

Buyer's Guide to Word Processing

# in Cider®

Green's Apple\* Magazine

## Print Out Your Season's Greetings

Troubleshoot Your System

Build Your Own \$20 Joystick



Plus: Three Great Educational Programs  
Number Crunching in Pascal  
Plot the Stars



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  - Pseudo-disk operations
  - Track buffering (p-System)

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- ETC MC68000 Assembler
- ETC MC68000 System Monitor
- ETC p-System (version IV) to Apple DOS Interface Utility

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- Apple DOS 3.3
- UCSD p-System (version IV) Interpreter—executes UCSD Pascal, FORTRAN-77 and BASIC P-Code
- UCSD Pascal **Now Included!**

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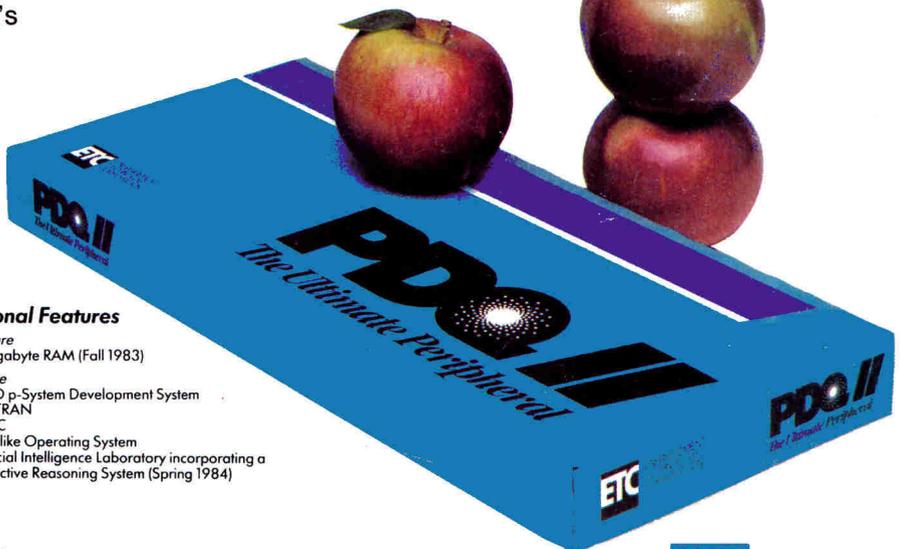
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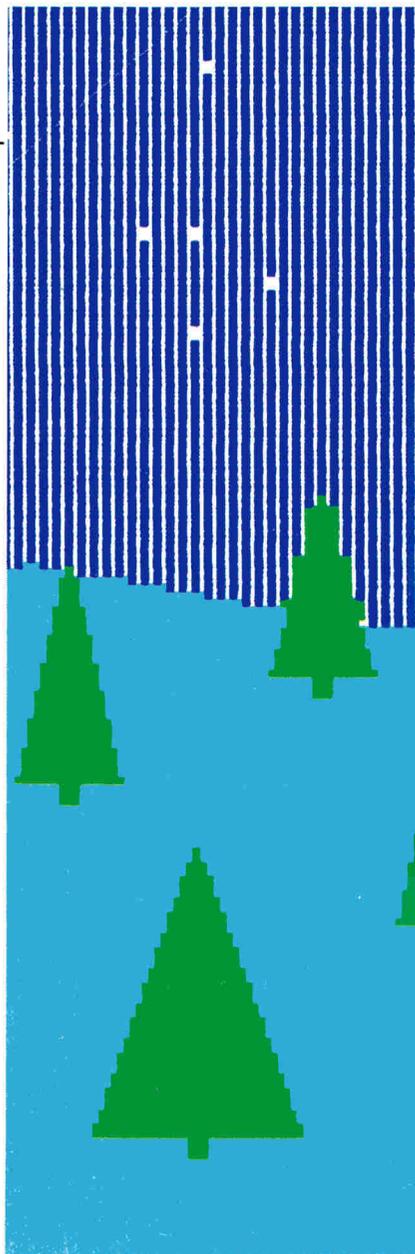
# PDQ II

*The Ultimate Peripheral*



### Optional Features

- Hardware**
  - 1 Megabyte RAM (Fall 1983)
- Software**
  - UCSD p-System Development System
  - FORTRAN
  - BASIC
  - Unix-like Operating System
  - Artificial Intelligence Laboratory incorporating a Deductive Reasoning System (Spring 1984)



Christmas Cards by Computer, p. 90

Cover art by Dan Collins

*inCider* is a member of the CW Communications/Inc. group, the world's largest publisher of computer-related information. The group publishes 42 computer publications in 18 major countries. Nine million people read one or more of the group's publications each month. Members of the publication group include: Australia: *Australasian Computerworld*, *Micro Magazine*; Argentina: *Computerworld/Argentina*; Brazil: *DataNews*, *MicroMundo*; Denmark: *Computerworld/Danmark*, *MikroData*; France: *Le Monde Informatique*; Germany: *ComputerWoche*, *MicroComputerWelt*, *PC Welt*; Italy: *Computerworld Italia*; Japan: *Computerworld Japan*; Mexico: *Computerworld/Mexico*; Norway: *Computerworld Norge*, *MikroData*; People's Republic of China: *China Computerworld*; Saudi Arabia: *Saudi Computerworld*; Spain: *Computerworld/Espana*, *MicroSistemas*; Sweden: *ComputerSweden*, *MikroDatorn*, *Min Hemdator*; United Kingdom: *Computer Management*, *Computer Business Europe*; United States: *Computerworld*, *Desktop Computing*, *HOT CoCo*, *inCider*, *InfoWorld*, *ISO World*, *Microcomputing*, *PC World*, *80 Micro*, *RUN*.

## ARTICLES

### 'Tis the Season to be Graphic **58**

Set a merry mood with these pleasing hi-res images.

by Maria DeMarco

### Toy Factory **66**

Seventh and eighth graders are not usually spellbound by the study of economics. Here's a program that turns an Apple into a model manufacturing plant, and in turn captures students' undivided attention.

by David P. Shields

### Formatted Lister **70**

Professional looking listings are yours with this handy utility.

by John J. Fedak and Jeffrey A. Mills

### Celestial Coordinates **76**

This astronomer shows how to calculate "setting circles," which help identify objects in the sky.

by Robert Suder

### The Apple As a Kid's Personal Tool **80**

Children are cleverly appropriating software intended for grownups. Recognizing this, some software manufacturers have begun making their products youth-friendly.

by Molly Watt

### Buyer's Guide to Word Processors **84**

Price is only one of many key factors to consider when shopping for a word processor. Learn what to look for in a word processor and then use the chart to locate the package you like best.

by Larry Strong and the *inCider* staff

### Christmas Cards by Computer **90**

Modernize an old Christmas tradition with a little help from your Apple.

by J.A. Mills and J.J. Fedak

### Build Your Own Joystick **96**

If high price tags have forced you to postpone the purchase of a joystick, here's an inexpensive alternative.

by George M. Engel

### A Simple Write Protect Indicator for the Apple II **100**

Write protect tabs don't always do what they're supposed to do. The result: disktruction. The alternative: *inCider's* easy-to-build write protect indicator.

by Richard Green

### List Manager (review) **102**

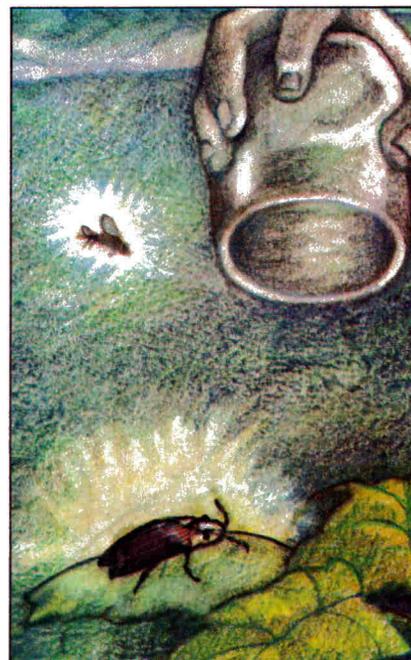
It's not inexpensive, but it certainly is dandy for data and an able labeler, too.

by Gregory R. Glau

### Using Every Bit of Your Memory **108**

Next time you run out of memory space, try solving the problem with your programming skills—not your checkbook.

by Peggy Burnett



Firefly Frolic, p. 148



Celestial Coordinates, p. 76

## System Security **117**

Don't lose your Apple to some two-bit crook. Anti-theft devices will foil even the most determined robber, and fans and surge suppressors will help keep your data safe from the elements.

by *M. Andre Little*

## Number Crunching in Pascal **125**

Boiling down masses of data into meaningful statistics is a critical step in doing research. Here are matching Pascal and Basic programs for getting useful numbers.

by *James R. Florini*

## A Type Command for DOS **140**

Here's how to arm Apple DOS with an important command. Now you can output text files quickly and easily.

by *William G. Wright*

## Firefly Frolic **148**

This whimsical game uses fireflies to shed light on number recognition for kids.

by *Douglas and Laura Werner*



The Apple As a Kid's Personal Tool, p. 80

## Match 'Em **156**

Recreate one of television's most durable game shows "live" on your Apple. A complete program listing is included.

by *Robert R. Devine*

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# Hot Cider



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Peterborough is one of the nicest places in the world to live. That's one of the reasons I came up here in the early days of 73 magazine. New Hampshire, for that matter, is one of the best states you'll ever find. It's uncrowded, populated with fiercely independent and friendly Hampshiresmen. And an increasing number (but not too many) of newcomers have decided they want to live the good life. There's no sales tax, no state income tax. It's the home of the Town Meeting, where everyone and anyone stands up and helps decide how things should be run.

But back to Peterborough. It's one of the prettiest areas I've ever seen—rolling hills covered with trees that in the fall take the area from just pretty to outright beautiful. You've probably heard of fall foliage tours: People from all over the country pay considerable sums to visit this area to see the stunning red and gold spectacle of the turning leaves as winter approaches. We live right in the middle of all that. The town itself is just small enough to be friendly and just large enough to have all the shops and services anyone needs. A lot of the locals have breakfast every morning at a little place in the middle of town that doesn't even have a sign, except for an old plaque on the door that says "Forest Fire Warden." It's a sort of social event, breakfast. There are good restaurants, with signs and names, but there isn't a fast-food place for at least ten miles in any direction, thanks be.

The town is awash with great buildings, from a relatively new town center brick complex where the Post Office is located to dozens and dozens of homes that are recognized as some of the most interesting and attractive buildings in New England. History is here in the area, and not just Revolutionary War history. Our

library, for example, is the first tax-supported public library established in the United States. Thornton Wilder's *Our Town* was inspired by Peterborough, and the famous MacDowell Artist's Colony is just a few miles from the town center.

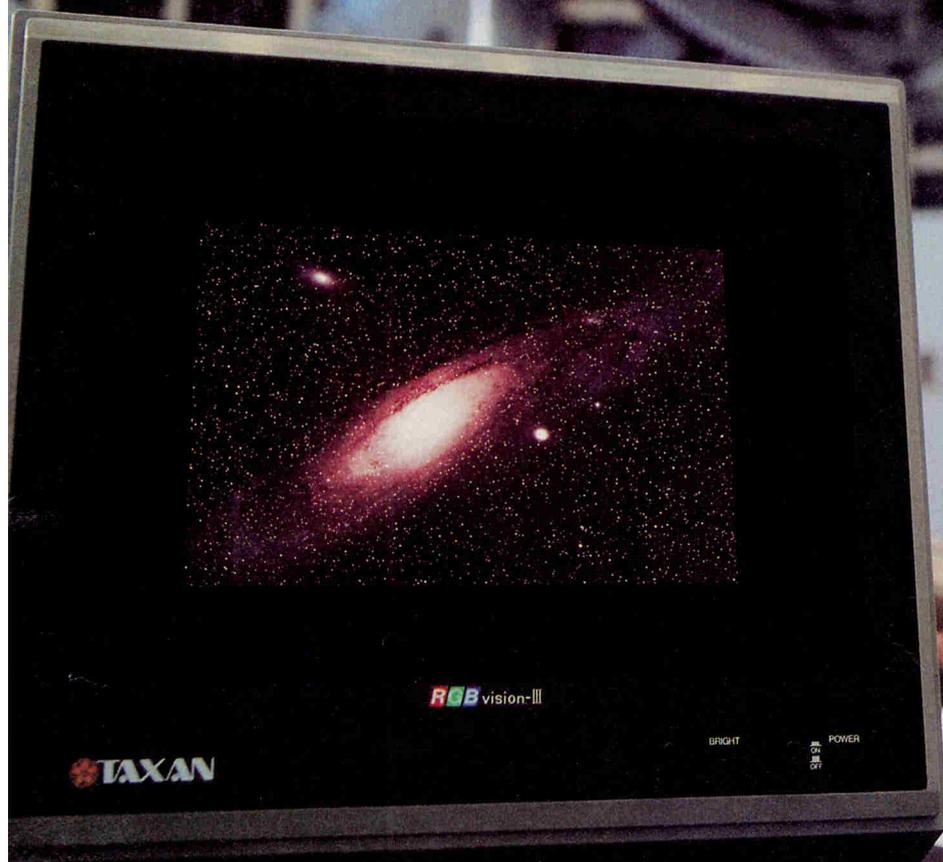
I think you begin to get the picture. But just a few more points: Peterborough is the home of two of the three biggest magazines in the country (both of which I started); of Brookstone, probably the world's largest mail-order tool specialty company; and of the New England Business Service (NEBS), which provides business forms for a substantial number of the small businesses in the country. Their headquarters are in an attractive industrial area just north of town, and they all contribute to the economy and sophistication of the area.

Speaking of those two big magazines, you might have snickered a bit back in the sixties if someone had told you little Peterborough was going to be a major publishing center. Well, it is now. And a few years from now, you're going to be hearing that some of the hottest, fastest-growing and most interesting new businesses are centered in Peterborough. People are beginning to join us in our new efforts from all over.

If all of this doesn't make you rush to drop us a line about yourself and how badly you want to come up to one of the best little towns in the world—to join us in the beginning of one of the most exciting new batches of enterprises going—too bad for you. We're going to have a wonderful time, working like slaves, living like people, and making a lot of money. ■

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*The editors who bring you inCider every month recently took off for a morning in Barry Orchards. It was cider time in New Hampshire, and time to celebrate a year well spent. We recorded the event for posterity, and for the benefit of all our readers who like to connect a face with a name. In the rear, from left to right, Jeff, Joan, Peg, Sam and Bob; in front, Paul, Linda and Tom.*

December marks the first full year of *inCider*, a year in which the magazine has grown in size and quality. Much as the editors would like to take the credit, truth is that *inCider's* readers have been the guiding force. You asked how to get the most from your Apple, and then you sent us answers.

You told us how your computer enriches your life, and you shared games, puzzles and programming insights for others to enjoy. When you asked for more product reviews, we set to work to review the widest possible selection of software and peripherals.

In this issue you'll find a quick-reference guide to dozens of popular word processing programs, as well as an overview of security systems. Games and simulations provide learning and fun for your family, and Molly Watt helps put educational computing in perspective. For talented folks who like to tinker, the mod-

est hardware projects will be easy to complete. And for those of you preferring program code to circuit boards, *inCider* remains a prime resource.

If you have dared to venture beyond Basic, you'll discover a powerful tool in Jim Florini's "Number Crunching in Pascal."

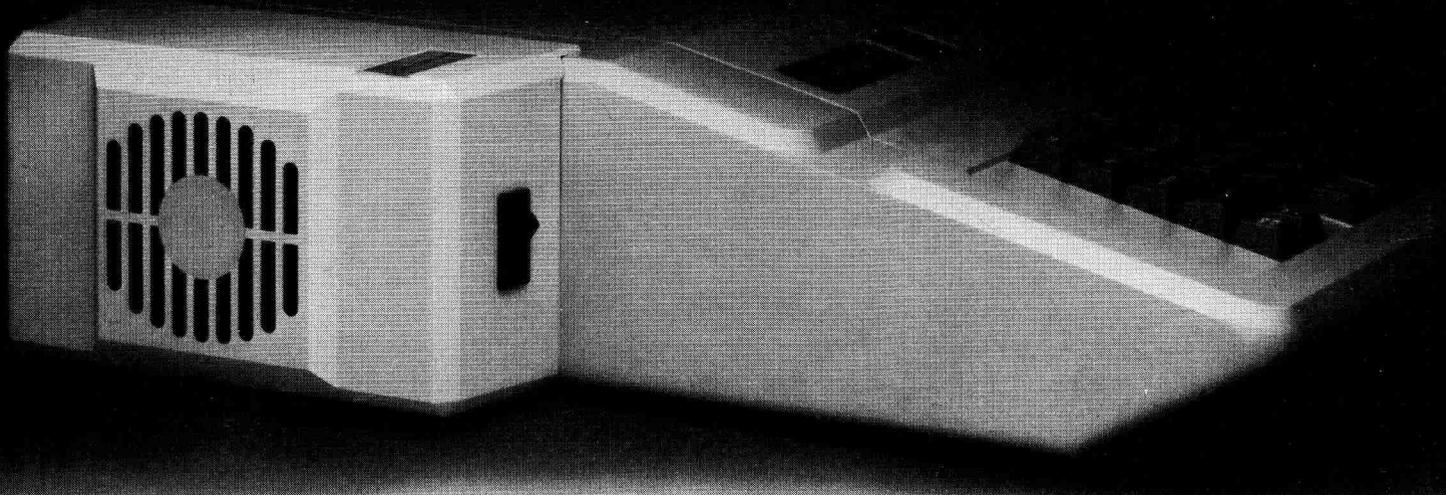
Peggy Burnett reveals tricks for "Using Every Bit of Your Memory," an article sure to be of value even if you have a massive 64K to tunnel around in. And of course, we wouldn't dare present a December issue that didn't contain holiday spirit! Please enjoy our two Yuletide offerings, and share them with your friends.

So thank you, *inCiders*, for helping us grow; keep those cards and letters coming. And don't miss next month's issue, when we'll be reporting on Apple users who have parlayed their computer skills into lucrative home businesses. ■

—LS

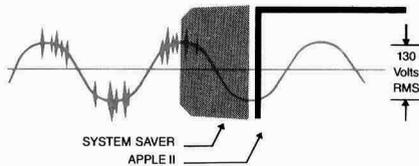
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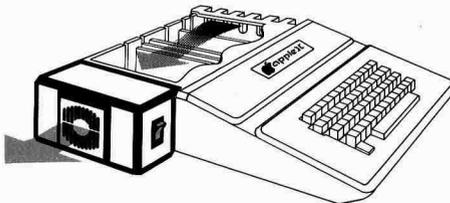


By connecting the Apple II power input through the SYSTEM SAVER, power is controlled in two ways: 1) Dangerous voltage spikes are clipped off at a safe 130 Volts RMS/175 Volts dc level. 2) High frequency noise is smoothed out before reaching the Apple II. A PI type filter attenuates common mode noise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

## For Cooling

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

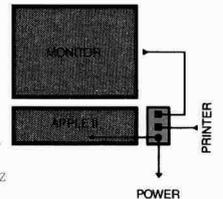
Today's advanced peripheral cards generate more heat. In addition, the cards block any natural air flow through the Apple II creating high temperature conditions that substantially reduce the life of the cards and the computer itself.



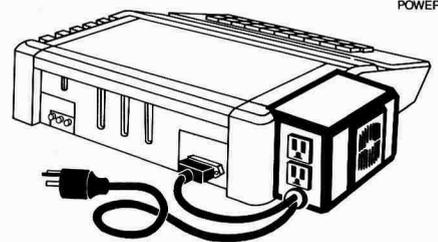
SYSTEM SAVER provides correct cooling. An efficient, quiet fan draws fresh air across the mother board, over the power supply and out the side ventilation slots.

## For Operating Efficiency

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



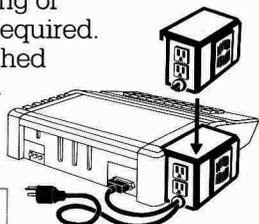
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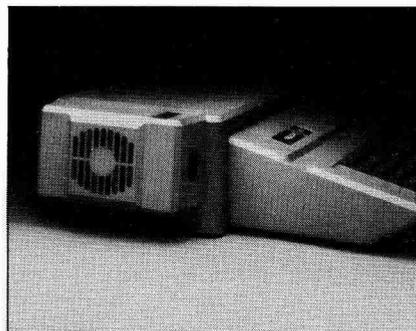
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# Fermentations

by Tom Woods  
inCider staff

## The Shakeout

**T**he new year is almost here, but 1984 will hold few promises for many of the 150 companies that are jockeying for position in the overcrowded microcomputer industry.

In September Osborne Computer Corporation filed for protection under the federal Bankruptcy Code. Although most industry analysts agree that Osborne's demise was a result of poor judgment and management and not of competitive market pressures, few speculate that there will be more than a handful of major players in the industry in the next two years.

In a recent article in the *Boston Globe*, Chris Christiansen, an analyst with the Yankee Group, a Boston market research company, predicted that Apple, IBM, Tandy, Wang, Digital and Hewlett-Packard would be the only serious makers of microcomputers in two years' time.

"The market is no longer as forgiving as it once was," said Mitchell Kapur, President of Lotus Development Corporation, at the CP/M East show last October. "Today, you have 150 manufacturers, each of whom expects to sell 100,000 machines next year, but common sense says that the total market for desktop computers for 1984 is not 15 million units."

Although a major shakeout was anticipated by many in the industry, it was not expected to occur so rapidly. In an October issue of *Business Week*, Steven Jobs was quoted as saying, "The shakeout of 1985 is happening now."

The shakeout has to be considered

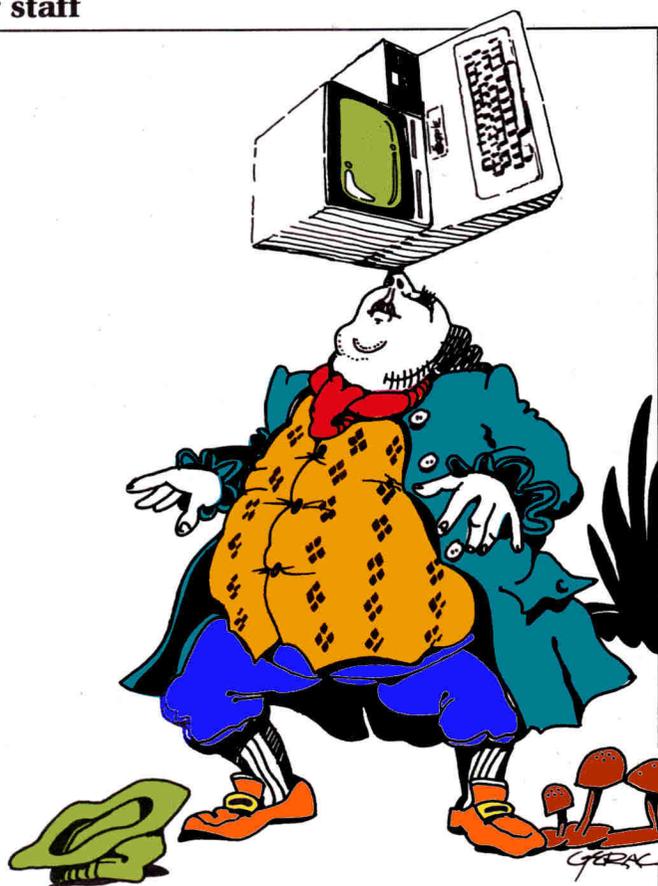
the fourth major event in the short history of the industry. Apple Computer became the pioneer of the industry in 1977 with the introduction of the Apple II. Two years later, a second major event—the introduction of VisiCalc—gave the personal computer legitimacy in the world of business. And corporate America became even more aware of the potential of microcomputers two years ago following the third major event—the introduction of the IBM PC.

There is much talk in the industry and in the press that the battle between IBM and Apple is over and that IBM is the clear winner. To deny that IBM is and will be a major force in the microcomputer industry is foolish. But don't count out Apple yet. "It is entirely premature to believe that Apple will be anything less than a major and significant player," said Mitchell Kapur.

Although Apple won't hold its number 1 position in the industry, its

sales are expected to reach 1 billion this year. The price of the Lisa has been cut 18 percent to compete with the IBM PC. And according to Apple's Renee Olsen, Apple is working on MS-DOS compatibility for Lisa as well as software that will enable the machine to exchange information with IBM mainframes. Apple also plans to add some of Lisa's features—most notably the mouse—to an enhanced version of the IIe.

So what does the shakeout mean? To IBM and Apple, it means a battle for supremacy. Clearly, Apple is devising a strategy to combat IBM, and although IBM appears to have won early battles, the war is not yet over. But to the industry at large, the downfall of a hundred or so smaller companies in the next few years may, in fact, dampen an innovative spark not unlike that which fueled the development of the first mass marketed microcomputer—the Apple II. ■



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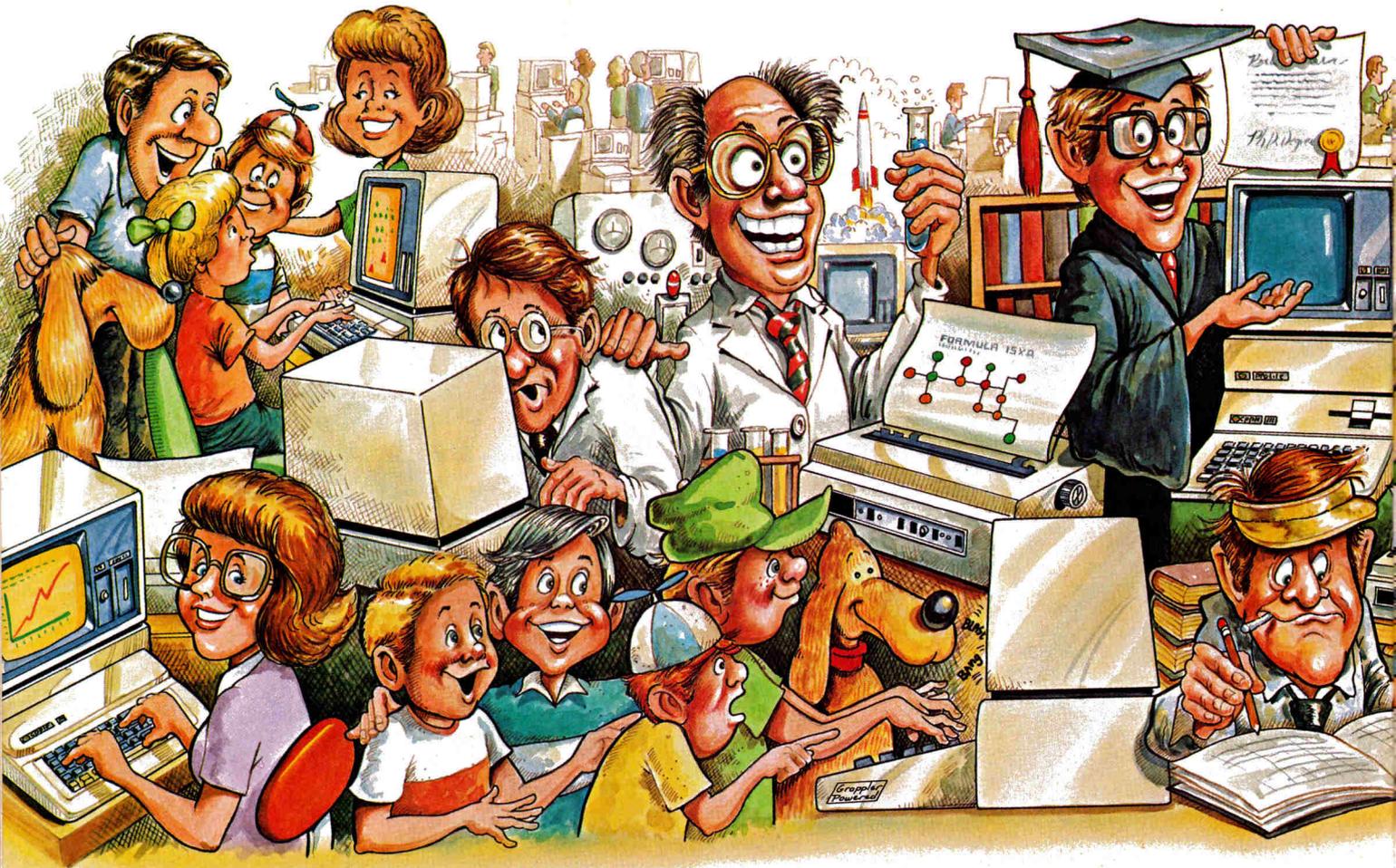
# COMPUTRONICS

50 N. PASCACK ROAD, SPRING VALLEY, N.Y. 10977

\* TRS-80 is a trademark of the Radio Shack Division of Tandy Corp. • \*APPLE is a trademark of Apple Corp. • \*IBM is a trademark of IBM Corp. • \*OSBORNE is a trademark of Osborne Corp. • \*CP/M is a trademark of Digital Research • \*XEROX is a trademark of Xerox Corp.

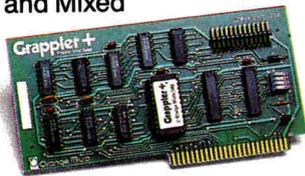
Circle 66 on Reader Service card.

# Satisfying Over With Innovation



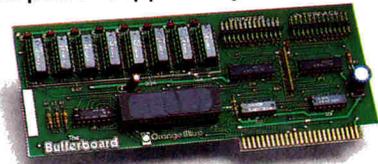
## Grappler<sup>TM</sup> + Printer Interface

The Original Apple<sup>®</sup> graphics printer interface. Since its introduction three years ago, the Grappler has been imitated by many, but never matched. Now with Dual Hi-Res Graphics for side by side reproductions and Mixed Mode screen dumping, the Grappler + remains the most intelligent interface available. Over two dozen commands give Apple users full control over any graphics or text on the Apple screen, including a new 80 column text dump. Performance, reliability and support have made the Grappler + the #1 selling intelligent Apple interface.



## Bufferboard<sup>TM</sup> For Apples and Printers

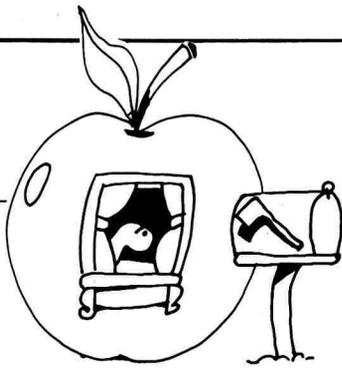
The economical way to add printer buffering. The Bufferboard easily adds memory to your current Apple interface system, freeing your computer for additional input. Easily upgradable from 16K, the Bufferboard can store up to 20 pages of text. It fits neatly inside your Apple, "docking" onto your existing printer interface.\* No clumsy boxes or cables, no external power supplies... just convenience and economy. With the Bufferboard, you might never wait for your printer again.



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



# Letters



## Apple and APO Go Well Together

This letter addresses the issue discussed in your August Letters column concerning mail order sales to APO/FPO locations.

I was in the mail order business between 1967 and 1972 and since then have been employed by the U.S. Departments of State and Commerce overseas. Mr. Lazear's letter evidences a misunderstanding of APO/FPO ground rules common to most small and many large mail order firms. He should seek a briefing from APO officials (in New York, San Francisco, Miami or Seattle) and obtain a list of APOs and the rules that apply to each.

Parcels sent to APO/FPOs (and to CFPO Belleville, Ontario, the Canadian equivalent, or BFPO, the United Kingdom equivalent) are subject to (1) the Status of Forces Agreement with the destination country *or*, if addressed to an American embassy or consulate, the diplomatic convention (usually the Vienna Convention), and (2) postal size and weight limits that may apply, usually because of special circumstances.

I know of no country that prohibits active duty U.S. government officials and military personnel from receiving U.S. goods. Parcels not marked "Contents for Official Use—Exempt from Customs Declaration" and not addressed to a diplomatic official (exempt, by the nature of his assignment, from certain customs formalities) may require a postal customs declaration sticker.

A number of countries deny some or all APO privileges to retired military personnel or to unaccompanied dependents. A few may assess duty on goods received by retired military personnel. In neither case does this involve the shipper in anything more onerous than filling out a customs sticker.

Export packing is not required for APO/FPO shipments, although shippers would be well advised to pack fragile merchandise carefully.

There is, however, no justification for an *ad valorem* charge for APO/FPO. Sears, Roebuck and Company, in my experience the most sophisticated shipper to diplomatic/military customers, charges \$1 extra for documentation and packing. My old employer charged nothing extra, except on goods sent by air freight, outside of military channels or, for CFPOs, by transfer from New York to the nearest Canadian post office.

Now that I am an APO customer (or was, until my recent transfer to Algiers) I simply refuse to do business with firms that won't take the trouble to learn what's involved. There are even firms which fail, or refuse, to recognize that APO/FPO customers are exempt from state sales taxes. Likewise, they are exempt from U.S. customs duty on goods originating outside the customs territory of the U.S. (the Virgin Islands, for example). The same goes for State Department personnel abroad, although diplomatic pouch customers have one advantage: Unlike APO/FPO, they are served by UPS.

APO/FPO officials are extremely cooperative with mailers and are bound to be better informed than the average local postal clerk who must look up requirements for each individual APO or FPO in the Postal Manual.

**Andrew Grossman**  
Algiers, State Department  
Washington, DC 20520

In response to Mr. Lazear's letter, I can only say, "I don't buy this shipper's bill of goods."

In addition to my Apple computer, disk drives and Japanese-made printer, I have also received hundreds of software items through my APO. None of these required or received any special packing beyond that necessary for shipment to New York.

Yes, there is special documentation required: the U.S. customs declaration. I get mine free from any post office. Once you have this form it takes less than a minute to fill out. It is my opinion that if a business values my patronage then it can grant me that minute.

For those of you in the mail order business, take heart. It's true, many of the GIs stationed overseas are frightened by their strange surroundings, tired of abuse by the people they serve and lonesome for their friends and families. They are by no means, however, stupid. They spend a great deal of their well-earned money on diversion. And right now, computers are beginning to catch on with service members. If you choose to discriminate against this market, that's your bad business.

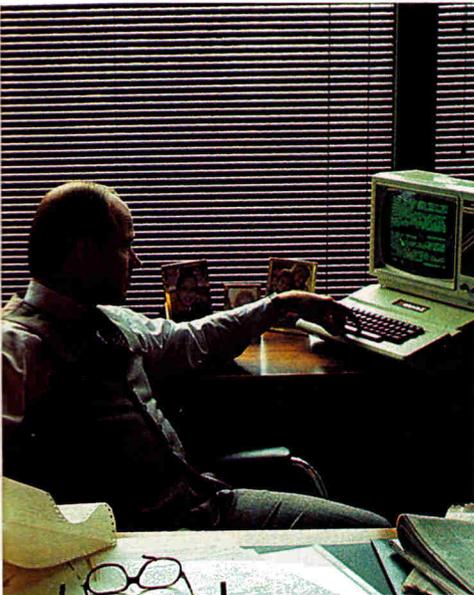
**Robert Zylka**  
2184CS, Box 2239  
APO New York, NY 09109

I would like to comment on Mr. Lazear's attempt (August Letters) to justify 10 to 15 percent surcharges to APO customers. Mr. Lazear states that some countries will not allow military members to import American products. I am currently stationed in Germany and in the past have been stationed in Korea; neither country has any such restriction. In fact, I know of no APO with that restriction.

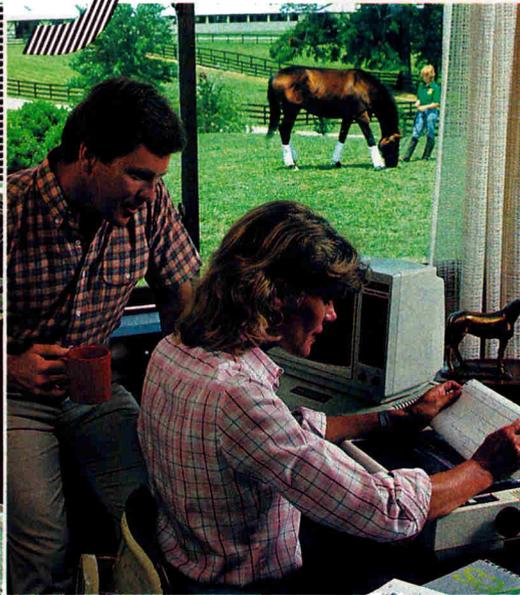
Customs declarations are required, but soldiers are not charged duty on products imported for their own use. Even if they were, what does the shipper care? It does not add to his costs.

Mr. Lazear next defends the surcharge as being a legitimate cost for product packaging and documentation, meaning, I suppose, the customs declaration. I do not understand this. I do a lot of mail ordering and I have not yet received a damaged item through the mail. Further, I have yet to see any special effort at packaging. In fact, Sears sends many of my orders in paper bags. The customs dec-

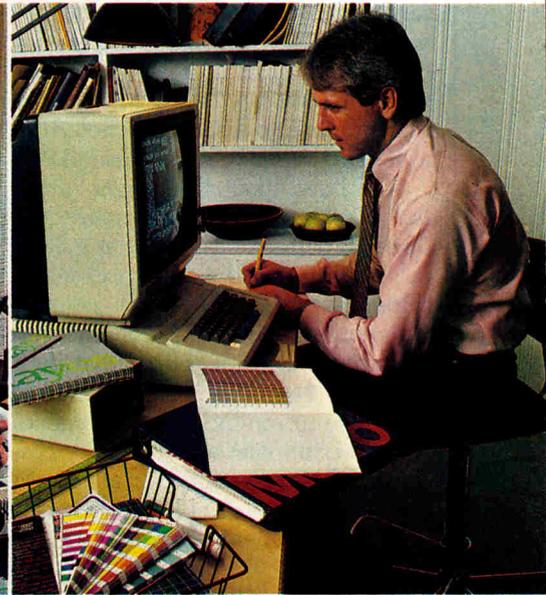
# Your Apple's telephone. Hayes



"Thanks for the prompt reply. Sure was a lot faster than waiting for the mail!"



"Gary: The pedigrees for next week's auction are as follows..."



"Attn. Prod., Sales, Purch.: Recommend 50% blue, 30% red screen for closest match!"

**A complete plug-in communications system for Apple® computers.** From Hayes, the established telecomputing leader: the simple but sophisticated Micromodem II™ plug-in board modem and its companion software, Smartcom I™. Everything you need to expand the world of your Apple II, IIe, II Plus and Apple III. In one, convenient communications package.

With Micromodem II and Smartcom I, you can access data bases, bulletin boards, and the varied resources of information services. Plan your travel itinerary via computer, including flight numbers, hotel and rental car reservations. Retrieve and analyze daily stock and options prices. Work at home and send reports to your office. You can even do your gift shopping by computer!

**Micromodem IIe. Think of it as your Apple's telephone.** It allows your computer to communicate with any Bell-103 type modem over ordinary telephone lines, at 110 or 300 bits per second. Micromodem IIe installs easily in an expansion slot, and requires no outside power source. It connects directly to either a single or multiline modular phone jack, to perform both Touch-Tone® and pulse dialing.

Micromodem IIe dials, answers and disconnects calls automatically. And, unlike some modems, it operates in full or half duplex, for compatibility with most time-sharing systems.

A built-in speaker lets you monitor your



calls when dialing. That way, you'll know if a line is busy. With Smartcom I, Micromodem IIe automatically redials your last number.

Discover how Micromodem IIe can help maximize the capabilities of your Apple. While Smartcom I software will minimize your efforts.

**Smartcom I companion software. For effortless communications.**

Whether you're a newcomer to personal computing or a seasoned professional, you'll appreciate the ease and speed with which you can perform any communications function. Thanks to Smartcom I!

Let Smartcom I guide you through a few easy-to-answer questions to tailor the program to your particular needs. Then you're ready to go!

Make a selection from the Smartcom I menu to manage your communications, files or printer. Program prompts guide you along the way. And menu selections let

you easily make a call, end a call, or answer a call. When you're on the receiving end, your Micromodem IIe answers automatically, even if you're not there!

Convenient! And so is the Smartcom I memory for phone numbers. Smartcom I stores three of your most frequently called telephone numbers and one prefix. Plus, it also remembers the last number dialed.

Smartcom I also provides a directory of the files stored on your disk. And lets you create, list, name, send, receive, print or erase files right from its menu.

Smartcom I is as versatile as you need it to be. It accepts DOS 3.3, Pascal, CP/M™ 3.0 or CP/M Plus™ operating systems. And accommodates up to six disk drives and several printer interface cards.

Like all our products, Smartcom I and Micromodem IIe are backed by excellent documentation and full support. Including a two-year limited warranty on Micromodem IIe and a 90-day warranty on Smartcom I!

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Micromodem IIe and Smartcom I are trademarks of Hayes Microcomputer Products, Inc. Apple Computer is a registered trademark of Apple Computer, Inc. Touch-Tone is a registered trademark of American Telephone and Telegraph. CP/M is a trademark of Digital Research, Inc. CP/M Plus is a trademark of Advanced Logic Systems.

laration takes one minute to fill out, although some smart companies have simply overprinted them.

Postage costs are based on the distance to the APO city and on the weight of the item shipped. I do not understand how a California-based company can say that it costs just as much to mail to a San Francisco APO as it does to mail to a New York APO.

And how about the weight of the item being shipped? Compare the same 15 percent surcharge on a \$300 color monitor and a \$300 package of software that weighs two pounds. Companies using the surcharge system would have us believe that both items cost \$40 to package and mail.

I'd like to remind those companies that discriminate against APO customers that eventually we all return to the States and are likely to remember how we were treated.

Thomas R. McDowell  
HHC 1st Spt. Bn.  
APO New York, NY 09137

### Foiling Pirates

I found the article entitled Zip-Lock (September) very clever, but I have a simpler method. A similar effect could be achieved by poking 128 (\$80) into memory location 214 (\$D6). This will cause the computer to interpret every statement typed in as RUN. Unfortunately, this only works if the program has been run. A clever pirate could very simply boot another disk and then load and list the program. If you have an answer to this problem, I would greatly appreciate hearing about it.

Joshua Smith  
18185 North Territorial Road  
Chelsea, MI 48118

### It's in the Manual

In the August Hints 'n' Techniques column Marc Dodson asks how to find control letters entered in program names. The DOS manual has a

program on page 151 that will do just that. An easier option is to catalog the disk in question from within the Apple Writer II, which will print the control characters.

Walt Hamilton  
Rt. 2, Box 66  
Central City, NE 68826

### The Accountant Talks Back

Your October issue contained a review of Decision Support Software's financial management system, The Accountant. Although the review was favorable, the "see Spot run" tone assumed that many of your readers were novices with written English instead of perhaps novices with personal computers. The reviewer, Gregory Glau, appears to have neglected the true interests of your readers while trying to be folksy with his mythical character, Tracy. This is reflected in such statements as, "Tracy bought The Accountant so she'd have an answer to all those 'Well, your Apple is so nice, but whatever do you do with it, dear?' questions."

Mr. Glau wrote that the VisiCalc interface "has promise." This interface is extremely flexible and powerful. An example supplied with the interface illustrates how estimated taxes can be quickly calculated by extracting information from The Accountant's database and using it with a VisiCalc tax form template (a VisiCalc tax form is supplied with the optional VisiCalc interface). Yet Mr. Glau admittedly avoided this very meaningful example in the manual.

Many reviews fail to address a very important aspect of computer software: performance. If a system is user friendly and easy to learn but is nonetheless slower than doing the task by hand, is it worth using? To Mr. Glau's credit, he did address performance, e.g., speed of retrieval. But he did not do the subject justice. He did point out that a search for 43 automobile transactions in a database of 409 transactions takes The

Accountant about three minutes and 50 seconds without pointers, but only 15 seconds with the pointers. This demonstrates the significant improvement in performance of The Accountant using the optional pointers, but it does *not* give your readers any sense of how fast this really is when compared to other Apple software that handles large amounts of data. I encourage you to publish performance statistics for competing products.

Mr. Glau expressed surprise that when he entered a transaction representing a MasterCard payment the interest was not automatically computed. Did Mr. Glau expect The Accountant to mysteriously know how much the MasterCard interest charge would be? He finally did realize that the interest charge must be posted as well and concluded that "It's to The Accountant's credit that finance charges can be handled two different ways." His explanation would have been more meaningful if it had included a discussion of how a transaction can be split (into as many parts as desired) and how the desktop calculator can be used, even in the midst of entering a transaction, to assist in calculating such things as interest charges.

Mr. Glau conjectured that The Accountant is "probably too primitive to use as a business application because it can't print statements or aging reports." This is nonsense. True, The Accountant is designed for personal financial management. Nevertheless, it already has widespread use in business as well.

Mr. Glau's bottom line conclusion missed the whole point of a review. He said that *if* "...you want to see what you're spending your money for, and are willing to spend a bit of time to record that information, The Accountant will do the job for you." Whom did he think would be interested in reading the review, if not those interested in just that?

Ernest H. Forman, DSc.  
Decision Support Software  
1438 Ironwood Drive  
McLean, VA 22101

# Apple® à la Modem

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It's an amazing modem called **THE OPERATOR™**.

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- 110/300 baud • full & half duplex • auto answer with disconnect • rotary, touch-tone™, key set compatible • totally self-contained (no RS-232 required) • single modem chip reliability • interfaces with most communications packages.

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# Plain talk about printers...

## Dot Matrix Printers

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

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

EPSON

## FX, RX & MX



The **FX-80** features 160 cps, a correspondence font, 10, 12 & 17 cpi, italics, double-strike/width/emphasis, etc., dot graphics, friction/pin feed (the adjustable tractor is optional) & a 2K buffer. The 256 programmable characters use the 2K buffer space. The **FX-100** is the 136 column version & includes an adjustable tractor.

The **RX Series** replaces the M X, & offers 100 cps print speeds, but nothing more remarkable.

RX-80.....	<b>\$389.88</b>
MX-80 F/T.....	<b>\$469.88</b>
MX-100.....	<b>\$659.88</b>
FX-80.....	<b>\$569.88</b>
FX-80 Tractor.....	<b>\$39.88</b>
FX-100.....	<b>\$749.88</b>

C. ITOH

## Prowriter

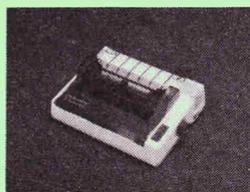


C. Itoh's venerable **Prowriter** has speed (120 cps), a buffer (1.5K), 10, 12, & 16 cpi (plus a proportional font with correspondence quality) and dot graphics (160x144 dpi). One of our biggest sellers. The **Prowriter 2** has the same specs, but in a 136 column format.

Prowriter.....	<b>\$399.88</b>
Prowriter 2.....	<b>\$719.88</b>

STAR MICRONICS

## Gemini 10X/15

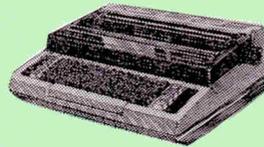


The **Gemini 10X** features 120 cps, 10, 12, 17 cpi, italics, a corres-

## Smith-Corona Memory Correct III Messenger

Here's the printer you've been waiting for. The Smith-Corona **Memory Correct III Messenger** is ideal for the home or small office. It combines the features of an electric typewriter **and** a letter-quality printer. And it's designed to handle both jobs with ease.

Features 12 cps, 3 pitches (10, 12 & 15), variable line spacing, 10.5" writing line, backspacing & auto-correction. Comes complete with parallel/serial interface.



Memory Correct III Messenger ..... **\$629.88**

pondance font, 120 x 144 dpi graphics matrix & a 1K buffer. **Gemini 10X's** comes with friction/tractor feed & use plain spool ribbons. The **Gemini 15** is the 132 column version, & it has a proportional font.

Star's **Delta 10** features both parallel & serial interfaces, 160 cps print speed, an 8K buffer, plus all of the Gemini 10X fonts.

Gemini 10X.....	<b>\$309.88</b>
Gemini 15.....	<b>\$459.88</b>
Delta 10.....	<b>\$529.88</b>

OKIDATA

## Microline Series



The **Microline 92** (80 col) & **93** (132 col) are ideal for word processing. They offer a 160 cps draft mode, a 40 cps correspondence mode, 10, 12 & 17 cpi (w/double-width), pin/friction feed (tractor is optional on the **92**) & dot-addressable graphics (120 x 1444). Centronics parallel interface is standard; the serial (RS-232C) interface is optional.

The **Microline 82A** (80 col) & **83A** (132 col) are data crunchers, period. They print 120 cps, at 10 & 16 cpi (5/8 double-width). Dot-addressable graphics are optional.

The **Microline 84** (132 col) is the Step 2 version, featuring 200 cps at 10, 12, & 17 cpi (w/double-width), all with a correspondence mode & dot addressable graphics. Parallel or serial (RS-232C) interfaces available.

Microline 82A.....	<b>\$389.88</b>
82A/92 Tractor.....	<b>\$59.88</b>
Roll Paper Holder.....	<b>\$49.88</b>
Microline 83A.....	<b>\$599.88</b>
82A/83A Okigraph 1.....	
Graphics ROM.....	<b>\$49.88</b>
Microline 92.....	<b>\$459.88</b>
Microline 93.....	<b>\$759.88</b>
92/93 RS-232C Interface.....	<b>\$99.88</b>
Microline 84.....	<b>\$1024.88</b>
w/RS-232C Interface.....	<b>\$1139.88</b>

MANNESMANN TALLY

## MT-160 L



The **MT-160 L** is the newest of the correspondence quality printers. It has speed (160 cps), 8 fonts, parallel & serial interfaces, friction/tractor feed, & menu-driven installation for easy set-up from the control panel—no more digging around for the 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. A new, low cost draft printer, the **Sprite**, is also available.

MT-160 L.....	<b>\$669.88</b>
MT-180 L.....	<b>\$849.88</b>
MT-Sprite.....	<b>\$329.88</b>

We sell other dot matrix printers, including the **Anadex WP-6000**, **DP-9501**, **DP-9620** & **DP-9625** & **IDS's Prism 80**, **Prism 132** & **MicroPrism**, & the **Inforunner Riteman**. You can call **(603) 881-9855** for technical details. For prices, or to order, call **(800) 343-0726**.

## Letter-Quality Printers

C. ITOH

## Starwriter



The C. Itoh **Starwriter** offers top speed at a good price. **Starwriter** uses Diablo code, wheels & ribbons, has a 40 cps print speed, 1/48" line space, 1/120" horizontal spacing—ideal for proportional modes. (For

real speed freaks, there's the **Printmaster**, at 55 cps. Same specs as above.)

Starwriter Parallel.....	<b>\$1219.88</b>
Printmaster Parallel.....	<b>\$1569.88</b>

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 1610/1620 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 12 cps (80 col) is available as well.

EXP-550.....	<b>\$669.88</b>
EXP-550 Tractor.....	<b>\$139.88</b>
EXP-500.....	<b>\$469.88</b>

We sell a variety of other letter-quality printers, including the **Comrex ComRiter**, **Diablo 620 & 630**, the **NEC 3530 & 7730**, the **Qume Sprint 11**«, the **Smith Corona TP-1 & 2**, plus many others. Call **(603) 881-9855** for technical details. For prices, or to order, call **(800) 343-0726**.

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\*, Ok data 80/90 Series & Centronics Series.

Pkaso Interface.....	<b>\$139.88</b>
*IDS Prism (Color).....	<b>\$159.88</b>

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 «.....	<b>\$149.88</b>
Bufferboard (16K).....	<b>\$149.88</b>

APPLE COMPATIBLE

## Parallel Card

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

Parallel Card.....	<b>\$89.88</b>
--------------------	----------------

## 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...

NEC

### JB-1205M



Slick design and specifications for an amber monitor, NEC's **JB-1205M** has an 18-20 MHz bandwidth and a crisp, clear amber display. Standard 80 column by 24 line (12" diagonal screen). The **JB-1201** is the green screen version.

**AMDEK**  
300 (12" green) ..... **\$149.88**  
300A (12" amber) ..... **\$159.88**  
Color I\* (Com) ..... **\$319.88**  
Color II (RGB) ..... **\$649.88**  
Color III (RGB) ..... **\$379.88**

USI

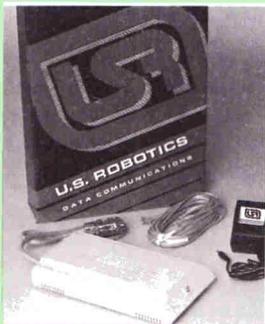
Pi-2 (12" green) ..... **\$159.88**  
Pi-3 (12" amber) ..... **\$189.88**  
Pi-4 (9" amber) ..... **\$159.88**

## Modems

Internal? External? 300 baud? Or 1200? 1200 baud makes sense if you're on-line during the day. If you're on-line late at night, 300 baud may be all you need. As always, research this stuff **before** you buy.

US ROBOTICS

### Password



The **Password** is a direct connect originate/answer type modem with 0-300 & 1200 baud capability (Bell 212A compatible). Features include auto dial/answer, auto mode/ speed select, full/half duplex (local echo), DTR override, RS-232C pins 2 & 3 reversible & audio phone line monitor. Comes with an RS-232C cable, power supply & modular cable.  
Password ..... **\$379.88**

## AMT Micro Drive 1

**\$199.88** UPS DELIVERED

AMT's **Micro Drive** is an Apple-compatible floppy disk drive that features a TEAC direct-drive mechanism. There are 16 sectors per track (48 tracks/inch), with a total capacity of 140K bytes. Track access time is 6 milliseconds at 300RPM, with an impressive Mean Time Between Failure of over 8000 hours. Direct drive mechanisms eliminate wheels and belts, giving you precise timing and consistent performance over the life of the drive. An impressive and compact package.  
AMT MicroDrive ..... **\$199.88**



DC HAYES

### Micromodem II

The **Micromodem II** is an originate/answer, auto dial/answer, full/half duplex internal modem for the Apple/Franklin systems. It includes a communications package, modem board, cables and complete documentation. A superior product.  
**Micromodem II** ..... **\$309.88**

DC HAYES

### Smartmodems



The **Smartmodems** are originate/answer, auto dial/answer, full/half duplex modems. There are two external modems (300 & 300/1200 baud) and the **1200B** (300/1200 internal for the PC) that includes the Softcom II software. Modular phone cable & power supply included. (RS-232C cable is optional).  
**"Stack" Smartmodems**  
300 baud ..... **\$219.88**  
300/1200 baud ..... **\$539.88**  
**Internal Smartmodem**  
1200B w/Softcom II ..... **\$459.88**

NOVATION

### AppleCat II

The **AppleCat II** is a 300 baud originate/answer, auto dial/answer, full/half duplex internal modem for the Apple/Franklin systems.  
**AppleCat II** ..... **\$319.88**

NOVATION

Smartcat (300 baud) ..... **\$199.88**  
Smartcat (1200 baud) ..... **\$499.88**

MPI

RS-232C Card ..... **\$99.88**

MICROSOFT

### Premium Pack

The Microsoft **Premium Package** includes 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 64K RAM (Franklin, for example), get the Z80/Softcard Combo. Same spec's, but **without** 16K RAMcard.  
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**

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

### UltraTerm

The **UltraTerm** 80-column card gives you up to 160 columns as well as an 80-column display on the Apple/Franklin, with upper/lower

case. It's great for spreadsheets, word processing, or any application where 80 columns isn't enough. New video enhancements make it an exceptional package.  
UltraTerm ..... **\$304.88**

VIDEX

### Enhancer II

Apple keyboard enhancer: type-ahead buffer, repeat, shift/cap lock, programmable keys, full ASCII (upper/lower case).  
Enhancer II ..... **\$109.88**

QUADRAM

### eRAM

eRAM Board ..... **\$119.88**

RANA SYSTEMS

### Elite-1

The **Elite-1**'s are single-sided, with 163K storage, 84ms access time & 13 or 16 sectoring. 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**  
Controller ..... **\$104.88**



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# The Assembly Advantage

by Randy Hyde

## Control Structures: Review and New

So far I've discussed five control structures in SPEED/ASM: the JMP instruction (unconditional goto), the JSR instruction (jump to subroutine), the SPEED/ASM IFx and IFx0 routines, the FOR/FOR0 loop and the 6502 branch instructions. SPEED/ASM supports several additional control structures, many of them ex-

tremely powerful and easy to use. Included in this set of routines are ONXGOTO, CASE, CASEI, INSET, and NOTINSET.

### A Quick Review of SPEED/ASM Control Structures

Before describing the new control structures, a quick review of the con-

trol routines I've presented thus far may help tie up any loose ends.

● *The JMP instruction* is actually a 6502 instruction. It is almost identical to the GOTO statement in Basic—it transfers control to a new statement which doesn't necessarily follow the JMP. The syntax for the JMP instruction is:

```
JMP <label>
```

where <label> is a valid statement label in your SPEED/ASM program.

● *The JSR instruction* is used to call a 6502 or SPEED/ASM subroutine. *The RTS instruction* is used to return from a user subroutine. The JSR/RTS combination is used identically to the GOSUB/RETURN statements in Basic (except, of course, you specify a statement label instead of a line number). The syntax for the JSR statement is:

```
JSR <label>
```

where <label> is the name of the user subroutine you wish to call. All user subroutines should be terminated with the RTS instruction. The RTS instruction does not allow any operands; its syntax is:

```
RTS
```

The JSR instruction also is used to call routines in the SPEED/ASM package, since all SPEED/ASM routines are nothing more than 6502 subroutines.

● *The SPEED/ASM IFx/IFx0 routines* come in two flavors (actually three, but I've only discussed two versions so far): the IF1/IF10 routines and the IFS/IFS0 routines. The IF1/IF10 routines are used to compare two integer values. IF1 compares two in-

*Listing. Demonstration SPEED/ASM program using routines ONXGOTO, CASE, CASEI, INSET and NOTINSET. These control structures will construct flexible menu programs.*

```
0800          1          ttl "Speed/asm Sample pgm #8"
0800          2          ;
0800          3          ;
0800          4          ;
0800          5          *****
0800          6          *
0800          7          * Speed/asm sample program #8 *
0800          8          *
0800          9          * Written by Randall Hyde *
0800         10          * Written on LISA v2.6 *
0800         11          * 7/22/83 *
0800         12          *
0800         13          *****
0800         14          ;
0800         15          ;
0800         16          ;
0800         17          ;
0800         18          *****
0800         19          *
0800         20          * SPEED/ASM Equates *
0800         21          *
0800         22          *****
0800         23          ;
0800         24          ;
0800         25          ;
0800         26          ;
0800         27          ;
0800         28          ;
0800         29          ;
0800         30          ;
0800         31          ; GENERAL PURPOSE EQUATES
0800         32          ;
0800         33          ; The following variables are used
0800         34          ; by the SPEED/ASM package and
0800         35          ; shouldn't be used by the SPEED/ASM
0800         36          ; programmer.
0800         37          ;
0800         38          ;
0800         39          ;
0800         40          ;
0000         41          FORASAV epz 0
0001         42          FORXSAV epz FORASAV+1
0002         43          FORYSAV epz FORXSAV+1
0003         44          FORZFC epz FORYSAV+1
```

*Listing continued.*

*Randy Hyde is proprietor of Lazerware, creators of SPEED/ASM and LISA. Address correspondence to him at 925 Lorna St., Corona, CA 91720.*



# PANTHER



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**VR**data

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Circle 101 on Reader Service card.

Listing continued.

```

0005      45 DESTADR epz FORZFG+2
0007      46 PTRADR  epz DESTADR+2
0009      47 ISIMMED epz PTRADR+2
000A      48 OP       epz ISIMMED+1
000C      49 MAXLEN  epz OP+2
000D      50 VALUE  epz MAXLEN+1
000F      51 DIGIT  epz VALUE+2
0010      52 LEADO  epz DIGIT+1
0011      53 JMPADR  epz LEADO+1
0013      54 COUNT  epz JMPADR+2
0014      55 GOTLN  epz COUNT+1
0015      56 LINEINDX epz GOTLN+1
0016      57 SIGN   epz LINEINDX+1
0017      58 ACL    epz SIGN+1
0018      59 ACH   epz ACL+1
0019      60 XTNDL  epz ACH+1
001A      61 XTNDH  epz XTNDL+1
001B      62 AUXL  epz XTNDH+1
001C      63 AUXH  epz AUXL+1
0800      64 ;
0033      65 PROMPT epz $33
004E      66 RNDL  epz $4E
004F      67 RNDH  epz $4F
0100      68 STACK equ $100
0200      69 INPUT equ $200
0800      70 ;
0800      71 ;
0800      72 ;
0800      73 ;
0800      74 ;
0800      75 ;
0800      76 ;
0800      77 *****
0800      78 * CONSTANTS *
0800      79 *****
0800      80 ;
0800      81 ;
0800      82 ;
0800      83 ; The following symbols are constants
0800      84 ; for the values "FALSE", "TRUE", and
0800      85 ; Carriage Return (respectively).
0800      86 ;
0800      87 ; These symbols should only appear
0800      88 ; as immediate operands to a 6502
0800      89 ; instruction or in the operand field
0800      90 ; of a pseudo-opcode like BYT.
0800      91 ;
0800      92 ;
0800      93 ;
0800      94 ;
0800      95 ;
0000      96 FALSE  equ 0
0001      97 TRUE   equ 1
008D      98 CR    equ $8D
0087      99 BELL  equ $87
0800     100 ;
0800     101 ;
0800     102 ;
0800     103 ;
0800     104 ;
0800     105 ;
0800     106 ; "IF" STATEMENT EQUATES
0800     107 ;
0800     108 ; The following symbols should only
0800     109 ; be used in the ADR pseudo-opcode
0800     110 ; following a call to the SPEED/ASM
0800     111 ; IFx routines.
0800     112 ;
0800     113 ;
0800     114 ;
00ED     115 EQ    equ "="
00A3     116 NE    equ "#"
00BE     117 GT    equ ">"
00BC     118 LT    equ "<"
BD8E     119 GE    equ ">"|"*256
ED8C     120 LE    equ "<"|"*256

```

Listing continued.

teger variables and IFI0 compares an integer variable to an integer constant. The IFS/IFS0 routines compare two SPEED/ASM strings. IFS compares two string variables and IFS0 compares a string variable to a string constant. The syntax for the IFx routines is:

```

JSR   IFI
ADR   <Ivar1>,<op>,<Ivar2>

```

and

```

JSR   IFS
ADR   <Svar1>,<op>,<Svar2>

```

where <Ivar1> and <Ivar2> are the names of properly defined SPEED/ASM integer variables and <Svar1> and <Svar2> are the names of SPEED/ASM string variables. <op> is

**"IFS compares two string variables and IFS0 compares a string variable to a string constant."**

any of the SPEED/ASM logical operators:

```

EQ
NE
LE
GE
LT
GT

```

as defined in the SPEED/ASM equates file.

The IFx0 routines compare a variable to a constant; the syntax for these two instructions is:

```

JSR   IFI0
ADR   <Ivar>,<op>,<Iconst>

```

and

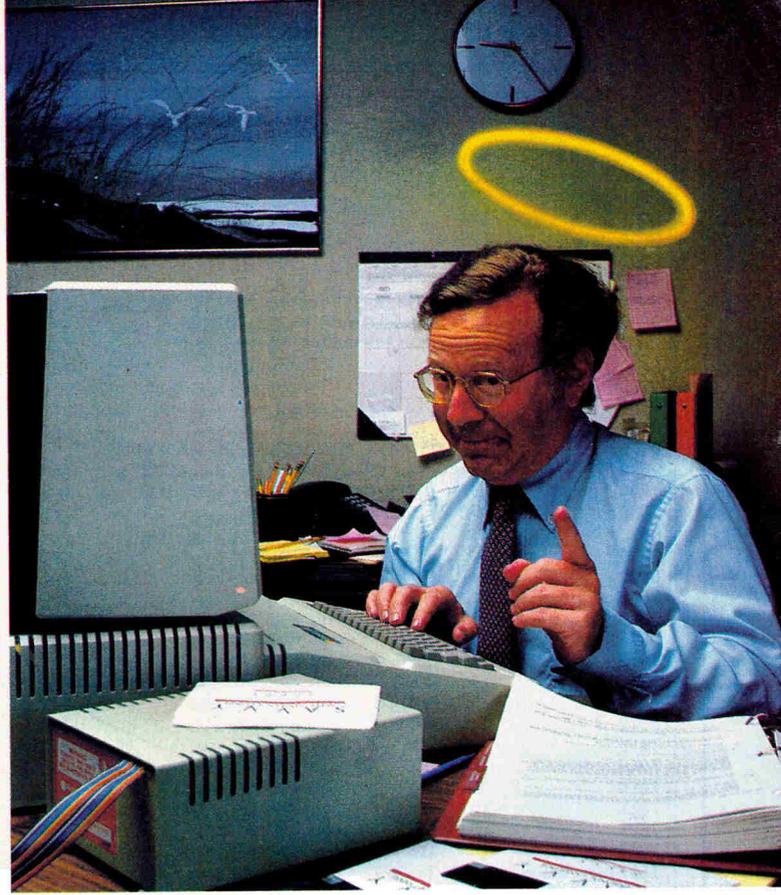
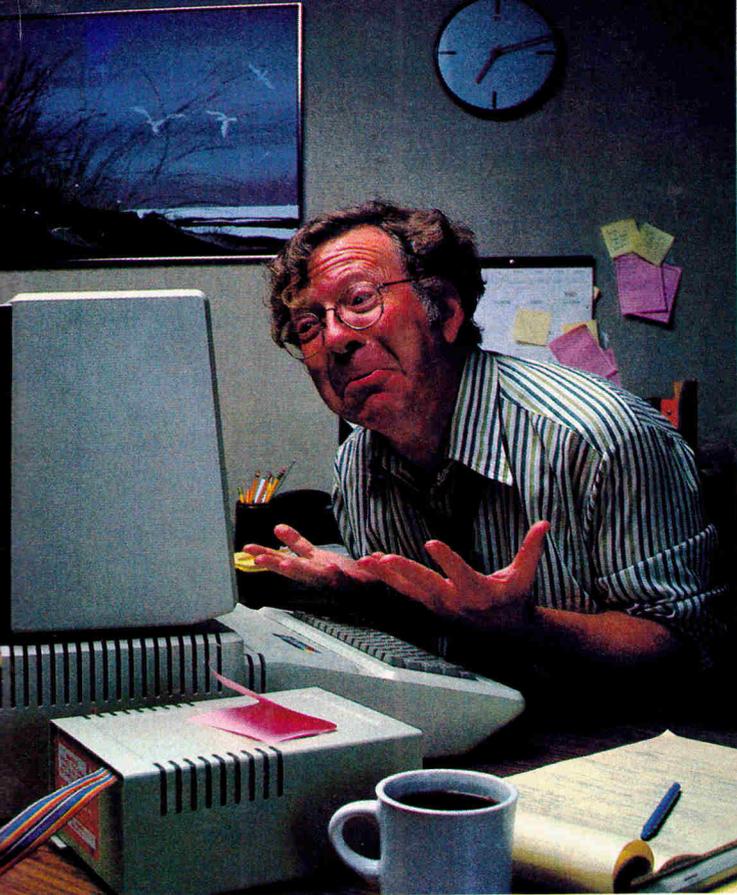
```

JSR   IFS0
ADR   <Svar>,<op>
BYT   "string constant",0

```

where <Iconst> is an integer constant and "string constant" is a zero terminated character string.

Immediately after the call to one of the IFx/IFx0 routines you should use the 6502/LISA BTR (branch if true) or BFL (branch if false) instruction to test the comparison for true or false.



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TECHNOLOGIES CORPORATION

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Listing continued.

```

0800      121 ;
0800      122 ;
0800      123 ;
0800      124 ;
0800      125 ;
0800      126 ;
0800      127 ;
0800      128 *****
0800      129 * SPEED/ASM ENTRY POINTS *
0800      130 *****
0800      131 ;
0800      132 ;
0800      133 ;
0800      134 ;
0800      135 ; NOTE: THE EQUATE OF PUTC MUST
0800      136 ; BE CHANGED IF YOU RELOCATE
0800      137 ; SPEED/ASM TO SOME LOCATION
0800      138 ; OTHER THAN $7800
0800      139 ;
0800      140 ;
0800      141 ;
7800      142 PUTC      equ $7800
7803      143 GETC      equ PUTC+3
7806      144 SAGL      equ GETC+3      ;FOR USE BY S/A ONLY- SEE DOC.
7809      145 SAPC      equ SAGL+3      ;" " " " " " " "
780C      146 HOME      equ SAPC+3      ;HOME AND CLEAR
780F      147 READLN    equ HOME+3
7812      148 INTT      equ READLN+3
7815      149 FOR       equ INTT+3
7818      150 FOR0      equ FOR+3
781B      151 NEXT      equ FOR0+3
781E      152 IFI       equ NEXT+3
7821      153 IFI0      equ IFI+3
7824      154 IFS       equ IFI0+3
7827      155 IFS0      equ IFS+3
782A      156 MOVE      equ IFS0+3
782D      157 LOAD       equ MOVE+3
    
```

Listing continued.

The SPEED/ASM FOR/FOR0 instructions emulate the Basic loops of the same name. The syntax for the FOR0 loop is:

```

JSR  FOR0
ADR  <Ivar>,<start>,<end>
    
```

```

JSR  NEXT
    
```

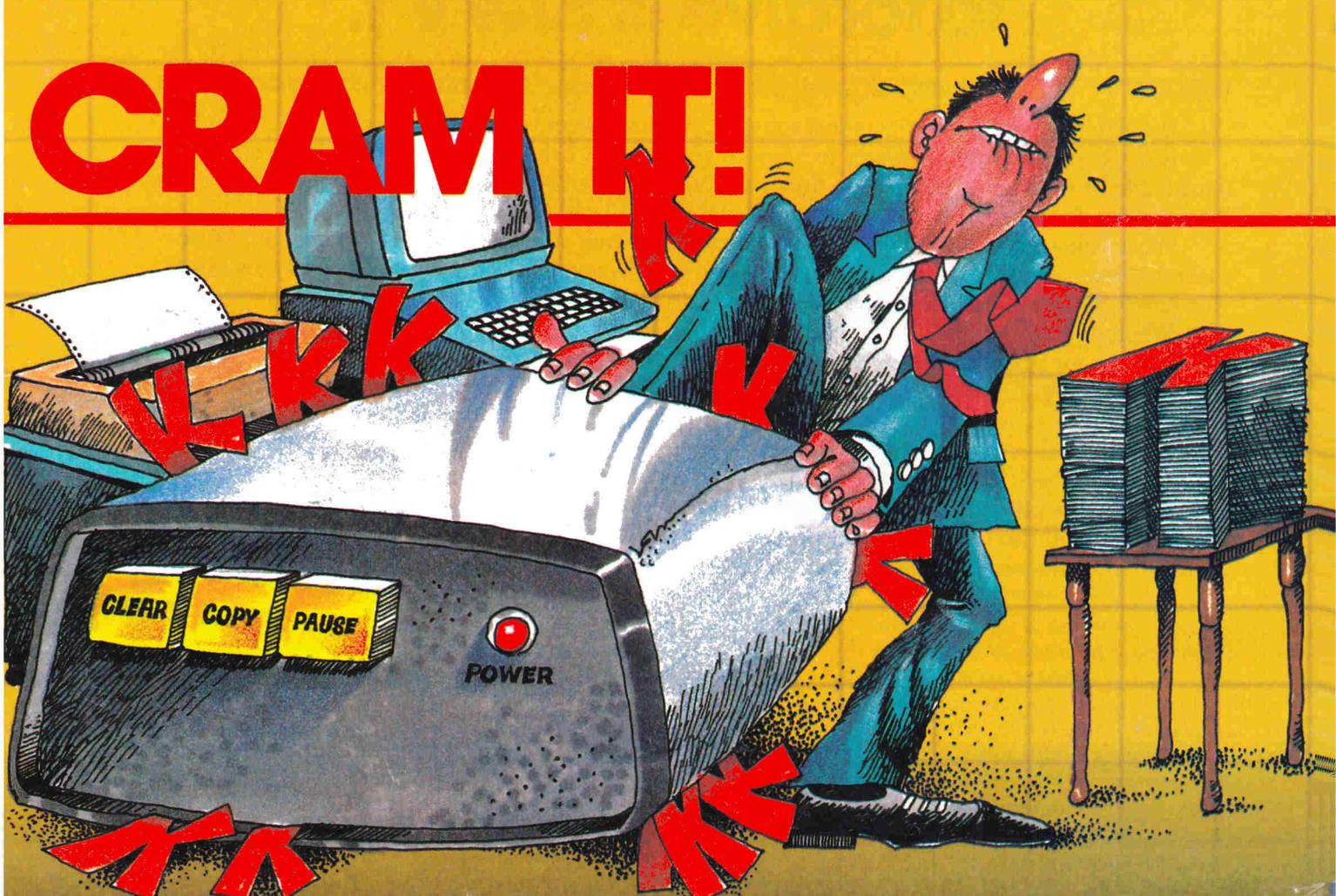
where <Ivar> is the name of a SPEED/ASM integer variable and <start> and <end> are integer constants. This emulates Basic statements of the form:

```
FOR I = 1 TO 10
```

The SPEED/ASM FOR loop handles the case where integer variables are required for the starting, ending or stepsize variables. The syntax for the FOR loop is:

```
JSR  FOR
```

# CRAM IT!



ADR <Ivar>,<vstrt>,<vend>,<vstep>

JSR NEXT

where <Ivar>, <vstrt>, <vend>, and <vstep> all are SPEED/ASM integer variable names.

To compare two single byte values pure 6502 code is used. The 6502 CMP instruction, along with the various branch instructions, lets you compare a value in memory to the value in the accumulator. After the instruction CMP<operand> where <operand> is any of:

<Ivar>  
#<Ivar>  
/<Ivar>  
<Ivar>,X  
<Ivar>,Y  
(ZPG,X)  
(ZPG),Y

the 6502 branch instructions can be

Listing continued.

7830	158	MOVS	equ	LOAD+3	
7833	159	LDSTR	equ	MOVS+3	
7836	160	PRINT	equ	LDSTR+3	
7839	161	PRTSTR	equ	PRINT+3	
783C	162	PRTINT	equ	PRTSTR+3	
783F	163	RDSTR	equ	PRTINT+3	
7842	164	RDINT	equ	RDSTR+3	
7845	165	ONKGOTO	equ	RDINT+3	
7848	166	CASE	equ	ONKGOTO+3	
784B	167	CASEI	equ	CASE+3	
784E	168	INSET	equ	CASEI+3	
7851	169	NOTINSET	equ	INSET+3	
7854	170	ABS	equ	NOTINSET+3	
7857	171	NEG	equ	ABS+3	
785A	172	MUL	equ	NEG+3	
785D	173	DIV	equ	MUL+3	
7860	174	MOD	equ	DIV+3	
7863	175	RND	equ	MOD+3	
7866	176	SUBSTR	equ	RND+3	
7869	177	INDEX	equ	SUBSTR+3	
786C	178	LENGTH	equ	INDEX+3	
786F	179	CONCAT	equ	LENGTH+3	
7872	180	GETWZPG	equ	CONCAT+3	;USED BY SPEED/ASM
7875	181	RDFP	equ	GETWZPG+3	
7878	182	PRTF	equ	RDFP+3	
787B	183	PRTF	equ	PRTF+3	
787E	184	FADD	equ	PRTF+3	
7881	185	FSUB	equ	FADD+3	
7884	186	FMUL	equ	FSUB+3	
7887	187	FDIV	equ	FMUL+3	
788A	188	FLT	equ	FDIV+3	
788D	189	FIX	equ	FLT+3	
7890	190	FNEG	equ	FIX+3	
7893	191	FADDIN	equ	FNEG+3	
7896	192	FSUBIN	equ	FADDIN+3	
7899	193	FTIMES	equ	FSUBIN+3	
789C	194	FINTO	equ	FTIMES+3	

Listing continued.

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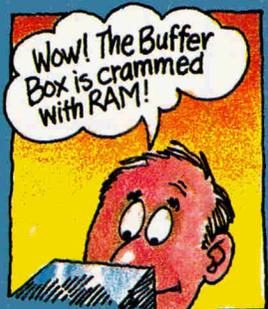
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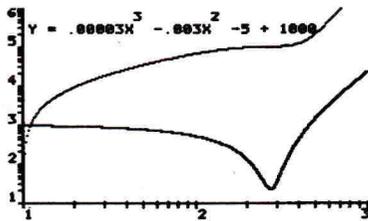
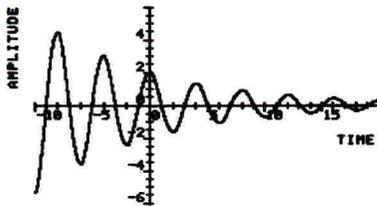
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*Listing continued.*

```

789F      195  IFF      equ FINIO+3
78A2      196  MOVFP    equ IFF+3
0800      197  ;
0800      198  ;
0800      199  ;
0800      200  ;
0800      201  ;
0800      202  *****
0800      203  *****
0800      204  ;
0800      205  ; Sample program #8 begins here.
0800      206  ;
0800      207  ;
0800 20 12 78 208  START    jsr  INIT          ;Always do first
0803      209  ;
0803 20 0C 78 210  MENULoop jsr  HOME
0806 20 36 78 211          jsr  PRINT
0809 D3 F0 E5 212          byt  "Speed/asm Sample Program #8",CR
080C E5 E4 AF
080F E1 F3 ED
0812 A0 D3 E1
0815 ED F0 EC
0818 E5 A0 D0
081B F2 EF E7
081E F2 E1 ED
0821 A0 A3 B8
0824 8D
0825 8D C5 F8 213          byt  CR,"Examples of various"
0828 E1 ED F0
082B EC E5 F3
082E A0 EF E6
0831 A0 F6 E1
0834 F2 E9 EF
0837 F5 F3
0839 A0 ED E5 214          byt  " menu programming",CR
083C EE F5 A0
083F F0 F2 EF
0842 E7 F2 E1
0845 ED ED E9
0848 8D
084B F3 F4 F9 215          byt  "styles.",CR
084E EC E5 F3
0851 AE 8D
0853 8D 216          byt  CR
0854 D3 E5 EC 217          byt  "Select one:",CR,CR
0857 E5 E3 F4
085A A0 EF EE
085D E5 BA 8D
0860 8D
0861 A0 A0 C1 218          byt  " A) Straight menu selection",CR
0864 A9 A0 D3
0867 F4 F2 E1
086A E9 E7 E8
086D F4 A0 ED
0870 E5 EE F5
0873 A0 F3 E5
0876 EC E5 E3
0879 F4 E9 EF
087C EE 8D
087E A0 A0 C2 219          byt  " B) Select values in a set",CR
0881 A9 A0 D3
0884 E5 EC E5
0887 E3 F4 A0
088A F6 E1 EC
088D F5 E5 F3
0890 A0 E9 EE
0893 A0 E1 A0
0896 F3 E5 F4
0899 8D
089A A0 A0 C3 220          byt  " C) Checking for values"
089D A9 A0 C3
08A0 E8 E5 E3
08A3 EB E9 EE
08A6 E7 A0 E6
08A9 EF F2 A0
08AC F6 E1 EC
08AF F5 E5 F3
08B2 A0 EE EF 221          byt  " not in a set",CR
08B5 F4 A0 E9
08B8 EE A0 E1
08BB A0 F3 E5
08BE F4 8D
08C0 8D 222          byt  CR
08C1 C3 E8 EF 223          byt  "Choice? :",0
08C4 E9 E3 E5
    
```

*Listing continued.*

**-The Assembly Advantage-**

used to determine how the variables compare. The applicable instructions are:

- BEQ—Branch if the accumulator equals the operand of CMP.
- BNE—Branch if the acc does not equal the operand of CMP.
- BLT—Branch if the acc is less than the operand of CMP.
- BGE—Branch if the acc is greater than or equal to the operand of the CMP instruction.

**The CSP Instruction**

The CSP instruction (Call SPEED/ASM Procedure) is a new pseudo-opcode/6502 instruction added to LISA's repertoire specifically for use by SPEED/ASM programmers. CSP combines LISA's JSR and .DA statements. This instruction may help make writing SPEED/ASM programs much easier.

The syntax for the CSP instruction is:

```
CSP <adrs> {<.da expressions>}
```

which is identical to the statements:

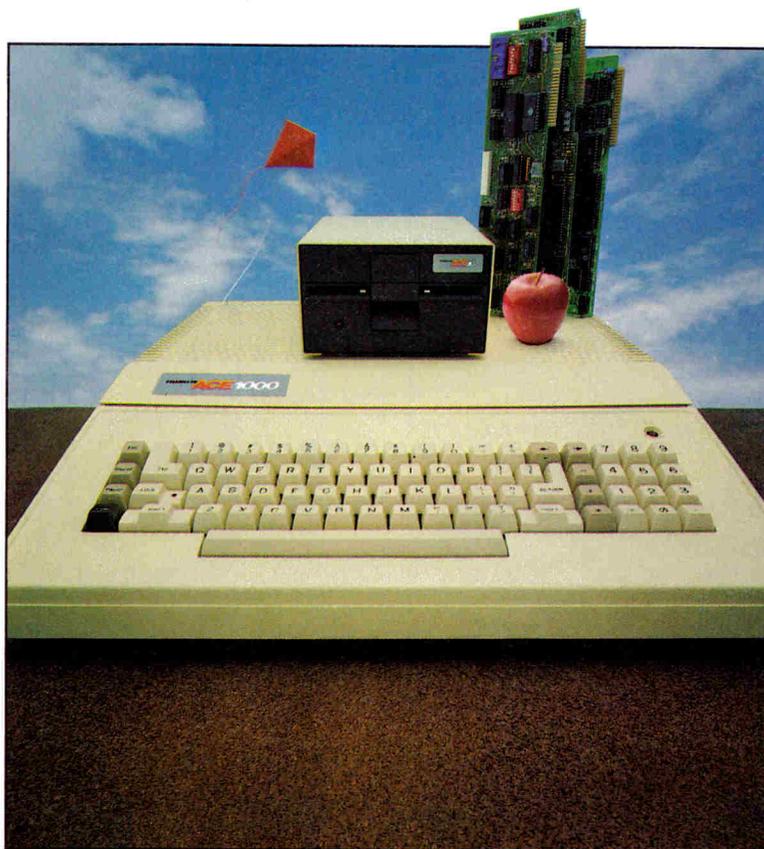
```
JRS <adrs>
.DA <.da expressions>
```

There are four different types of <.da expressions>: a full address, a string expression, a high order byte value, and a low order byte value.

Any time an address expression appears in the operand field of a .DA statement (or in the <.da expression> portion of the CSP statement) two bytes of object code are generated. If a string appears in the operand field of a .DA or CSP instruction, then a single byte of object code is emitted for each character in the string. For our purposes you should enclose the string with quotation marks. If an address expression is immediately preceded by a pound sign (#), then only one byte of object code is output; its value will be the low order byte of the specified address expression. If an address expression is prefaced with a slash (/), then the high order byte of the address expression's value is output.

With the CSP instruction you can type many SPEED/ASM statements on a single line. Some examples of the CSP statement in operation include:

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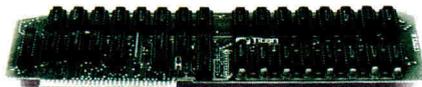
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*Listing continued.*

```

08C7 BF A0 BA
08CA 00
08CB          224 ;
08CB          225 ;
08CB          226 ; Read a character, if it is lower
08CB          227 ; case convert it to upper case,
08CB          228 ; then jump to the appropriate routine.
08CB          229 ;
08CB 20 03 78 230      jsr GETC
08CE C9 E1    231      cmp #"a"          ;See if lower case
08D0 90 02    232      blt >0
08D2 29 DF    233      and #$DF          ;Converts it to upper
08D4          234 ;
08D4 20 48 78 235      ^0      csp CASE,#NUMCAS0/3
08D7 03
08D8 C1 0B 09 236      CASES0 .da "A",STDMENU
08DB C2 54 0A 237      .da "B",SETSELCT
08DE C3 5E 0B 238      .da "C",NOTSTEXP
08E1          239 ;
0009          240      NUMCAS0 = *-CASES0
08E1          241 ;
08E1          242 ;
08E1          243 ;
08E1          244 ; An invalid value was entered at
08E1          245 ; this point.
08E1          246 ;
08E1 20 36 78 247      csp PRINT
08E4 8D 8D 87 248      byt CR,CR,BELL,BELL
08E7 87
08E8 C9 EE F6 249      byt "Invalid entry, press return",CR,0
08EB E1 EC E9
08EE E4 A0 E5
08F1 EE F4 F2
08F4 F9 AC A0
08F7 F0 F2 E5
08FA F3 F3 A0
08FD F2 E5 F4
0900 F5 F2 EE
0903 8D 00
0905          250 ;
0905 20 0F 78 251      jsr READLN
0908 4C 03 08 252      jmp MENULOOP
090B          253 ;
090B          254 ;
090B          255 ;
090B          256      *****
090B          257 ;
090B          258 ;
090B          259 ; A standard menu selection is
090B          260 ; demonstrated here. Actually,
090B          261 ; the main menu is identical to
090B          262 ; this type of code.
090B          263 ;
090B 20 0C 78 264      STDMENU jsr HOME
090E 20 36 78 265      csp PRINT
0911 8D 8D    266      byt CR,CR
0913 D3 F4 E1 267      byt "Standard Menu Selection",CR,CR
0916 EE E4 E1
0919 F2 E4 A0
091C 8D
092C A0 A0 B0 268      byt " 0: print 0",CR
092F BA A0 F0
0932 F2 E9 EE
0935 F4 A0 B0
0938 8D
0939 A0 A0 E1 269      byt " 1: print 1",CR
093C BA A0 F0
093F F2 E9 EE
0942 F4 A0 E1
0945 8D
0946 A0 A0 E2 270      byt " 2: print 2",CR
0949 BA A0 F0
094C F2 E9 EE
094F F4 A0 E2
0952 8D
0953 A0 B5 B5 271      byt " 55: print 55",CR,CR
0956 BA A0 F0
0959 F2 E9 EE
095C F4 A0 B5
095F B5 8D 8D
0962 C3 E8 EF 272      byt "Choice? :",0
0965 E9 E3 E5
0968 BF A0 BA
096B 00
096C          273 ;
    
```

*Listing continued.*

**-The Assembly Advantage-**

```
CSP PRINT,"Printing strings with CSP",#0
CSP IF1,I,LE,J
CSP IFS0,STRNG,EQ,"STRING COM-
PARE",#0
CSP FOR0,I,1,100
CSP FOR,I,STRT,END,STEP
CSP PRTINT,I
```

Due to its convenience I will use CSP in many of the examples that follow.

