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September 1982
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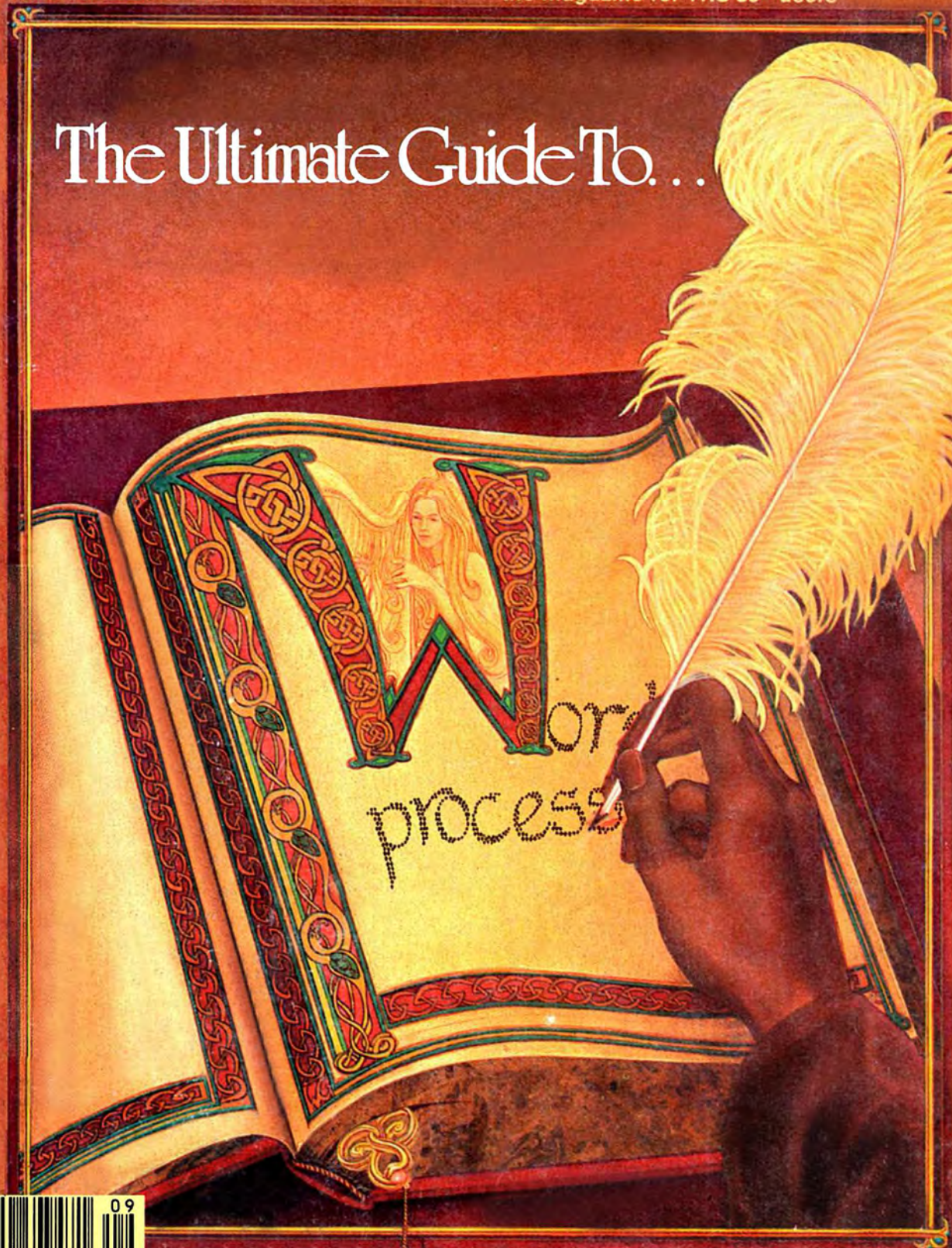
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A WAYNE GREEN PUBLICATION

the magazine for TRS-80* users

The Ultimate Guide To...



The Colorful Computer Part II
Model II Word Processors Compared

#32



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80 Contents

Features

88. Word Processing— An In-Depth Look

After months of testing every word processor he could find for the Models I and III, reviewer Robinson has put together an opus on word crunching. But before you get into the nitty gritty of Robinson's research, read his opening thoughts on the subject.

Dan Robinson



92. Model I/III Word Processing—CP/M

Robinson begins his word processing discussion with the esteemed Wordstar. But before you can use it, you've got to take a trip to the hardware store.

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Cover by William Giese

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96. Model I/III Word Processing—Deluxe Versions

Next, our peripatetic reviewer explains what thrills await you when you buy a word processor with all the frills.

112. Model I/III Word Processing—Under \$50 Versions

Word processing is even for those of us still waiting for Michael Anthony—the millionaire's messenger—to appear on our doorstep. And Robinson shows us the way with a guide to the low-end WP market.



116. Model I/III Word Processing—Spelling Checkers

In this final Robinson installment, Dan takes a look at the software replacing what he's found to be the most reliable spelling-checker to date: WIFE/CMD.

152. The Colorful Computer—Part II

Learn graphics technique by putting a Playboy bunny on your CRT.

Franklyn D. Miller

164. Three Model II Word Processors

Since good word processors produce comparable results, they must be compared in the highly subjective arena of interaction and user friendliness.

Paul Grupp

168. Printer Color Art

Take a deep breath, then prepare to have it taken away once you learn how to bring out the Rembrandt in you with an Epson MX-80 and a colored ribbon kluge.

Francis Kalinowski

ART PRINTOUT



Articles

124. Sling Some Hash

Store and retrieve items in an unsorted list.

Ken Knecht

126. Printing Perfection

Customize SuperScript for your Epson MX-80.

John T. Phillipp

139. Moby Dick Touch-Typing Tutor

If you don't type fast enough, Ishmael's Nantucket sleighride ends abruptly in the belly of the Great White Whale.

Michael Brown

140. Basic Word Processing

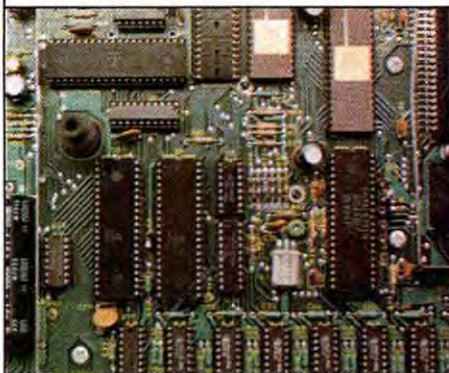
With a little manipulation, you will find your Color Computer has a word processor built into its ROM.

Louis J. Cutrona, Jr.

186. Cheaper Upgrade

Save more than \$75 by installing Extended Color Basic yourself.

Richard Tucker



190. Graftrax 80

How to install it and some tricks for your bag once it's installed.

Thomas McNamee


80 Contents

198. Pascal Goes Color

Computerware and Dynasoft combine to bring this language to the 16K Color Computer.

Scott L. Norman

204. Screenplay

 Use POKE to write and draw on your CRT.

Warren Merkey

222. Inside Scripsit—Part I

Rooting around in Assembly can be very difficult if you don't know the territory first.

Craig Lindley

230. Joystick Paintbrush

How to draw with your Color Computer.

Gerald Sprouse



234. Compiler Comparison

Radio Shack vs Microsoft Basic, which compiler is for you?

Ken Knecht

238. Conversion

Bob Boothe's Level II graphics for the Color Computer.

Frank Osborne

242. Homebrew Data Base Management—Part II

Add subroutines for purging, selecting and restoring files.

Karl Townsend

252. LDOS 5.1

More DOS for your money.

Charles P. Knight

256. RECOVER

All is not lost when your 80 exits Scripsit without your permission.

David Gobel

260. Technological Destiny—Part IV

This author shows you don't have to be a Girl Scout to be a smart cookie.


Gary Dillio

268. Bit Smitten—Part II

After reading Part I of this series—For the Novice—the title no longer suits you. So we changed it. In this installment, learn about data degradation.


Jay Chidsey

270. Order Form

 Author Wright found existing order forms just didn't fit the bill his needs demanded, so now he has his 80 make the forms.

Albert J. Wright

276. The Game of Sim

 Sometimes, even triangles outside Bermuda should be avoided.


Stephen Radin

282. PCLEAR 0

Maximize memory by reserving zero pages for graphics in Extended Color Basic.

John Heusinkveld

286. Screen Veil

 Cure reading-over-the-shoulder syndrome with a cloak, not a dagger.

Mike Keller

288. Juicing Pin 18

A Black Box mod for an Epson and Model I.

Barry N. Gorodetzer

290. JKL Minus Blanks

Get rid of an annoying habit when screen dumping with NEWDOS.

Richard M. Straw

292. Only Macro-Mon Knows

They call it The Shadow. It has almost every feature a machine-language programmer would want.

Richard C. McGarvey

Departments

8. Remarks

While the Japanese are attracting teenagers to technical careers through ham and computer clubs, our kids are spending their time on drugs, disco and driving. It's putting us at a terrible disadvantage.

Wayne Green

16. Proof Notes

All is not well with Tandy's flagship micro, the Model 16.

20. Input

A call for Commander Color graphics in Basic and more articles for the novice, some advice for horse bet-

tors and a cry to take the smut out of *80 Micro*.