**The ONXGOTO Subroutine**

The first new SPEED/ASM control routine I will discuss is the ONXGOTO routine. The ONXGOTO routine transfers control to a new statement depending upon the value in the X registers. The syntax for the ONXGOTO instruction is:

```
JSR ONXGOTO
ADR <numentries>
ADR <label0>,<label1>,...,<labeln>
```

where <numentries> is the number of labels that follow the <numentries> value and <label1>..<labeln> are labels within your SPEED/ASM program. If the X register contains zero, control is transferred to <label0>. If the X register contains one, ONXGOTO will jump to location <label1>, etc. If the X register contains a value greater than <numentries>, then program execution continues with the 6502 statement immediately following the <labeln> entry. **Warning!** It is critical that the <numentries> value *exactly* represents the number of addresses that follow. If <numentries> is too small and the ONXGOTO routine falls through, the 6502 will attempt to execute one of the trailing addresses as valid 6502 code. This usually will cause the program to bomb. One way to guarantee that the <numentries> value is always correct is to use a call to ONXGOTO of the form:

```
JSR ONXGOTO
ADR ENTRY0/2
TABLE0 ADR ADRS1,ADRS2,...,ADRSn
;
ENTRY0 EQU *-TABLE0
```

The "\*" operator in the operand field says "give me the current program address." By subtracting the address of the jump table's first entry from the address of the first byte after the address table, this equate calculates the number of bytes in the table.

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```

096C 20 42 78 274      csp RDINT,SELCTVAR
096F DC 0B
0971      275 ;
0971 20 4B 78 276      csp CASEI,NUMCSI/4,SELCTVAR
0974 04 00 DC
0977 0B
0978 00 00 AE 277 CASEI  adr 0,ZERO
097B 09
097C 01 00 C7 278      adr 1,ONE
097F 09
0980 02 00 DD 279      adr 2,TWO
0983 09
0984 37 00 F3 280      adr 55,FIFTYFIV
0987 09
0988      281 ;
0010      282 NUMCSI = *-CASEI
0988      283 ;
0988      284 ;
0988      285 ; If the program gets to this point
0988      286 ; then they've entered an invalid
0988      287 ; value.
0988      288 ;
0988 20 36 78 289      csp PRINT
098B 87 87 8D 290      byt BELL,BELL,CR
098E C9 EE F6 291      byt "Invalid entry, press return",CR,0
0991 E1 EC E9
0994 E4 A0 E5
0997 EE F4 F2
099A F9 AC A0
099D F0 F2 E5
09A0 F3 F3 A0
09A3 F2 E5 F4
09A6 F5 F2 EE
09A9 8D 00
09AB 4C 0B 09 292      jmp STDMENU
09AE      294 ;
09AE      295 *****
09AE      296 ;
09AE      297 ; Control is transferred here if
09AE      298 ; the user pressed 0.
09AE      299 ;
09AE 20 36 78 300 ZERO  csp PRINT,#CR,"You pressed zero",#CR,#0
09B1 8D D9 EF
09B4 F5 A0 F0
09B7 F2 E5 F3
09BA F3 E5 E4
09BD A0 FA E5
09C0 F2 EF 8D
09C3 00
09C4 4C 0F 0A 301      jmp QUITSTD
09C7      302 ;
09C7      303 ;
09C7      304 *****
09C7      305 ;
09C7      306 ; Control is transferred here if
09C7      307 ; the user pressed 1.
09C7      308 ;
09C7 20 36 78 309 ONE   csp PRINT,#CR,"You entered 1",#CR,#0
09CA 8D D9 EF
09CD F5 A0 E5
09D0 EE F4 E5
09D3 F2 E5 E4
09D6 A0 B1 8D
09D9 00
09DA 4C 0F 0A 310      jmp QUITSTD
09DD      311 ;
09DD      312 ;
09DD      313 *****
09DD      314 ;
09DD      315 ; Control is transferred here if
09DD      316 ; the user pressed 2.
09DD      317 ;
09DD 20 36 78 318 TWO   csp PRINT,#CR,"You entered 2",#CR,#0
09E0 8D D9 EF
09E3 8D
09F0 4C 0F 0A 319      jmp QUITSTD
09F3      320 ;
09F3      321 ;
09F3      322 *****
09F3      323 ;
09F3      324 ; Control is transferred here if
09F3      325 ; the user pressed 55.
09F3      326 ;
09F3 20 36 78 327 FIFTYFIV csp PRINT,#CR
09F6 8D
    
```

Listing continued.



Listing continued.

```

09F7 D9 EF F5 328      byt "You entered fifty-five",CR,0
09FA A0 E5 EE
09FD F4 E5 F2
0AA0 E5 E4 A0
0AA3 E6 E9 E6
0AA6 F4 F9 AD
0AA9 E6 E9 F6
0AAC E5 8D 00
0A0F          329      ;
0A0F          330      ;
0A0F 20 36 78 331     QUITSTD  csp PRINT,#CR
0A12 8D
0A13 D0 F2 E5 332     byt "Press return to continue:"
0A16 F3 F3 A0
0A19 F2 E5 F4
0A1C F5 F2 EE
0A1F A0 F4 EF
0A22 A0 E3 EF
0A25 EE F4 E9
0A28 EE F5 E5
0A2B BA
0A2C 00          333     byt 0
0A2D 20 0F 78 334     jsr READLN
0A30 4C 03 08 335     jmp  MENULoop
0A33          336     ;
0A33          337     ;
0A33          338     ;
0A33          339     ;
0A33          340     ;
0A33          341     *****
0A33          342     ;
0A33          343     ; Demonstrate set selection with
0A33          344     ; the INSET routine.
0A33          345     ;
0A33          346     ;
0A33 20 36 78 347     SETLoop  jsr PRINT
0A36 8D D0 F2 348     byt CR,"Press return to continue:",0
    
```

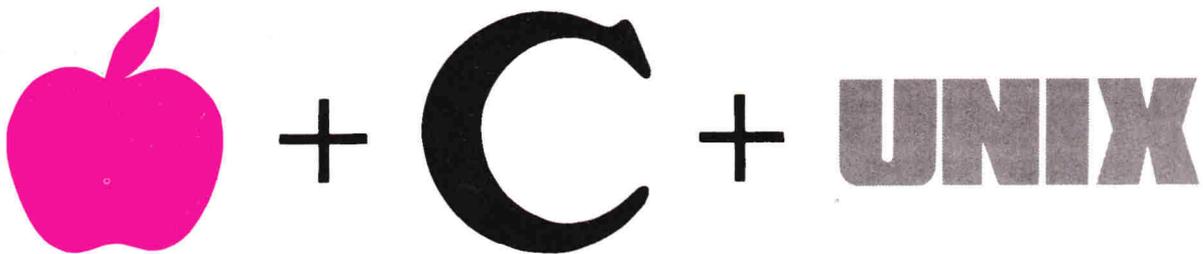
Listing continued.

if a match is found.

During execution the CASE statement compares the value in the 6502 accumulator to <value0>. If the accumulator is equal to <value0>, control is transferred to location <adrs0>. If the accumulator does not equal <value0>, the accumulator is compared against <value1> and control is transferred to location <adrs1> if a match is made. If the accumulator doesn't equal <value1> it's compared to <value2>, etc. If the accumulator isn't equal to any of the values present in the CASE statement, control is resumed at the first statement after the <valuen> entry.

SPEED/ASM will bomb horribly if <numentries> doesn't properly reflect the number of cases in the CASE statement. The safest way to specify this value is to have LISA v2.6 calculate it for you. This can be accomplished using code of the form:

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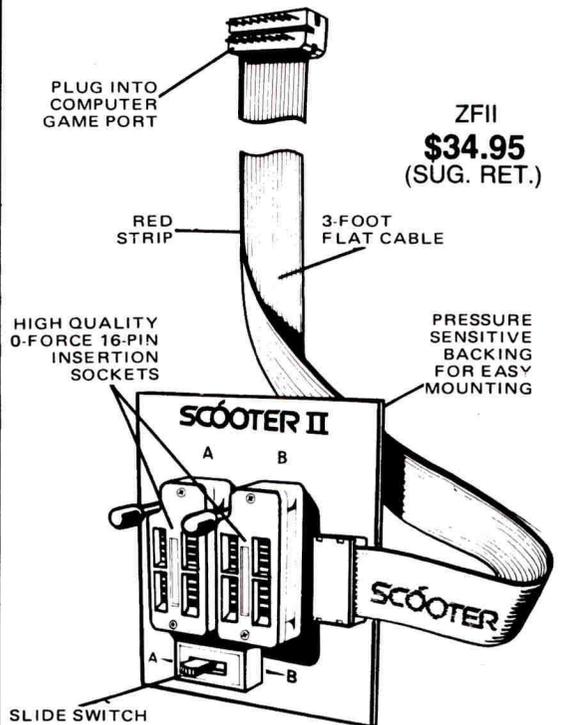


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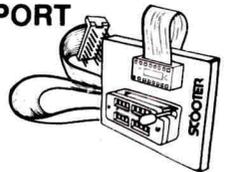
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I-1283

*Listing continued.*

```

0A39 E5 F3 F3
0A3C A0 F2 E5
0A3F F4 F5 F2
0A42 EE A0 F4
0A45 EF A0 E3
0A48 8D
0A51 20 0F 78 349      jsr READLN
0A54          350      ;
0A54 20 0C 78 351      SETSELCT jsr HOME
0A57 20 36 78 352      jsr PRINT
0A5A C5 EE F4 353      byt "Enter an alphabetic or numeric",CR
0A5D E5 F2 A0
0A60 E1 EE A0
0A63 E1 EC F0
0A66 E8 E1 E2
0A69 E5 F4 E9
0A6C E3 A0 EF
0A6F F2 A0 EE
0A72 F5 ED E5
0A75 F2 E9 E3
0A78 8D
0A79 E3 E8 E1 354      byt "character (return quits):",0
0A7C F2 E1 E3
0A7F F4 E5 F2
0A82 A0 A8 F2
0A85 E5 F4 F5
0A88 F2 EE A0
0A8B F1 F5 E9
0A8E F4 F3 A9
0A91 BA 00
0A93          355      ;
0A93 20 03 78 356      jsr GETC
0A96 C9 8D 357      cmp #CR
0A98 D0 03 358      bne >1
0A9A 4C 03 08 359      jmp MENULOOP
0A9D          360      ;
0A9D          361      ; Convert lower case to upper case
0A9D          362      ;

```

*Listing continued.*

```

CSP CASE,#NUMCASES/3
CASETBL .DA <value0>,<adr0>
        .DA <value1>,<adr1>
        .
        .
        .
        .DA <valuen>,<adrn>

```

```

;
NUMCASES = *--CASETBL

```

This code automatically computes the number of cases present in the case list. Furthermore, you don't have to change anything if you add or delete cases later on.

The CASEI statement is similar to the CASE statement; the only difference is the CASEI routine lets you compare a SPEED/ASM integer variable to a series of integer values (CASE only performs byte comparisons). The syntax for the CASEI statement is:

```

CSP CASE,<numentries>,<SVariable>
ADR <value0>,<adr0>
ADR <value1>,<adr1>

```

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```
ADR <value2>,<adrs2>
.
.
.
ADR <valuen>,<adrsn>
```

The variable <numentries> is the number of cases (a two-byte value for CASEI and a single byte value for CASE); <SAvariable> is the name of a SPEED/ASM integer variable; <valuei> (i=0..n) are 16-bit integer values, and <adrsi> (i=0..n) are the names of statement labels in your SPEED/ASM program where a branch will be made to if <SAvariable> equals <valuei>.

Like the CASE and ONXGOTO statements, <numentries> must accurately describe the number of entries in the case table or SPEED/ASM may hang. To make sure you enter the proper value you should let LISA v2.6 compute the number of entries for you using code of the form:

```
CSP CASEI,NUMCASES/4,VAR
CASES ADR <value0>,<adrs0>
ADR <value1>,<adrs1>
ADR <value2>,<adrs2>
.
.
.
ADR <valuen>,<adrsn>
;
NUMCASES = *-CASES
```

NUMCASES must be divided by four, since there are four bytes in each case entry.

**The INSET and NOTINSET Routines**

The INSET and NOTINSET routines compare the accumulator against a set of values and branch to a single location if the accumulator is in the specified set (INSET), or is not in the specified set (NOTINSET). The syntax for these two routines is identical:

```
CSP INSET,<numentries>
BYT <value0>,<value1>,...,<valuen>
ADR <adrs>

or

CSP NOTINSET,<numentries>
BYT <value0>,<value1>,...,<valuen>
ADR <adrs>
```

*Listing continued.*

```
0A9D C9 E1 363 ^1 cmp #a"
0A9F 90 02 364 blt >0
0AA1 29 DF 365 and #SDF
0AA3 366 ;
0AA3 367 ^0:
0AA3 368 ;
0AA3 369 ;
0AA3 370 ;
0AA3 371 ;
0AA3 372 ; Note the sneaky way of specifying
0AA3 373 ; the number of elements in the sets.
0AA3 374 ; LISA's STR pseudo-opcode emits the
0AA3 375 ; length of the string that follows.
0AA3 376 ; This just happens to be the number
0AA3 377 ; of characters in the set. This only
0AA3 378 ; works if the set consists entirely
0AA3 379 ; of printable characters.
0AA3 380 ;
0AA3 20 4E 78 381 jsr INSET
0AA6 1A C1 C2 382 str "ABCDEFGHIJKLMNPOQRSTUVWXYZ"
0AA9 C3 C4 C5
0AAC C6 C7 C8
0AAF F2
0AC1 06 0B 383 adr ISALPHA
0AC3 384 ;
0AC3 20 4E 78 385 jsr INSET
0AC6 0A B0 B1 386 str "0123456789"
0AC9 E2 E3 E4
0ACC B5 B6 B7
0ACF B8 B9
0AD1 34 0B 387 adr ISNUMRIC
0AD3 388 ;
0AD3 389 ;
0AD3 390 ; Non-alphanumeric character at this point.
0AD3 391 ;
0AD3 20 36 78 392 csp PRINT,#BELL,#CR
0AD6 87 8D
0AD8 D9 EF F5 393 byt "You pressed a non-alphanumeric"
0ADB A0 F0 F2
0ADE E5 F3 F3
0AE1 E5 E4 A0
0AE4 E1 A0 EE
0AE7 EF EE AD
0AEA E1 EC F0
0AED E8 E1 EE
0AF0 F5 ED E5
0AF3 F2 E9 E3
0AF6 A0 E3 E8 394 byt " character"
0AF9 E1 F2 E1
0AFC E3 F4 E5
0AFF F2
0B00 8D 8D 00 395 byt CR,CR,0
0B03 4C 33 0A 396 jmp SETLOOP
0B06 397 ;
0B06 398 ;
0B06 20 36 78 399 ISALPHA csp PRINT,#CR,#CR
0B09 8D 8D
0B0B D9 EF F5 400 byt "You entered an alphabetic character"
0B0E A0 E5 EE
0B11 F4 E5 F2
0B14 E5 E4 A0
0B17 E1 EE A0
0B1A E1 EC F0
0B1D E8 E1 E2
0B20 E5 F4 E9
0B23 E3 A0 E3
0B26 E8 E1 F2
0B29 E1 E3 F4
0B2C E5 F2
0B2E 8D 8D 00 401 byt CR,CR,0
0B31 4C 33 0A 402 jmp SETLOOP
0B34 403 ;
0B34 20 36 78 404 ISNUMRIC csp PRINT,#CR,#CR
0B37 E8
0B39 D9 EF F5 405 byt "You entered a numeric character"
0B3C A0 E5 EE
0B3F F4 E5 F2
0B42 E5 E4 A0
```

*Listing continued.*

Listing continued.

```

0B45 E1 A0 EE
0B48 F5 ED E5
0B4B F2 E9 E3
0B4E A0 E3 E8
0B51 E1 F2 E1
0B54 E3 F4 E5
0B57 F2
0B58 8D 8D 00 406      byt CR,CR,0
0B5B 4C 33 0A 407      jmp SETLOOP
0B5E          408      ;
0B5E          409      ;
0B5E          410      ;
0B5E          411      ;
0B5E          412      ;
0B5E          413      ;
0B5E          414      ;
0B5E          415      *****
0B5E          416      ;
0B5E          417      ;
0B5E          418      ; Demonstrate the NOTINSET routine
0B5E          419      ; here.
0B5E          420      ;
0B5E 20 0C 78 421      NOTSTEXP jsr HOME
0B61 20 36 78 422      NOTSTLP  csp PRINT
0B64 C2 F9 A0 423      byt "By typing a non-alphanumeric",CR
0B67 F4 F9 F0
0B6A E9 EE E7
0B6D A0 E1 A0
0B70 EE EF EE
0B73 AD E1 EC
0B76 F0 E8 E1
0B79 EE F5 ED
0B7C E5 F2 E9
0B7F E3 8D
0B81 E3 E8 E1 424      byt "character you can exit this routine"
0B84 F2 E1 E3
0B87 F4 E5 F2
0B8A A0 F9 EF
0B8D F5 A0 E3
0B90 E1 EE A0
0B93 E5 F8 E9
0B96 F4 A0 F4
0B99 E8 E9 F3
0B9C A0 F2 EF
0B9F F5 F4 E9
0BA2 EE E5
0BA4 8D 00 425      byt CR,0
0BA6 20 03 78 426      jsr GETC
0BA9 C9 E1 427      cmp #"a"
0BAB 90 02 428      blt >0
0BAD 29 DF 429      and #$DF
0BAF          430      ;
0BAF 20 51 78 431      csp NOTINSET
0BB2 24 B0 B1 432      str "0123456789ABCDEFGHIJKLMNORSTUVWXYZ"
0BB5 E2 E3 B4
0BB8 E5 B6 B7
0BBB B8 B9 C1
0BBE C2 C3 C4
0BC1 C5 C6 C7
0BC4 C8 C9 CA
0BC7 CB CC CD
0BCA CE CF D0
0BCD D1 D2 D3
0BD0 D4 D5 D6
0BD3 D7 D8 D9
0BD6 DA
0BD7 03 08 433      adr MENULOOP
0BD9 4C 61 0B 434      jmp NOTSTLP
0BDC          435      ;
0BDC          436      ;
0BDC          437      ;
0BDC          438      *****
0BDC          439      ;
0BDC          440      ; Variable declaration
0BDC          441      ;
0BDC 00 00 442      SELCIVAR adr 0
0BDE          443      end
**** END OF ASSEMBLY

```

In the case of INSET the 6502 accumulator is compared to the values <value0>..<valuen>. If the accumulator is equal to any value in this list, control is transferred to location <adrs>. If the accumulator doesn't equal any of the values in the set, program execution continues with the first statement after the INSET statement.

The NOTINSET routine is used to ensure that the accumulator doesn't contain a value in a given set. Control is transferred to the branch address if and only if the value in the accumulator does not match any of the values in the set. If the accumulator matches one of the values in the set that follows the call to NOTINSET, control is transferred to the first statement after the NOTINSET jump address.

Conclusions

The program control transfer routines provided in the SPEED/ASM package are very powerful. This month's demonstration program

**"The program control transfer routines provided in the SPEED/ASM package are very powerful. Along with the power, however, comes responsibility."**

shows how these control structures can be used to set up some very flexible menu programs.

Along with the power, however, comes responsibility. It is very important that you make sure all <numeric> values properly reflect the number of entries in the table following the SPEED/ASM routine call. SPEED/ASM uses this information to determine how many cases to check, where the first instruction following the case table can be found, etc. Failure to provide proper data in this parameter slot probably will cause your program to hang. ■

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by Bill O'Brien

## The Print's the Thing

It's not often that one finds much to rave about when it comes to printer cards. Apple has had the UPIC (Universal Parallel Interface Card) for some time now, and although it's a tricky devil that seems to have intramachine communications in mind as well as simple parallel printer output, it's been two years since Mr. Jobs uttered those fateful words to me: "We are exploring the possibilities of distributive processing." Still, nothing seems to have come of it. If you have a parallel printer, it's as good a choice as any, since there is no other choice. Right? Wrong.

For some time I had known of boards from a company in a place in Pennsylvania that I could never pronounce correctly. Do the words Bala

Cynwyd (KINWID) mean anything to you? The company, of course, is Interactive Structures. I knew they made some rather interesting and reliable data acquisition and printer interface cards for the Apple II, but I was ignorant (caught again!) of anything they were doing with the III. Then one day I was browsing through a pile of ads and came across one for I.S. announcing a printer card called PKASO. It looked good. It was capable of handling a variety of printers (see Table 1), by means of a PROM change, plus graphics and even color. It looked very good.

The biggest surprise of all came when, looking down the list of compatible computers, I saw the triple slashes that meant "me" compatibility. I was even more excited when I received it.

The concept behind the Apple III has always been one of transparent peripherals—a file was screen, disk or printer bound simply by directing the output there, without the need for special programming. Everything is handled by an intervening driver file.

It's the same with the PKASO card. No matter which printer you have attached to your III, the same commands are issued to the card. This is the important concept. It is the interface card that intercepts all commands and translates them (via the currently installed PROM) for the individual printer. No matter which

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Okidata 83A (with dot addressable graphics)

Table 1. PKASO addressable printers.

Size	Code	Command
5 CPI	8	~E8,
6	9	~E9,
8.25	10	~E10,
10	0	~E0,
12	1	~E1,
16.5	2	~E2,

Table 2a. Adjusting printer character sizes.

~Dn,

(Where n is a number between 0 and 255 used to set the physical width of the printed line.)

~CL,R,W,

(Where C is the defining character, L is the left margin, R is the right margin and W is the wrap margin, where printing continues for lines that exceed the preset width.)

~Fn,(T1),...,(Tn)

(Where n is the number of tabs to set and (T1) through (Tn) are the Tab positions.)

~F0,

(Clears all Tabs.)

~I,

(Advances to next Tab position.)

~Tn

(n = 0 for standard 6 LPI  
n = 1 for Hires print spacing  
n = 2 gray scale or 6 dot spacing  
n = 3 Bit graphics 7 dot spacing)

~L,

(Send form feed.)

~J,

(Send line feed.)

Table 2b. Print format commands.

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~Rn,

(n=0 -> Standard Printer Typeface  
 n=1 -> Apple III Screen Typeface  
 n=3 -> Compressed Screen Typeface  
 n=5 -> Inverse Screen Typeface  
 n=7 -> Inverse & Compressed)

~Pn,

(n=0 -> 40 col standard screen 1  
 n=1 -> 40 col screen 2\*  
 n=2 -> 80 col standard screen  
 n=3 -> 80 col reversed interlace \*)

[\* - for custom software]

Table 3b. Text print command parameters.

Table 3a.

Soft font command parameters.

features your particular printer supports (if it's listed in Table 1), you can use those features by sending an attention character, the ~ (called a tilde), to the card, to let it know there

is a special command about to be issued; follow this with an uppercase character to inform it of the type of a command it is, and finally the command parameters.

To programmers, it should be obvious that, finally, one set of commands (Tables 2 and 3) can be incorporated into a program to handle a variety of functions for a variety of output devices, including some basic text formatting procedures. Again, all of the commands listed will produce the stated results no matter which of the printers in Table 1 you are using, despite the fact that the instructions understood by the individual printers vary from machine to machine.

Included also are commands for dumping the standard text screen, any of the graphic screens (saved with the GSAVE option and using an I.S. supplied basic program and invokable module) and a Superhi-res mode where the printer can be directly programmed without worrying about what condition or mode the screen is in.

Hi-res screen dumps (or actually file prints) can be done in either randomized grey pattern or standard dot to dot correspondence. The differences should be apparent from Figures 1 and 2, but briefly, the actual content of an Apple III pic file is a series of values that were contained in memory. Although Apple does a fine job of presenting a homogenous visual image, they are, after all, individual values.

The randomizing feature presumes that between any two of the same values the same "shade" (for lack of better term) would appear, and puts it there. Essentially, this smoothes out the overall picture. The feature is quite valuable in many applications and just plain fun in a lot more. Now my poor UPIC is being kept in reserve for that letter-quality printer I keep dropping hints about to everyone I know. Who can tell, with Christmas coming, I may just find a little Diablo 620 or even an F10 in my sock.

#### Vacation

I took a brief respite from work and writing and reading reference materials just long enough to sneak out to the movies this year. They've come a long way what with sound and color and everything. I saw two

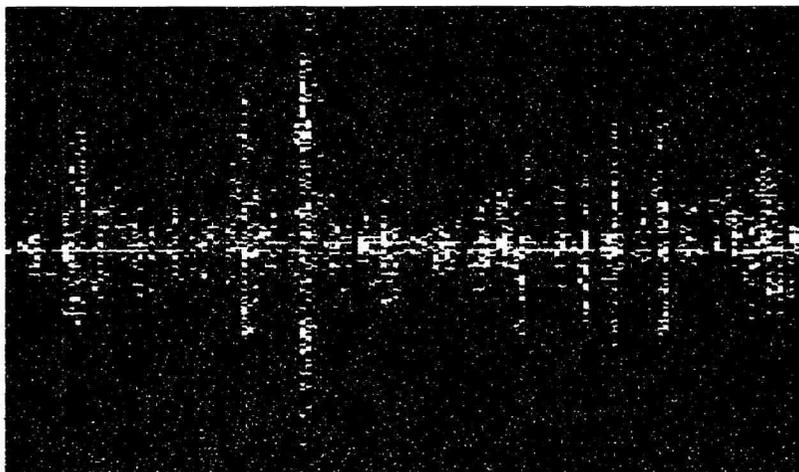


Figure 1. Computer generated picture, "Shoreline," using random function.

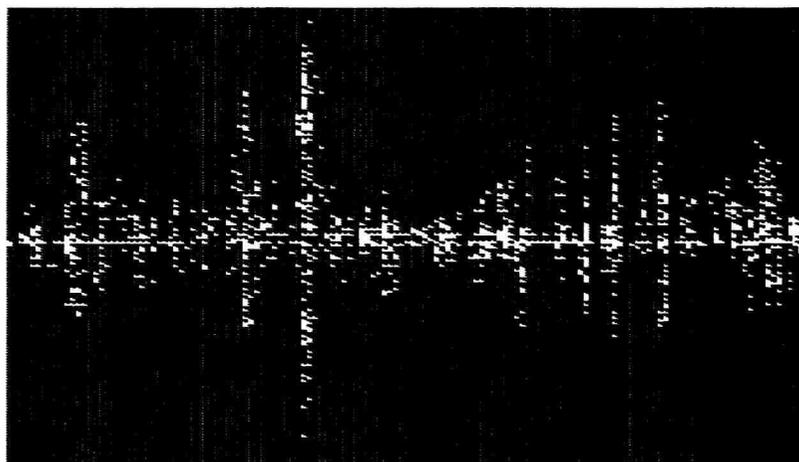


Figure 2. Same picture as Figure 1, but without random function.

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Figure 3.  
Z-80 memory map for the Votrax personal speech system.

VOTRAX PROPRIETARY MODULE	000-7FFF
SYSTEM RAM	8000-8FFF
RESERVED FOR EXPANSION	9000-BFFF
PERSONALITY ROM	C000
UNUSED EPROM AREA	DFFF
PERSONALITY EXPANSION	E000-FFFF

features that stand out above the others. One was called Return of the Jenny or something like that. I had originally thought it was a documentary about a World War I fighter plane, but apparently not. Even so it was utterly enjoyable from a fantasy point of view.

The other, called War Games, opened my eyes a little to the ever expanding world of computer capabilities. I was totally unaware that an auto dial acoustic modem existed and I also discovered that people still use old computers. They really don't die, they just wind up in Hollywood.

Actually, it was the speech synthesis that caught me most, and I was on the verge of dragging out my old Votrax Type 'N' Talk when I stumbled on their ad for something called a Personal Speech System. To fill in any non-TNT aficionados, it was (is) an output device that took serial data typed at a computer or terminal in plain English and transformed it into spoken words. You needed a speaker and there were volume and rate controls on the front panel (you could vary the speed of the device from a slow monologue to a rapid collision of words). The unit itself was very small (its power supply was half its own size again) and although you couldn't get a "real" inflection out of it, it performed beautifully. For the time and the price, it was a marvel.

Enter now the Personal System and a few things have been changed. There is a built-in speaker, the rate control is gone, and the unit itself is about 12 inches long. Also, both parallel and serial ports protrude from the back. However, before I go on about how great it is, we'll get minor sore points out of the way.

First of all, there is still an inflection problem—the sounds emanating from the speaker seem not even remotely human.

Second, I waited expectantly, knowing that its parallel port would allow me to plug my UPIC into it and get talking. I was sadly mistaken. Votrax has taken it into their head to bring the parallel signals out in a DB-25 type connector, typically used

Speech Control Character	@	
Features	@R	rate
	@(0-7)	inflection
	@A	amplitude
	@C	conversion mode
	@V	voice mode
Non-speech Control Character	!	
Features	!(1,2,3)	musical tone channel
	!A	alarm set
	!B	baud set
	!E	envelope set
	!F	filter set
	!L	load
	!N	noise set
	!P	prompt
	!T	tempo set
	!U	user program
	!W	wait
Attention Control Character	[ESC]	
Features	[ESC]C	connect I/O
	[ESC]M	mode set
	[ESC]P	power up
	[ESC]Q	quit
	[ESC]R	reserve memory
	[ESC]S	special characters
	[ESC]T	time set
	[ESC]V	speak version

Table 4. Summary of controls.

Table 5.  
Speech data definitions.

TEXT	Standard English text (alphabet characters Aa to Zz, number characters 0 to 9 plus other printable ASCII characters)
PHONETIC	ASCII characters representing phonemes
Exceptions:	Most other printable ASCII characters are treated as punctuation, with the following spoken as indicated:
	# "number"
	\$ "dollars"
	% "percent"
	& "and"
	* "star"
	+ "plus"
	/ "slash"
	> "greater than"
	< "less than"

more disharmony anyway.

Other than that, though, it is quite wonderful, and Figure 3 should give you a general idea why. A short time ago it was difficult to find a computer with a full complement of memory; now we have peripherals that equal or surpass that.

The PSS can be used either through a parallel port (as long as the cable conventions are met) using the standard UPIC driver or through the serial port using the RS-232 driver Apple supplies. Baud rates for serial communication (the speed at which the computer and the device converse) can be set by means of three of eight dual in-line switches recessed in the back panel. Choices range from 75 to 9600 bits per second.

Also available are switches to select either parallel or serial mode and the type of handshaking (for serial), either XON-XOFF, a software handshaking convention where a DCI or

in serial applications. If they had only one connector on the back, I could possibly forgive them for this. After all, IDS's printer series has been cursed this way almost from the beginning and I could understand Votrax saving the cost of another connector. But they have *two* anyway, and there are Centronics-type connectors available which mount to PC boards and take up about the same amount of space.

To their credit, Votrax can supply

you with a proper cable from the PSS, but I've lived with two standards throughout my computer life: Serial ports are female DB-25s (violated most notably by IBM and their Async Communications Card) and parallel cables from computers are typically terminated with 36-pin amphenol male connectors. Parallel ports are female versions of that connector (IDS aside). The type of parallel port really wasn't described in the ad, and I don't really think we need

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**Table 6.**  
*Time control functions.*

DC3 character is transmitted between the computer and the communicating device to indicate that the sending device should pause, or RTS (Request To Send), which is a hardware handshaking method.

Once connected, you can do a multitude of things with it providing you use the correct control codes (Table 4) and observe the simpler rules for pronunciation (Table 5). For one, you can access the built-in clock (for vocal output from the PSS only), or preset a number of announcements to be spoken at given times (Tables 6 and 7). You can produce eight predefined sound effects as simple as hourly chimes or as complex as the intrinsic music generator will allow. And speech is as involved as opening the driver we've made for it and printing to it.

When I brought it back to the office to pack up and return to Votrax,

FORMAT	DESCRIPTION
[ESC]Thhmmss.	[ESC] Attention character T Time control character hh Hour mm Minutes ss Seconds . Sequence terminator
[ESC]!A#hhmmTEXT	[ESC] Attention character ! Non-speech control character A Alarm control character # Alarm number (0-7) hh Hour mm Minutes TEXT Optional phrase to be spoken .Sequence terminator
[ESC]Mcdsp.	[ESC] Attention character M Mode control character c Clock chime (0-2) 0-Verbal time on request 1-Chime on 1/4 hour 2-chime & verbal time d Delay time Time in seconds between the receipt of any two characters which, if reached, will cause all previous characters to be spoken. If set to 0, disabled. s Serial output data length p Parallel output data length 0-8 data bits 1-7 data bits, 8th bit = 0 2-7 data bits, 8th bit = 1 . Sequence terminator

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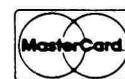
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IP#.
   
IPS TEXT.
   
IPP TEXT.

User Prompt
   
Serial Computer Prompt
   
Parallel Computer Prompt
   
! Non-speech control character
   
P Prompt control indicator
   
# Prompt number (0-8)
   
0-Ping 5-Interrogative
   
1-Alarm 6-Bleep
   
2-Big Ben 7-Charge!
   
3-Error 8-Bang
   
4-Ding Dong
   
S Serial output
   
P Parallel output
   
TEXT String to be sent via the serial or parallel port
   
. Sequence terminator

Table 7.
   
Prompt controls.

them, I got a DIRECTORY FULL message. Apparently there is a primary directory limit of 55 files. Five megabytes is a lot of room and 55 files hardly touch it, so we can circumvent this idiosyncrasy by creating sub-directories to categorize the types of programs and data we'll be handling.

The first drive I received was the Apple hard disk, Profile. As one might expect, coming from Apple, it was the most naturally suited for the III in terms of appearance. The interface card carries the Apple logo, will mount in any of the slots in the III (be sure to assign the correct slot number with the System Utilities Disk) and provides a DB-25 connector that protrudes slightly through one of the rear slots. The drive itself can sit on the Apple's case with the Monitor III on top of that. Connection between the hard disk and the computer is from a DB-25 on the back of the drive via a

the product development head hounded me for three days to show him how it worked. I can't say it's perfect—there are times when some of the words are not *quite* clear, but the firm is trying, and has done sky-rockets over the original Type 'N' Talk.

**Hard Wars**

It's not often that I'm overcome with anything, but this past month I

was totally overwhelmed. Through the grace of the powers that be and the cooperation of Apple Computer, Davong Systems and Xcomp Inc., I was blessed with a total 26 megabytes of hard disks to play with. Actually it wasn't play, it was all long, hard work that culminated in the following evaluation (right!).

My initial experiences with hard drives and the III were at first disappointing. After putting a few files on

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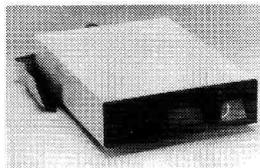


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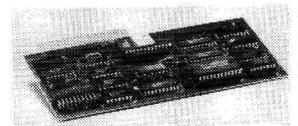
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short length of ribbon cable. It's a 5M (five million byte) disk that can be formatted using the SOS Utilities (once the .PROFILE driver has been added).

I'd had it for about 18 days when my Apple III bit the dust. It was 212 degrees Celsius in my living room and the III had been on for three or four hours when, with an almost imperceptible "pffftt," it gave up its life and took the Profile with it. I felt sorry for the hard disk—after all, it had traveled back and forth across the country from reviewer to reviewer only to meet its sorry end at the hands of my beast. It had performed flawlessly until then.

I replaced the motherboard on the III and Apple shipped me a new drive, and for the remainder of its stay with me, it also performed above and beyond the call of duty.

**"It was 212 degrees Celsius in my living room and the III had been on for three or four hours..."**

I found Profile itself to have only one quirk which I found discomforting (on a scale of uncomfortable, disagreeable and intolerable). On power-up, Profile does an internal check and surface analysis of the disk platters. While hard disks can usually take anywhere from 10 to 20 seconds to come to speed and be ready to use, Profile adds about 30 to 40 seconds to this for the surface verification, which can include the automatic transfer of data from a corrupt track to an available one. (The manual says it can take the drive up to a maximum of three minutes to be ready.)

The sore point there occurs if you have an application that transfers PREFIX\$ to the disk *after* Profile's LED shows a steady red light. Al-

though it could possibly save some aggravation later on, it's a minor inconvenience and it can't be deselected. Of the three hard disks I looked at, only Apple had this feature. I imagine it's purely a judgment call as to whether or not you're willing to trade faster initial access speed for possible corruption of hard disk data (personally, I'd prefer the verification feature).

Backup III, Apple's hard disk backup program supplied with Profile, was a little bit of a letdown. It works quite well, taking only 85 seconds to format and fill a floppy with a segment of the hard disk, and will give you a complete table of contents showing which disks contain what.

Backup options include full disk, filename, and last date selection criteria and although it would take 35

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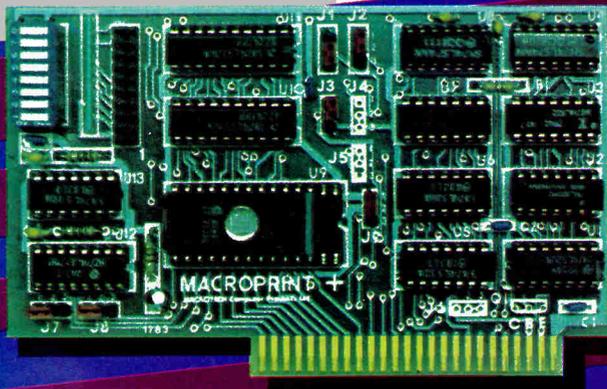
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disks to completely back up Profile (the data is *not* stored in the normal SOS directory fashion), that's only a small tradeoff in having the facility available.

What is irking, though, is that when Backup III finds an error (a bad sector on a destination disk, for instance) it aborts. If you were happily backing up three megabytes of information, had gotten to the two and a half point, and Backup III determined that the floppy you just put

**"If I ever use half of the material they provide..."**

in was bad, it would stop. You'd have to start the whole thing over again from the beginning (my Waterloo was on an 18-disk backup procedure; I got to number seven and it stopped). Also, the documentation notes that a situation could arise where Backup III can create a set of disks that will not be restorable.

Although Apple's documentation writer doesn't detail the how's and why's of it beyond the fact that it is a memory size difficulty, the problem is confined to 128K machines (there are some of us who still have them), in which case files would be restored by pathname rather than in bulk. I would presume that table of contents for the saved files would be too large to fit into memory, but don't quote me on it.

Next on the list was the Davong 5M unit. Of all, the documentation for that system was the most intense. If I ever use half of the material they provide, it will probably be too much for me. That is not to say that it shouldn't have been there, I'm actually very glad it is. In fact, they even document how to install a drive that isn't necessarily from Davong, using their interface card and software, providing you know the specifica-

tions for the drive in question. With the exception of a missing figure 2 that showed the cable orientation for the card, it is most well done.

The hard disk system itself is the most massive of the three, and also the most attractive. It comes with a strain relief attachment for the III's slot, and the interconnect cable is rfi (radio frequency interference) protected. There are a host of additional connectors on the back of the drive which are not documented and I can

**"Davong is very helpful in making sure you optimize the amount of space you need."**

only guess at whether or not they are supported for the Apple III (the same drive, by interchanging interface cards, can be used on a multitude of computers).

The only problem I have from a hardware point of view is that the Davong system *must* be turned on for the III to boot. If not, the screen fills with garbage and it locks up. Included in this proviso is the elapsed time between turning on the disk and the Apple. You must allot sufficient time for the drive to come to speed or the same problem will arise.

The extent of this inconvenience depends entirely on your machine habits. My CP/M work is done entirely to floppy and there are times when I use the Utilities to format 10 or 20 disks. During these periods I don't need the hard disk to be active, but it must be if I want to use the machine.

Considering that the hard disk is offered in a variety of sizes, Davong is very helpful in making sure you optimize the amount of space you need. Their system may be partitioned into smaller storage units through the install program to a maximum of four divisions per driver file. If more are needed, another copy of the driver is loaded and the device names (the

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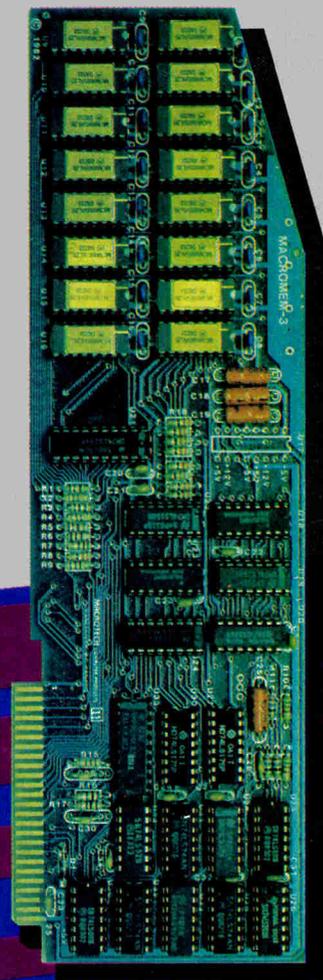
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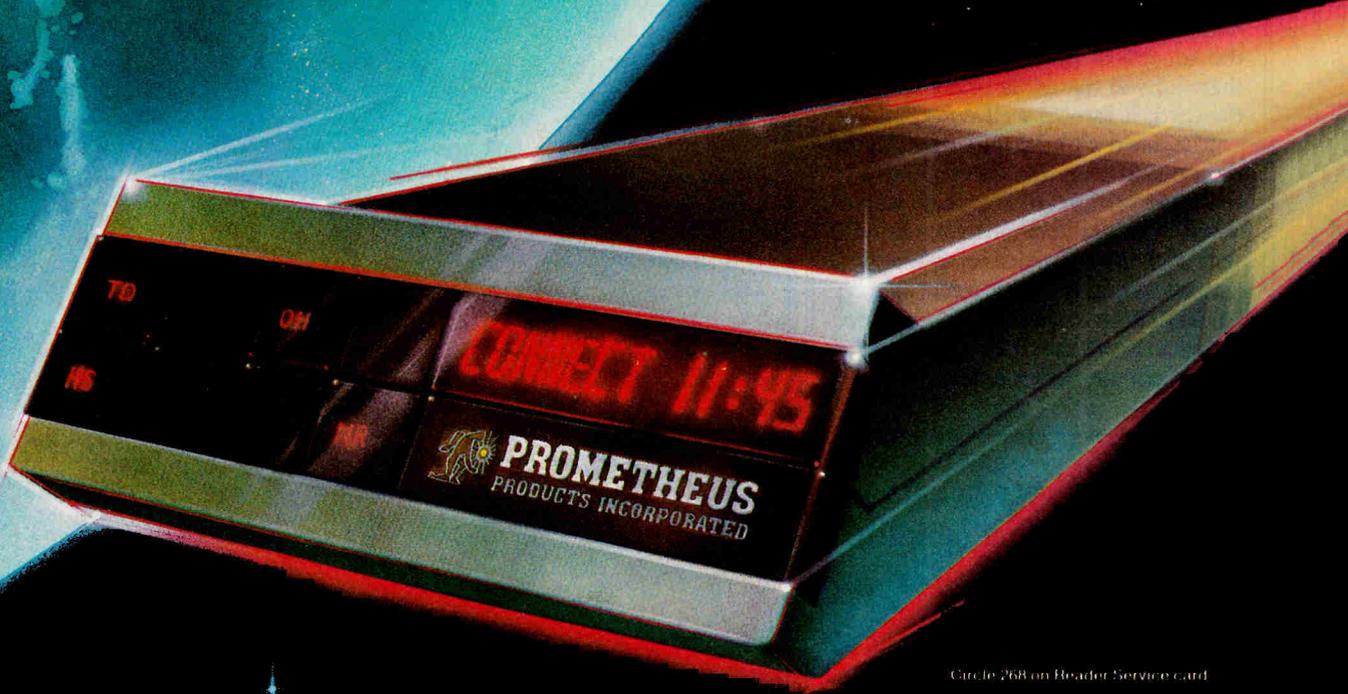


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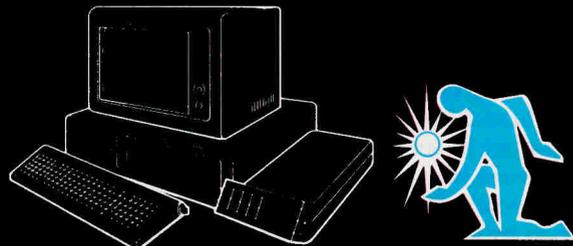
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# PROMETHEUS

default is .H1, .H2, .H3, .H4) are changed to reflect the difference.

Davong also supports backup of its hard disk to floppy and I have one minor and two major criticisms about the way they do that. Upon entering the backup program, you are asked to place a formatted floppy in the destination drive. Logical as it may sound, this request is made *before* a destination drive is selected. When that message appeared I questioned whether or not the program had a bug and had picked up some erroneous information, I removed all floppy disks, pressed "any key" as the prompt advised, and crossed my fingers. Naturally it came back with entry prompts for source and destination drives, but there was a fine moment of anxiety that I could have lived without.

Part of the above should also hint at one of the major criticisms. The backup program does not do formatting and most times you are left to guess how many disks you need until you run the program. Should your guesstimation be wrong, you'll have to reboot the System Utilities disk and format the rest.

Additionally, it appears as though the backup operation is a volume move, and, in fact, Davong states that it cannot be used for subdirectories or individual files. Given a 2M partitioned surface of their hard disk that might contain one 600K file, enough formatted floppies for the entire two megabytes must be provided. It's a bit awkward.

#### Awesome

Last of all was the disk system from Xcomp. I must honestly say that I had never heard of them before and initially visions of third or fourth rate merchandise danced in my head. That is definitely *not* the case.

They were trusting enough of me and their product to send along a 16M hard disk system. I had never seen one before and I won't hesitate to say I was awed. It was no larger than any of the others—in fact I was surprised that it was actually a little narrower than Profile although somewhat taller. The interface card

bore the initials SVA, which I presume to be Sorrento Valley Associates, a longstanding manufacturer of 8-inch and other cards for the Apple II.

Physically, the system is set up as two 8M volumes. This is *not* changeable. One of the volumes can be write-protected by means of a front panel switch; this allows one of the volumes to be the backup for the other. This may or may not cause problems, depending on a few things.

As it arrived from Xcomp, the drive was already conditioned (note I did not say "formatted") and ready to be formatted by a Utilities disk with their driver. The format procedure is quite rapid (to gauge size compared with formatting time, the Xcomp unit is the fastest of the three tested, formatting 8M in about the same time Profile formats 5M). However, should you accidentally crash the drive (as I did, but not accidentally), there are a few surprises.

By using Backup III to copy files from the first 8M to the second, I destroyed what appears to be an information file containing data about the hard disk system; this file is checked whenever either drive is accessed. SOS utilities couldn't reformat either of the two surfaces because the driver routine could no longer analyze this information block. This meant that the drive had to be reconditioned (all surfaces checked and verified for data retention ability and a new "control" block written).

In and of itself, that is no problem—Xcomp provides the needed utilities; I would presume, though, that they are somewhat new to Apple III conventions. The conditioning routines are Pascal programs run from Apple II emulation (Apple has an emulation mode Apple II Pascal runtime package) and that's not really a problem. They work. The method used is to check each of the slots to find the hard disk interface card. However, some Apple III boards, when initialized (and that is how the program determines whether or not the correct board is selected), must see some response from the physical

device to which they are connected.

Such is the case with my PKASO board. When the program went out to find the hard disk card, along the way it passed through my printer card. My printer was not on. The program hung up. Luckily, Interactive Structures has built several warning flags into their card that display on the lower right corner of the screen when a printer problem is noticed. I saw the indication for "printer off line" flashing at me, so I turned the printer on and the program chugged right along correctly finding the hard disk slot.

Conditioning 16M is *not* something you want to do if you're pressed for time, believe me. It takes almost four hours to read and verify every little bitty section of the disk. Under normal conditions, you will never have to do that. You can back up the first eight megabytes to the second and trust it (Xcomp does not have a hard-to-floppy backup, but at last note there was a streaming tape device in the works).

The only hardware complaint I have is about the interface cable. The connection to the card leaves the cable routed toward the front of the Apple III, and it must be looped back to correctly exit from the slot. This can play havoc with adjacent boards, and the sharp solder connections often found there may puncture the cable, causing a short.

One other small complaint is that I couldn't fill the disk up. Try as I might, I dumped everything I had on it, backed up Profile to the other eight megabytes, and it still smiled and asked, "What's next?"

And Xcomp the company, although it provides no real backup for its hard disk, although its touch on the III does appear to be fledgeling, is definitely on my recommended list. The Xcomp people are easy to talk to and the company is responsive.

Davong took three days to get back to me on a question I had, one that prevented me from using the system. In fairness to them, they prefer to work through their dealer network, using dealers to field questions and provide primary support.

Apple sometimes is left out when support is discussed. I expect a lot from them, and they have yet to let me down when it comes to answers I need for this column. By assumption and first-hand information, I know that this is the same level of support they have for their dealers when questions arise. I just wish more Apple dealers would take advantage of them.

**Conclusions**

As technology becomes more sophisticated, reviews like this become more and more difficult to do. None of the drives failed, they are all relatively quiet in operation, and they all extend the capability of the III to stellar levels. On a strictly subjective level, I would rank them Xcomp, Apple and Davong, with such a small difference between them that the final judgement did, indeed,

have to be subjective. Apple got first honors in professionalism, Davong in mechanical excellence and Xcomp in direct user friendliness. Now if the three of them could get together. . . .

Of the three, only the Apple unit has an "on" light, which, given the silence of the drives, I happen to think is essential. None of them have a valid backup system for critical information, although the Xcomp unit comes closest. Had they provided 8M of removable hard disk (to prevent accidents) with the 8M fixed, they would have earned my undying praise. Apple got a demerit for not yet introducing a larger capacity hard disk (across the board, not just for the III). Davong, at one point in the drive installation, asks the user to determine what type of hard drive is connected. This isn't a difficult procedure, but I shudder to think of the possibilities. And that's the way it

went. Little, mundane (except for the backup) points that could be and should be refined.

**Ho Ho Hope**

Soon, a somewhat rotund but nevertheless jolly man, dressed all in red, mounted on a red sleigh led by eight horned quadrupeds, will put in an appearance in your home. Some say there really isn't such an entity, but we know different. Where there is magic in the heart, there is the possibility of all things. I hope, when he arrives, he'll leave you the most precious of all gifts and that you'll enjoy it throughout the year. (By the way, this applies to *everybody*. I have it on very good authority that Mr. Claus is nonsectarian—just don't forget the cookies.)

For the time being, enjoy the holidays.

Ciao bene, AppleAmerica! ■

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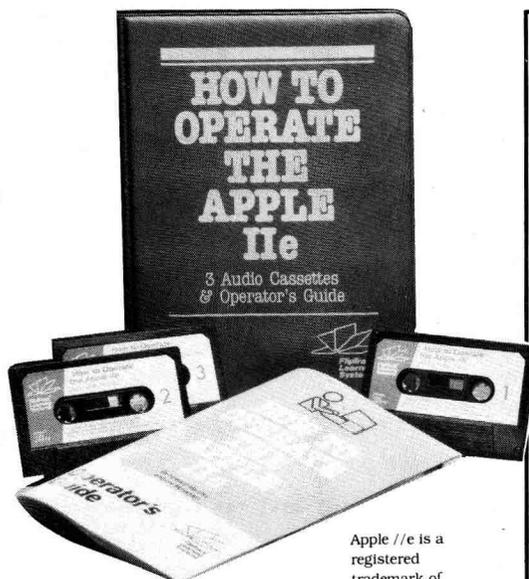
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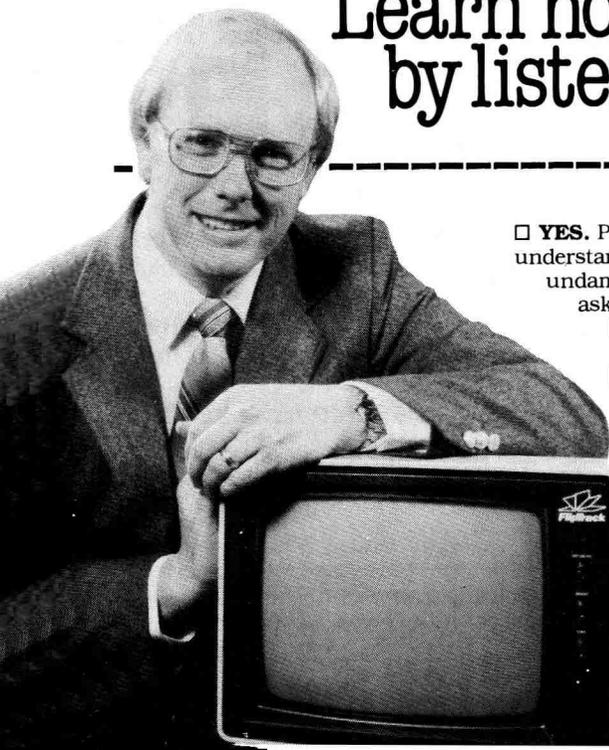
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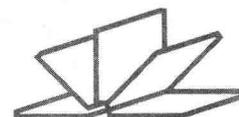
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# Bent on Business

by Gregory R. Glau

## Ratios, Etc.

**M**erry Christmas! This twelfth issue of *inCider* should arrive just before most small business owners end their fiscal year. Soon we'll have the year end statements that tell us how well (or how poorly) we managed our businesses last year, along with all sorts of figures and percentages that we may or may not use for statistics, graphs, and so on.

It's a funny thing about business-people—once you own a business, you're automatically expected to understand all those facts and figures your accountant comes up with. When the banker or accountant mentions the *quick ratio* or *acid test* or the *Use of Funds Report*, they assume you understand what they mean. While some business owners had college training, too many of us didn't, so we've had to learn the hard way—by trial and error.

So now you might understand that current assets should be about two times what current liabilities are, that overhead should be about X percent of sales, that your accounts receivable total should be roughly twice that of what you owe, and so on; through *experience* you've come to agree with what the experts say in their books.

Your Apple can be a terrific tool for this kind of analysis. In any spreadsheet program or even in a little homegrown Basic program, you can enter formulae and financial data for your business and let your Apple do all the calculations. You can even design screen displays and printouts to determine what the proper ratios should be, so you can compare yours to the ideal figures.

When you get your year end statement this year, examine the parts of your business you may never have examined before. Let your Apple do

the math and perhaps you'll learn something that will help you next year.

\$\$\$\$\$\$

One thing dear to all our hearts is *cash*. Without it, business stops. Calculate your working capital by subtracting current liabilities from current assets—deducting anything you owe on a short term basis both from cash *and* anything you could quickly convert to cash. One similar ratio is suggested in *The Analysis of Financial Statements* (by Leopold Bernstein, published by Dow Jones-Irwin). It's a measurement of your financial liquidity:

$$\frac{\text{Cash + Cash-like Assets}}{\text{Total Assets}}$$

The higher this ratio is, the more liquid your current assets are. In effect, this ratio asks, "What percent of our total assets comes from our current assets—the ones we can change quickly into cash?" Obviously, if all of your assets are in cash (or its equivalent), you'd be very liquid in terms of capital. As this ratio decreases, you'll find that you may experience cash problems.

If you have a total of \$20,000 in current assets (cash and cash equivalents) and \$100,000 in total assets, this ratio would be .20, or 20%. If you had \$40,000 in current assets, this figures rises to .40, or 40%. The higher the figure, the more liquid is the state of your assets.

On the ugly side of the ledger, your accounts payable total represents what you owe. One helpful ratio associated with payables is this one from the same book:

$$\frac{\text{Accounts Payable}}{\text{Purchases}} \times 365$$

This ratio measures current payables—not those overdue. For example, let's assume your total purchases last year were \$180,000 and your year end accounts payable total \$20,000. With the above formula (the 365 stands for days in the year), you end up with:

$$20,000 / \frac{180,000}{365}$$

When you divide 180,000 by 365 you get 493—the dollar amount of inventory you purchased each day last year. When you divide 493 into current payables of \$20,000, you get 40—your accounts payable total representing forty days worth of purchases.

What if your current accounts payable total \$40,000? Your formula is:

$$40,000 / \frac{180,000}{365}$$

This indicates your current accounts payable total represents 81 days worth of purchases—an amount definitely older than it should be.

Along this same line, your financial statements should list the total cost of goods sold and your year end inventory. Ideally, your Apple should average your starting and ending inventory amounts, and if you have monthly figures, your total and average for the year.

Whenever a business has inventory, the only way it can create a profit is to sell the products—the more items sold, the larger the profit (at least that's the way it should be). The secret, then, is to *turn* your inventory as often as possible. A ratio

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

noted by Albert Lowry in *How to Become Financially Successful by Owning Your Own Business* (published by Simon and Schuster) is:

$$\frac{\text{Cost of Goods Sold}}{\text{Inventory}}$$

If your total cost of goods sold last year was \$120,000 and your average inventory was \$10,000, you're turning your inventory 12 times a year. If you have \$20,000 worth of things on your shelves, you're moving your inventory only six times a year.

Compare this ratio with other years. Did you turn your inventory more last year than usual, or less often? A slowdown is a danger sign—products are sitting in your warehouse, rather than moving.

In *How to Read a Financial Statement* (published by John Wiley & Sons), John Tracy suggests that rather than comparing profits to sales (as we all do), you should compare profits to total assets:

$$\frac{\text{Operating Profit Before Taxes}}{\text{Total Assets}}$$

If your business shows a net profit before taxes of \$20,000 and you have total assets of \$100,000, the amount you earned based on the assets you have *invested* in the business comes out to .20, or 20%. If you had a net profit before taxes of only \$5,000, you only earned five percent on your assets; it might be better to take those assets and invest them elsewhere.

Tracy and Bernstein both suggest you examine the relationship between what your business owes (your total liabilities) to the total amount invested in the enterprise (usually listed on the balance sheet as owner's or stockholder's equity). Here's the formula:

$$\frac{\text{Total Liabilities}}{\text{Owner's or Stockholder's Equity}}$$

Include *all* debt and *all* equity (including what are called "retained earnings") to get a proper comparison.

Imagine your business has total liabilities of \$100,000 and owner's equity is \$200,000. Your formula is:

$$\frac{100,000}{200,000}$$

This gives you a .5 ratio, meaning you have two dollars of equity (investment) in your business for every dollar you owe. Generally, this ratio should stay below 1—otherwise, your creditors have more invested in your business than you do. This is another ratio that deserves to be examined on a comparative basis—how did you do last year compared with prior years?

Finally, Al Lowry suggests an interesting ratio that compares your long-term debt to the net value of the building(s), property and equipment you use in your business. Generally speaking, businesses finance long-term purchases either through equity financing (sell some more stock) or through long-term borrowing. Short-term loans are fine to solve cash flow fluctuations. But avoid using long-term financing to handle your day-to-day cash requirements. The cash gets spent, but the long-term obligation remains, and must be repaid. Here's the formula:

$$\frac{\text{Net Value of Building(s)} + \text{Property} + \text{Equipment}}{\text{Long-term Debt}}$$

As long as the top figure is larger than your debt total, this ratio is acceptable. If what you owe on a long-term basis begins to exceed what your fixed assets are, the ratio is warning you that you're trying to solve everyday cash flow problems with long-term money.

#### Things to Remember

Keep in mind that ratios are indications of a particular financial condition. There aren't any steadfast rules that apply to every business; since conditions change every year for every business, any ratio should be considered as just a guide. But like a danger signal in medicine, financial ratios often can point out trouble in your business.

It's also important to examine ratios you use over extended periods of time. Surprisingly, each specific comparison will usually produce fig-

ures close to those from other years—danger arises only through wide value swings.

Watch for percentages rather than raw figures. Don't be like the business owners who thought they were golden because they kept working capital at a \$25,000 level. However, each year their sales went up, their operating capital—as a percent of sales—became lower and lower. Suddenly they had plenty of sales, but not enough available cash to support them. If they'd examined their working capital in relation to sales as a ratio, they might have noticed the trend before it was too late.

Try some of these unusual ratios on your upcoming financial statement. Let your Apple do the hard work and you'll learn something important and helpful about your business, so next year will be even better! ■

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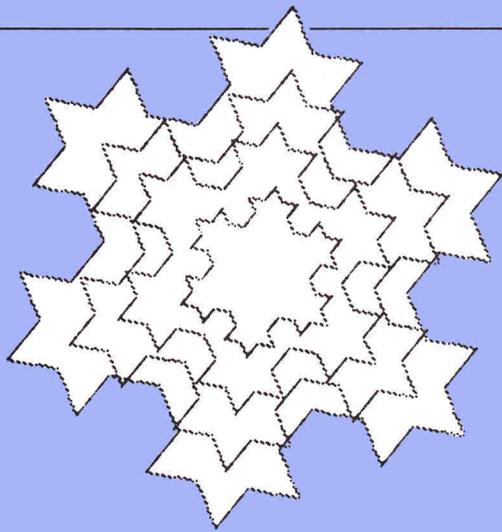
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# 'Tis the Season To be Graphic

by Maria DeMarco

**T**rees are a perennial subject for computer scientists. The Christmas variety, however, is appropriate only during the holiday season.

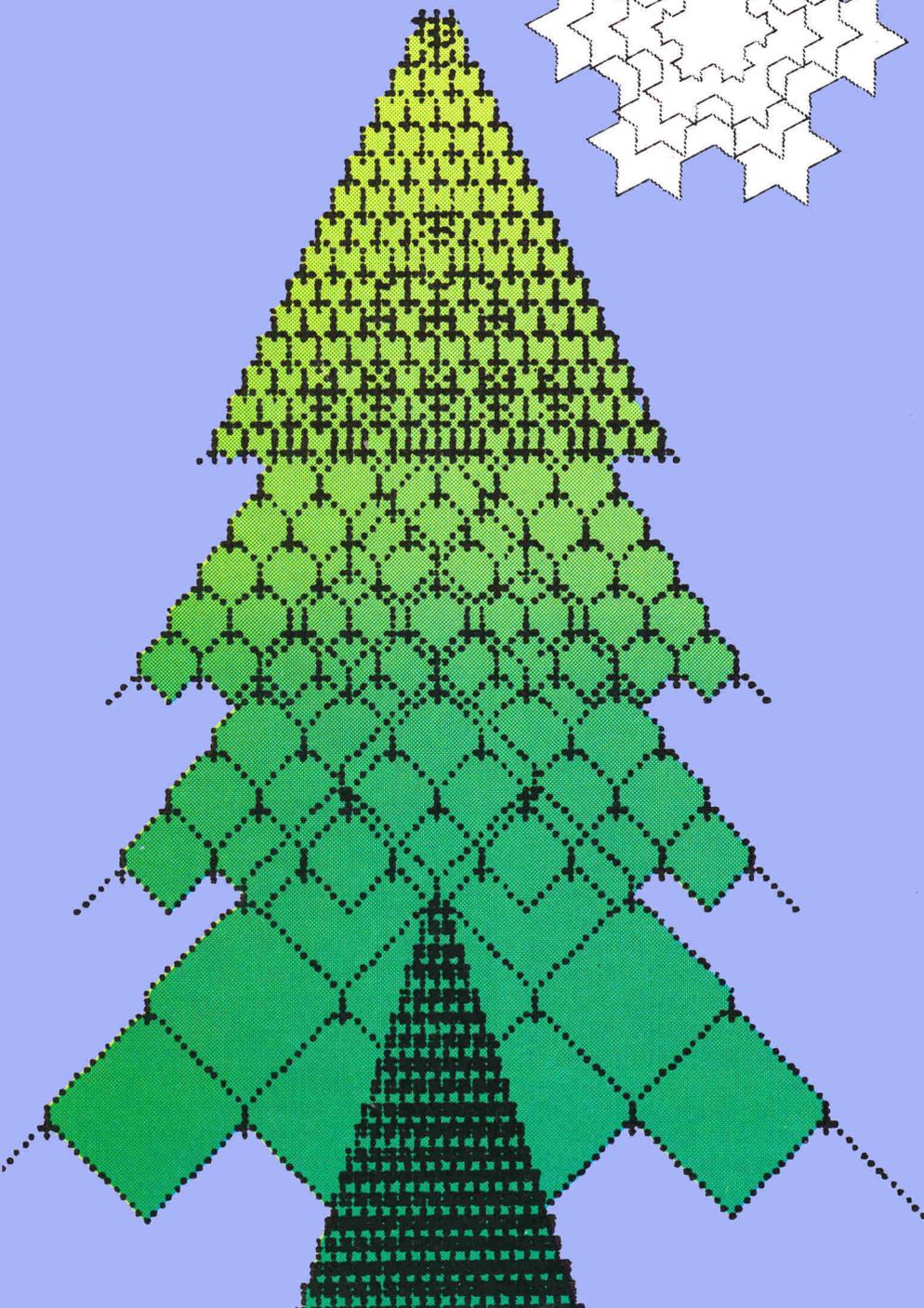
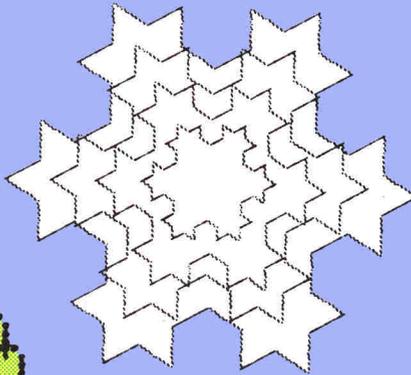
Preparing a Christmas card on the computer does not necessarily mean it has to look like something out of a geometry textbook. Using both the computer's ability to duplicate any kind of pattern and Apple Pascal's Turtle graphics, I managed to create some interesting artistic effects.

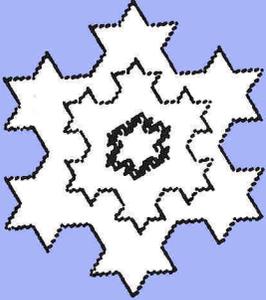
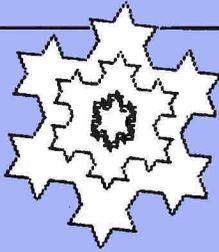
In my Pascal program XMASTREE (Listing 1), procedure START, which includes a call to procedure FILL, creates the canvas on which I will create my trees. A pencolor of BLACK1 is used for the area I will be drawing on, and GREEN is used for the outline.

Procedure TREE is a main procedure, with two nested procedures—procedure BRANCH and procedure Y. Procedure TREE (beginning at BEGIN (\*TREE)) calls procedure BRANCH and passes it an integer value of 70, which is stored in its local variable called NO. Procedure BRANCH, in turn, calls procedure Y, the basic building block for the trees. Procedure Y also has a local integer variable called LEN which accepts whatever integer value is passed to it from procedure BRANCH.

The procedure TREE uses a pencolor of NONE to move to the correct position on the screen, and then sets a pencolor of WHITE. White gives the finest lines possible, whereas the colors give a wider line so that they may show up on a color television screen. Even on a black and white monitor you will notice a contrast between the tree and its green border.

The main program, as in most Pascal programs, is quite short, leaving most of the drudgery to the proce-





dures. The integer variable HEIGHT is set to 30 in the main program and is left at this value for the duration of this version of my tree program. The Boolean variable called FOREVER is used to keep the menu repeating ad infinitum.

The main program presents the menu of choices for selecting your Christmas tree, passes on instructions according to your choice, and returns you safely to the menu to make another selection. Thus, it supervises from below all procedures mounted on its responsible shoulders.

The case command in the main program calls the appropriate procedure, depending on the option you have selected. It also sets the appropriate values for the integer variables SIZE, used by the BRANCH procedure, and SCALE, which is needed by the Y procedure. Each tree begins with the START procedure, which creates the canvas, and ends with the FINISH procedure, which puts on the finishing touches.

Once you decide which tree you want to take home, enter a "4" to exit the program. This will execute the GOODBYE procedure, which includes an Exit(Program) command.

Note that CLSCREEN is not a built-in Pascal function, but rather refers to my procedure CLSCREEN which makes the current text lines scroll up out of sight, leaving a clean slate for the menu display. Nor are INVERSE and NORMAL Pascal intrinsics, though they are available as commands in Applesoft Basic. These two variables have been defined as type CHAR at the beginning of the program,

*Listing 1. XMASTREE.*

```
PROGRAM XMASTREE;
USES TURTLEGRAPHICS;
VAR SCALE,I,J,K,HEIGHT,STX,SIZE:INTEGER;
    CH,NORMAL,INVERSE:CHAR;
    SEL:INTEGER;
    FOREVER:BOOLEAN;
    TEST:REAL;

PROCEDURE CLSCREEN;
VAR LINE:1..25;
BEGIN
    FOR LINE:= 1 TO 25 DO WRITELN;
END;

PROCEDURE FILL;
BEGIN
    VIEWPORT(0,279,0,191);
    FILLSCREEN(GREEN);
    VIEWPORT(25,255,1,190);
    FILLSCREEN(BLACK1);
END;

PROCEDURE TREE(HEIGHT:INTEGER);
VAR I,P1,P2:INTEGER;

    PROCEDURE BRANCH(NO:INTEGER);
    VAR I,A,B:INTEGER;

        PROCEDURE Y (LEN:INTEGER);
        BEGIN
            TURNT0(-90);
            MOVE(LEN*SCALE);
            J:=TURTLEX; K:=TURTLEY;
            TURNT0(-45);
            MOVE(ROUND(LEN*SCALE*TEST));
            A:=TURTLEX;
            B:=TURTLEY;
            MOVETO(J,K);
            TURNT0(-90);
            MOVE(LEN*SCALE);
            MOVETO(J,K);
            TURNT0(-135);
            MOVE(ROUND(LEN*SCALE*TEST));
            END (* END Y*);

        BEGIN (*BRANCH*)
            Y(SIZE);
            P1:=A;
            P2:=B;
            PENCOLOR(WHITE);
            FOR I:= 1 TO NO DO
                BEGIN
                    IF TURTLEY<(190-HEIGHT) THEN EXIT(BRANCH);
                    Y(2);
                END;
            END;

        BEGIN (*TREE*)
            BRANCH(70);
            FOR I:= 69 DOWNT0 0 DO
```

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*Listing continued.*

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and then set equal to CHR(20) and CHR(18), respectively, in the main program. After making these assignments, they can then be used in print statements, like so:

```
WRITE(INVERSE, ENTER SELECTION );
```

These ASCII values can be used for INVERSE and NORMAL in Pascal 1.1.

A building block approach also can be used to create the snowflakes—

**"The SNOW program can be modified to create snowflakes of many sizes at random screen points for a truly white Christmas."**

without which Christmas wouldn't really be complete. Because the techniques used in the program SNOW are similar to those in XMASTREE, you don't need a blow-by-blow description of the program (Listing 2). When you run this program, you will see the following message on the screen:

```
SCALE: INTEGER 1-10
```

Entering a whole number in that range will set the size of the snowflake. When you have seen enough of a particular snowflake, press any key and you will be returned without ado to Textmode. The following message then will be displayed:

```
TO CONTINUE PRESS Y
```

Pressing Y will let you try creating a snowflake of a different size.

The snowflakes show the output from the SNOW program, using the integer values of 9 and 5. It's more fun watching Mother Nature dynamically at work on the screen than seeing the static printout; the same applies for the Christmas trees.

The Snow program can be modified to create snowflakes of many sizes at random screen points for a truly white Christmas.

I wish you a very Graphic Christmas and a Happy New Year. ■

*Listing continued.*

```

      BEGIN
      IF P2<(190-HEIGHT) THEN EXIT(TREE);
      PENCOLOR(NONE);
      MOVETO(P1,P2);
      PENCOLOR(WHITE);
      BRANCH(I);
      END;

END;

PROCEDURE START;
BEGIN
  INITTURTLE;
  FILL;
  MOVETO(STX,190);
  PENCOLOR(WHITE);
END;

PROCEDURE FINISH;
BEGIN
  PENCOLOR(NONE);
  MOVETO(STX,190-(I*HEIGHT-60));
  PENCOLOR(WHITE);
  TREE(HEIGHT*I);
END;

PROCEDURE TREE1;
BEGIN
  TEST:=2;
  TREE(HEIGHT);
  FOR I:= 2 TO 6 DO
    BEGIN
      TEST:=TEST+2;
      IF I= 6 THEN TEST:=1;
      FINISH;
    END;
  END;

PROCEDURE TREE2;
BEGIN
  TEST:=1.5;
  TREE(HEIGHT);
  FOR I:=2 TO 6 DO
    BEGIN
      CASE I OF
        2:TEST:=1.5;
        3:TEST:=2.5;
        4:TEST:=4;
        5:TEST:=9;
        6:TEST:=1
      END (*CASE*);
      FINISH;
    END;
  END;

PROCEDURE TREE3;
BEGIN
  TEST:=0.5;
  TREE(HEIGHT);
  FOR I:= 2 TO 6 DO
    BEGIN
      CASE I OF
        2:TEST:=1;

```

*Listing continued.*

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Listing continued.

```

3:TEST:=2;
4:TEST:=4;
5:TEST:=9;
6:TEST:=1;
END(*CASES*);
FINISH;
END;

```

END;

PROCEDURE FRAME;

```

BEGIN
  PENCOLOR(NONE);
  TURNT0(0);
  MOVETO(25,1);
  PENCOLOR(WHITE1);
  MOVE(230);
  TURN(90);
  MOVE(189);
  TURN(90);
  MOVE(230);
  TURN(90);
  MOVE(189);
END;

```

END;

PROCEDURE MESSAGE;

```

BEGIN
  PENCOLOR(NONE);
  MOVETO(52,160);
  WSTRING('MERRY');
  MOVETO(38,145);
  WSTRING('CHRISTMAS');
  PENCOLOR(NONE);
  MOVETO(191,160);
  WSTRING('HAPPY');
  MOVETO(181,145);
  WSTRING('NEW YEAR');
END;

```

END;

PROCEDURE GOODBYE;

```

BEGIN
  CLSCREEN;
  GOTOXY(5,5);
  WRITE(NORMAL,'THAT'S ALL FOLKS');
  EXIT(PROGRAM);
END;

```

BEGIN (\*MAIN PROGRAM\*)

```

  FOREVER:=FALSE;
  HEIGHT:=30;
  STX:=139;
  NORMAL:=CHR(20);
  INVERSE:=CHR(18);
  REPEAT
  CLSCREEN;
  GOTOXY(12,2);
  WRITE(INVERSE,'CHOOSE YOUR TREE');
  GOTOXY(5,6);
  WRITE(NORMAL,'1. DISPLAY TREE1');
  GOTOXY(5,10);
  WRITE('2. DISPLAY TREE2');
  GOTOXY(5,14);
  WRITE('3. DISPLAY TREE3');

```

Listing continued.

Listing continued.

```
GOTOXY(5,18);
WRITE('4. EXIT PROGRAM');
GOTOXY(10,21);
WRITE(INVERSE,'ENTER SELECTION ');
READLN(SEL);
CASE SEL OF
  1:BEGIN SIZE:=1;SCALE:=1;START;TREE1;END;
  2:BEGIN SIZE:=2;SCALE:=1;START;TREE2;END;
  3:BEGIN SIZE:=2;SCALE:=2;START;TREE3;END;
  4:GOODBYE;
END (*CASES*);
MESSAGE;
FRAME;

READ(KEYBOARD,CH);
TEXTMODE;
UNTIL FOREVER;
END.
```

Listing 2. SNOW.

```
PROGRAM SNOW;
USES TURTLEGRAPHICS;
VAR SCALE:INTEGER;
    CH:CHAR;
    FOREVER:BOOLEAN;

PROCEDURE FLAKE;
VAR I:INTEGER;

PROCEDURE PATTERN(SIZE:INTEGER);
VAR I:INTEGER;
PROCEDURE TRI;
BEGIN
  MOVE(SIZE*SCALE);
```

Listing continued.

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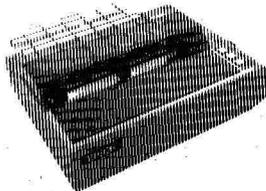
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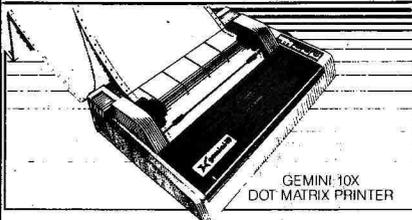
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*Listing continued.*

```

TURN(120);
MOVE(SIZE*SCALE);
END (*TRI*);

BEGIN (*PATTERN*)
FOR I:= 1 TO 3 DO
BEGIN
TURN(-60);
TRI;
END;
TURN(-60);
MOVE(SIZE*SCALE);
TURN(-60);
MOVE(SIZE*SCALE);
END(*PATTERN*);

BEGIN (*FLAKE*)
FOR I:= 1 TO 6 DO
BEGIN
PATTERN(2);
END;
END (*FLAKE*);

BEGIN (*MAIN PROGRAM*)
FOREVER:=FALSE;
REPEAT
WRITELN('SCALE:INTEGER 1-10');
READLN(SCALE);
INITTURTLE;
MOVETO(70,45);
TURNTO(-90);
PENCOLOR(WHITE);
FLAKE;
PENCOLOR(NONE);
MOVETO(80,55);
SCALE:=SCALE-2;
TURNTO(-90);
PENCOLOR(WHITE);
FLAKE;
PENCOLOR(NONE);
MOVETO(90,65);
SCALE:=SCALE-2;
TURNTO(-90);
PENCOLOR(WHITE);
FLAKE;
PENCOLOR(NONE);
MOVETO(100,75);
SCALE:=SCALE-2;
TURNTO(-90);
PENCOLOR(WHITE);
FLAKE;

READ(KEYBOARD,CH); (* PRESS ANY KEY TO
RETURN TO TEXTMODE *)

TEXTMODE;
WRITELN;
WRITE(' TO CONTINUE PRESS Y ');
READ(KEYBOARD,CH);
WRITELN;
IF CH<>'Y' THEN EXIT(PROGRAM);
UNTIL FOREVER;
END.
    
```

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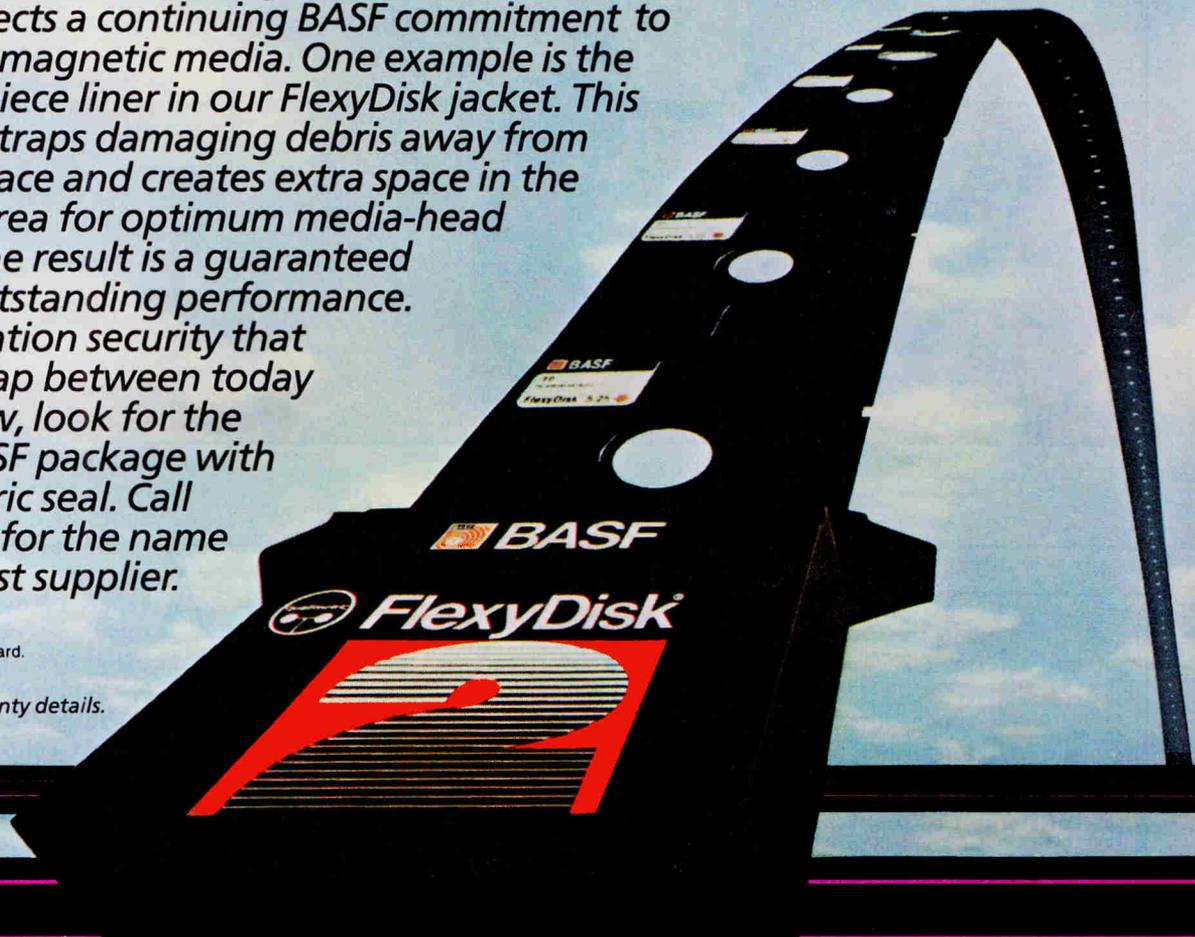
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by David P. Shields

*Program listing, Toy Factory.*

```

10 REM (C) 1983 D SHIELDS
20 REM
30 CLEAR : TEXT : HOME
40 GOTO 290
50 REM
60 REM ::: CENTER PRINT :::
70 ST% = (40 - LEN (ST%)) / 2: PRINT
   SPC( ST%);ST%: RETURN
80 REM
90 REM :::CENTER OUT ERASE:::
100 FOR I = 1 TO 12: POKE 34,12 -
   I: POKE 35,12 + I: POKE 33,4
   + 3 * I: CALL - 936: FOR J
   = 1 TO 18: NEXT J: NEXT I: RETURN
110 REM
120 REM ::: FALLING LETTERS
130 REM
140 L = PEEK (37): IF NOT QQ THEN
   DIM R$(40),DL(40):QQ = 1
150 POKE 216,0: FOR X = 0 TO 39:
   R$(X) = " ":DL(X) = 0: NEXT
   : FOR X = 1 TO LEN (ST%):R$
   (X) = MID$(ST%,X,1):NEXT
   (X): FOR X = 0 TO LEN (ST%) -
   1:DL(X) = INT ((RND (1) *
   L) - L):NEXT
160 FOR X = 0 TO LEN (ST%):DL(X
   ) = DL(X) + 1: IF DL(X) > L THEN
   DL(X) = L
170 IF DL(X) = 0 THEN DL(X) = 1
180 IF DL(X) < 1 THEN 210
190 HTAB (X + INT ((20 - LEN (
   ST%) / 2)):UTAB DL(X): PRINT
   R$(X): IF DL(X) = 1 THEN 210
200 HTAB (X + INT ((20 - LEN (
   ST%) / 2)):UTAB DL(X) - 1:
   PRINT " "
210 NEXT
220 FOR X = 0 TO LEN (ST%) - 1:
   IF DL(X) < > L THEN 160
230 NEXT : RETURN
240 REM
250 REM ::: GET RESPONSE :::
260 GET Z%:Z% = 0: FOR I = 1 TO
   LEN (Z%): IF MID$(Z%,I,
   1) = Z% THEN Z% = 1
270 NEXT I: IF Z% = 0 THEN 260
280 PRINT Z%: RETURN
290 REM ==> BEGIN MAIN PROGRAM
300 FOR I = 1 TO 5: READ DAY$(I)
   :NEXT I
310 FOR I = 1 TO 3: READ EQUIP$(
   I):NEXT I
320 CASH = 20:E$ = EQUIP$(1):E =
   50:PRICE = 2:LOAN = 110:X =
   1:Y = 1
330 UTAB 6:ST% = "TOY FACTORY": GOSUB
   140
340 FOR I = 1 TO 1000: NEXT I
350 PRINT : PRINT : INPUT "HI! W
   HAT IS YOUR NAME ? ":NA$
360 PRINT : PRINT :ST% = "CONGRA
   TULATIONS, " + NA$ + " !!!":
   GOSUB 70: PRINT :ST% = "YOU

```

*Listing continued.*

As part of a graduate course in economics education, I had to devise a project that would impart some economic concepts to my always reluctant students. Being the avid Apple buff that I am, I seized upon the opportunity to hide away and play with my favorite educational toy.

The result is the program that I call Toy Factory, a business simulation game in which you start your own business to manufacture any kind of toy your heart desires (even Apples, I suppose). Daily business risks occur randomly to simulate real and often unexpected expenses that detract from income.

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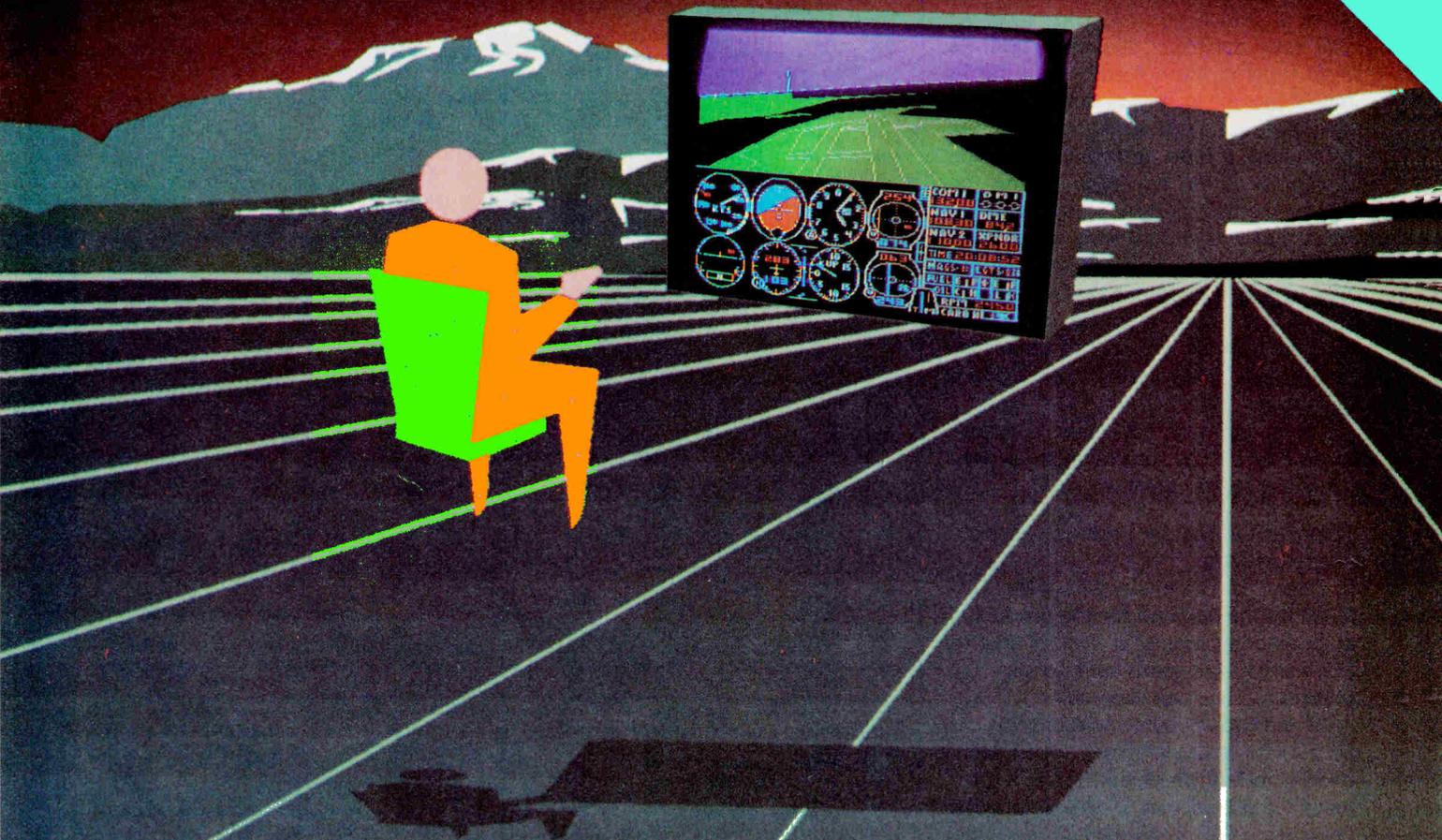
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Listing continued.

choice of three methods to manufacture your toys. For each method, the cost factor and the production rate are different, to simulate the advantages of such investments and also the risks. Daily risks become much more costly when using more expensive equipment.

2) *Pricing.* You can also control the price at which you sell your toys. As you raise the price, the daily business risks become more costly, resulting in loss of income as buyers stop buying.

3) *Financing.* You start your business by signing a loan agreement with the Apple Bank. At any time during the game you may increase your loan to either finance a capital investment or to avoid a negative cash balance. At the end of the first four-week (20-round) session, all loans must be paid back with interest. If you do not have cash to do this, your factory is declared bankrupt.

Three primary economic concepts can be learned by the player from participating in Toy Factory:

1) Capital goods are necessary for economic growth.

2) Pricing must remain within the limits set by the demand for the product.

3) Borrowing money is a valid way to finance capital goods and to pay for unexpected business expenses.

At the end of four weeks of play, an accounting is made of net profits. Any indebtedness to the bank, including interest, is subtracted. If the balance is negative, the business is declared bankrupt and you are given the opportunity to start again with a new business. If the balance is positive, however, you can continue your business venture for another month. Competition between players can be encouraged by keeping track of who makes the most profit.

My seventh and eighth grade students have thoroughly tested Toy Factory. They are eager to play it and the game induces keen competition. Random decision making has given way to clearer strategies that demonstrate a basic understanding of the economic concepts involved.

If that isn't enough, I had a lot of fun programming Toy Factory, and got an A in my course to boot. ■

```

ARE NOW THE OWNER OF A TOY
FACTORY.": GOSUB 70
370 PRINT : PRINT : PRINT "WHAT
KIND OF TOY WILL YOU MAKE ?"
: INPUT "(PLURAL FORM PLEASE
.)" : TY%
380 PRINT : PRINT "O.K. "NA%", "
TY%" IT WILL BE !!!": FOR I =
1 TO 2000: NEXT I: GOSUB 100

390 PRINT "THERE ARE 3 WAYS TO M
AKE "TY%": PRINT
400 PRINT " 1) USING A "EQUIP%(
1)" WHICH": PRINT " MAKE
$ 50 "TY%" A DAY."
410 PRINT " 2) USING A "EQUIP%(
2)" WHICH": PRINT " MAKE
$ 100 "TY%" A DAY."
420 PRINT " 3) USING A "EQUIP%(
3)" WHICH": PRINT " MAKE
$ 200 "TY%" A DAY."
430 PRINT : PRINT "YOU CAN HAVE
ONLY ONE OF THESE MACHINES":
PRINT "TO WORK WITH AT A TI
ME. YOU MUST TRADE"
440 PRINT "IN YOUR MACHINE WHEN
YOU PURCHASE A": PRINT "BETT
ER ONE. SINCE YOU ARE JUST S
TARTING"
450 PRINT "YOUR FACTORY, IT WOU
LD BE BEST TO START": PRINT "
WITH A "EQUIP%(1)".
460 PRINT : PRINT "A NEW "EQUIP%
(1)" COSTS $80. YOU WILL ALS
O": PRINT "NEED A LITTLE CAS
H FOR UNEXPECTED"
470 PRINT "BUSINESS EXPENSES THA
T COME UP DAILY.": PRINT "FO
R THIS YOU WILL HAVE TO TAKE
OUT A"
480 PRINT "LOAN AT THE APPLE BAN
K.": PRINT TAB(13) "-----
-----"
490 PRINT TAB(7) "PRESS ANY KEY
TO GO ON. ": GET Z%: GOSUB
100
500 K = 36: POKE 48,K
510 HLIN 39,0 AT 0: HLIN 39,0 AT
1
520 ULIN 0,47 AT 0
530 HLIN 0,39 AT 46: HLIN 0,39 AT
47
540 ULIN 47,0 AT 39
550 POKE 32,3: POKE 33,36: POKE
34,2: POKE 35,22
560 VTAB 3: ST% = "APPLE BANK LOA
N AGREEMENT ": GOSUB 70: ST
% = "-----
-----" : GOSUB 70
570 PRINT " I, "NA%", AM BORR
OWING"
580 PRINT : PRINT "$100 FROM APP
LE BANK TO START A"
590 PRINT : PRINT "FACTORY TO MA
KE TOY "TY%".
600 PRINT : PRINT " I AGREE TO
PAY APPLE BANK 10%"
610 PRINT : PRINT "SIMPLE INTERE
ST. THE TOTAL AMOUNT"
620 PRINT : PRINT "OF $110 WILL
BE DUE AT THE CLOSE"
630 PRINT : PRINT "OF MY FOURTH
WEEK OF BUSINESS."
640 PRINT : INPUT " SIGN NAME
HERE: ": Z%
650 IF LEFT% (Z%, LEN (NA%)) <
) NA% THEN PRINT "NO, "NA%
" MUST SIGN THIS !!!": GOTO 6
40
660 FOR I = 1 TO 1000: NEXT I: POKE
32,0: POKE 33,40: POKE 34,0:
POKE 35,24: GOSUB 100
670 PRINT : PRINT "YOU CAN NOW B
UY YOUR $80 "EQUIP%(1)": PRINT
"AND HAVE $20 LEFT OVER FOR
EMERGENCIES."
680 PRINT "YOU MAY BORROW MORE M
ONEY AT ANY TIME.": PRINT "B
UT YOU WILL HAVE TO PAY IT B
ACK WITH"
690 PRINT "10% SIMPLE INTEREST A
T THE END OF YOUR": PRINT "F
OURTH WEEK OF BUSINESS."
700 PRINT : PRINT "THE USUAL SEL
LING PRICE FOR TOY": PRINT T
Y% " IS $2. YOU WILL ALSO"
710 PRINT "START THERE. YOU MAY,
HOWEVER, RAISE OR": PRINT "
LOWER YOUR PRICE BY $1 AT AN
Y TIME. YOU"
720 PRINT "RUN THE RISK OF LOSIN
G MONEY IF YOUR": PRINT "PRI
CE GETS SO HIGH THAT PEOPLE

```

```

STOP": PRINT "BUYING, SO BE
CAREFUL WITH THIS."
730 PRINT : PRINT : PRINT "PRESS
ANY KEY WHEN YOU ARE READY
TO": PRINT "BEGIN MAKING YOU
R TOY "TY%": GET Z%: GOSUB
100
740 ST% = NA% + "/"S TOY FACTORY":
GOSUB 70: ST% = " WE MAKE TO
Y " + TY% + " !!!": GOSUB 70
750 FOR I = 1 TO 38: PRINT "=":
NEXT I: PRINT : POKE 34,3
760 FOR WK = 1 TO 4: FOR DY = 1 TO
5
770 PRINT "WEEK "WK" -- "DAY$(DY
)": PRINT TAB(21) "$" "CASH"
AVAILABLE"
780 FOR I = 1 TO 38: PRINT "-":
NEXT I
790 PRINT : PRINT "1. YOU ARE US
ING A "E%: PRINT " WHICH M
AKES "E" "TY%" A DAY."
800 PRINT "2. YOU ARE CHARGING $
"PRICE" PER TOY."
810 PRINT "3. YOU OWE THE BANK $
"LOAN.": PRINT
820 PRINT "DO YOU WANT TO CHANGE
ANYTHING? (Y/N)": Z% = "YN
": GOSUB 240
830 IF Z% = 1 THEN GOSUB 950: HOME
: GOTO 770
840 GOSUB 1220
850 CASH = CASH + (E * PRICE): X =
1: IF CASH > 500 THEN X = 2:
IF CASH > 1000 THEN X = 3: IF
CASH > 1500 THEN X = 4: IF C
ASH > 2000 THEN X = 5
860 Y = 1: IF PRICE > 3 THEN Y =
2: IF PRICE > 5 THEN Y = 3: IF
PRICE > 7 THEN Y = 4: IF PRI
CE > 9 THEN Y = 5: IF PRICE >
10 THEN Y = 6: IF PRICE > 11
THEN Y = 7: IF PRICE > 12 THEN
Y = 8: IF PRICE > 13 THEN Y =
10
870 FL = 0: HOME : NEXT : NEXT
880 ST% = "END OF THE MONTH REPOR
T": GOSUB 70
890 PRINT : PRINT "CASH AVAILABL
E.....$" "CASH"
900 PRINT : PRINT "LOAN PAYMENT
WITH INTEREST.....$" "LOAN"
910 PRINT : PRINT "NET PROFIT...
.....$" "CASH - L
OAN"
920 IF CASH - LOAN < = 0 THEN PRINT
!ST% = "YOU ARE BANKRUPT !!!
": GOSUB 70: PRINT "WANT TO
MAKE A DIFFERENT TOY? (Y/N)
": Z% = "YN": GOSUB 240: IF
Z% = 1 THEN POKE 34,0: HOME
: GOTO 320
930 IF CASH - LOAN > 0 THEN PRINT
!ST% = "VERY GOOD, " + NA%: GOSUB
70: PRINT : PRINT "WANT TO C
ONTINUE MAKING TOY "TY%": PRINT
"FOR ANOTHER MONTH? (Y/N) ":
Z% = "YN": GOSUB 240: IF Z
% = 1 THEN POKE 34,0: HOME
: CASH = CASH - LOAN: LOAN = 0
: GOTO 740
940 PRINT : PRINT !ST% = "GOOD L
UCK NEXT TIME !!!": GOSUB 70
: VTAB 23: POKE 34,0: END
950 PRINT "WHAT DO YOU WANT TO C
HANGE?(1,2,OR 3)": Z% = "12
3": GOSUB 240: PRINT
960 ON Z% GOSUB 980,1120,1180
970 RETURN
980 IF E% = EQUIP%(2) THEN 1040
990 IF E% = EQUIP%(3) THEN 1080
1000 PRINT "1." "EQUIP%(2)" "(100 TO
YS/DAY) : $200": PRINT "2
." "EQUIP%(3)" "(200 TOYS/DAY)
: $500": PRINT "3.KEEP YOUR OL
D "EQUIP%(1)": PRINT : PRINT
"WHICH DO YOU WANT ? ": Z% =
"123": GOSUB 240
1010 IF Z% = 1 THEN E% = EQUIP%(
2): CASH = CASH - 200: E = 100
: GOTO 1030
1020 IF Z% = 2 THEN E% = EQUIP%(
3): CASH = CASH - 500: E = 200
1030 RETURN
1040 PRINT "1." "EQUIP%(3)" "(200 TO
YS/DAY) : $400": PRINT "2." "EQ
UIP%(1)" "(50 TOYS/DAY)
: FREE": PRINT "3.KEEP
YOUR OLD "EQUIP%(2)": PRINT :
PRINT "WHICH DO YOU WANT ?
": Z% = "123": GOSUB 240
1050 IF Z% = 1 THEN E% = EQUIP%(
3): CASH = CASH - 400: E = 200

```

Listing continued.

Listing continued.

```

: GOTO 1070
1060 IF ZX = 2 THEN E$ = EQUIP*(
1):E = 50
1070 RETURN
1080 PRINT "1."EQUIP*(1)"(50 TOY
S/DAY) : FREE": PRINT
"2."EQUIP*(2)"(100 TOYS/DAY)
: FREE": PRINT "3.KEEP Y
OUR OLD "EQUIP*(3): PRINT : PRINT
"WHICH DO YOU WANT ? ";ZZ$ =
"123": GOSUB 260
1090 IF ZX = 1 THEN E$ = EQUIP*(
1):E = 50: GOTO 1110
1100 IF ZX = 2 THEN E$ = EQUIP*(
2):E = 100
1110 RETURN
1120 IF FL = 1 THEN PRINT : PRINT
"YOU ALREADY CHANGED THE PRI
CE TODAY.": PRINT "YOU WILL
HAVE TO WAIT UNTIL TOMORROW"
: PRINT "TO DO IT AGAIN.": FOR
I = 1 TO 3000: NEXT I: RETURN
1130 PRINT "1. RAISE THE PRICE $
1.": PRINT "2. LOWER THE PRI
CE $1.": PRINT "3. STAY AT T
HE SAME PRICE.": PRINT : PRINT
"WHICH DO YOU WANT TO DO ? "
;ZZ$ = "123": GOSUB 260
1140 IF ZX = 2 AND PRICE = 1 THEN
PRINT : PRINT "PRICE TOO LO
W ALREADY !!!": PRINT "CANNOT
BE LOWERED !!!": FOR I = 1 TO
3000: NEXT I: RETURN
1150 IF ZX = 1 THEN FL = 1:PRICE
= PRICE + 1: GOTO 1170
1160 IF ZX = 2 THEN FL = 1:PRICE
= PRICE - 1
1170 RETURN
1180 PRINT "YOU MAY BORROW AS MU
CH AS YOU LIKE.": PRINT "BUT
YOU WILL HAVE TO BE ABLE TO
PAY": PRINT "IT BACK WITH 1
0% INTEREST AT THE END": PRINT
"OF THE BUSINESS MONTH.": PRINT
1190 INPUT "HOW MUCH DO YOU NEED
? *";L$:L = VAL (L$):N = L
/ 10: PRINT : PRINT "INTERE
ST ON THIS LOAN WILL BE *N
1200 LOAN = LOAN + L + N:CASH = C
ASH + L
1210 FOR I = 1 TO 2500: NEXT I: RETURN
1220 PRINT : PRINT "ST$ = *** BU
SINESS RISK **": GOSUB 70:R%
= INT ( RND (1) * 12) + 1:
FOR I = 1 TO 38: PRINT "-":
: NEXT I: PRINT
1230 ON R% GOSUB 1290,1300,1310,
1320,1330,1340,1350,1360,137
0,1380,1390,1400
1240 R = 3 * R
1250 IF E$ = EQUIP*(1) THEN R =
R * X * Y
1260 IF E$ = EQUIP*(2) THEN R =
2 * R * X * Y
1270 IF E$ = EQUIP*(3) THEN R =
4 * R * X * Y
1280 PRINT : PRINT "THIS COSTS Y
OU *R:CASH = CASH - R: FOR
I = 1 TO 4000: NEXT I: RETURN
1290 PRINT "YOUR "E$" BREAKS DOW
N.":R = 25: RETURN
1300 PRINT "TAXES ARE DUE ON YOU
R "E$".":R = 15: RETURN
1310 PRINT "YOU MUST DONATE TO T
HE UNITED FUND.":R = 10: RETURN
1320 PRINT "YOUR "E$" NEEDS OIL.
":R = 5: RETURN
1330 PRINT "DEALER SENDS BACK A
SHIPMENT OF FAULTY": PRINT T
Y$ AND DEMANDS A REFUND.":R
= 25: RETURN
1340 PRINT "YOU DECIDE TO ADVERT
ISE TO BOOST SALES.":R = 15:
RETURN
1350 PRINT "YOU LOST A GOOD CUST
OMER.":R = 20: RETURN
1360 PRINT "YOU LOST YOUR BEST C
USTOMER.":R = 30: RETURN
1370 PRINT TY$ NOT DELIVERED ON
TIME.":R = 15: RETURN
1380 PRINT "YOU COULD NOT SELL A
LL OF THE": PRINT TY$ "YOU M
ADE TODAY.":R = 25: RETURN
1390 PRINT "THE ROOF OF YOUR FAC
TORY NEEDS REPAIR.":R = 30: RETURN
1400 PRINT "EVERYTHING WENT O.K.
TODAY.":R = 0: RETURN
1410 DATA MONDAY,TUESDAY,WEDNES
DAY,THURSDAY,FRIDAY
1420 DATA WOCKET,SPEEDY-WOCKET,L
IGHTENING-WOCKET
1430 REM
1440 REM (C) 1983 D SHIELDS

```

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# Formatted Lister

Achieve that well-groomed look with this great little utility.

by John J. Fedak and Jeffrey A. Mills

Are you tired of the seemingly haphazard way in which your Apple II does a program listing? Formatted Lister, a program/exec file, produces a formatted listing of the program in memory, then delivers its output to the screen or to your printer. See Listings 1 and 2 to compare a standard Apple II printout with one produced by this program.

Formatted Lister splits lines containing multiple statements at a colon. All print lines containing more than one space have a bracketed figure to tell you how many spaces there are. Printed listings are titled and numbered so that they are easily put in order if shuffled.

```

0 REM *** SAMPLE PROGRAM ***
5 HOME
10 A$ = "INCIDER "; B$ = "MAGAZINE"

15 HTAB 8: VTAB 4
20 PRINT "XXXXXXXXXXXXXXXXXXXXX"
   XXX
30 FOR A = 0 TO 9: HTAB 8: PRINT
   "X"
   NEXT
35 HTAB 8: PRINT "XXXXXXXXXXXXX"
   XXXXXXXXXXXX
40 HTAB 16: VTAB 8: FLASH : PRINT
   A$
45 HTAB 16: PRINT B$
50 NORMAL : VTAB 23: END

```

Listing 1. Standard Apple II listing.

To initially set up the needed text file, enter the complete program as shown in Listing 3. Then type RUN 62000. This will create a file title FL (Formatted Lister).

You should note that if your program contains a line numbered zero (0), that line will not appear in the list. Also, any lines numbered above 59999 will not appear. These limits are necessary so that Formatted Lister has room in memory along with your program.

## How It Works

Formatted Lister relies on several

DATA statements and therefore begins its run with dummy reads to skip over any DATA statements that may be in your program (line 60040).

The Apple II "tokenizes" a number of keywords to save space. This means that if you type INPUT, for example, the computer stores only the token CHR\$(132) instead of CHR\$(73), CHR\$(78), CHR\$(80), CHR\$(85), and CHR\$(84). In order for Formatted Lister to produce a readable listing, all tokens have to be translated to their original keyword. The keywords are stored in an array for easy translation.

```

5 HOME
10 A$ = "INCIDER ";
   B$ = "MAGAZINE"

15 HTAB 8:
   VTAB 4
20 PRINT "XXXXXXXXXXXXXXXXXXXXX"

30 FOR A = 0 TO 9:
   HTAB 8:
   PRINT "X[23]X";
   NEXT
35 HTAB 8:
   PRINT "XXXXXXXXXXXXXXXXXXXXX"

40 HTAB 16:
   VTAB 8:
   FLASH :
   PRINT A$

45 HTAB 16:
   PRINT B$

50 NORMAL :
   VTAB 23:
   END

```

Listing 2. Program listed using Formatted Lister.

# Some Very Good Reasons to Buy an Echo Speech Synthesizer.

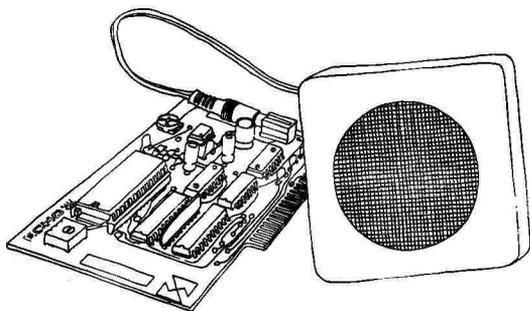
We're confident we have the most intelligible, versatile, and economical speech synthesizer on the market. Once you hear it, we're sure you'll be convinced too. All ECHOs are capable of speaking in four different voice modes which range from a robotic machine voice to natural female speech. (The fixed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



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Circle 355 on Reader Service card.

You don't actually RUN Formatted Lister, you EXEC it (EXEC FL). It merges itself with your program, then runs. Since the new line zero (0) is GOTO 60000, your entire program is skipped over.

After loading the array with the keywords, Formatted Lister then checks to see whether you want the output from the program to go to a printer or to the screen (line 60060). The printer is set up in a subroutine numbered 61200-61320. The printer used in this program is an NEC PC-8023A-C with a Grappler Plus interface card. If you have a different printer or card, you can substitute values of your own. Each statement in the subroutine is documented with a REM so that it can be easily located.

● Line 60110 finds the location of the starting address of the program.

● Lines 60120-60130 calculate the line number of the next line in storage.

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```

0 GOTO 60000: REM *****
  ** FORMATTED **
  ** LISTER **
  *****
  ** BY J.FEDAKX
  ** & J.MILLSX
  *****

60000 DATA <$$>,END,FOR,NEXT,DA
TA,INPUT,DEL,DIM,READ,GR,TEX
T,PR#,IN#,CALL,PLOT,HLIN,ULI
N,HGR2,HGR,HCOLOR=,HPLLOT,DRA
W,XDRAW,HTAB,HOMR,ROT=,SCALE
=,SHLOAD,TRACE,NOTRACE,NORMA
L,INVERSE,FLASH,COLOR=,POP,U
TAB,"HIMEM:"
60010 DATA "LOMEM:",ONERR,RESUME
,RECALL,STORE,SPEED=,LET,GOT
O,RUN,IF,RESTORE,"&","&",GOSUB,R
ETURN,REM,STOP,ON,WAIT,LOAD,
SAVE,DEF,POKE,PRINT,CONT,LIS
T,CLEAR,GET,NEW,TAB(,TO,FN,S
PC(,THEN,AT,NOT,STEP
60020 DATA +, -, *, /, ^, AND, OR, >, =,
<, <=, >=, INT, ABS, USR, FRE, SCRN(,
PDL, POS, SQR, RND, LOG, EXP, COS,
SIN, TAN, ATN, PEEK, LEN, STR$, VA
L, ASC, CHR$, LEFT$, RIGHT$, MID$

60030 HOME
60040 READ A$: IF A$ < > "<$$>"
" THEN 60040
60050 DIM A$(106): FOR A = 0 TO
106: READ A$(A): NEXT
60060 HOME: PRINT "PRINTER? (Y/
N)";: GET PR$: PRINT PR$: IF
PR$ < > "Y" AND PR$ < > "N
" THEN 60060
60070 HOME
60080 IF PR$ < > "Y" THEN LC =
37: GOTO 60110
60090 GOSUB 61200
60100 POKE - 16384,0: POKE - 1
6302,0
60110 A = PEEK (103) + PEEK (10
4) * 256 + 2
60120 L$ = "": Q = 0: S = 0: F = 0
60130 L = PEEK (A) + PEEK (A +
1) * 256: L$ = "RIGHT$ ("
+ STR$ (L), S) + "": A =
A + 1
60140 IF L > 59999 THEN 60370
60150 GOSUB 61600
60160 A = A + 1: B = PEEK (A)
60170 IF B < > 0 THEN 60200
60180 IF L > 0 THEN GOSUB 61000

60190 A = A + 3: GOTO 60120
60200 IF L = 0 THEN 60160
60210 IF B < 32 OR B > 234 THEN
60160
60220 IF B < > 32 AND S > 0 THEN
60240
60230 GOTO 60270
60240 IF S = 1 THEN L$ = L$ + "

60250 IF S > 1 THEN L$ = L$ + CHR$
(91) + STR$ (S) + CHR$ (93
)
60260 S = 0
60270 IF B = 32 AND Q = 1 THEN S
= S + 1: GOTO 60160
60280 IF B = 34 THEN Q = 1 - Q
60290 IF B > 127 THEN 60340
60300 IF F = 0 THEN L$ = L$ + "

60310 F = 1: L$ = L$ + CHR$ (B)
60320 IF B = 58 AND Q = 0 THEN GOSUB
61000: L$ = "": Q = 0: S
= 0: F = 0
60330 GOTO 60160
60340 F = 1: IF B > 234 THEN 6016
0

60350 L$ = L$ + " " + A$(B - 128)
+ " "
60360 GOTO 60160
60370 GOSUB 61800: END
61000 M$ = " "
61010 IF L$ = " " THEN 61060
61020 IF LEN (L$) < = LC THEN
PRINT L$: PL = PL + 1: L$ = M
$: GOTO 61000
61030 M = LC
61040 IF MID$ (L$, M, 1) = " " OR
MID$ (L$, M, 1) = ", " THEN M$
= MID$ (L$, M + 1, LEN (L$)
+ 1 - M): L$ = LEFT$ (L$, M)
: M$ = " " + M$: GOTO
61020
61050 M = M - 1: GOTO 61040
61060 RETURN
61200 IF PR$ = "N" THEN 61320
61210 PRINT: INPUT "ENTER LISTI
NG NAME>": PN$: IF LEN (PN$)
= 0 THEN 61210
61220 FF$ = CHR$ (12): REM FORM
FEED
61230 EL$ = CHR$ (18): REM ENLA
RGE
61240 EO$ = CHR$ (20): REM ENLA
RGE OFF
61250 LP$ = CHR$ (27) + "B": REM
LPI
61260 CL$ = CHR$ (9) + "80N": REM
CPL
61270 RS$ = CHR$ (9) + "I": REM
REPEAT PRINT ON SCREEN
61280 PS = 82: REM PAGE SIZE
61290 PR# 1
61300 PRINT EO$: LP$: CL$: RS$:
61310 LC = 79: PL = 0: PN = 0
61320 RETURN
61400 IF PR$ = "N" THEN 61420
61410 PRINT: FOR D = 1 TO LC: PRINT
":;: NEXT: PRINT
61420 RETURN
61600 IF PR$ = "N" THEN 61680
61610 IF PL = 0 THEN 61640
61620 IF PL > 0 AND PL < PS - 10
THEN PL = PL + 1: PRINT: GOTO
61680
61630 GOSUB 61400: PRINT FF$:
61640 PRINT EO$: PN$: EO$:
61650 PN = PN + 1: PRINT SPC LC
- 10 - 2 * LEN (PN$):; "PAGE
E":; PN
61660 GOSUB 61400: PRINT
61670 PL = 7
61680 RETURN
61800 IF PR$ = "N" THEN 61870
61810 GOSUB 61400
61820 PRINT
61830 PRINT EL$: "END":; PN$: EO$
61840 PRINT FF$:
61850 PR# 0
61860 TEXT
61870 RETURN
62000 REM *** CAPTURE AND CREATE
TEXT FILE ***
62010 D$ = CHR$ (4)
62020 PRINT D$: "OPEN FL"
62030 PRINT D$: "DELETE FL"
62040 PRINT D$: "OPEN FL"
62050 PRINT D$: "WRITE FL"
62060 PRINT "DEL 60000, 61999"
62070 PRINT "POKE-16384, 0: POKE-1
6302, 0"
62080 PRINT "MONC, I, 0"
62090 POKE 33, 30
62100 LIST - 61999
62110 PRINT "NOMONC, I, 0"
62120 PRINT "CALL-1233: CALL-936"

62130 PRINT "RUN"
62140 PRINT D$: "CLOSE FL"
62150 TEXT

```

Listing 3. Formatted Lister.

● Line 60140 checks to see that the line number limit is not violated.

● Line 60150 accesses a subroutine that keeps track of the number of lines per printed page. It will start a new page when the next line won't fit on the current page.

● Lines 60160-60360 translate the Apple II's memory into printable strings and divides them into individual statements, each ending with a colon (or

the line end).

● Line 60370 goes to a subroutine that turns off the printer and ends the program.

● Lines 61400-61420 print a row of dots to format the printed page.

Just a note in closing: If you choose the printer option, Formatted Lister will give you a pleasant graphics display to watch while the formatting is going on. ■

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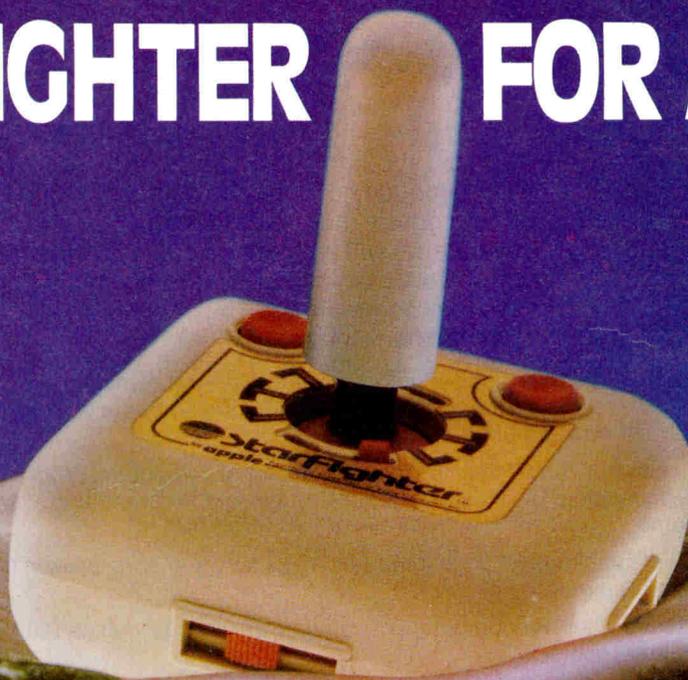


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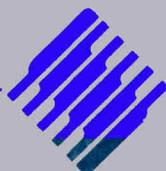
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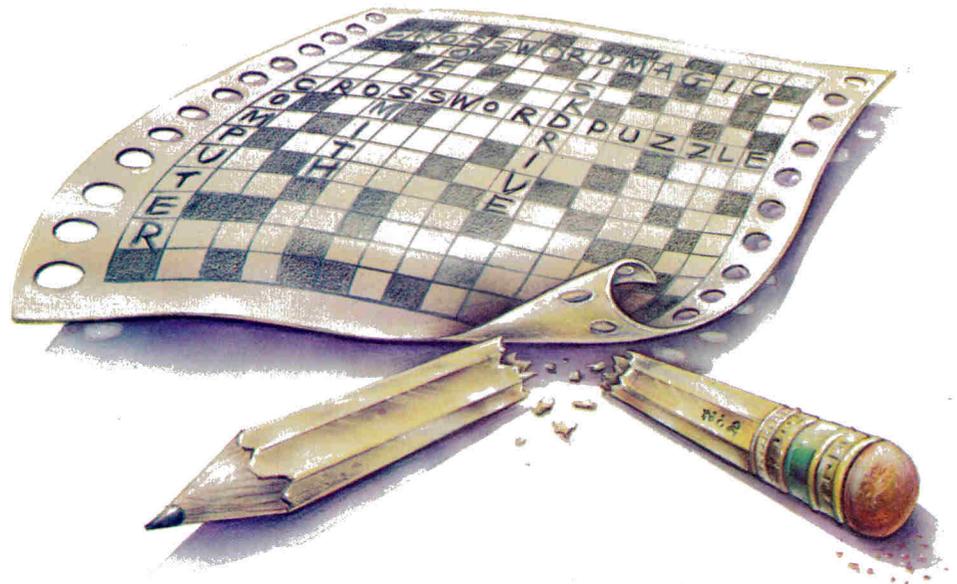
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L I B R A R Y

The background is a dark, star-filled sky. A bright, multi-pointed star is located at the top center. A comet with a long, multi-lined tail streaks across the lower half of the image, moving from the bottom left towards the top right. The title 'Celestial Coordinates' is written in a large, stylized, light blue font with a white outline, positioned in the upper right quadrant.

# Celestial Coordinates

by Robert Suder

All amateur astronomers at one time or another have trouble locating an object in the sky. After all, the sky is a big place. Therefore, most telescopes are equipped with devices called "setting circles." However, the use of setting circles involves a series of tedious calculations using tables found in handbooks. The program in this article permits the amateur astronomer to perform these calculations quickly, without the handbooks. Therefore, s/he can spend time observing, not calculating.

For convenience, astronomers have divided the celestial sphere into 24 equal units in an east-west direction. The position of an object in this direction is called its *right ascension* (RA), and is measured in hours, minutes, and seconds. *Declination* is the object's position north or south of the celestial

equator, and is measured in degrees, minutes, and seconds. The RA and declination of an object give its position in the sky. For example, on April 15 1980, the planet Mars was at RA 9h 58m, dec. +15 deg, 6m.

To find an object using setting circles, you need to know both the RA and the local sidereal time (LST). Sidereal time is based on the stars instead of the sun. From our previous example, Mars was on the observer's meridian (the circle in the sky extending from due north to due south) at 9:58, LST. This corresponds to 8:22 P.M. The hour angle (HA) is simply the difference between the LST and RA. This is the value used by the setting circles. ■

Address correspondence to Dr. Robert Suder, 5839 Downing, Portage, MI 49009.

```

LIST OF TASKS AVAILABLE
(1) LOCAL SIDERIAL TIME
(2) HOUR ANGLE
(3) QUIT

SELECT 1

WHAT IS THE DATE?
ENTER IN THE FORM MM/DD/YYYY 1/17/1983

WHAT IS YOUR LOCAL STANDARD TIME?
ENTER IN THE FORM HOURS.MINUTES USING
A 24 HOUR CLOCK.
FOR EXAMPLE, 10:23 PM IS ENTERED AS
22.23

8.15

YOUR LOCAL SIDERIAL TIME IS
15 HOURS 18 MINUTES

WHAT IS THE DATE?
ENTER IN THE FORM MM/DD/YYYY 1/17/1983

WHAT IS YOUR LOCAL STANDARD TIME?
ENTER IN THE FORM HOURS.MINUTES USING
A 24 HOUR CLOCK.
FOR EXAMPLE, 10:23 PM IS ENTERED AS
22.23

21.25

WHAT IS THE RIGHT ASCENSION?
ENTER IN THE FORM HOURS.MINUTES.
FOR EXAMPLE, 15 HOURS 35 MINUTES IS
15.35

5.34

YOUR HOUR ANGLE IS 1 HOUR 4 MINUTES
EAST
    
```

Program listing. Celestial Coordinates.

```

10 REM LOCAL SIDERIAL TIME AND
   HOUR ANGLE
20 REM BY DR. ROBERT SUDER
30 REM APRIL 10, 1981
40 REM THIS PROGRAM USES EQUA
   TIONS FOUND IN ASTRONOMY MAG
   AZINE, DECEMBER 1978,P.50
50 REM JUNE 1979, P. 16, AND J
   UNE 1983, P. 48
60 HOME
70 PRINT : PRINT : PRINT : PRINT
   : PRINT " LOCAL SIDERIAL T
   IME AND HOUR ANGLE"
80 FOR PAUSE = 1 TO 1500: NEXT P
   AUSE: REM DELAY
100 REM INITIAL DATA
110 HOME
120 PRINT : PRINT "USING A DATA
   STATEMENT ON LINE 6010, E
   NTER YOUR LONGITUDE IN THE F
   ORM"
130 PRINT "DEGREES 'COMMA' MINUT
   ES. FOR EXAMPLE,"
140 PRINT "IN KALAMAZOO, MICH, E
   NTER 6010 DATA
   85,38"
150 PRINT : PRINT "USING A DATA
   STATEMENT ON LINE 6020, E
   NTER A TIME ZONE CORECTION F
   ACTOR."
160 PRINT "THE CORRECTION FACTOR
   S ARE AS FOLLOWS:"
170 PRINT "EST = 5; CST = 6; MST
   = 7; PST = 8 FOR KALAM
   AZOO, ONE WOULD ENTER"
180 PRINT "6020 DATA 5"
190 PRINT : PRINT "IF TH
   E ABOVE CONSTANTS HAVE ALREA
   DY BEEN ENTERED, PRESS 'RETUR
   N'. OTHERWISE,
200 INPUT "PRESS 'E' TO EXIT PRO
   GRAM ";X$
210 IF X$ = "E" THEN END
220 HOME
230 CLEAR

240 READ A,A1
250 READ T
260 A1 = A1 / 60: REM CONVERTS
   MINUTES TO DECIMAL
270 A = A + A1: REM LONGITUDE AS
   DECIMAL
280 PRINT : PRINT " LIST O
   F TASKS AVAILABLE"
290 PRINT " -----
   -----"
300 PRINT : PRINT " (1) LOC
   AL SIDERIAL TIME"
310 PRINT " (2) HOUR ANGLE"

320 PRINT " (3) QUIT"
330 PRINT : PRINT : INPUT "SELEC
   T ONE ";MT
340 IF MT = 1 OR MT = 2 OR MT =
   3 THEN 360
350 GOTO 330
360 IF MT = 3 THEN END
370 HOME
380 PRINT : PRINT : PRINT "WHAT
   IS THE DATE?"
390 INPUT "ENTER IN THE FORM MM/
   DD/YYYY ";Z$
400 GOSUB 5000
410 IF Y = 1982 THEN K = 6.6224:
   GOTO 440: REM K DEPENDS ON
   YEAR - SEE ABOVE REFERENCES
420 IF Y = 1983 THEN K = 6.6065:
   GOTO 440
430 IF Y = 1984 THEN K = 6.5906:
   GOTO 440
440 HOME
450 PRINT : PRINT "WHAT IS YOUR
   LOCAL STANDARD TIME?"
460 PRINT "ENTER IN THE FORM HO
   URS.MINUTES USING A 24 HOUR
   CLOCK."
470 PRINT "FOR EXAMPLE, 10:23 PM
   IS ENTERED AS 22.23"
480 INPUT C
490 C2 = (((C - INT (C)) * 100) /
   60) + INT (C): REM DECIMA
    
```

Listing continued.

Listing continued.

```

L TIME
500 C3 = T + C2: REM GREENWICH S
TANDARD TIME
510 IF C3 < 24 THEN 540: REM CH
ECK FOR HOUR > 24
520 C3 = C3 - 24
530 B = B + 1
540 A2 = A / 15
550 L = K + 0.0657 * B + 1.0027 *
C3 - A2: REM CALCULATION OF
LST
560 IF L < 24 THEN 580
570 L = L - 24
580 IF MT = 2 THEN 660: REM CAL
CULATE HA
590 L2 = (L - INT (L)) * 60: REM
CONVERT DECIMAL TIME TO HR
AND MIN
600 HOME
610 PRINT : PRINT "YOUR LOCAL SI
DERIAL TIME IS"
620 PRINT INT (L);" HOURS "; INT
(L2 + .5);" MINUTES"
630 PRINT : PRINT : PRINT "PRESS
'RETURN' TO CONTINUE"
640 INPUT X$
650 GOTO 220
660 HOME
670 PRINT : PRINT "WHAT IS THE R
IGHT ASCENSION?"
680 PRINT "ENTER IN THE FORM HOU
RS . MINUTES"
690 PRINT "FOR EXAMPLE, 15 HOURS
35 MINUTES IS"
700 PRINT "15.35"
710 INPUT R
720 R2 = ((R - INT (R)) * 100) /
60) + INT (R): REM RA IN
DECIMAL DEGREES
730 J = L - R2: REM HOUR ANGLE
740 IF J > 0 THEN 830
750 J1 = ABS (J)

```

```

760 IF J1 > 12 THEN 800
770 J = J1
780 J2 = (J - INT (J)) * 60
790 GOTO 900
800 J = J + 24
810 J2 = (J - INT (J)) * 60
820 GOTO 930
830 J1 = ABS (J)
840 IF J1 > 12 THEN 870
850 J2 = (J - INT (J)) * 60
860 GOTO 930
870 J = J - 24
880 J = ABS (J)
890 J2 = (J - INT (J)) * 60
900 HOME : PRINT : PRINT "YOUR H
OUR ANGLE IS "; INT (J);" HO
URS "; INT (J2 + .5);" MINUT
ES"
910 PRINT "EAST"
920 GOTO 950
930 HOME : PRINT : PRINT "YOUR H
OUR ANGLE IS "; INT (J);" HO
URS "; INT (J2 + .5);" MINUT
ES"
940 PRINT "WEST"
950 PRINT : PRINT : PRINT : PRINT
"PRESS 'RETURN' TO CONTINUE"

960 INPUT X$
970 GOTO 220
5000 REM DATE SUBROUTINE .
5010 REM ALLOWS DATE TO BE ENTE
RED IN THE FORM MM/DD/YYYY
5020 FOR I = 1 TO LEN (Z$)
5030 IF MID$ (Z$,I,1) < > "/" THEN
NEXT I
5040 REM I IS THE POSITION OF T
HE FIRST '/'
5050 FOR N = I + 1 TO LEN (Z$)
5060 IF MID$ (Z$,N,1) < > "/" THEN
NEXT N
5070 REM N IS THE POSITION OF T
HE SECOND '/'
5080 M$ = LEFT$ (Z$,I - 1):M = VAL
(M$)
5090 D$ = MID$ (Z$,I + 1,N - I -
1):D = VAL (D$)
5100 Y$ = RIGHT$ (Z$,4):Y = VAL
(Y$)
5110 IF M > = 1 AND M < = 12 THEN
5150
5120 VTAB (15): PRINT "THE MONTH
";M;" DOESN'T EXIST."
5130 VTAB (17): PRINT "PRESS 'RE
TURN' AND START OVER."
5140 INPUT A$: GOTO 220
5150 IF D > = 1 AND D < = 31 THEN
5190
5160 VTAB (15): PRINT "A MONTH D
OESN'T HAVE ";D;" DAYS."
5170 VTAB (17): PRINT "PRESS 'RE
TURN' AND START OVER."
5180 INPUT A$: GOTO 220
5190 IF Y > = 1583 THEN 5240
5200 VTAB (15): PRINT "THE YEAR
HAS TO BE AFTER 1583"
5210 VTAB (16): PRINT "YOU TYPED
";Y
5220 VTAB (17): PRINT "PRESS 'RE
TURN' AND START OVER."
5230 INPUT A$: GOTO 220
5240 REM DETERMINE DAY OF YEA
R
5250 X1 = 365 * Y + INT ((Y - 1)
/ 4) - INT (0.75 * (INT (
(Y - 1) / 100) + 1))
5260 IF M > 2 THEN GOTO 5290
5270 X = 365 * Y + D + 31 * (M -
1) + INT ((Y - 1) / 4) - INT
(.75 * INT (((Y - 1) / 100)
+ 1))
5280 GOTO 5300
5290 X = 365 * Y + D + 31 * (M -
1) - INT (.4 * M + 2.3) + INT
(Y / 4) - INT (.75 * (INT
(Y / 100) + 1))
5300 B = X - X1
5310 RETURN
6000 REM LONGITUDE AND CORRECTI
ON FOR GMT
6010 DATA 85,38
6020 DATA 5

```

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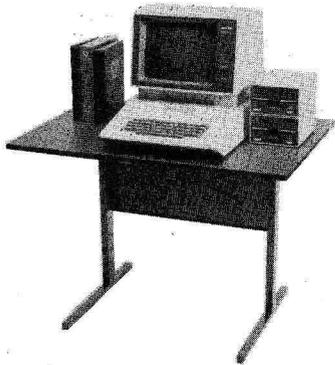
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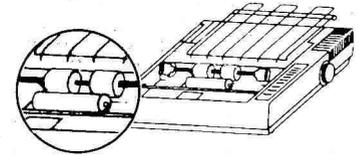
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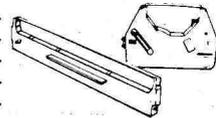
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WRITE**	44.6 sec.	14.9 sec.
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## As a

# Kid's Personal Tool

Children of the future will have—by today's standards—magical software to help them learn. But even now, kids may use their Apples as their own personal tools, as this expert describes.

—by Molly Watt

Most kids learn to use the pencil, blender, hammer and telephone in the comfort of their own homes. Learning to use these tools is part of growing up in the eighties. Now, add to this list the micro-computer.

Some adults believe the computer has only two functions for kids—as a game machine or a tutoring machine providing drill and practice in school subjects. Nonetheless, plenty of children have harnessed the computer as a childhood tool in ways that mirror adult business applications.

While I was learning to use VisiCalc (perhaps the most popular business tool ever developed), an eleven-year-old friend named Cindy informed me that she had used VisiCalc to organize her seashell collection. This was the first time I had stopped to consider kid's information storage and data processing needs. All kids compile information, be it baseball statistics, friends' addresses, phone numbers and birthdays or a collection of knock-knock jokes.

When I was a youngster I kept my information about star constellations, rock collections, and secret coded information on my best friends in a series of black and white composition books, which I lugged around on my back in a school bag. Today's student often can be seen with a file disk taped

to a notebook cover or carrying around a plastic disk box. A computer provides multiple ways to sort, format and revise the information stored within it.

Until recently kids were stuck using adult tool programs like VisiCalc and Applewriter; few computer tool programs were developed specifically for kids. This situation is changing, so parents and teachers should be alert for new programs that help kids express their ideas and store information.

### Disk Magazines

*Window*, by Window Inc., Watertown, MA, provides a regular column to use with VisiCalc, which must be booted before loading the *Window* program. The Vol. 1, No. 3 disk column, "The Sad Story of the Sox," compiles baseball statistics. This project integrates the computer's capabilities as a calculator, data processor and sorter with a kid's love of the grand old game. Also included is "Mini-Songwriter," a program that helps kids create computer music (see Photos 1 and 3).

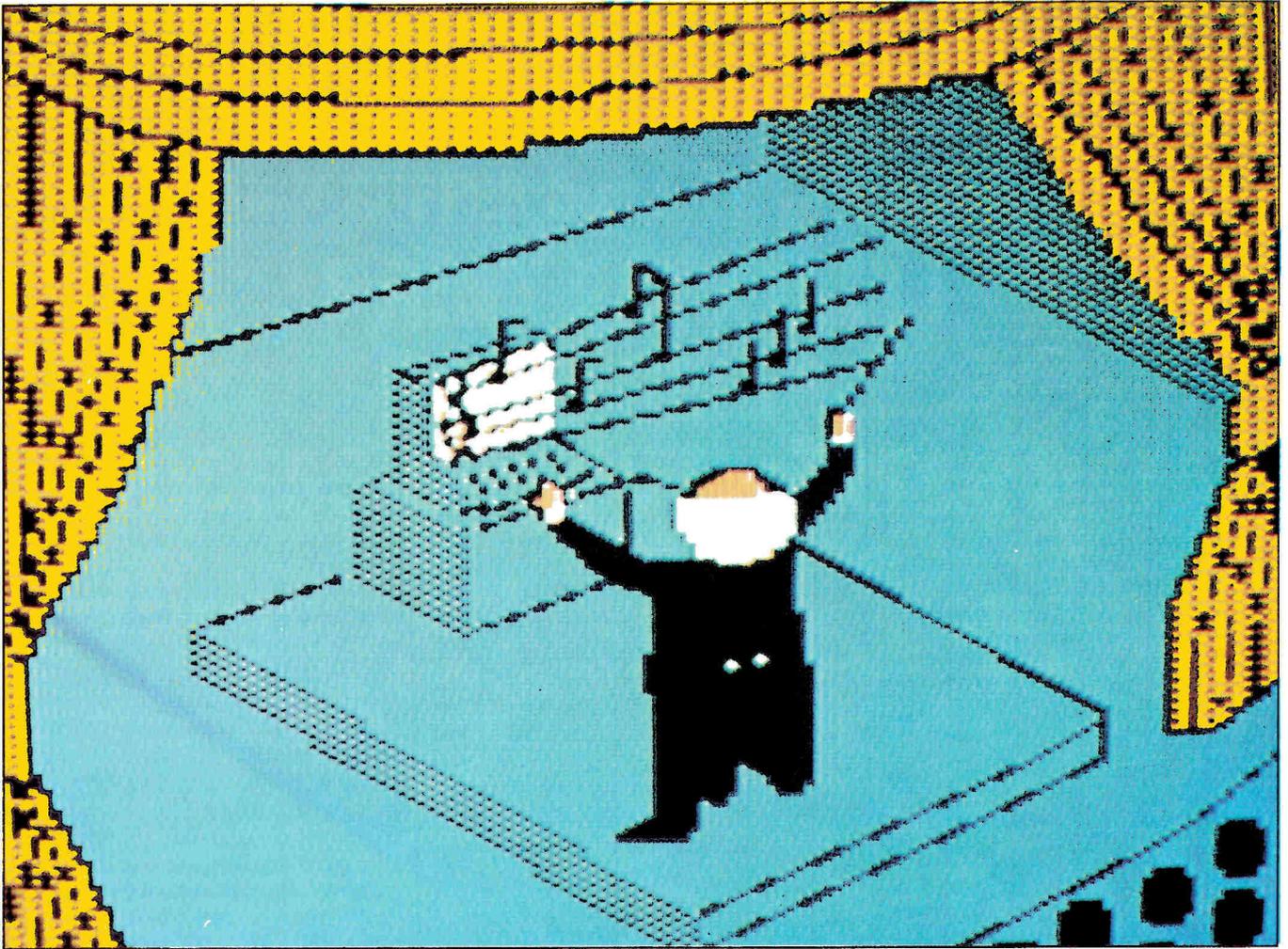
A previous issue includes an electronic notebook database manager by Bill Crouch with suggestions—aimed, I suspect, at the adult user—for organizing lists, mailing labels, class rosters, recipe files and home inventories. I watched a grade school friend experiment with computers produce an alphabetical list of her friends and their

phone numbers, which she posted next to her phone.

Scholastic *Wizware's* first issue of *Microzine* included a tool for organizing secret files. This program combines a kid's natural interest in secrets with the metaphor of a recipe box that stores information. The program sorts by alphabetizing the "cards." The second tool provides a simple drawing language to create computer graphics posters. The commands are similar to Logo and Delta Drawing: R for right, L for left, U for up, D for down plus a number input to indicate a line's length in a chosen direction. Then, as in Basic, type RUN to see your poster program or NEW for a fresh start. This program will enhance any computer literacy program.

The Semantic Calculator, developed by Judah Schwartz at Education Development Center and produced by Sunburst, helps teach mathematical operations. The electronic notepad provides a database for "how many" of "what." Most computational mistakes

*Molly Watt was an elementary school teacher and administrator for more than twenty years, and a parent for the past quarter century! She currently coordinates the Institute in Educational Computing at Keene State College, Keene, New Hampshire, and is writing Teaching Logo's Power, to be published by Addison-Wesley in 1984. Write to her at Gregg Lake Road, Antrim, NH 03440.*



One of many interesting scenes from "Mini-Songwriter," a program in Window disk magazine.

arise from losing track of these two items. In the Semantic Calculator, the user fills in line A and line B of the notepad as follows:

	How Many?	What?
A	3	Apples
B	5	Oranges

Then s/he instructs the computer to add them. (How many of us remember

adding apples and oranges—or bushels and inches—and receiving a large red X and a sense that math was too confusing?) The computer, unlike my sixth grade teacher, responds to this instruction very reasonably, asking, "Can apples be converted to oranges or can oranges be converted to apples (yes or no)?"

If the user answers "no" the program replies: "Apples and oranges are both what?" If s/he answers "fruit" the program completes the operation with: "3 fruit and 5 fruit = 8 fruit." If the user had said "snakes," "trees" or "pests," the program would have continued in just as obliging a manner. After all, it is a dumb machine waiting

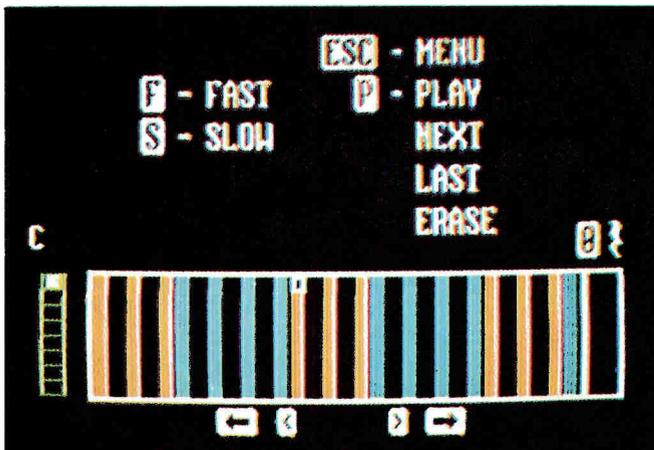


Photo 1. Keyboard used in Window's "Mini-Songwriter."

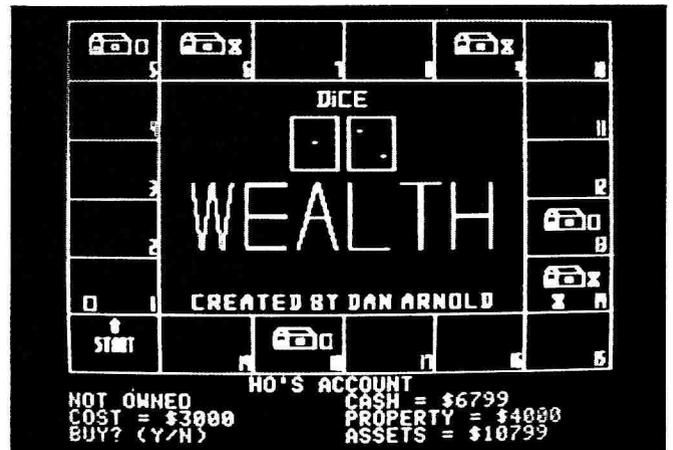


Photo 2. Board for Window's "Wealth" game.

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## Bank Street Writer

The program most closely emulating computer office applications is Bank Street Writer, the word processor produced by Broderbund for home use and Scholastic for school use. Bank Street Writer fulfills young writers' needs as determined by research conducted at New York City's Bank Street College. Many parents and teachers use this top-selling program because they find it friendlier than those programs designed to meet adult needs. Using Bank Street Writer doesn't require a manual or a tutorial—though they're provided—or a special course. You just sit down and use it.

Kids use this word processor to organize their riddle collections, write book reports, send letters to their friends, write novels and produce school newspapers. Its convenient prompts keep

reminders about program functions at the top of the screen. It helps kids present teachers with neat, readable work.

Some educators suspect using a word processor in school writing programs may make us a nation of writers again, as some believe we were before the advent of telephones and television. A kid having a personal word processor may become as ordinary within a decade as having a collection of felt tip pens is today!

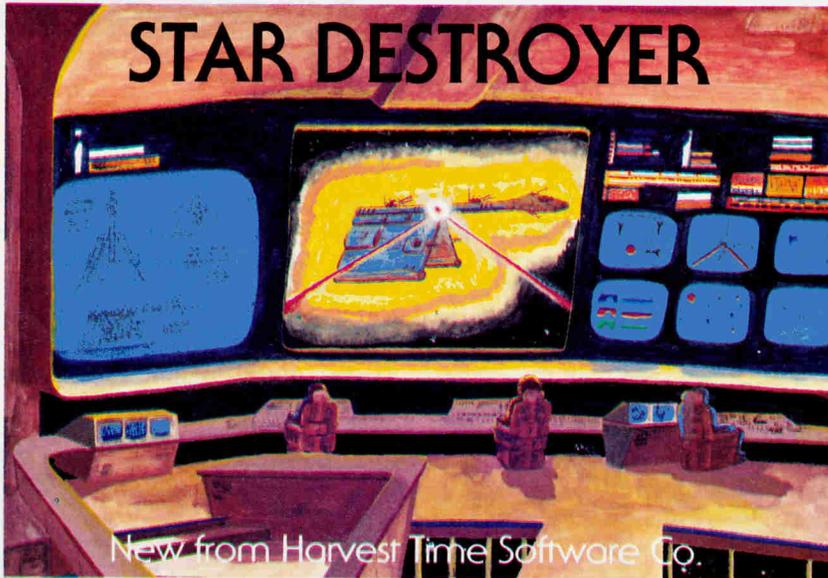
## Rocky's Boots

An excellent example of a kid's personal tool is Rocky's Boots, produced by The Learning Company. I consider playing games an essential element of a child's search for wisdom and knowledge; Rocky's Boots amply provides a child a stimulating environment for learning about computer science and logic gates while s/he creates an original arcade game. Unfortunately, after spending hours to master the program's tools, one cannot save to disk any games created. I found myself leaving the computer on for hours in a desperate attempt to preserve my game.

## The Future

Five years from now these educational tools will seem incredibly limited. Word processing programs will include comments to help kids write more effectively. Spelling checkers and dictionaries will be included for the youngest writer's needs. Perhaps a child will be able to dictate directly into the word processor. There will be a plethora of programs available for writing complex musical compositions. Painting by graphics pad will be infinitely more refined than by the Koala Pad. Someday soon kids could use a text manipulator, music composer, graphics pad and a note pad *simultaneously* on different sections of the same screen. Kids of the future may have the tools at their fingertips to produce homemade animated, musical productions and send them directly over telephone wires to their friends' homes—the same way our kids wander around the neighborhood putting on plays about Star Wars and The Wizard of Oz! ■

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See your local dealer for details.

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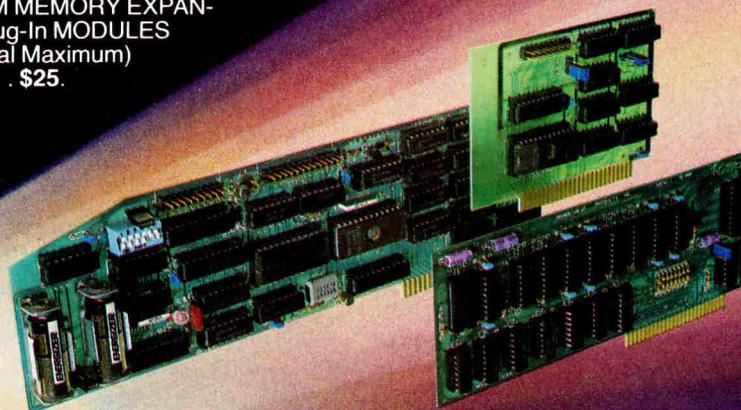
P/S 16K BUFFER CARD. For use with existing parallel interface card . . . . \$125.

Hardware "SWITCH"  
Option . . \$25.

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# Buyer's Guide to Word Processors

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Here's the place to start your shopping trip.

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by Larry Strong

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**T**hese days, choosing the right word processor requires dedication and stamina. Each new week ushers in a new round of wp packages, all of them claiming superiority. In one way it's pleasant having such a vast variety of products from which to choose. But after a while it gets to be an endurance contest as you wade through all the buzzwords, hype and hoopla.

To help you make your decision, *iN-Cider* this month presents a buyer's guide to word processors. The first part of the guide summarizes the important features you should seek in a word processor. The second part of the guide is an easy-to-read chart listing the major word processor packages for the Apple and a breakdown of their features.

## Documentation

Critical to a word processor is the quality of its documentation. It should adequately describe the software. The writing should be clear, professionally printed and logically laid out. Some manufacturers include extra touches.

Don't underestimate the importance of an index—if you want to find a quick answer it's a godsend.

## Disk Policy

Most word processors include an original and back-up copy of the software. Some systems are not copy-protected so that you can make your own back-up. If you end up with a damaged disk, some manufacturers will replace it free and some won't.

## Special Hardware

The basic configuration for the

word processors included in the guide consists of an Apple II Plus or Apple IIe with 48K of memory, one disk drive, a monitor and a printer. Several systems require a one-wire shift mod—usually included—so that the shift key can be used for capitals.

## Printer Interface

If you already own a printer, be sure to get a word processor that will interface with it. Most systems have the driver pre-programmed so that you can select from a menu and match the printer you are using. Even though your printer may not be listed, it still might work with one of the pre-programmed drives. Several systems allow you to write your own driver, thus allowing you to interface with any printer.

A third method by which to control your printer is to embed control characters in the text of your document.

## Screen Format

How your text looks on the screen is crucially important. Ideally, you would see everything including upper- and lowercase and the entire body of your document. This is impossible, however, because you are initially limited to uppercase only, 40 columns and a maximum of 24 lines.

To solve the upper-/lowercase problem, some systems use the escape key as a shift key and show uppercase in inverse on the screen. A second solution is to use an upper-/lowercase module in the computer which actually displays text in upper- and lowercase. A third approach is to use hi-res graphics and create your own upper-/lowercase characters. Yet another solution is

to use an 80-column board which gives upper- and lowercase characters. Almost without exception you are limited to displaying a maximum of 24 rows. All systems use vertical scrolling.

There are several approaches to solving the 40-column display problem. The first is horizontal scrolling. When you reach either side of the screen, text is scrolled to either the left or right.

A second approach is to use hi-res graphics. Depending on your software and your system, you can display up to 70 columns on the screen. With this method you don't have to purchase additional hardware. A third solution is to purchase an 80-column card which will display your text in upper- and lowercase in 80 columns.

Another consideration is the monitor you use. If you can live with a 40-column display, then a television set will be adequate. However, the resolution diminishes rapidly when you display more than 40 columns. It is therefore preferable to use a good hi-res monitor.

## Report Format

A number of word processors create form letters. This function allows you to merge variable data with a standard letter and then sit back and watch as your Apple prints out one customized letter after another.

Headers and footers are nice features. You create them once and subsequently they are printed on each page. Another noteworthy feature is "auto-page numbering," which automatically and sequentially numbers your text pages. Justification of the right margin will give your document that profes-

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Documentation				Disk Policy			Special Hardware Required	Printer Interface			Screen			
Size	Pages	Index	Backup	Damage Replacement	Upgrade Copy	Write Your Own Driver		Embedded Printer Control Code	Pre-Programmed Interfaces	Upper/Lowercase	Horizontal Scrolling	Hi-Res Screen	80-Column Board Compatible	
Apple Writer II	6 x 9	106	N	Included	90 days free, then \$15	Free	None	N	Y	N	Note 1	N	Y	Y
Bank Street Writer	5 1/4 x 7 1/4	35	Y	Included	\$5	N	None	N	N	Y	Note 1	N	Y	N
Circa Script	5 1/4 x 8 1/2	48	Y	Copyable	No charge	Free swap	None	N	Y	Y	Note 1	N	N	Apple IIe
The Correspondent	9 x 12	80	Y	Included	\$10	\$20	None	N	Y	Y	Note 1	Y	N	Apple IIe
Docuwriter	8 1/2 x 11	N/A	Y	\$10	90 days free	Variable Terms	None	N	Y	Y	Y	N	N	N
Easy Writer	6 x 9	78	Y	Included	90 days free then \$20	N	None	Y	Y	Y	N	Y	N	Y
Executive Secretary	8 1/2 x 11	89	Y	Upon registration	\$7.50 for one year	\$7.50 for one year	80-column board	N	Y	Y	Y	N	N	Y
Format II, Enhanced Version	7 x 9	N/A	Y	Copyable	\$30	\$30	80-column card	N	Y	N	Note 1	Y	N	Y
The Incredible Jack	5 1/2 x 5 1/2	127	Y	Free upon registration	Free	Free	64K, 2 disk drives	N	N	Y	Y	Y	N	Y
Letter Perfect	10 x 11 1/2	97	Y	\$30	\$10	\$30	None	Y	Y	Y	Note 1	Y	Y	Y
Magic Window II	7 x 10	150	Y	\$20	90 days free	N/A	None	N	Y	Y	Note 1	Y	Y	Y
PFS:Write	6 x 8 1/2	140	Y	Included	90 days free	\$35	None	N	Y	Y	Y	Y	N	Y
Pie Writer	6 x 9	164	Y	Copyable	N	N	None	Y	N	Y	Note 1	Y	N	Y
Power Text	8 1/2 x 11	350	N	Copyable	5-year warranty	Variable	64K, 2 disk drives	N/A	Y	Y	Note 1	Y	N	Y
Quickwriter	8 1/2 x 11	4	N	Copyable	N	\$5	None	N	Y	N	IIe	N	N	N
School Writer II	8 1/2 x 11	10	N	Copyable	90 days free	N	None	Y	Y	N	Y	N	Y	N
ScreenWriter II	5 1/2 x 8 1/2	321	Y	Included	\$5	\$15	None	Y	Y	Y	Note 1	N	Y	II+, N; IIe; Y
Select: The Word Processor	8 1/2 x 11	107	Y	Copyable	Free	Free	None	N	Y	Y	Y	Y	N/A	Y
Super-Text Home/Office	6 x 9	11	Y	Included	\$10	Variable	None	N/A	Y	Y	Note 1	Y	Y	N
Super-Text Professional	6 x 9	124	Y	Included	\$10	Variable	80-column board	N/A	Y	Y	Note 1	Y	N	Y
Word Handler II	6 x 8 1/2	106	Y	\$15	Free	Free	None	Y	N	Y	Note 1	N	Y	Y
Write Away	N/A	175	Y	Copyable	Full Warranty	Variable	None	Y	Y	Y	Note 1	N	N	Y
Write-On!	5 x 7	70	N	\$5	Free	N	None	Y	Y	Y	Note 1	Y	Y	N
The Write Stuff	7 1/2 x 10	96	Y	Included	90 days free then \$15	Half-price	None	N	Y	Y	Y	N	N	Y
Zardax	5 1/2 x 8 1/2	200	Y	Included	90 days free then \$15	Free	Keyboard connector, II+	Y	Y	Y	Y	Y	Y	Y

Note 1: Accepts one-wire shift mod and upper/lower case mode

Format								Screen Display			Edt mode (cursor movement)				Block Actions	Find/Replace	Price
Form Letters	Headers and Footers	Auto Page Numbering	Justification	Centering	Subscript	Underline	Bold	Final Form	Page Number	Tabs	Word	Paragraph	Screen	Page			
Y	Y	Y	Y	Y	Embedded	Y	N	Y	N	N	Y	Y	N	N	Y	Y	\$150 II + \$195 Iie
N	Y	Y	N	Y	N	N	N	N	N	N	N	N	N	N	Y	Y	\$69.95
Y	Headers only	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	Half	N	Y	Y	\$39.95
N	N	N	Y	Y	N	N	N	Y (with 80-column card)	Y	Y	Y	Y	Y	Y	Y	Find Only	\$44.95
Y	N/A	Y	Y	Y	Y	Y	N	Y (with wraparound)	N/A	Y	N	N	N	N	N	Y	\$79.95
N	Y	Y	Y	Y	Y	Y	Y	Y (with wraparound)	N	Y	Y	N	Y	N	Y	Y	\$99.95
Y	Headers only	Y	Y	Y	Embedded	Y	Embedded	Y	Note 2	N	Y	N	Y (half screen also)	Note 3	Y	Y	\$250
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	\$150
Y	Y	Y	Y	N	N	N	N	Y (with 80-column card)	N	Y	N	N	N	N	Y	N	\$179
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	\$149.95
Y	Headers only	Y	Y	Y	Y	Y	Y	Y (with 80-column card)	Y	N	N	N	Y	Y	N	Y	\$149.95
Y	Y	Y	N	Y	N	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	\$125
Y	Y	Y	Y	Y	N	Y	Y	N	Note 2	N	Y	Y	Y	Y	Y	Y	\$149.95
Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	N	Y	Y	\$299
Y	N	N	Y	Y	N	N	N	Y (with wraparound)	N	Y	N	Y	Y	Y	Y	Y	\$14.95
N	N	N	N	N	N	N	N	N	Y	N	N	N	Y	Y	N	N	\$29.95
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	N	Y	Y	\$129.95
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	\$495
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	\$99
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	\$99
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	\$59.95
Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	Y	N	Y	N	Y	Y	\$175
Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y	Y	Y	Y	Y	Y	Y	\$129.95
Y	Y	Y	Y	Y	N	Y	Y	Y (with wraparound)	Y	Y	Y	Y	Y	Y	Y	Y	\$99.95
Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	N	N	N	N	N	Y	Y	\$210

Note 2: Document line number

Note 3: Go to document line number

## Manufacturers' Addresses:

**Apple Writer II**  
Apple Computer Inc.  
20525 Mariana Avenue  
Cupertino, CA  
(408) 996-1010

**Bank Street Writer**  
Broderbund Software Inc.  
17 Paul Drive  
San Rafael, CA 94903  
(415) 479-1170

**CircaScript**  
Circadian Software Inc.  
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Melbourne, FL 32901  
(305) 723-5717

**The Correspondent**  
Southwestern Data Systems  
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Santee, CA 92071  
(619) 562-3670

**Docuwriter**  
CMA Micro Computer  
55722 Santa Fe Trail  
Yucca Valley, CA 92284  
(619) 365-9718

**EasyWriter**  
Information Unlimited Software  
2401 Marinship Way  
Sausalito, CA 94965  
(415) 331-6700

**Executive Secretary**  
Sof/Sys Inc.  
4306 Upton Avenue South  
Minneapolis, MN 55410  
(612) 929-7104

**Format II, Enhanced Version**  
Kensington Microware  
919 Third Avenue  
New York, NY 10022  
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**The Incredible Jack**  
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Kings Park, NY 11754  
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**Magic Window II**  
Artsci Inc.  
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North Hollywood, CA 91601  
(213) 985-5763

**PFS: Write**  
Software Publishing Corp.  
1901 Landings Drive  
Mountain View, CA 94043  
(415) 962-8910

**Pie Writer**  
Hayden Software  
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Rochelle Park, NJ 07662  
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**Power Text**  
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**Quickwriter**  
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Montgomery, AL 36109  
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**School Writer**  
Peak Software  
868 Heartwood Circle  
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**ScreenWriter II**  
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**Word Handler II**  
Silicon Valley Systems Inc.  
1625 El Camino Real #4  
Belmont, CA 94002  
(415) 593-4344

**Write Away**  
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**Write-On!**  
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sional look. Subscript and superscript put characters one-half line below or above the line you are typing on.

**Screen Display**

A great deal of helpful information can be shown on the screen. However, when you have printer control codes, formatting codes, 40-column wrap-arounds, paragraph markings and such, you begin to wonder what your document will actually look like. To handle this problem, several systems display on the screen how your document will appear in its final form.

Good word processors display the page and line number of the text location you are working on at any given time. It also is helpful to have a tab line to display your tab stops. Numerous other aids are offered from system to system such as help menus, document name, storage space left, total characters used, justification mode, etc.

**Edit Mode**

All word processors allow the user to move the cursor a character or a line at a time. But do you need the capability to move the cursor a paragraph, screen, page or more at a time? It's extremely handy to define a block of text and then delete, copy or move it. With global find and replace, you define a string of characters or text and to what you'd like it changed. The program then automatically makes the specified changes. Deletions are handled similarly.

**Conclusion**

Before buying a word processor, make a list of the features you want and the hardware you already own. From there, pinpoint all packages that meet your personal requirements. Don't hesitate to call a manufacturer with any questions you may have. And finally, try before you buy. If possible, borrow a copy from a friend or use your dealer's copy. ■

*This buyer's guide was prepared through the joint efforts of author Larry Strong and the inCider staff. Much of the information in the accompanying chart was supplied by the respective manufacturers.*

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FEATURES	The Home Accountant™	The ACCOUNTANT Finance Data Base System™
Transactions Per Disk	1000	2000-4000
Number of Codes	1	63
Automatic Transactions	25	900
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Frequency:	NO	YES
Double Entry	NO	NO
Accounting Background Required	NO	YES
Accommodates Any Type Transaction	One at a time	Screen at a time
Transaction Retrieval	NO	YES
Backdate Transactions	SOMETIMES	ALWAYS
Ability to Interrupt While Printing	YES	NO
132 COL. PRINTER REQUIRED	292,661	292,661.42
NUMERIC FORMATTING	NO	YES
Optional VisiCalc Interface		
PERFORMANCE		
Startup to Transaction Entry	113 sec	44 sec
Begin Printing Balance Sheet After Entering Transactions	162 sec	1 sec
Begin Printing Transactions After Entering Transactions	106 sec	2 sec
RATING		
Peelings II evaluation	B/D	A
PRICE		
APPLE II/IIe Personal Version	\$75	\$129
IBM PC Personal Version	\$150	\$195
APPLE II/IIe The Business ACCOUNTANT™	—	\$255
IBM PC The Business ACCOUNTANT™	—	\$295

\*based on APPLE benchmarks. The Accountant's performance superiority is even greater on the IBM PC

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**CREATIVE COMPUTING — Jan. 1983**

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# Christmas Cards

Dear Reader,  
Merry Christmas  
From J.A. Mills and J.J. Fedak

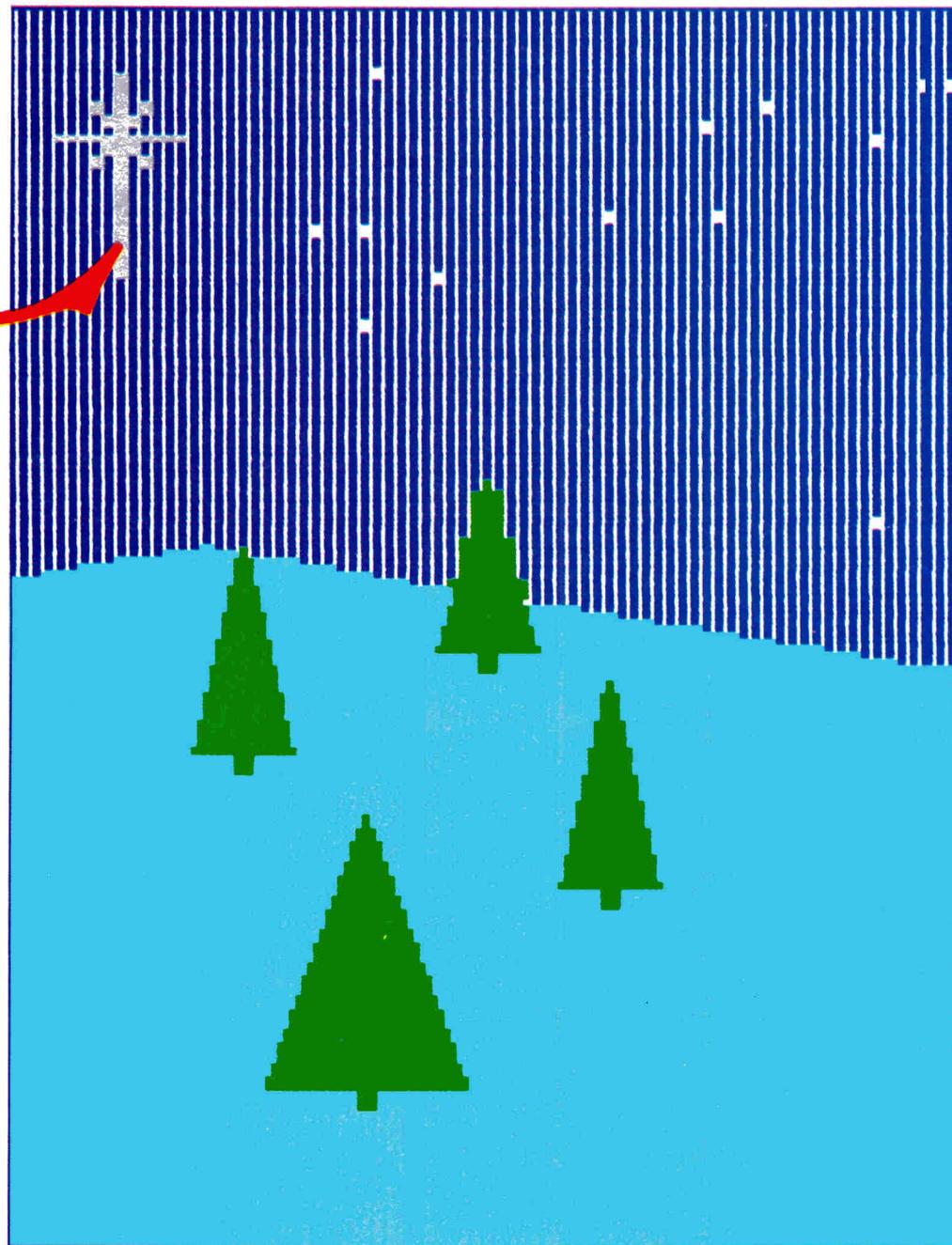
As the holiday season nears, our thoughts turn to wishing our friends and acquaintances "Happy Holidays." As a computer-oriented person, would you like to include your Apple in all the merriment? The following program will do the trick.

This program lets you generate personalized Christmas (or holiday) cards with pre-printed addresses. The entire process takes two passes through the printer—one each for the card side and address side. The program was written on an Apple II Plus with an NEC8023 printer controlled by a Grappler II Plus interface card. You easily may adapt printer controls to your own needs.

The program's menu choices are:

- A) *Create address file.* This lets you enter a name/address file which also contains the "hello" and "closing signature" names for your card list.
- B) *Print card pictures.* This generates cards in the order you entered the name/address file.
- C) *Address cards.* After removing the printed cards from your printer and turning the paper back-to-front (with the first card printed in the first position), this menu choice lets you print return and mailing addresses in the same order as the cards.
- X) *Exit.* This option lets you cleanly exit the program.

Lines 110 through 160 contain sev-



eral string variables containing printer function codes. You can change these lines to the code your particular printer requires.

Lines in the 10000 series create the name/address file. Lines in the 20000 series "draw" the cards. Lines in the 30000 series "address" the cards. Lines in the 40000 series are short subroutines called from other areas.

When completed, you may tailor each card to the size of a standard business envelope as follows: Fold the en-

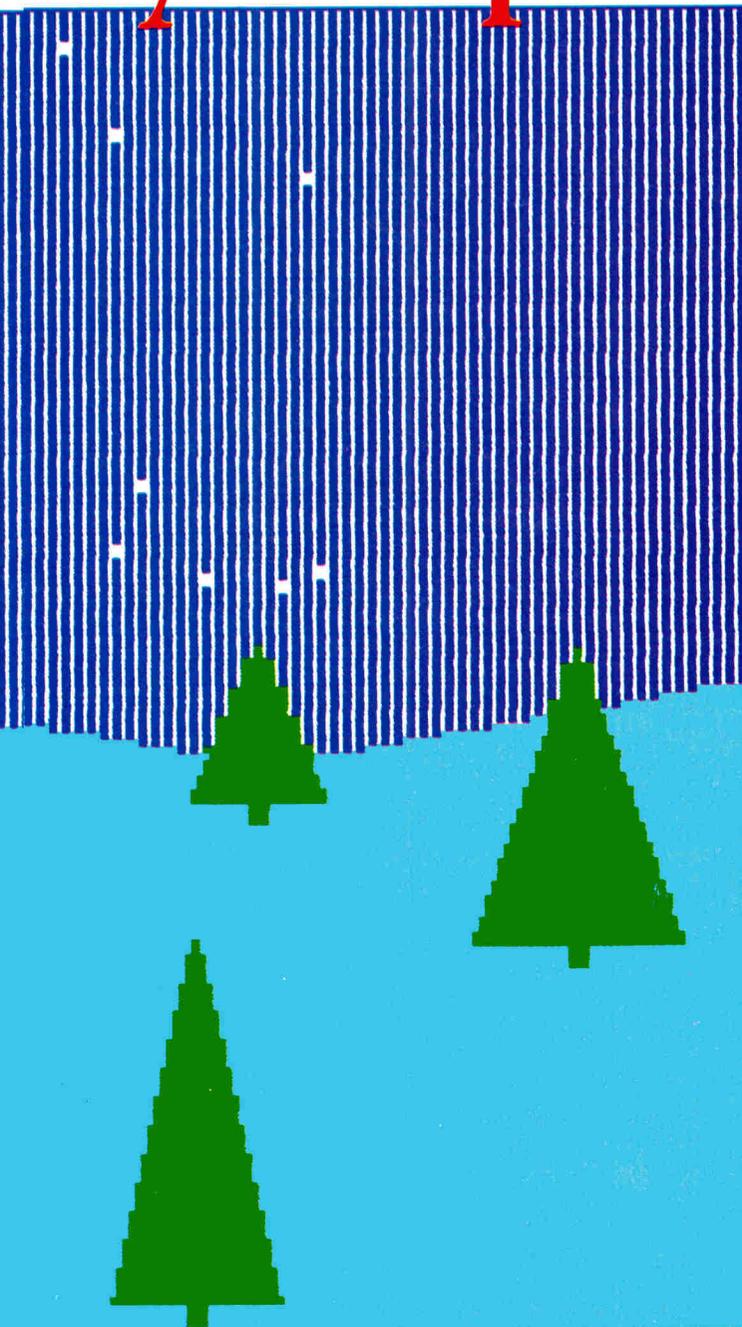
velope just above the return address; bring the bottom flap up and insert it under the flap formed by the first fold; and seal with a "festive" adhesive sticker (available in most 5 & 10s or card shops).

We wish you a happy holiday season and hope you use this program to wish your friends a happy holiday, too! ■

---

Please address correspondence to J.A. Mills and J.J. Fedak, PO Box 06021, Columbus, OH 43206.

# by Computer



Program listing, XMAS Cards.

```

10 REM *** XMAS CARDS ***
20 CD$ = CHR$ (4)
30 TEXT : HOME : INVERSE : PRINT
  "XMAS CARDS - MAIN MENU": NORMAL
  : PRINT
40 PRINT : HTAB 4: PRINT "A) CRE
  ATE ADDRESS FILE"
50 PRINT : HTAB 4: PRINT "B) PRI
  NT CARD PICTURES"
60 PRINT : HTAB 4: PRINT "C) ADD
12010 PRINT : PRINT CD$;"WRITE "
  ;FL$

```

```

RESS CARDS"
70 PRINT : HTAB 4: PRINT "X) EXI
  T"
80 PRINT : PRINT : PRINT "ENTER
  CHOICE> ";
90 GET A$: IF A$ < > "A" AND A$
  < > "B" AND A$ < > "C" AND
  A$ < > "X" THEN 90
100 PRINT A$: IF A$ = "X" THEN 9
  00
110 REM >>>PRINT CONTROLS<<<
120 EL$ = CHR$ (18): REM (ENLARG
  ED ON)
130 EO$ = CHR$ (20): REM (ENLARG
  ED OFF)
140 FF$ = CHR$ (12): REM (FORM F
  EED)
150 TF$ = CHR$ (27) + "P": REM (
  TYPEFACE)
160 PS$ = CHR$ (9) + "G2D": REM
  (PRINT SCREEN)
170 IF A$ = "A" THEN GOSUB 1000
  0
180 IF A$ = "B" THEN GOSUB 2000
  0
190 IF A$ = "C" THEN GOSUB 3000
  0
200 GOTO 30
900 TEXT : HOME : INVERSE : PRINT
  "XMAS CARDS - ENDED": NORMAL
  : PRINT
999 END
10000 REM ***ADDRESS INPUT ROUTI
  NEXXX
10010 TEXT : HOME : INVERSE : PRINT
  "XMAS CARDS - ADDRESS INPUT"
  : NORMAL : PRINT
10020 GOSUB 11000: REM (ADDRESS
  START)
10030 IF EF = 0 THEN GOSUB 1200
  0: REM (PROCESS ADDRESS)
10040 IF EF = 0 THEN 10030
10050 GOSUB 13000: REM (ADDRESS
  END)
10999 RETURN
11000 REM ***ADDRESS START**
11010 INPUT "ENTER ADDRESS FILE
  NAME> ";FL$: IF LEN (FL$) =
  0 THEN 11010
11020 CD$ = CHR$ (4)/
11030 PRINT : PRINT CD$;"OPEN ";
  FL$
11040 PRINT CD$;"DELETE ";FL$
11050 PRINT CD$;"OPEN ";FL$
11060 EF = 0
11070 GOSUB 14000: REM (INPUT AD
  DRESS)
11999 RETURN
12000 REM ***PROCESS ADDRESS**

```

Listing continued.

# How a fireman and a broken leg made software simple.



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Meet Dennis Jarvis, a firefighter from Southern California. About five years ago he broke his leg in a fire-related accident and was confined to the house for about six months. To keep him occupied, Dennis' wife bought him a computer.

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Hotline: (213) 991-8200

FIREFIGHTER.  
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31245 La Baya Drive, Westlake Village, CA 91362

*Listing continued.*

```

12020 PRINT A1$
12030 PRINT A2$
12040 PRINT A3$
12050 PRINT A4$
12060 PRINT A5$
12070 PRINT A6$
12080 PRINT A7$
12090 PRINT CD$
12100 GOSUB 14000: REM (GET ADDR
      ESS)
12999 RETURN
13000 REM **ADDRESS END**
13010 PRINT : PRINT CD$;"WRITE "
      ;FL$
13020 PRINT ">>>EOF<<<"
13030 PRINT CD$;"CLOSE ";FL$
13999 RETURN
14000 REM *INPUT ADDRESS*
14010 TEXT : HOME : INVERSE : PRINT
      "XMAS CARDS - ADDRESS INPUT"
      : NORMAL : PRINT
14020 PRINT "ENTER MAILING NAME"

14030 GOSUB 15000: REM (ENTER IN
      FO)
14040 A1$ = Z$: IF LEN (Z$) = 0 THEN
      EF = 1: GOTO 14999
14050 PRINT "ENTER GREETING NAME
      "

14060 GOSUB 15000: REM (ENTER IN
      FO)
14070 A2$ = Z$: IF LEN (Z$) = 0 THEN
      14020
14080 PRINT "ENTER NUMBER AND ST
      REET"
14090 GOSUB 15000: REM (ENTER IN
      FO)
14100 A3$ = Z$: IF LEN (Z$) = 0 THEN
      14050
14110 PRINT "ENTER CITY"
14120 GOSUB 15000: REM (ENTER IN
      FO)
14130 A4$ = Z$: IF LEN (Z$) = 0 THEN
      14080
14140 PRINT "ENTER STATE"
14150 GOSUB 15000: REM (ENTER IN
      FO)
14160 A5$ = Z$: IF LEN (Z$) = 0 THEN
      14110
14170 PRINT "ENTER ZIP"
14180 GOSUB 15000: REM (ENTER IN
      FO)
14190 A6$ = Z$: IF LEN (Z$) = 0 THEN
      14140
14200 PRINT "ENTER CLOSING NAME"
14210 GOSUB 15000: REM (ENTER IN
      FO)
14220 A7$ = Z$: IF LEN (Z$) = 0 THEN
      14170
14230 TEXT : HOME : INVERSE : PRINT
      "XMAS CARDS - ADDRESS INPUT"
      : NORMAL : PRINT
14240 PRINT "CURRENT ADDRESS:": PRINT
    
```

*Listing continued.*

Listing continued.