30. Debug

How to connect the plotter in "Digital Doodles" and a correction for "Video Snow Shovel."

34. Aid

Readers looking for Model II programs, an IBM-Color Computer interface and POKE conversions for Tanktics.

40. 80 Accountant

Trade-offs between dedicated and non-dedicated word processors; comments on the Model 16; the Model II and CP/M; and a new oil and gas accounting system.

Michael Tannenbaum

44. Soft Bits

Offset pointers in a string array by a fixed amount.

Roger Fuller

48. Kitchen Table Software

Our intrepid KTI observer reviews the toast of Sri Lanka's new line of generic software.

David Busch

50. Commander 80

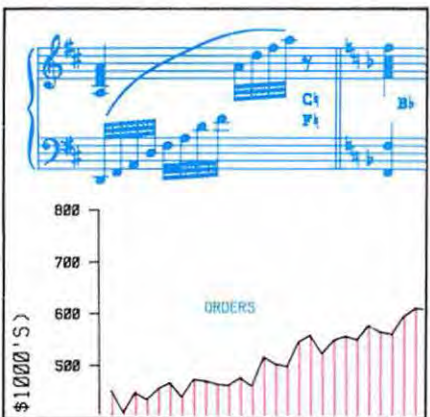
The trademark nonsense seems to be everywhere you look in the software business. We'll soon see more documentation devoted to credits than to the operation of the software.

Jake Commander

56. Calendar

58. Reviews

Super Color Writer, machine-language modules for the novice, Radio Shack's Color Computer disk system, Penetrator, Color Berserk, EPS-80 word processor, Snapp Spooler, and SFINKS 3.0.



80 Contents

PUBLISHER/EDITOR
Wayne Green
EXECUTIVE VICE PRESIDENT
Sherry Smythe
ASSISTANT TO PRESIDENT
Matt Smith
GENERAL MANAGER
Debra Wetherbee
ASSISTANT PUBLISHER
Jeff DeTray
FINANCIAL COORDINATOR
Roger Murphy
CIRCULATION COORDINATOR
603-924-9471
Patricia Ferrante
BULK & NEWSSTAND SALES MANAGER
Ginnie Boudrieau
ADVERTISING, 603-924-7138
David Schisler, Advertising Manager;
Susan Martin, Piergiorgio Saluti: Sales;
Penny Brooks: Ad Coordinator.
New England Advertising Representative:
John A. Garland, Garland Associates, Inc.,
Box 314 SHS, Duxbury, MA 02332
617-934-6464

PRODUCTION
Nancy Salmon, Manager; Michael Murphy,
Assistant. Frances Benton, Betty Butler,
Theresa Ostebo, Scott Philbrick, Dianne
Ritson, Mary Seaver, Deborah Stone, Irene
Vail; Ad Coordinators: David Wozmak,
Judy Wimberly; Advertising Production:
Steve Baldwin, Fiona Davies, Bruce
Hedin, Jane
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PHOTOGRAPHY
Sandra Dukette, Bryan Hastings, John R.
Schweigert, Thomas Villeneuve, Robert M.
Villeneuve

TYPESETTING
Melody Bedell, Sara Bedell, Debbie
Davidson, Michele DesRochers, Jennifer
Fay, Ellen Schwartz, Lisa Steiner, Karen
Stewart

DESIGN
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80 formats its program listings to run 64-characters wide, the way they look on your video screen. This accounts for the occasional wrap-around you will notice in our program listings. Don't let it throw you, particularly when entering assembly listings.

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300. News


Whither DOS for the Model 16? New computer crime insurance. Motorola 68000 seminar. Wait ahead for TRS-80 wanters of TK!Solver. Computer lingo. Video games mean cash at U. W. Va.



325. Feedback Loop

Satisfying the IRS, proportional spacing, digitizers, joining computer clubs, LPRINT problem, and machine-language manuals for the Color Computer.
Terry Kepner


330. Fun House

 A new column for kids and the child in us all.
Richard Ramella



339. Index to Advertisers

342. Copernica Mathematica


 Differential equations.
Bruce Douglass

352. Notes from Beneath the Keyboard

More on competitive tree searches.
Paul Wiener



364. MONEY DOS

 Are there any takers to J.M.'s \$50,000 bet his commodities system will not fail?
J.M. Keynes

376. Medical Opinion

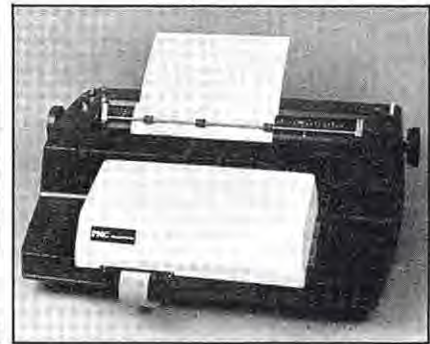
A look at some patient billing programs.
Phillip R. Mills, M.D.