```
14250 PRINT A1$: PRINT A2$: PRINT
      A3$: PRINT A4$; ", "; A5$; " "
      ;A6$: PRINT A7$
14260 PRINT : PRINT "IS THIS INF
      ORMATION CORRECT? (Y/N) ";
14270 GET KB$: IF KB$ < > "Y" AND
      KB$ < > "N" THEN 14270
14280 PRINT KB$
14290 IF KB$ = "N" THEN PRINT CHR$
      (7); CHR$ (7); CHR$ (7): GOTO
      14010
14999 RETURN
15000 REM XXENTER INFOXX
15010 POKE 51,65: CALL - 657
15020 Z$ = "": REM (NULL STRING)
15030 Z = 512
15040 Z1$ = CHR$ ( PEEK (Z) - 12
      8): IF Z1$ = CHR$ (13) THEN
      15999
15050 Z$ = Z$ + Z1$
15060 Z = Z + 1
15070 GOTO 15040
15999 RETURN
20000 REM XXXPRINT CARDSXXX
20010 TEXT : HOME : INVERSE : PRINT
      "XMAS CARDS - PRINT CARDS"
      : NORMAL : PRINT
20020 GOSUB 21000: REM (START CA
      RDS)
20030 IF EF = 0 THEN GOSUB 2200
      0: REM (PRINT CARDS)
20040 IF EF = 0 THEN 20030
20050 GOSUB 23000: REM (END CARD
      S)
20999 RETURN
21000 REM XXSTART CARDSXX
21010 EF = 0
21020 INPUT "ENTER ADDRESS FILE
      NAME> "; FL$: IF LEN (FL$) =
      0 THEN 21020
21030 PRINT : PRINT CD$; "VERIFY
      "; FL$
21040 PRINT : PRINT CD$; "OPEN ";
      FL$
21050 HGR2
21060 HCOLOR= 6
21070 Y0 = 85:Y1 = - .15:XL = (Y
      - Y1) * .50
21080 FOR X = 0 TO 279
21090 IF Y0 < 80 OR Y0 > 105 THEN
      YI = - YI
21100 HPLLOT X,0 TO X,Y0:Y0 = Y0 +
      YI
21110 NEXT
21120 HCOLOR= 4: HPLLOT 10,20 TO
      30,20
21130 HPLLOT 20,11 TO 20,40
21140 HPLLOT 15,15 TO 25,25
```

```
21150 HPLLOT 25,15 TO 15,25
21160 FOR A = 1 TO 20
21170 X = INT ( RND (1) * 190) +
      35
21180 Y = INT ( RND (1) * (Y0 -
      5))
21190 HPLLOT X,Y TO X + 1,Y TO X +
      1,Y + 1 TO X,Y + 1
21200 NEXT
21210 X = 40:Y1 = 80:Y2 = 110:PC =
      .25: GOSUB 24000
21220 X = 250:Y1 = 90:Y2 = 130:PC
      = .4: GOSUB 24000
21230 X = 200:Y1 = 90:Y2 = 110:PC
      = .5: GOSUB 24000
21240 X = 80:Y1 = 70:Y2 = 95:PC =
      .3: GOSUB 24000
21250 X = 100:Y1 = 100:Y2 = 130:P
      C = .25: GOSUB 24000
21260 X = 190:Y1 = 130:Y2 = 180:P
      C = .25: GOSUB 24000
21270 X = 60:Y1 = 120:Y2 = 160:PC
      = .4: GOSUB 24000
21280 HCOLOR= 7: HPLLOT 0,191 TO
      279,191
21290 TEXT : HOME : INVERSE : PRINT
      "XMAS CARDS - PRINT CARDS"
      : NORMAL : PRINT
21300 PRINT : PRINT CD$; "PR#1"
21310 PRINT EL$; TF$;
21320 PRINT FF$; FF$; : REM >>>BLA
      NK PAGES<<<
21330 GOSUB 40000: REM (GET ADDR
      ESS)
21999 RETURN
22000 REM XXPRINT CARDXX
22010 FOR A = 1 TO 6: PRINT : NEXT
22020 PRINT EL$; "DEAR "; A2$; ", "
22030 PRINT : PRINT
22040 A$ = "MERRY CHRISTMAS"
22050 GOSUB 25000: REM (SPACE AN
      D PRINT)
22060 A$ = "AND HAPPY NEW YEAR"
22070 GOSUB 25000: REM (SPACE AN
      D PRINT)
22080 PRINT PS$
22090 PRINT
22100 A$ = " -FROM-"
22110 GOSUB 25000: REM (SPACE AN
      D PRINT)
22120 A$ = A7$
22130 GOSUB 25000: REM (SPACE AN
      D PRINT)
22140 PRINT FF$;
22150 GOSUB 40000: REM (GET ADDR
      ESS)
22999 RETURN
23000 REM XXEND CARDXX
```

Listing continued.

Listing continued.

```
23010 PRINT EO$;FF$;FF$;
23020 PRINT : PRINT CD$;"PR#0"
23030 PRINT : PRINT CD$;"CLOSE "
      ;FL$
23999 RETURN
24000 REM **DRAW TREES**
24010 FOR Y = Y1 TO Y2
24020 XL = (Y - Y1) * PC
24030 XL = INT (XL + .5)
24040 HCOLOR= 7
24050 H PLOT X - XL,Y TO X + XL,Y

24060 NEXT
24070 FOR Y = Y2 TO Y2 + 3
24080 H PLOT X - 1,Y TO X + 1,Y: NEXT

24999 RETURN
25000 REM **PRINT AND SPACE**
25010 A = LEN (A$) * (2) - 1
25020 REM >>> FOLLOWING LINE HAS
      AT LEAST 35 BLANKS <<<
25030 PRINT LEFT$ ("
      - INT (A / 2));
      ",35
25040 FOR A = 1 TO LEN (A$): PRINT
      " "; MID$ (A$,A,1);: NEXT
25050 PRINT : PRINT
25999 RETURN
30000 REM ***PRINT ADDRESS***
30010 TEXT : HOME : INVERSE : PRINT
      "XMAS CARDS - ADDRESS CARDS"
      : NORMAL : PRINT
30020 GOSUB 31000: REM (START AD
      DRESSES)
30030 IF EF = 0 THEN GOSUB 3200
      0: REM (ADDRESS CARDS)
30040 IF EF = 0 THEN 30030
30050 GOSUB 33000: REM (END ADDR
      ESSES)
30999 RETURN
31000 REM **START ADDRESSES**
31010 EF = 0
31020 INPUT "ENTER ADDRESS FILE
      NAME> ";FL$: IF LEN (FL$) =
      0 THEN 31020
31030 PRINT : PRINT CD$;"VERIFY
      ";FL$
31040 PRINT : PRINT CD$;"OPEN ";
      FL$
31050 PRINT CD$
31060 PRINT "ENTER RETURN ADDRES
      S STREET"
31070 GOSUB 15000: REM (ENTER IN
      FO)
31080 RS$ = Z$: IF LEN (Z$) = 0 THEN
      EF = 1: GOTO 31999
31090 PRINT "ENTER RETURN CITY,
      STATE, ZIP"
31100 GOSUB 15000: REM (ENTER IN
      FO)
31110 RC$ = Z$: IF LEN (Z$) = 0 THEN
      31060
31120 PRINT : PRINT : FLASH : PRINT
      "REVERSE FORMS. LINE UP TO T
      OP-BACK OF FIRST CARD PRIN
```

```
TED. PRESS RETURN.": NORMAL
31130 CALL - 678: REM (WAIT FOR
      RETURN)
31140 PRINT : PRINT CD$;"PR#1"
31150 PRINT TF$;
31160 GOSUB 40000: REM (GET ADDR
      ESS)
31999 RETURN
32000 REM **PRINT ADDRESS**
32010 FOR A = 1 TO 10: PRINT : NEXT

32020 PRINT RS$: PRINT RC$
32030 FOR A = 1 TO 7: PRINT : NEXT

32040 PRINT : PRINT :Z$ = "
      ": REM
      (30 BLANKS)
32050 PRINT Z$;A1$
32060 PRINT Z$;A3$
32070 PRINT Z$;A4$;",";A5$;" "
      ;A6$
32080 PRINT FF$;
32090 GOSUB 40000: REM (GET ADDR
      ESS)
32999 RETURN
33000 REM **END ADDRESS**
33010 PRINT : PRINT CD$;"PR#0"
33020 PRINT : PRINT CD$;"CLOSE "
      ;FL$
33030 PRINT CD$
33999 RETURN
40000 REM **READ ADDRESS**
40010 PRINT : PRINT CD$;"READ ";
      FL$
40020 GOSUB 41000: REM (READ LIN
      E)
40030 A1$ = Z$: IF Z$ = ">>>EOF<<
      <" THEN EF = 1: GOTO 40999
40040 GOSUB 41000: REM (READ LIN
      E)
40050 A2$ = Z$
40060 GOSUB 41000: REM (READ LIN
      E)
40070 A3$ = Z$
40080 GOSUB 41000: REM (READ LIN
      E)
40090 A4$ = Z$
40100 GOSUB 41000: REM (READ LIN
      E)
40110 A5$ = Z$
40120 GOSUB 41000: REM (READ LIN
      E)
40130 A6$ = Z$
40140 GOSUB 41000: REM (READ LIN
      E)
40150 A7$ = Z$
40160 PRINT CD$
40999 RETURN
41000 REM **READ LINE**
41010 Z$ = "": REM (NULLS)
41020 GET Z1$: IF Z1$ = CHR$ (1
      3) THEN 41999
41030 Z$ = Z$ + Z1$: GOTO 41020
41999 RETURN
```

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# Build Your Own Joystick

Here's a simple construction project that will bring you hours and hours of joy. Are you game?

—by George M. Engel—

How often do we see games for “joystick only,” like Choplifter, or games with near-impossible paddle controls. Oh, for a joystick! But look at the prices...\$49.95, \$59.95, \$69.95... etc, etc.

There's really no mystique behind building one. It simply takes about \$15 and some of your parts, money and time. The schematic in Figure 1 and list of locally-obtained parts should

help you in building your own. You need a knowledge of small tools and soldering to complete the project. A nibbling tool would be handy, but not necessary in cutting out the joystick hole. Also handy would be a six-foot, six-conductor cable, if you can get one, but you can use any insulated wire of around 20 gauge.

A joystick with 150k ohm potentiometers is ideal, but if you use the 100k Radio Shack stick, you'll have to add capacitors C1 and C2. Why capacitors and why different? You use the capacitors to vary the time constant inputs to pins 6 and 10. Since the Apple sees the horizontal and vertical screens a little differently, the capacitors were chosen to give you a complete range from 0 to 255, corner to corner.

If you use a 40K pot, the capacitor values would be around .25 microfarad. Don't be afraid to vary the capacitors if you find that you are not getting a full range of motion. In some of my prototypes, C2 had to be increased (by adding parallel capacitors)

to nearly the same value as C1.

I used a gob of General Electric silicone rubber inside the joystick case around the cable to prevent the cable from pulling out—sort of a strain relief. Use the same on the dip header socket. ■

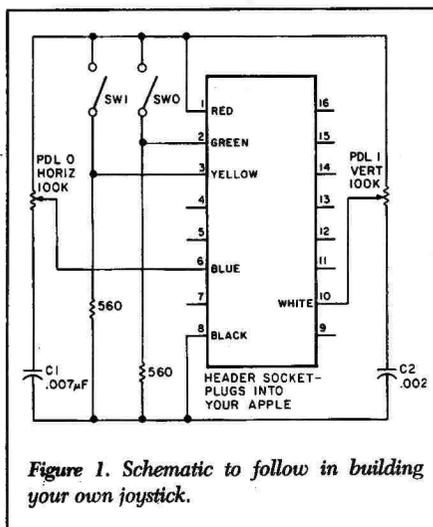


Figure 1. Schematic to follow in building your own joystick.

You can write George Engel at 35 Old Ansonia Road, Seymour, CT 06483.

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275-618	Square push-button (2)	\$1.49
270-231	Experimenter box, 4 × 2½ × 1½	\$1.69
276-1980	Dip header socket, (16 pin) (1)	\$0.85
	560 ohm, ¼ Watt resistors (2)	
	.002 microfarad capacitors (2)	
	.005 microfarad capacitor (1)	
	6 feet of 6 cond. cable (18 to 22 ga.)	
	G.E. silicone rubber	app. \$3.50
	Tools: nibbler, soldering iron, misc.	
Note: .002 and .005 in parallel equals a .007 capacitor.		

Parts List.

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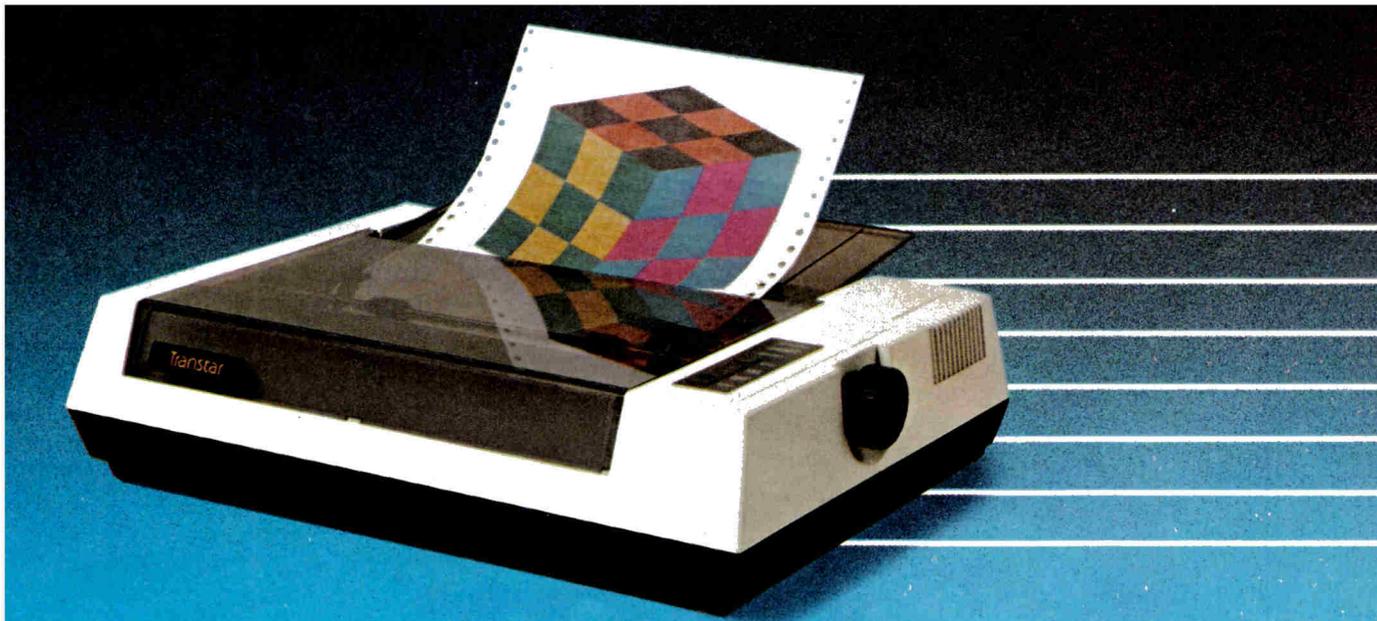
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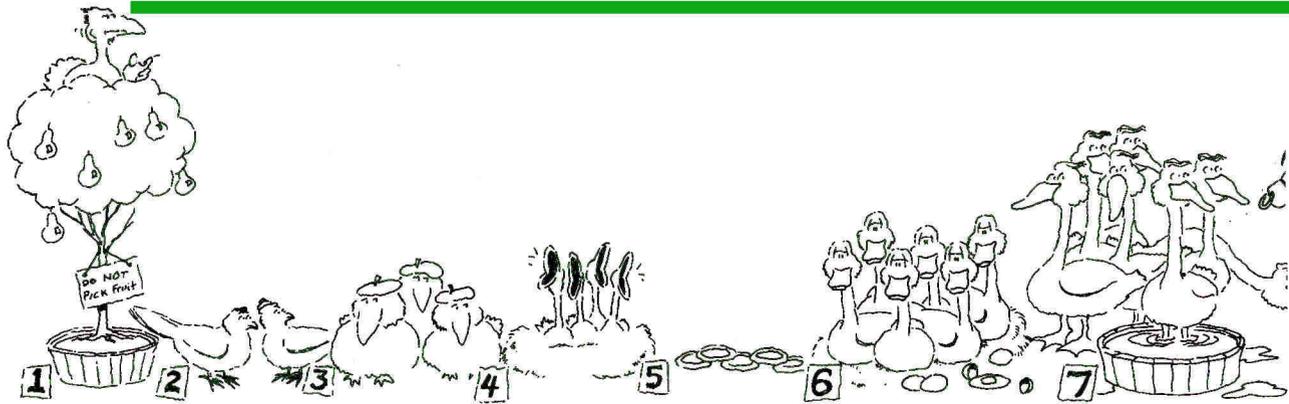
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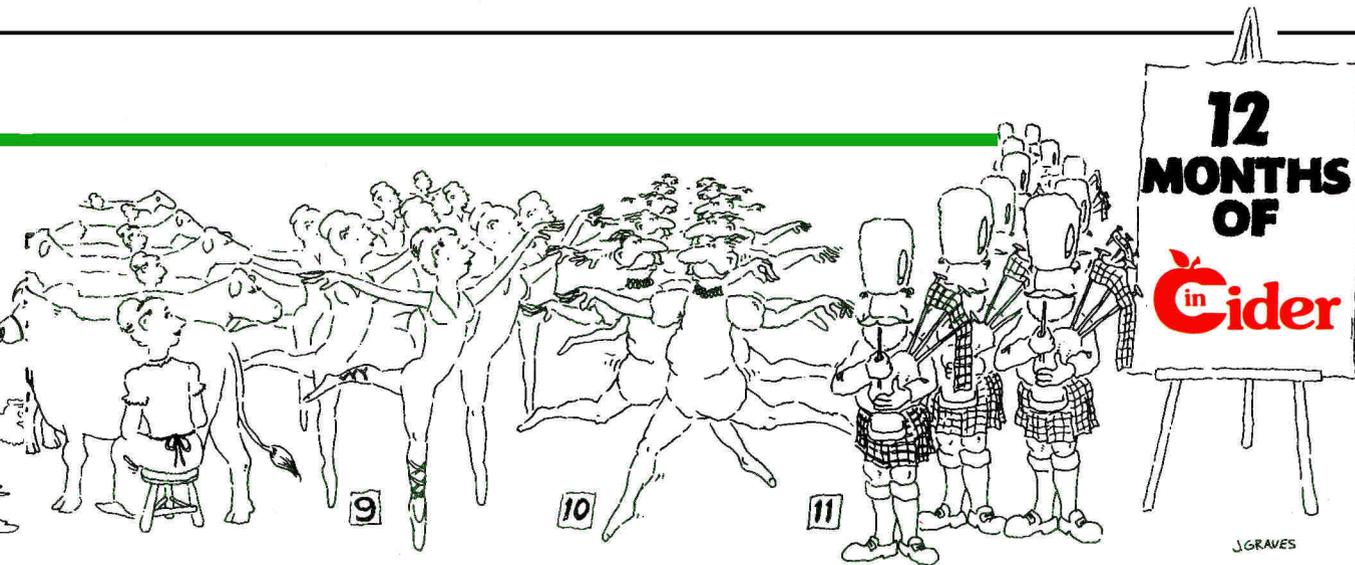
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# A Simple Write Protect Indicator for the Apple II

by Richard Green



Photo 1. The drive on the left is in use, as seen by the red in-use LED. The drive on the right has a write protected disk in it and is showing a green LED.

**CAUTION!** The following modification requires soldering and will void your Apple Disk II warranty.

How many times have you seen warnings like this one? Not often enough as far as I'm concerned. As a hardware person with a lot more ambition than time, I've noticed a real shortage of *simple* projects for the Apple II. Here is one I found useful.

Just after buying my second Apple Disk II I was in the middle of programming when I typed `SAVE xxxx`. The red in-use light came on and my program was saved as requested. There was only one problem: My program was saved on a write protected disk. (Glad

I didn't type `INIT`.)

Soon I discovered I could write to at least half of my write protected disks. Some of my write protect tabs were made of a fairly soft material similar to black electrical tape. This material when warm was allowing the microswitch in my new drive to remain in the unoperated position, which indicates a non-write protected disk to the Apple II. This allows you to save, write, delete, or rename files, and initialize, which erases everything and leaves you with a blank disk.

This, of course, is not a good situation. Can you imagine initializing your new \$250 copy protected word processor late one night? My solution: building an indicator that shows when the microswitch is electrically closed—verifying that your disk is in fact write protected. See Photo 1.

## Eve of Construction

Construction is easy: You can use parts available at most Radio Shack stores. See the Table for a list. The

Part	Radio Shack Number
Two-Color LED (XC-5491)	276-035
470 Ohm ¼ W Resistor	271-1317
4.7K ¼ W Resistor	271-1330
270 Ohm ¼ W Resistor	271-1314
7400 Quad 2-Input NAND Gate	276-1801
0.1 MFD Disk Capacitor	272-135
Double-sided Tape (optional)	64-2344

The author has a limited number of completed modules available for \$12.95 each.

Table. Parts list.

Address correspondence to Richard Green, 4430 E. Harvey, Fresno, CA 93702.

heart of the indicator is a two-color LED that glows green when current flow is in one direction and red when current flows in the opposite direction. By using this two-color LED we still can have the red in-use indicator as well as a green indicator to show write protect status—without another hole in the front of the disk drive.

Refer to Figure 1 for a diagram of the circuit and to Figure 2 for the parts layout. You can mount parts on a small piece of perfboard or an etched circuit board. The LED must line up with the hole marked "in use" in the drive's case. I mounted my circuit board next to the microswitch (Photo 2) by using a 4/40 machine screw, spacer and nut, and by taking advantage of an existing hole in the baseplate of my older drive. I had to drill a mounting hole in the newer drive. If you don't wish to drill holes, you could fasten the circuit board to the baseplate with some double-sided tape. See Figure 3 for a traceable pattern of the circuit board.

Remove the original LED by prying or cutting a small plastic ring from the back of the LED and slip the LED out toward the rear of the drive. The plastic ring is a clip and should be discarded so that the drive can be easily disassembled. Cut the red and black wires from the LED you just removed and connect them to the circuit board as shown in Figure 2.

You must make two other connections. One is to the rear of the microswitch on the same terminal as the existing black wire. Be prepared to re-adjust the microswitch position if you remove it to make this connection. After you install the indicator, you easily may adjust the microswitch so that the indicator lights only when you use a write protected disk.

Make the other connection—for +5 volts—to the positive end of capacitor C4 on the main circuit board. Be careful when routing the wire from the indicator board to the main circuit board. Make sure the wire does not interfere with inserted disks and that it won't be pinched or cut when the drive is reassembled.

Test the circuit by applying power and verifying that the indicator is not lit. Insert a write protected disk and

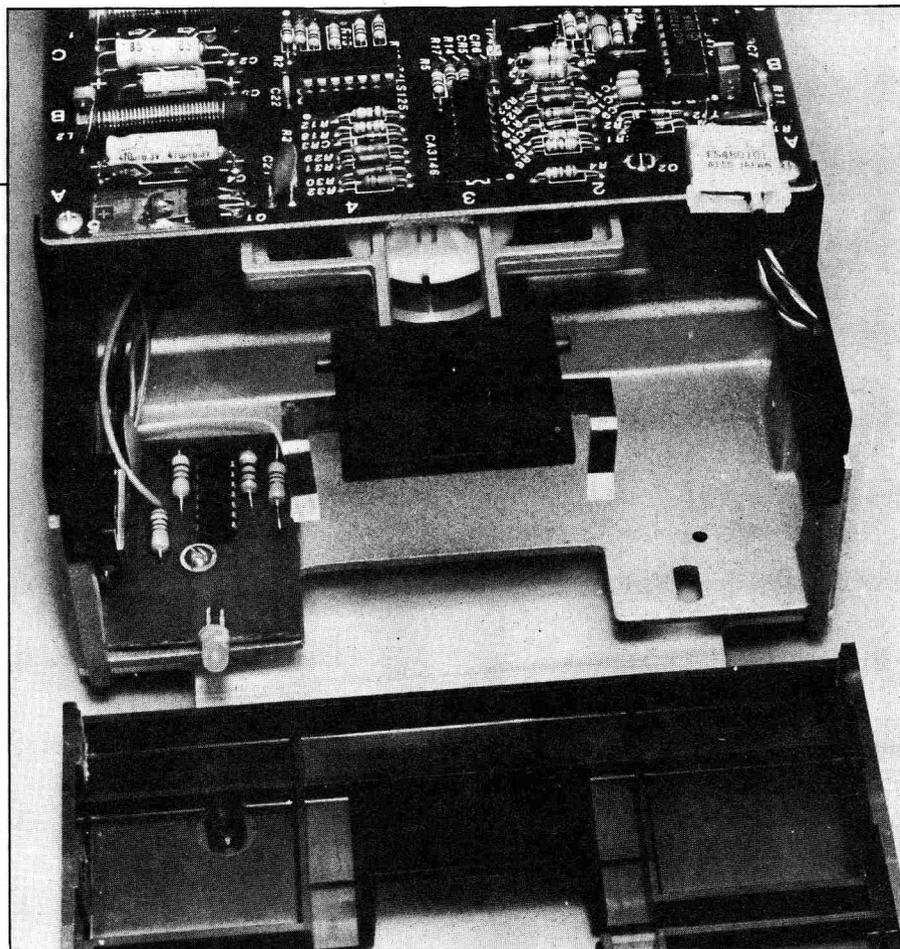


Photo 2. The circuit board is mounted next to the microswitch on the drive's baseplate. Capacitor C4 can be seen in the upper left. The flat side of the LED is toward the center of the drive.

verify that the indicator glows green. If it glows red you installed the LED in the wrong direction and will have to reverse it. (I did it twice.) Finally, boot a disk and the indicator should glow red while the drive is in use. If it does, everything is in order and you can re-assemble your drive. ■

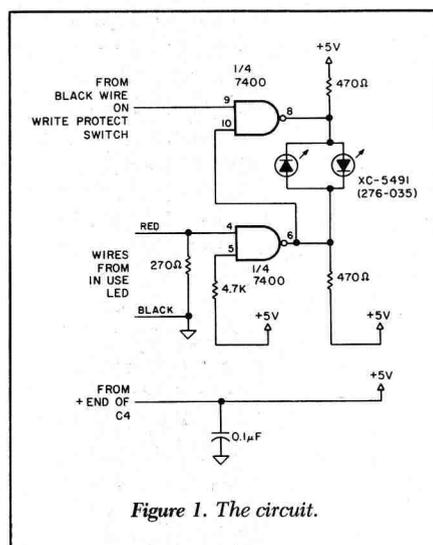


Figure 1. The circuit.

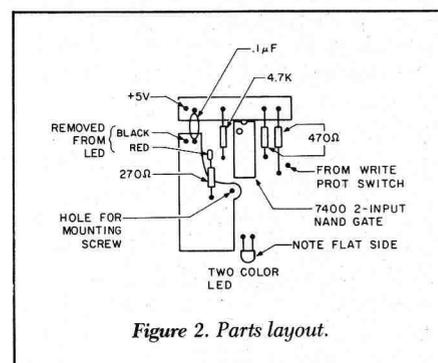


Figure 2. Parts layout.

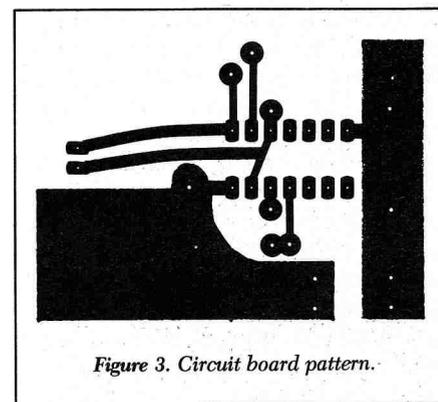
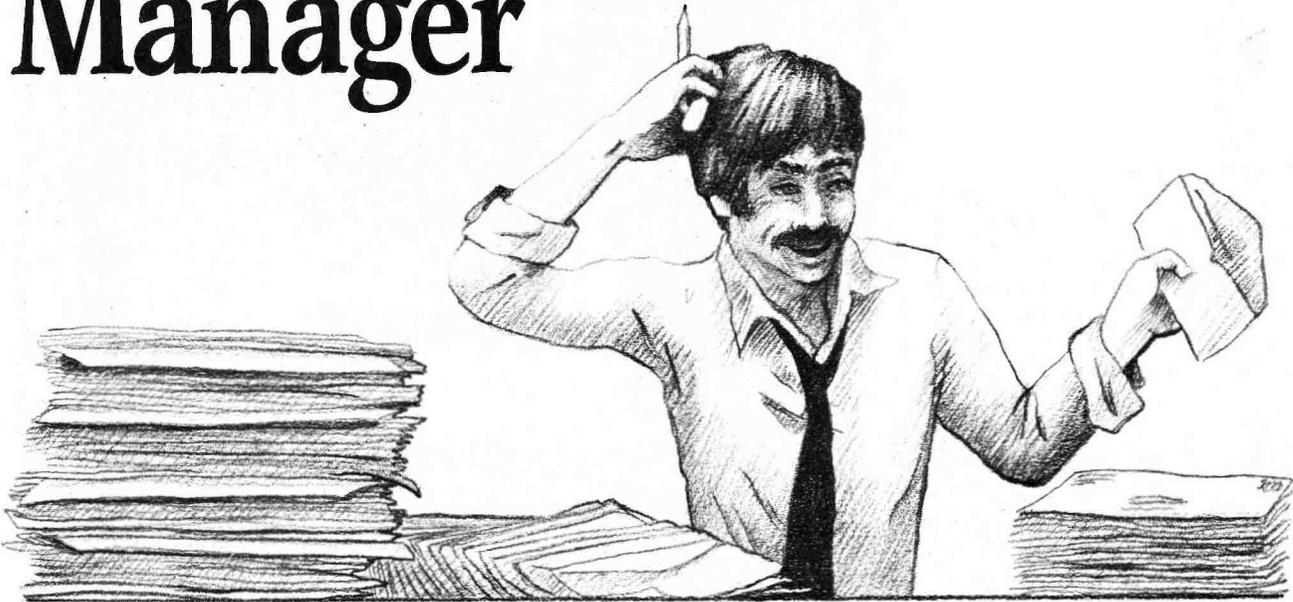


Figure 3. Circuit board pattern.

# List Manager



by Gregory R. Glau

Don't expect to hand this program to your secretary and say, "Send out some mailings, Helen." First, you must configure it to your Apple. You use one of the system's three disks—the Configurator Disk—to adapt the program to whichever computer you're using. Make copies of the program disks for your own use, then use the Configurator to initialize the copies.

That's easy enough, but you're also asked to copy CP/M onto your working disks. Finally, with the CP/M PIP program, you must place BRUN onto them. You need two disk drives to use the Configurator program.

Of course, that's one problem for any "program for all terminals." Since how you move depends upon your hardware, this program comes with 29 stickers that cover the movement commands for 29 different terminal configurations.

Since I have an Apple with a Videx board, for example, I use control-W to move up, control-Z to move down, and the right and left arrows for horizontal movement. But to move from field to field on our mailing list files, I must tab. My Apple II doesn't have a tab function, so the List Manager program uses control-I. The manual also

explains how to configure the program to any terminal, and how to change the codes. The Apple IIe includes tab and horizontal movement keys, so you can configure List Manager to use them.

## The Manual

The 116-page indexed manual uses examples to teach you List Manager's workings. Though the program was created to generate mailing labels, it will work with the company's word processing program, PeachText. And List Manager offers powerful searching routines to let you print labels for the exact people you wish.

Each record may contain up to 14 items of data. They're all treated as text, so you can enter numbers or characters in any combination. The maximum number of characters in each record is 509.

Each record automatically includes a copy field, where you can designate if people will receive multiple copies of a mailing. Setting this entry at 3, for instance, would print three labels for that particular person. This is well and good if you think you need to, but superfluous if you don't—and there's no

way to delete the feature.

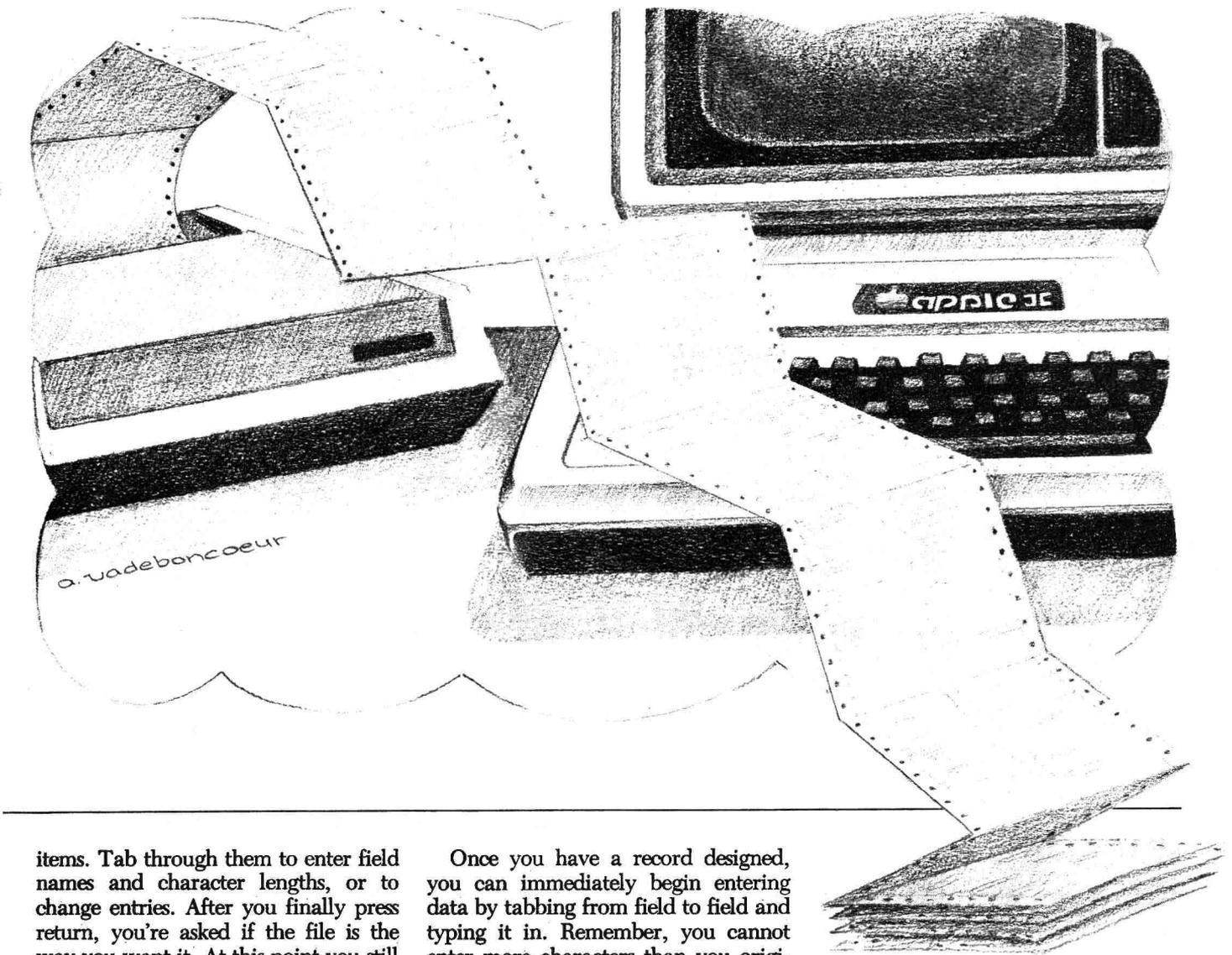
Every record must have at least one key for the List Manager to sort on. You can also have two cross index keys. However, these keys affect how many records you can store. For instance, with a record of 100 characters and the primary index, my Apple can store 296 records per disk. Adding one cross index key drops the total to 226. When I search with both cross index keys (as well as the primary key), the total slides to 196.

## The Menu

The program is menu-driven. Once you boot CP/M and get the A> prompt, you type ML to summon the main menu's eight selections, including one that terminates the session and returns you to CP/M. "??" pulls up a help screen (one of several) that explains how to move around within the program. Defining and entering data into a mailing label file is quick and easy.

The menu's only drawback is that everything is a two-digit selection, and you must press return. That's no major problem, but single-item selections are a bit faster.

Your screen displays the 14 available



items. Tab through them to enter field names and character lengths, or to change entries. After you finally press return, you're asked if the file is the way you want it. At this point you still can go back and change it.

Keep your program disk in drive A and your data disk in drive B. You can store much more data with a blank disk. The command to put data on drive B is easy, too; if your file name is MEMBERS, just type B:MEMBERS.

Once you accept the file design, you may select up to three index items (you must have at least one). For instance, you could sort on names, and perhaps also on zip codes. The program will set up pointers for these items, so when you search either to print, view or change files, they appear in order.

When List Manager displays your records for you, it sorts them alphabetically on the primary index. Thus, the first one you see when you browse through a file is the first alphabetically. If you enter a name as THORELL, PAUL R., it's displayed or printed as PAUL R. THORELL. You can override this "comma reversal" feature, but it's plain *smart* of List Manager to do it automatically.

Once you have a record designed, you can immediately begin entering data by tabbing from field to field and typing it in. Remember, you cannot enter more characters than you originally had specified.

When you add a record, the program automatically checks if a file exists under the same name (if that's your primary field). List Manager also saves each verified entry with another disk access. You can browse through the database, pulling up one screen of data after another, and you can quickly delete a record too.

The system allows you to set "assumed values," similar to default entries. Each blank screen produces these items already listed, and you always can change them. If you have many entries with similar addresses, for example, this is a real time saver. The List Manager can combine files, if you wish. The display shows you which items will be truncated or deleted when you combine two files.

#### Printing Labels

Once you create a record definition and enter your data, you're ready to print mailing labels. This section of the

*Greg Glau, owner of a heating and refrigeration business, lives in sunny Arizona. He'd like to hear from you. Write him at PO Box 1627, Prescott, AZ 86302.*

**"List Manager certainly does what it says it will,  
and once it's configured to your system anyone  
should be able to use it well."**

system holds both the program's strongest and weakest parts.

The best part is that designing a form is quick and easy; you just tell List Manager how many labels across (up to five) and what size they should be. You may move around the label area using the control-W, control-Z and the arrow keys. When you want to position something, press control-P and tell the program which item you'd like there.

If you enter an item that covers another, the program beeps and asks again. In short, you cannot make a mistake.

Once you position all the items, you see the label as it will be printed. The asterisks following the field names indicate the length of the field—how much space it can take on the label.

In the PM selection, you can sort using just the main index and/or the two other indexes (they sort inside your

primary key). List Manager lets you "print" to the screen, so you can see what your label will look like.

The system has a complete set of comparative searching features usually found in a database program. On page 36 of its manual List Manager mentions that while it's basically a mailing-list program, it also can be used for general data management. Since your text entry is freeform, and since the system will search and print on virtually any criteria and key item(s) you select, you could use the program as a warranty record file, or for inventory, or whatever.

### Conclusion

I really found only a couple of weaknesses—the program hangs if your searches get ten levels deep, and it doesn't seem to care if you have a printer on-line or not.

List Manager certainly does what it

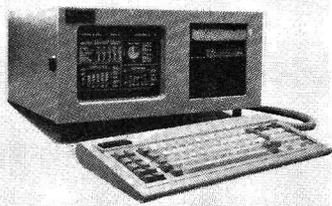
says it will, and once it's configured to your system (which takes a bit of knowledge) anyone should be able to use it well. Control-I for the Tab function for the Apple is a limitation, but it just takes getting used to. Because it goes to the disk for every input/output, List Manager is not terrifically fast, but the lack of speed doesn't seem to hurt anything.

It's flexible in both how it searches and in the formats for its labels. I believe that whatever type of label you want to use, this program could format it to your specifications.

And it can function as a simple database in addition to its primary duty. If you need a mailing list system, look at this one. It's not inexpensive, but on the whole List Manager is definitely a good program. It's available for \$375 from Peachtree Software Inc., 3445 Peachtree Road N.E., Atlanta, GA 30326. ■

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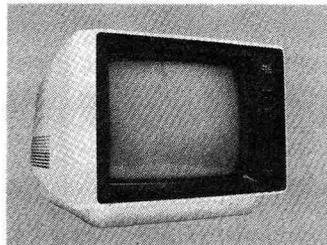
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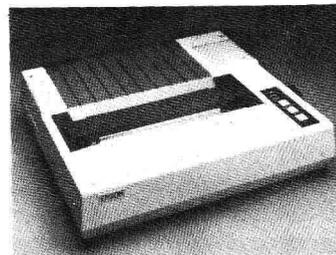
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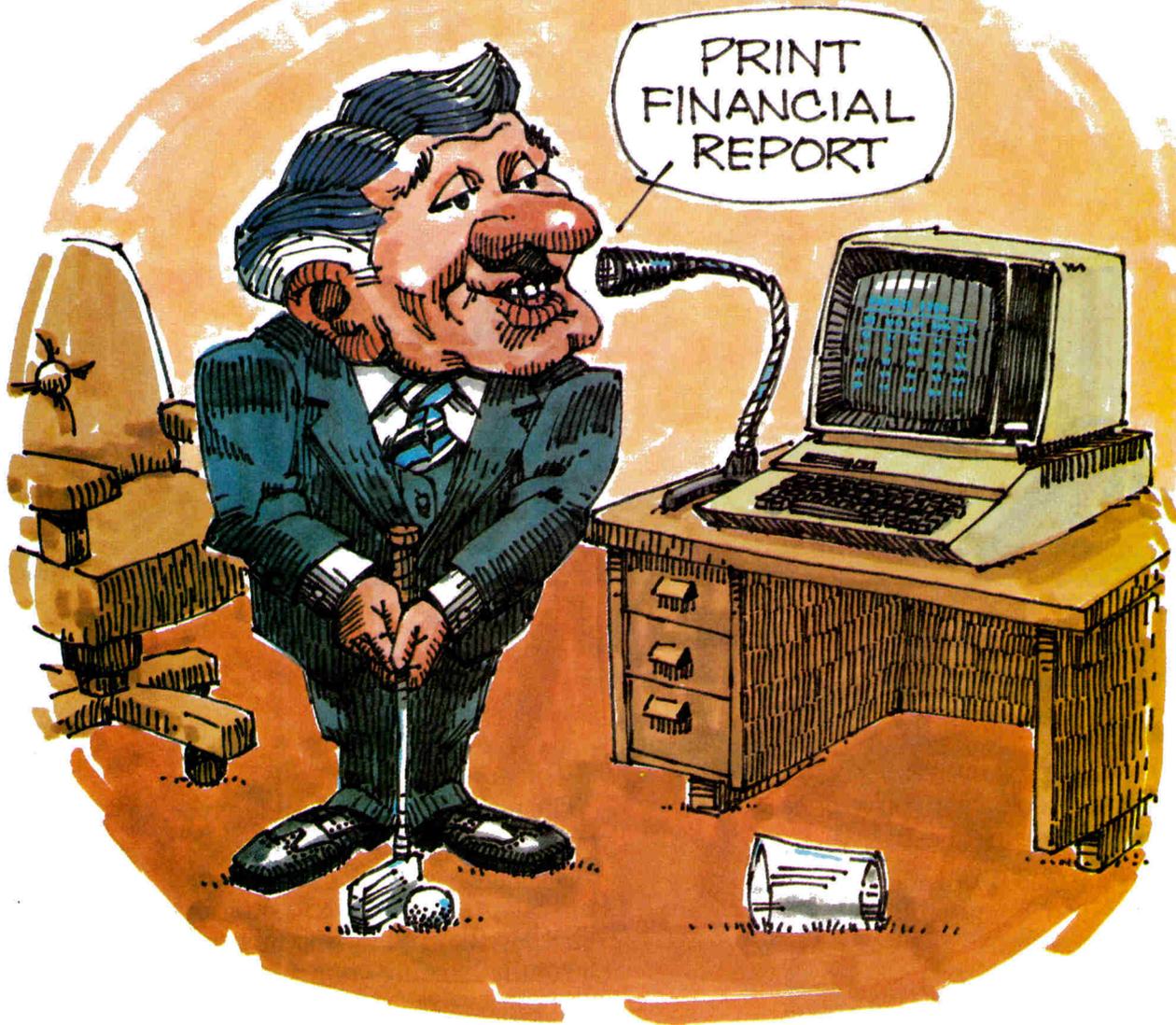
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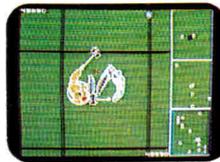
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# Using Every Bit of Your Memory

Hold it! Don't buy that new memory card yet!

by Peggy Burnett

```

10 INPUT "TYPE IN LAST NAME;FIRST NAME : ";NAME$
20 FOR I = 1 TO LEN (NAME$)
30 IF MID$ (NAME$,I,1) = ";" THEN 100
40 NEXT
50 PRINT "NO SEMICOLON FOUND IN NAME!": GOTO 32767
100 PRINT "THANK YOU"
32767 END

```

*Listing 1a. Because this program doesn't exit the loop through the NEXT statement, it leaves data permanently on the stack.*

```

10 INPUT "TYPE IN LAST NAME;FIRST NAME : ";NAME$
15 I1 = 0
20 FOR I = 1 TO LEN (NAME$)
30 IF MID$ (NAME$,I,1) = ";" THEN I1 = 1:I = LEN (NAME$)
40 NEXT
45 IF I1 > 0 THEN 100
50 PRINT "NO SEMICOLON FOUND IN NAME!": GOTO 32767
100 PRINT "THANK YOU"
32767 END

```

*Listing 1b. This program demonstrates the proper way to exit the loop so that the FOR data will be removed from the stack.*

```

10 REM THIS PROGRAM PRINTS OUT 5 NUMBERS
20 A = 1
30 B = 2
40 C = 3
50 D = 4
60 E = 5
70 PRINT A,B,C,D,E
80 END

```

*Listing 2a. This program uses 136 bytes of memory. Compare it with Listing 2b.*

You're trying to write an important program for your Apple II Plus. Suddenly, that depressing message flashes across the screen—*out of memory*. You're devastated. So, you pick up your checkbook and head off to the computer store to buy even more memory. Right?

Wrong. Buying more memory can be a solution to your problem, but there are ways to fit great big programs into not-so-big amounts of memory without buying more hardware. In this article, I'll discuss several programming techniques I've used to do just that. While this article is specifically addressed to Apple II Plus owners, the basic techniques also can be applied to other computers.

## Diagnosing the Problem

The first thing to do is to figure out what's wrong. There are two different problems that generate the out-of-memory error—one is that all available memory is used up with program statements and data; the other is that the *stack* is full. You can tell which your problem is by typing:

```
PRINT FRE(0)
```

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This tells you how many bytes of memory are left for you to use. If the answer is large, you're actually out of stack space, not out of memory.

### So What's the Stack?

The stack is a pile of data that computers use internally to be able to keep track of subroutines, FOR-NEXT loops and certain types of expressions. It works just like a pile of cards. When you add more cards to the top of the pile, it gets bigger. It doesn't get smaller unless you take cards back off again.

The Apple puts an entry on the stack whenever you GOSUB, and takes one off when you RETURN from a subroutine. Each right parenthesis in arithmetic expressions adds an entry to the stack; a left parenthesis takes one off. Each FOR adds to the stack; each NEXT removes from it.

You probably won't get into trouble with the stack by having too many right parentheses and not enough left ones—the Applesoft syntax checker protects you from that. But the subroutines and FOR-NEXT loops are a common source of problems.

### Avoiding Stack Problems

To avoid the problems that subroutines can cause with the stack, always RETURN from subroutines. Sometimes it's tempting to GOTO out of a subroutine. Don't do it! Resist temptation, and figure out a way to RETURN instead.

To avoid filling up the stack with FOR-NEXT loops, be sure you always NEXT your way out of the loop—don't GOTO out of it. Listings 1a and 1b show two programs looking for a semicolon in a string. Listing 1a does not properly exit the loop, and therefore leaves data permanently on the stack. Listing 1b demonstrates the right way to exit the loop so that the FOR data will be removed from the stack. Using GOTO to exit a FOR-NEXT loop is traditionally considered to be perfectly acceptable programming procedure on most computers. But don't do it in Applesoft!

### If You Really Are Out of Memory

If stack space is not the problem and you really are out of memory, you

must make your program smaller. There are several ways to do this.

One way is to use less memory for data. You can do this by (1) dimensioning your arrays smaller or (2) using fewer variables by reusing the same variable for different purposes. According to the Applesoft Reference Manual, the program line:

100 X=FRE(0)

not only tells you how much memory remains, it frees up memory that was in use but is no longer needed by your program.

You may make your program itself smaller by deleting REM statements, and by combining several statements on one line. Listings 2a and 2b demon-

```
20 A = 1:B = 2:C = 3:D = 4:E = 5
70 PRINT A,B,C,D,E
80 END
```

Listing 2b. This program is identical to Listing 2a, except that it uses only 80 bytes.

Listing 3a. Excerpts from Account Updater, the program that allows the user to enter the trades for an account; computes commissions, fees, and profit/loss; and prints out a statement to be mailed to the account-holder.

```
5 REM -----ACCOUNT
  UPDATER-----
6 REM PROGRAM TO UPDATE EACH AC
  COUNT, BASED ON TODAYS TRADE
  S. WRITTEN FOR
8 REM JEFFREY S. QUINTO & CO, I
  NC.
9 REM BY: PEGGY BURNETT. 9/82
10 :
11 REM -----INITIALIZE VBLES, H
  OUSEKEEPING-----
12 HOME
13 IF SPECIAL% = 1 THEN GOSUB 1
  1660: GOTO 2120: REM RESUME
  AFTER SPECIAL PAIRING
14 CLEAR
20 D$ = CHR$(13) + CHR$(4): REM
  CR + CTL D
30 SCREEN$ = "PR#0":PNTER$ = "PR#
  1"
100 DIM VMO$(12),COMMOD$(90),CDT
  E$(90),CQTY$(90)
105 DIM CPRICE(90),VCOM$(53),SPR
  ED$(90)
110 DIM TDTE(90),UNIT(53),PRICE(
  12,1),TBILLS(10,1)
120 PRINT D$,SCREEN$: REM OUTPU
  T TO SCREEN
130 PRINT D$;"OPEN DATEFILE,D1"
140 ONERR GOTO 190
150 PRINT D$;"READ DATEFILE"
160 INPUT DTE$,TDTE
180 GOTO 195
190 ERRMSG$ = "UNABLE TO READ DAT
  EFILE.": GOSUB 10000: GOTO 3
  2767
195 POKE 216,0
196 Y1% = INT (TDTE / 10000)
198 :
199 REM -----GET ACCT
  # & VERIFY IT-----
200 HOME
201 ERRLINE% = 0:TRXS% = 0:SPECIA
  L% = 0:CAMT = 0:PS = 0:TE =
  0:FEE = 0:TBILLS = 0
202 PRINT D$;"CLOSE"
204 VTAB 1: HTAB 1: INVERSE : PRINT
  "FUTURES TRADING": NORMAL
205 VTAB 2: HTAB 1: REM POSITIO
  N TO LINE 2
206 PRINT "ACCOUNT NUMBER: "; SPC(
  10): VTAB 2: HTAB 17
210 INPUT " ";ANACCT$
212 IF ANACCT$ = "DONE" OR ANACC
  T$ = "SAVE" OR LEN (ANACCT$
  ) = 0 THEN 3200.
220 IF ERRLINE% = 1 THEN GOSUB
  10050: REM CLEAR ERR MSG FR
  OM SCREEN
230 ONERR GOTO 340: REM SET TR
  AP IF ACCT# NOT ON THIS DISK
235 ANACCT = VAL (ANACCT$)
240 PRINT D$;"OPEN ACCOUNT ";ANA
  CCT
260 PRINT D$;"READ ACCOUNT ";ANA
  CCT
270 INPUT NAME$,STREET$,CITYST$,
  ZIP
280 ONERR GOTO 360: REM CHK FO
  R SPECIAL COMMISSION TYPE
290 INPUT CTCOMMTYPE%
300 POKE 216,0: REM REMOVE ALL
  ERROR TRAPS
312 PRINT D$;SCREEN$: REM SET O
  UTPUT TO SCREEN
315 VTAB 3: HTAB 1: PRINT NAME$
316 ONERR GOTO 400
317 PRINT D$;"CLOSE"
338 GOTO 400
339 REM -----ACCT# FILE ERRORS
  FOLLOW:
340 ERRMSG$ = "THAT FILE IS NOT O
  N THIS DISK"
345 GOSUB 10000: REM DISPLAY ER
  ROR MSG
350 GOTO 205
360 CTCOMMTYPE% = 1: REM NO SPEC
  IAL COMMISSION TYPE
370 GOTO 300
375 LB = 0
380 GOTO 311
400 POKE 216,0
410 REM LINES 401-1195 HAVE BEE
  N
420 REM OMITTED FOR BREVITY'S S
  AKE.
430 REM THEY ALLOWED THE USER T
  O INPUT
440 REM THIS ACCOUNT'S TRADES F
  OR TODAY,
450 REM PERFORMING ALL NEEDED E
  DITING, ETC.
460 :
470 :
```

Listing continued.

Listing continued.

```
480 :
1198 :
1199 REM LET HIM VERIFY THIS TR
X
1200 VTAB 10: HTAB 1
1205 PRINT "VERIFY ('?' FOR INST
RUCTIONS): "
1210 VTAB 10: HTAB 34: INPUT "";
INPU$
1211 IF ERRLINE% = 0 THEN 1220
1212 FOR I = 11 TO 15: REM CLEA
R INSTRUCTIONS OFF SCREEN
1213 VTAB 1: HTAB 1: PRINT TAB(
39)
1214 NEXT
1215 GOSUB 10050: REM ALSO CLEA
R ERROR LINE
1220 IF INPU$ = "ERROR" OR INPU$
= "NO" THEN 410
1250 IF INPU$ = "SAVE" OR INPU$ =
"DONE" THEN GOTO 1272
1260 IF INPU$ = "SPECIAL" THEN S
PECIAL% = 1: GOTO 1272
1270 IF LEN (INPU$) > 0 THEN GOTO
1285
1272 IF COMMOD% = 0 THEN GOTO 1
280
1275 TRXS% = TRXS% + 1: COMMOD%(TR
XS%) = COMMOD%: CDTE%(TRXS%) =
DTE%: CQTY%(TRXS%) = QTY%: CPR
ICE(TRXS%) = PRICE
1276 TDTE(TRXS%) = TDTE: SPRED%(TR
XS%) = 0
1280 IF LEN (INPU$) = 0 THEN GOTO
410: REM GET NEXT TRX
1282 GOTO 1300: REM FINISH UP
1285 VTAB 12: HTAB 1: PRINT "JUS
T HIT RETURN IF TRANSACTION
IS OK"
1286 PRINT "ERROR" OR "NO" TO R
ETTYPE IT"
1287 PRINT "SAVE" OR "DONE" IF
NO MORE ENTRIES"
1288 PRINT "SPECIAL" FOR SPECIA
L PAIRING"
1289 ERRLINE% = 1: GOTO 1200
1290 REM THIS SECTION OF CODE H
AS ALSO BEEN OMITTED FOR BRE
VITY.
1300 REM IT PRINTS THE CLIENT'S
STATEMENT ON THE PRINTER,
1310 REM AND PERFORMS THE PAIRI
NG OF PURCHASES
1320 REM AND SALES TO ARRIVE AT
A NET
1330 REM PROFIT OR LOSS
1340 :
1350 :
1360 :
2110 IF SPECIAL% = 1 THEN GOSUB
11600: REM SPECIAL PAIRING
2120 :
2200 REM MORE CODE OMITTED HERE
2210 REM THIS AREA UPDATED THE
CLIENT'S LEDGER BALANCE AND
OPEN POSITION (LIST OF
2220 REM TRADES HE HAS OPEN AS
OF TODAY).
2230 :
2240 :
2250 :
3140 PRINT D$;"CLOSE"
3190 RUN : REM GET NEXT ACCOUNT
NUMBER.
3198 :
3199 REM -----USER IS ALL DO
NE. EXIT THIS PROGRAM-----
3200 HOME
3202 VTAB 3: HTAB 1
3204 PRINT " 1. CONTINUE ENTERIN
G FUTURES TRADES"
3206 PRINT " 2. ENTER OPTIONS TR
ADES"
3208 PRINT " 3. PRINT OUT GRAND
TOTALS REPORT"
3209 PRINT " 4. ENTER OR CORRECT
CLOSING PRICES"
3210 VTAB 2: HTAB 1: INPUT "ACTI
ON: "; X$
3212 IF X$ = "1" THEN 200
3214 IF X$ = "2" OR X$ = "3" OR
X$ = "4" THEN 3220
```

Listing continued.

strate these techniques. The two programs work exactly the same, but Listing 2a uses 56 bytes more than Listing 2b does. However, you sacrifice readability (an important feature when debugging and maintaining a program) when you use these techniques.

### Breaking Up Your Big Programs Into Little Ones

You can realize the most dramatic savings in memory by breaking your big programs into little ones, and bringing one little program at a time into memory as needed. One way to do this is to completely separate the two programs, executing the first program until you are done, then bringing in the second one with the following AppleSoft statement:

```
9999 PRINT CHR$(4); "RUN PROGRAM2"
```

In this statement, CHR\$(4) (control-D) is a call to the operating system, followed by the operating system command to RUN PROGRAM2. This method completely clears memory before it loads in PROGRAM2, giving PROGRAM2 full use of all the memory you have. Therefore, any communication needed between PROGRAM1 and PROGRAM2 will have to be done via disk or tape files.

### A Real-World Example

I use this technique for Jeffrey S. Quinto and Company, a Kansas City commodities brokerage firm for whom I wrote Account Updater, and its subprogram Special Pairing. In this application, Jeff's staff inputs all the applicable closing prices on the commodities market today. Then the Apple updates each account with today's trades, figures commissions and fees, computes the current market value of this account's holdings, and prints out a statement to be mailed to each account holder. Each week Jeff Quinto thinks of more new ways to enhance the program.

We added a "special pairing" routine to handle unusual clients' transactions; we added a routine to keep track of Treasury Bills that a client might put on deposit with Jeff's company; we added special types of commissions to be used on what is termed a "spread" in the commodities business; and we

put in the ability to enter prices in either decimal (12.5) or fractional (12½) form. As we added these and other features, the program grew more complicated and eventually grew too big to fit into his 64K Apple II Plus.

To solve the problem, I made the part of the program that reads in today's closing prices into a separate program. After we typed in all necessary closing prices as of the day's market closing, the Apple edited the input, and saved the new prices on disk. It then brought in the program that allows the user to enter the trades, and then computed the current market values (using the closing price file saved on disk) and printed out a statement. If we entered a trade for a commodity for which the disk file had no closing price, the program asked him to type in the closing price, which then was added to the file.

That temporarily solved our memory problems. We decided to add another program that prints out grand totals after all the account updating and statement printing is complete, and still another one that takes care of accounts involved in options trading. But once again, the main program (the one that updates each account and prints the statements) became too big to fit in memory.

This time, there wasn't any logical place to break it. The whole program works together, and there was just no way to split it up without seriously degrading the performance (speed!) of the system.

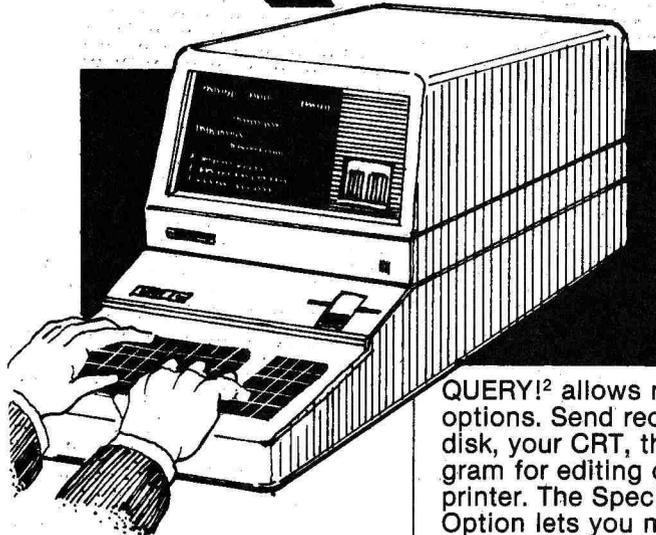
### Communicating between Two Programs in Memory

To solve this problem, I took the large but infrequently used "special pairing" subroutine out of the account updating program and made it a separate subprogram. This subroutine must work with the rest of the program, using the current values of the many variables, so the first program must not clear the memory when it brings in the subprogram.

To accomplish this, the CHAIN utility program (on your Apple System Disk) must reside on your program disk. If it doesn't, copy it using the FID program on your System Disk. FID is quite easy to use—you should have no

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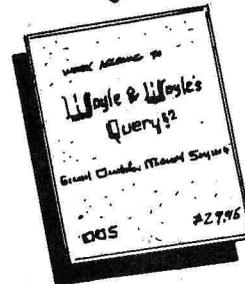
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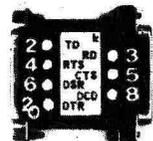
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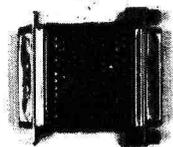
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Listing continued.

```

3216 GOTO 3210
3220 VTAB 7: HTAB 1
3255 IF X$ = "2" THEN PRINT D$;
"RUN OPTION UPDATER"
3260 IF X$ = "3" THEN PRINT D$;
"RUN TOTAL PRINTER"
3270 IF X$ = "4" THEN PRINT D$;
"RUN FIX CLOSING"
9990 GOTO 32767
9999 REM -----SUBROU
TINE TO DISPLAY ERROR MSGS---
-----
10000 VTAB 23: HTAB 1
10005 INVERSE
10010 PRINT ERRMSG$
10020 POKE 216,0: REM REMOVE ER
ROR TRAPS
10025 NORMAL
10026 ERRLINE$ = 1
10030 RETURN
10048 :
10049 REM -----SUB TO CL
EAR ERR MSG OFF SCREEN-----
-----
10050 VTAB 23: HTAB 1
10060 PRINT SPC( 39)
10070 ERRLINE$ = 0
10080 RETURN
10098 :
11598 :
11599 REM -----S
PECIAL PAIRING-----
-----
11600 HOME : VTAB 2: HTAB 1
11610 PRINT "REMOVE YOUR TOTALS
DISK & PUT YOUR"
11620 PRINT "PROGRAM DISK IN DRI
VE 1."
11630 INPUT "HIT RETURN WHEN REA
DY: "; INPU$
11640 PRINT D$; "BLOAD CHAIN,A520
,D1": REM BRING IN PGM CHAI
NER
11650 CALL 520"SPECIAL PAIRING":
REM CHAIN TO SPECIAL PAIRI
NG SUBPROGRAM
11660 REM SPECIAL PAIRING WILL
CHAIN BACK TO THIS LINE WHEN
DONE.
11670 CAMT = 0:PS = 0:NFEE = 0:EF
EE = 0: IF TRXS% > 0 THEN GOSUB
11202: REM PAIRING SUB FIGU
RES COMMISSIONS,FEES,ETC
11680 HOME : VTAB 2: HTAB 1: NORMAL
-----
11690 PRINT "REMOVE PROGRAM DISK
, & PUT YOUR TOTALS"
11700 PRINT "DISK BACK IN DRIVE
1."
11730 INPUT "HIT RETURN WHEN REA
DY: "; INPU$
11995 RETURN
12000 :
32767 END

```

trouble with it.

Once you have CHAIN on your program disk, the following two lines will load in the next program, erasing the first program from memory but leaving all your variables intact:

```

1000 PRINT CHR$(4);
"BLOAD CHAIN,A520,D1"
1010 CALL 520"NEXT PROGRAM"

```

In line 1000, 520 is the address in memory into which CHAIN is loaded, and the optional parameter DIV indicates which drive CHAIN is on. Line 1010 actually loads and starts execution of NEXT PROGRAM. (Note that there can be no spaces before the quotation marks.) Listings 3a and 3b show the way these statements were used in our application, along with examples of most of the other techniques explained in this article.

### Summary

In this article, I've covered several ways to make your programs fit into smaller amounts of memory. You can use less space for data, make your program itself smaller by combining statements on one line and deleting remarks, and you can split your programs up into separate smaller ones, calling them automatically as needed. Or, you can go out and buy more memory. ■

```

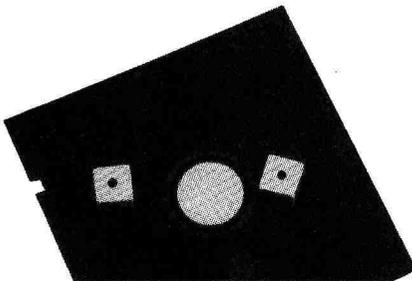
5 REM -----SPECIAL
PAIRING-----
6 REM THIS SUBPROGRAM IS CALLED
IN FROM ACCOUNT UPDATER WHE
N
7 REM SPECIAL PAIRING IS NEEDED
FOR AN ACCOUNT.
8 REM WHEN ALL DONE, THIS SUBPR
OGRAM BRINGS BACK ACCOUNT UP
DATER.
9 REM WRITTEN BY P. BURNETT 3/8
3 FOR JEFFREY S. QUINTO & CO
-----
2110 GOSUB 11700: REM SPECIAL PA
IRING
2120 PRINT D$;"BLOAD CHAIN,A520,
D1": REM LOAD PGM CHAINER I
NTO MEMORY AT 520
2130 CALL 520"ACCOUNT UPDATER": REM
-----
CHAIN TO ACCOUNT UPDATER
2140 :
2150 :
11700 REM THIS SUB DOES THE SPE
CIAL PAIRING CALCS
11710 PRINT "THIS IS THE SPECIAL
PAIRING PROGRAM."
11720 PRINT "THE SUBROUTINE ALLO
WS THE USER TO"
11730 PRINT "MODIFY THE WAY THE
TRADES ARE PAIRED."
11735 PRINT
11740 PRINT "HIT RETURN WHEN REA
DY TO RETURN TO"
11750 INPUT "THE MAIN PROGRAM: "
; INPU$
11790 RETURN
32767 END

```

Listing 3b. Excerpts from the subprogram Special Pairing, which is called in by Account Updater (Listing 3a) only for special types of clients.

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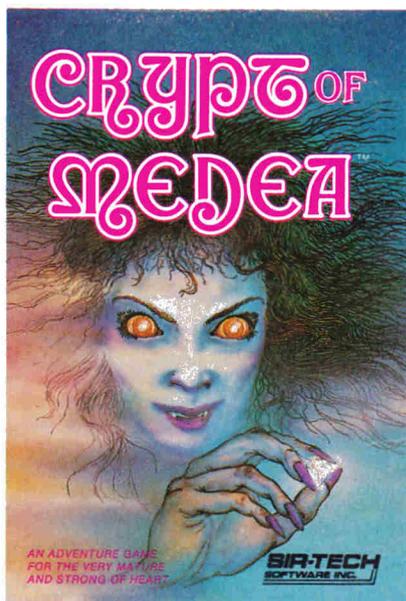
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 City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_  
 Phone ( ) \_\_\_\_\_  
 I am interested in large-volume purchases  
 for my company.  
 Please enclose \$2.50 for mailing to foreign  
 countries. IC

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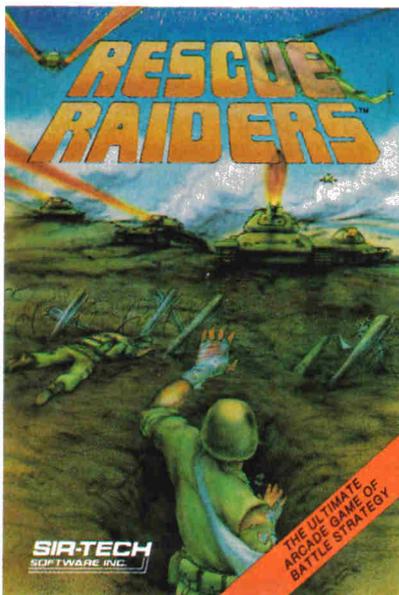
**SOFTWARE THAT CHALLENGES,  
INTRIGUES, AND ENTERTAINS...**

*As you search for freedom, you will test your courage and challenge your problem solving ingenuity.*



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Now, better than ever, the Wizardry adventure continues with LEGACY OF LLYLGAMYN. Cast spells, work your way through a 3-D maze and enjoy the thrill of Wizardry with our newest software innovation--WINDO-WIZARDRY™. Its Lisa-like windows help you play faster and more efficiently than ever before! All the information you'll ever need is at your fingertips' command. SOFTALK's Review Editor, Roe Adams, calls LOL "...an excellent game! It's a landmark in graphics advancement." LEGACY OF LLYLGAMYN is a new world of excitement!

### "The Best Yet!"

Margot Comstock Tommervik,  
Editor, SOFTALK



# SIR-TECH SOFTWARE INC.

When you're ready to add disk drives to your system, pick them carefully. Get all the options you need, but don't pay for features you'll never use.

You get that flexibility in Micro-Sci 5¼" floppy disk drives. Choose from a selection that includes everything from a beginner's first add-on to large capacity, high-speed subsystems right for the busiest office environment.

Micro-Sci's Model A2 is a superbly crafted, 35-track drive which is completely compatible with all Apple II® and Apple IIe® hardware and software. It features a jumper-selectable boot PROM and a price tag its competitors envy. Just right for the budget-conscious consumer!

Programmers and word processors rejoice! You need no longer sacrifice pre-packaged software compatibility in favor of large storage when you buy a disk drive for your Apple II or IIe. The new Model A82 from Micro-Sci combines a full 328K capacity—more than twice the space of a Disk II®—

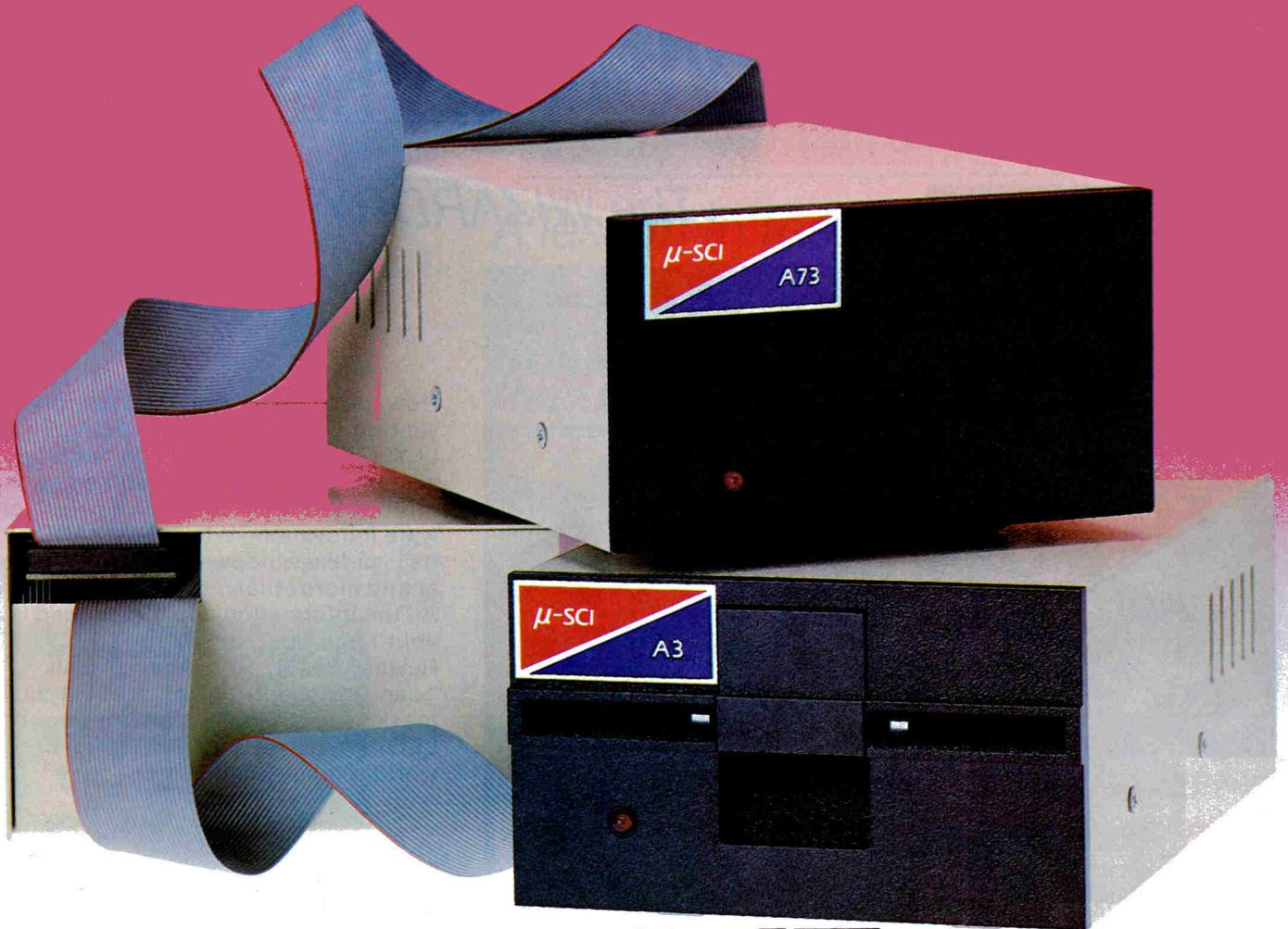
with the ability to read standard 35-track software.

Apple III® owners will crave the Model A3. It offers all the features and capabilities of the Disk III® at a fraction of the price. Ideal as a second drive!

At 286K, Micro-Sci's Model A73 provides Apple III users with twice the capacity of the Disk III, and it plugs right in to the built-in controller—no extra board or power cord!

The king of all Apple compatible drives is the Micro-Sci Model A143, the largest 5¼" floppy disk storage system available for the Apple III. 572K storage capacity and the 5msec access time make the A143 a powerful back-up device for hard disk systems.

One option you'll never see on a Micro-Sci drive is a princely price tag—we control your costs as carefully as we control our quality. So drive carefully to your nearest computer center for a demonstration of Micro-Sci craftsmanship and quality. Do it today!



# DRIVE CAREFULLY.

**μ-SCI**

**MICRO-SCI**

Circle 371 on Reader Service card.

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# System Security

Here's a lineup of gadgets to keep your computer system safe in a harsh world.



---

by M. Andre Little

---

Leaving your sliding glass door in shards, the intruder strides into your den and cackles with glee—your \$3000 Apple system seductively beckons the stranger. Swiftly, he glides up, placing gloved hands upon the keyboard. He pulls and pulls. Consternation gives way to anger as he struggles with the shell enclosing your Apple II. In silent frustration, the chastised thief settles on a nearby TI programmable calculator and departs.

An investment ranging into the thousands of dollars demands a reasonable amount of security. As the microcomputer becomes a more essential component in our growing technological world, the need for uninterrupted usage increases, and various forms of security are of greater concern.

Only in recent years have users of mainframe computers and minicomputers come to recognize the dangers associated with unrestricted access to their software and hardware. The business community has proven exceptionally susceptible to losses due to lapses in computer security. Indeed, significant advances in sophisticated security techniques have resulted from clever criminal acts and naive over-

sights, as the following cases reveal:

- After exchanging bank deposit slips on the counter in the bank with his own MICR-coded deposit slips, a depositor allowed several days for the deposits of other people to accumulate, withdrew over \$100,000 and has yet to be caught.

- A computer operator printed 200 extra copies of his check by simply pressing the repeat button on the printer and was arrested after trying to cash 37 checks all at the same bank.

- A disgruntled employee destroyed all on-line files, forcing his former employer into bankruptcy.

In just the last 18 months, the exploding microcomputer industry has generated a proliferation of security and protection devices. Microcomputer users are now becoming aware of the many threats to their computer's security. Programmers require a constant power supply without spikes and surges. Business users must guard against all unauthorized use. And all of the above must be concerned about the possible theft of their expensive, sometimes irreplaceable investment. Manufacturers are beginning to respond en-

thusiastically.

Microcomputer users are primarily interested in three areas of security: theft protection, access protection and protection against the environment (i.e., heat and power distortions).

Theft protection is generally accomplished by one of three methods: system enclosures that secure the microcomputer to a desk or other surface by means of a set of bolts; flexible cable security devices that lock the microcomputer, system enclosure or peripheral to some large fixture such as a wall or a desk; and adhesive security pads that secure the microcomputer or peripheral to a desk without the need for drilling or bolting.

Access protection is addressed by either a locking keyboard cover or a keylock control for the power supply. Some system enclosures include extra power outlets for the Apple, a monitor, and a fan or printer that allows simultaneous power-on from a single keylock built into the front of the enclosure.

---

Please send correspondence to M. Andre Little, 4415 Hazel Ave., Fair Oaks, CA 95628.

Security Systems					Surge Suppression	Power Outlets	Fan Included
	Keylock Power Control	Theft Protection	Access Protection	Peripherals Secured			
Micro Power Bench \$89	Yes	No	No	None	Optional \$40.00	Four**	Optional \$40
Pro-Tech Security Pad \$135	No	Yes	No	None	No	—	No
Anchor Pad Model 1416 \$112 uninstalled \$150 installed	No	Yes	No	Smaller Pads Available	No	—	No
Station II \$129	Yes	Yes	Yes	4 Disk Drives, Apple Monitors and some other Monitors	Yes	Three**	Optional \$49
Pro-Tech II \$155	No	Yes	No	3 Disk Drives and Monitor	No	—	No***
Apple Center Model 10 \$179.95	No	Yes	No	2 Disk Drives and Monitor	No	—	No***
Apple Center Model 12 \$239.95	Yes	Yes	Yes	2 Disk Drives and Monitor	Yes	Two	Yes
Computer Security System \$295 uninstalled \$400 installed & delivered	No	Yes	No	3 Disk Drives and Monitor	No	—	No***
Data-Mate Model 10500 \$375	No	Yes	Yes	All Disk Drives and Monitor	No	—	—

\*\*Fan utilizes one outlet

\*\*\*Compatible with side-mounted fans

As more expansion boards are added, heating problems can occur and cause unusual memory and data-handling problems. An internally or externally mounted fan relieves this problem. Over the last few years, the need for surge suppression has been demonstrated. Power surges can wipe out RAM and disk memory. Even momentary power losses can cause the loss of an on-line program, creating many extra hours of work. In spite of the protection features already built into the Apple, electronic device manufacturers are offering a variety of products to address these problems.

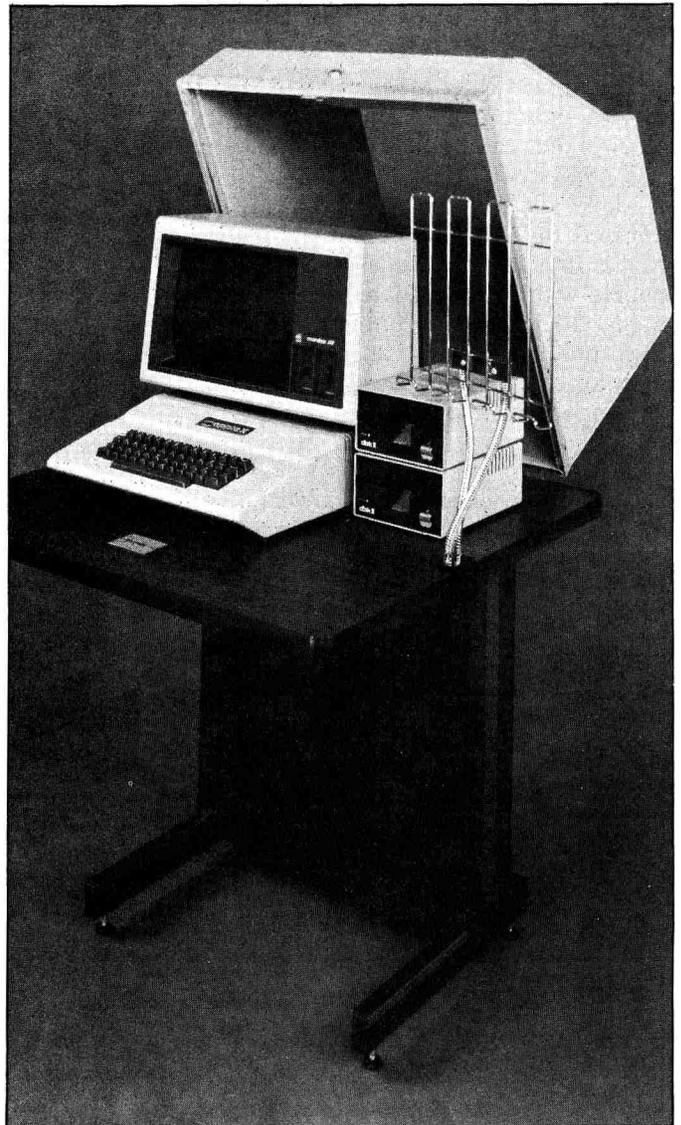
#### System Enclosures

The majority of Apple II support systems are system enclosures that not only offer some form of protection (theft, access or environmental), but also help to protect and organize peripherals as well. We all know the tedium and frustration involved in having to unstack and restack monitors and drives just to change a simple board. Most enclosures allow internal access to the Apple without such unstacking and restacking. Most enclosures also require drilling and bolting to a desktop.

Cab-Tek's Micro Power Bench is inexpensive and functions primarily as an organizer; it offers nothing in the way of theft and access protection. I mention it here simply because an optional fan and surge suppressor are available, and the keylock control of four additional outlets is handy for those who feel they already have a secure environment for their Apple.

Probably the most value and functional variety for the money is offered by the Trace System's Station II. Formed into a structural high-impact plastic shell, Station II matches the Apple's creamy color; it fits snugly

Construction	Manufacturer
Wood Grain Oak and Walnut \$30 additional	Cab-Tek Inc. 11 Riverside St. Nashua, NH 03062 (800) 343-4311
Adhesive, Steel	Segull Enterprises 88 Britannia St. P.O. Box 869 Taunton, MA 02780 (617) 823-9684
Foam Adhesive, Aluminum and Steel	Equipment Environments 57 Adelaine St. Hudson, NH 03061 (603) 883-9980
High-Impact Plastic	Trace Systems 1928-A Old Middlefield Way Mountain View, CA 94043 (415) 964-3115
Metal	Segull Enterprises (See Above)
Steel	Doss Industries 1224 Mariposa San Francisco, CA 94107 (415) 861-2223
Steel	Doss Industries (See Above)
	Equipment Environments (See Above)
Metal Stand with Plastic Cover	Maine Manufacturing Co. 46 Bridge St. P.O. Box 408 Nashua, NH 03061 (800) 258-1768



*The Data-Mate 10500 is designed for use in schools and offices.*

around the Apple II and comes with everything necessary to bolt it to a desk or any flat surface. An optional cable security kit allows minimal mobility without permanent mounting.

The promise of organization and security lured me into purchasing Station II. Station II can support a nine-inch monitor (at a slight angle for more comfortable viewing) and a pair of disk drives. The keyboard's distance from the user is adjustable, and there is a built-in surge suppressor. My favorite aspect of the Station II is the keylock power control. The Apple II, along with two peripheral devices

(usually, the monitor and optional fan), can be plugged into the shell's interior outlets allowing power-on with a single key from the front. Imagine not having to reach into the dreary nether regions at the rear of your computer anymore. Additionally, this set-up allows you to lock the Apple into an off position; only those with a key have access.

Station II's primary disadvantage lies in the accumulation of cords at the rear interior. After pulling the Apple II out, reinsertion can prove to be difficult. Also, the keylock operates a cam, which rotates into one of the Apple's

ventilation slots and effectively locks the Apple II within the shell. Many times I have found myself struggling to position my Apple so the cam would slip into a slot easily.

Segull Enterprises markets a system enclosure called Pro-Tech II. Pro-Tech II can be bolted down to secure an Apple II and up to three disk drives. A 21-inch security cable is supplied for securing a monitor to the enclosure. The Apple II is secured within the enclosure by a unique system of rear keylocks. An optional five-foot security cable is available but the \$50 price is a little high. No surge suppression is of-

**"One doesn't need much experience with a crowbar  
to pry up a system enclosure from a desk."**

ferred, but Pro-Tech II is compatible with side-mounted fans.

The Apple Center Models 10 and 12 by Doss Industries are metal system enclosures that can be bolted down and will protect two drives and a monitor. A Model 10S is available but the only apparent difference between it and the Model 10 is that the Model 10 is compatible with a side-mounted fan. The Model 10 is designed primarily as a theft protection unit with no provisions for surge protection nor any protection against access. For an additional \$60, the Model 12 offers a built-in cooling fan, surge protection and a front keylock to switch power on for the Apple II. All Apple Center models have a keylock to lock the Apple II within the enclosure. When unlocked, the top half of the enclosure lifts up for convenient access to the Apple II's interior.

The Data-Mate Model 10500 is an Apple II security work station designed for use in schools and offices. It consists of a choice of stationary or movable bases that support a woodgrain table top. A large plastic cover locks over the Apple, all drives and up to a 13-inch

monitor. An optional steel cover may be purchased for an additional \$100. There are no provisions for surge protection or cooling, although Data-Mate will allow an internally mounted fan (side-mounted fans may be used but must be removed when locking down). Data-Mate is expensive (\$375 with the plastic cover) and is better categorized as computer furniture rather than as a simple enclosure.

**Adhesive Pads**

As nice as system enclosures are for organization, their effectiveness against access and theft is somewhat illusory. Recently, I was extolling the virtues of my Station II to a neighbor. With a paper clip, a great big smile, and less than 60 seconds of work, he proceeded to unlock and power-up my system. This demonstrated rather dramatically that security measures involving keylocks exist primarily to keep honest people honest. (Although startling, this revelation did not shake the belief that I got more than my money's worth with Station II's other fine assets.) Also, one doesn't need much experience with a crowbar to pry up a system enclosure from a desk. For these reasons

I have taken a good hard look at adhesive pads.

Equipment Environments markets the premier adhesive pad—Anchor Pad. Established over ten years ago, Equipment Environments initially was concerned with securing electric typewriters and calculators. Now, over 80 percent of their sales are for securing personal computers.

Anchor Pad requires no drilling or bolting. Computers without tie-down holes are mounted with special adapter feet, which are then bolted to a 16-gauge galvanized steel plate. The adhesive mat is secured to the surface, and the steel plate is then locked to the mat by means of two heavy steel rods that are inserted with a special tool and secured by covering locks. After securing, Anchor Pad's adhesive mat can only be removed by a special heating process that is explained in the instructions.

Over 200 businesses, hospitals, schools, colleges and governmental agencies are presently using Anchor Pads to secure their equipment. With this kind of track record, Anchor Pad deserves careful consideration for those concerned with absolute security against theft.

Equipment Environments also has recently provided a Security Rack that attaches to Anchor Pad and secures several disk drives and a monitor. The Rack swivels a full 360 degrees. With no fan, surge suppression, or access protection, the steep price of \$295 will only attract those who are serious about their security.

Another advertised adhesive pad, the Pro-Tech Security Pad, is offered by Segull Enterprises. The cost is slightly less than Anchor Pad, and the materials are similar. This pad has yet to establish a reputation in the marketplace.

**Fans**

Lastly, we must consider those devices sold separately that address the environment of the Apple.

The two most advertised fans are the System Saver and the Super Fan II. Both fans are mounted externally and have built-in switches. Both also have two extra outlets so that the Apple, a monitor and another accessory may be

Fans	Mounting	Surge Suppressor	Outlets	Manufacturer
Cab-Tek Fan \$40	Internal	No	None	Cab-Tek Inc. 11 Riverside St. Nashua, NH 03062 (800) 343-4311
Trace Systems Fan \$49	External	No	None	Trace Systems 1928-A Old Middlefield Way Mountain View, CA 94043 (415) 964-3115
Apple Cooler \$59	Internal	No	None	M R Engineering 4730 W. Addison Chicago, IL 60641 (312) 286-6606
Super Fan II \$74.95	External	Optional \$34.05	Two	R H Electronics Inc. 566 Irelan Buellton, CA 93427 (805) 688-2047
System Saver \$89.95	External	Yes	Two	Kensington Microware 919 Third Ave. New York, NY 10022 (212) 486-7707

powered up with the single built-in switch. The primary difference between the two is that the System Saver comes with a surge suppressor while the Super Fan II does not. (A surge suppressor can be purchased separately.) Both perform similarly, so the primary consideration would probably be price.

Another advertised fan is the Apple Cooling Fan, which costs less than the System Saver or the Super Fan II. The Apple Cooling Fan is mounted internally, drawing cool air from one side of the Apple interior and blowing it out the other. No extra outlets or surge suppression are supplied. This fan is perfect for use with system enclosures that are not compatible with externally mounted fans.

Electronic Protection Devices sells a series of surge protectors as well as EMI-RFI filter devices—the Lemon,

Lime, Peach and Orange. Each is progressively more expensive. The Lemon plugs directly into any standard three-wire duplex outlet and has two lights that go out in the event of circuit failure. The Lime is similar to the

**"Today's trend is towards smaller computer systems."**

Lemon; but it includes a 4½-ft power cord and a built-in power switch. The Peach offers electromagnetic and radio frequency interference protection as well as surge suppression. It plugs directly into a wall outlet. The Orange offers a combination of all of the above. All but the Peach offer protec-

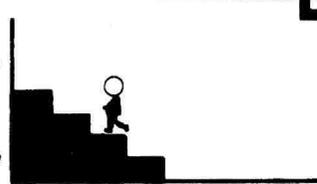
tion for six peripherals. The Peach offers protection for three peripherals.

Another concern for programmers and on-line data handlers is the possibility of a brownout or power failure. Standby power devices are advertised but are quite expensive. RH Electronics Inc. offers the Guardian Angel, a standby power device that will supply power from six to fifteen minutes after a power failure. Guardian Angel can back up your Apple, a monitor, a printer and a disk drive.

Many other companies are coming out with a variety of products: plexiglass keyboard covers, special transportation cases, dust covers. One company even sells computer insurance. Today's trend is towards smaller computer systems or networks of interconnected microcomputers, and you can expect to see an increasing number of security related products. ■

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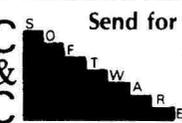
**MAGIC CRAYON** Children draw, select colors and command the computer to re-draw their own pictures. Good introduction to computer use. \$35

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Three programs use colorful, lively graphics to teach number skills.

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- Let's Tell Time
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# Inside Apple

Vol. 1, No. 4

## A dot matrix printer that will improve your image.

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

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

Take legibility, for instance.

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

And is it fast.

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

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

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

like superscript and subscript, to name just two.

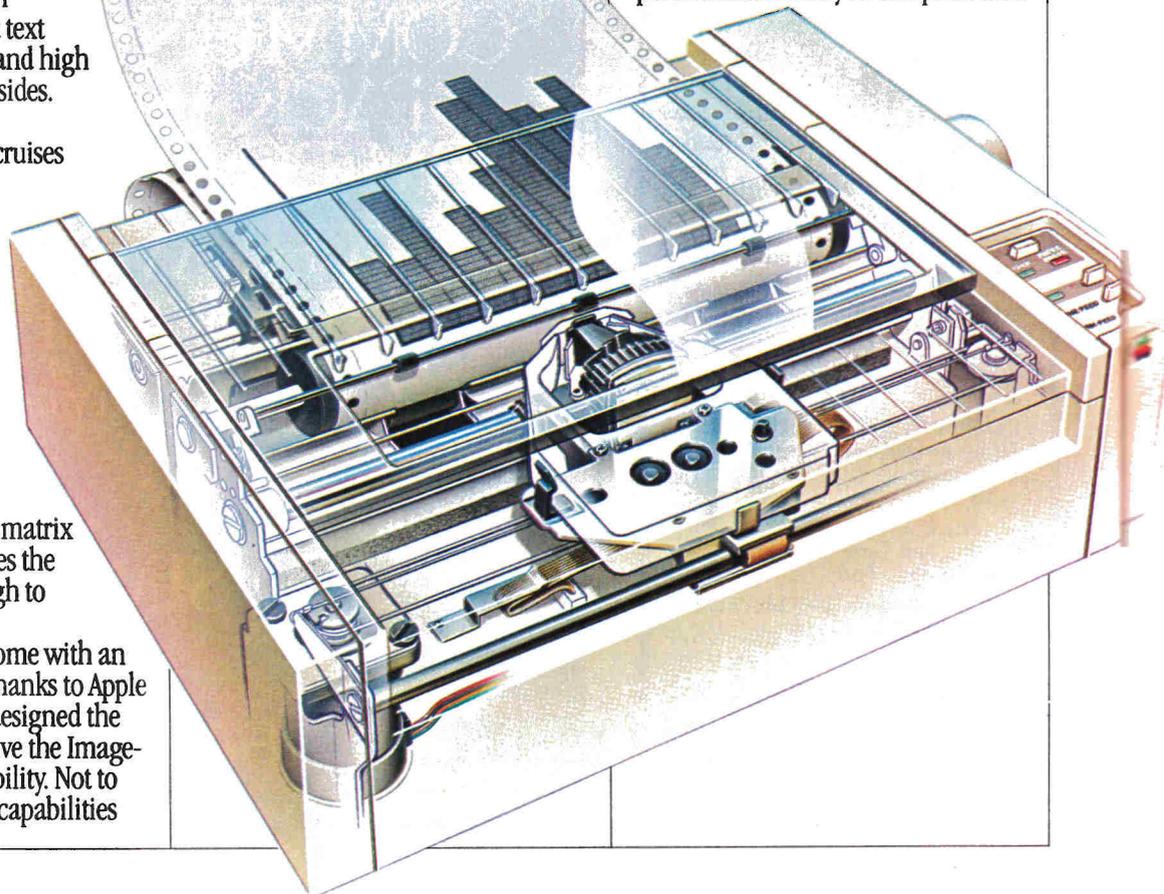
Now, with all this high-speed performance, you'd expect the Imagewriter to make the Devil's Own Noise. It doesn't. In fact, the Imagewriter is specially constructed — with overlaid seams and special sound-deadening materials — to achieve a remarkable 53 dB. How loud is a remarkable 53 dB? You'd make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

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

Yet even with all its improvements, the Imagewriter is a better deal than any other dot matrix printer with comparable

performance. And you can print that.

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## Charge!

Go out there and get the Apple Personal Computer System you really want. Now. Without laying out your extra cash. Without tying up your other lines of credit. With the Apple Card. The only consumer credit card reserved exclusively for the purchase of Apple Computers, peripherals and software.

Like all our products, it works simply:

Fill out an application (short, to the point and annotated in English) at an authorized Apple dealer honoring the Card. Your salesperson will call in the application and in most cases get an approval for you right on the spot.

You can then take your Apple system home. You don't even have to wait for the Card; we'll mail it out to you. And by the time you get it, you'll probably be well into doing whatever you bought your Apple system to do.

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

When you use the Apple Card to make additional purchases, all you have to do is show the Card and sign the invoice. As long as it's within your credit limit, of course. Our dealers get a little nervous when someone signs for half their inventory. You understand.

You'll also receive monthly statements that include the latest purchases, credit available, and the minimum payment due. You'll also be happy to know Apple Card credit terms are affordable and the payments can be spread out. It's all

spelled out for you at the time your Card is approved.

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

## Give your floppy disks the boot.

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

Well, you can stop shuffling any time now.

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

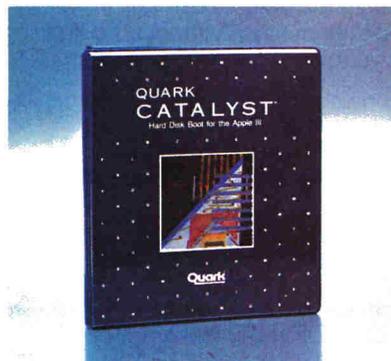
Catalyst allows you to take a wide variety of software programs and store them on your ProFile. Once they're on your ProFile, you just select the program you want from the Catalyst menu that appears on your monitor — then Catalyst does the rest. You'll never have to boot those programs again.

What kinds of programs will work with ProFile and Catalyst?

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

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

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





## Locksmith 5.0™ . . . Before It's Too Late.

If something can go wrong, it will. At the worst possible moment.

That's why you can count on a vital disk failing just when you need it most. Maybe it simply wore out . . . or was damaged by static electricity . . . or spilled cola rendered the disk unusable. Without a backup copy, you'll quickly find yourself at the end of your rope.

Fortunately, there is the new, state-of-the-art **Locksmith 5.0.**

Two years of research went into this updated version of the undisputed leader in software backup programs. The new **Locksmith 5.0** deciphers the latest, most sophisticated copy protection devices. So you can make backups of virtually **all** Apple-compatible programs\*—more than any other nibble copier now available.

And, with the **Locksmith 5.0**, backups will be **easy** to make. It offers you a new, highly detailed owner's manual that clearly takes you step-by-step through each operation.

The cost? **Locksmith 5.0** retails for just \$99.95. And the deal is even sweeter if you own an earlier Locksmith version. Locksmith 4.X owners can upgrade for only \$24.95—3.X owners for only \$39.95 (direct from Omega).

When your disks fail, don't be left hanging. Back them up with **Locksmith 5.0**. It's available from your nearest dealer **now**. If he's out of stock, order direct from Omega MicroWare, Inc. by calling toll free:

**1-800-835-2246**

(Kansas residents call 1-800-362-2421). Or simply send \$99.95 plus \$3.50 for shipping and handling charges to OMEGA MICROWARE INC.

**Apple IIE-compatible!**



OMEGA MICROWARE, INC.

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\*Note: Locksmith 5.0 copies **everything** from your original program, including all copyright notices and serial numbers. Locksmith is a trademark of Omega MicroWare, Inc. Apple Computer is a registered trademark of Apple Computer, Inc. © Omega MicroWare, Inc. 1983

Circle 226 on Reader Service card.

# NUMBER CRUNCHING

## In Pascal

by James R. Florini

Listing 1. Pascal version of TTEST.

```

(**S**)
PROGRAM RUN_TTEST;
  (If you entered the "Entries" unit as described in the January 1983 issue of
  inCider, you can omit everything between the dotted lines below and just
  ENTRIES in the USES declaration)
  USES TRANSCEND;
  CONST MAXNUM=50; (Can be as big as you want it)
  TYPE RIGHT_ONES=SET OF CHAR;
      DATATYPE=PACKED ARRAY[0..MAXNUM] OF REAL;
  VAR MEANS, DEVIATIONS, ALLSAME, PRINTED: BOOLEAN;
      J, ALL_N, N1, N2, DF: INTEGER;
      P, MEAN1, SD1, SEM1, MEAN2, SD2, SEM2, T: REAL;
      CHOICE :CHAR;
      PRINTOUT: TEXT;

  {-----Everything between these lines is in the ENTRIES unit -----}
  { All this can be replaced by "USES ENTRIES" if you have that Unit }
  { installed in your SYSTEM.LIBRARY }

  FUNCTION GET_CHAR (PROMPT1, PROMPT2:STRING; ACCEPTABLE: RIGHT_ONES): CHAR;
  VAR CH, ENTRY: CHAR;
  BEGIN
    REPEAT
      WRITE (PROMPT1);
      IF PROMPT2 <> '' THEN BEGIN WRITELN; WRITE (PROMPT2); END;
      UNITCLEAR (1); (Clear type-ahead buffer)
      READ (ENTRY); IF ENTRY = CHR(27) THEN EXIT (PROGRAM);
      IF ENTRY IN ['a'..'z'] THEN ENTRY:=CHR(ORD(ENTRY) - 32);
      IF NOT (ENTRY IN ACCEPTABLE) THEN
        BEGIN
          WRITELN; WRITELN; WRITELN;
          WRITELN ('"',ENTRY,'" is not an acceptable entry.', CHR(7));WRITELN;
          FOR CH:=CHR(33) TO 'Z' DO IF CH IN ACCEPTABLE THEN WRITE ('"',CH,'" ');
          IF ' ' IN ACCEPTABLE THEN WRITE (' ' and <SPACE> ');
          WRITELN (' are appropriate entries at this point.');

```

Listing continued.

You may think that "playing the odds" is an activity that occurs only in Las Vegas and Atlantic City, but there are many other situations in which people need an idea of the chances that something or other is true. From this need has grown the field of statistics, the mathematical manipulation of data to predict such probabilities.

Long experience, much argument and considerable theory have gone into the development of accepted techniques for comparing groups of data and coming to conclusions from them. To illustrate one of these, as well as for my own use in the lab, I've written the programs in Listings 1 and 2 to calculate probability values using the *student t test*. Listing 1 is a Pascal version, and Listing 2 is in Applesoft, to allow a direct comparison between features of the two leading Apple languages. To a neophyte, the statistical terms might look pretty imposing; just keep in mind they are a way of indicating how sure you are that two sets of values are *really* different.

### Theoretical Background

Most people are aware that measurements are not absolutely reproducible—they will vary from one time to the next. There is also variation within a population. For example, different people of the same

Address correspondence to Dr. James R. Florini, Biology Dept., Syracuse University, 108 College Place, Syracuse, NY 13210.

Listing continued.

```

    WRITELN (CHR(7),'The entry is ',L-10,' digits too long.');
```

```

    WRITELN ('Make a shorter entry.');
```

```

    READLN (ENTRY);
    END;
    UNTIL L<=10;
    END; (CHECK-LENGTH)

PROCEDURE CHECK_NUMERALS; (Check for non-numeric characters)
VAR I: INTEGER;
BEGIN
    FOR I:=1 TO LENGTH (ENTRY) DO
        BEGIN
            IF NOT (ENTRY[I] IN ['0'..'9', '.', '-', '+', ',', 'E']) THEN
                BEGIN
                    WRITELN (ENTRY, ' contains a non-numeric character, ',ENTRY[I],'.');
                    WRITE (CHR(7), 'Please enter a corrected number. ');
                    READLN (ENTRY); CHECK_LENGTH;
                    CHECK_NUMERALS; EXIT (CHECK_NUMERALS);
                END;
            END;
        END;
    END;

PROCEDURE GET_EXPONENT;
VAR E, L: INTEGER;
    NUM: STRING(5);
BEGIN
    EXPONENT:=TRUE; E:=POS('E',ENTRY);
    LESSTHAN1:=COPY (ENTRY,E+1,1)='-';
    L:=LENGTH(ENTRY); NUM:=COPY(ENTRY,E+1,L-E);
    POWER:=ROUND (ABS (VALUE (NUM))); DELETE (ENTRY,E,L-E+1);
    IF POINT<>0 THEN MAGNITUDE:=POINT-1
    ELSE MAGNITUDE:=LENGTH(ENTRY)-1;
    IF LESSTHAN1 THEN MAGNITUDE:=MAGNITUDE-POWER
    ELSE MAGNITUDE:=MAGNITUDE+POWER;
    IF (MAGNITUDE > 37) OR (MAGNITUDE < -37) THEN SHOW_ERROR;
    END;

BEGIN (MAIN VALUE FUNCTION)
    IF ENTRY='' THEN
        BEGIN
            WRITELN (CHR(7),'NO ENTRY WAS MADE!'); VALUE:=0; EXIT (VALUE);
        END;
    CHECK_LENGTH; CHECK_NUMERALS; STOREENTRY:=ENTRY; NEGATIVE:=ENTRY[I]='-';
    POINT:=POS ('.', ENTRY);
    IF POINT <> 0 THEN DELETE (ENTRY, POINT, 1);
    IF POS('E',ENTRY)<>0 THEN GET_EXPONENT ELSE EXPONENT:=FALSE;
    REPEAT
        COMMA:=POS ('.', ENTRY);
        IF COMMA<>0 THEN DELETE(ENTRY,COMMA,1);
    UNTIL COMMA=0;
    NUMDIGITS:=LENGTH(ENTRY);

    FOR I:=1 TO NUMDIGITS DO
        BEGIN
            DIGIT:=COPY(ENTRY,I,1); NUMBER[I]:=POS (DIGIT,'123456789');
        END;
    TEMP:=0; FOR I:=1 TO NUMDIGITS DO
        TEMP:=TEMP + NUMBER[I] * PWR(10, NUMDIGITS - I);
    IF POINT <> 0 THEN DENOM:=(PWR(10, NUMDIGITS - POINT + 1))
    ELSE DENOM:=1;
    TEMP:=TEMP /DENOM; IF NEGATIVE THEN TEMP:= -1 * TEMP;
    IF EXPONENT THEN
        BEGIN
            IF LESSTHAN1 THEN
                BEGIN
                    WHILE POWER > 38 DO
                        BEGIN
                            POWER:=POWER-1; TEMP:=TEMP/10;
                        END;
                    TEMP:=TEMP/PWR(10,POWER)
                END ELSE TEMP:=TEMP*PWR(10,POWER);
            END;
        VALUE:=TEMP;
    END; (VALUE)

(----- Everything between the lines is in Vol 1 No 1 of inCider -----)

FUNCTION POWER (X, EXPONENT: REAL): REAL;
(X to the nth power = antilog of N times log (base 10) of X)
VAR NUMBER: REAL;
BEGIN
    NUMBER:=LOG (X); NUMBER:=EXPONENT * NUMBER;
    NUMBER:=EXP (2.302582 * NUMBER);
    POWER:=NUMBER;
END;

PROCEDURE INTRODUCE_PROGRAM;
BEGIN
    WRITELN ('T TEST':15); WRITELN;
    WRITELN ('This program calculates p values');
    WRITELN ('(using the Student t test) for data');
    WRITELN ('entered either as individual values or');
    WRITELN ('as means, standard deviations (or SEM)');
    WRITELN ('and number of replicate data. At');
    WRITELN ('present, up to ',MAXNUM,' replicates');
    WRITELN ('can be entered, but that number can');
    WRITELN ('be changed by simply changing MAXNUM');
    WRITELN ('at the beginning of the program.');
```

```

    WRITELN ('The program will accept (and print out)');
    WRITELN ('data until a "Q" is entered.');
```

```

    WRITELN ('Press <RETURN> to continue.');
```

```

    READLN;
    WRITE (CHR(12),CHR(26));
    END;

PROCEDURE MAKE_CHOICES;
```

Listing continued.

height do not necessarily weigh the same amount. However, it does seem likely that people over six feet tall will weigh more than those under five feet six. How likely is it? What are the odds?

To help answer questions like these, statisticians have developed ways of describing the "spread" of the data. In using these techniques it is often not possible, or even necessary, to measure every individual item in a large population. Instead, the population can be *sampled* in a random way. Then the results are analyzed mathematically to establish the extent to which the individual items differ from each other—that is, how much the various responses differ from the average for all of those tested. The *standard deviation* of the sample is a description of this spread. People who work with such numbers develop a feeling for their meaning in the way a baseball fan learns that 500 is an incredible batting average and a lousy fielding average.

It is important to determine the validity of any apparent difference between the averages for populations being compared. It seems logical that by repeating measurements you would approach more closely the "true" value of an average. Obviously, if you want to know whether A and B are *really* different, your chances of being correct are improved as the reliability (repeatability) of your estimates of A and B gets better. The extent to which your measured average corresponds to the actual value (which, presumably, only God knows) is described by a quantity known as the *standard error of the mean*, or SEM.

Some of these numbers can be mixed in rather complex calculations to yield *t* and *p* values. The former is of interest primarily to statisticians, but the latter is a rather handy (if somewhat backwards) number that expresses, in decimal form, the likelihood that A and B are really the same. (As statisticians put it, is the "null hypothesis" true?) A *p* value of 0.05 means that there is a 95 percent chance that A and B are really different—that the apparent difference doesn't just result from bad luck in

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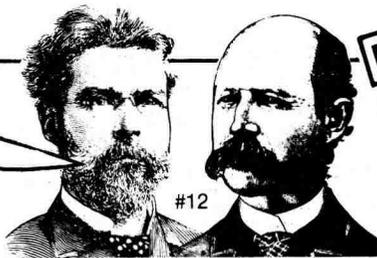
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Listing continued.

```

VAR CHOICE: CHAR;
ENTRY: STRING(10);
BEGIN
PRINTED:=TRUE; CHOICE:=GET_CHAR
('Will data and results be P)rinted out', 'or shown on the C)onsole? ',
['P', 'C', 'S']);
CASE CHOICE OF
'P': REWRITE (PRINTOUT, 'PRINTER:');
'C', 'S': PRINTED:=FALSE;
END; {CASE STATEMENT}
WRITELN;
MEANS:=GET_CHAR ('Enter data as I)ndividual values or ', 'as M)ean of sets? ',
['I', 'M'])='M'; WRITELN;
IF MEANS THEN
BEGIN
DEVIATIONS:=GET_CHAR ('Will Standard D)eviations or E)rrors ',
'be entered? ', ['D', 'E'])='D'; WRITELN;
ALLSAME:=GET_CHAR ('Do all groups contain the same number', 'of samples? ',
['Y', 'N'])='Y'; WRITELN;
IF ALLSAME THEN
BEGIN
WRITELN ('How many samples in each group? ');
READLN (ENTRY); ALL_N:=ROUND (VALUE (ENTRY)); WRITELN;
N1:=ALL_N; N2:=ALL_N;
END;
END; {If means}
END; {MAKE-CHOICES}

PROCEDURE MAKE_ENTRIES (WHICH: STRING; VAR MEAN, SD, SEM: REAL; VAR N; INTEGER);
VAR I: INTEGER;
ENTRY: STRING;
X: DATATYPE;

PROCEDURE CALC_MEAN (X: DATATYPE; VAR MEAN, SD, SEM: REAL; N: INTEGER);
{Uses provisional mean method to minimize
rounding errors. See p 92 in COMPUTE!, Sept., 1982}
VAR SQUARES, DIFFERENCE: REAL;
I: INTEGER;
BEGIN
CASE N OF {get rid of trivial cases}
0: BEGIN MEAN:=0; SD:=0; SEM:=0; END;
1: BEGIN MEAN:=X[I]; SD:=MEAN; SEM:=MEAN; END;
END; IF N<2 THEN EXIT (CALC_MEAN);
MEAN:=0; SQUARES:=0;
FOR I:=1 TO N DO
BEGIN
DIFFERENCE:=X[I]-MEAN; MEAN:=(MEAN+DIFFERENCE)/I;
SQUARES:=SQUARES+DIFFERENCE*(X[I]-MEAN);
END;
SD:=SQRT (SQUARES/(N-1)); SEM:=SD/SQRT (N);
END; {CALC-MEAN}

BEGIN {MAIN MAKE-ENTRIES}
IF MEANS THEN {Means and SD or SEM being entered}
BEGIN
WRITELN; WRITE ('Enter the mean of the ', WHICH, ' set: '); READLN (ENTRY);
MEAN:=VALUE (ENTRY);
IF DEVIATIONS THEN
BEGIN
WRITE (' :3, Enter the SD of the ', WHICH, ' set: '); READLN (ENTRY);
SD:=VALUE (ENTRY);
END ELSE
BEGIN
WRITE (' :6, Enter the SEM of the ', WHICH, ' set: '); READLN (ENTRY);
SEM:=VALUE (ENTRY);
END;
IF ALL_SAME THEN N:=ALL_N ELSE
BEGIN
WRITE (' :9, Enter N for the ', WHICH, ' set: ');
READLN (ENTRY);
N:=ROUND (VALUE (ENTRY));
END;
IF DEVIATIONS THEN SEM:=SD/SQRT (N) ELSE SD:=SEM*SQRT (N);
END ELSE {Individual data points being entered}
BEGIN
WRITELN; N:=0;
WRITELN ('Enter "C" when complete');
WRITELN ('Enter the ', WHICH, ' set of data:');
REPEAT
N:=N+1;
REPEAT {Avoid accidental end of entries}
WRITE ('Datum #', N, ': '); READLN (ENTRY);
UNTIL ENTRY<>'';
IF NOT (ENTRY[1] IN ['C', 'c']) THEN X[N]:=VALUE (ENTRY);
UNTIL ENTRY[1] IN ['C', 'c'];
N:=N-1; {Remove "C" entry}
CALC_MEAN (X, MEAN, SD, SEM, N);
IF PRINTED THEN
BEGIN
WRITELN (PRINTOUT, 'Computation #', J); J:=J+1;
IF WHICH = 'first' THEN WRITE (PRINTOUT, 'First set: ');
IF WHICH = 'second' THEN WRITE (PRINTOUT, 'Second set: ');
FOR I:=1 TO N DO
BEGIN
WRITE (PRINTOUT, X[I]:9:3, ', ');
IF I MOD 6=0 THEN WRITELN (PRINTOUT);
END;
WRITELN (PRINTOUT);
END;
END;
END;
PROCEDURE T_TEST;
{Derived from BASIC version in "Some Common BASIC Programs" by
    
```

Listing continued.



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Listing continued.

```

Pooler, Borchers, and Cook. Osborne/McGraw-Hill, Berkeley, 1981)
CONST A1=0.196854; A2=0.115194; A3=3.44E-04; A4=0.019527;
VAR S, DF, R, Y, Z, J, K, L, TSQ, TEMP: REAL;

PROCEDURE LEAVE_IT; {Avoid divide by zero errors}
BEGIN
  T:=1; P:=1; EXIT(T_TEST);
END;

PROCEDURE CALC_T;
VAR NUM1, DENOM1, DENOM2: REAL;
BEGIN
  DF:=N1+N2-2;
  NUM1:=(MEAN1 - MEAN2) * (MEAN1 - MEAN2);
  DENOM1:=(N1 - 1) * SD1*SD1 + (N2 - 1) * SD2*SD2;
  IF DENOM1=0 THEN LEAVE_IT;
  TSQ:=ABS((NUM1/DENOM1) * (DF/ (N1 + N2)) * (N1 * N2));
  T:=SQRT(TSQ);
END;

PROCEDURE RANGE_TSQ;
BEGIN
  IF TSQ=0 THEN LEAVE_IT;
  IF TSQ < 1 THEN
    BEGIN S:=DF; R:=Y; Z:=1/TSQ; END
  ELSE BEGIN S:=Y; R:=DF; Z:=TSQ; END;
END;

BEGIN
  {I don't know where Poole et al. found these equations, but they work!}
  P:=1; Y:=1; CALC_T;
  RANGE_TSQ; IF (S=0) OR (R=0) THEN LEAVE_IT;
  J:=2/9/S; K:=2/9/R;
  L:=ABS((1-K)* POWER(Z, 1/3) - 1 + J) / SQRT(K * POWER(Z, 2/3) + J);
  IF R < 4 THEN L:=L * (1 + 0.08 * POWER(L, 4) / POWER(R,3));
  TEMP:=1 + L*(A1 + L *(A2 + L *(A3 + L * A4)));
  P:=0.50 / POWER(TEMP, 4);
END;

PROCEDURE SHOW_RESULTS;
BEGIN
  WRITE (CHR(26),CHR(12)); WRITELN; WRITELN;
  WRITELN ('SET #1':19,'SET#2':14); WRITELN;
  WRITELN ('MEAN',MEAN1:15:4, MEAN2:15:4);
  WRITELN ('SD ',SD1:15:4, SD2:15:4);
  WRITELN ('SEM ',SEM1:15:4, SEM2:15:4);
  WRITELN (' N ',N1:12, N2:15);
  WRITELN; WRITELN('t =',T:8:4,' with ',N1+N2-2,' degrees of freedom.');
```

sampling. If you are trying to prove that two populations are different, the smaller the value of p, the more likely you are right. To make things easier for people who don't do this kind of thing every day, I have added a few lines to the program to illustrate the usual interpretation of such data.

**Caution:** If you use this program for serious data analysis, please keep in mind that a thorough knowledge of the underlying assumptions and limitations of the t test is necessary to avoid making mistakes in interpreting the results. That's why courses in statistics take at least a full semester.

### How the Program Works

Now, how does the program calculate these things? First, it prints a little introduction to explain what it can do. It invites you to choose the kinds of input and output to be used this time, and directs entry of the appropriate numbers. Then come the calculations themselves.

In statistics books, standard deviations are generally introduced by calculating the average and then going back and determining the amount that each value differs from that average. This difference, expressed as something like  $(X - x_i)$ , is then squared, and all these squares added to give the *sum of squares*. This sum is divided by  $(N - 1)$ , where N is the number of numbers that were averaged. Finally, the standard deviation is the square root of that quotient. Mathematically, this is expressed as follows:

$$SD = \frac{(X - x_i)^2}{(N - 1)}$$

This is not the best method for use in a computer, because it requires two passes through the data. Various other approaches have been devised over the years. Unfortunately, some of them can introduce substantial errors when differences between rather large numbers are being calculated in a system (like Apple Pascal) that carries real numbers to only five or six significant digits. The *provisional mean* method used here was devised to avoid that kind of error, and (as



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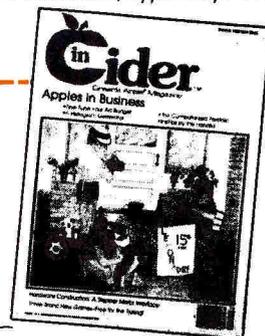
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$$t^2 = \frac{(\text{MEAN1} - \text{MEAN2})^2 \times (\text{DF1} + \text{DF2}) \times \text{N1} \times \text{N2}}{(\text{DF1} \times \text{S1}^2 + \text{DF2} \times \text{S2}^2) \times (\text{N1} + \text{N2})}$$

Figure. Equation for calculating t.

Listing 2. Applesoft Basic version of TTEST.

```

9 REM *****
10 REM PROGRAM RUN_TTEST
11 REM *****
20 J% = 1
30 DIM X(50)
40 GOSUB 1000: REM INTRODUCTION AND CHOICES
50 IF PT% THEN GOSUB 6000: GOSUB 2000
60 HOME : IF PT% THEN PR# 1: PRINT "COMPUTATION # ";J%: PR# 0
70 J% = J% + 1: REM NUMBER OF COMPUTATIONS DONE
80 P1$ = "FIRST "
90 GOSUB 3000: REM ENTER FIRST SET OF DATA
100 M1 = M:S1 = SD:E1 = SEM
110 IF NOT SAME% THEN N1 = N
120 HOME
130 P1$ = "SECOND "
140 GOSUB 3000: REM ENTER SECOND SET OF DATA
150 M2 = M:S2 = SD:E2 = SEM
160 IF NOT SAME% THEN N2 = N
170 GOSUB 4000: REM CALCULATE T AND P VALUES
180 GOSUB 5000: REM PRESENT A SUMMARY OF THE RESULTS

```

Listing continued.

illustrated by PROCEDURE CALC\_MEAN) it is very easy to code. It looks a little weird, but really does work correctly.

Calculation of t and p values is a good deal more complicated. In the equation below, MEAN1, SD1, and N1 are the mean (average), standard deviation, and number of samples in the first group, while MEAN2, SD2, and N2 are the corresponding values for the second. Procedure CALC\_T is a rather plodding solution of this long but uncomplicated equation in the Figure.

Once t has been calculated, p can be determined. This one is really messy; it is so tedious that statisticians long ago got into the habit of simply putting t and df (for *degrees of freedom*, which is  $N1 + N2 - 2$ , if you are interested) in tables that give limiting values of p for a range of t's. That's why p is usually presented as  $<0.05$  or  $<<0.001$ , rather than as a specific decimal. The method used here is derived from the corresponding Basic program published by Poole, Borchers, and Cook (*Some Common Basic Programs*, Osborne/McGraw-Hill, Berkeley, 1981); I'm glad I didn't have to program it from scratch.

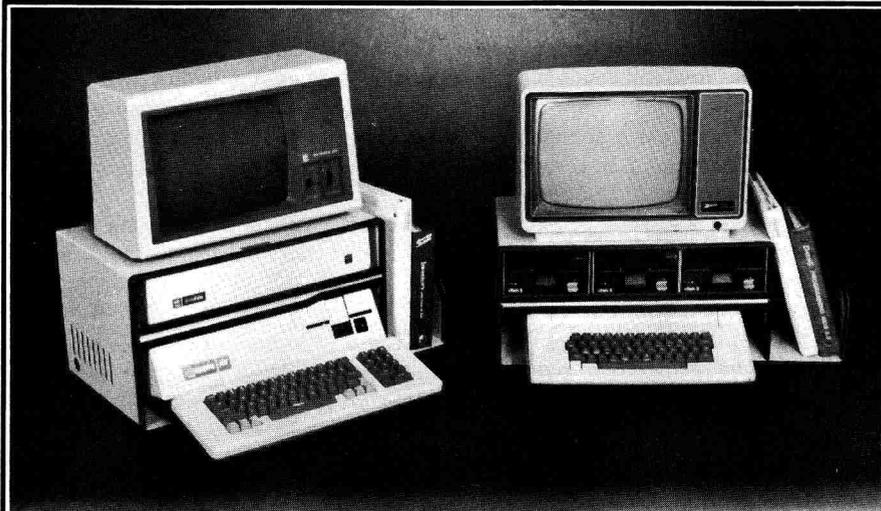
Once the equations are solved, the results are shown on the screen, and, if that selection has been made, printed out as well. There are also a few explanatory comments added for the benefit of people who aren't used to interpreting p values.

### Comparison of the Basic And Pascal Programs

I tried to parallel the Pascal program with the Basic as closely as possible, even using REM statements to indicate the areas corresponding to the specified Pascal procedures. At first glance the Pascal program seems a lot longer than the Basic, but that is not true of the version that uses the ENTRIES Library unit. It seems to me that the Pascal program is a little easier to follow, but that may be because I do most of my programming in Pascal.

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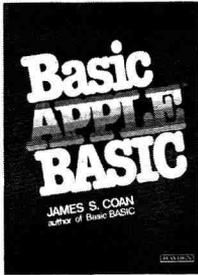
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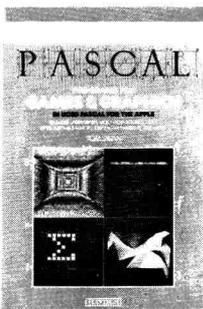
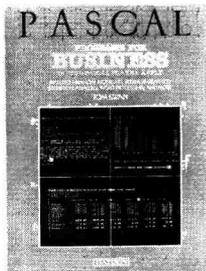


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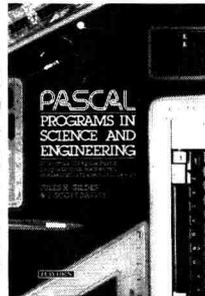


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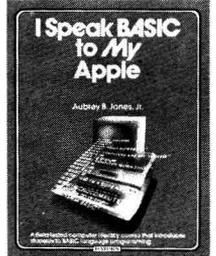
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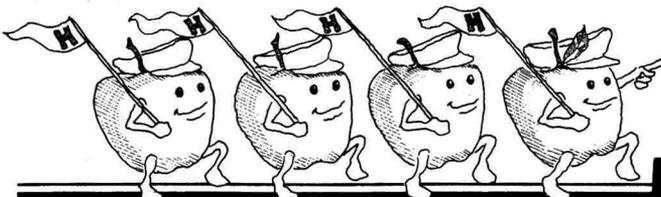
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## Hayden

**"Overall, the choice of language for an application like this seems to rest on the programmer's prior leaning. For myself, I'll take Pascal—most of the time."**

*Listing continued.*

```

190 VTAB 22
200 PRINT "<SPACE> TO CONTINUE, <S> TO START OVER, <Q> TO QUIT.": GET A$
210 IF (A$ < > "Q") AND (A$ < > "S") AND (A$ < > " ") THEN HOME : GOTO 200
220 IF A$ = "S" THEN HOME : GOTO 40
230 IF A$ = "Q" THEN HOME : GOTO 250
240 HOME : GOTO 50
250 END
999 REM *****
1000 REM PROCEDURE INTRODUCE_PROGRAM
1001 REM *****
1010 HOME
1020 PRINT " T TEST": PRINT
1030 PRINT "THIS PROGRAM CALCULATES P VALUES"
1040 PRINT "(USING THE STUDENT T TEST) FOR DATA"
1050 PRINT "ENTERED EITHER AS INDIVIDUAL VALUES OR"
1060 PRINT "AS MEANS, STANDARD DEVIATIONS (OR SEM)"
1070 PRINT "AND NUMBER OF REPLICATE DATA."
1080 PRINT : PRINT "AT PRESENT, UP TO 50 REPLICATES"
1090 PRINT "CAN BE ENTERED, BUT THAT NUMBER CAN BE"
1100 PRINT "CHANGED SIMPLY BY CHANGING THE ARRAY"
1110 PRINT "DIMENSION IN INSTRUCTION #30."
1120 PRINT : PRINT "THE PROGRAM CONTINUES UNTIL A 'Q' IS"
1130 PRINT "ENTERED TO STOP IT.": PRINT
1140 INPUT "PRESS <RETURN> TO CONTINUE": A$
1141 HOME
1149 REM *****
1150 REM PROCEDURE MAKE_CHOICES
1151 REM *****
1160 PRINT "P)PRINT OUT RESULTS, OR S)HOW ON CONSOLE": GET A$
1170 PT% = 0: IF A$ = "P" THEN PT% = 1
1180 PRINT
1190 PRINT "ENTER I)NDIVIDUAL VALUES OR M)EANS?": GET A$
1200 IF (A$ < > "I") AND (A$ < > "M") THEN HOME : GOTO 1190
1210 MEAN% = 0: IF A$ = "M" THEN MEAN% = 1
1220 IF MEAN% = 0 THEN RETURN
1230 PRINT : PRINT "ENTER STANDARD D)EVIATIONS OR E)RRORS?": GET A$
1240 IF (A$ < > "D") AND (A$ < > "E") THEN HOME : GOTO 1230
1250 DEV% = 0: IF A$ = "D" THEN DEV% = 1
1260 PRINT : PRINT "SAME NUMBER IN ALL GROUPS? ": GET A$
1270 IF (A$ < > "Y") AND (A$ < > "N") THEN HOME : GOTO 1260
1280 SAME% = 0: IF A$ = "Y" THEN SAME% = 1
1290 IF NOT SAME% THEN RETURN
1300 PRINT : INPUT "HOW MANY SAMPLES PER GROUP? ": A$
1310 N = VAL (A$):N1 = N:N2 = N
1320 RETURN
1999 REM *****
2000 REM PROCEDURE PRINT_HEADING
2001 REM *****
2010 PR# 1
2020 PRINT " CALCULATION OF T AND P VALUES": PR# 0
2030 RETURN
2499 REM *****
2500 REM PRINTOUT OF INDIVIDUAL ENTRIES
2501 REM *****
2505 GOSUB 6000: PRINT P1$:" SET: ";
2515 K = 0: REM MUST BE ZEROED BECAUSE ALSO USED IN T CALCULATION
2525 FOR I = 1 TO N
2535 PRINT X(I):" ";
2544 REM THE NEXT LINE SIMULATES "IF I MOD 6 = 0 THEN PRINT"
2545 K = K + 1: IF K > = 6 THEN K = 0: PRINT : PRINT " ";
2555 NEXT
2565 PR# 0: RETURN
2999 REM *****
3000 REM PROCEDURE CALC_MEAN
3001 REM *****
3020 PRINT : PRINT
3030 IF MEAN% THEN 3160
3040 I = 1:M = 0:SD = 0:SEM = 0:SQ = 0
3050 PRINT "ENTER 'C' WHEN DONE.": PRINT
3060 PRINT "FOR THE ";P1$;"GROUP.": PRINT
3070 PRINT "ENTER POINT #";I;":": INPUT A$
3080 IF A$ = "" THEN PRINT CHR$(7): PRINT : GOTO 3070
3085 IF A$ = "C" THEN 3110
3090 X(I) = VAL (A$)
3100 I = I + 1: GOTO 3070
3110 N = I - 1: FOR I = 1 TO N
3120 DI = X(I) - M:M = M + DI / I:SQ = SQ + DI * (X(I) - M)
3130 NEXT
3135 IF PT% THEN GOSUB 2500
3140 SD = SQR (SQ / (N - 1)):SEM = SD / SQR (N)
3150 RETURN
3160 PRINT "ENTER ";P1$;"MEAN ";: INPUT M
3170 IF DEV% THEN 3210
3180 HTAB 5
3190 PRINT "ENTER ";P1$;"SEM ";: INPUT SEM:
3200 GOTO 3220
3210 PRINT "ENTER ";P1$;"STD DEV ";: INPUT SD
3220 IF SAME% THEN GOTO 3240
3230 PRINT "NUMBER OF POINTS IN ";P1$;" GROUP? ": INPUT N:
3240 IF DEV% THEN 3260
3250 SD = SEM * SQR (N): RETURN
3260 SEM = SD / SQR (N): RETURN
3999 REM *****

```

*Listing continued.*

that a Pascal programmer must write. But once they are written, they are always available, and I like being able to tailor these things to my own preferences. It's a bit like using a manual gear shift rather than automatic transmission when driving.

In these programs, the greater execution speed of Pascal doesn't make much difference. It may take a second longer for the Basic program to calculate the p values, but that's not noticeable—everything happens a great deal faster than I can type in the numbers, anyway!

The most important difference is the greater control of program output and formatting provided by Pascal. The necessity in Applesoft of shifting between PR#1 and PR#0 when the results are being printed is cumbersome. It is also easier in Pascal to present the results in a satisfactory format. The data line up better with a more reasonable selection of the length of numbers. Presumably Basic systems that include PRINT USING could handle this better than Applesoft, but it's hard to beat the two-semicolon format (to specify total length and digits following the decimal) used to format *real* number output in Pascal.

Several authors have written that Basic is best for relatively short programs that will be used for short periods of time, while Pascal is better for more complex programs to be used (and changed) over extended periods. It seems to me that the TTEST programs are on the borderline here. The Basic version is sufficiently short and simple that it is not difficult to follow, and there are not enough similar variables for the two-significant-letter limitation on Applesoft names to cause problems. (On the other hand, it really is nice to have Pascal variable names that say exactly what they mean.) Boolean variables can be simulated easily in Applesoft, and these programs don't require sets, so some of the extra features of Pascal are not missed here.

Overall, the choice of language for an application like this seems to rest on the programmer's prior leaning. For myself, I'll take Pascal—most of the time. ■



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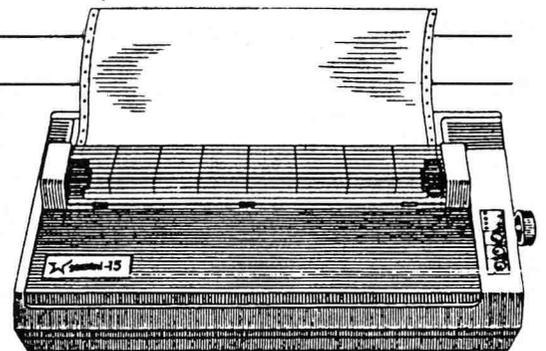
```

4000 REM      PROCEDURE T_TEST
4001 REM      *****
4010 REM
4019 REM THE FOLLOWING CONSTANTS ARE USED IN CALCULATION OF THE P VALUE
4020 A1 = 0.196054
4030 A2 = 0.115194
4040 A3 = 3.44E - 04
4050 A4 = 0.019527
4060 GOTO 4100
4070 REM      EXIT SUBROUTINE
4080 T = 1:P = 1: RETURN
4090 REM      CALCULATE T
4100 DF = N1 + N2 - 2
4110 P = 1:Y = 1
4120 NUM = (M1 - M2) * (M1 - M2)
4130 DENOM = (N1 - 1) * S1 * S1 + (N2 - 1) * S2 * S2
4140 IF DENOM = 0 THEN 4070
4150 T2 = ABS (NUM / DENOM) * (DF / (N1 + N2)) * (N1 * N2))
4160 T = SQRT (T2)
4170 IF T2 = 0 THEN 4070: REM      EXIT
4180 IF T2 < 1 THEN 4210: REM      INVERSE CALCULATIONS
4190 S = Y:R = DF:Z = T2
4200 GOTO 4230
4210 S = DF:R = Y:Z = 1 / T2
4220 P = 1:Y = 1
4230 IF (S = 0) OR (R = 0) THEN 4070: REM      EXIT
4240 J = 2 / 9 / S:K = 2 / 9 / R
4250 L = ABS ((1 - K) * Z ^ (1 / 3) - 1 + J) / SDR (K * Z ^ (2 / 3) + J)
4260 TEMP = 1 + L * (A1 + L * (A2 + L * (A3 + L * A4)))
4270 P = 0.5 / (TEMP ^ 4)
4280 RETURN
4999 REM      *****
5000 REM      PROCEDURE SHOW_RESULTS (ALSO PRINTS)
5001 REM      *****
5010 REM
5020 IF PT% THEN GOSUB 6000
5030 HOME : VTAB 2
5035 PRINT
5040 HTAB 10: PRINT "SET #1";: HTAB 25: PRINT "SET #2": PRINT
5050 PRINT "MEAN";: HTAB 12: PRINT M1;: HTAB 27: PRINT M2
5060 PRINT "SD";: HTAB 12: PRINT S1;: HTAB 27: PRINT S2
5070 PRINT "SEM";: HTAB 12: PRINT E1;: HTAB 27: PRINT E2
5080 PRINT " N";: HTAB 12: PRINT N1;: HTAB 27: PRINT N2
5090 PRINT
5100 PRINT "T = ";T;" WITH ";N1 + N2 - 2;" DEGREES OF FREEDOM."
5110 HTAB 14: PRINT "P = ";P
5120 PRINT
5130 PRINT "THIS INDICATES A ";(100 - 100 * P);" % LIKLIHOOD"
5135 PRINT "THAT THE TWO POPULATIONS ARE DIFFERENT
5140 PRINT : PRINT "MOST STATISTICIANS WOULD CONSIDER THIS"
5150 IF P > 0.05 THEN PRINT "NOT SIGNIFICANT."
5160 IF P < = 0.01 THEN PRINT "HIGHLY SIGNIFICANT."
5170 IF (P < = 0.05) AND (P > 0.01) THEN PRINT "SIGNIFICANT."
5190 PR# 0
5200 RETURN
5908 REM      *****
6000 REM      PRINTER TURN-ON, SINGLE SPACING SETTINGS FOR MY MX-80/APPLE
6001 REM      INTERFACE; YOUR SYSTEM MAY TAKE DIFFERENT CODES
6002 REM      *****
6010 PR# 1: PRINT CHR$ (4); CHR$ (9); CHR$ (75): RETURN
6020 REM
7000 REM      *****
7001 REM      VARIABLE CATALOG
7002 REM      *****
7003 REM      >> INTEGERS (AND REALS TREATED AS INTEGERS - I DIDN'T BOTHER TYPING
              THE % ALL THE TIME)
7004 REM      J% - NUMBER OF COMPUTATIONS DONE;
7005 REM      I,K,N - COUNTERS IN VARIOUS PARTS OF THE PROGRAM
7006 REM
7007 REM
7008 REM      >> INTEGERS USED AS BOOLEAN VARIABLES - TRUE IF EQUAL 1, FALSE IF
              EQUAL 0
7009 REM      PT% - RESULTS TO BE PRINTED OUT?
7010 REM      MEAN% - DATA ENTERED AS MEANS? (OTHERWISE AS INDIVIDUAL POINTS)
7011 REM      DEV% - STANDARD DEVIATIONS BEING ENTERED? IF NOT, STANDARD
              ERRORS WILL BE ENTERED.
7012 REM      SAME% - SAME NUMBER OF POINTS IN BOTH GROUPS?
7013 REM
7015 REM
7020 REM      >> REAL NUMBER VARIABLES - I.E., WITH DECIMAL POINTS
7021 REM      M1, M2 - MEANS OF GROUPS 1 AND 2
7022 REM      S1,S2 - STANDARD DEVIATIONS OF GROUPS 1 AND 2
7023 REM      E1,E2 - STANDARD ERRORS OF THE MEAN OF GROUPS 1 AND 2
7024 REM      N1, N2 - NUMBER OF POINTS AVERAGED IN GROUPS 1 AND 2
              (STRICTLY SPEAKING, THESE ARE INTEGERS)
7025 REM      M, SD, SEM, N - TEMPORARY VALUES FOR MEAN, ETC., USING IN
              CALCULATING THE RESULTS IN THE CALC_MEAN SUBROUTINE
7026 REM      DI,SQ - INTERMEDIATE VALUES FOR DIFFERENCE, SUM OF SQUARE
              S USING THE PROVISIONAL MEAN PROCEDURE
7027 REM      T - STUDENT'S T VALUE
7029 REM      P - PROBABILITY THAT THE "NULL HYPOTHESIS" IS VALID
7030 REM      DF - DEGREES OF FREEDOM (THIS IS ACTUALLY AN INTEGER)
7031 REM      L, S,R,J,K,Y,Z,TEMP, NUM,DENOM - TEMPORARY VALUES USED IN
              CALCULATING T AND P. THE GLOBAL NATURE OF SUCH VARIABLES IN
              BASIC CAN CAUSE SOME UNEXPECTED RESULTS IN OTHER PARTS OF THE
              PROGRAM. NOTE, FOR EXAMPLE, THE USE OF K TO COUNT THE NUMBER
              OF POINTS PRINTED IN LINES 2515-2545.
7035 REM
7040 REM
7041 REM      >> STRING VARIABLES
7042 REM      P1% - PROMPT SPECIFYING THE FIRST OR SECOND GROUP OF DATA IS BEING
              PROCESSED
7043 REM      A# - GENERAL VARIABLE USED TO RECEIVE ANSERS IN THE MAKE-CHOICE
              SUBROUTINE
    
```

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# A Type Command for DOS

This modification, when slipped into an empty space in DOS, enables you to display text files by typing one command.

by William G. Wright

One deficiency of Apple DOS is the lack of a command to display text files on an output device such as the screen or a printer. CP/M has the TYPE command and Pascal has T(ransfer, but Apple DOS lacks this useful feature. Currently, the only way to view the contents of a text file is to write a program to read and display it.

Modifications to DOS have been published previously (for instance, *Call-A.P.P.L.E.*, June 1982). However, these efforts have produced some undesirable side effects, the most serious of which is sacrificing an existing DOS command to implement a new one. This is thought to be necessary since the table DOS uses to decode and execute commands are already full.

Another shortcoming of previously

published methods is that they only work correctly for sequential files. With a little work and some false starts, I struck upon an idea for implementing a command that displays text files and preserves the current DOS commands, requires no additional memory (it occupies 32 unused bytes in the current DOS), and works for most random access files, as well as all sequential text files. The modification will work on both the Apple II Plus and Apple IIe.

## TYPE is a Modification

The new command, called TYPE, is actually a modification of the existing VERIFY command, which confirms that a file is readable. It operates on any file type and, although the *DOS Manual* does not reveal the fact, it is

invoked by DOS after every SAVE and BSAVE command. This modification to VERIFY affects only text type files (which are never saved or bsaved) and thus preserves the use of VERIFY for other file types. Indeed, you can still verify text files; you just get to view them as you do so!

Some background information may be helpful here. DOS 3.3 is written in 6502 machine language and its modification requires more information than Apple divulges in the *DOS Manual*. Fortunately, there is an excellent book entitled *Beneath Apple DOS* by Don Worth and Pieter Lechner that provides the technical information necessary to implement the TYPE command.

The format of a text type file is relatively simple. A sequential text file consists of groups (records) of ASCII (displayable) characters separated by return characters. A random access text file may have embedded ASCII 00 (null) characters that must be skipped when displaying the file.

## VERIFY Command Steps

Getting down to specifics, the VERIFY command performs the following steps:

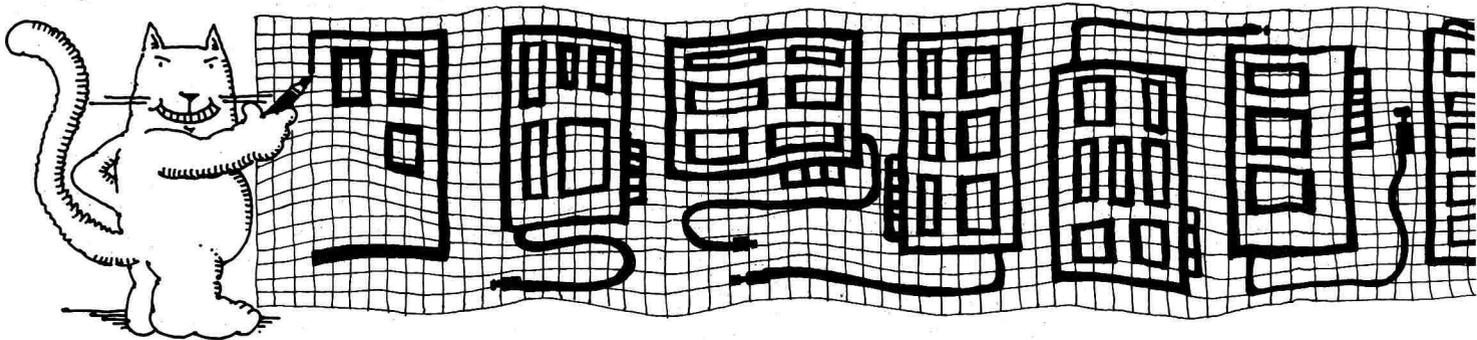
1. Opens the specified file. If the file is not there, displays FILE NOT FOUND and exits.

```

BCDF- AD E1 B5    LDA  $B5E1    ;Check last sector read
BCE2- 10 03    BPL  $BCE7    ;If not first, skip
BCE4- 20 8E FD    JSR  $FD8E    ;Send C/R to output
BCE7- 20 B6 B0    JSR  $B0B6    ;Call RWTS to read next sector
BCEA- B0 12     BCS  $BCFE    ;If end-of-file, return
BCEC- AD F6 B5    LDA  $B5F6    ;Load file type
BCEF- 29 7F     AND  #$7F     ;Disregard LOCK bit
BCF1- D0 0B     BNE  $BCFE    ;If not text file (type 00), return
BCF3- A8       TAY
BCF4- B1 42     LDA  ($42),Y  ;Get next character from input buffer
BCF6- F0 03     BEQ  $BCFB    ;If null (00), skip
BCF8- 20 ED FD    JSR  $FDED    ;Call COUT to display it
BCFB- C8       INY
BCFC- D0 F6     BNE  $BCF4    ;If not back to zero, loop
BCFE- 60       RTS
;
```

Listing 1. Type routine.

Address correspondence to William G. Wright, 4591 Jamboree, Oceanside, CA 92056.



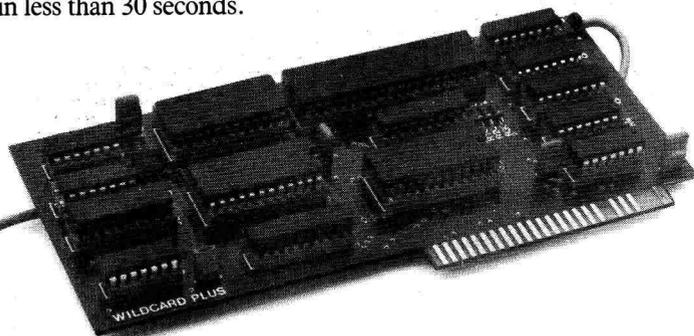
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```

BA69- AD E1 B5   LDA   $B5E1   ;Check last sector read
BA6C- 10 08     BPL   $BA76   ;If not first, skip
BA6E- A9 16     LDA   #16     ;Init line count
BA70- 8D 9D B3   STA   $B39D   ;Store it
BA73- 20 8E FD   JSR   $FD8E   ;Send C/R to output
BA76- 20 B6 B0   JSR   $B0B6   ;Call RWTS to read next sector
BA79- B0 12     BCS   $BA8D   ;If end-of-file, return
BA7B- AD F6 B5   LDA   $B5F6   ;Load file type
BA7E- 29 7F     AND   #$7F    ;Disregard LOCK bit
BA80- D0 0B     BNE   $BA8D   ;If not text file (type 00), return
BA82- A8        TAY
BA83- B1 42     LDA   (&42),Y ;Zero Y-register as byte counter
BA85- F0 03     BEQ   $BABA   ;Get next character from input buffer
BA87- 20 E0 BC   JSR   $BCE0   ;If null (00), skip
BA8A- C8        JSR   $BCE0   ;Call Part 2 to check line count
BA8B- D0 F6     INY
BA8D- 60        BNE   $BA83   ;Increment byte counter
          RTS    ;If not back to zero, loop
          ;Return to VERIFY command handler

```

Listing 2. Alternative modification (Part 1).

2. Reads one data sector (256 bytes) into memory via a call to Read/Write Track/Sector (RWTS), the portion of DOS that accesses the disk. If RWTS gets an input/output error while reading, it displays I/O ERROR and exits DOS.

3. If step 2 is successful, increments the sector count and repeats step 2. Otherwise, RWTS has returned an end-of-file indication and VERIFY exits DOS.

#### TYPE Implementation

Implementation of the TYPE command involves adding four steps be-

tween steps 2 and 3, as follows:

2a. If this is the first sector read, send a return character to the output device to drop down from the command line, since DOS does not display the return typed at the end of a command.

2b. If RWTS indicated end-of-file, go to step 3.

2c. If the file type is not text (as identified by a byte in the file's directory entry), go to step 3.

2d. Pass the data sector to the output device one character at a time. This is accomplished through repeated calls

to the monitor's character output (COUT) routine until the entire sector has been displayed. ASCII 00 (null) characters are not sent to the output device since they are merely fillers in a random access file.

The machine language routine to implement the four additional steps requires only 32 bytes. Thanks again to *Beneath Apple DOS*, I found an unused area in DOS that was 32 bytes long. After patching in the routine, the only other required modification was a patch to the VERIFY command handler to call my routine instead of RWTS. My routine then does the required RWTS call. A nice, but not necessary, modification changes the name of the VERIFY command to TYPE, or to any other name with six characters or less. This does not affect the SAVE or BSAVE commands that do not call VERIFY by name, but will affect any Basic programs that call VERIFY internally.

Circle 228 on Reader Service card.

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## Modifications Needed

The following instructions allow you to make the necessary DOS modifications to implement the TYPE command. The addresses provided are for DOS 3.3 on a 48K Apple. If you have less than 48K, you will have to adjust the addresses for your machine (step-by-step instructions are provided in Appendix A).

1. Boot the system with a DOS 3.3 disk.
2. Enter the monitor and change the instruction at \$AD1B from JSR \$B0B6 (20 B6 B0) to JSR \$BCDF (20 DF BC). This change replaces the call to RWTS with a call to the TYPE routine which is added next.
3. Insert the code shown in Listing 1 starting at \$BCDF. This is the actual TYPE routine.
4. (optional) Change locations \$A902 to \$A907 from 56 45 52 49 46 D9 (VERIFY) to 54

59 50 C5 00 00 (TYPE). This changes the name of the VERIFY command to TYPE. If you choose your own name, enter the ASCII representation at this address, setting the high bit of the last character.

### Changes Saved

The changes just described will be in effect until DOS is rebooted, since they are patches to the image of DOS in memory. One method of implementing the TYPE command would be to trans-

late the patches to POKE instructions and include them in your Hello program. This method has the advantage of not permanently modifying DOS, but does increase the size and complexity of your Hello program.

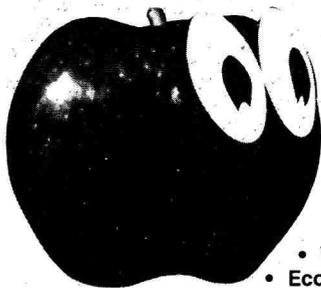
If you prefer to save the changes permanently as a part of DOS, I suggest you try the new command first on a text file. Having verified that it works, the modification can be made permanent using one of the following methods:

```

BCE0- C9 8D      CMP    #$8D    ;Is char a return?
BCE2- F0 03      BEQ    $BCE7  ;Yes, check line count
BCE4- 4C ED FD    JMP    $FDED  ;No, output char and return
BCE7- 98          TYA                    ;Save Y-register
BCE8- 48          PHA                    ;Call CATALOG end-of-page routine
BCE9- 20 2F AE    JSR    $AE2F
BCEC- 68          PLA                    ;Restore Y-register
BCED- A8          TAY                    ;Return
BCEE- 60          RTS
    
```

Listing 3. Alternative modification (Part 2).

Circle 204 on Reader Service card.



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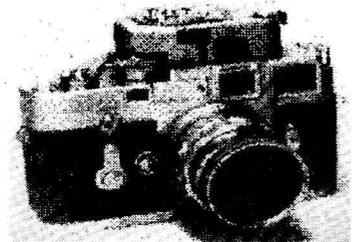
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## Appendix A Step-by-Step DOS Modification Instructions

By performing the following steps and checking the data typed *before* hitting the return key, the inexperienced programmer can make the modifications required to implement the TYPE command. For the beginner, I recommend the use of pokes or the INIT command to make the changes permanent. Remember not to reboot before making the changes permanent if you want to save them.

Step 1. Boot the system with a DOS 3.3 disk.  
Step 2. Type CAL-151(return). You should get the \* prompt indicating that you are now in the monitor.

Step 3. Type AD1B.AD1D(return). You should see AD1B- 20 B6 B0.

Step 4. Type AD1C:DF BC(return). You should get the \* back.

Step 5. Type AD1B.AD1D(return). You should see AD1B- 20 DF BC.

Step 6. Checking your input carefully before hitting return, type in each of the following lines:

```
BCDF:AD E1 B5 10 03 20 8E FD 20  
B6(return)
```

```
BCE9:B0 B0 12 AD F6 B5 29 7F D0  
0B(return)
```

```
BCF3:A8 B1 42 F0 03 20 ED FD C8  
D0(return)
```

```
BCFD:F6 60(return)
```

Step 7. Type BCDLF(return). You should see a listing like Listing 1, without the English comments. If there are any differences, return to step 6 and retype the line that does not agree.

Step 8. (optional) Perform this step only if you want to change the name of the VERIFY command to TYPE.

a. Type A902.A907(return). You should see A902- 56 45 52 49 46 D9.

b. Type A902:54 59 50 C5 00 00(return).

c. Type A902.A907(return). You should see A902- 54 59 50 C5 00 00.

Step 9. Type control-C(return) to exit the monitor.

## Appendix B Alternative Modifications To Add a Pause

The alternative modifications described below make the displayed output pause at the end of each screenful. To resume listing, press any key. Apple IIe owners should not use this alternative.

In step 2 of the modification procedure described in this article, change the instruction at \$AD1B from JSR \$B0B6 (20 B6 B0) to JSR \$BA69 (20 69 BA). In step 3, instead of inserting the code in Listing 1 at \$BCDF, insert the code in Listing 2 at \$BA69 and the code in Listing 3 at \$BCE0. The other steps are the same as described.

1. With the patched DOS loaded, use the INIT command, as described in the *DOS Manual*, to create a new slave disk. Make sure you use a blank or unwanted disk, since this destroys all the information previously stored on the disk.

2. Using a disk zap program, you can apply the above changes directly to the DOS image on the first three tracks of a DOS disk. This method requires a thorough knowledge of the zap procedure and great care must be taken to ensure that the changes are applied at the correct locations.

The advantage of this method is that you can change DOS on an existing disk without losing existing files. *Beneath Apple DOS* provides both a disk zap program and the information necessary to compute the exact locations on the disk for the required patches.

3. Another method that allows you to modify DOS on a master disk without losing existing files involves the use of the Master Create program supplied on the DOS 3.3 System Master disk.

**Warning:** If you apply the above changes to a master disk, the resulting DOS is no longer relocatable since the changes use absolute addresses computed for a 48K Apple! This is no problem unless you try to boot your modified DOS on a 36K or smaller machine.

With this warning in mind, you can BLOAD MASTER CREATE and enter the monitor with a CALL-151. Store a \$00 at location \$810 (810:00) and execute Master Create with 800G. When the program stops, check the value of the displayed P-register. If it is even (probably 32), then DOS was loaded successfully. If not, the disk is probably a slave disk rather than a master. If the load was successful, you can apply the changes to the DOS image loaded by Master Create. Instead of the addresses given in steps 2 to 4 above, make the modifications at \$2E1B instead of \$AD1B, \$1669 instead of \$BA69 and \$2A02 instead of \$A902. The patches themselves are identical.

After making the patches, restart Master Create at \$82D (82DG). You can write the modified DOS to as many disks as desired at this point. In the future, you can run Master Create from a modified disk with no changes

needed to write the modified DOS to additional disks.

### TYPE Command Use

To display a text file on the screen or verify a non-text file, assuming you've changed the command name to TYPE, enter the following command:

```
TYPE f [,Ss] [,Dd] [,Vv]
```

(Example: TYPE APPLE PROMS,D2)

where f is a required filename and s, d and v are optional slot, drive and volume numbers, respectively. If file f is of type text, you should then see the contents displayed on the screen. If the file is over one screen in length, the Stop-List feature (control-S) stops the listing. Another control-S continues the listing. If file f is a non-text file and is read successfully, you should get the prompt character for the Basic you are using. To send the output to the printer, issue the PR#1 command prior to the TYPE command.

I have included alternative changes in Appendix B which make the output pause at the end of each screenful of data as the CATALOG command does. The modifications described there replace those made in steps 2 and 3 of the above procedure. I did not implement this feature initially, since many of my file dumps are to the printer and I hate having to sit at the keyboard and type characters every 22 lines to get the file printed. I have provided this version for those who may want the pause feature. Apple IIe owners should not use this alternative since their DOS uses the area at \$BA69.

In conclusion, through maximum use of existing DOS commands and routines, a new and useful command was added to DOS with no loss of current capability. The only problem with the new command occurs when displaying certain random access text files. The VERIFY command handler quits reading the file when the first zero Track/Sector List entry is encountered. Since some random access files do not have contiguous Track/Sector List entries, this may cause an incomplete dump. This differs from the previously mentioned occurrence of null (00) bytes within a data sector. The latter more common characteristic of random access files is handled correctly. ■

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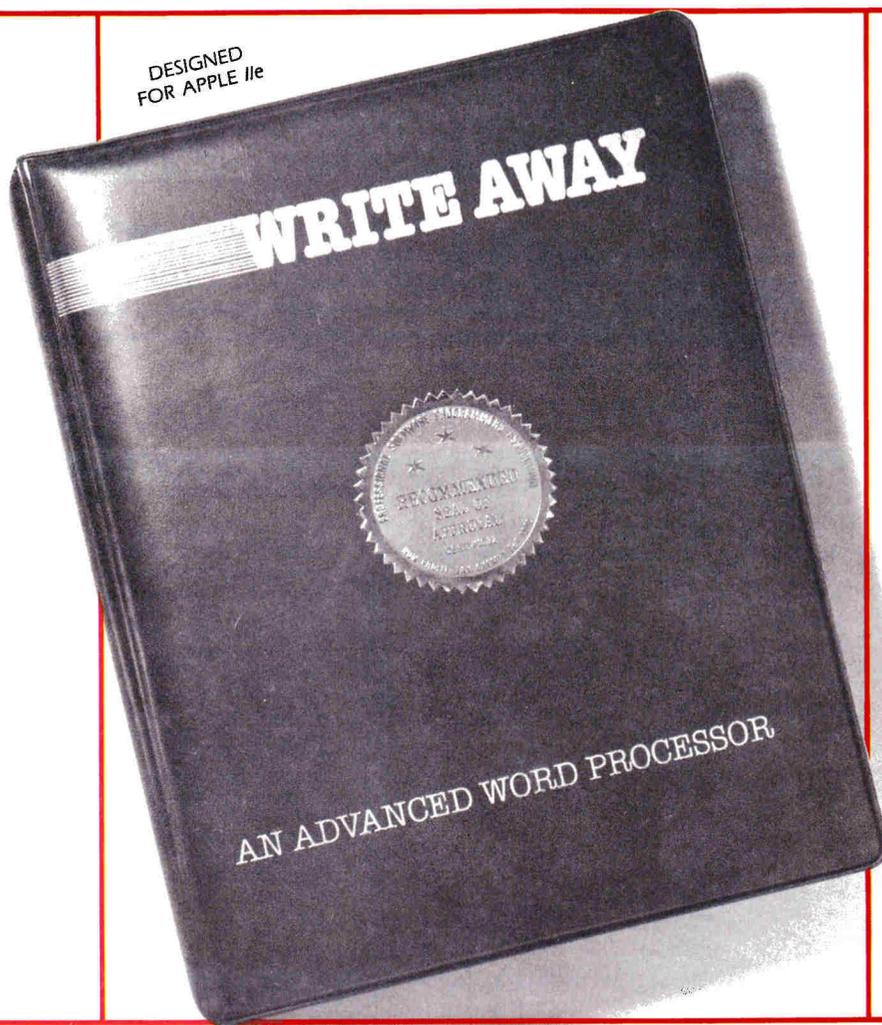
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• Selection	✓							
• Global	✓							
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"Soft" Hyphens	✓							
"Widow Line" Avoidance	✓							
"Help" Screen	✓							
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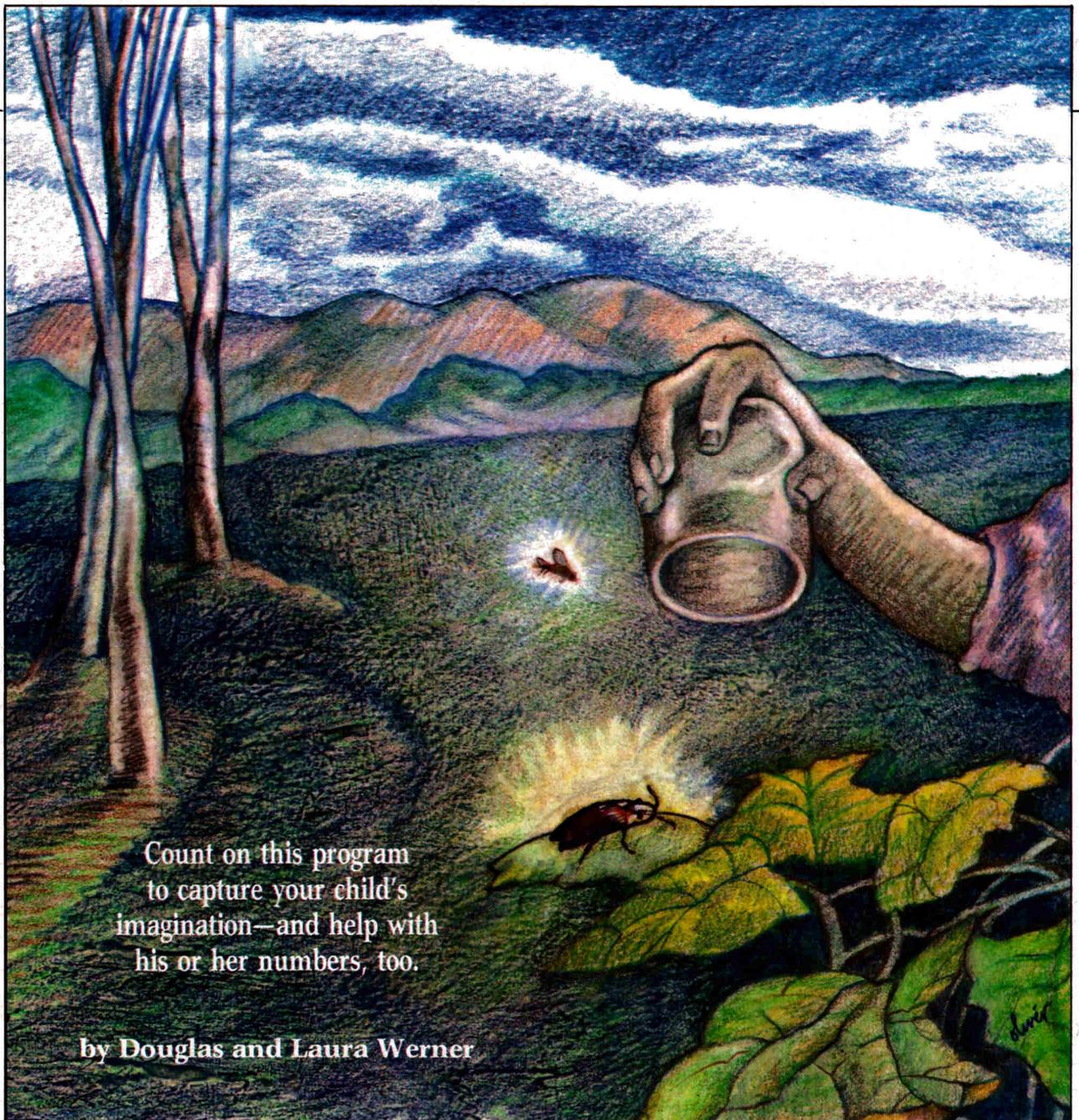


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Count on this program  
to capture your child's  
imagination—and help with  
his or her numbers, too.

by Douglas and Laura Werner

## Firefly Frolic

**D**o you remember those hot summer nights when you and your friends counted fireflies or caught them in jars? Remembering what fun it was and wanting to help my five-year-old daughter, Laura, with school difficulties, prompted me to write Fireflies. Now your kids can enjoy this sport anytime with an Apple, and learn something in the process.

The idea for Fireflies came from Laura. I was looking for an idea for a game program and asked my kids for help. Laura suggested catching insects in a net. When her counting and number recognition problems began, I changed her idea to counting insects rather than catching insects.

Fireflies is written in Applesoft Basic and runs on an Apple II Plus or an Apple II with Applesoft Basic.

The program needs approximately 11K to run. A small routine for sound generation is poked into locations \$0302 to \$0319 by the program. After keying in the program, type SAVE FIREFLIES to write it to disk.

The Fireflies program uses lo-res

---

Address correspondence to Douglas Werner, 20 Seymour St., Torrington, CT 06790.

Program listing, Fireflies.

graphics to draw a jar on the screen. From one to twelve fireflies are displayed above the jar. Originally, I displayed eleven fireflies, but a teacher suggested the twelve, since there are twelve numbers on the clock dial. This teaches kids how to count and recognize the numbers they will use first.

Playing Fireflies

Fireflies gives four- to seven-year-olds practice in counting and number recognition. It also boosts preschoolers' abilities in these areas.

When Fireflies starts, you are asked if you would like instructions. Answering Y(es) prints the instructions. A N(o) answer skips the instructions.

Next, you are asked if you want noisy or quiet fireflies. Selecting noisy fireflies by pressing any key except return is easier for a child to use. An adult override feature (the return key) muzzles those noisy little insects.

The program then calls the lo-res graphics mode. A blue jar is drawn in the center of the screen. From one to twelve yellow fireflies appear above the jar. You count the fireflies and enter the number from the keyboard. The number then appears next to the jar in a 3 x 5 lo-res matrix.

The entered number is checked by the Apple for correctness. A correct answer produces a rising tone through the Apple speaker and light is added to the jar.

A wrong answer results in the message GUESS AGAIN and a speaker beep. You are given another try to answer correctly. Another wrong answer produces a falling tone and light is removed from the jar. If correct, the answer is printed at the bottom of the screen and a new problem is presented.

After fifteen counting sessions, the jar is full. The Apple then displays YOU WIN in lo-res graphics and plays the opening bars of "The Sun Will Come Out Tomorrow" from the play/movie "Annie."

Pressing the letter Q quits the program from any screen. You can program any letter you wish if Q doesn't meet your needs.

```

10 REM
15 REM
20 REM *****
25 REM *
30 REM * FIREFLIES *
35 REM *
40 REM * BY *
45 REM *
50 REM * DOUGLAS R.WERNER *
55 REM * 20 SEYMOUR ST. *
60 REM * TORRINGTON, CT *
65 REM * 06790 *
70 REM *
75 REM *COPYRIGHT 03/12/82*
80 REM *
85 REM *****
90 REM
95 REM
100 TEXT : HOME : VTAB 5: PRINT TAB(
16)"FIREFLIES": FOR DLY = 1 TO
500: NEXT : VTAB 8: PRINT TAB(
11)"BY DOUGLAS R. WERNER": FOR
DLY = 1 TO 500: NEXT : VTAB 1
1: PRINT TAB( 12)"COPYRIGHT
(C) 1982": FOR DLY = 1 TO 500
: NEXT
110 VTAB 17: PRINT "DO YOU WANT I
NSTRUCTIONS (Y/N) ";
120 GET AN$: IF AN$ = "Y" THEN GOSUB
1890: GOTO 150
130 IF AN$ = "N" THEN GOSUB 2020
: GOTO 150
140 GOTO 120
150 HOME
160 DIM X(20),Y(20)
170 POKE - 16368,0
180 FOR EL = 1 TO 20: READ X(EL):
NEXT EL
190 FOR EL = 1 TO 20: READ Y(EL):
NEXT EL
200 FOR AD = 770 TO 793: READ DT:
POKE AD,DT: NEXT
210 GR : HOME :BTY = 33:T = 0:TN =
22:TM = 20
220 COLOR = 2: VLIN 19,34 AT 14: HLIN
14,25 AT 34: VLIN 19,34 AT 25
230 FLIES = INT (13 * RND (1))
240 IF FLIES = 0 THEN FLIES = 1
250 FLIES$ = STR$(FLIES)
260 VTAB 22: PRINT " "
270 COLOR = 13: GOSUB 320
280 GOSUB 550
290 COLOR = 0: GOSUB 800
300 GOSUB 550
310 GOTO 270
320 ON FLIES GOTO 520,510,500,490
,480,470,460,450,440,430,420,
410,400,390,380,370,360,350,3
40,330
330 PLOT X(20),Y(20)
340 PLOT X(19),Y(19)
350 PLOT X(18),Y(18)
360 PLOT X(17),Y(17)
370 PLOT X(16),Y(16)
380 PLOT X(15),Y(15)
390 PLOT X(14),Y(14)
400 PLOT X(13),Y(13)
410 PLOT X(12),Y(12)
420 PLOT X(11),Y(11)
430 PLOT X(10),Y(10)
440 PLOT X(9),Y(9)
450 PLOT X(8),Y(8)
460 PLOT X(7),Y(7)
470 PLOT X(6),Y(6)
480 PLOT X(5),Y(5)
490 PLOT X(4),Y(4)
500 PLOT X(3),Y(3)
510 PLOT X(2),Y(2)
520 PLOT X(1),Y(1)
530 FOR X = 1 TO 30: NEXT X
540 RETURN
550 IF NXTKEY = 1 THEN GOTO 660
560 K1 = PEEK ( - 16384): POKE -
16368,0
570 IF K1 < 127 THEN RETURN
580 TS = TN:TN = 133: GOSUB 1870:T
N = TS
590 IF K1 = 209 THEN GOTO 1880
600 IF K1 < 177 OR K1 > 185 THEN
RETURN
610 IF LEN (FLIES$) = 2 AND K1 >
177 THEN RETURN
620 NM$ = CHR$( K1 - 128):NM = VAL
(NM$): GOSUB 1540
630 IF LEN (FLIES$) = 2 THEN NXT
KEY = 1: RETURN
640 CMP1 = ASC (FLIES$): IF CMP1 =
(K1 - 128) THEN GOTO 1020
650 GOTO 750
660 K2 = PEEK ( - 16384): POKE -
16368,0
670 IF K2 < 127 THEN RETURN
680 IF K2 < 176 OR K2 > 185 THEN
RETURN
690 TS = TN:TN = 133: GOSUB 1870:T
N = TS
700 NM$ = CHR$( K2 - 128):NM = VAL
(NM$): GOSUB 1540
710 NXTKEY = 0
720 C1$ = CHR$( K1 - 128):C2$ = CHR$(
K2 - 128):ST$ = C1$ + C2$
730 K1CMP = VAL (FLIES$):K2CMP =
VAL (ST$)
740 IF K1CMP = K2CMP THEN GOTO 1
020
750 WF = WF + 1: IF WF = 2 THEN GOTO
1130
760 VTAB 22: PRINT "GUESS AGAIN"
770 PRINT CHR$( 7): RETURN
780 DATA 16,19,22,18,21,16,19,22
,18,21,16,19,22,18,21,16,19,2
2,18,21
790 DATA 3,3,3,5,5,7,7,7,9,9,11,
11,11,13,13,15,15,15,17,17
800 PLOT X(20),Y(20)
810 PLOT X(13),Y(13)
820 PLOT X(1),Y(1)
830 PLOT X(7),Y(7)
840 PLOT X(15),Y(15)
850 PLOT X(19),Y(19)
860 PLOT X(3),Y(3)
870 PLOT X(10),Y(10)
880 PLOT X(14),Y(14)
890 PLOT X(6),Y(6)
900 PLOT X(2),Y(2)
910 PLOT X(12),Y(12)
920 PLOT X(18),Y(18)
930 PLOT X(11),Y(11)
940 PLOT X(8),Y(8)
950 PLOT X(16),Y(16)
960 PLOT X(4),Y(4)
970 PLOT X(17),Y(17)
980 PLOT X(5),Y(5)
990 PLOT X(9),Y(9)
1000 GOSUB 1820: GOSUB 1820
1010 RETURN
1020 COLOR = 13: HLIN 15,24 AT BTY
1030 GOSUB 1110
1040 BTY = BTY - 1
1050 IF BTY = 18 THEN 1100
1060 COLOR = 0: FOR R = 15 TO 19: HLIN
4,11 AT R: NEXT R: COLOR = 13
1070 WF = 0
1080 POP
1090 GOTO 230
1100 WF = 0: GOTO 1250
1110 TS = TN:TN = 40: FOR TN = 85 TO
61 STEP - 3
1120 GOSUB 1870: NEXT TN:TN = TS:
TM = 20: RETURN
1130 BTY = BTY + 1
1140 WF = 0
1150 IF BTY = 34 THEN BTY = 33
1160 COLOR = 0: HLIN 15,24 AT BTY
1170 FOR R = 15 TO 19: HLIN 4,11 AT
R: NEXT R
1180 COLOR = 13
1190 TS = TN:TN = 40: FOR TN = 61 TO
85 STEP 3
1200 GOSUB 1870: NEXT TN:TN = TS:
TM = 20
1210 HOME : VTAB 22: PRINT TAB(
13)"THE ANSWER WAS "; FLASH
: PRINT FLIES: NORMAL
1220 FOR DLY = 1 TO 1750: NEXT DL
Y: HOME
1230 POP
1240 GOTO 270
1250 COLOR = 13: HLIN 14,25 AT 18
1260 POKE 768,20
1270 SUB = 0: GOSUB 1280: GOTO 137
0
1280 FOR I = 18 TO 34
1290 FOR J = 1 TO (I - 17) * 3 /
4
1300 PLOT 14 - J,I: PLOT 25 + J,I
1310 POKE 769,5: CALL 770
1320 NEXT
1330 IF SUB = 1 THEN 1350
1340 COLOR = 0: HLIN 15,24 AT 33 -
(I - 18): COLOR = 13

```

Listing continued.

ANS\$	Answer
BTY	Current bottom of jar (Y axis)
C1\$	First entry of two input numbers
C2\$	Second entry of two input numbers
CL	Column for screen fill upon winning
CMPI	Numeric value of flies for comparison
COLOR	Current lo-res color selected
D	Duration of tone for sound routine
DLY	Delay
F	Frequency of tone for sound routine
FLIES	Current number of flies
FLIES\$	String equivalent of FLIES
FS	Saves current frequency
K1	First key input
K2	Second key input
K1CMP	Value of FLIES\$ for two entry compare
K2CMP	Value of ST\$ for two entry compare
KY\$	Key input for end of game questions
NM	Numeric equivalent of NM\$ for lo-res graphics display
NM\$	Number entered via keyboard as string
NS	No sound switch
NXTKEY	Second keystroke flag
R	Row for number erase
ST\$	Concatenation of C1\$ and C2\$ for two entry numbers
T	Toggle for noisy fireflies alternate tone
WF	Number of wrong attempts (2 maximum)
X	Array for storing vertical firefly screen positions
Y	Array for storing horizontal firefly screen positions

Table. List of variables used in Fireflies.

**How the Program Works**

After typing RUN, lines 95 to 100 execute a couple of subroutines that print or do not print the instructions. Lines 120 and 130 clear the screen and reset the keyboard strobe to prepare the Apple keyboard for input. The firefly position array is filled and the machine language sound routine is poked into memory from lines 135 through 145.

The lo-res graphics mode is entered, the screen is cleared, the jar bottom coordinate is initialized and the jar is drawn in lines 150 and 155. The random fly generator is located in lines 160 to 170.

The main program loop consists of five lines (180 to 200) that call subroutines. These subroutines get and validate keystrokes and blink the fireflies. A routine located in lines 205 to 315 turns the fireflies on. All key-

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stroke input and error checking are accomplished from lines 320 to 425. The data for firefly placement is located at lines 430 and 435. Lines 440 to 545 set up X-Y coordinates for random blinking and turning the fireflies

**"These subroutines get and validate keystrokes and blink the fireflies."**

off. Line 540 calls the firefly sound routine.

Lines 550 to 600 add light to the jar, sound a rising tone, check for a win, reset all flags, erase the displayed 3x5 number and return to select a new number of fireflies.

After a second wrong answer, lines

**Listing continued.**

```

1350 NEXT
1360 RETURN
1370 COLOR= 0: PLOT 14,18: PLOT 2
      5,18
1380 COLOR= 13: GOSUB 1390: GOTO
      1400
1390 FOR I = 1 TO 14: VLIN 35,35 -
      I AT 14 - I: VLIN 35,35 - I AT
      25 + I: POKE 769,2: CALL 770:
      NEXT : RETURN
1400 COLOR= 0
1410 SUB = 1: GOSUB 1280
1420 COLOR= 0: GOSUB 1390
1430 FOR I = 1 TO 1000: NEXT
1440 COLOR= 15: FOR CL = 0 TO 39:
      HLIN 0,39 AT CL: NEXT CL
1450 COLOR= 1: PLOT 11,3: PLOT 15
      ,3: PLOT 12,4: PLOT 14,4: VLIN
      5,9 AT 13: VLIN 3,9 AT 17: HLIN
      17,21 AT 3: HLIN 17,21 AT 9: VLIN
      3,9 AT 21: VLIN 3,9 AT 24: HLIN
      24,28 AT 9: VLIN 3,9 AT 28
1460 HLIN 13,17 AT 21: VLIN 15,21
      AT 13: VLIN 15,21 AT 15: VLIN
      15,21 AT 17: VLIN 15,21 AT 19
      : VLIN 15,21 AT 21: PLOT 22,1
      6: VLIN 17,20 AT 23: PLOT 24,
      21: VLIN 15,21 AT 25: VLIN 15
      ,19 AT 28: PLOT 28,21
1470 GOSUB 1530
1480 HOME : VTAB 22: PRINT "TO PL
      AY AGAIN, PRESS ANY KEY ": PRINT
      "TO QUIT, PRESS "Q" ";
1490 GET KY$
1500 IF ASC (KY$) < > 81 THEN GOTO
      210
1510 IF ASC (KY$) = 81 THEN GOTO
      1880
1520 GOTO 1480
1530 TS = TN:TN = 76:TM = 140: GOSUB
      1870:TN = 90:TM = 133: GOSUB
      1870:TN = 84:TM = 40: GOSUB 1
      870:TN = 76:TM = 90: GOSUB 18

```

```

70:TN = 56: GOSUB 1870:TN = 4
5: GOSUB 1870:TN = 50: GOSUB
1870:TN = 56:TM = 220: GOSUB
1870:TN = TS: RETURN
1540 IF NXTKEY = 1 GOTO 1570
1550 COLOR= 0: FOR R = 15 TO 19: HLIN
      4,11 AT R: NEXT R
1560 COLOR= 9: GOTO 1580
1570 COLOR= 9: GOTO 1590
1580 ON NM GOTO 1620,1640,1660,16
      80,1700,1720,1740,1760,1780
1590 IF NM = 0 THEN GOTO 1610
1600 ON NM GOTO 1630,1650,1670,16
      90,1710,1730,1750,1770,1790
1610 HLIN 9,11 AT 15: VLIN 15,19 AT
      9: VLIN 15,19 AT 11: HLIN 9,1
      1 AT 19: COLOR= 13: RETURN
1620 VLIN 15,19 AT 5: COLOR= 13: RETURN
1630 VLIN 15,19 AT 10: COLOR= 13:
      RETURN
1640 HLIN 4,6 AT 15: PLOT 6,16: HLIN
      4,6 AT 17: PLOT 4,18: HLIN 4,
      6 AT 19: COLOR= 13: RETURN
1650 HLIN 9,11 AT 15: PLOT 11,16:
      HLIN 9,11 AT 17: PLOT 9,18: HLIN
      9,11 AT 19: COLOR= 13: RETURN
1660 HLIN 4,6 AT 15: HLIN 5,6 AT
      17: HLIN 4,6 AT 19: VLIN 15,1
      9 AT 6: COLOR= 13: RETURN
1670 HLIN 9,11 AT 15: HLIN 10,11 AT
      17: HLIN 9,11 AT 19: VLIN 15,
      19 AT 11: COLOR= 13: RETURN
1680 VLIN 15,17 AT 4: HLIN 4,6 AT
      17: VLIN 15,19 AT 6: COLOR= 1
      3: RETURN
1690 VLIN 15,17 AT 9: HLIN 9,11 AT
      17: VLIN 15,19 AT 11: COLOR=
      13: RETURN
1700 HLIN 4,6 AT 15: PLOT 4,16: HLIN
      4,6 AT 17: PLOT 6,18: HLIN 4,
      6 AT 19: COLOR= 13: RETURN
1710 HLIN 9,11 AT 15: PLOT 9,16: HLIN

```

**Listing continued.**

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Listing continued.

```

9,11 AT 17: PLOT 11,18: HLIN
9,11 AT 19: COLOR= 13: RETURN

1720 VLIN 15,19 AT 4: HLIN 4,6 AT
17: HLIN 4,6 AT 19: VLIN 17,1
9 AT 6: COLOR= 13: RETURN
1730 VLIN 15,19 AT 9: HLIN 9,11 AT
17: HLIN 9,11 AT 19: VLIN 17,
19 AT 11: COLOR= 13: RETURN
1740 HLIN 4,6 AT 15: VLIN 15,19 AT
6: COLOR= 13: RETURN
1750 HLIN 9,11 AT 15: VLIN 15,19 AT
11: COLOR= 13: RETURN
1760 HLIN 4,6 AT 15: VLIN 15,19 AT
4: VLIN 15,19 AT 6: HLIN 4,6 AT
19: PLOT 5,17: COLOR= 13: RETURN

1770 HLIN 9,11 AT 15: VLIN 15,19 AT
9: VLIN 15,19 AT 11: HLIN 9,1
1 AT 19: PLOT 10,17: COLOR= 1
3: RETURN
1780 HLIN 4,6 AT 15: VLIN 15,17 AT
4: HLIN 4,6 AT 17: VLIN 15,19
AT 6: COLOR= 13: RETURN
1790 HLIN 9,11 AT 15: VLIN 15,17 AT
9: HLIN 9,11 AT 17: VLIN 15,1
9 AT 11: COLOR= 13: RETURN
1800 HLIN 4,6 AT 15: VLIN 15,17 AT
N4: HLIN 4,6 AT 17: VLIN 15,1
9 AT 6: COLOR= 13: RETURN 13:
RETURN
1810 END
1820 IF NS = 1 THEN RETURN
1830 POKE 768,TN: POKE 769,TM: CALL
770
1840 IF T = 1 THEN GOTO 1860
1850 T = 1:TN = 19: RETURN
1860 T = 0:TN = 22: RETURN
1870 POKE 768,TN: POKE 769,TM: CALL
770: RETURN
1880 TEXT : HOME : PRINT "THANKS
FOR THE GAME!!": END
    
```

```

1890 HOME
1900 PRINT TAB( 15);: FLASH : PRINT
"FIREFLIES": NORMAL
1910 PRINT : PRINT : PRINT "FIREF
LIES IS A COUNTING GAME. A N
UMBER"
1920 PRINT : PRINT "OF FIREFLIES
APPEARS ABOVE A JAR. YOU"
1930 PRINT : PRINT "COUNT THE FIR
EFLIES AND KEY IN THE NUM-"
1940 PRINT : PRINT "BER YOU COUNT
ED. IF YOU'RE RIGHT, THE"
1950 PRINT : PRINT "JAR FILLS WIT
H THE LIGHT FROM THE FIRE-"
1960 PRINT : PRINT "FLIES."
1970 PRINT : PRINT " IF YOU'RE
WRONG, YOU GET ONE MORE"
1980 PRINT : PRINT "CHANCE. IF Y
OU'RE WRONG AGAIN, YOU"
1990 PRINT : PRINT "LOOSE SOME LI
GHT FROM THE JAR. "
2000 VTAB 24: PRINT "GOOD LUCK! -
- - PRESS ANY KEY... ";
2010 GET ANS$
2020 HOME : PRINT : PRINT "FOR QU
IET FIREFLIES PRESS <RETURN>."
"
2030 PRINT : PRINT "FOR NOISY FIR
EFLIES PRESS ANY OTHER KEY."
2040 PRINT : PRINT "PRESS "Q" TO
QUIT AT ANY TIME ";
2050 GET ANS$
2060 IF ASC (ANS$) = 13 THEN GOTO
2090
2070 IF ASC (ANS$) = 81 THEN GOTO
1880
2080 RETURN
2090 NS = 1
2100 RETURN
2110 DATA 174,0,3,173,43,192,136
,208,5,206,1,3,240,9,202,208,
245,174,0,3,76,5,3,96
    
```

605 to 660 remove light from the jar, sound a falling tone, reveal the correct answer, and return to display the same number of fireflies.

Lines 665 to 710 display YOU WIN in lo-res graphics, play the song and

**"According to Laura's teacher, her number recognition and counting have improved remarkably."**

allow you to quit or continue.

The lo-res number routine that displays numbers in a 3x5 matrix on the screen is located from lines 715 to 850.

Lines 855 to 875 are where the firefly sound is or is not generated, depending on your selection. Line 880 has the sound routine and line 885 contains the end game routine.

Lines 890 and 990 give instructions for you and the computer (noisy or quiet fireflies). Last, but not least, is the decimal data for the sound routine on line 995.

To display any other number of fireflies, change 13 in line 160 to the number you want to display plus one. For example, to display 15 fireflies, change 13 to 16. The new line 160 will read FLIES = INT(16 \* RND (1)). If you decide to display 20 fireflies, change line 350 to IF LEN(FLIES\$) = 2 AND K1 > 178 THEN RETURN.

This program meets all the requirements for a fun children's game—is easy to use, makes noises, flashes lights, provides a challenge for children and uses positive feedback.

Fireflies was fun to write and Laura enjoys playing it. According to Laura's teacher, her number recognition and counting have improved remarkably. Mission accomplished!

I hope that your children enjoy Fireflies as much as mine do. If you have any interesting enhancements or suggestions, please feel free to contact me. Laura and I will appreciate it. ■

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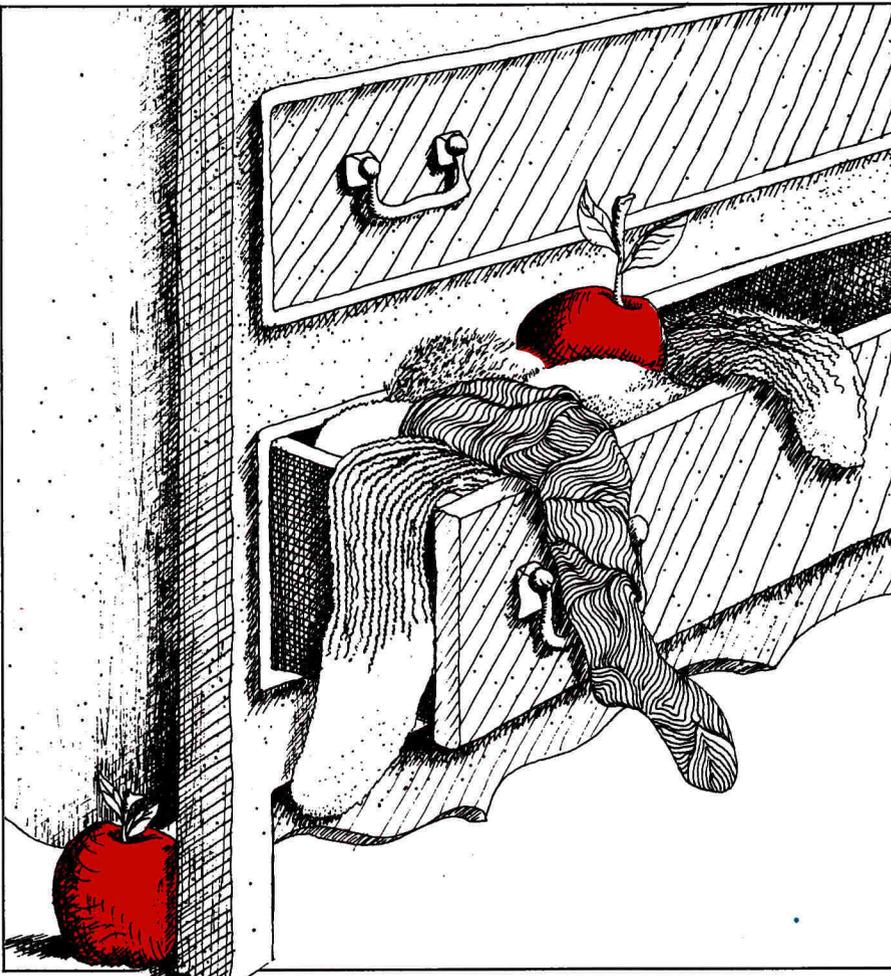


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# Match 'Em

Here's a game that combines fun, mental exercise  
and an interesting programming technique,  
all in one neat package.

by Robert R. Devine



If you liked Concentration, you'll love Match 'Em! In this game, two players compete by locating pairs of hidden objects. Each object appears in different colors and rotations on the screen. Should each player make the same number of matches, the one who matches the hidden apples is the winner.

In addition to the game, I'll present an interesting technique to save and load the shape table. You may want to employ this technique in other programs.

One problem I have with computer board games is the need to enter many horizontal and vertical coordinates to specify a certain square. In Match 'Em, however, you simply use the I, J, K and M keys to move a flashing cursor until it is on the coordinates you want, and then select that box with the space bar. Selecting illegal coordinates is not possible since the cursor will flash only if the box you're on has not been matched.

#### Entering the Program

First, enter the shape table (Listing

Address correspondence to Robert R. Devine,  
PO Box 10, Adona, AR 72001.

Listing 1. The Match 'Em Applesoft program listing.

2), because you will need it in memory in order to debug the Applesoft program. To get the shape table into memory enter the monitor with CALL -151. Now, type 14E4: 07 00 10 00 ID 00, etc., until you have filled about four lines on the screen. Now hit return, enter another colon and type in another four lines. Repeat this process until you have entered the entire table. After checking the shape table's contents, return to Applesoft with 3D0G and save it with BSAVE MSHAPES, A\$14E4, L\$14C. Details on entering and examining shape tables are found on page 96 of the Applesoft reference manual. The BSAVE command is covered on page 92 of the DOS manual.

Once the shape table is on disk, enter the Applesoft program (Listing 1). Try to enter the program exactly as it appears here. You don't want the program to get any longer than it is already.

Once you have entered the program, check its length to make sure it does not run into the shape table. To do so, enter the monitor and type AF.B0. As long as a value less than B0 14 (\$14B0) is returned, you should be all right. (The value will probably be around \$1409.)

Next, debug the program. You must add two lines:

```
1 LOMEM:18000
2 PRINT CHR$(4); "BLOAD MSHAPES"
```

Now, run the program and get all those bugs out!

Once the program is running properly, you can consider your task complete and save Match 'Em, or you can continue to read this article and discover a way to fool your Apple into incorporating the shape table directly into your program file. You will learn something about how your computer works in the process.

### Fooling the Apple

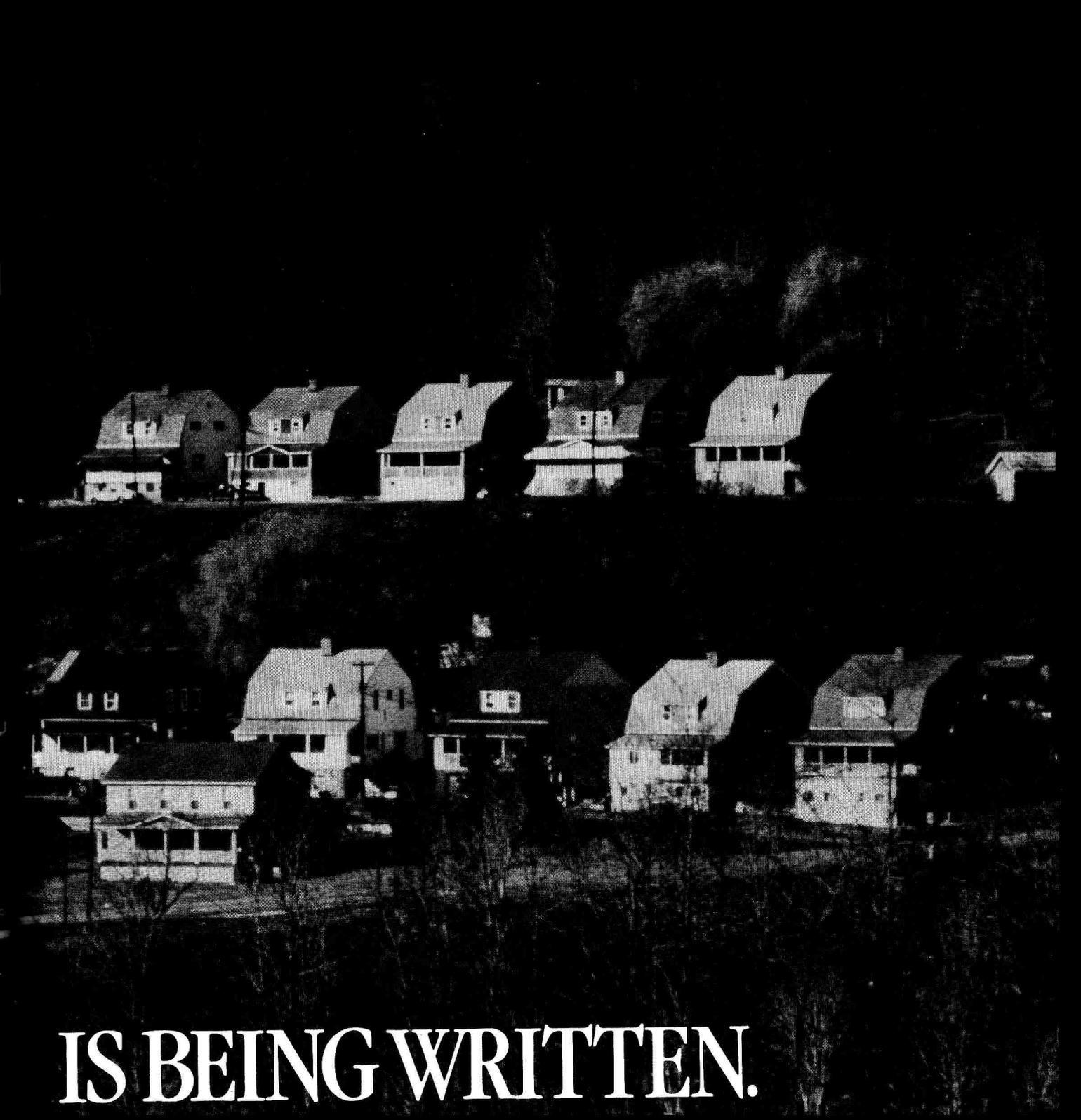
At this point, you should have the Applesoft program in memory and the shape table on disk. Now, delete lines 1 and 2 from the program and BLOAD MSHAPES into memory. Now you can fool your Apple into saving both the Applesoft program and the shape table as one complete disk file.

```
5 X = RND ( - PEEK (78) - PEEK (79) * 256): REM SE
   ED THE RANDOM TABLE
7 TEXT
10 HOME : VTAB 12: HTAB 16: PRINT "MATCH-EM": VTAB 14
   : HTAB 13: PRINT "COPYRIGHT 1981": VTAB 16: HTAB
   12: PRINT "ROBERT R. DEVINE": VTAB 18: HTAB 13: PRINT
   "ADONA ARKANSAS"
15 VTAB 22: INPUT "INSTRUCTIONS ? ";A$: IF LEFT$(A$,
   1) < > "Y" THEN 100
20 HOME : PRINT " MATCH-EM IS A TWO PLAYER GAME. TH
   E": PRINT : PRINT "OBJECT TO TO LOCATE MATCHING P
   AIRS OF": PRINT : PRINT "OBJECTS ON A 6X6 GRID.
   USE THE I,J,K,": PRINT : PRINT "AND M KEYS TO MOV
   E THE CURSOR WHERE YOU"
30 PRINT : PRINT "WANT, AND THE SPACE BAR TO TURN IT
   OVER.": PRINT " IF A MATCH IS MADE, THAT PLAYER
   GOES " > "Y" THEN 100
40 PRINT : PRINT " THE GAME ENDS WHEN ALL MATCHES A
   RE": PRINT : PRINT "FOUND. PLAYER 1 IS BLUE. PLAY
   ER 2 IS": PRINT : PRINT "RED. IN CASE OF A TIE, T
   HE PLAYER WHO"
50 PRINT : PRINT "MATCHES APPLES IS THE WINNER. ": PRINT
   : PRINT "TOUCH ANY KEY TO BEGIN";: GET A$: PRINT

100 POKE 232,228: POKE 233,20: HOME : VTAB 12: PRINT
   "PARDON ME WHILE I SET UP THE BOARD": GOTO 5000
110 GOSUB 7000: REM SETUP THE GAME
199 REM MAIN PROGRAM
200 X = 1:X1 = 0:Y = 1:Y1 = 0:PL = PL + 1: IF PL = 3 THEN
   PL = 1
210 HOME : VTAB 22: HTAB 8: PRINT "PLAYER "PL" S TURN
   "
220 GOSUB 399: DRAW CH AT XC,YC:XO = XC:YO = YC:X1 =
   X:Y1 = Y: REM FIRST SQUARE TURNED
230 GOSUB 399: DRAW CH AT XC,YC: REM SECOND SQUARE T
   URNED
240 IF N(X,Y) < > N(X1,Y1) THEN FOR B = 1 TO 600: NEXT
   B: HCOLOR= 0: GOSUB 290:XC = XO:YC = YO: GOSUB 29
   0: GOTO 200: REM NO MATCH TURN SQUARE BACK OVER
250 B = 66: IF PL = 2 THEN B = 99: REM SET FLAG FOR P
   LAYERS SQUARE
260 SQ = SQ + 2: IF N(X,Y) = 18 THEN AP = PL: REM SET
   APPLE FLAG
265 N(X,Y) = B:N(X1,Y1) = B:B = 2: IF PL = 2 THEN B =
   5: REM AWARD SQUARE TO PLAYER-SET PLAYERS COLOR
270 HCOLOR= B: FOR X = YC - 10 TO YC + 10: HPLOT XC -
   12,X TO XC + 12,X: NEXT X: FOR X = YO - 10 TO YO +
   10: HPLOT XO - 12,X TO XO + 12,X: NEXT X: REM FI
   LL SQUARES WITH PLAYERS COLOR
275 IF SQ = 36 THEN 600: REM ALL SQUARES USED ?
280 VTAB 23: HTAB 8: PRINT "PLAYER "PL" GOES AGAIN": GOTO
   220
290 FOR Y = YC - 7 TO YC + 7: HPLOT XC - 7,Y TO XC +
   7,Y: NEXT Y: RETURN : REM ERASE SHAPE
399 REM READ KEYBOARD
400 P = PEEK ( - 16384): POKE - 16368,0
420 IF P = 205 THEN 450
430 IF P < > 201 THEN 455
440 Y = Y - 1: IF Y = 0 THEN Y = 6
445 GOTO 455
450 Y = Y + 1
455 IF Y > 6 THEN Y = 1
460 YC = 13 + (Y - 1) * 26:A = Y * 42
470 IF P = 202 THEN 500
480 IF P < > 203 THEN 495
490 X = X + 1
495 IF X > 6 THEN X = 1
497 GOTO 510
500 X = X - 1: IF X = 0 THEN X = 6
510 XC = 65 + (X - 1) * 31
520 VTAB 22: HTAB 30: PRINT "("X","Y)": IF N(X,Y) <
   > 66 AND N(X,Y) < > 99 AND (X1 < > X OR Y1 < >
   Y) THEN 540: REM ONLY FLASH AVAILABLE SQUARES
530 GOTO 400
540 SCALE= 1: ROT= 0: HCOLOR= 3: DRAW 1 AT XC,YC: FOR
```

Listing continued.





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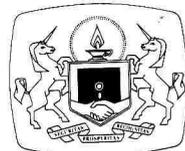
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# The Applesoft Adviser

by Dan Bishop

## The Automatic Menu Formatter

Like any fine restaurant, most complex applications programs require the use of at least one menu. In a computer program, a menu is a list of functions or subfunctions the program can perform. This list, displayed on the video monitor, represents each function name or description as a number or letter. The menu subroutine allows us to use these numbers or letters to select the computer's next specific function. Usually, we communicate the selection by pressing the key corresponding to the appropriate letter or number. However, some programmers prefer to use cursor control keys, with which we move the cursor (or an arrow) along the list until it points to the desired selection.

I often find myself spending much time designing visually appealing video displays. Menus, however, are just lists of items. A menu display should lend itself to a generalized subroutine usable in *all* programs, without needing to be recoded for each application. In this column, I will describe how to develop such a subroutine. The object of this article is not to present the menu formatter so much as it is to provide insight into how such subroutines can be developed.

### To Begin With...

As with any successful project, we must begin by defining needs and setting goals. In this case, the need is for a subroutine that provides menu displays. The goal is to develop a versatile subroutine that can produce a variety of different visually appealing displays.

With these ideas forming the project's starting point, we must imagine

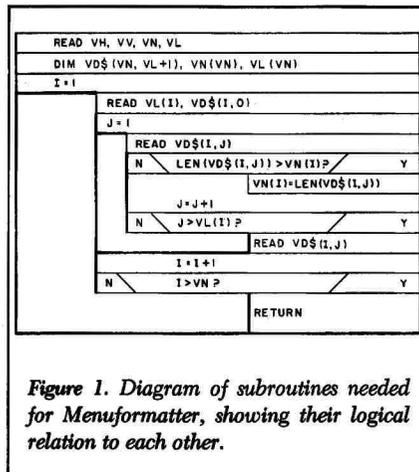


Figure 1. Diagram of subroutines needed for Menuformatter, showing their logical relation to each other.

what kinds of displays we desire. The following list could result:

1. A black background with the menu title centered on the screen. The longest option line will be centered, and all other options will begin at the same column as the longest line (that is, all options will be left justified).
2. A white background, with the menu occupying a black window in the center of the screen. Menu title and options to be handled as in #1.
3. A hatched background of asterisks (\*), or of any other desired character, with the menu occupying a black window in the center of the screen. Menu title and options to be handled as in #1.
4. As #3, but with a solid border separating the menu window from the hatched background.
5. As #1, but with a solid border surrounding the menu window.
6. Any of the above displays, but with the menu option lines centered individually in the display. This option might look strange for long lists, but for short menus of two or three

items it may look better, particularly if the options are separated by blank lines.

7. Any of the above displays, but with the menu window displayed in inverse (black on white) mode.

If all seven of these characteristics could be incorporated into our subroutine, we would have a total of twenty different options from which to choose. If our program had twenty menu displays, each one could be different!

Of course, if we design a generalized subroutine for use at several different points in our program, we must determine how best to incorporate the specific titles, options and messages for each display into the program. One method might be to use *assignment statements*, which define each menu line before the menu formatter subroutine is called. For example, we could use the following series of lines:

```
1500 V$(1) = "*** INVENTORY MASTER MENU ***"
1510 V$(2) = "ADD NEW ITEM TO LIST"
1520 V$(3) = "DELETE OLD ITEM FROM LIST"
1530 V$(4) = "VIEW ITEM ON LIST"
1540 V$(5) = "EDIT ITEM ON LIST"
1550 V$(6) = "SAVE ITEM ONTO DISK FILE"
1560 V$(7) = "PRINT INVENTORY LIST"
1570 V$(8) = "END THE PROGRAM"
```

These lines could be part of a subroutine by themselves, or could appear in the main program just prior to the GOSUB command that transfers the program to the menu formatter subroutine. The subroutine would

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use  $V\$(i)$  for its PRINT statements, so each separate menu would redefine the  $V\$(i)$  array elements to correspond with its own list of options.

Why we use an array to represent the lines to be displayed should be obvious. Each line to be displayed requires the same two operations: positioning the cursor at the point where the line should begin, and printing that line. Furthermore, some menus may have only three lines to be printed, others may have 15. A generalized subroutine handling a variety of situations uses an array and provides the subroutine with a value representing the number of array elements involved each time it is called. Thus, the above example might use:

```
1580 VL = 8
1590 FOR I = 1 TO VL
1600 HTAB 8: PRINT V$(I)
1610 NEXT I
```

We must remember to insert assignment statement lines into the program at appropriate places, or set up specific subroutines and subroutine calls to handle them. I prefer to use READ/DATA statements. With this approach, I can place all text lines that are to appear in the menu displays at the end of the program. This solves the problem of determining exactly where individual lines should be placed in the program. It also makes it easier to locate and change a line that may not be quite right.

If the menus for a particular program appear in a certain sequence and are never repeated, we could read each line from the data list as it is used (say, as  $V\$(i)$ ) and immediately print it. Unfortunately, this simple situation rarely comes up. More commonly, the program will have a "master menu" that lists a program's major features as options for selection. When one of these options is chosen, a secondary menu display appears. The secondary menu contains a list of options dealing with the feature chosen from the master menu. One of these options allows return to the master menu. Thus, each menu used by the program may be called upon at any time, and may be needed several times during the program's operation.

V	Identifies which menu is currently being used.
V1	Horizontal tab for menu title.
V2	Horizontal tab for menu option lines.
V3	Vertical tab for menu window.
V4	Horizontal tab for menu window, left edge.
V5	Horizontal tab for menu window, right edge.
V0\$	String of 40 blank spaces.
V1\$	String of 40 hyphens.
V2\$	String of 40 "=" signs.
V3\$-V9\$	40-character strings containing any valid displayable character to be used for background.
VB\$	Generalized variable used in background subroutine. The desired background string (V0\$-V9\$) is assigned to VB\$ before calling the background subroutine.
VC	Text flag; VC = 0 forces left justification of menu lines; VC = 1 forces screen centering (ragged margins) of menu lines.
VH	Number of video columns normally used by system (usually 40 or 80). This is read in as a data element at the start of the program but may be redefined as necessary.
VL	Number of option lines in the longest menu. This variable is used only for dimensioning the arrays.
VL(I)	Number of option lines in the i'th menu.
VN	Number of menus in the program. This variable is used only for dimensioning the arrays.
VN(I)	Length of the longest option line in the i'th menu.
VR	A value corresponding to the position of the chosen keyboard character in the string of allowed characters.
VR\$	The actual keyboard character pressed by the operator.
VV	Number of video rows in the system being used. Read in initially as 24, this number may be redefined at will for special display effects.
VW\$	A string of blanks having a length equal to the size of the menu window for a given menu display.
I,J	Loop counters used within the subroutines.

*Table. Variables used by the Menuformatter program.*

For this capability, we want each menu line stored in an array. By using a two-dimensional array, with one subscript representing a specific menu and the other subscript representing a particular line in that menu, we can display any menu whenever we wish. Using  $VD\$(I,J)$  for the j'th video display line in the i'th menu, we can place the PRINT command within a FOR...NEXT loop that uses J for a counter and display the entire menu with a simple subroutine. This, of course, requires us to define the number of lines appearing in each menu so we can set the appropriate loop limit for each. We can use the READ/DATA commands to handle this, too, using an array  $VL(I)$  to hold the number of lines for the i'th menu.

Whenever we use such arrays we must dimension them, so we also must tell the Apple how many menus the program will use (VN) and how many lines the largest menu in the program will have (VL). These two variables will be defined by data elements at the start of our data list. Now we can dimension the arrays

$VD\$(I,J)$  and  $VL(I)$ , using the following statement:

```
DIM VD$(VN,VL), VL(VN)
```

Don't confuse the variable VL with the array  $VL(I)$ ; both may be used in the program. By using variable names within the subroutine, using the subroutine in a different program requires changing only the data elements. The subroutine then can be transferred from program to program without change.

### Identifying the Subroutines

If we closely examine the information presented in the preceding section, we can identify several subroutines our menu formatting subroutine will need. First, of course, will be the subroutine that reads all data elements into the arrays. This routine also should read VN and VL at the start and should dimension the arrays.

The list of display options presented earlier points to other necessary subroutines. One subroutine must control the background for the

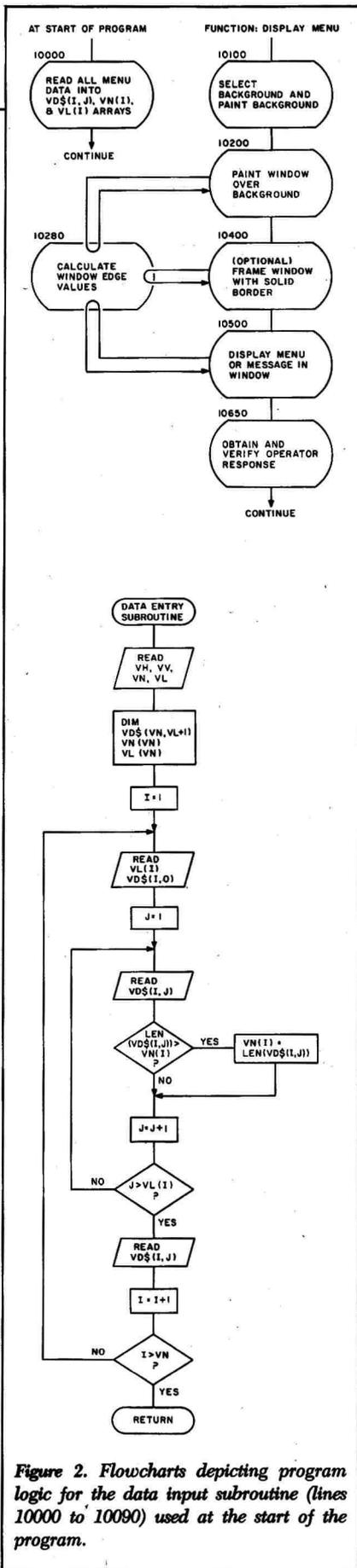


Figure 2. Flowcharts depicting program logic for the data input subroutine (lines 10000 to 10090) used at the start of the program.

menu display. Another must clear a window in the center of that background so the menu may be printed clearly. We may wish to call a third subroutine to draw a frame around the window, setting it off more distinctly from the background. We will need another to actually print the menu lines in the window. Figure 1 lists these subroutines.

We can specify whether each text line is to be left justified or centered on the screen by using two separate subroutines. The process for printing text lines on the screen is the same in both cases; the only difference is the horizontal tab that defines where the line will begin printing. Because the two processes are so similar, we can program more economically if we use the same subroutine for both and set a flag (VC) to tell the Apple whether we want left justification or centering. If VC=0, we instruct the subroutine to left justify all lines; if VC=1, the Apple will center the text.

At this point, we realize that if we are to center the menu window on the screen, we must inform the Apple of the screen dimensions. Of course, these values could be inserted into the menu formatter subroutine as 40 columns by 24 rows, but that would lessen the subroutine's versatility. After all, some menus may be printed on an 80-column screen, others on the standard 40-column screen. Moreover, although both screen configurations have 24 rows, there may be times when we would wish to have the menu formatter think the screen has only 15 rows, with the background and menu filling only a portion of the screen.

To handle these situations, we add two more data elements at the top of our data list, and read them into the program as VH and VV—values corresponding to standard video horizontal width (columns: VH) and standard video vertical height (rows: VV). Although we read the values for VH and VV at the program's outset, we may reassign them at any time, allowing ourselves to design programs with some menus using 40 columns, others using 80 columns. The menu formatter subroutine will not differ-

entiate between the two if it always assumes VH has the appropriate value for the menu currently being displayed. It will be centered in either case.

### The Data Input Subroutine

We must assign each menu a value that tells the Apple how wide to make the menu window. Since this value depends on the length of the longest line in that menu, we must devise a method to calculate that value and store it as an array element, VN(I). We could count the characters in every long line for each menu, and make the resulting longest value another data element. But since each line is read as a data element, we could get the Apple to use the LEN function to calculate the longest line value, saving us the trouble. After all, didn't we buy the fool thing to make our lives easier?

Figure 2 presents flowcharts for the data input subroutine; the Table lists variables used by the menu formatter program. Two other items appear in this subroutine. The first is the menu title line at the top of the window. We could read in this line as part of the FOR...NEXT loop which reads all other data lines. However, I chose to keep it separate so its length would not be compared with that of the menu's other lines. We read in its value before entering the FOR...NEXT loop, and store it as the zero'th line for that menu...VD\$(I,0).

The second feature is the prompt—for each menu—that asks the user to enter a choice by pressing a key on the keyboard. Only certain keys are allowed for each menu; the program should reject any other entry. While the list of allowed keys changes with each menu, the procedure for accomplishing this task remains the same. Thus, the keyboard entry routine might just as well be part of the menu display routine. We need only tell the Apple which keys are allowed for each menu by presenting them as another data element associated with each menu. This program reads that data element at the end of each menu's list and stores it as VD\$(I, J + 1), where J is the number of



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LETTERS ON FILE

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Listing continued.

```

10080 READ VD$(I,J)
10090 NEXT I: RETURN
10099 REM BACKGROUND SUBROUTINE
10100 FOR I = 1 TO VV
10110 PRINT VB$;
10120 NEXT I
10130 RETURN
10199 REM MENU WINDOW SUBROUTINE
E
10200 GOSUB 10280
10210 FOR I = - 1 TO VL(V) + 7
10220 VTAB V3 + I: HTAB V4
10230 PRINT VW$;
10240 NEXT I
10250 RETURN
10280 V1 = INT ((VH - LEN (VD$(
V,0)) - 4) / 2) + 1
10290 V2 = INT ((VH - VN(V) - 6)
/ 2) + 1
10300 V3 = INT ((VV - VL(V) - 7)
/ 2) + 1
10310 IF V1 < V2 THEN 10360
10320 V4 = V2
10330 V5 = V4 + VN(V) + 6
10340 VW$ = LEFT$ (VO$,VN(V) + 6
)
10350 GOTO 10390
10360 V4 = V1
10370 V5 = V4 + LEN (VD$(V,0)) +
4
10380 VW$ = LEFT$ (VO$, LEN (VD$(
V,0)) + 4)

```

```

10390 RETURN
10399 REM BOX FRAME SUBROUTINE
10400 GOSUB 10280
10410 VTAB V3 - 2: HTAB V4 - 1
10420 PRINT LEFT$ (VO$, LEN (VW
$) + 2);
10430 FOR I = - 1 TO VL(V) + 7
10440 VTAB V3 + I: HTAB V4 - 1
10450 PRINT " ";: HTAB V5: PRINT
" ";
10460 NEXT I
10470 VTAB V3 + I: HTAB V4 - 1
10480 PRINT LEFT$ (VO$, LEN (VW
$) + 2);
10490 RETURN
10499 REM MENU LINE DISPLAY SUB
ROUTINE
10500 GOSUB 10280
10510 VTAB V3: HTAB V1
10520 PRINT " "VD$(V,0)" ";
10530 VTAB V3 + 1: HTAB V1
10540 PRINT " "LEFT$ (V2$, LEN
(VD$(V,0)))" ";
10550 FOR I = 3 TO VL(V) + 2
10560 VTAB V3 + I: HTAB V4
10570 IF VC = 0 THEN 10590
10580 HTAB INT ((VH - LEN (VD$
(V,I - 2))) / 2)
10590 PRINT " "MID$ (VD$(V,VL(
V) + 1),I - 2,1)" "VD$(V,I -
2);
10600 NEXT I

```

Listing continued.

nally greater than VN, the number of menus.

### On Backgrounds and Windows

We can form the background for the video display simply by filling the screen with strings containing the character(s) we wish to display. These strings need to be defined, so lines 30-39 in the listing assign strings of 40 characters each to the variables V0\$-V9\$. V0\$ and V2\$ should appear just as they do in lines 30 and 32 for any program that uses the menu formatter subroutine.

The subroutine beginning at line 10100 fills the screen with a designated character by assigning the appropriate string to VB\$. VB\$ is printed on the screen 24 times (if VV has a value of 24). On the other hand, before executing a GOSUB 10100, we could change the value of VV to 15, and only 15 lines of the display will be filled in.

Or how about a multiple character background? First set the value of VV to correspond to the number of lines for a given character, then GOSUB 10100 to print those lines on the screen. Change VV (if desired), reassign VB\$ to a different string of characters, and GOSUB 10100 again. We can repeat this process several times, providing a customized background!

An INVERSE command (or, heaven forbid, a FLASH command) before the GOSUB 10100 will change the background completely. For example:

```

VB$ = V0$: INVERSE: GOSUB 10100:
NORMAL

```

will fill the screen with white—kind of an inversed HOME.

Once we have painted the background, we must construct a window for the menu by painting a box of appropriate dimensions in the center of the screen, using blanks (for black) or inversed blanks (for white). The trick is determining the VTAB and HTAB positions and the length of the string of blanks to be used.

Figure 3 shows the general format for the menus produced by the menu formatter. The top row is blank, and is followed by the menu title. Row 3 underlines the title (using the "=" sign); row 4 is blank. Then the formatter prints the block of lines defined for that menu's option list, one row per line. At the bottom of the list is an underline and the prompt SELECTION... or CHOICE..., centered on the screen. The bottom row of the menu window is left blank. So if a menu has VL(I) rows of options, the menu window must be VL(I)+7 rows high. With a 24-row screen, this limits the menu to 17 options, which poses no real problem.

If the video screen has VV rows, then the formula:

$$V3 = \text{INT}((VV - VL(I) - 7)/2)$$

will calculate the top row for the menu window, allowing a VTAB V3 instruction to place the cursor in proper vertical position for printing

the menu window. Line 10300 handles this calculation.

For aesthetic purposes, the menu title should be independently centered—without regard to lines in the menu itself. This was one reason for reading the menu title into the VD\$ array separately. However, we use the same algorithm to determine where the menu title should begin printing (V1) and where the menu option lines should begin (V2), and it is essentially the same algorithm used above for calculating V3.

Lines 10280 and 10290 calculate the values for V1 and V2. The longer of these two options (having the smaller value for the left margin, V1 or V2) is used to identify the left margin for the menu window, V4. V5, the location for the right margin (used only by the border routine) also is calculated based on the longer of these values.

The 4 in line 10280 forces two blanks before and after the menu title. The 6 in line 10290 forces space for the option code to the left of the menu line. Finally, the formatter calculates and represents the actual width of the window by the length of blank characters stored in VW\$ (line 10340 or 10380).

The window then is painted over the background by executing the main program's GOSUB 10200 command, which prints the appropriate number of VW\$ lines in sequence. Of course, a FLASH or INVERSE command prior to the GOSUB 10200 produces the appropriate effects on the screen display. To display the menu as black on white, we can use an inverse window.

### The Picture Frame

The subroutine at 10400 produces a frame around the window—always of appropriate dimensions, whether the window has been printed or not. On a black background, the subroutine produces a white frame if we issue an INVERSE command prior to using the subroutine. In a white background, we can produce a black frame. Flashing frames also are possible!

The frame subroutine uses the

**Listing continued.**

```
10610 VTAB V3 + I + 1: HTAB V1
10620 PRINT " " LEFT$ (V2$, LEN
(VD$(V,0))) " ";
10630 VTAB V3 + 3 + I: HTAB V4 +
4
10640 PRINT "CHOICE...";
10650 VR = 0: GET VR$
10660 FOR I = 1 TO LEN (VD$(V,V
L(V) + 1))
10670 IF VR$ < > MID$(VD$(V,V
L(V) + 1),I,1) THEN 10690
10680 VR = I:I = 50
10690 NEXT I
10700 IF VR = 0 THEN 10650
10710 VC = 0: RETURN
11000 DATA 40,24,5,9
11010 DATA 7, MASTER MENU
11020 DATA - MAIL LIST, " "
11030 DATA "-- ACCTS RECEIVABLE
", " "
11040 DATA - GAMES, " "
11050 DATA - END THE PROGRAM
11060 DATA M A G X
11100 DATA 6, MAIL LIST MENU
11110 DATA ADD NEW NAME, DELETE
OLD NAME
11120 DATA EDIT NAME IN FILE, L
IST NAMES
11130 DATA PRINT LABELS, RETURN
TO MASTER MENU
11140 DATA ADELPH
11200 DATA 5, ACCTS. RECEIVABLE
```

```
MENU
11210 DATA ADD NEW CLIENT, DELE
TE OLD CLIENT
11220 DATA EDIT CLIENT INFORMAT
ION, RECORD TRANSACTION
11230 DATA GO BACK TO MASTER ME
NU
11240 DATA ADERG
11400 DATA 9, " I I G A M E S
I I "
11410 DATA DONKEY GONG, CHESS
11420 DATA STAR SHOOT, HAIRY DE
AL
11430 DATA SUB SINKER, PLANE PO
PPER
11440 DATA ADVENTURE, TARGET
11450 DATA RETURN TO MENU
11460 DATA "12345678X"
11500 DATA 7, " "
11510 DATA THIS ILLUSTRATES THA
T THE
11520 DATA MENU FORMATTER NEED
NOT BE
11530 DATA RESTRICTED TO MENUS.
11540 DATA MESSAGES CAN BE DISP
LAYED
11550 DATA USING THIS SUBROUTIN
E ALSO!
11560 DATA " ",PRESS SPACE BAR
TO CONTINUE...
11570 DATA " "
```

Lines 100 to 990 in the listing correspond to a sample illustration of various menu display techniques. The master menu ties into each of the other three menus; these in turn tie back to the master menu. In addition, selecting options other than "Return to Master Menu" produces a screen message display handled by the menu formatter just as though it, too, was a menu. You really should give this program a try, if only to see the variety of display features you can easily produce.

Throughout this subroutine, all variables (except I and J) begin with the letter V (for video). The variable V itself identifies which of the five menu/message display blocks are being dealt with at a particular time. By adopting this convention, it is easier to avoid duplicating variables from other parts of the program.

Study the data lines (11000 + ) and program lines (100 to 990) to see how the formatter accomplishes each of the demonstrated effects. It should be fairly easy to alter the lines between 100 and 990 to change a menu's appearance. After playing with the possibilities for a while, you may become convinced that lines 10000 to 10710 should become a part of every program you write!

### Conclusion

Adding variety to your menu displays and prompting messages may not improve your social life, but it certainly will improve the effectiveness of your programs. Consider this menu formatter as a starting point for creative ideas of your own to enhance the appeal of your software.

Next month I plan to reveal a little of my personal biography to complement January's issue on cottage industry. Custom Comp fits that description well, and proves that it is possible to make a living from a personal computer. The hours may be long, and many of the experiences along the way may prove frustrating, but controlling one's own destiny can be extremely rewarding. Would I recommend this kind of life to anyone? Join us next month! ■

same formulae (lines 10280 to 10390) the window subroutine uses to determine the placement of the window (or frame) boundaries. If we produce the frame in the same mode (normal, inverse or flash) as either the background or the window itself, it will not be distinguishable in the display.

You may have difficulty creating a frame when using an 80-column board. My 80-column board does not interpret the HTAB ## command properly if the value for ## exceeds 40. Consequently, we cannot use the subroutine as written for menus printed on an 80-column display. In the other subroutines, the values used for HTAB ## are less than 40, so no difficulty arises.

### Displaying the Menu

Now that we have filled the screen with the desired background, painted in a window, and (perhaps) framed it, at last we are ready to print the menu information into the window. Recall that if we define VC=1, the menu option lines will be centered on the appropriate row of the display, producing a ragged appearance. If VC is not otherwise defined, these lines will all be left justified, with the longest of the lines centered on the screen.

Subroutine 10500 handles the menu display. First, we call the subroutine at 10280 to be sure we have assigned the proper values to V1, V2, V3 and V4. The subroutine then dis-

plays (line 10520) and underlines (line 10540) the menu title. The menu option lines are displayed one at a time by using a FOR...NEXT loop (lines 10550 to 10600). The horizontal tab for each of these lines is set to V4 unless VC=1, in which case the subroutine executes line 10580, tabbing each line individually based on its specific length.

Line 10620 produces another underline row, and line 10640 prints the prompt CHOICE... beneath the menu. The subroutine obtains the operator's response as VR\$ (line 10650), and compares this variable, character by character, with VD\$(V,VL(V)+1), the sequence of allowed codes for that menu (read in initially from data statements). If it finds a match, it sets VR equal to the loop counter at that point, which also corresponds to the position in the code string at which a match occurred. If the subroutine finds no match, the subroutine cycles back to the CHOICE... prompt.

This convenient error trap is built right into the menu selection process.

On returning from this subroutine, the program may use the value of VR in an ON VR GOTO ###, ###, ###... command (see lines 150, 230, 330 and 440). In this way, the key selected by the operator during the menu display forces the program to jump to the appropriate part of the program that corresponds to the function described in the menu.

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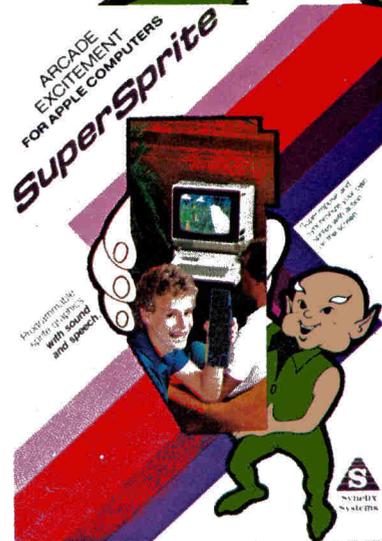
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# The Apple Clinic

by Earle Hancock

## A Man of Letters

This question has the distinction of being the first received by *in-Cider* for the "Apple Clinic" column. I had hoped for a question with an easy and definite answer. Cleanliness is, however, near to my heart (as readers of my July article will have noticed), so here we go...

### Ion or No Ion

I live and work in a 150-year-old brick house, and no amount of cleaning can keep things dust free for very long. My Apple is covered with plastic or cloth whenever it's not in use, but I still see a film accumulate on horizontal surfaces with dismayingly rapidity.

Air ionizers are widely advertised not only for their possible health benefits, but for removing particles from the atmosphere, and I have seen a lot of dirt collect on the walls close to one. Considering the expense and hassle of chewed up disks and drive repairs, it might well be worthwhile to spend the \$70 to \$100 generally asked for one of these gizmos.

On the other hand, something that dumps hundreds of millions of ions into the air every minute just might lead to a static discharge situation, causing even worse disk damage. Have you had experience with this particular high-tech dilemma? Thanks for your time and attention.

Pierce Butler  
Natchez, MS

Dirt and dust do cause damage to disk drives and disks. In addition, a layer of dust on electrical compo-

nents insulates the parts, helping to elevate temperatures. The expansion and contraction of components due to temperature changes is one of the major causes of integrated circuit failure.

Avoiding dust and dirt is a twofold job. The first task is to cover or otherwise protect the equipment. In my work area I use a large lint-free towel to cover the computer, monitor,

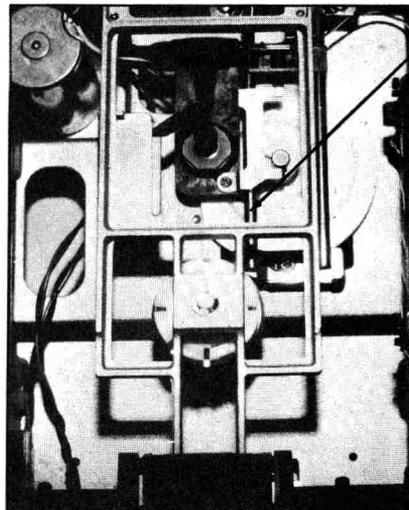


Photo. Bird's-eye view of disk drive with arrow pointing to glides.

drives and printer. The towel does not become statically charged like plastic and it can be washed occasionally.

All my disks are stored in covered boxes of one design or another. Flip n' File, Minikas-Ette/10 Library Case and Stor-Ware are examples of commercially available products for storage and safekeeping of disks. Many people use the box the blanks are sold in.

The second task is to eliminate as much dirt and dust from the sur-

rounding area as possible—which brings us to the subject of ionizers.

Research I have seen suggests that negative ions in the air are drastically depleted in the area near a CRT. Other research suggests that low ion levels can have ill effects on humans. Ion generators may, however, produce ozone (a poisonous gas) and a by-product of ion production. No evidence I could find supports the idea of extra static electricity being caused by ion generators. With a mixed review like this—and since I'm not a physician—I could not recommend the use of ionizers.

Some relief for the problem of airborne dust and dirt may be found by using a room air filter. In any case, an anti-static floor pad for your work station is probably a good idea. The pad will help bleed off any static charge that comes in contact with it, preventing static build-up.

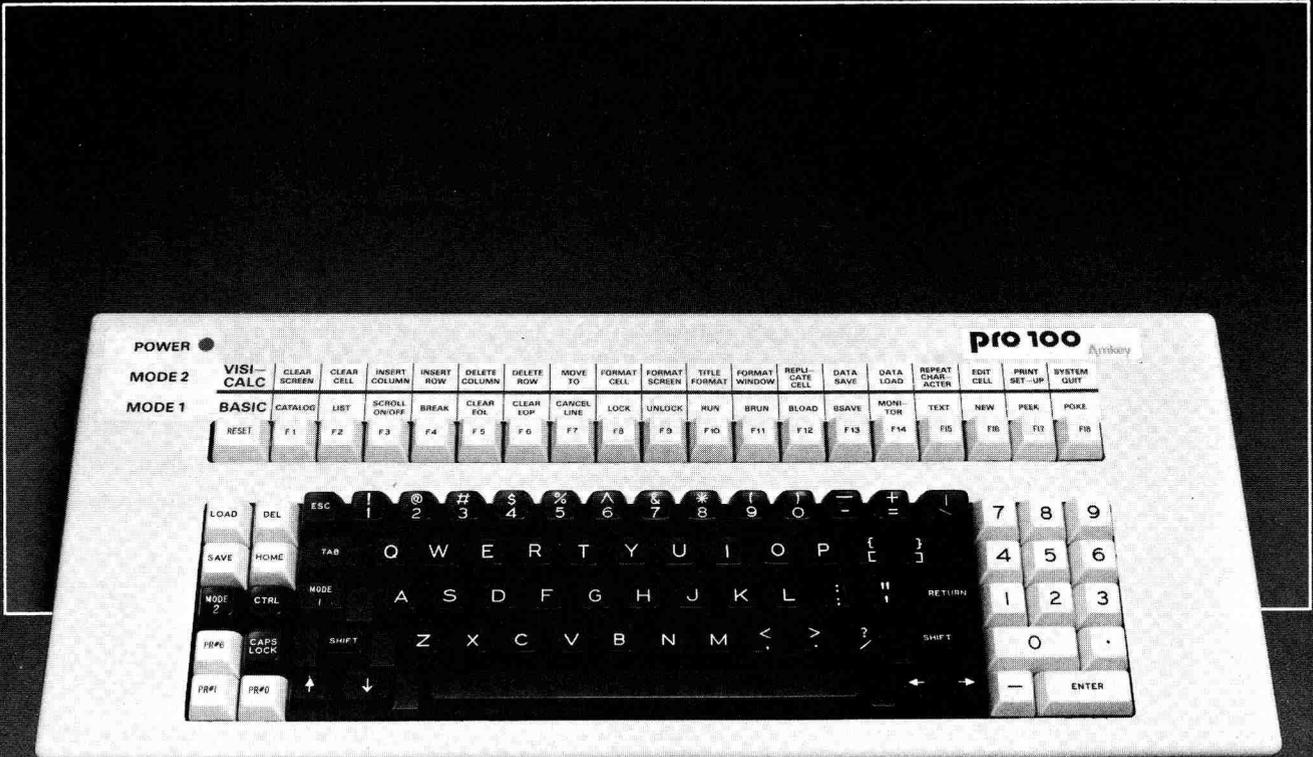
Thank you for your letter, Pierce. I hope the answer helps.

I purchased an Apple II Plus several months ago and now find myself with a problem. I am currently on orders for assignment to Germany in February. My problem is the 220 volts, 50 hertz that is used in Europe. I had read that there was a way to convert the Apple to 120/220v, 50/60hz but inquiries to dealers and a

---

*Earle Hancock has directed the microcomputer project at Minuteman Regional Vocational School, Lexington, MA, for three years. He has served as an advisor to the Massachusetts Association of Vocational Administrators, and is an active member of the Boston Computer Society and other computer organizations. Address correspondence to him at 6 Birch Road, Wenham, MA 01984.*

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letter to Apple (unanswered) haven't helped me.

Having been to Europe before, I know that prolonged use of equipment on the transformers available will ruin the equipment. My question is, is there a suitable method or are my fears unjustified for the transition?

Daniel J. Martin  
Columbus, GA

A power supply consists of a transformer, a rectifier, a filter, a DC regulator and a voltage reference source. The transformer takes the AC line voltage (115 volts for American equipment) and transforms it into the required voltage for the supply output. This secondary voltage is rectified to produce a DC voltage. The rectified voltage must be conditioned, or filtered, to get a smooth

DC output, which is sent to the computer for use by the various parts. The Apple power supply is a "switching" type and requires a smaller transformer, but the idea is similar.

Power supplies can be designed to accept 115v, 220v or both, as well as other input voltages of no concern to us here. Apples made for the US market are designed to accept 115v (older models were adaptable for 115v or 220v), and will not work properly on European current (220 volts, 50 hertz). Further, attempting to use that current *will damage the power supply and the computer beyond repair*. US market monitors also will not function using 220v, 50hz.

Current converters claim to provide the proper voltages and hertz, but I have heard bad reports about their use. A call to Apple International in California confirmed my findings. In fact, they have had at

least one Apple self-destruct recently while plugged into a power converter. My recommendation is not to use them.

Perhaps you could take your Apple and monitor with you and place an ad in the post newspaper offering to exchange your US Apple for a Eur-Apple owned by someone scheduled to come to the US. Remember that

**"Once in a while a company's instructions should be ignored."**

you will need a monitor and an Apple matched to the type of current you will be using.

In addition to our first few questions from the mail bag, several other problems have come to my attention this month.

**Sticky Slide**

Once in a while a company's instructions should be ignored. In virtually every Apple or other repair manual are warnings against using lubricants inside the disk drive. Naturally, you wouldn't want to douse the read/write head with your favorite spray squeak remover. Sometimes, however, judicious use of lubricants is the correct solution to a problem.

At least twice in the last four months I have worked on disk drives that were not working solely because the read/write head mechanism could not move freely on the glides that support it (see photo, with arrow pointing to glides). Careful application (use a lint-free sponge-tipped applicator) of a silicon-based lubricant to the glides will allow the mechanism to slide easily.

Diagnosing this problem can be tricky. The drive may appear to be working correctly, but may fail at any point during boot or other operations requiring read/write head movement. If you remove the drive

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cover and observe the read/write head mechanism during operation, you will see the ball bearing connected to the read/write head tray jump out of its track (an eccentric circle carved into the plastic disk under the read/write tray). That plastic disk is attached to the stepper motor and is the device that positions the head.

As with all things technical, Mur-

**"The law that seems most appropriate is: 'All things are possible except skiing through a revolving door.'"**

phy's Laws on Technology apply here also. The law that seems most appropriate is: "All things are possible except skiing through a revolving door."

#### Institutional Repair

Several businesses and schools have asked for help in keeping their equipment in good working order. The key to improved maintenance and lower repair costs is to have an "in-house" repair person who regularly deals with repair problems. This person does not have to be a technician, but should be interested in technical things, know how (or be willing to learn how) to operate a multimeter and be able to do some light soldering and chip swapping. Anyone who occasionally builds electronic kits qualifies nicely. If such a person does not exist in your organization, find someone willing to coordinate repairs done by outside repair contractors.

The "in-house" repair person (IHRP) should act as an intermediary between employees of the company and repair persons from the outside. The IHRP quickly will learn to solve the easier problems. Further, the IHRP quickly will identify those machines requiring more attention, and probably will offer solutions either to the operators who may need refresher training, or the outside service person who may be unaware of special

conditions existing within.

The sole person responsible for repair and maintenance will likely consider that the equipment belongs to him/her. I know of no better way to ensure well maintained equipment.

#### The Apple 500

Advertisements for peripherals all read similarly: "Just plug it in and the rest is child's play." Recently, I plugged in a peripheral card for a remote controlled robot. Everything was installed properly but the robot refused to work. After some fumbling around I decided to remove the other peripheral cards. With the power off, I removed the RAM card, modem, and printer cards. Then the robot worked, maneuvering about the room and delighting an audience of computer campers gathered about.

Why would the robot fail to oper-

ate with other peripherals installed? Examination of the software driver gave no clue, but the circuit diagram did. The radio control hardware requires 270 ma (milliamp) of current. The Apple power supply is rated at 500 ma for all slots, so the robot's card was using more than half the available 5-volt supply—leaving 200 to 300 ma for the other peripheral cards to share.

When a power supply is asked to deliver more than its rating, the voltage output will drop below usable levels. In a sense, the Apple was experiencing an internal brownout.

Do you have a problem with your Apple? Share it with me. I may be able to save you time and money. Send a self-addressed, stamped envelope to Earle Hancock, 6 Birch Road, Wenham, MA 01984.

I look forward to hearing from you. ■

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## Where Is It?

by Paul M. Danzer

When I first got my Apple II Plus it came with four small books that covered the computer, disk drives and monitor. Shortly thereafter I added a Z-80 processor in the form of the SoftCard Premium Pac and the number of books grew to seven. Two months after that the masochism inherent in us all apparently drove me to get involved with Z-80 assembly language and the number of books then totalled 12.

As if this were not bad enough, I found I could intermix Z-80 assembly language and 6502 assembly language, but the penalty was three

more books. The challenge now was not working on the keyboard or writing software, but finding something—anything—in the books.

Particularly frustrating were the used and usable locations in memory. Scattered through the pages were Apple memory maps, CP/M memory maps, IOBYTES, cryptically forbidden locations noted as "occasional scratch-pad use," and similar notes and warnings.

Since the primary problem was now one of library research rather than computer work, I compiled a table of all known addresses while

operating under CP/M, version 2.23—the popular "60K version." I resolved my occasional conflicts of information (of course, all of these books don't agree) by using the utility DDT and examining either a memory dump or listing.

In one case the table may confuse you. All the references show the start of FBASE as CC00 but my machine jumps to CB00. Sorry, you can't expect me to resolve all of the problems.

I hope my table helps other would-be assembly language programmers. Anyway, at least now I can get back to writing software. ■

### A Compendium of CP/M Locations

or:

I shot a vector in the air  
It landed in memory—  
I now know where.

MAJOR AREA	ADDRESS (hex)	USE/NOTES
System Parameters	0000	Boot
	0001	BIOS ENTRY (LOW BYTE)
	0002	BIOS ENTRY (HIGH BYTE)
	0003	IOBYTE (pg. 163, CP/M manual)
	0004	Currently logged disk drive
	0005	BDOS (entry to FDOS, holds jump to FBASE)
	0006	Holds value of FBASE (LOW BYTE)
	0007	CB00 for CP/M 60 (HIGH BYTE)
	0008-005B	Interrupt, scratch, and reserved areas
	005C-007C	Default file control block
	007D-007F	Default random record position
	0080-00FF	Default location for disk I/O =

Table continued.

### References

1. *Microsoft SoftCard System (for Apple II)—Installation and Operation Manual* (Version 2.23). This is the book referred to in the table as "CP/M 60 manual."
2. As above for Version 2.0.
3. *Osborne CP/M User Guide* by Thom Hogan (Osborne/McGraw-Hill, Microsoft/SoftCard Edition).
4. *8080/8085 Assembly Language Programming* (Intel Corp. manual number 9800940).
5. *CP/M Assembly Language Programming* by Ken Barbier (Prentice-Hall).
6. *Using CP/M* by Fernandez and Ashley (Wiley and Sons).
7. *8080/8085 Assembly Language Programming* by Fernandez and Ashley (Wiley and Sons).
8. *8080/Z80 Assembly Language* by Alan Miller (Wiley and Sons).

Write to Paul M. Danzer, 2 Dawn Road, Norwalk, CT 06851.

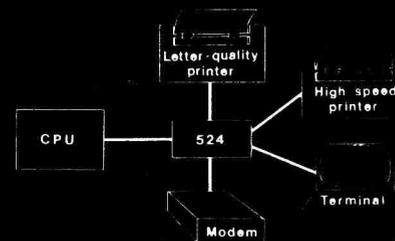
Table continued.

MAJOR AREA	ADDRESS (hex)	USE/NOTES
		initial default DMA address, page 107,8 of CP/M 60 manual
Start of TPA	0100	TBASE
End of TPA	C3FF	
Start of CCP	C400	CBASE
End of CCP	CAFF	
Start of FDOS = BDOS + BIOS		
BDOS	CB00	FBASE
BIOS	DA00	
	DFFA-DFFF	6502 vectors
	E000-EFFF	Apple memory map I/O. Note call 6502 by reference to address E400
Start 6502 stack/zero page	F000	
	F045	6502 A register pass area
	F046	6502 Y register pass area
	F047	6502 X register pass area
	F048	6502 P (status) register pass area
	F048	6502 stack pointer function
End 6502 stack/zero page	F1FF	
Start I/O config block	F200	
	F200-F27F	User patch area slot 1 (printer inter- face—see page 161,2 of CP/M 60 manual)
	F280-F2FF	User patch area slot 2
	F300-F37F	User patch area slot 3 (80-column card)
	F380-F395	I/O vector table
	F396-F3A0	Software screen function table— see page 155 of CP/M 60 manual
	F3A1-F3AB	Hardware screen function table— also page 155
	F3AC-F3B7	Keyboard definition table
	F3B8	Number of disk controllers
	F3B9-F3BF	Card type table (see page 173 of CP/M 60 manual)
	F3C0-F3DA	6502 and Z80 mode switching and vec- tors, such as F3D0 which holds ad- dresses of 6502 subroutines to be called.
	F3DE-F3DF	Z80 address of softcard (LOW BYTE- HIGH BYTE)
	F3E0-F3FF	6502 reset and other vectors
End I/O config block	F3FF	
	F400-F7FF	Apple screen memory
	FA03	BIOS entry
	FA06	Console status (test CON:)
	FA09	Console input (CON: input one character)
	FA0C	Console output (CON: output one character)
	FA0F	LST: output
	FA12	PUN: output
	FA15	RDR: output

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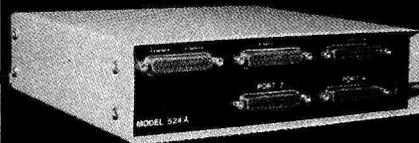
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# Great Hexexpectations

by John Szasz

Most people shy away from binary notation, but in fact it can be easy to learn, especially if you already know hex. The binary digits are 0 and 1 representing the quantities zero and one. If you want to represent a greater quantity, then you must use more digits. This same pattern is found in hex, where if you want a number greater than F then you start using more digits and, of course, in decimal where the cutoff point is nine.

In binary the quantity two is represented by 10. Three is 11, because  $01 + 10 = 11$ . Do you see how this works? See Figure 1, the BINEX Chart, for hex and binary representations of the quantities zero through fifteen.

BINEX (see the Listing) is a program that tests how well you know your hex to binary conversions. You are given a hex or binary number, and then must provide the equivalent. You may peek at the BINEX

Chart for help by pressing P.

After 20 (decimal) questions, the number you got correct is presented in a display that also includes the conversions you missed and how many times you peeked at the chart. See Figure 2 for a sample display.

The menu for BINEX (Figure 3) is

*John Szasz resides at 55 (or 37 or 110111) West Stone Ave., Fairfield, LA 52556. You can write to him there.*

```

10 REM
SET UP BINEX

20 GOSUB 80:NL = 1: DIM B$(15),
HE$(15),WR$(20),AN$(20): FOR
X = 0 TO 15: READ B$(X): NEXT
: FOR X = 0 TO 15: READ HE$(
X): NEXT : GOTO 130
30 REM

SOME SUBROUTINES

40 UTAB 24: PRINT " <<< PRESS
A KEY TO CONTINUE >>>": POKE
49168,0: GET E$: RETURN
50 IF P$ = "H" THEN Q$ = Q$ + HE
$(Z):A$ = A$ + B$(Z): RETURN

60 Q$ = Q$ + B$(Z):A$ = A$ + HE$
(Z): RETURN
70 REM

BINEX INSTRUCTIONS

80 HOME : HTAB 11: PRINT "BINEX
INSTRUCTIONS": PRINT : PRINT
"BINEX TESTS YOUR KNOWLEDGE
OF BINARY TO": PRINT "HEXADE
CIMAL AND HEXADECIMAL TO BIN
ARY": PRINT "CONVERSIONS."
90 PRINT : PRINT "THE TRICK IN M
ASTERING BINEX IS TO LEARN":
: PRINT "THE FIRST 16 BINARY
NUMBERS AND THEIR": PRINT "
HEXADECIMAL EQUIVALENTS, ALL
OTHER ": PRINT "NUMBERS ARE
JUST MORE NIBBLES ADDED ON."
100 PRINT : PRINT "YOU CAN SET T
HE NUMBER OF NIBBLES TO A": PRINT
"MAXIMUM OF 4. YOU MAY ALSO
PEEK AT THE": PRINT "BINEX C
HART DURING TESTING BY ENTER
ING": PRINT "P/ INSTEAD OF
THE ANSWER YOU DON'T KNOW"
110 PRINT : PRINT : HTAB 17: PRINT
"ENJOY!": GOSUB 40: RETURN
120 REM

BINEX MENU

130 HOME : PRINT "COPYRIGHT (C)
1983 JOHN SZASZ ": PRINT : PRINT
"BINEX": PRINT : PRINT : PRINT
"SET AT ": INVERSE : PRINT
NL: NORMAL : PRINT " NIBBLE
S": PRINT
140 PRINT "(H) HEXADECIMAL -> BI
NARY ": PRINT "(B) BINARY ->
HEXADECIMAL": PRINT "(S) SE
T NUMBER OF NIBBLES": PRINT
"(P) PEEK AT BINEX CHART": PRINT
"(I) INSTRUCTIONS": PRINT "(
Q) QUIT": PRINT : PRINT : PRINT
"CHOOSE ONE !": GET P$
150 IF P$ = "H" OR P$ = "B" THEN
220
160 IF P$ = "S" THEN 290
170 IF P$ = "P" THEN GOSUB 320
180 IF P$ = "Q" THEN HOME : PRINT
"BYE": END
190 IF P$ = "I" THEN GOSUB 80
200 GOTO 130
210 REM

THE TEST

220 HOME :C = 0:P = 0:W = 0: FOR
X = 1 TO 20:Q$ = C$:A$ = C$:
FOR Y = 1 TO NL:Z = INT ( RND
(1) * 16): GOSUB 50: NEXT : PRINT
Q$: HTAB 17: INPUT "=";B$: IF
B$ = "P" THEN GOSUB 320:"HOME
: PRINT Q$: HTAB 17: INPUT
="";B$:P = P + 1
230 IF A$ = B$ THEN UTAB PEEK
(37): HTAB 35: PRINT "RIGHT"
: PRINT :C = C + 1: NEXT : GOTO
250
240 UTAB PEEK (37): HTAB 35: INVERSE
: PRINT "WRONG": NORMAL : PRIN
:W = W + 1:WR$(W) = Q$:AN$(W
) = A$: NEXT X
250 PRINT : PRINT C: " CORRECT OU
T OF 20": FOR X = 1 TO 1000:
NEXT : PRINT : IF C < 20 THEN
PRINT "THESE ARE THE ONES Y
OU MISSED!": PRINT : FOR X =
1 TO W: PRINT WR$(X): HTAB
17: PRINT " = ": PRINT AN$(X
): NEXT
260 PRINT : IF P < > 0 THEN PRINT
"YOU PEEKED AT THE CHART ":P
" TIMES": PRINT
270 GOSUB 40: GOTO 130
280 REM

SET NUMBER OF NIBBLES

290 HOME : PRINT "SET NUMBER OF
NIBBLES": PRINT : PRINT "PRE
SS A NUMBER BETWEEN 1 AND 4
": GET P$: IF VAL (P$) < 1
OR VAL (P$) > 4 THEN 290
300 NL = VAL (P$): GOTO 130
310 REM

PEEK AT BINEX CHART
320 HOME : HTAB 15: PRINT "BINEX
CHART": PRINT : PRINT : FOR
A = 0 TO 15: HTAB 9: PRINT H
E$(A): HTAB 31: PRINT B$(A
): NEXT : GOSUB 40: RETURN
330 REM

CONVERSION TABLES

340 DATA "0000","0001","0010","
0011","0100","0101","0110","
0111","1000","1001","1010","
1011","1100","1101","1110","
1111"
350 DATA "0","1","2","3","4","5
","6","7","8","9","A","B","C
","D","E","F"

```

Program listing, BINEX.

straightforward. Pressing H or B starts the testing, S prompts you to set the number of hex digits to work with. P for peeking at the chart appears here, as well as the option to look at the instructions with I, or to quit by pressing Q.

When you get bored with only one hex digit, set the number of nibbles to the maximum of four (16 bits). This is where you really have to know your

**"After 20 (decimal) questions, the number you got correct is presented."**

stuff. Just remember that if you treat the nibbles separately you shouldn't have much trouble. ■

BINEX

SET AT 2 NIBBLES

- (H) HEXADECIMAL -> BINARY
- (B) BINARY -> HEXADECIMAL
- (S) SET NUMBER OF NIBBLES
- (P) PEEK AT BINEX CHART
- (I) INSTRUCTIONS
- (Q) QUIT

CHOOSE ONE :

Figure 3. The menu.

BINEX CHART

0	0000
1	0001
2	0010
3	0011
4	0100
5	0101
6	0110
7	0111
8	1000
9	1001
A	1010
B	1011
C	1100
D	1101
E	1110
F	1111

<<< PRESS A KEY TO CONTINUE >>>

Figure 1. The BINEX Chart.

DD	= 11011101	RIGHT
B9	= 10111001	RIGHT
B5	= 10110101	RIGHT
71	= 01110001	RIGHT
1B	= 00011101	WRONG
A9	= 10101001	RIGHT

17 CORRECT OUT OF 20

THESE ARE THE ONES YOU MISSED!

42	= 01000010
C9	= 11001001
1B	= 00011011

YOU PEEKED AT THE CHART 2 TIMES

<<< PRESS A KEY TO CONTINUE >>>

Figure 2. A test results display.

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# DOS Problem Solved

by Mort Butler

**M**y APPLE III and I do not seem to get along very well. In emulation mode, I was writing an Apple II program, including a menu; at the end of each of the choices, that subprogram was supposed to run and then automatically return to the menu. At the end of each subprogram, I added a line such as: 900 PRINT D\$; "RUN MENU" (D\$ = control-D). This only ended the subprogram without going back to the menu on my disk.

After reading the DOS manual in detail for hours, I finally tripped over

the fact the DOS must see a carriage return *prior* to asking it to do some-

**"This only ended the subprogram without going back to the menu on my disk."**

thing. The carriage return is ASCII character #13. Therefore I used a

CHR\$(13) + CHR\$(4) and DOS recognized the request and returned to the disk menu. It seems that when you are asking DOS to do something in the first program run or the HELLO boot program, it will do it—but if you ask DOS to find another program and run it then ask it to do something else, it will not do it without first seeing a carriage return. ■

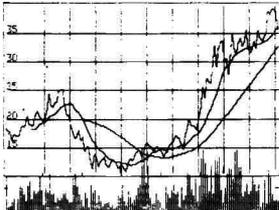
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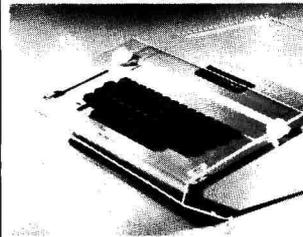
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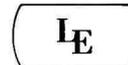
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by Chester H. Page

Sequential text files are very convenient for storing information, but there is often a need (or at least a desire) to keep such information confidential. The obvious way to protect it is to encipher the text, converting each character with an EOR operation with a "code byte." Since EOR (exclusive or) is reversible, subjecting the encoded material to the same operation will decode it.

Not all bytes are suitable for EOR encoding. We must avoid 00, the end of record and cannot use a hi-bit re-

moval because it would be restored on printing back to the disk. It is de-

---

**"We must avoid 00, the end of record and cannot use a hi-bit removal."**

---

sirable to use ordinary capital letters for entering code bytes, because they can be entered from the keyboard on

demand. All these conditions can be met by accepting any typed character and then forcing its hex representation into the form \$7X by operating on it with AND #\$0F followed by ORA #\$70.

The program in the listing loads a text file from a disk, requests the code key, enciphers the text, and requests the name under which the encoded

---

*Address correspondence to Chester H. Page, 15400 Layhill Road, Silver Spring, MD 20906.*

Circle 302 on Reader Service card.

## LOCK-IT-UP

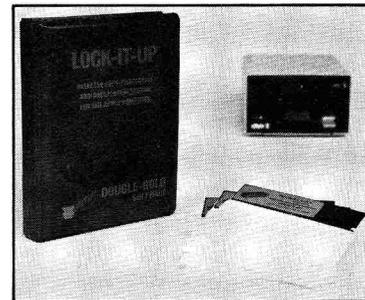
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:ASM

*Program Listing, Encoder.*

```

1000 *****
1010 * ENCODER *
1020 * CHET PAGE, MARCH 1983 *
1030 *****
1040 .OR $800
1050 * .TF ENCODER
1060 COUT .EQ $FDED
1070 RDKEY .EQ $FD0C
1080 GETLN .EQ $FD6F
1090 CROUT .EQ $FD8E
1100 BUFF .EQ $200
1110 CURLIN .EQ $75
1120 LANG .EQ $AAB6
1130 YSAV .EQ $06
1140 STORE .EQ $0A
1150 PRT .EQ $04
1160 PROMPT .EQ $33
1170 REENTRY .EQ $3D0
1180 ERRHNDL .EQ $9D5A
1190 ERRFLAG .EQ $D8
1200 RUNMODE .EQ $D9
FC22- 1210 VTAB .EQ $FC22
0024- 1220 CH .EQ $24
0025- 1230 CV .EQ $25
FC58- 1240 HOME .EQ $FC58
0800- A9 40 1250 ENTRY LDA #A0
0802- 8D B6 AA 1260 STA LANG LANG = FP
0805- 85 76 1270 STA CURLIN+1 RUNNING PROGRAM
0807- A9 06 1280 LDA #06
0809- 85 33 1290 STA PROMPT NOT DIRECT MODE
080B- A9 80 1300 LDA #80
080D- 85 D9 1310 STA RUNMODE INSURANCE
080F- 85 D8 1320 STA ERRFLAG SET ERROR FLAG
0811- A9 B4 1330 LDA #C0SEF CLOSE FILE ON END OF DATA
0813- 8D 5A 9D 1340 STA ERRHNDL
0816- A9 08 1350 LDA /C0SEF
0818- 8D 5E 9D 1360 STA ERRHNDL+1
081B- A9 00 1370 LDA #0 INIT TEXT POINTER
081D- 85 0A 1380 STA STORE
081F- A9 95 1390 LDA #95
0821- 85 0B 1400 STA STORE+1
0823- A2 E3 1410 LDX #MON SET UP MON I,0
0825- A0 07 1420 LDY /MON
0827- 28 36 09 1430 JSR PRINT
082A- 20 58 FC 1440 JSR HOME
082D- 20 51 08 1450 JSR ASK REQUEST INPUT FILE NAME
0830- 20 79 08 1460 JSR OPENF
0833- 20 84 08 1470 JSR READF
0836- 4C 9A 08 1480 JMP LOAD
0839- 20 EE 08 1490 CDSK JSR CODASK
083C- 20 0E 09 1500 JSR ENCODE
083F- 20 58 FC 1510 JSR HOME
0842- 20 51 08 1520 JSR ASK REQUEST OUTPUT FILE NAME
0845- 20 79 08 1530 JSR OPENF
0848- 20 8F 08 1540 JSR WRITEF
084B- 20 CB 08 1550 JSR SAVE
084E- 4C D0 03 1560 JMP REENTRY
0851- A9 0A 1570 ASK LDA #0A REQUEST FILE NAME
0853- 85 25 1580 STA CV
0855- A9 0C 1590 LDA #0C
0857- 85 24 1600 STA CH
0859- 20 22 FC 1610 JSR VTAB
085C- A2 72 1620 LDX #MENU
085E- A0 07 1630 LDY /MENU
0860- 20 36 09 1640 JSR PRINT
0863- 20 6F FD 1650 JSR GETLN GET NAME
0866- E8 1660 INX
0867- A9 00 1670 LDA #0
0869- 9D EC 09 1680 STA NAME,X END MARK
086C- CA 1690 DEX
086D- BD 00 02 1700 .1 LDA BUFF,X
0870- 9D EC 09 1710 STA NAME,X
0873- CA 1720 DEX
0874- E0 FF 1730 CPX #FF
0876- D0 F5 1740 BNE .1
0878- 60 1750 RTS
0879- A2 51 1760 OPENF LDX #OPEN
087B- A0 09 1770 LDY /OPEN
087D- 20 36 09 1780 JSR PRINT
0880- 20 49 09 1790 JSR PR.NM
    
```

*Listing continued.*

material is to be filed. The code key is any sequence of characters that can be remembered at decoding time—for example, the operator's name.

The built-in MON I/O allows the user to check the input text and to observe the output. The encoded file

sometimes seems short (on the screen) because many characters are converted to nonprinting control characters.

The program is run by Brunning ENCODER, or by calling 2048 with ENCODER loaded. ■

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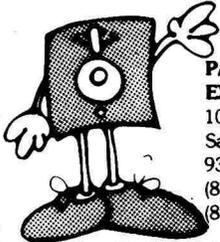


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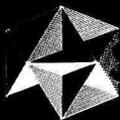
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Listing continued.

```

0883- 60          1800          RTS
0884- A2 59      1810 READF  LDX #READ
0886- A0 09      1820          LDY /READ
0888- 20 36 09  1830          JSR PRINT
088B- 20 49 09  1840          JSR PR.NM
088E- 60          1850          RTS
088F- A2 61      1860 WRITEF LDX #WRITE
0891- A0 09      1870          LDY /WRITE
0893- 20 36 09  1880          JSR PRINT
0896- 20 49 09  1890          JSR PR.NM
0899- 60          1900          RTS
089A- A0 00      1910 LOAD   LDY #00      LOAD ORIGINAL TEXT
089C- 88          1920 .1      DEY
089D- 84 06      1930          STY YSAV
089F- 20 0C FD  1940          JSR RDKEY
08A2- 09 80      1950          ORA #80
08A4- A4 06      1960          LDY YSAV
08A6- 91 0A      1970          STA (STORE),Y
08A8- 20 ED FD  1980          JSR COUT
08AB- A4 06      1990          LDY YSAV
08AD- D0 ED      2000          BNE .1
08AF- C6 0B      2010          DEC STORE+1
08B1- 4C 9C 08  2020          JMP .1
08B4- A4 06      2030 CLOSEF LDY YSAV      END-OF-DATA FILE CLOSER
08B6- A9 00      2040          LDA #00
08B8- 91 0A      2050          STA (STORE),Y
08BA- A2 69      2060          LDX #CLOSE
08BC- A0 09      2070          LDY /CLOSE
08BE- 20 36 09  2080          JSR PRINT
08C1- 20 49 09  2090          JSR PR.NM
08C4- A9 95      2100          LDA #95      RESTORE TEXT POINTER
08C6- 85 0B      2110          STA STORE+1
08C8- 4C 39 08  2120          JMP CDSK
08CB- A0 00      2130 SAVE   LDY #00      SAVE ENCODED TEXT
08CD- 88          2140 .1      DEY
08CE- 84 06      2150          STY YSAV
08D0- B1 0A      2160          LDA (STORE),Y
08D2- F0 0C      2170          BEQ DONE
08D4- 20 ED FD  2180          JSR COUT
08D7- A4 06      2190          LDY YSAV
08D9- D0 F2      2200          BNE .1
08DB- C6 0B      2210          DEC STORE+1
08DD- 4C CD 08  2220          JMP .1
08DD- 4C CD 08  2230 *NEW FILE CLOSER NEEDED BECAUSE CLOSEF JUMPS TO CO

DASK
08E0- 20 ED FD  2240 DONE   JSR COUT      END-OF-TEXT MARKER
08E3- A2 69      2250          LDX #CLOSE
08E5- A0 09      2260          LDY /CLOSE
08E7- 20 36 09  2270          JSR PRINT
08EA- 20 49 09  2280          JSR PR.NM
08ED- 60          2290          RTS
08EE- A2 84      2300 CODASK LDX #C.ASK      REQUEST CODE KEY
08F0- A0 09      2310          LDY /C.ASK
08F2- 20 36 09  2320          JSR PRINT
08F5- 20 6F FD  2330          JSR GETLN
08F8- A9 00      2340          LDA #00      REPLACE <CR> WITH 00
08FA- 9D EC 09  2350          STA CODE,X
08FD- CA          2360          DEX
08FE- BD 00 02  2370 .1      LDA BUFF,X
0901- 29 0F      2380          AND #80F      FORCE CODE TO FORM $7X
0903- 09 70      2390          ORA #870
0905- 9D EC 09  2400          STA CODE,X
0908- CA          2410          DEX
0909- E0 FF      2420          CFX #8FF
090B- D0 F1      2430          BNE .1
090D- 60          2440          RTS
090E- A0 00      2450 ENCODE LDY #0      ENCIPHER TEXT WITH CHANGING SU

BSTITUTIONS
0910- A2 00      2460          LDX #00
0912- 88          2470 .1      DEY
0913- F0 17      2480          BEQ .4
0915- BD EC 09  2490 .2      LDA CODE,X
0918- D0 05      2500          BNE .3
091A- A2 00      2510          LDX #0
091C- 4C 15 09  2520          JMP .2
091F- B1 0A      2530 .3      LDA (STORE),Y
0921- F0 0E      2540          BEQ .5
0923- 5D EC 09  2550          EOR CODE,X
0926- 91 0A      2560          STA (STORE),Y
0928- E8          2570          INX
0929- 4C 12 09  2580          JMP .1
092C- C6 0B      2590 .4      DEC STORE+1
092E- 4C 12 09  2600          JMP .1
0931- A9 95      2610 .5      LDA #95      RESTORE TEXT POINTER
0933- 85 0B      2620          STA STORE+1
0935- 60          2630          RTS
0936- 86 04      2640          PRINT STX PRT
0938- 84 05      2650          STY PRT+1
093A- A0 00      2660          LDY #0
093C- B1 04      2670 .1      LDA (PRT),Y
093E- F0 08      2680          BEQ .2
0940- 09 80      2690          ORA #80
    
```

Listing continued.

# Hints 'n' Techniques

Circle 397 on Reader Service card.

Listing continued.

0942-	20	ED	FD	2700	JSR	COUT	
0945-	C8			2710	INY		
0946-	10	F4		2720	BPL	.1	
0948-	60			2730	RTS	.2	
0949-	A2	EC		2740	LDX	#NAME	PR.NM
094B-	A0	09		2750	LDY	/NAME	
094D-	20	36	09	2760	JSR	PRINT	
0950-	60			2770	RTS		
0951-	80	84		2780	OPEN	.HS	8D84
0953-	4F	50	45				
0956-	4E	20		2790	.AS/OPEN	/	
0958-	00			2800	BRK		
0959-	80	84		2810	READ	.HS	8D84
095B-	52	45	41				
095E-	44	20		2820	.AS/READ	/	
0960-	00			2830	BRK		
0961-	80	84		2840	WRITE	.HS	8D84
0963-	57	52	49				
0966-	54	45		2850	.AS/WRITE	/	
0968-	00			2860	BRK		
0969-	80	84		2870	CLOSE	.HS	8D84
096B-	43	4C	4F				
096E-	53	45	20	2880	.AS/CLOSE	/	
0971-	00			2890	BRK		
0972-	45	4E	54				
0975-	45	52	20				
0978-	46	49	4C				
097B-	45	20	4E				
097E-	41	40	45	2900	MENU	.AS/ENTER	FILE NAME/
0981-	80	80		2910		.HS	8D8D
0983-	00			2920	BRK		
0984-	80	80		2930	C.ASK	.HS	8D8D
0986-	41	4E	59				
0989-	20	53	45				
098C-	51	55	45				
098F-	4E	43	45				
0992-	20	4F	46				
0995-	20	4C	45				
0998-	54	54	45				
099B-	52	53	20				
099E-	41	4E	44				
09A1-	20	53	50				
09A4-	41	43	45				
09A7-	53	20	43				
09AA-	41	4E	20				
09AD-	42	45	20				
09B0-	55	53	45				
09B3-	44	20	41				
09B6-	53	20	43				
09B9-	4F	44	45				
09BC-	20	48	45				
09BF-	59			2940	.AS/ANY SEQUENCE	OF LETTERS AND SPACES CAN	
					BE USED AS CODE KEY/		
09C0-	8D			2950	.HS	8D	
09C1-	45	4E	54				
09C4-	45	52	20				
09C7-	59	4F	55				
09CA-	52	20	48				
09CD-	45	59	20				
09D0-	41	4E	44				
09D3-	20	50	52				
09D6-	45	53	53				
09D9-	20	52	45				
09DC-	54	55	52				
09DF-	4E			2960	.AS/ENTER YOUR KEY	AND PRESS RETURN/	
09E0-	8D	8D		2970	.HS	8D8D	
09E2-	00			2980	BRK		
09E3-	84	CD	CF				
09E6-	CE	C9	AC				
09E9-	CF	8D	00	2990	MON	.HS	84CDCFC9ACCF8D00
09EC-				3000	NAME	.EQ	X
09EC-				3010	CODE	.EQ	X

**SYMBOL TABLE**

0051-	ASK
.01=086D	
0200-	BUFF
0984-	C.ASK
0839-	CDSK
0024-	CH
0969-	CLOSE
0884-	CLOSEF
08EE-	CODASK
.01=08FE	
09EC-	CODE
FD0D-	COUT
FD8E-	CROUT
0075-	CURLIN
0025-	CV
08E0-	DONE
090E-	ENCODE
.01=0912, .02=0915, .03=091F, .04=092C	

.05=0931	0959-	READ	
0800-	ENTRY	0884-	READF
00D8-	ERRFLAG	03D0-	REENTRY
9D5A-	ERRHNDL	00D9-	RUNMODE
FD6F-	GETLN	08CB-	SAVE
FC58-	HOME	.01=08CD	
AAB6-	LANG	000A-	STORE
089A-	LOAD	FC22-	UTAB
.01=089C		0961-	WRITE
0972-	MENU	088F-	WRITEF
09E3-	MON	0006-	YSAV
09EC-	NAME		
0951-	OPEN		
0879-	OPENF		
0949-	PR.NM		
0936-	PRINT		
.01=093C, .02=0948			
0033-	PROMPT		
0004-	PRT		
FD0C-	RDKEY		

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# Fudge It!

by Don Fudge

## The Transformation of Apple Graphics and Sound

As you may have noticed, I'm letting this column serve two purposes: to inform you about Apple graphics and sounds as they now exist and to apprise you of their evolution. In this month's column, we'll take a thorough look at the present and future of Apple graphics and sounds. I intend to keep you informed of the ongoing revolution in Apple graphics and sound, a revolution that was bound to come—a revolution which realized, once and for all, something most of us have suspected or known for a long time: *The 6502 CPU in the Apple Computer is neither a video display processing chip (VDP) nor a programmable sound generator (PSG)!*

For four years it was quite acceptable to pretend that the Apple 6502 was a VDP or PSG, but now it's nearly 1984, and this pretense is no longer viable. At first, compared to other computers, Apple's graphics were

just fine. Compared to PET and TRS-80 micros, Apple was great, Apple sounds were great and Apple graphics were great. But then Atari's sounds and graphics bested Apple's and the Commodore 64 and TI 99/4A sound and graphics came along and left Apple in the dust with sprites and programmable sounds that were faster, cleaner and easier to use than Apple's. Now there are even cheaper machines with better graphics and sounds than either the Commodore 64 or the TI 99/4A, and Commodore 64 prices keep dropping and dropping.

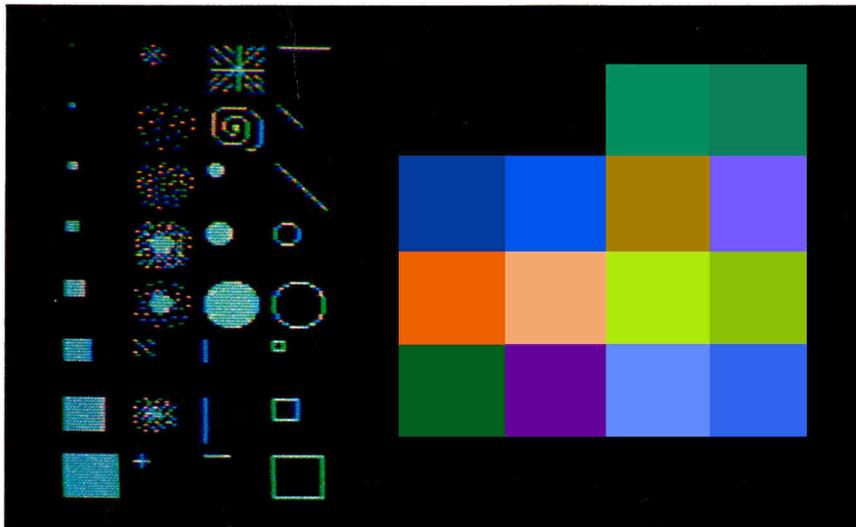
Even if Apple were to create a three- or four-hundred dollar low-end game machine (the Crabapple?) with excellent multiplane sprite graphics and PSG sounds, its impact would be on *future* Apple purchasers. But what about you, the current Apple users—the one-million of you who own Apple II and IIe machines?

What can you do to rehabilitate your Apple's graphics and sound capabilities?

If you've been following this column, you know I'm deeply involved in the Apple graphics renaissance, and firmly believe in the SuperSprite board and its accompanying StarSprite I system. See articles in the September and October *inCider* and the chart in the November "Fudge It!" column; they tell an illuminating story.

This month I'll be referring to standard Apple 6502 graphics and sound production, VDP graphics and PSG sound production, and VDP graphics and PSG sound production via the SuperSprite board and the StarSprite system (which includes software, manuals and two versions of my Ampersprite language). Incidentally, StarSprite I is automatically included with every SuperSprite board and gives you Ampersprite, sprite editing, games with user-definable characteristics, tutorials and a whole raft of utilities. StarSprite II has line-drawing, pattern editing, a collision-counter-using game, color-filling, few-sector instant scene creation, translation of 6502 scenes to VDP scenes and extensive Ampersprite tutorials.

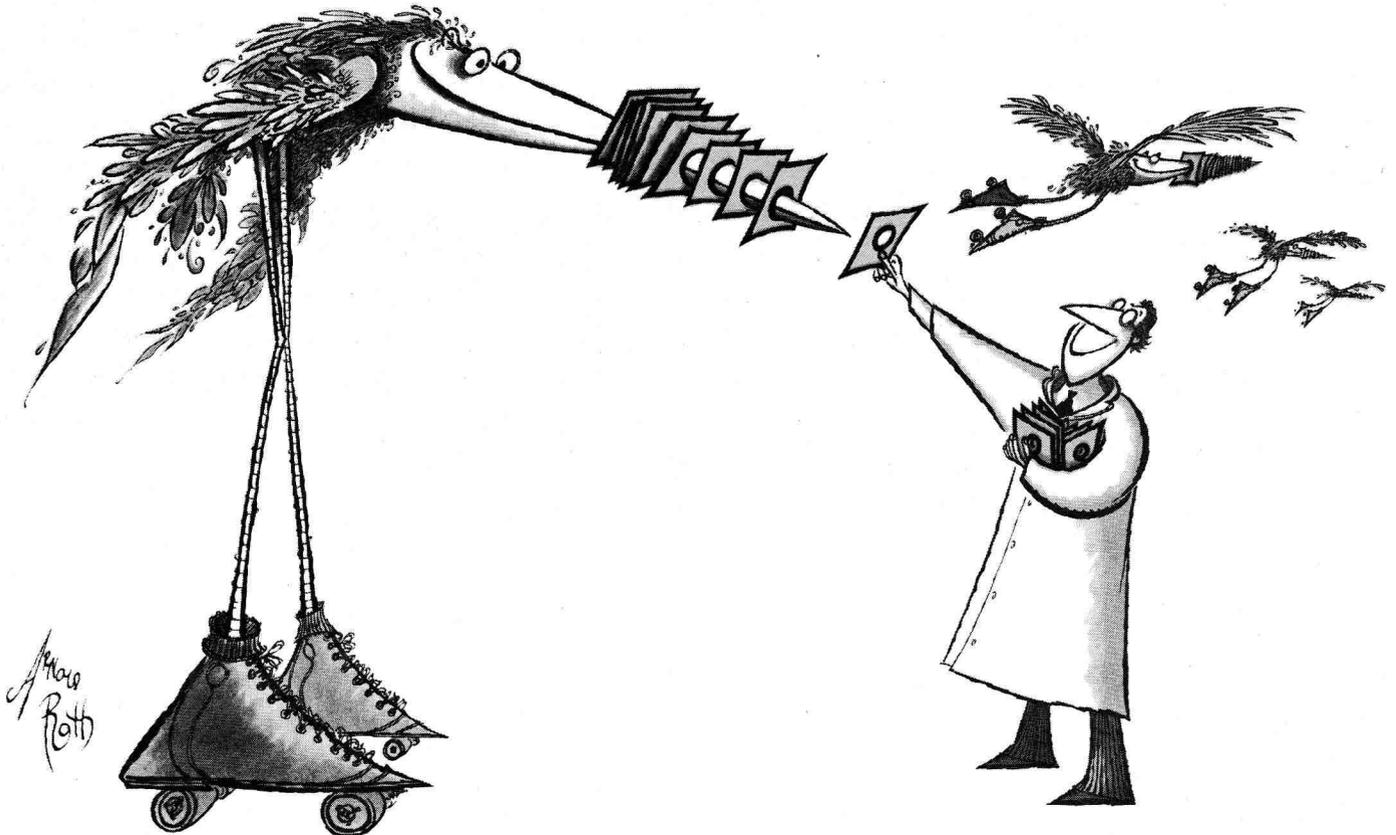
You can find some utilities performing functions discussed in the following section in StarSprite I, others in StarSprite II. StarSprite III comprises source codes for the entire system and a manual on machine language interfacing with the SuperSprite board.



SuperSprite's 16 VDP colors, illustrated by the palette of the Sprite Painting utility.

Address correspondence to Don Fudge at Avant-Garde Creations, PO Box 30160, Eugene, OR 97403.

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Bear in mind that VDP and PSG are two features of the SuperSprite board, which also contains programmable sound filters, the Echo II speech synthesizer and the capability of simultaneous 6502 video and VDP video on the same screen.

### Comparing Apple 6502 Graphics With VDP Graphics

The Apple's two hi-res screens correspond to 8K sections of RAM. Changes in hi-res byte data mean changes in screen display. Data like \$FF (11111111 binary) gives a hi-res "dash" on the screen, since 1 = "on" = a visible screen-dot. Data like \$00 (00000000 binary) gives nothing on the screen at that hi-res location. "On" and "off" bits next to each other (10 or 01) give color while two "on" bits in a row give white. The msb (most significant bit) in every hi-res byte is the color flag. If it's "on" your colors are blue or orange; if it's "off" your colors are violet or green.

Because of the above color flag, only seven bits per byte of Apple hi-res bytes are used for hi-res display. With most micros and VDP's, all eight bits in every hi-res byte are used for display—color flags don't exist.

This means Apple 6502 graphics colors are determined by (1) the color flag and (2) the bit column on the screen being even or odd. VDP graphics colors are determined differently. Since all bits in hi-res bytes are used for display data, color data needs its own data table, called a *color table*. Here's how it works.

Think of the *pattern table* as a library of possible shapes (on 8-dot x 8-dot square tiles) that can each be used anywhere on the hi-res screen. Think of the *color table* as a library of color data whose every byte relates to a corresponding byte in the pattern table, giving each byte of pattern a pair of colors to color it. Think of a *name table* as a hi-res screen map that points out the screen positions in which pattern tiles from the pattern table are used. 768 pattern positions on the screen are sequential, starting with 0 at the upper left and going

down to 767 at the lower right corner.

A screen byte has "on" bits and "off" bits; a color table's data tells what color they are. The VDP's 16 colors can be assigned to either "on" bits or "off" bits. VDP colors are black, medium and light green, dark and light blue, dark red, cyan, medium and light red, dark and light yellow, dark green, magenta, grey, white and transparent. Apple 6502 has only six hi-res colors: black, white, green, orange, violet and blue. Apple 6502 colors are created according to which bits in a byte are "on" or "off." VDP colors relate to which color (0-15) is specified by the color table for a byte's "on" and "off" bits. Let's look:

location \$2000 has \$76  
location \$0000 has \$7F

Let's say the color table starts at location \$2000 in the VRAM (video RAM on the SuperSprite board), and the pattern table starts at location \$0 in VRAM.

The name table has \$0-\$FF, \$0-\$FF, \$0-\$FF as its three pages of data, which we'll store in VRAM at, let's say, \$3800. The name table merely tells us which pattern will be found at which pattern position on the hi-res screen. The \$0-\$FF arrangement allows all patterns and their relative colors to be sequential in memory. This means the first byte on the hi-res screen will correspond to the bit-mapped pattern byte at VRAM's location 0 (the pattern table

would be from \$0-\$17FF). It also means the hi-res screen's first byte will correspond to the color data found in the color table's first byte, at \$2000.

The color table's first byte is \$76. The pattern table's first byte is \$7F. This pattern would be one "off" bit and seven "on" bits, like so:

01111111

Color table data is one byte, but each nibble (four bits or 1/2 byte) of this data is used separately. The first nibble, represented by the first hex digit in the hex number \$76, is \$7, which is cyan—the color of all "on" bits found in pattern byte 0. The first nibble of color data always corresponds to pattern bytes' "on" bits. The second nibble, \$6, is the color red, and corresponds to pattern table "off" bits. Therefore, the pattern table byte above, 01111111, will show up as a red dot followed by a cyan dash. If the pattern byte had been 01010101, the screen would show a red and cyan dotted line.

### Got That?

It's easy to understand that the two hex digits in a color table byte represent two separate VDP colors corresponding to "on" and "off" bits in bit-mapped pattern table bytes. And it's easy to understand the bit-mapped structure of pattern table bytes, where "on" bits in pattern bytes take on different colors than "off" bits. But the entire name table concept and pattern positions in general take time for an Apple owner to absorb, because they're so radically different from anything the average Apple owner has experienced.

In Graphics II mode with the TMS 9918A, the video screen is divided such that the name table pattern positions 0-255 correspond to the top third of the screen, name table pattern positions 256-511 correspond to the middle third and name table pattern positions 512-767 correspond to the bottom third.

The data in any of the 768 pattern positions must be a number from 0 to 255 (\$0-\$FF). This data represents

\$80 = 10000000	\$7D = 0111 1101
\$80 = 10000000	\$7D = 0111 1101
\$80 = 10000000	\$7D = 0111 1101
\$80 = 10000000	\$7D = 0111 1101
\$80 = 10000000	\$7D = 0111 1101
\$80 = 10000000	\$7D = 0111 1101
\$80 = 10000000	\$7D = 0111 1101
\$F8 = 11111000	\$7D = 0111 1101
\$00 = 00000000	\$7D = 0111 1101

Figure. Pattern table and color table bytes 24-31, representing data for a cyan L on a magenta background.

# Finally, a 6502 Assembler that doesn't require a genius to operate.



## LISA v2.6

You don't need an I.Q. of 200 to learn assembly language on your Apple II or Apple IIe. All you need is the best 6502 assembler around: **Lazer's Interactive Symbolic Assembler (LISA v2.6)**. LISA is the easy-to-learn and easy-to-use system that will have even the absolute beginner up and running in a matter of minutes. In addition to LISA's clearly written 240-page manual more tutorial material is available for LISA than any other assembler (including books by *D. Fudge, R. Hyde, W. Mauer, and R. Mottola*). LISA is the beginner's best choice.

Even if your I.Q. is 200, you'll appreciate LISA's speed, power, and ease of use. At 20,000 lines/minute it's 20 to 30 times faster than ORCA/M or Apple's own Toolkit assembler. That's why people like Bill Budge, Ken Williams, Brian Fitzgerald, Don Fudge, and Steve Wozniak use it every day. LISA is very usable. That's why it's the most often used assembler ever created for the Apple II.

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which pattern table pattern number will be used at that particular location on screen. The color table's data will always correspond directly with pattern table bytes. That is, the 492nd byte in the color table will always give the two colors that will be used in the 492nd byte in the pattern table. A pattern is eight bytes in a column.

In the Figure you see the 24th-31st bytes of both the pattern table and the color table. This combination of data represents a cyan L, on a magenta background, an 8 × 8 screen tile that may or may not be used on screen. As yet, we don't know whether this pattern shall ever appear on screen, and if it does, where. Screen use and position are the functions of the name table, not the color or pattern tables. Unless your skimming of the name table found a three, you can be certain the above data is unused.

The Figure represents pattern #3 only. Think of the pattern table and its corresponding color table data as a library of possibilities. Then think of walking through that library and choosing various patterns, by number, to appear on the screen. Some numbers could be used many times while others wouldn't be used at all. This is what name tables are about. They tell *which* patterns are to be used and *where* they'll be positioned on screen. The 0-255, 0-255, 0-255 configuration mentioned earlier (in hex—where 255 is shown as \$FF) sequentially lets you use 768 unique patterns on screen, so that all pattern and color data is incorporated and screen mapping is easy.

Apple screen mapping is set and quite jumbled, as you'll see on page 21 of the white Apple Reference Manual. VDP hi-res mapping is user-definable, via the name table, as explained above. If you wanted a black screen on your Apple, you'd enter HGR, HGR2, or CALL-62450. With the VDP, you could enter the &RD0 Ampersprite command, or CALL-831 to clear VRAM. If you wanted pattern, color and name tables to reflect displaying a black screen, you'd put

zeros in all 768 name table bytes, and then make sure the first pattern (#0) was all zeros and that the second hex digit in the first eight bytes of the color table was 0 for transparent or 1 for black.

### Display Modes

In Graphics I mode color tables are short and limited and screen color display is limited; only 256 patterns can be unique.

There is a multicolor mode similar to Apple 6502 lo-res mode, except you get 64 × 48 colored squares on screen rather than 40 × 48.

The text mode with VDP has the same room for characters (40 × 24) as normal Apple 6502 text, but with the VDP, text colors and backgrounds can be any of the VDP's 16 colors. The text mode's name table holds 960 pattern positions, rather than 768. Ampersprite's &N#,# command, rather than normal PRINT statements, permits me to get text characters onto the screen. The StarSprite I manual and software illustrate how to set words or sentences equal to strings and use them with Ampersprite-run screen printing GOSUBS. Upper- and lowercase and all ASCII characters are supported both in text mode and in graphics mode! Text used in graphics mode is as easy to use as text mode text. In graphics mode text is 32 characters per line and 24 lines high. No color table is needed in text mode, which uses the Ampersprite command &RX#,#, where the first number is text color and the second number is VDP backdrop and text background color.

So you can forget hi-res character generators with VDP graphics. Unlike Apple 6502 graphics, VDP graphics can place any character, number, or upper- or lowercase character anywhere on text or graphics screens.

The resolution of VDP video is 256 × 192, compared with 280 × 192 with Apple 6502. This means VDP video yields faster graphics, easier programming and shorter programs (anything beyond 255 requires 16-bit numbers).

### Line Drawing and Colored Scenes

"Paint Master Scene Utility" exemplifies a scene utility to create 6502 graphics scenes that may be saved in only three disk sectors. The utility's color-fill algorithm is the fastest around. So, using this same basic color-fill flowchart, I created a fast color-fill routine for the VDP graphics. And I had to develop a quick machine language line-drawing algorithm as well. Scene-creation utilities store a set of line endpoints as HPLLOT shape sets, and store another set of data representing color-fill seed locations. Using this data, machine language color-fill algorithms use the scene file data from saved scene files, and redraw the set of HPLLOT shapes, after which they color-fill all spaces between lines or enclosed areas, using the seed locations saved in the file. A seed location is the set of screen coordinates at which the color-fill originally began. Other data saved in scene data files is the color used for each fill.

In the StarSprite system StarSprite II holds the line-drawing algorithms, color-fill routines and scene-creation utilities. StarSprite I's scene-creation routine has 52-sector saves and uses sprite painting, not color-fill.

With Apple 6502, you draw lines with HPLLOT commands that specify beginning and ending X and Y coordinates. With the VDP, you specify the same data and execute a certain GOSUB and the line is drawn. With Apple 6502 scene-drawing routines, color numbers that point to eight or more special color data bytes (in a table) determine the color in a color-fill. With VDP color-fills you merely specify colors 0-15; no color data tables are needed.

Apple 6502 graphics have six colors—no more. The VDP has 16 colors. Apple 6502 scene routines almost always boast from 20 to 2 billion colors, because they use patterns of blue, violet, green, orange, white and black pixels configured in many different ways. Close inspection reveals all such patterns as being composed of six colors—no more. Close inspec-

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tion of VDP color reveals 16 separate colors. No buts about it.

### Supplementation, Not Replacement

As we work our way through these comparisons, remember that these delightful and revolutionary VDP graphics characteristics will not replace current Apple graphics. With the StarSprite system and SuperSprite board, new VDP features (and PSG sounds, filters, and Echo II speech synthesis) will *add* to current Apple 6502 graphics and sound capabilities. Supplementation and enhancement are what this article is about—not replacement. Learning to incorporate sprites and PSG sounds into programming routines should be a fairly comfortable transformation, built upon already existing Applesoft knowledge and graphics techniques.

### Scrolling Routines

Apple scrolling moves 8K of jumbled-up hi-res locations in a jumbled-up algorithm. With VDP scrolling, you merely move the name table's pattern data 1, -1, 32, -32, 33, -33, 31, -31 screen positions to scroll the screen right, left, down, up, or diagonally—a straightforward algorithm involving a mere ¼K (768 bytes).

### Collision Detection

With normal 6502 graphics you may use vector shapes from either Basic or machine language and use PEEK (234) or its machine language equivalent to detect collisions. But there's a problem: Vector shapes are too slow for most purposes. With block shapes you must do various types of EORs, ORAs, ANDs and masks at the machine language level to end up with collision checking, which is usually inaccurate and too often slows down your animation. From Basic you can forget it completely.

Sprites used in VDP graphics animation move so quickly with so little chronological overhead that even crude parameter checking will often suffice for collision detection. If you need exceptionally good and fast col-

lision detection, have no fear—Ampersprite.int is here. This is an interrupt-driven version of Ampersprite, included with the StarSprite I software automatically given to all SuperSprite board owners.

In this language, the VDP status register is checked up on 60 times per second after each video frame refresh. If a collision is found, PEEK into location 232, after which a quick parameter check will identify the collision. StarSprite II contains two sample games, one of which was written with Ampersprite and uses parameter checks for collision detection; the other uses Ampersprite.int, which is interrupt-driven and simply checks location 232 for collisions.

Why are the above sample games written in Basic (Applesoft with Ampersprite as the main video manipulator)? Because, unlike 6502 graphics, *most VDP applications do not require machine language*. Ampersprite was invented to preclude the necessity for machine language, which intimidates many Apple users. Examine the performance comparison chart from last month's Fudge It! column. See what I mean? We're not fooling around with this new StarSprite/SuperSprite/Ampersprite system—we're talking true quantum-leap transformation here!

### Shapes and Animation

One aspect of 6502 graphics that has always proved troublesome for most Apple users was the needless complexity involved in animation. Here are just some of the headaches for your average animator: pre-shifted shapes with concomitant waste of memory, page flipping, movement routines whose edge-of-shape bits were background colored to erase-as-you-draw (but which necessitated bland, featureless backgrounds) and flicker from shapes being too large or numerous.

Then there's the two-dimensional destructive aspect of all 6502 graphics animation. VDP graphics are multiplane, like Disney animation. With SuperSprite board use, sprites each have their own plane, as do the

pattern plane, backdrop and 6502 graphics plane.

When you move a shape in an Apple 6502 scene, it leaves a hole in the background and erases the background bytes at the new location. This is no way to program animation!

Popular packages have attempted to cope with this mess with the following animation methods:

1. Double XDRAW
2. Block shape shift animation
3. DRAW/DRAW with background storage and refresh
4. Block, two page flipping
5. Block, one page (2nd page for background storage)
6. Block, one page (erasing done with shape border)
7. Sliver restore/erase
8. Various combinations of masking, shifting, EORing, etc.

Vector shapes always have been too slow, block shapes too demanding on memory and unnecessarily complex; HPLLOT shapes always have been too slow and too narrow in potential scope of application.

Animation on a VDP-based system is simply a matter of moving the sprites around by changing their X-Y coordinates. There's no erasing and redrawing, no flicker, no fuss, no extra memory or buffer requirements, no two-page flipping, and no magic words to say. There's no complexity at all; a FOR-NEXT loop (within which X and/or Y coordinates are changed) is all that's required.

```
10 FOR E = 0 TO 208: &AX0,E : NEXT
```

This simple Basic line has more animation potential than all the machine language 6502 animation routines ever conceived, as I wrote last month. It will move sprites, but not block shapes. A sprite and a block shape are both bit-mapped objects constructed of bytes, whose "on" bits are (figure) the sprite or block shape, and "off" bits are (ground) the invisible or background portions of the shape. Both are placed upon the screen according to the assigned shape coordinates.

There's a big difference here: Sprites can have any on-screen or off-screen X or Y coordinates, while block shapes need on-screen coordinates whose horizontal resolution is 40. In other words, there are 256 possible horizontal sprite coordinates, but only 40 possible block shape coordinates. Block shapes are given X coordinates representing the horizontal byte column, while sprites are given screen-pixel X coordinates. Single block shapes must move sideways 7, 14, 21 (etc.) dots at a time. For smaller movements, you must use wasteful sequences of pre-shifted block shapes. An alternative is shift animation, first presented in *Hi-Res Secrets*. This animation method allows block shapes to move a dot at a time, but it's slow.

There's another problem. Step increment values of one, three, five, seven or more will give you nasty color changes on anything but white block shapes; a figure will flicker back and forth between hi-res colors if you move in any of those increments. Thus, both byte-sized animation movements and shift animation will give you color flicker, unless you use only white shapes, which doesn't create very colorful games.

The alternative is to make 2-, 4-, 6- or 8-bit movements entirely with block shapes, or to use both double shifts and constant page flipping for shift animation, which slows it down further. It goes without saying that color flicker and color clash (6502 hi-bit-on color horizontal to hi-bit-off color) are *not* problems with the VDP graphics.

Yes, I do work for Avant-Garde Creations. Make no mistake about that. Nevertheless, my praise of SuperSprite technology stems from its potential to *revolutionize* Apple graphics.

### The Sprite Miracle

You're probably wondering about this magic word "sprite." Just what is it about that type of video methodology that makes it so much faster and cleaner than block, HPlot and vector shapes? Well, in simple terms,

the way sprite moving works is to update a couple of pointers, but the way block shape (the fastest of all 6502 shapes) moving works is to transfer a block of hi-res, bit-mapped data from one rectangular section of hi-res RAM to another. While sprite moving involves two pointer updates, block shape moving for a shape equivalent to that sprite might involve 160 byte transfers, and possibly an additional 160 byte transfers to restore the background at the previous location.

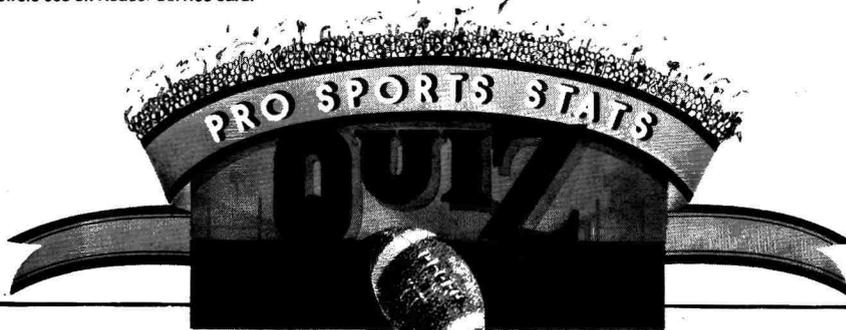
### Conclusion

In conclusion, I think it's obvious that we're at the brink of a revolution in Apple graphics that within a year or two will affect virtually every Apple II or IIE. Because speech, music, and sound effects (and especially a PSG whose sound effects do not slow up either VDP or 6502 processing)

are now Basic-accessible, Apple graphics now can compete with any on the market today. You programmers out there will immediately recognize the fact that the central impediment to decent sounds on the Apple is that once they begin, they monopolize the 6502 and prevent time for good animation. This is why most Apple arcade game sounds have been so peepy-poppy and clicky-clacky for the last four years.

It's high time that Apple video processing was assigned to a video processor, not a data-computing chip (6502), and it's high time that Apple audio processing was assigned to an audio processor, not the overworked little 6502. Why should Apple's arcade games continue to be so inferior to arcade machines? The technology and software is at hand to bring Apple to the state-of-the-art in one swift stroke. What are we waiting for? ■

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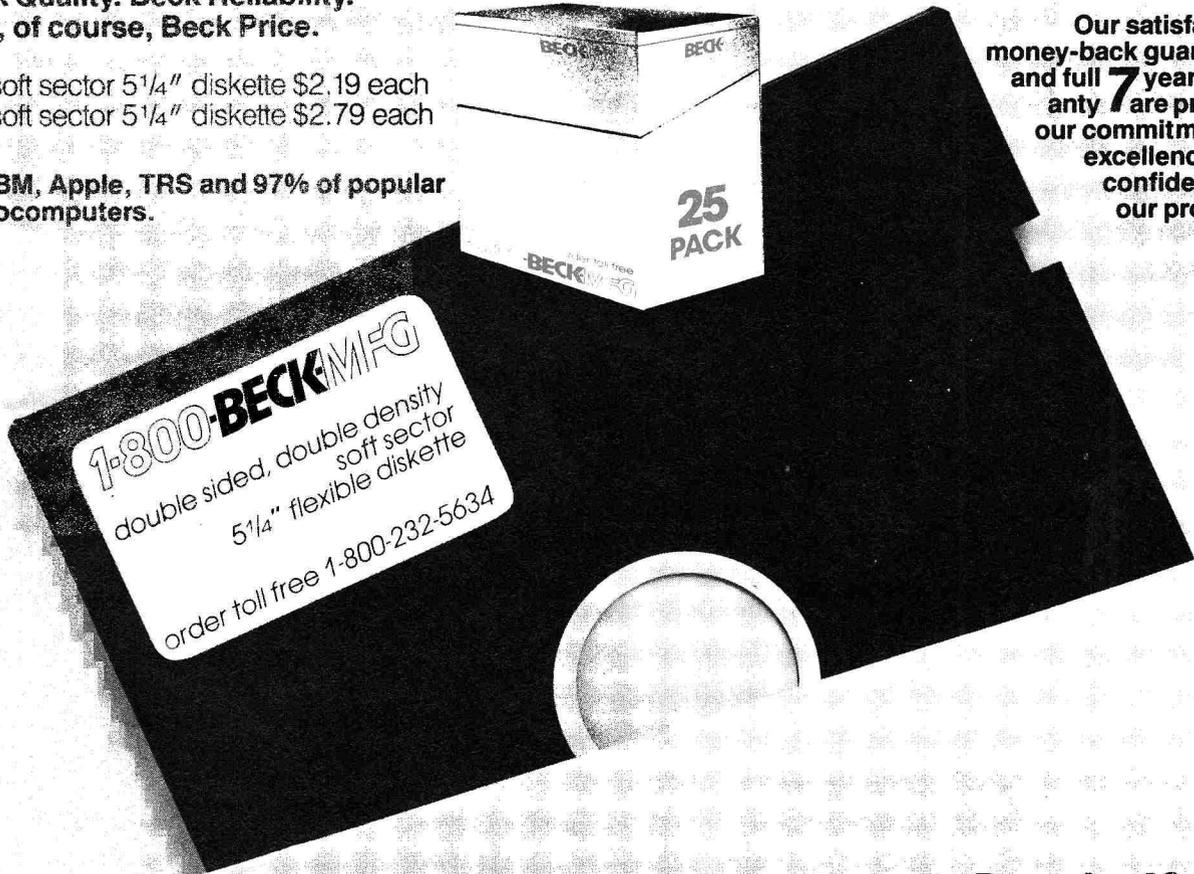
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## Silicon Valley Guy Handbook

by Patty Bell and Doug Myrland

Avon Books  
959 8th Ave.  
New York, NY 10019  
Softcover, \$3.95

**T**ake this quiz.

1. My friends call me
  - a. Collect
  - b. Irresponsible
  - c. In for consultation
  - d. Dragon Master
2. I am most afraid of
  - a. Norman Bates
  - b. Tylenol
  - c. Telling my mother I'm sleeping with a person from a different religious persuasion.
  - d. De-rezzing my own program.
3. As a small child I liked to play
  - a. Doctor and Nurse
  - b. Cowboys and Indians
  - c. Hide and Seek
  - d. Master Control and Robot
4. The man I admire most is
  - a. Taller than me
  - b. Richard Nixon
  - c. Alex Karras
  - d. Steve Wozniak

If you answered d. to any of these, you may enjoy the *Silicon Valley Guy Handbook*. If you answered d. to all the above, you probably are a Silicon Valley guy (or gal). With the handbook you can follow Ray FIFO (First In, First Out) from childhood (learning how to tap into the Bell System's long-distance network) through getting on-line (get to know your modular office unit) to burnout at age 36.

Will Ray be able to access that cute little program down in word processing? Punch my code! He may go subroutine or main program. You'll have to buy the book to find out. If the terms get confusing, there is a glossary at the end of the book.

What makes a Silicon Valley Guy? Clip-on tie, plastic pocket protector, beeper, and worn-out

tennis shoes. He hangs out down at the Radio Shack. He lives on cola and junk food. The best place to eat is the one with the most vending machines. This book sets a new standard for computer hackers with satire that hits close to home. Don't share it with your computer friends if you want it back. ■

John R. Tkach  
Bozeman, MT

## The Official Computer Hater's Handbook

by D. J. Arneson

Dell Publishing  
1 Dag Hammarskjöld Plaza  
New York, NY 10017  
Softcover, \$3.95

**I**f you are wondering what to give your computer-hating friends for Christmas, D. J. Arneson may have solved your problem. *The Official Computer Hater's Handbook*, like others of its ilk, is good for a laugh. At \$3.95, maybe that's a bargain.

The *Handbook's* underlying formula has proven successful in the past: Choose a target (in this case the stereotypical hacker), and then define your victim in terms that will make everyone else feel superior. Ridicule his appearance, his habits and his goals. But do it in such a jolly good-natured way that nobody will take offense.

The *Handbook* takes a weak premise (computers are hateful) and tries to make something of it. It borrows some standard devices from popular culture, recognizable by the widest possible audience, and reiterates the theme well beyond normal endurance: "101 Things to Do with a Dead Computer." "Murphy's Laws." The requisite "Glossary." You get the idea. Arneson comes through with some good lines, but you won't be overwhelmed.

I rather liked "Warheads of the

Future." We're first reminded of the classic "computer error" back in 1980, when the Pentagon's best silicon-based minds told us the U.S. was under attack by the U.S.S.R. The error was detected in time to prevent "the end of the world as we know it." Well, putting those electronic marvels to good use, the *Handbook* suggests the result might be *new* warheads that would pack a wallop the equivalent of .01 megagrams of flint, "equal to 3 times the destruction wrought on William Tell's apple." The deployment system? Why, "Dunce Pack II," of course.

The text is generously relieved by interesting photos and drawings. The design is attractive and the typesetting clean. The language, if not brilliant, is at least clear. So your investment will not be for naught. But if any of your friends happen to be female, you'd be wiser to spare them. It's probably true that more men than women are involved with beeping, but Arneson's thrust is almost exclusively male. Women are parodied fairly tastelessly (e.g., an illustrated play on *silicon* vs. *silicone*; ASCII = "the key to your girlfriend's apartment"), but after all, this author is clearly not aiming for a sophisticated audience.

So if you were planning to put this one on the shelf next to Hofstaeder's *Godel, Escher, Bach*, reconsider. ■

Linda Stephenson  
inCider staff

## Apple Machine Language

by Robert D. Rosen

Holt, Rinehart and Winston  
383 Madison Ave.  
New York, NY 10017  
Softcover, \$19.95

**P**eople who write assembly-language programming books tend to assume too much hardware and software knowledge on the

reader's part. To learn assembly programming, one does not need terribly advanced programming experience—given a well written tutorial text. With *Apple Machine Language*, Robert Rosen has produced a very satisfying introduction to assembly programming for the Apple user with either beginning or intermediate Basic experience.

Rosen approaches the subject with hands on and moves, generally, from the bottom up. First, he gives a short but informative review of binary and hex bases and of the uses of RAM and ROM. Then, he jumps right into the Apple monitor program to see what it can do: display memory one byte at a time or in larger chunks, change the contents of memory, or turn a machine-language listing into assembly language. Each command, with variations that we are stepped through, brings in a new aspect of assembly programming—memory addressing, data transfer through direct and then indirect maneuvers, the simplest assembly-language instructions in machine and then mnemonic code. Rosen anticipates and clearly answers our questions: Why are memory addresses displayed in a certain pattern? What does each column in an assembly listing mean? How can I display a listing longer than one screen?

What Rosen does on a local level—alternating a little technical information with each hands-on “experiment”—he does on a larger scale over the entire book. Chapter 2 covers general operations—ways of moving bits around. Then, chapter 3 treats us to an interesting application: Apple graphics displays produced by ROM subroutines. Plotting, displaying text and producing screen attributes make ASCII codes, logical operations and subroutine effects on registers pleasant and meaningful. After proving that assembly language can produce useful results, in chapter 4 Rosen brings us back to some straight technical work on loops, branches and jumps. Along with the mini-assembler and nested

loops, we learn about making music with the Apple sound capabilities. Chapter 6 covers a number of arithmetic operations. After introducing matrices, chapter 7 then shows us how to create shape tables for graphics. The book concludes with a chapter on indirect addressing, interfacing assembly language with Basic and debugging assembly-language routines.

Review questions for self-testing are included at the end of each chapter. Appendices include instruction mnemonics, addresses of built-in subroutines and a cross-referenced glossary. The book's only notable omission is a discussion of hardware. One would not learn from this book that there is any difference between a memory location and a 6502 register; in fact, the term 6502 never appears. Inclusion of a simple diagram of 6502 architecture would have been helpful.

However, for those who want a serious but interesting introduction to assembly programming, *Apple Machine Language* is a very good place to start. ■

Virginia Schaefer  
Brookline, MA

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### Microcomputers Can Be Kidstuff

by Anna Mae Walsh Burke  
Hayden Book Company Inc.  
10 Mulholland Drive  
Hasbrouck Hts., NJ 07604  
Softcover, \$8.95

If there is one subject I know well, it is kids! Besides being a kid once and having them, I have taught thousands of kids everything from ABC's to computer literacy.

I can just imagine young Johnny reading this simplified computer book with both parents looking over his shoulder anxiously waiting for him to turn the page. It is that good!

The publishers advertise this book as “a friendly guide to using a

micro in your home and school.” And friendly it is! It is very understandable and has excellent illustrations.

You will be taken on an exciting computer information trek. First, you will be reintroduced to computer history. Remember UNIVAC? Then, you'll discover the many uses of the computer, from space exploration to graphic advertisements.

Once your appetite has been whetted, the author acquaints you painlessly with some elementary computer terms. You will learn the differences between hardware and software, what a micro-chip is and how it is made. An excellent glossary is also included.

The chapter I like best deals with computer “talk.” It describes several computer languages and gives samples of each for comparison. Later in the book, you get to try your hand at two of the easier languages—Pilot and Basic.

The book is a bit deceiving. Though it appears as a kiddie primer on computers, it really is quite comprehensive. You'll learn much about programming, including how to write an elementary flowchart. Once you write your first program with the aid of this book, I'm convinced you'll be hooked on computers for life.

Don't miss getting this book for the kid in your life...or just for yourself. I won't tell! ■

Dr. Nancy White Kelly  
Stockbridge, GA

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### Secrets of Better Basic

by Ernest E. Mau  
Hayden Book Publishing Co. Inc.  
10 Mulholland Drive  
Hasbrouck Hts., NJ 07604  
Softcover, \$14.95

Assume for a moment that you are a fairly proficient Apple-soft programmer, having mastered the Applesoft manual with ambitions of writing more advanced programs.

**"Mau makes frequent reference in his programming examples to Apple Integer and Applesoft Basic."**

All well and good, but do your programming techniques waste valuable memory space? Do your programs execute as quickly as they could? Are you handling numbers quickly and accurately?

If you find yourself answering "No" or "I don't know" to most or all of those questions, then *Secrets of Better Basic* may be the book you need to polish your programming skills. Author Ernest E. Mau begins by defining basic computer terms, explaining how a personal-sized system is set up and how it works. Mau also makes useful suggestions for buying and using hardware and software. The book is written in a "let's get it straight" tone where Mau assumes nothing about the reader's preknowledge and therefore he wants to make sure *you* know what *he* is talking about.

Mau begins his discussion of programming by reminding the reader of the basic steps in approaching a programming job: identifying and evaluating the problem, devising a workable solution, creating a flow-chart of the proposed program, coding a program and then testing, debugging and running it. Again, elementary stuff to many, but these may be new concepts for some self-taught Applesoft programmers.

Having spent a third of the book laying the groundwork, Mau now jumps into the heart of his subject by showing you how to strip your final program code to the essentials, such as dropping REM statements and overlong or unnecessary variable names to save time. Examples of cluttered vs. purged programs are shown where time savings can be calculated in minutes rather than seconds.

Various forms of Basic (and there are many) are also described with how they handle numerical functions and at what speeds. He explains the relative speed savings in dealing with integers and real numbers and working on a single or double precision basis. Ways to speed up numerical operations and to make sure that your results are accurate are examined.

Mau also includes tips on elimination of unnecessary characters from your code, how to make FOR-NEXT loops and IF-THEN statements more efficient, compressing several program lines onto one line and using string variables to increase speed. Frequent references to the various types of Basic demonstrate how these approaches may be applied for the version you may be using.

This book is not Apple-specific. Mau's examples are coded in Microsoft Basic (two disk versions are available for Apples). On the other

hand, Mau makes frequent reference in his programming examples to Apple Integer and Applesoft Basic, explaining how the techniques will work for the different codes.

In the body of the text is a comparison chart of commands and intrinsic function commands available to seven popular Basics, including Applesoft, Apple Integer, and Microsoft's MBasic and GBasic. This feature proves valuable to the reader as he attempts to adapt the examples in the book to an Apple code.

*Better Basic* is a practical and readable volume which, if studied carefully, will help the reader to eliminate sloppy programming habits and to get more performance from his system. ■

**Brian Murphy**  
Fairfield, CT

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# Software Reviews



## Music Games

**M**usic Games, a set of 12 programs on one disk, teaches musical concepts that range from the most basic Moving on the Staff to more complicated rhythm, note-reading and memory skills.

The first program shown on the Menu is "Bach the Younger," a rendition of "Solfeggietto" by Karl Philipp Emanuel Bach. The players are instructed to select the program from the menu, enter tempo and enjoy.

### Note Recognition Programs

Four of the games deal with note recognition: Moving on the Staff, Flash Cards, What's My Name? and Note Finder.

Moving on the Staff is a program that can be used by the youngest music students. Low-resolution graphics present a large staff and three notes. The player must press one of three keys to indicate the direction of the tones that are sounded and presented graphically. Each of the keys represents the initial sound of the word (U

for up, D for down and S for same). The player has three chances to choose the right answer. Since there are only three possibilities, the program is a positive experience for even the youngest music student.

What's My Name is another program for young children. It has large, easy-to-see graphics, and it teaches the names of the keys on the piano. It does, however, require the student to type the names of the piano keys, # for sharp and < for flat.

Flash Cards, a high-resolution program that teaches and reinforces the notes on the staff, introduces something I have not seen in other music programs: It includes five clefs, not just the treble and bass clefs. It is therefore appropriate for students of many instruments. In a series of ten questions, the student is given three chances to name the note. If he/she does not answer correctly after three tries, the name of the note appears in its correct place on the staff.

In Note Finder, the weakest of these programs, four octaves of piano keys and the staff are drawn on the

screen. When the player types the name of a note, small lines appear on the drawing, indicating the piano key named and shown on the staff above. There is no real goal to this game, and children lose interest quickly. The second problem occurs when the player requests A-flat. The note-indicator line is placed so close to the edge of the key that it appears to indicate G instead.

### Rhythm

There are five programs in this section: Counting Aid, Measure Count, and Rhythm 1, 2 and 3.

The rhythm programs all require a game paddle. Each of the games first displays four quarter-notes to establish a beat and a rhythm which the player tries to tap out using the game paddle. Rhythm 2 uses quarter-notes, half-notes, dotted half-notes and whole notes; it is the easiest drill to master for most students. Rhythm 1 is a low-resolution graphics program that shows only the stem of the notes in the rhythm. The stems show patterns consisting of quarter-notes, eighth-notes, sixteenth-notes and triplets. Rhythm 3 creates patterns using eighths through whole notes. The computer then plays the correct rhythm as shown on the screen. It does not repeat the correct pattern, nor does it play the pattern that the student typed in. One of the children who tried the program became indignant, saying, "It *could* show you what you put in when you make a mistake! Then I'd know what I did wrong." In this case, she was using an Apple Joystick whose clicker has a stiff action. This made it difficult for her to enter an accurate rhythm, even when entered slowly, as the directions recommended.

While the graphics in these sections are excellent, the instructions are not well written. They are densely printed (a problem that occurs in many of the programs) and English usage is sometimes poor.

Counting Aid asks the player to "enter the rhythm from your music according to the handy coding." By using control-Z, you can refer to the screen version of the instructions—a



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chart which shows the codes for entering notes—but it is distracting to switch back and forth. An alternate chart is provided in the booklet. Although not mentioned, each note must be entered separately until the two measures are complete. Then the smallest value is established, and lines link two measures of these notes with the two measures typed in. The rhythm is then played once. Although the instructions in the booklet state that you can repeat the entry by pressing return, I was not able to do this. Return sent the program back to the menu.

Measure Count is fun and challenging. Based on a familiar math game, the object is to add the note values in a measure until the total count is reached (for example, in a 2/4 measure, the notes must add up to 2, with the quarter note equal to one beat). The computer enters notes

at random and adds the score. You do need to understand fractions and decimals to be able to play the game at all levels, but all of the children who tried this game enjoyed it. The younger ones especially appreciated the fact that if they chose too large a note, they were instructed to try again, with suggestions for appropriate entries.

### Ear Training

Hearing is Believing could be an excellent ear-training game. As a simple tune is played, the notes (except for the number that the player wishes to be left out) appear on the screen. The player is then asked to type in the names of the notes that do not appear. If you want the melody repeated, you can do this by pressing P. If you answer correctly, or have tried three times and not guessed the melody, the notes with their names

appear on the screen. Unfortunately, at this point, you can no longer hear the tune repeated; and if you guess the right answer, the response is a rendition of "Clementine," rather than the original melody.

The object of Memory is to pick out the notes of a scale that have been played. The names of the notes appear on the screen in ascending order, and then you choose the number you wish to guess. That number is then played. You can choose whether you want the letter to light up or not, a factor that increases or decreases the difficulty of the game. While the idea behind this game is good, the execution leaves much to be desired. The player has a choice of the speed at which the notes will be presented (from 1 to 255), but this doesn't necessarily produce the tone represented by the letters on the screen. Speeds 1 through 3 produce only a series of clicks from the Apple speaker.

In most of the other games, each answer in a series is entered separately. But in this game all the answers must be entered at once. This is not clear in the instructions; the game doesn't give the player a second chance.

In sum, Music Games presents some enjoyable and educationally sound programs. It has a retail price of \$29.95 and is published by Howard W. Sams & Co. Inc., 4300 West 62nd St., Indianapolis, IN 46268. ■

Janet Meizel  
Davis, CA

### Apple Cider Spider

In Apple Cider Spider, a hi-res game that combines real-time animation, mazes and sound, a little spider in a cider mill stays out too late one night and is now faced with the difficult task of finding his way back to his web. Obstacles include apples rolling toward the crusher, apple juice pouring into jars, frogs, birds and flying arrows.

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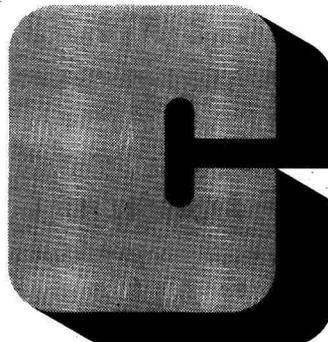
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and six normal playing levels. Levels can be switched at any time during the game by simply pressing control-L.

It seems the little spider also left several drop lines from the night before. He can move left and right on any platform or conveyor belt, walk up or down a drop line or jump. He can jump from platform to platform or from platform to drop line. The controls for these maneuvers are keyboard or joystick, depending on what's best for you.

Keyboard controls can be modified. After booting the disk and selecting keyboard controls, you are shown suggested keys for moving up, down, left, right and for jumping. You are then asked if these are suitable. If not, you can choose your own keys. Pressing control-I during the game allows you to change controls without disturbing the game. Pressing control-T toggles between keyboard control and joystick control.

The animation in Apple Cider Spider is slow, and the controls are somewhat difficult to master. If you make the slightest mistake, such as jumping into a frog, falling off a platform, or hitting an apple, you lose a spider. Sound effects are simple but adequate.

Every time the spider jumps from a platform to a drop line, your score increases by 200 points. There is also a bonus value at the top of the screen, and it decreases by increments of 100 as the game progresses. At the end of

the game, the bonus value is added to your score; but, if the bonus value goes to 0, you lose a spider.

Some drop lines are marked with a bonus number. When the spider walks over the number, the bonus value is automatically multiplied by

**"If you make a high score, you are asked to enter your initials."**

this number. Bonus markers appear and disappear randomly.

You start the game with five spiders. You can get up to five extra spiders for each 50,000 points you score. High scores are stored on the Apple Cider Spider disk and can be displayed at any time during the game by pressing control-V. If you make a high score, you are asked to enter your initials. It is then saved on disk. You can erase the high scores from the disk whenever they are displayed by pressing control-E.

When jumping from platform to platform or from platform to drop line, your goal is to reach the highest drop line—the drop line that ends at the top of the screen. Then you can

enter the next screen. The object is to keep climbing until you reach the safe environs of the attic.

The drop lines do not swing, but the spider can hang on to them for temporary safety. For example, if a frog is heading in the spider's direction and there is a drop line directly in front of him, the spider can jump onto the drop line and the frog will safely pass below.

Other special features of the game include pressing the escape key to freeze the game, control-S to toggle the sound on and off and control-R to restart the game. Limited speech is possible with the Mockingboard Speech Synthesizer.

Apple Cider Spider is manufactured by Sierra On-Line Inc., Sierra On-Line Building, Coarsegold, CA 93614. Price is \$33.33. ■

Eric Grammer  
Peterborough, NH

### Learning System

If you are an educator and are caught between preprogrammed software, which almost meets your needs, and the expense and hassle of having someone program for you, The Learning System, a teacher-authoring program, will solve your problem. You don't have to be a programmer to use it. All you need to know is how to turn on the Apple and

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use the disk drive.

The Learning System is menu driven and leads you through the construction of the test part of the program easily. You have three options for the format of the test you design: fill-in, column match and multiple choice. The menu options are foolproof. This program will not allow you to make a mistake in programming on its structure. If you make an error or change your mind about a question, there is a review component in the create procedure that requires you to check your question and make any necessary changes. The program does not continue until you have approved the drill. You also have the option of changing or deleting questions at a later date.

The next part of The Learning System is an option that helps the author design composition segments to accompany each test. The actual construction is menu motivated and is not unlike the building of the tests. This aspect of the system makes the program more versatile than a test building aid.

The compositions can be used with the tests in a variety of ways. Each composition is a set of elements you write to correspond with the test questions. The compositions can be used before or during the test. This gives you the option of using the program to teach and evaluate or just to evaluate. I found this option helpful for designing tests where I wished to provide background information or formulas as part of the testing procedure.

Graphic material cannot be included in the compositions. This is the only real weakness in the entire system. There is a limitation on the amount of space for the compositions but it is more than adequate for most projects. If you need to exceed the limits of 150 characters for each of the 25 questions, you must provide the text in another form.

Once the tests and compositions have been written, the system is ready to use. The student takes the test and has immediate feedback; questions answered incorrectly are



repeated. Whether test or drill, the program is highly interactive and provides the student or trainee every benefit immediate correction can provide.

While the student receives instant feedback, the administrator of the exam is able to view student scores at a later date. This feature can be helpful particularly when a series of tests is given and learning patterns are as important as the answers on a single test or question.

There are other features of this system that should be mentioned briefly. Full directions are given on the menu for optional use of a printer in every phase of the system. The manual that accompanies the system is clearly written and is absolutely consistent with the menus on the disks. When I called the company with technical and informational questions, I was served quickly and competently.

This package is a potential answer to many problems in teacher education. Students can learn to develop curriculum units on this system and begin their own computer education at the same time. This is a fine system, carefully developed and a bargain at the price. The combination of the program and support behind it make The Learning System an appropriate choice of software for those who wish to author their own teacher/trainer programs.

The Learning System is manufactured by MicroLab, 2310 Skokie Valley Rd., Highland Park, IL 60035.

Price is \$75. ■

Rufus Winsor  
N. Dartmouth, MA

## Micro Mother Goose

**M**icro Mother Goose is a series of nine graphically portrayed Mother Goose rhymes and three modified (Mother Goose theme) video games.

The graphics used in this package, created using the Graphics Magician software, are very well done. The rhymes are accompanied by electronically synthesized music which is generally quite good, except for occasional tempo problems.

The package is organized around two menus—one Blue and one Orange. Each choice on the menus is labelled by both words and symbols. This feature makes it quite easy for young children to associate symbols with the words and then their favorite rhyme. Menu selection is operated around three keys. The space bar steps the cursor through the menus, and the return key selects the choice that is indicated by the cursor. The only other key needed is the escape key, which will exit a program and return to the Blue menu. My two-year-old son already discriminates between the three keys and selects or replays rhymes as desired.

The three video games included on the disk are all rather simple versions of games that all of us have encountered. For example, London Bridge-Out! is simply another version of the familiar Little Brick Out game. However, simple though they may be, they are adequate for a young child to develop hand-eye coordination skills. But how long will they be attracted to these when there are so many more sophisticated computer games in which to become involved?

An important characteristic of this package is the fact that it is not copy protected. It is important for a child to develop a sense of responsibility. I am helping my child learn how to handle disks by allowing him to handle a copy of the Micro Mother Goose

"More and more software manufacturers are turning to C."

disk and place it in the drive. However, if this were the only copy of the disk I had...

Although the authors claim that Micro Mother Goose is suitable for ages three to nine, I feel it is more appropriate for ages three to six. Beyond age six (even earlier), Mother Goose has a difficult time competing with the many other children's characters.

Micro Mother Goose is manufactured by Software Productions, 2357 Southway Drive, Box 21341, Columbus, OH 43221. Price is \$39.95. ■

Michael Waugh  
Athens, GA

### Aztec C

Have you ever thought about learning another programming language? The C language, developed at Bell Laboratories for the Unix project, is an excellent choice. Because of its clarity, power and portability, more and more software manufacturers are turning to C for help in filling the applications software gap.

A modest investment in the Aztec C programming system gives real added value—the C language is a programming environment that serves as a kind of Unix trainer. A shell program is provided that is similar to the DOS command interpreter. It comes with Unix-like command files and another famous (some

would say notorious) Unix hallmark—utilities that seem to be named strangely but that turn out to be mnemonically well designed.

One of the interesting features of Aztec C is that the Apple keyboard and screen device drivers have been rewritten to provide input/output compatibility with Unix. High bits in all your text files will no longer be automatically set. This means that the values of bytes in text files will be true ASCII values, instead of ASCII values plus 128.

Another Unix feature is the redirection of input and output. The ability to redirect input and output means that you can do useful things with files much more quickly than if you had to write the whole routine yourself. As in Unix, the standard input and output stream files are called STDIN and STDOUT. If you want to redirect the output of a program to a

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file named sample, you simply type >sample when running the program. The shell automatically creates and opens the file and then closes it when you are done. You should also be able to redirect the output from STDERR, the standard output stream for error messages, to a file, but the manual does not say how to do this.

In addition, there's a variety of memory-resident shell utility programs. Once you have loaded the shell, they go to work right away. You also get disk-resident utilities on the system disk along with the compiler, the two assemblers and the linker.

A complete manual takes you through the commands for the compilation, assembly and link steps and also shows you how to put together a shell file of commands that will do the whole process automatically for a series of C source files.

**"You'll never go back to FID again."**

The manual is somewhat terse on the subject of adding device drivers to the shell or adding to or changing the library. A very simple step-by-step explanation of just one installation would be very helpful.

These minor shortcomings in the manual are mitigated by the fact that one of the three unprotected disks includes the C and 6502 assembly language source for the stand alone library, the standard I/O routines, the floating point routines, the device drivers and the utility programs.

Getting started is easy. You just boot DOS, insert the disk labeled Startup, type BRUN SHELL, and in a

few moments, you see a question mark: the same prompt you would expect from Unix.

Speed of execution is not what you would expect from a compiled language. This is surprising because C has a reputation as a fast language. I called the company, and they explained that the assembler currently supplied was intermediate P-code interpretive assembler, and that a native code assembler in the works would be much faster.

The shell's ability to process command line arguments makes house-keeping and general maintenance much easier. Once you have deleted seven or eight unneeded files with one use of the rm command, you'll never go back to FID again. And when using argument count and argument vector, you can create your own utilities that work the same way.

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"WizPlus lets you raid these files on the disk."

the overall ease of use is the fact that the default drive is not a moving target. If you catalog the contents of drive 2, it does not automatically become the active drive for subsequent file operations.

Bugs in the language include:

- Index() returns 0 if the character to be searched for in the target string is not found, but in C everything begins at zero.
- Isdigit(), a standard library function which tells you if a character is a digit, is not included. The source for this is in Kernighan and Ritchie, though, so this is a minor inconvenience.
- Putw() doesn't work the first time it is used if the argument is a negative number.
- % (mod operator) gives the correct result only if both arguments are positive.
- The standard I/O library, STDIO.H, must be listed as STDIO.H,D1 if you have it on drive 1; the manual says otherwise, and it does slightly diminish the flexibility.

Graphics are promised for some date in the near future. Although output can be redirected to the printer with the command >PR., there is no real print utility. If you're like me, your old printer has no idea what to do with a tab character, and you'll have to spend some time writing a real print utility.

Vendor support is important for a \$200 product for which you must sign a formidable licensing agreement. Updates are available at \$50 a year. My first update, which arrived a few months after its projected delivery date, included scientific math functions and a new shell that loads programs much faster than the old one.

Initially, before getting the compiler, I wrote to Manx asking about system requirements. They never did answer the letter, which I must admit I found rather strange. It turns out that you need a RAM card to

bring your system up to 64K, and it is hard to imagine doing any amount of useful work without two drives, although it is theoretically possible to work with one drive.

If you're interested in using the C language on the Apple II, Aztec C is for you. The C language is fully implemented, and almost all functions of the standard C library are included. And the Apple Shell really makes the product stand out. Furthermore, the same company makes a C compiler for CP/M systems and for the IBM PC, so when you want to transport your system to another microcomputer (or to a Unix system, for that matter), you won't have to rewrite the whole thing.

Aztec C is manufactured by Manx Software Systems, Box 55, Shrewsbury, NJ 07701. ■

George Girton  
Santa Monica, CA

## WizPlus

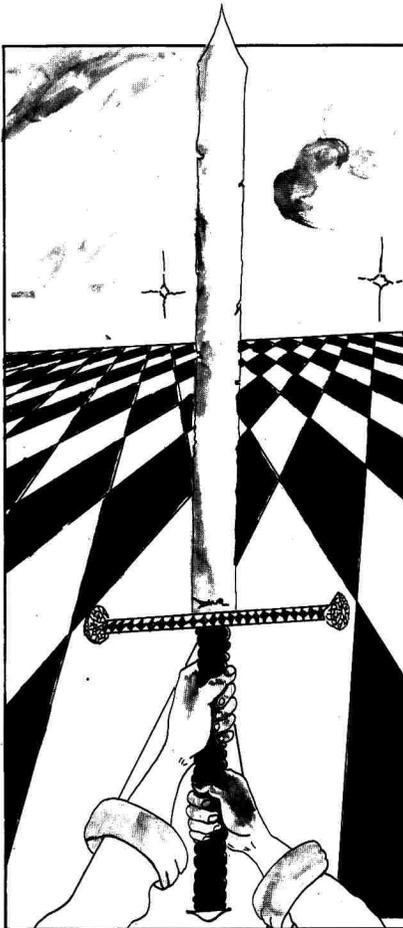
Each month, more and more adventurers, old and young, discover the lure of the Wizardry series of games. Sir-Tech Software started with Proving Grounds of the Mad Overlord, followed with Knight of Diamonds, and now has promised an ongoing series of other scenarios.

These are role-playing games, loosely based on Dungeons and Dragons. You start the game by creating characters; these are your playing pieces, and you can use up to six at a time. You use them to explore the maze in pursuit of the evil wizard Werdna. The characters can be from many races, have various occupations, be good guys or bad, and have many other abilities. Each time you play the games, your characters can grow and develop. They can also weaken and eventually die. The games create disk files for each character and update them after each move. WizPlus, an enhancement to the Wizardry series, lets you raid these files on the disk, find out what is there, and make changes.

WizPlus' 50-page manual is exceptionally well done with many sample menus. Each option is carefully explained. The program is written in Pascal and has its own operating system. Like Wizardry, also written in Pascal, it works fine on an ordinary Apple. Normal DOS commands (LOAD, RUN, LIST) have no effect on WizPlus.

There is a good hi-res title page of the wizard to welcome you to the program. From there on, almost everything is handled by one-key commands from clear and simple menus. The opening menu describes the major abilities of this program: display of a roster of all your characters, examination and modification of any individual character, the updating of characters made by version 1.0 Wizardry, and the transfer of characters to another scenario without deleting them from the original.

Displaying a character shows all the values which define the charac-



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ter. All the familiar terms are there: experience, gold, strength, hit points and so on. Even the password, if you use one, is revealed. Then the real power of WizPlus can be called upon to change any of these values. There is a combination option called Madi Special that restores characters to full health, lowers the age to 18, brings them back to the castle and sets the number of spells to nine.

Boltac Swindle is a very useful option. Boltac is the proprietor of the general store; each character buys weapons and armor there during the game. This option lets you give your characters anything they need without paying for it. In the back of the manual there are complete lists of equipment found in each scenario. You can swindle Boltac out of anything you want. Explore these lists with great care. All these items can be found by exploring the maze, but

even expert players will find only a few of the more exotic ones (Murasama Blade, Lord's Garb, plate mail +5). The manual lists everything, but explains nothing. It's up to you to discover what they do and which ones have powers or curses.

When characters die in the maze or when the power "accidentally" goes off during the game, your band is not returned to the castle. They are labelled Out, and you have to go down in the maze, find them and bring them back. One option lets you restore these Out characters to the castle without risking others.

Other options change all the basic values. Hit points measure the amount of damage a character can take before dying. A value of 100 is very good. WizPlus lets you restore any that are missing or even raise them past 30,000. Ability scores (luck, piety, strength, and so on) can

be set from 0 to 31, even though 18 is the highest used by the game. Age can be set anywhere. Gold and experience points are earned by successfully battling monsters. It could take months to gain a million of either. With WizPlus, these can be set from nothing to almost 1 trillion (although the program bombed when I tried to exceed this).

You can change the name and password, race, class and orientation of characters. Some of these are of dubious value. You can create an unaligned character with no race. Yet, a good ninja may be just what you need. There are times when Wizardry kills a character permanently and declares it Lost Forever. This option restores it to any degree of health you want. You can also kill a character. You will not often need all this power over a character, but WizPlus gives you complete control.

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Finally, you have control of spells. If you are to succeed in Wizardry, you will have to master spells. The game allows only certain spells for particular classes of characters. WizPlus lets you get around that limit. Each spell is listed and it can be given to any character. Any spell can be given to any class. This process can become tedious if you are giving a character all spells at once. Even lowly thieves can now have the full power of priests and mages.

The least satisfying feature of the whole package is the appendix to the manual. There are maps of the 10 levels of Proving Grounds, and although they are generally good, some of the many small errors make me suspect that other advanced Wizardry players should have worked with the author. Level 1 does not show the workroom of the old sorcerer in the dark corridor, nor does it

show the whole corridor. Level 4 does not show the rather large area of rooms at the lower left. Certain doors can only be opened with the right key or statue, and these are not shown. The spell-deadening area on level 5 is not marked. Finally, level 10 could have been mapped more accurately.

There are a few features missing from WizPlus that would have been helpful. Most valuable would have been a printout option to help keep track of a character's abilities and equipment. Experienced players soon develop a set of cards on their characters. A printout would take the place of these cards and give you the information you need.

Another problem is that maps for Knight of Diamonds are missing. The program works with both scenarios and even lists equipment for both. Everything about WizPlus is compat-

ible with both scenarios. The maps, however, are only provided for Proving Grounds.

The final gripe is with the disclaimer in the front of the manual: "Datamost Inc. makes no warranties, either express or implied, with respect to the WizPlus software, its quality, performance, merchantability, or fitness for any particular use."

WizPlus could be just what you need to restore zest to your band of weary warriors and get a stalled adventure back on track. Is it worth \$39.95? Maybe. WizPlus is an entertaining Wizardry enhancement, but it is also a costly investment. It is published by Datamost Inc., 8943 Fullbright Avenue, Chatsworth, CA 91311. ■

Kerry J. Lanz  
Fairfield, CT

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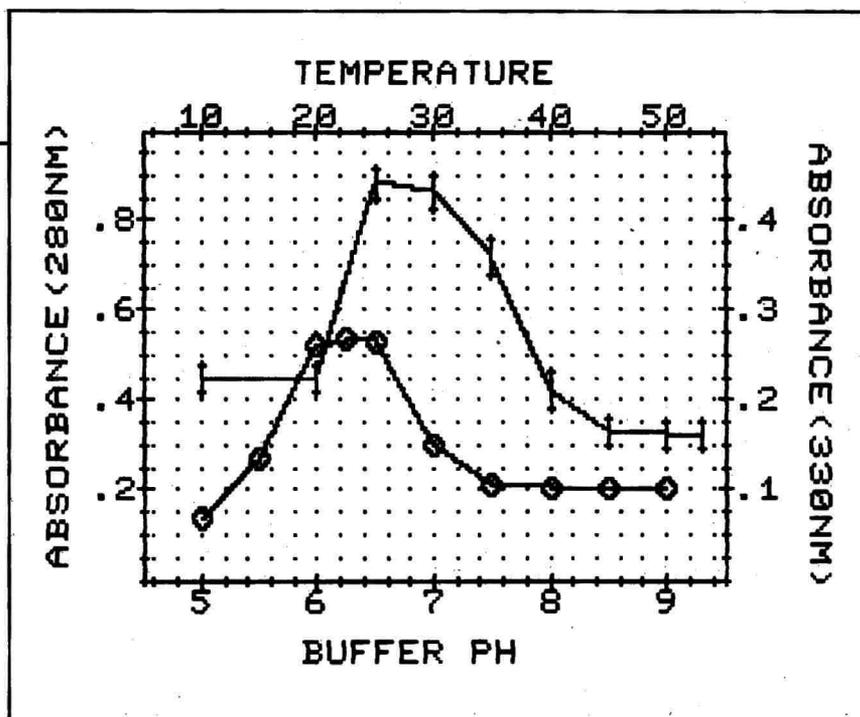
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## Scientific Plotter

Occasionally it is necessary to put away the game disks and do some real work on the computer. For many this work involves reducing piles of data into a form that can be used to impress colleagues or an employer. Making a graph that effectively portrays all the data that has been collected is one way of accomplishing this task.

Graphic representations can be made with any of a number of different plotting programs. However, most of this software is relatively expensive and limited, and is often designed for business statistics reporting. But Interactive Microware Inc., Box 771, State College, PA 16801 has produced a plotting program that is obviously designed for scientific applications.

The Scientific Plotter, which includes several effective demonstrations and an excellent operations manual, can be purchased for \$25. This is a small price to pay for a program that produces professional, camera-ready graphs of scientific data.

The graphs are created by answering simple questions that are presented on the monitor; the results can be viewed at any stage of the process with a simple keystroke. The user can

select the exact height and width of the axes, making it possible to create an appropriate format for effective presentation of the data. Axes are plotted on the screen with a resolution of 280 by 192 points, and there can be as many as 2400 data points using any of 20 different symbols.

Each data point can be accompanied by a standard error bar, a feature not found in some of the more popular and expensive plotting programs. Seven colors are available for plotting the axes, symbols and labels. And the color graphics are terrific for making slides.

With Scientific Plotter, you can store both format and data files. Once a graph format is created, it can be used repeatedly to present several groups of data. Also, multiple line graphs can be produced by overlaying several sets of data on the same format.

A few disadvantages of the program should be noted. This is not a program to select if you want to produce bar or pie graphs. The software creates only line and scatter plots. Also, the program is designed to produce high quality printouts on a number of different printer and interface combinations. Unfortunately, when used with a Grappler printer interface card, it is not possible to print double-size or rotated printouts directly from the program. This prob-

lem can be solved by storing the graph as a picture and then using a screen dump routine with the appropriate interface commands.

In summary, Scientific Plotter is an effective and fast tool for producing high quality graphs. Its low cost and utility are rarities in today's software market. ■

O.T. Wendel  
Kirksville, MO

## Bible Mountain

Bible Mountain is a quiz-type program dealing with the Bible, but it can also be used for homework or other testing situations. The Bible Mountain disk contains five programs, all in standard DOS 3.3 files. Here's a look at each program.

Hello, the Applesoft program that is run when the Bible Mountain disk is booted, loads the program's introduction hi-res screen. This picture is stored unconventionally on the disk (it isn't shown when you catalog the disk), but it loads in less than four seconds.

BM Data Input is an Applesoft program that you run when you want to create your own questions for the Bible Mountain program. BM Shapes is a machine language shape table used in the Bible Mountain program. And Questions is a text file with 60 biblical questions supplied with the disk.

Bible Mountain, the main program on the disk, automatically loads BM Shapes. Next, it asks you to enter the names of the people playing. From two to twenty people can play, making Bible Mountain ideal for Sunday school classes.

Next you are prompted to input the name of the text file which has the questions, or type C to catalog the disk. Unless you've already created your own questions file with the BM Data Input program, type QUESTIONS. After the questions have loaded, press any key to start the game.

Players are divided into two teams.

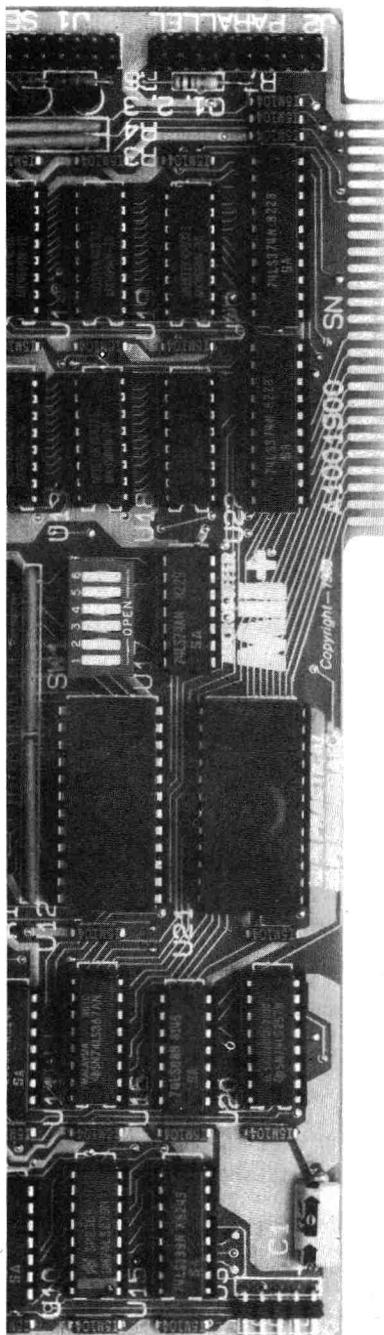
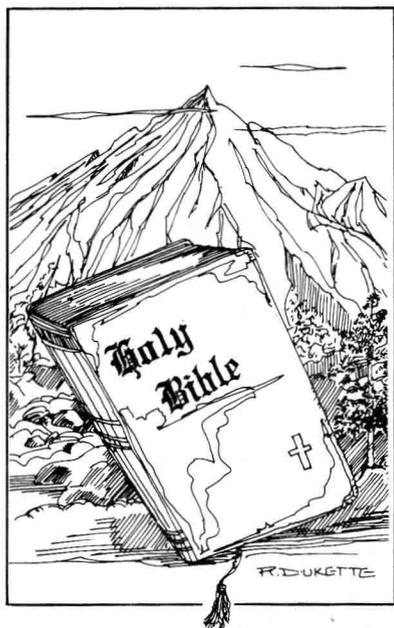
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Team 1 is on the left side of the mountain, and Team 2 is on the right side. The computer asks the players (alternating between the teams) the questions previously loaded. For example, the computer will ask a player from Team 1 the question: "What was the name of the angel who spoke to Mary?" If the player answers "Gabriel," he advances one step up the mountain. If he enters "Gabrial" (correct answer but misspelled), he will still advance one step. Some misspelling is allowed.

If the player enters a wrong answer, no advancement is made; but the computer will give the correct answer followed by a scriptural reference. A correct but misspelled answer will cause the computer to give the correct spelling.

The first team to make it to the top wins. A heavenly surprise awaits at the top. I was delighted when I made it to the top (playing against myself), but I can't tell you what the surprise is here!

Excitement is added with an occasional downpour from the cloud above. The chance of a downpour occurring can be changed within the program. If you are directly below a downpour, your team backslides two steps down the mountain. The cloud itself is constantly in motion as you



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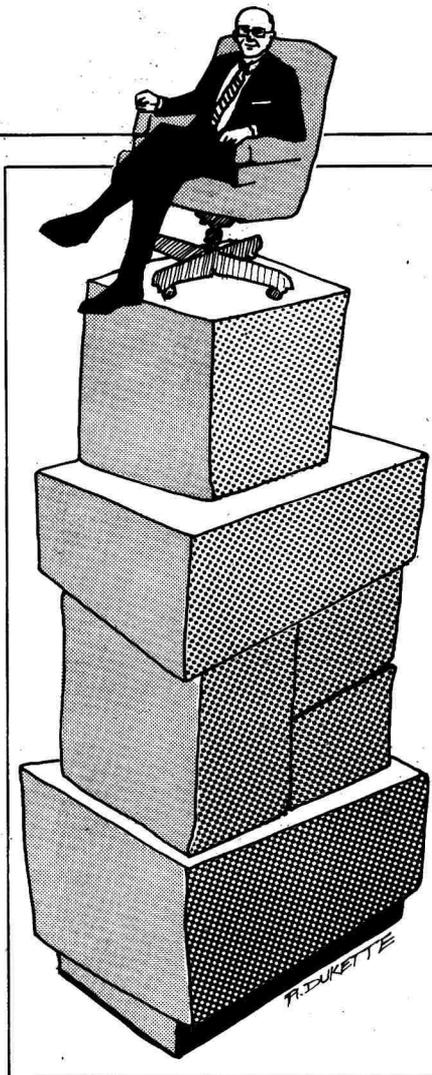
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contemplate an answer.

When a game is over, you're presented with a clear, concise Next Game menu. Here you can reshuffle teams, reshuffle the questions in memory, load new questions from the disk, play the game again or quit the game.

The BM Data Input program allows you to create your own questions for the Bible Mountain program. The questions you enter need not be biblical; in fact, they may be about anything. When you run BM Data Input, you are shown the main menu. Pressing the escape key at any time during the Input program returns you to this main menu.

In conclusion, Bible Mountain is a delightful program for Bible education, and it can be customized for one's own needs. It is manufactured by J&M Software, Box 2132, Athens, TX 75751. Price is \$25. ■

Eric Grammer  
Peterborough, NH

scuttling frantically to place those blocks.

This is an exciting game that is almost as challenging to an adult as it is to a child. If you've got a younger child in the house, it might be a good idea to use the program's Instructor mode. This will give him/her a chance to practice before playing against the clock.

This highly addictive and entertaining game is sold by the MicroLearn division of MicroLab as an educational software package. The game does teach some points about balance and structure, and it develops eye/hand skill. Mostly, it's just good fun and needs no further justification.

MicroLab Inc. is located at 2699 Skokie Valley Road, Highland Park, IL 60035. Price is \$30. The System requirements are a 48K Apple II or an Apple IIe and a disk drive. ■

Brian Murphy  
Fairfield, CT

## Highrise

**H**ighrise is thoroughly addictive. It doesn't make any difference if you're a youngster or a parent. Five minutes with this game and you're hooked.

The object of the game is to build a stable tower of blocks on the hi-res color screen. A little character named Barnaby scuttles back and forth at the bottom of the screen, selecting and catching blocks which tumble from five chutes. Using the arrow keys, the player moves Barnaby and his building block onto a springboard. The block is positioned carefully, then a stroke of the return key hurls the building block into place on the tower.

The blocks come in a variety of shapes and sizes, which diversify as the game progresses. The player has to select the blocks with great care or the whole structure will tumble. Once the blocks are piled to a certain height, indicated on screen by an ar-

row, Barnaby climbs off the screen and the game goes on to the next level of difficulty.

Scoring is based on the number of blocks it takes for the tower to be built. The more you use, the better off you are; but it's also true that lingering too long at one level decreases the amount of time you'll be able to spend on subsequent levels. As you progress from level to level and the number of seconds wanes, the number of chutes available decreases.

By the time an adept player gets beyond the 20th level, there's only one chute working. At these levels, blocks are already in position where the tower must be built, making the player's selection more difficult. At this point the player should have an expert knowledge of which blocks to use, how to position them and how to discard the ones he/she doesn't need. Even armed with this knowledge, the tendency is to have little Mr. Barnaby

## Insta-Load

**I**nsta-Load, a collection of system utility programs sharing space on an unprotected disk, will soup up your disk files and make them much more fun to use. The principal routines are Fastrack, Initializer, Disk Check and Disk Map. Let's start with Fastrack, the star of the show.

Assume for a moment that you have written an enormous Applesoft or binary program and saved it on a disk. Let's also assume that you've been spending sleepless nights worrying about the unreasonable length of time it takes your Apple to load that code into memory. Stop tossing and turning! If you've got the minimum amount of extra disk space available, adding Fastrack will enable you to load your program at 4,000 bytes a second, which is close to 400 percent faster than standard DOS 3.3.

Adding a Fastrack loader to a vacation planning program of 32 sectors, I saved nearly 50 percent of my previous loading time. That amounts

to only seven seconds or so, but the point had been made. Fastrack works. Given a much longer machine language or Applesoft program, the savings in time loading would be even more dramatic and valuable.

The process for Fastracking a program is not difficult to follow. You name the program to be Fastracked and select the drive it will load from, the drive you're saving to and a name for your Fastrack loader program. As you follow the steps, Insta-Load creates a Fastrack loader, which takes about three sectors of disk space and does the actual loading when you want to use your original program.

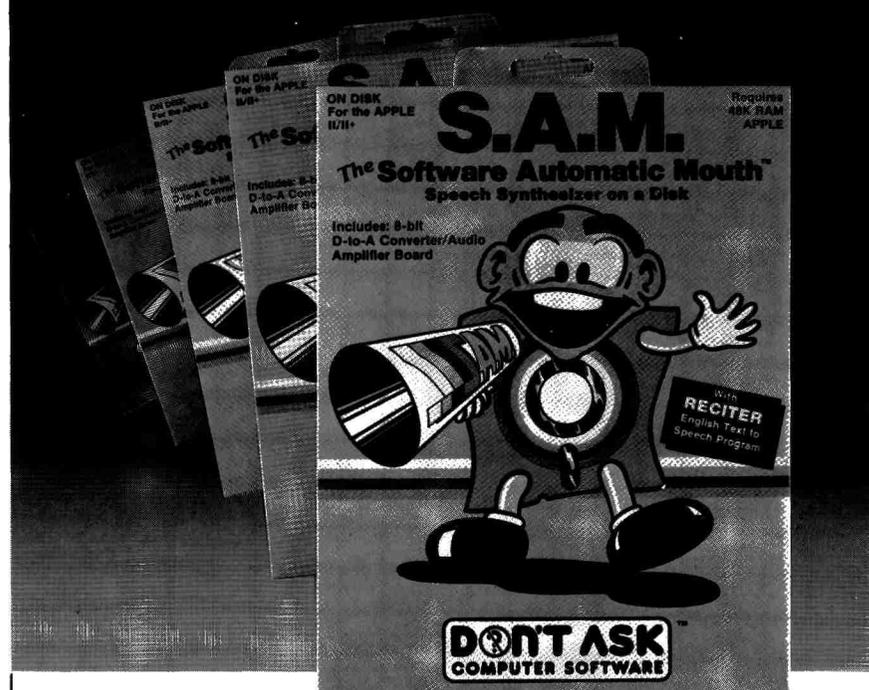
You can use this as a sort of program copying utility in the following way: Load your original program from disk A, Fastrack it with the Insta-Load disk, and save it to an initialized disk B. When you CATALOG disk B, you'll find only the name of your Fastrack loader—but not that of the original program. At this point, just remember to relax. All the data is there on the new disk even though only three or so of the total sectors are showing up on the disk catalog under the name of the Fastrack loader you've just created.

If you want to find the location of the data, just use another of Insta-Load's features, the Disk Map utility. The Disk Map is easy to use and works efficiently. It will scan any unprotected disk, letting you know on a screen graphic which sectors are free, how many bytes of memory you have left and where certain programs are located on the disk.

Across the top of the graphic is a series of characters flagging each track by its hexadecimal value. Along the side of the graphic is a vertical register showing the hex values of the sectors. Routines used in Disk Map show the number of free tracks, the number of bytes left on the disk for new programs and the exact locations of named programs. With this utility, you can literally fill a disk to the brim; you know exactly how far you can go until you run out of space.

The Disk Check program is extremely useful. The program's Quick Check routine will quickly tip you off

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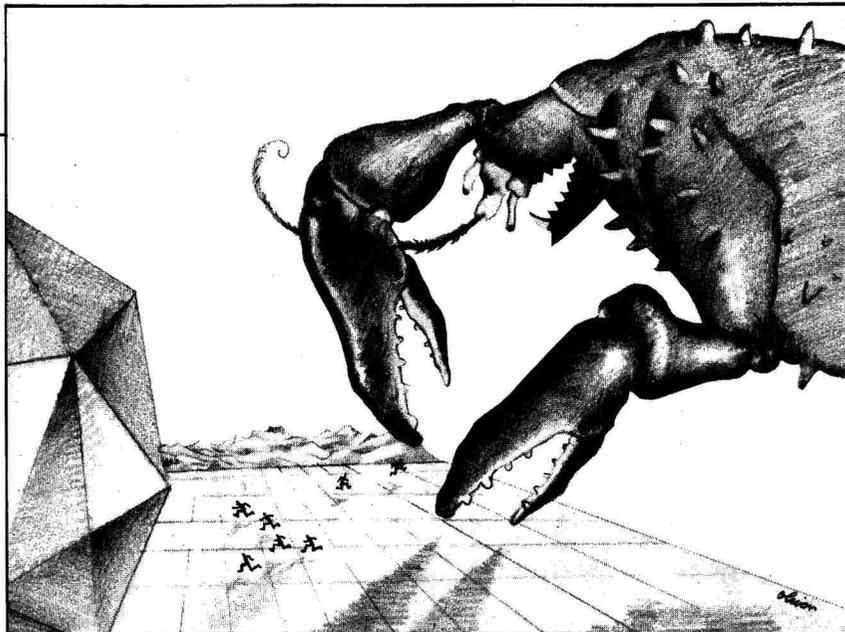
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to the presence of bad sectors on an unprotected disk. If unreliable sectors are detected, you then use the Disk Mark routine. It flags the sectors in the Volume Table of Contents so that the DOS will automatically avoid them and save programs and data only on the unflagged sectors. A double benefit is that you are able to use a disk with a limited number of bad sectors without risking the loss of valuable data.

The Initializer utility is a routine that automatically formats a blank disk; you don't have to write or load a Hello program. The utility also stores Integer Basic on the disk for loading onto a language card. An added benefit is that the Initializer enables you to boot your disk more quickly. Just make sure, if you're using a one drive system, that you don't initialize your Insta-Load disk by accident.

Insta-Load is a product that performs several disk utility chores with great efficiency. Of all the routines, Disk Map seems to be the most useful, allowing you to freely scan all your disks. The Disk Check routine is a virtual insurance policy. It can set your mind at ease about a suspicious disk and protect you from a bad one. Add to these utilities the rapid file loading features of Fastrack and you have a very versatile DOS utility disk indeed.

Eden II Computing, the manufacturer, can be contacted by writing to Box 959, Pebble Beach, CA 93953.

Price is \$19.95. ■

Brian Murphy  
Fairfield, CT

## Dark Crystal

**T**he Dark Crystal, a fantasy film conceived by Jim Henson of The Muppets fame, is also an adventure game you can play on your Apple.

It takes place in a strange land of magic and monsters. The crystal, once an object of beauty and light, has been damaged and shines no more. A fragment of the crystal has been lost. The urSkeks, evil beings created at the time of the crystal's darkening, have vowed to destroy or enslave all other living creatures on the planet. To assist them, enormous crab-like monsters have been dispatched to all parts of the land to kill all who may be found.

Your task is to guide Jen and Kira, the two surviving Gelfings, as they search for the missing crystal shard; they must find the shard before the planet's three suns converge over the spot where the crystal is suspended. If you succeed, joy returns to the world. If you fail, the urSkeks will rule in darkness for all eternity.

The program comes on a pair of double-sided disks. Side A of disk 1 is used to boot the program. The remaining three sides contain the adventure (graphic scenes and descriptive text).

Interacting with the program is accomplished via two-word commands (e.g., THROW SWORD). Directions (north, east, south, west, up and down) may all be abbreviated to a single letter. All other commands must be completely (and correctly) spelled out.

Dark Crystal is a big adventure, containing approximately 100 rooms and locations. Although no sound or motion is used, the hi-res drawings are superb. One program feature I especially liked was the ability to save the game at multiple points. When saving, you are prompted for a letter between A and O, each of which may be restored at a later time. Most other adventures allow you to save only one version per disk—the most recent one. Because of the multiple save feature, you can explore old areas of the program without having to start over from scratch each time.

The program is most appropriate for the beginning to intermediate adventurer. Most of the puzzles are easily solved, but a few will probably keep you guessing for hours.

In many ways, my feelings toward the program are ambivalent. The idea of transforming a popular movie into a computer game is an exciting one and is sure to generate a buying audience that might not, under normal conditions, be interested in adventure programs. Completion of the program, however, left me feeling a little betrayed. I expected more than Dark Crystal was able to offer. I spent two days examining objects and trying all possible commands in each location. But the vast majority of locations serve no purpose other than a change of scenery. There are only a handful of objects to find, and useful clues are held to a minimum. Play consists mainly of wandering around until you bump into something important.

The player is not expected to drum up imaginative uses of objects to save him/herself. The solution of most riddles involves guessing what one possible command the program parser is expecting. Equivalent meaning, in most cases, will not suffice.

Finally, the program is extremely

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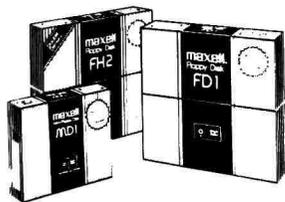


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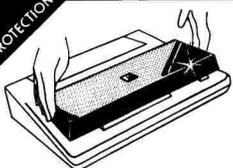
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## Software Reviews

disk-intensive. The disk is accessed every time the player wishes to move. I assume this is done to load a picture or necessary text. The Restore Game procedure is particularly annoying since it involves three separate disk swaps: one to reload the beginning of the program, one to restore the game, and the appropriate disk for that phase of play. You haven't really experienced frustration until you have made 30 or so unsuccessful guesses at a Dark Crystal riddle and had to re-boot after each one. At times, I feared more for the life of my disk drive than for the life of Jen.

As an artistic effort (hi-res, that is), Dark Crystal is exceptional. As an adventure, however, it's only mediocre. Dark Crystal is sold by Sierra On-Line Inc., Sierra On-Line Building, Coarsegold, CA 93614. It requires an Apple II or II Plus with 48K and a single drive. Price is \$39.95. ■

Steven Schwartz  
Pittsburgh, PA

### Sight 'N' Sound

The good old days of the 1960's rock light shows are gone but not forgotten; they live on in Sight 'N' Sound, a program that allows you to stage a hi-res color light show on your monitor to match any music you play.

Programmer Ray Balbes has designed an unusual and entertaining program that responds to an audio signal through the Tape Input jack in the back of your Apple II. The program distinguishes different tones and rhythms as they are inputted into the Apple. You can use any audio source that can be connected to an RCA style jack and cable (the cable that may have been supplied with your Apple is perfect). The most likely sources are portable cassettes and the Tape Out jack of your stereo receiver or preamp. The program interprets the audio signal your Apple "hears" into hi-res graphics that move rhythmically on screen.

You can design your own light show with Sight 'N' Sound. The

printed documentation shows how to plot center points for the kaleidoscopic screen displays you will use. The technique is essentially the same as plotting points on the hi-res graphics screen. You may draw lines between these points in any of seven colors, or let the program randomly assign colors from instant to instant as the routine runs.

You have the option of placing dancing shapes from Sight 'N' Sound's own shape tables on the screen or making geometric forms that will move to the music. You can fill as much of the screen as you like, and you can put dancing graphics on the screen and make them respond quickly or slowly to the music. In the Slow Response mode, the shapes take longer to appear on screen and they linger before disappearing. The advantage is that they fill the screen more completely. At the faster speeds, the shapes appear to move in better time to the music, but they fill less of the screen. Experiment to see which time setting suits you best. Since the setting ranges in value from 1 to 255, you should be able to find a setting that suits you perfectly.

Once you have the light show just the way you want it, you may save the data to the program disk or to your own work disk. You may load the data for later use whenever you like, recreating the light show exactly as you designed it. If you tire of your own light shows, you may run some of the demonstration shows provided with the disk. The first kaleidoscope program is a beauty; you'll find it hard to resist playing every record you own through it to see how the music looks.

Sight 'N' Sound's documentation offers assistance to programmers who want to use the package as a utility to create their own programs. You may also copy the disk as needed for back-up purposes.

Information and ordering for this program is obtainable from Balbes Software Systems, #6 White Plains Rd., St. Louis, MO 63017. Price is \$24.95. ■

Brian Murphy  
Fairfield, CT

## VIS\Bridge/SORT

**V**IS\Bridge/SORT is a unique program you use in conjunction with VisiCalc to sort either your rows or columns in ascending or descending order.

You may have the data from your utility bills or sales records, for example, in VisiCalc files on a monthly basis. While it's important to see their monthly trend, wouldn't it also be helpful to see what those figures look like sorted from the highest to the lowest?

Do you have a number of stores or divisions or salespeople? Would it be informative to structure their sales information from high to low?

This package will not only sort your VisiCalc files, it will let you save the new, sorted files for other use. If, for instance, you access them now with a graphics program, you'll be able to plot the new, sorted files too.

The program isn't perfect; it requires a bit of disk swapping to get the end result, but that doesn't detract from the fact that it works. There are some typographical errors in the display in the early version, but the folks at Solutions Inc. stated they will be fixed.

The system allows you to use up to five rows or columns to specify the final sorting you want. Remember that you can only sort on rows or columns at one time.

Let's say you use VisiCalc to track sales information. Obviously, your actual data will encompass an entire year, while this sample only shows three months.

If you run this information through VIS\Bridge/SORT you can design up to five sort priorities. You might instruct the system to sort first on the January sales figure—to list the production of your best salesperson first.

A second priority may have to do with "tie" conditions: If two salespeople have the same sales for the period, you can instruct the system to list them in alphabetical order, either ascending or de-

**"The program isn't perfect; it requires a bit of disk swapping to get the end result, but that doesn't detract from the fact that it works."**

scending.

The first priority told the program to look through the January sales figures and put them in high-to-low order. The second sort instruction told the system—if there was a tie for two sales amounts—to put the names of the salespeople in alphabetical order.

If this process sounds difficult, it's not. You use the number 1 for your first priority, 2 for the second, and so on, up to a total of five. If you want your data to sort with the highest number first, you put a minus sign in front of the priority number (-1, -4, etc.). If you want it to display in ascending order, you simply put the number in (1, 4, etc.).

These priority codes are put into your spreadsheet immediately to the left of rows you want to sort, or right above columns if you're sorting them. You use the VisiCalc INSERT command to make a blank row or column for your codes. The only time the system will look for a secondary sort code is when there is a tie between two or more items after they've gone through the first criteria.

You'll get a proper sort only if the row or column you sort contains the same type of information. You want it to be all numbers, or all labels. If VIS\Bridge/SORT finds any nonnumeric character in a row or column, all the items will be sorted in alphabetic sequence.

The manual explains that if a number is left justified (as VisiCalc labels normally are), a single-digit number like 5 will be stored as a 5 followed by a blank space. When the program looks at it to put it into order, it looks at just the first character. So, the number 5 comes after 17, because 5 is larger than 1.

Normally, any information you store in VisiCalc will be the same type—all numerical or all alphabetical—in any row or column, so you may never run into this situation.

While the 34-page manual (without an index) isn't a tutorial, it does come with a brief tutorial section in the back that covers an example file, which is included on the program disk. This part makes the system easier to grasp than the main section of the manual does.

Unless your VIS\Bridge/SORT program and your sorted files are on the same disk, you get an error when the system switches from its program file to your data. Although you can recover from it without any real difficulty, the manual should mention that you need to have both this program and your working files on the same disk.

I somehow got lost in an error loop and the manual was not helpful. Worse, the instructions I did see were not clear. While this sort of package is obviously geared to someone who's familiar with their Apple and doesn't get upset when they run into such a problem, it'd be a definite improvement if the error handling were better.

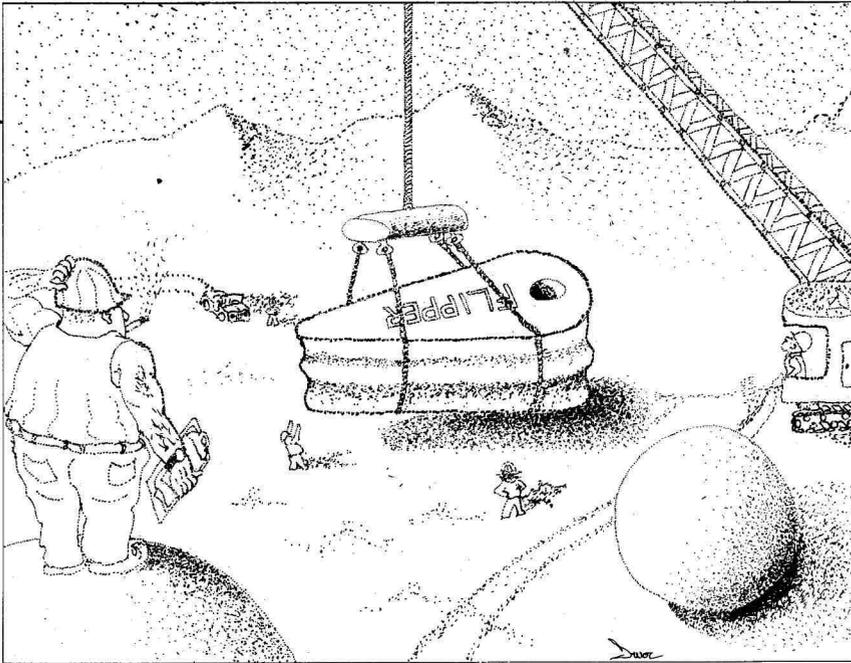
All in all, however, this system is a useful utility. Anyone who uses VisiCalc will find it's a good value.

VIS\Bridge/SORT is manufactured by Solutions Inc., Box 989, Montpelier, VT 05602. Price is \$89. ■

**Greg Glau  
Prescott, AZ**

## Pinball Construction Set

**I**wonder how many pinball aficionados there are in the U.S.? There certainly must be enough to make Bill Budge's Pinball Construction Set a bestseller. This program goes beyond the "load and play" of other Apple pinball games. You can create and test an unlimited number of pinball variations with it, and you can save them on your own disks for later play.



There's no soldering required!

Building your pinball game can be divided into three areas: selection of standard parts (bumpers, flippers, etc.); advanced design—creating and painting obstacles, selecting scoring values and sound effects, modifying standard settings (like gravity, speed, etc.); and testing and creating your own game disks.

#### Selection of Parts

Pinball Construction Set begins by displaying the outline of a pinball game board, an array of parts, and graphic symbols for the alternate construction modes. Virtually all interactions with the program are performed with a joystick. In the Initial mode, you select items from the parts box (like bumpers, flippers and magnets) with a pointing hand by guiding the hand to the part desired, pressing the joystick button, dragging the part onto the playing field and releasing the button when the part is correctly situated. Until your design is saved, nothing is permanent. Using the same procedure, you may reposition the part as often as you like. If you decide to remove it altogether, just drag it back into the parts box.

Parts include two sizes of flippers, balls, round and oblong bumpers, knockers, slingshots, a ball launcher, a vertical and a horizontal set of drop targets, a ball

catcher/hopper, a magnet, spinners, a ball disintegrator, lanes and gates, rollover lights and targets. This array of parts allows you to design a variety of sophisticated games.

#### Advanced Design

Additional obstacles can be included in the playing field. A square shape is provided that can be combined with other squares and transformed into any shape, with judicious use of a hammer and pair of scissors. Several standard shapes are provided in the parts box, including two straight lines (useful for creating the ball launch chute) and two diagonal lines.

To paint the obstacle, you exchange the pointing hand for a paintbrush, dip it in your favorite color and touch the shape(s) you wish to paint. A magnifier symbol is available for painting fine details. If you like, you may design a hi-res name for the game by moving the magnifier into the upper section of the parts box—a nice final touch. Also, for those without color displays, a black and white magnifier may be used.

A special wiring kit is available for changing the scoring and sound effects associated with each part in your game. You may also select a series of conditions that must occur to obtain bonus points or increase the bonus multiplier (two to five

times the bonus points acquired during the turn). For example, you can indicate that bumpers one, two and three must be hit to obtain a 3000 point bonus. Each part selected continues to retain its individual scoring value (say, 30 points). These conditions may be changed as often as you like using a wirecutter to nullify conditions and a screwdriver to choose new ones.

You can increase or decrease the effects of gravity, speed, kicking strength of bumpers, and elasticity of collisions between the ball and non-bumper obstacles. Note that this affects all parts in your game and may not be applied selectively.

#### Testing and Saving Games

To test your game, place one or more balls on the playing field and then move the pointing hand to the play symbol—a flipper and ball. The game will now function as it would in normal play. You can examine the scoring process, see if there are places the ball gets stuck, and determine if bumpers and other objects have the desired interactions.

At any point during construction you may save the game to your own disk. This is particularly useful prior to major modifications. You may also opt to make your own game for play independent of the Construction Set. The program takes the information from your saved game and writes a machine language program to your disk. Now, whenever you like, you can BRUN the game. Since each game requires over 100 sectors of storage, approximately three may be saved per disk. Each game allows from one to four players, five balls each.

#### Evaluation

The weakest part of the package, perhaps the only weakness, is the instruction manual. In the more difficult construction techniques, examples are noticeably absent. Most problems that you encounter will have to be resolved through experimentation, trial and error, or simply deciding that you have run

into a program limitation. Examples of such situations include changing the base of the game so there are other places where a ball can drain, and determining which obstacles are solid.

The limitations of Pinball Construction Set are few. Complex and exciting games that rival those being commercially marketed can be created. Its no-programming-required approach makes it simple enough for anyone to use. As a game creation device, it has no equal.

Pinball Construction Set is sold through Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403. Price is \$40. ■

Steven Schwartz  
Pittsburgh, PA



## The Caverns of Freitag

Many of you are familiar with the Dungeons and Dragons-type games for the Apple. Did you ever wish that you could see the monsters as they approached or watch your arrows fly? The manufacturers of Caverns of Freitag have added this active visual element and created an arcade-style adventure.

Caverns of Freitag takes place in an extensive set of maze-like tunnels and caverns. The object of the game is to locate and slay the evil dragon Freitag while escaping from or eliminating the endless array of monsters and creatures that want to kill you. You begin each game with a relatively low number of hit points. If your points drop to zero while in combat, the game ends with your death. Successful combat encounters, however, enable you to advance to more powerful classes with a greater number of hit points.

You always start at the Inn, armed with a standard sword, shield, and a dozen arrows. Each time you return to the Inn, all hit points lost in battle are replenished.

If you have defeated a sufficient number of the caverns' inhabitants, you may be awarded an advancement to a higher warrior class. You may also trade gold for arrows or extra hit points (beyond those normally credited to your given class).

The game is controlled entirely with the Apple keyboard. Exploring the terrain requires the use of nine directional keys (T, Y, U, G, H, J, B, N and M). These same keys, in conjunction with the control key, are used to attack the monsters. For example, to dispatch an electric moth that is situated diagonally to your right, you press control-M. Sword attacks may occur in any direction as long as no spaces separate the monster from you. Attacks with your bow and arrows, on the other hand, may only take place at a distance of two or more squares and must not be in a diagonal direction. Combat is resolved on the basis of hit points. Each time you strike a monster with sword or arrow (or one strikes you), hit points are subtracted from the object of the attack. Once the monster's hit points are reduced to zero, it dies and disappears.

Each type of monster has a set number of hit points and its own

special characteristics. Although most can only move one square per turn and must be in an adjacent square to attack you, one can move multiple squares and another can cast debilitating spells from a distance. Attack patterns vary from species to species. Some must attack only horizontally or vertically, while others may also use the diagonals. As you gain combat experience, this knowledge will be crucial in assuring your continued survival.

One key element of the game is the capture of treasure chests that are scattered liberally throughout the maze. Chests may contain gold, arrows, a more powerful sword or shield, or perhaps nothing. On the other hand, a few chests are teleporters, and you may find yourself instantly whisked to an unfamiliar and often fatal section of the maze.

In addition to the monsters, healers may be encountered. These strange blockheads may be used to restore some hit points when you are far from the Inn. Unlike the treasure chests and the Inn, however, the healers are mobile and you will have to chase them.

Other than fighting the monsters or trying to move out of their way,

you have a magic spell at your command. By pressing escape you are temporarily transformed into a long-legged bird and can run twice as fast as normal. Unlike your warrior persona, you are defenseless against attacks in this state; you can't take advantage of special screen commands to see where you are going. At the end of your flight, you must rest for two turns.

Caverns of Freitag offers three different display modes that you may shift to at any time. Mode 1 is standard and it graphically shows only the immediate vicinity—10 by 9 squares. Mode 2 displays the same area in text mode. Each monster is represented by the first letter of its name. It also shows your present class, special weapons, hit points remaining, gold on hand and so on. Mode 3 shows a hi-res map. Although it does not display monsters, it is useful for planning your direction of movement and locating healers. While playing, you may press the colon key to recenter the display in modes 1 and 2. In all other cases, the display shifts only when you move off screen.

Caverns of Freitag may be played at any of nine difficulty levels. And be prepared to invest some time. To win the game, even at level one, requires at least an hour. If you're like most players, however, it will be some time before you reach this level of skill. One nice feature is that, at least within a given skill level, the maze is always the same from game to game. Once you understand the game features and learn the monsters' various strengths and other characteristics, the game becomes one of biding your time while advancing far enough in class to successfully approach Freitag. Although the instructions do not specify it, you must return to the Inn after slaying Freitag to truly complete the adventure. The surprise ending is a great touch!

The only negative aspect of the game is a lack of a pause command for freezing a game in progress. One effective solution is to return to the

Inn and kill everything in the immediate vicinity before leaving the game. But this is not completely effective because all monsters continually follow your movements. If any were moving toward you—even from 50 to 100 spaces away—and their movements are not blocked by a wall, be assured that they *will* catch up with you.

Caverns of Freitag is a captivating game. Although it does not show the actual sword strokes, it allows you to experience Freitag's monster-laden world and perform heroic acts in your own home. It requires an Apple II+ or IIe and a single disk drive. Caverns of Freitag is distributed by Muse Software, 347 N. Charles Street, Baltimore, MD 21201 and retails for \$29.95. ■

Steven Schwartz  
Pittsburgh, PA

## Apple Writer IIe

**A**pple Writer IIe is a powerful word processor that is easy to learn and use. It is designed to take advantage of the expanded keyboard and additional function keys on the IIe; and it has distinct advantages over otherwise fine word processors.

For instance, scrolling, deletion and general editing and cursor movement are more natural because certain keys have been dedicated to these functions. As a result, fewer keystrokes are needed for some commands. With Apple Writer IIe, you can prepare letters, tables, reports, articles, lists and even book-length manuscripts. The flexibility of print formatting and the convenience of screen preview prior to printout are outstanding, and the list price of \$195 is not unreasonable considering the quality of this product.

Apple Writer IIe comes with two volumes of documentation, one dealing with the word processor itself and the other detailing its word processing language—a built-in utility for automating word process-

ing operations. These manuals are probably among the best I have seen for *any* piece of software. They are lucid, well organized and indexed.

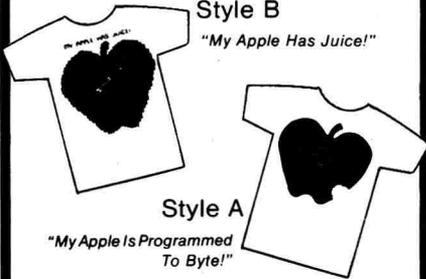
Apple Writer IIe itself comes as a copy-protected, two-disk set. After bootup, you are asked if you need any help before going to the main Entry/Edit mode of the program. The Help menu can be also called at any time during program operation. Pressing return sends you into Entry/Edit mode; you are presented with a single data line at the top of the screen and a flashing cursor immediately below. The data line is a single line in 80-column format (two lines in 40-column) that gives information such as the name of the document currently in memory, the length of the document, the position of the cursor and the amount of available memory left.

With Apple Writer IIe, entry, editing and review are all part of the same level of user interaction. There is no formal switching from one to the other; this is logical because most of the user's time is spent performing one or the other of these operations. Text entry involves typing characters on the keyboard; these are placed in memory as part of the document and echoed to the TV or monitor screen. Editing refers to operations such as inserting or deleting text, making block moves of text from one part of the document to another, finding and replacing selected words or passages and so on. The review of text already entered, also known as scrolling, is analogous to manually paging through a document.

With Apple Writer IIe, a single keypress will move the cursor one character to the right or left, or one line up or down. Hold any of the cursor movement keys down, and thanks to Apple Writer's autorepeat function, the cursor movement will continue in the corresponding direction automatically. Holding down the up or down arrow keys allows scrolling of text for purposes of reviewing what has been entered. Cursor movement can also be *amplified* by pressing

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Hello thayuh. This is Eben Flow, proprietor of the Fish or Cut Bait Company, buyer and seller of lobstah bait for 49 years. My hobbies are collecting linoleum samples, squashing flies and playing pac-person on my home computer.

But here on Martinicus Rock, off the coast of Maine, the power can be a tad erratic. So, to cure the brownout and blackout problems, and to keep them spikes and surges off my picture tube, I got me a **MAYDAY** Uninterruptible Power Supply from SUN RESEARCH. Them fellas fixed me up real good and real light on my pocketbook, too. Got me a **MAYDAY** for my mini-calcaputer with a voltage regulator and everything for only 325 clams. They even included the battery in a nice waterproof box. Handy out here, you know. Now, if **MAYDAY** would only keep them sea dogs out of my barrel. . .

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the solid apple key at the same time you press one of the arrow keys: the cursor will then jump left or right a word at a time, or it will jump up or down twelve lines at a time, depending on the key pressed. (Left-right jumps will not exceed 12 characters, however.) The cursor can also be moved from one tab stop to another by pressing the solid apple key and the tab key simultaneously.

When entering text with Apple Writer IIe, you will normally be in the Insert mode. Wherever you are in the document, text will be inserted as you type, pushing words to the right and below the cursor ahead of it.

Alternatively, you can perform a primitive form of editing by typing in Apple Writer IIe's Replace mode: by pressing control-R, you can type over existing text, replacing it with characters entered from the keyboard. Press Control-R again and you are back in Insert mode. This method of replacing text directly is sometimes quite convenient.

Whether in Insert or Replace mode, "word wrap-around" is in effect, unless purposefully disabled. A word is any continuous set of non-space characters. If you are nearing the end of a line, long words may be split between the current line and the beginning of the next one. The wrap-around feature avoids these word breaks by placing the entire word on the next line automatically.

Deletion of text with Apple Writer IIe proceeds backwards. When you press the delete key at the upper right of the keyboard, the cursor moves from right to left and from the current line to the line above. As it moves the cursor erases the characters over which it passes. This action is much like a little Pac-Man eating backwards and pulling a long train of text behind it. In practice, this backwards deletion is natural. As you enter text, it is much faster to correct your mistakes as you make them with one or more delete keypresses. In cases where errors are later found within

a block of text, no motion is lost because the cursor has to be positioned first anyway.

Two other types of editing operations, text moves and finding/replacing text, fall under the category of global editing functions.

You can perform block moves of text with the two apple function keys and with control-W and control-X. Basically, you move text from the document into a small buffer in memory; it can then be inserted anywhere in the document. You use control-X to move entire paragraphs and control-W to move a word at a time into the memory buffer prior to actual insertion. When using the solid apple key, in conjunction with control-X and control-W, you can copy into the buffer for later reinsertion and still leave the original text intact—this is equivalent to a block copy operation. The only limitation is how much text can be moved in any one operation. The size of the memory buffer is only 1024 bytes, about the size of a medium size paragraph. Therefore, longer passages require multiple move operations.

Another editing function, Find/Replace, locates specific words or passages within the text and replaces them with other text. In the Apple Writer IIe, this function is easy to use and flexible. There are a variety of characters that one can use as delimiters to specify wild-cards (any character), any length, and carriage returns. The F/R command can be used to correct spellings and to systematically replace names, dates, phrases and other data in the document. The execution is fast, and you have the option of both automatic and prompt modes of operation. In long documents, which have recurring section or unit numbers, F/R can be employed for scrolling.

Apple Writer IIe even has a split screen function. This allows for the comparison of two non-continuous parts of a document in memory on the same screen. In this mode you have two twelve-line displays, one on top of the other, and each with

its own data line. You can edit each displayed portion independently by toggling back and forth as necessary. In fact, since two documents may be coresident in memory, two different texts could be compared and edited. This is explained in the manual.

Storage and retrieval involves more than just saving and loading a document to and from a disk. Naturally, you should be able to name and rename a document, load, save, lock, unlock and so forth. However, you should also be able to merge small documents into larger ones so that you will be able to print large reports or manuscripts that will not fit all at once in memory. *Selective* retrieval and storage of *parts* of a document is desirable. And, at any time during Editing/Entry, you must have immediate access to any word processing utilities on disk.

Apple Writer IIe provides all the essential features mentioned. The control-S and control-L commands are used to save and load a document. Selected parts of a document can be transferred by means of appropriate command parameters. All disk commands are presented in the form of a menu that can be called up by a single control code—O. Further, disk utilities written in the Word Processing Language (WPL) as well as tabulation files, print value tables and glossary files can be saved or loaded quickly. New disks can be initialized, without DOS of course, at any time. This is enough for about 60 double-spaced typewritten pages.

In judging a word processor from the aspect of format/preview/print-out, you should ask at least these questions:

- How easy is it to issue print commands and to change them when needed?
- Can you see the final, formatted document on the screen before printout—can you preview it?
- How quickly and conveniently can you jump from the Edit/Entry mode to the Preview mode in order to see the effect of your for-

mat commands?

Other important considerations are whether you can print part of a document and whether you can chain documents together for long continuous printouts with consecutive page numbers.

One of the strengths of Apple Writer IIe is that it meets all of the above criteria admirably. The manner in which the document is printed is determined by print values. Print values can be set or embedded directly into text while in Entry/Edit mode, or they can be set in a print value table. Print values apply to such things as top, bottom, left and right margin widths, line spacing, paragraph margins, justification mode, single page option and print destination (printer or screen).

Text can be justified in any one of four ways using the appropriate two-letter command. Left and right justification yields smooth left and right borders. Fill justification gives smooth borders on both sides. Center justification is usually employed to center headings, titles and so on.

Previewing text involves setting the print destination parameter equal to zero. (Slot 0 refers to the monitor screen.) You then issue one of two printout commands, NP or CP, and the text is printed out on the screen. Control of this screen preview is limited but adequate. You can start and stop the printout with control-S, or exit with the escape key.

The commands to print, NP and CP, mean "new printout" and "continue printing." With NP, the document is printed out with page numbers beginning with #1. With CP, the document is printed out starting at the place where the prior printout left off, and continuing from the last page number used. One use for the CP command is to print out multiple files as one long continuous document; chapters in a book for example can be combined into a consecutively numbered manuscript.

Just how are these print values

issued? First, you can call up a print value table with control-P and set the parameters as desired. Second, you can embed the print values directly into text; this is done by placing each two-letter parameter on a separate line along with its numeric value, if any. Such embedded commands supersede any values previously set in the table. Embedded commands which require numeric values, margin widths for example, can be set with either *absolute* or *relative* values. The relative method (plus or minus sign in front of the number) is convenient for formatting selected passages of text, and restoring the old table values at the end of such passages.

Another feature is the ENABLE/DISABLE PRINTOUT command. The EP command is embedded in text. Setting EP to 0 disables printout, and nothing will be sent to the printer (or screen) until the enable print command, EPI, is encountered. Multiple sections may be selectively enabled or disabled throughout a single document.

In summary, the strong points of Apple Writer IIe include excellent documentation and ease of learning and use. It cannot perform office and database management functions found on larger word processing systems, but it will perform many business tasks such as automated form letter and report generation. The ability to quickly change from Editing to Screen Preview mode, the host of easy to use formatting features, and its integration with the expanded Apple IIe keyboard are among Apple Writer IIe's other outstanding features. Most of the drawbacks mentioned are related to the restricted memory space, a limitation that probably could be remedied in future releases. None of the deficiencies are serious.

Apple Writer IIe is manufactured by Apple Computer, 20525 Mariani Ave., Cupertino, CA 95014. ■

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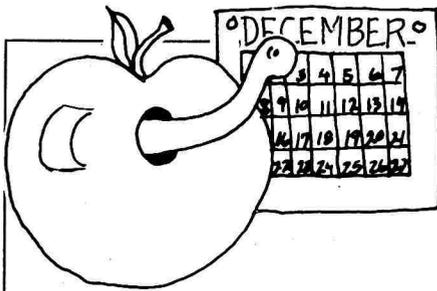
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## Micro Macros, October

There are a couple of errors in Sandy Mossberg's "Micro Macros" in the October issue. First, on page 126 in the seventh line of the third column, the BSAVE command for Keymac should read BSAVE KEYMAC, A\$93B2, L\$1B8.

Also, a byte was omitted from the hex listing. At the bottom of page 130, insert location 949E containing 00.

—the editors

## Tally Ho!, September

Reginald Blue's Scorekeeper program in the September issue (page 102) doesn't record the top two scores as it should. Replacing lines 720 through 770 with the following lines will fix the problem:

```
720 IF SC > HS(N) THEN LS(N) =
      HS(N): P2$(N) = P1$(N): HS(N) =
      SC: P1$(N) = R$: GOTO 230
730 IF SC > LS(N) THEN LS(N) = SC
      P2$(N) = R$: GOTO 230
740 PRINT : PRINT : PRINT SC" IS
      NOT A HIGH SCORE": PRINT
750 PRINT "PRESS ANY KEY TO
      CONTINUE "; GET Y$: GOTO 230
```

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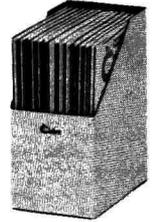
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## The Apple Dot Matrix Printer

For those who have wished that Apple would manufacture a dot matrix printer that uses normal paper and offers special printing functions, the wait is over. Enter the Apple Dot Matrix Printer, or DMP for short.

### Vital Statistics

The DMP is a solidly built parallel printer. Print speed is 120 cps at 10 characters per inch. It prints bidirectionally and uses logic seeking to enhance print speed. With its built-in tractor and paper roller bar, it can easily accommodate pin feed or standard typing paper through the paper inlet at the top rear.

### Printer Setup

The DMP I received for review contained an Apple II Parallel Interface Card, the appropriate connecting cables, ribbon cartridge and operator's guide. Versions are also available for the IIe and III. I had some difficulty following the instructions for card and cable installation on my II Plus because the text and pictures indicated that the cable connected directly through the slot in the back to the interface card. Not possible! If you open a II Plus, you'll notice that slot 1 does not line up with any of the openings on the back of the machine. However, after sorting through the assorted cables and connectors provided, I was able to come up with a combination that worked.

The cartridge ribbon is similar in design to the type used in Diablo printers. It's one of the few I have seen that can actually be installed without getting ink all over your hands. You just remove DMP's cover and pop it into place. I have been using the original ribbon for the past three months and the print quality is still acceptable.

Loading paper is equally easy. To use the DMP with the single sheets (letterhead, for instance), you pull the paper guide and roller bar for-

ward, move the paper release lever to the pin-feed position, and slide the paper through the single sheet paper inlet. Line up your paper with the margin indicators on the roll bar, flip the paper release lever to the friction position, and you're ready to go.

Apple has also simplified pin-feed paper loading. Rather than positioning the tractor mechanisms in the front of the printer, the DMP has them behind the platen. To use pin-feed paper, you remove the top back cover, insert the paper holes in the sprockets of the paper clamps and turn the platen knob until the print head is at the top of the form. That's right—no threading by hand!

### The Operator's Guide

The operator's guide shows you how to set up the DMP, install paper and ribbon and run a small test. Beyond that, Apple has provided a tutorial/demonstration disk that tests your printer connections and shows you how to list programs and use command codes within software or word processing. Examples are provided in Applesoft, Pascal and Business Basic.

```
PICA (10 TO THE INCH)
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PICA PROPORTIONAL
ELITE PROPORTIONAL
EXTENDED (9 TO THE INCH)
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ULTRACONDENSED (17 TO THE INCH)
REPEAT A CHARACTER:  ~~~~~
UNSLASHED ZEROS:  50000
SLASHED ZEROS:    50000
PRINT 1 CHAR. OVER ANOTHER:  2
UNDERLINE PORTIONS OF TEXT
BOLDFACE PRINTING
HEADLINE TYPE
```

Figure 1. Examples of special print functions.

A second program (DMP Exerciser) allows you to set and test the printer's many features (changing the margins, type styles, using foreign character sets, printing graphics, etc.). Unfortunately, you are not shown how to do this. To Apple's credit, all programs on the demo disk are unprotected. You are free to examine, copy, and modify them to your heart's content.

Finally, a double-sided reference card is provided showing the effects of DIP switch placements; and the ASCII, hex, and decimal (CHR\$) codes are shown for accessing printer functions. For most users, however, this sheet will only be helpful with a good deal of practice.

After requesting more detailed instructions on using the DMP, I was hopelessly confused. Apple was kind enough to forward a draft of a new, two-part user's guide, and the guide goes a long way toward making the use of the DMP relatively painless. Each print function is illustrated with examples, and a program listing is also provided that allows you to embed hex codes within your own programs (without having to resort to cumbersome CHR\$ statements).

### Special Print Functions

The DMP is packed with special printing functions. Figure 1 gives examples of different print styles and features. All, by the way, are controllable through software. Since features can be combined, you can create a wide variety of type styles (e.g., boldface headlines).

Although most of these type styles are now standard on the newer dot matrix printers, Apple has added the ability to do proportional printing! In normal dot matrix output, each character is given the same space as every other character. In proportional printing, however, wider characters (like W) are given more room than the thinner ones (like I). This gives the text a more natural, professional look. Previously, this was a feature seen only in the more-expensive letter quality printers.

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tween letters when you are in Elite Proportional mode, you can change them by adding control codes between the letters. Codes are available for adding one to six dot spaces, and the codes may be chained together for even greater spacing.

In addition to the standard characters, the DMP is capable of using custom character sets. One company is already releasing a program that takes advantage of this. Essentially, a font is designed (similar to using Animatrix in the Applesoft Tool Kit) and then downloaded to the printer. As long as the printer remains on, that particular character set will be used. Control codes are provided in the DMP manual to switch back and forth between the special and normal fonts. Thus, even though the DMP has no italic font, there's nothing to stop you from creating one yourself. Also, given the DMP's large potential market, enterprising software companies will undoubtedly offer additional fonts.

### Graphics, Too!

You can print pictures, diagrams, or anything else you like on the DMP. The demo disk in the operator's guide even has a binary program called SCRNDMP, which it uses for hi-res screen dumps (normal, inverse, and/or double size). Although no instructions are included for using the program to dump your own pictures (assuming it's possible), I wouldn't be surprised to see a short article explaining it in the near future.

### Evaluation

Perhaps the biggest plus for the DMP is the software control of print styles and functions. For example, there is nothing more annoying than having to disassemble the printer just to switch between slashed and unslashed zeros.

To allow for easy and inexpensive expansion of type styles, it is possible to load custom character sets from software and store them in the printer's memory. Other companies require you to purchase new chips or special, expensive interface boards.

Print quality is very good in all modes. Although not of correspondence quality, the dots are tightly packed and present a good compromise between dot matrix and letter quality printing.

The noise level seems typical for machines in the DMP's price range and would be acceptable in most homes or offices. Beware of boldface printing, however. The volume and quality of the sound have much in common with someone scratching their fingernails on a blackboard.

When using pin-feed paper, the DMP occasionally has problems with paper jams. I believe this is related to the tractor feed's rear placement. Other than the roller bar, there is nothing to hold the paper firmly in place on the platen. Because there is often slack in the space between the tractor mechanisms and the print head, be very careful not to try ripping off the paper when the DMP is still printing. This generally results in a line or two printed at a very unusual and unacceptable angle. At the very least, you will destroy your between-line spacing.

On the other hand, the placement of the tractors is also a plus—at least in terms of saved paper. By flipping the plastic paper guide forward, you can reach in and tear off the last printed page while still leaving the printhead at the top of the next page. If you're a stickler for beginning at the top of a fresh page (and not 4–5 lines down), you'll love the DMP!

I give the operator's guide and demo disk high marks for getting you up and running (with the exception of interface and cable connecting) and for showing you the many wonderful features of the DMP. Since all text in the tutorials is listable to the printer (as well as the programs themselves), you can still have a hard copy for future reference. The programs should also be very useful to help dealers successfully demonstrate the DMP.

In terms of showing you how to access these same features in your own Basic programs or word processing, I give the same material very low marks. Inexperienced users and non-

programmers won't have a prayer. The new manuals, however, improve this situation considerably. But there is still room for improvement.

I am still having problems controlling the line spacing. When switching between type styles or changing functions, the printer often inexplicably switches to double spacing.

All in all, I have no difficulty recommending this printer. With the new manuals, I believe Apple has another winner. The DMP retails for \$695 and is manufactured by Apple Computer Inc., 20525 Mariani Ave., Cupertino, CA 95014. ■

Steven Schwartz  
Pittsburgh, PA

## Mockingboard

There seems no end to the number of devices on the market that enhance the Apple computer's abilities. From 16K plug-in RAM and multi-megabyte hard disk systems to boards that allow the Apple to run CP/M based software, there is probably someone who makes just what you need.

Occasionally, the manufacturers of add-on hardware products are the sole suppliers of software support. Nonstandardization of design can also become a problem; a video enhancement board from one manufacturer may not function exactly the same as a similar product from another, making modifications and software patches necessary.

An interesting exception to these problems is a new family of sound and speech generators called the Mockingboards.

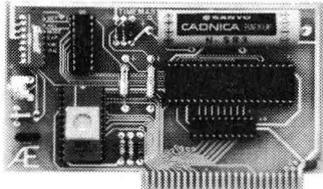
With no shortage of sound or speech systems for the Apple, what makes the Mockingboards different? First, the system is modular. The line consists of Sound II (\$129), a dual sound effects board; Speech I, a speech synthesizer (\$99); and Sound/Speech I, a combined sound effects/speech synthesizer (\$179). Combinations of these boards may be used in order to

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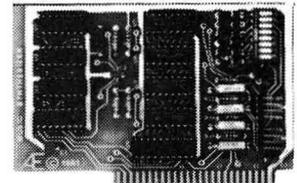
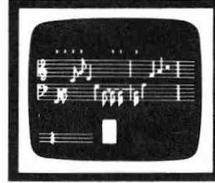
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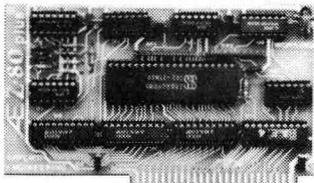
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build up to the desired system.

Secondly, the Mockingboard system is supported by many leading software manufacturers. The result: enhanced sound capabilities from many of their games and other programs without the need for the user to provide modifications.

Technically, the Mockingboards offer some interesting advantages over other methods of speech and sound generation. For sound, the Mockingboards use General Instruments' AY-3-8910 Programmable Sound Generator. This chip allows for great software control of sound. A series of registers on the generator may be programmed to the desired volume, tone, and duration, producing sounds as varied as flutes, gunshots and helicopters. Thanks to a device called a Versatile Interface Adaptor, all of this is done without the constant processor attention required in some systems. In effect, the main program simply tells the Mockingboard what sound is desired, triggers the board to produce the sound, then is free to go about its business. As a result, programs can have both high-speed graphics and great sound.

The boards all provide volume controls (two for the Sound II and Sound/Speech I) and can drive loudspeakers directly. In fact, the volume levels produced will surprise you. The frequency response of the boards is admirable, allowing for a deep, resonant bass and sharp highs.

Installation consists of plugging into the main bus. Mockingboards normally use slot 4, but another may be used if necessary. A small connector attaches to the rear of the board, and cables lead out of the computer for connection to your speaker (or speakers). For the more adventurous, the output of the board may be connected to the input of a stereo amplifier and a pair of larger speakers. This lets all your neighbors know when you are playing Space Invaders.

Speech produced by the Mockingboards is not going to pass for human, but it does sound better than many of the other speech synthesizers available today. For all of its color-

tion, the speech is clear and quite understandable.

Included with either of the speech boards is a text-to-speech program that converts written English to speech. Also provided is very thorough documentation of the algorithm used in this program.

When the board's volume is turned up high, the no-signal noise level can be distracting when using other programs. The board sometimes produces a low-level buzz from the speakers that varies in pitch and intensity according to the CPU's activity. Many persons will not notice this at all, but if it should bother you, it is very easy to unplug the output connector from the back of the board when not in use.

The Mockingboards are reasonably priced. They are manufactured by Sweet Micro Systems, 150 Chestnut St., Providence, RI 02903. ■

**Chuck Doherty**  
So. Dartmouth, MA

## Hayes Joystick

**J**oystick design is a barren field for an engineer; after all, what can you put into a joystick that you haven't seen before on some other unit?

It seems that the trick is to build into your unit features you can't see—like good smooth control. That's what has been built into Hayes Products' Computer Control Mach III joystick.

At first glance, the Hayes joystick

does not stand out in the crowd of similar units. The dimensions are comfortable for firing the orange Paddle 0 button on the top of the unit with the left hand while manipulating the stick with the right hand. There is a brown Paddle 1 function button on the body of the unit, and the control stick on the Mach III is topped with a Paddle 0 firing button. The nice thing about this feature is that it can be fired without having to toggle a switch to select the shaft or body firing button. The one drawback of this system is that the shaft, atop which the firing button rests, is simply too short for an adult hand.

An adult will have no trouble maneuvering the stick, but firing the button on top of it will be a little awkward for a man or woman. I have exceptionally small hands for a grown man, and I found the handle too short to fire the button on top comfortably. The bright side of this issue is that the combination joystick/button is just perfect for a child's hand.

In this unit, the spring centering is gentle and almost unnoticeable during play. This self-centering feature can be modified by twisting some plastic bolts located on the underside of the unit. You can enjoy as much or as little play as you like. Another nice feature is the set of trim tabs that automatically adjust the X and Y axis alignments of the joystick. In some programs, this can be a real blessing.

I tested the Mach III with some favorite Apple games like Miner 2049er, Star Blazer, Apple Galaxian, Threshold, Kamikaze, Nightmare Gallery and Beer Run. The feel of play was smooth on every game and there was no conscious effort needed to overcome the springs centering the joystick. In playing Nightmare Gallery, the centering feature and the X/Y axis trim controls helped keep the stick centered.

The A2-FS1 Flight Simulator is the ultimate test for a joystick. This realistic flight simulation program is designed to work with keyboard or joystick commands. Needless to say, the realism of the simulation is diminished when using a keyboard. The trouble with joystick flying, how-

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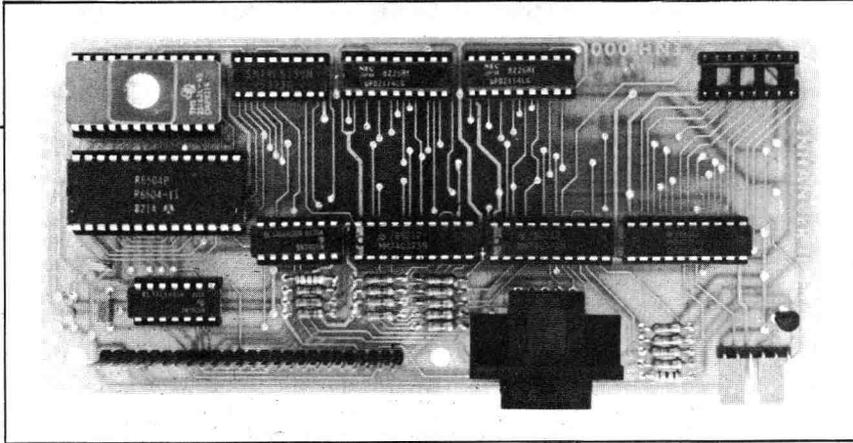
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The Enhancer II from Videx.

ever, is that they don't adequately control the aircraft. Even the popular TG joystick, a spring-centered unit with its own set of axis trim controls, does not do a very good job controlling the plane.

But the Mach III does. Its X and Y axis trim tabs center the rudder and elevator indicators with great precision before takeoff and act like aircraft trim tabs once the plane is airborne. Two years after buying the program, I finally enjoyed it to its full potential.

The manufacturer of the Mach III, Hayes Products, is located at 1558 Osage Street, San Marcos, CA 92069. Price is \$49.95. ■

Brian Murphy  
Fairfield, CT

## The Enhanced Apple II

**D**o you use your Apple for word processing often enough to have grown tired of seeing everything in uppercase? Would you like to be able to display and print all 128 ASCII characters, lowercase included? How about transforming the Apple keyboard into a super-type-writer keyboard with auto-repeat on every key?

A product that will let you do all this is called the Enhancer II from Videx (897 NW Grant Ave., Corvallis, OR 97330). It costs \$149 and it's a winner.

The Enhancer II is a board that replaces the piggyback keyboard encoder found on Revision 7 or greater

Apples. Revisions 0 through 6, which have the piggyback keyboard, need a lowercase display adapter, available from Videx. Those with the old, one-piece board will have to upgrade to the newer style before being able to use the Enhancer II. You can check your machine by removing the top and looking along the left edge of the motherboard until you come to the row with the letter E alongside. If you have a white rectangle with three large holes, you have a Revision 7 or greater; if you find a socket labeled Memory Select, you have an older style.

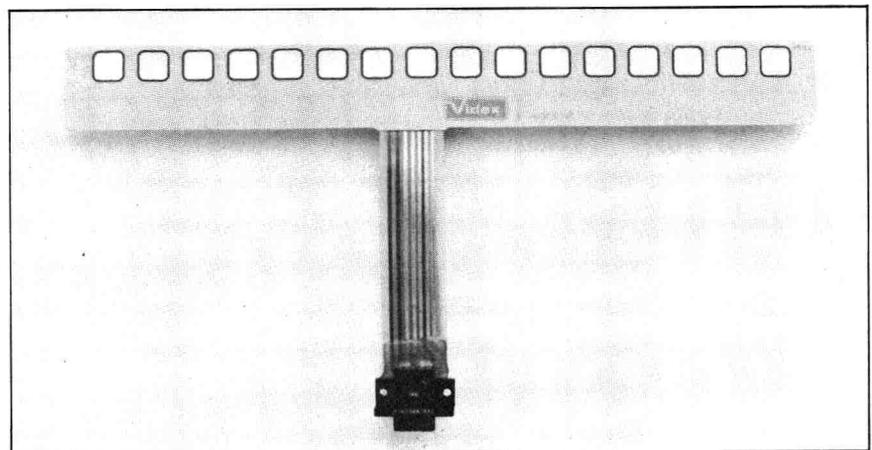
The Installation and Operational Manual gives clear directions. Although you must remove the case from the motherboard to change the encoder board and pull out and replace a few ICs, there are no wires to solder or cut. There are a couple of optional wires that you will want to install to make full use of the Enhancer's capabilities, but these are

merely inserted into the appropriate, clearly defined holes of the IC sockets and wedged in by the IC's contact pins.

The Enhancer II comes with a lowercase chip that replaces the Apple character set and gives you both upper- and lowercase on the normal 40-column Apple display. (The Videx Videoterm 80-column card has its own lowercase chip.) Also included in the package is a utilities disk containing 29 files. There are two Hello programs and two Configuration files. When you boot the disk for the first time, Hello calls a Configuration program that asks you to insert a DOS system master disk. FPBasic and INTBasic files are loaded in, modified with the Lowercase Fix and then saved on the Enhancer II utilities disk. The Configuration program produces a fast-loading (4 seconds) Basic file of whichever type is not resident in ROM.

There is a download program on the disk that can reconfigure your keyboard into the Dvorak layout, another program called Macro Editor, which allows you to create and use macros, and several others of varying interest and use.

You can redefine almost any key to create a macro (a special character or word, phrases, even paragraphs). This means, with the press of a single key, you can cause these characters or lines to appear time after time without having to retype them completely. Macros can be defined directly on



The Videx Function Strip.

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the keyboard by a control/shift/repeat sequence followed by the key to be redefined, the macro definition, and then ended by a repeat. They can also be created using the Macro Editor file on the utilities disk and sorted on a disk to be downloaded at a later time.

The Enhancer II has its own microprocessor, a 6504 (which uses the Apple's 6502 instruction set), and 1K of low-power static RAM. It performs a comprehensive self-test whenever your Apple is powered up. If a fault condition is found, it attempts to print an error message to your screen. Its RAM and ROM are entirely separate from those of the Apple and cannot be tested with ordinary diagnostic programs. It has 512 bytes of memory reserved for macro definitions, and since every macro requires two bytes of overhead and one byte for each ASCII character, you can define one 510-character macro, 170 single-character macros or anything in between.

Each key will repeat automatically, at a rate of about 15 characters per second, if you hold it down for more than  $\frac{3}{4}$  of a second. If you hold a character key down, and at the same time, press the repeat key, the character just zooms along, repeating itself about 50 times per second.

There is a 128-character type-ahead buffer. (The unEnhanced Apple has a one-character buffer.) That is, if you're typing faster than the Apple can carry out your instructions and you return to scan the keyboard, then everything you've typed, up to 128 characters, is stored in the Enhancer's microprocessor and sent when the Apple is again ready for it.

The type-ahead and the auto-repeat features can be turned off from a download or by holding in the space bar when you turn on your machine. (Some game programs are disturbed by the type-ahead buffer.) If this is done, the Enhancer II behaves like an ordinary Apple keyboard encoder.

There are two distinct operational modes for the Enhancer II that are mutually exclusive. Think of them as completely separate keyboards.

The first is the Caps Lock mode, which is identical to the normal Apple II character set except for the auto- and fast-repeats, the type-ahead buffer and the user-definable macros.

The second is the Caps Unlock or Lowercase mode, in which all 128 ASCII characters can be entered from the keyboard. If both the shift and reset keys are pressed together, Lowercase mode is in effect. While in this mode, if you press the control key or reset, by itself, you are placed in Caps Lock mode (as if you were holding in the shift key) until you press either shift key. To obtain some of the ASCII characters, it's necessary to use various combinations of control or control/shift. For instance, the Spanish character tilde ( $\sim$ ) is control/shift 2 and curly brackets (braces) are the parentheses with control/shift.

Naturally, the system reset command must be changed to allow the above use of the reset button or trying to change modes will result in the rebooting of the system. The Enhancer II allows you to use control/reset or reset only as your reboot command; if you wish, you can disable reset completely. The choice is made by deciding which pins to use on the cable connector when you install the board.

Videx considers all the keys on the board (including the space bar) to be characters with the exception of the five function keys—reset, repeat, control and both shifts. A function key does not generate an ASCII character, but when pressed by itself or in combination with one or more keys, it causes some particular action to take place. (Escape generates an ASCII code and is therefore not a

function key.) There are 52 keys on the board, and subtracting five leaves us with 47 character keys.

Using control and shift (one or both), there are four possible combinations of character-key entries:

- A key may be pressed by itself.
- It may be pressed in combination with the control key.
- It may be pressed with the shift (either or both) keys.
- It may be pressed with both control and shift.

Four combinations multiplied by 47 characters equals 188. Since there are, in effect, two keyboards, there is a total of 376 keyboard characters, 188 on each board, which you can redefine.

Videx manufactures an optional Function Strip (\$39 alone or \$179 with the Enhancer II). This is a 12-inch plastic strip with 16 membrane (pressure-sensitive) keys and a stick-on backing. You attach it to your Apple's lid, just over the keyboard area, and you then have 16 more user-definable keys with which to create macros or to use as command or function keys. The Macro Editor program on the utilities disk has a Function Strip definition section for this purpose.

The Function Strip cable plugs into a socket on the front edge of the Enhancer II board. I bought my Enhancer directly from Videx; the Function Strip was not then available and the Enhancer II board did not come with the cable socket attached. When I subsequently bought the Function Strip, again directly from Videx, it came with the necessary socket enclosed, which I then had to carefully solder to the Enhancer II board. This is no longer the case—the board comes with the fitting already in place.

Videx claims there should be no interference between the Enhancer II and any peripheral. My Apple II Plus has a Microsoft 16K RAMcard in slot 0; a Grappler printer interface card attached to an Epson MX-100 printer with Graftrax Plus in slot 1; a Hayes Micromodem in 2; a Videx Video-term 80-column board with an In-

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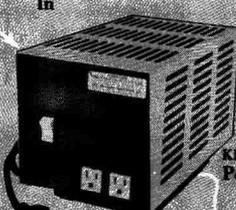
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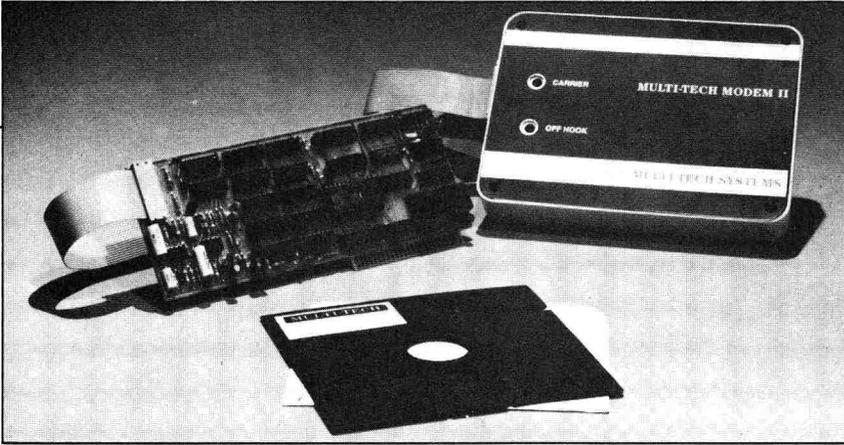
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TouchTone dialing is not directly available from the modem. If you need TouchTone (for Sprint or MCI for example), you can use your own TouchTone phone in parallel with the modem. You can also enter an asterisk to allow a two-second pause for a second dial tone. A nice feature of this modem is that a small speaker in the exterior unit allows you to listen for dial tones, busy signals, wrong numbers and the like. This is preferable to other systems that require you to wait for a modem tone or to hang up when you think enough time has elapsed.

After dialing the number (manually or by program), the system will wait for a modem tone. When the modem tone is detected, you can enter two-way communications by selecting the appropriate Full or Half Duplex terminal mode.

The BREAK command is used to send a long string of binary zeros, used for various functions, to the host computer. This key is not available on the Apple keyboard; it is included in the software.

The EXIT command allows you to temporarily leave the terminal mode, without hanging up, to operate in the DOS environment. The E command allows you to change the attention character from control-A to some other character. This allows you to send control-A over the phone lines, for example.

The last two commands allow you to establish a modem to modem connection, after first calling human to human. When making this switch, one modem manually selects the Answer mode and the other selects the Originate mode.

A printer can be used to record the communication even when using the firmware. A simple PR#1 command turns on the printer in slot 1 and records everything that appears on the screen. I had some intermittent problems with this mode, which I was unable to solve, but I am not ready to blame the firmware or the printer. Just be aware that using a

verse EPROM and an attached Soft-switch in slot 3; a Microsoft Softcard in 4; a Rana controller card with an Elite Three double-sided/double-density drive in 5; a Disk II controller in slot 6 that is attached to a Disk II and a Micro-Sci A2; and an empty slot 7. I have never had a problem traceable to the Enhancer.

Should you consider buying the Enhancer II and the Function Strip? I vote yes. They've made my computing life easier, and they'll do the same for yours. ■

J. W. Schwarz  
Port Chester, NY

## Modem II

The Multi-Tech Modem II is a complete 300 baud modem and communications package for the Apple that consists of a two-part modem, a software disk, a phone cord and an instruction manual.

Installation is very easy and consists of plugging the Apple interface card into slot 2, connecting it to an exterior telephone interface unit with a short ribbon cable, and then connecting the interface to the telephone wall jack with the supplied phone line. The telephone disconnected by this procedure can be connected to a spare outlet on the interface unit, and it operates in parallel with the modem.

The modem operates without additional software because the Apple interface card is supplied with ROM firmware. This program is activated with a simple IN#2 command. The

firmware then samples all input to the Apple from the keyboard looking for an attention character, usually control-A. When this character is typed (or received from a program), the menu illustrated below is displayed and the firmware waits for a single-letter command.

```
MULTI-TECH MODEM II
V1.3
ENTER:
1 - 110 BAUD, 8 DATA,
2 STOP
3 - 300 BAUD, 8 DATA,
1 STOP
H - HALF DUPLEX TERM
F - FULL DUPLEX TERM
Z - HANG UP
Q - START DIALING
B - XMIT BREAK
X - EXIT TERM MODE
E - ENTER ATTN CHAR
A - MANUAL ANS
O - MANUAL ORIG
```

The indicated commands are self-explanatory, assuming you have read the manual. The first two select either 110 or 300 baud communications with the default being the normal 300 baud used for most digital communications today. The second two options indicate whether or not what you type will be displayed locally (half duplex) or echoed by the remote system back to you (full duplex). This can be easily checked by experimentation. Try half duplex first if you don't know which to use. If you see everything you type being repeated, then switch to full duplex.

Hang up should be obvious, but don't overlook this step when you complete your call. Simply hitting reset to exit the firmware will leave the

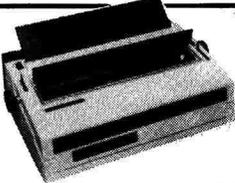
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printer in this way may require special attention.

The firmware can be placed in a Remote mode by commanding an IN#2 followed by a PR#2. In this mode, the Apple will answer incoming phone calls with a modem tone and automatically enter the terminal mode if an answering modem tone is detected. This way you can operate the Apple remotely from another Apple or terminal. A number of control character commands are available in this mode to control the modem and local Apple, such as stopping local transmissions with control-S and resuming with control-Q. Several other commands are available as well.

A useful feature provided with the Modem II is a disk of software including an Advanced Terminal Program. This program is written in Applesoft with a small machine language driver for the modem interface. The advantage is that it is very well documented and easy to modify. The disadvantage is that it is not as full featured as other communications packages.

The program is powerful considering that it is written in Basic. For example, file transfer with protocol controls apparently is available, but not discussed in the manual. I saw no mention of any specific protocol that allows the transfer of binary programs.

Capture of data to disk and/or printer is provided as is dialing from a phone directory on disk (up to 20 numbers). The program will operate in 40-column mode or 80 columns with any of several 80-column adaptors for the Apple II or IIe. The problem I had here was reading the fine print in the manual. The instructions say to configure the program while in the 40-column mode and then switch to 80-column mode before running the program. I tried running the re-configured program from 40 columns and caused the program to go into a loop which I couldn't break without a reset. I didn't like the results I received, but careful reading of the fine print cleared up the problem.

A sophisticated configuration program accompanies the Advanced

Terminal Program. This program creates a text file of variable parameters used by the terminal program such as duplex mode, baud rate, attention character, printer slot and default disk drive. The program is easy to use and allows multiple parameter files to be created for the various computer systems you may be contacting.

The program allows you to display incoming characters in true upper/lowercase if your display supports lowercase, or gives you the option to convert all lowercase characters received to uppercase. This feature is nice, but it could have been expanded to support lowercase input from normal or modified Apple II keyboards.

The most serious shortcoming I observed with the Modem II is the lack of interrupt capability. The USART driver on the modem interface card apparently can generate character interrupts, but this signal is not passed to the Apple, so interrupt driven communications is not possible. At 300 baud this is usually not noticeable, but it is very apparent when the host transmits a control-G (bell). The modem will lose the next two to four characters after a control-G, which is annoying to say the least. This is most frequent during log on to my host computer, which uses the bell as an attention getter at the beginning of each log in phrase.

A major feature not tested but available with this system is CP/M support. According to the documentation, you can create a modem environment for CP/M even including modem I/O at the command level.

The Modem II is manufactured by Multi-Tech Systems Inc., 82 Second Ave. SE, New Brighton, MN 55112. Price is \$399. ■

**George Guild  
Nashua, NH**

*(The manufacturer points out that owners of the Modem II can enable interrupts by soldering a jumper onto the Modem II printed circuit board. This option is documented in the latest version of the manual.—ed)*

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edited by Joan Witham

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## Electronic English

English Grammar is designed to teach parts of speech to students in any grade or for home learning. This two-disk program is available from T.H.E.S.I.S., PO Box 147-E, Garden City, MI 48135 for \$45 plus \$3 S/H. Reader Service number is 438.

## Personal Bibliographic System

A specialized word processor and database system for compiling and maintaining formatted bibliographies, the Personal Bibliographic System consists of two programs. It is available for \$250 from Personal Bibliographic Software Inc., PO Box 4250, Ann Arbor, MI 48106. Reader Service number is 439.

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man knowledge—trying to understand reality by seeking and analyzing information. This educational game may be obtained for \$49.95 from Krell Software, 1320 Stony Brook Road, Stony Brook, NY 11790. Reader Service number is 445.

## Math Equations Made Simple

Calcu-Plot is a mathematical utility package that transforms complex equations into clean, easy-to-read graphics. The program accepts data from keyboard disk files and print format VisiCalc files. It's available for the Apple II and IIE computers for \$150 from Human Systems Dynamics, 9010 Reseda Blvd., Suite 222, Northridge, CA 91324. Reader Service number is 448.

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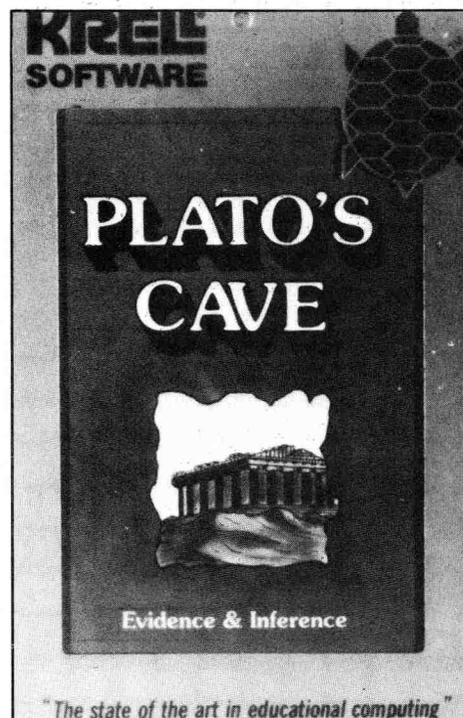
San Jose, CA 95130 for further information. Reader Service number is 444.

## Gruds in Space

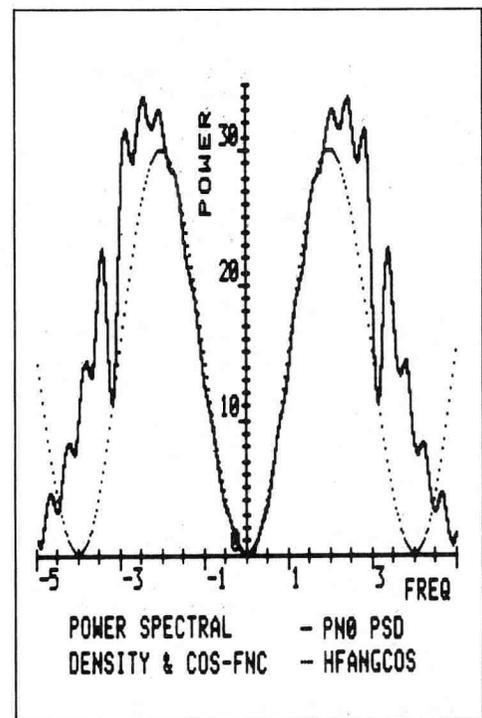
Gruds in Space, an adventure game from Sirius with over 150 animated screens and (according to Sirius) an incredibly funny storyline, is on store shelves now for \$39.95. Contact Sirius for more information at 10364 Rockingham Drive, Sacramento, CA 95827. Reader Service number is 446.

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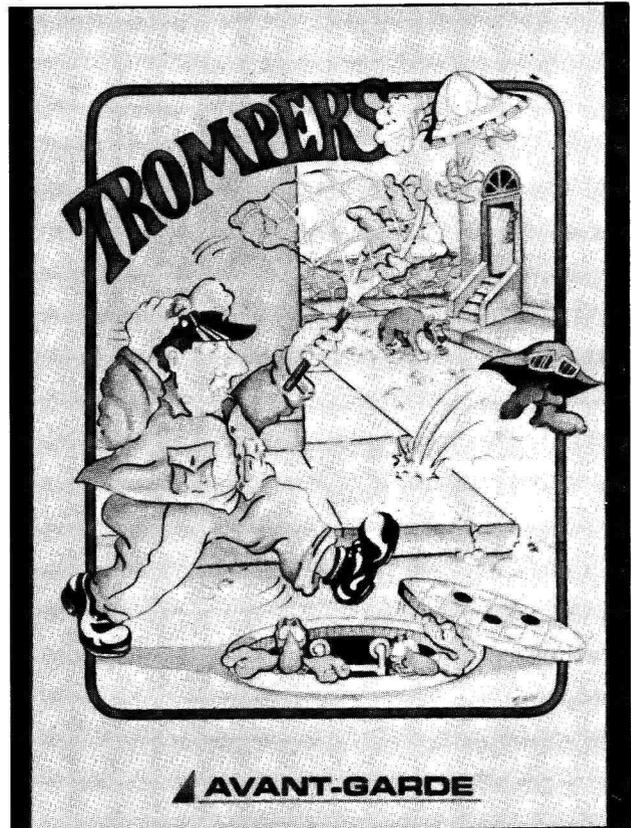
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**Apple BC**

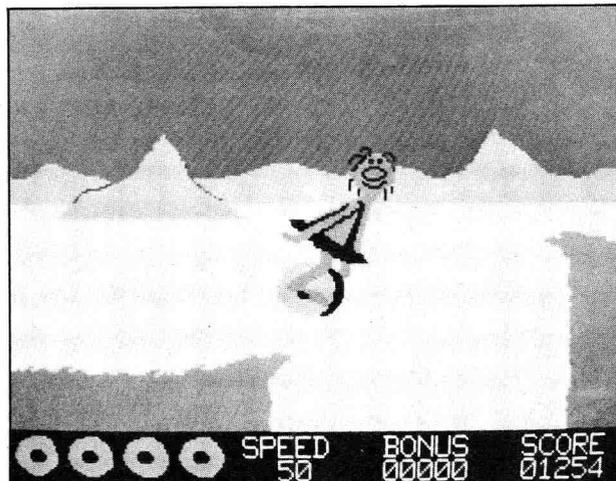
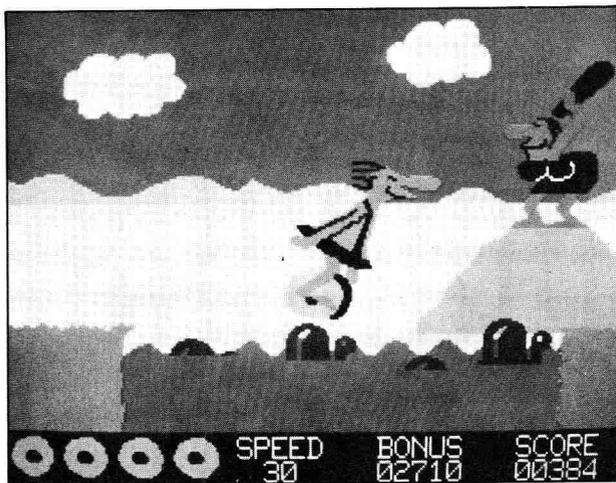
Quest for Tires stars Thor who zips through the world of "BC" on his prehistoric unicycle. Thor's challenge is to rescue his girlfriend, the cute chick, from the terrifying pterodactyl, and other more unusual creatures. Suggested price is \$34.95 from Sierra On-Line, Sierra On-Line Bldg., Coarsegold, CA 93614. Reader Service number is 453.

**Lisa Accounting Software**

BPI Systems has released integrated accounting packages especially for Apple's Lisa Computer. BPI General Accounting, BPI Accounts Receivable and BPI Accounts Payable utilize the Lisa's many features, including its Graphics Mouse technology. The suggested retail price is \$595 each from BPI, 3423 Guadalupe, Austin, TX 78705. Reader Service number is 456.

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B.C.'s "Quest for Tires."

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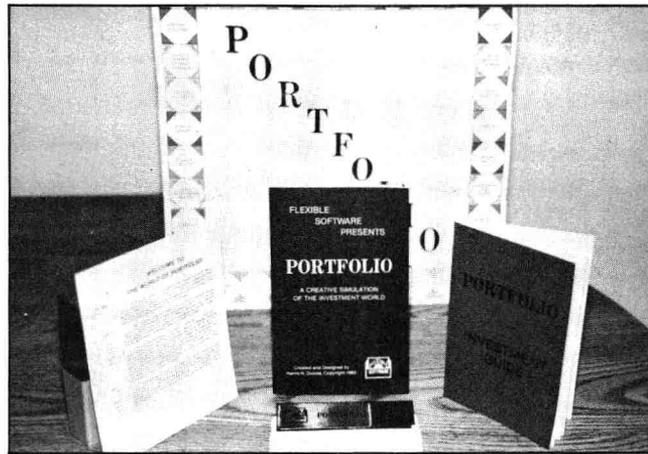
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Services Inc. (CASI) has announced an Investors Management Information System (I.M.I.S.) for the professional financial broker/dealer with an Apple II Plus or IIfx. The system provides portfolio management, mail list management, full investor reports, interconnections to external information sources and word processing for \$235. Contact CASI, 12535 Seal Beach Blvd., Suite 210, Seal Beach, CA 90740. Reader Service Number is 458.



Investor's Game.

**Investor's Dream**

A game of financial finesse, Portfolio is a simulation of the investment world where millions are

riding on your decision to buy or sell on Wall Street. The Portfolio package is available for \$64.95 through Flexible Software, PO Box 5841, Dept A., Charlottes-

ville, VA 22905. Reader Service number is 459.

**Logo Locomotion**

Six fun-packed games

(for grades 2-12) that teach the graphics commands of the Logo language are contained in Logo Locomotion for \$23.95. Contact Compulit, PO Box 254, Sherborn, MA 01770 for further information. Reader Service number is 457.

**New Wizardry Window in Legacy**

Sir-Tech Software has incorporated its Windo-Wizardry hi-res display manager into the third Wizardry program by Sir-Tech, Legacy of Llylgamyn. The new Lisa-like technique allows more text and graphics with less clutter. This third scenario requires that you have the original Wiz-

**in Cider**  **in Cider**  
**BOOK SHELF**

**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

**APPLE MACHINE LANGUAGE**—by Don Inman and Kurt Inman. APPLE MACHINE LANGUAGE builds upon your previous knowledge of BASIC, and teaches you the machine language in small, easy, completely illustrated steps. Following this guide, you will be able to write machine language programs directly, using the Apple System Monitor. Each new program is thoroughly presented in functional blocks, with sketches of how each step will actually appear on the video screen. Soon you will be entering and executing your own machine language programs, with predictable results! BK 1248 \$14.95

**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.

**MASTERING CP/M**—by Alan R. Miller. For advanced CP/M users or systems programmers who want maximum use of the CP/M operating system, this book takes up where the *CP/M Handbook* leaves off. It will give you an in-depth understanding of the CP/M modules such as CCP (Console Command Processor), BIOS (Basic Input/Output System), and BDOS (Basic Disk Operating System). It explains the incorporation of additional peripherals to the system, console I/O, the use of the file control block and much more. It also includes a library of useful macros and a comprehensive set of appendices. BK 1263 \$16.95

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ardry game. The Legacy costs \$39.95 plus from Sir-Tech Software, 6 Main St., Ogdensburg, NY 13660. It is for the II Plus and IIe. Reader Service number is 451.

### Learn Words/Meanings with Computers

Cloze-Plus is a series of reading selections (levels 3-8) on topics such as archaeology, myths, sports, etc. that develop comprehension skills and vocabulary through context analysis activities. One reading level is \$150; three levels are \$425. For further information, contact I/CT, 10 Stepar Place, Huntington Station, NY 11746. Reader Service number is 441.

### JACKreport

A report generator for the Incredible JACK has been introduced by Business Solutions Inc., 60 Main St., Kings Park, NY 11754. JACKreport uses information from any JACK file to create customized reports. Suggested retail price is \$99. Reader Service number is 449.

### Artist Designer II

A drawing system designed particularly for artists, Artist Designer II permits the production of irregular shapes, curves and shading with random dots and textures on all Apple computers. Price is \$49.95 from CAPS Software, 4024 Alto St., Oceanside, CA 92056. Reader Service number is 450.

### Titan Empire

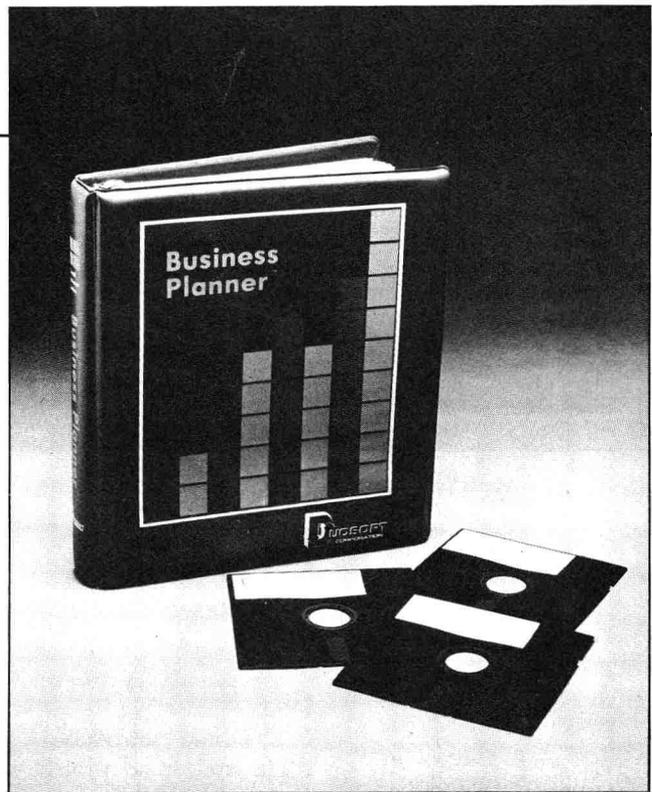
Titan Empire is an outer-space adventure that teaches you about the solar system while you defend the planets against the evil Titans. It requires both quick reflexes and strategic planning. Retail price is \$34.95. Contact Muse, 347 N. Charles St., Baltimore, MD 21201 for further information. Reader Service number is 442.

### Help for the Entrepreneur

Designed for entrepreneurs who wish to start a new business or expand an existing firm, Business Planner provides a simulated model for projection of monthly income/expense figures, budget allocations and sales forecasts. The package features graphical projections, pro-forma financial statements, user-defined categories and code word file protection. You can obtain this program for \$395 from Duo-soft Corporation, 1803 Woodfield Drive, Savoy, IL 61874. Reader Service number is 447.

### Pyramid Adventure

Infocom Inc. has announced Infidel, the first game in their new Tales of Adventures series. Set in the vast Egyptian desert, Infidel challenges you to find the buried entrance to the last great pyramid and, once inside, seize priceless hidden treasures. Infidel retails for \$49.95 from Infocom Inc., 55 Wheeler St., Cambridge, MA 02138. Reader Service number is 454.



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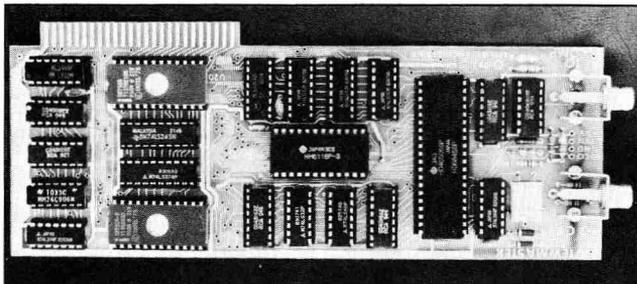
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# New Products

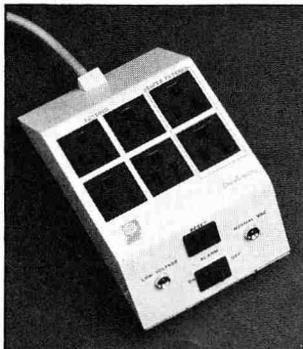
edited by Joan Witham



Viewmaster 80-column card.

## Viewmaster 80-Column Card

The Viewmaster 80 is compatible with all Apple languages and 80-column software for the Apple II Plus or Franklin Computers. Suggested retail price is \$169. Contact Applied Engineering, PO Box 470301,



Surge and spike protector.

Dallas, TX 75247 for further information. Reader Service number is 460.

## Surge and Spike Protector

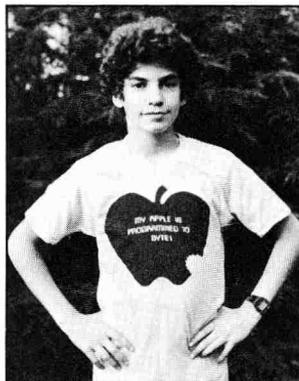
PTI had introduced a surge and spike protector that features brownout notification when the line voltage drops to 100 volts. Suggested retail price is \$69. PTI Industries can be contacted at 4740 Scotts Valley Drive, Scotts Valley, CA 95066. Reader Service number is 463.

## Power Pad/Leonardo's Library

Power Pad is a touch-sensitive input device (12 x 12-inch) for \$99.95 that combines with Leonardo's Library, a series



Power Pad and Leonardo's Library-integrated learning.



Custom-designed Apple T-shirts.

troller, cable and documentation are included for \$399.95. For further information, contact Wholesale Technology Inc. 1530 South Sinclair, Anaheim, CA 92806. Reader Service number is 461.

## Computer Gift-wear

A catalog of books and merchandise geared to the Apple user will join Sinequanon's initial offering of custom designed Apple T-shirts sold at \$8 each. Contact Sinequanon, 104 East 40th St., New York, NY 10016 for further information. Reader Service number is 465.

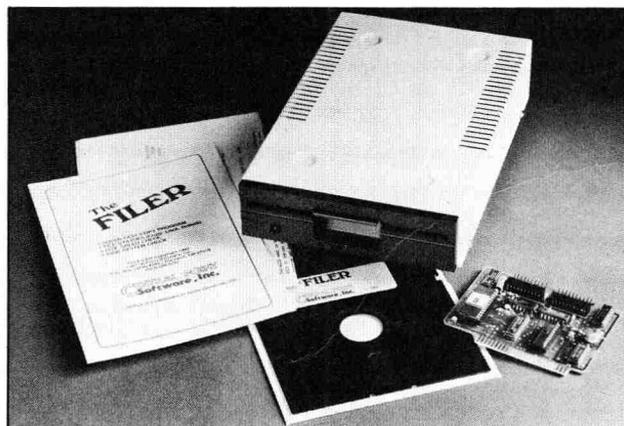
## Color Printer

Color Printer permits full-color printouts on the Epson MX-80 printer (with Grafrax) using any Apple or Apple-compatible computer. The package, at \$69.95, includes four printer ribbons, an unprotected DOS 3.3 disk and documentation. It's from Enhanced Software Products Inc., PO Box 178, Wantagh, NY 11793. Reader Service number is 467.

of learning/discovery software packages priced from \$24.95 to \$49.95, to become an integrated learning system for Apple computers. Contact Chalk Board Inc., 3772 Pleasantdale Road, Atlanta, GA 30340 for further information. Reader Service number is 462.

## Half-Track Drive

The Half Track 5 1/4-inch floppy disk drive stands half the height of an Apple drive, provides 160K bytes of dual density storage and is compatible with the Apple II, II Plus and IIe. Filer DOS 3.3, con-



The Half Track disk drive with 160K bytes.

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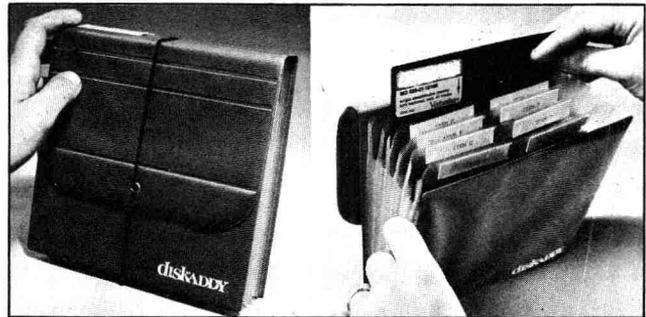
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## New Products



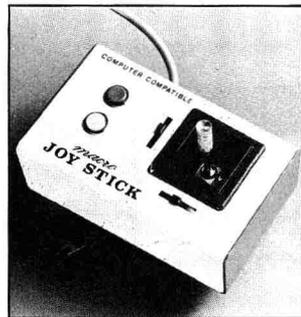
Diskaddy storage case.

### Diskaddy

Diskaddy is a portable storage system to protect and transport 5¼- and 8-inch disks. Prices range from \$7.99 to \$21.99 from MB International Inc., 701 B St., Suite 1300, San Diego, CA 92101. Reader Service number is 466.

### Half Track Joystick

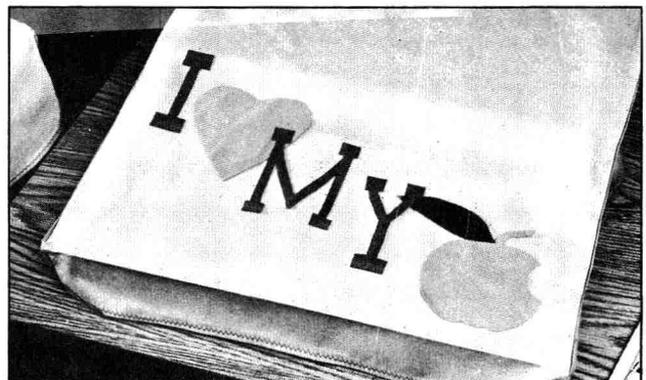
The Half Track joystick features complete compatibility with Apple computers, plus a metal enclosure, dual left and right push-buttons and self-centering with adjustable height. The joystick is available from Wholesale Technology Inc., 1530 South Sinclair, Anaheim, CA 92806 for \$69.95. Reader Service number is 472.



Half Track Joystick.

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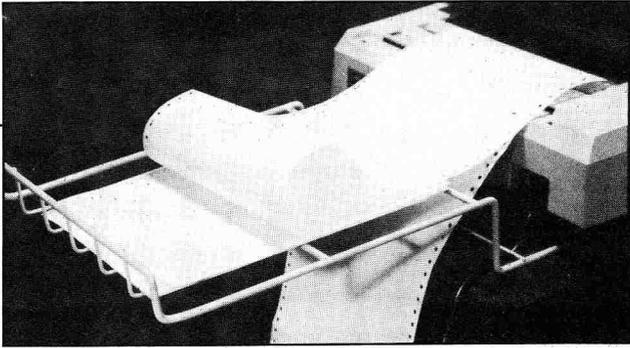
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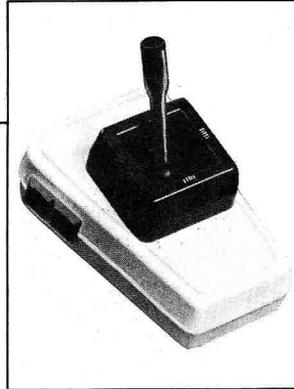
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The Magstik joystick,

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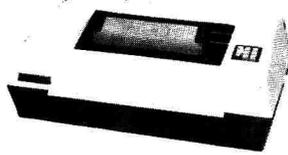
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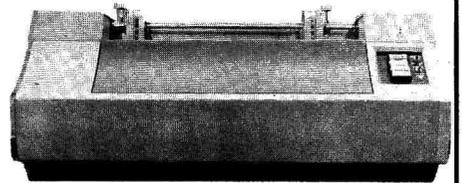
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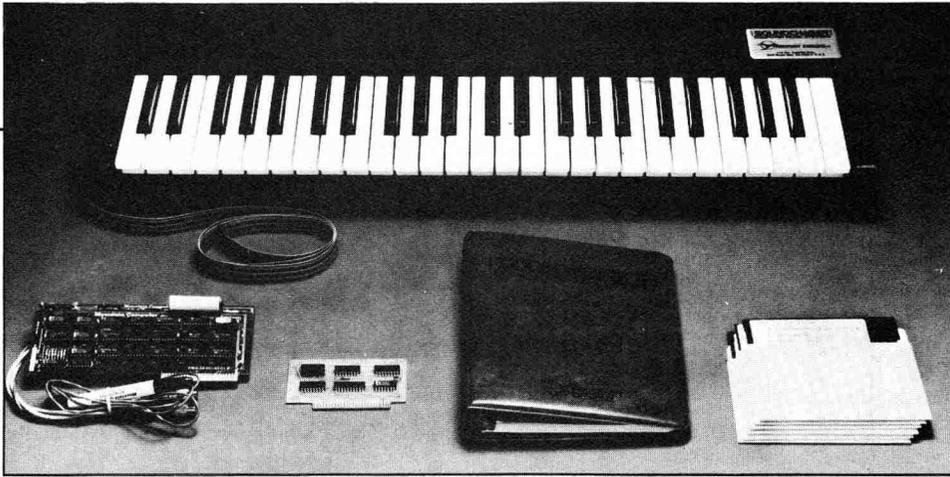
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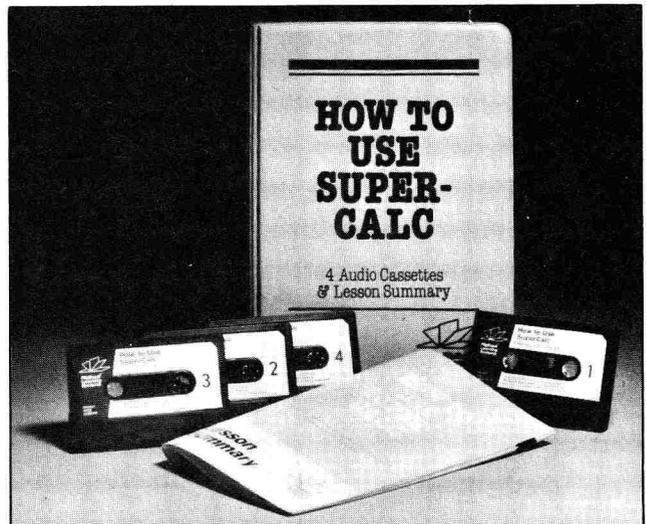
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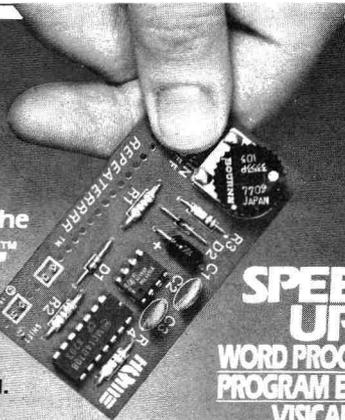
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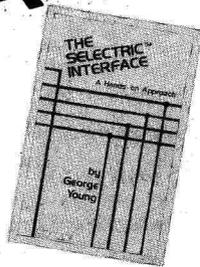
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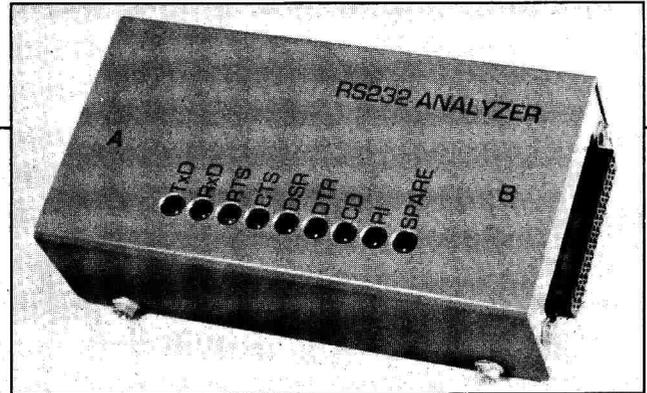
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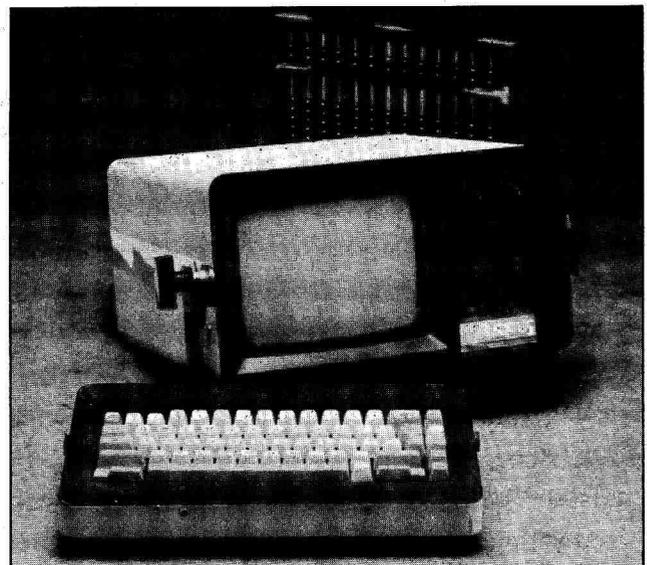
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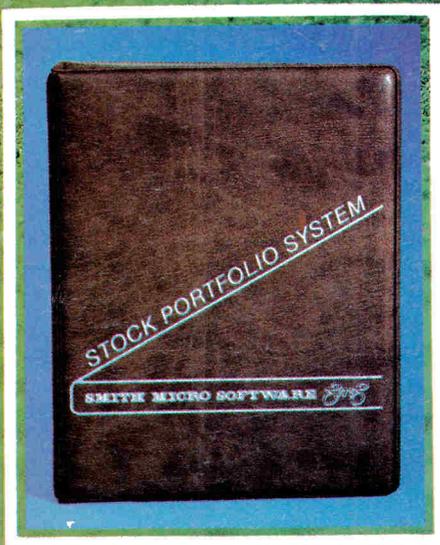
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