381. Reload 80

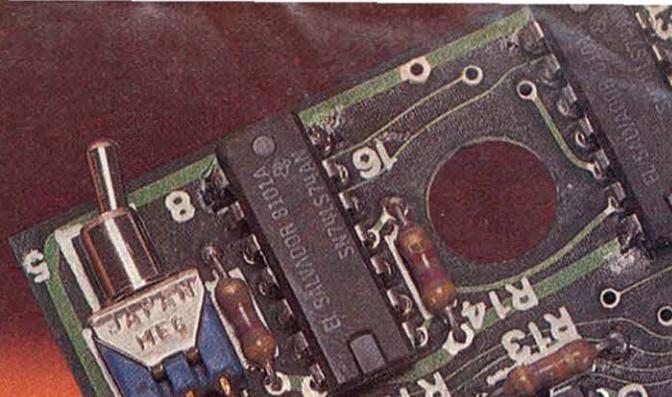
POKEing machine-language subroutines into memory.
Art Huston

384. New Products

PMC's Electric Typing Fingers, KWIKIT cassette storage system, green phosphor CRT, ARMdisk/525 Winchester, Surge Protector, Screen Kleen, chemical dealers software, VisiGraph, church donations program, Color Forth, Supertax, Regilean Bloodworm, and the King James Bible on disk.



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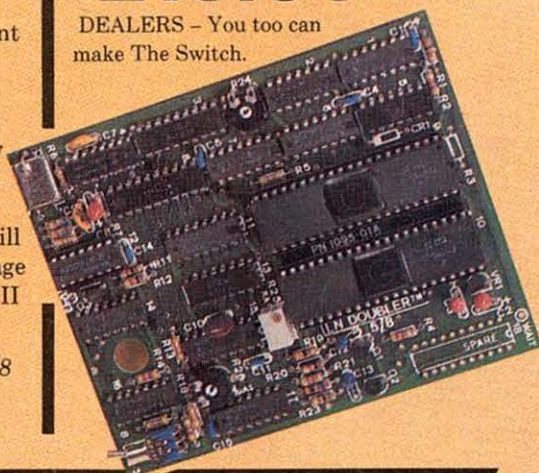
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80 REMARKS

by Wayne Green

"The Japanese have proven their superiority in engineering by crushing most of our electronic industries."

Japan Cometh

Having attended the entry exercises of several new microcomputer systems in recent weeks, I've been trying to get a grip on what all this means in terms of the long run for the industry.

The current run started just a couple weeks ago when I listened to extravagant oratory as DEC unveiled four new microcomputers. My first thought was, "How can a businessman make an intelligent decision between the four systems?" I saw no clear answer. Next came the Sony entry with its outstanding color graphics capability; Sony specializes in it and thus has a decided edge. This was followed by the Victor and then two from Wang.

Other recent entries are a new system from Casio, pictured in a *Time* magazine article, one from Sanyo, one from Panasonic and so on. The Japanese entries seem to have one thing in common: the ability to run CP/M programs. Come to think of it, most of the others cite that as a benefit too.

CP/M has been around for a while, but it didn't get a lot of recognition until IBM decided to use it to get around having to spend money for programs. It had been used on several of the lesser-known microcomputer systems, particularly some of the S-100 bus systems. Perhaps the best known of the CP/M user systems was the Northstar—until IBM. Suddenly CP/M was not just legitimate, but The Standard.

This is just what the Japanese had been waiting for. Until a standard came along, the Japanese were at a terrible disadvantage. Looking back over the development of microcomputer marketing, we see that each new system brought on the market was made incompatible with all others. One *could* translate programs from a Commodore system to an Apple or a Radio Shack, but it wasn't easy. Thus, program publishers had to identify every program being sold as to the system it would work with.

Each version of Basic was different enough as to result in gibberish when moved from one system to another. Some of the conversions between systems were relatively simple; others, such as the con-

version of programs from the Model I or III Radio Shack systems to run on their Model II, were almost beyond human capability. And that was just between systems of the *same* manufacturer!

No two systems seemed to be even remotely similar in their graphics generation, making the conversion of programs that use graphics, such as business charting programs, expensive to convert. It was this bewildering software mess that kept the Japanese at bay. With all of the computer languages being in English, the Japanese had an almost impossible problem. Their programmers first had to learn English, then how to program. Little of significance came through this fine filter, keeping the Japanese from being able to really tackle our market.

IBM, rather than forcing software firms to go back to the drawing board and custom write or convert programs for their system, made it so it would run programs designed to work with CP/M. It was a shortcut that sped the IBM entry into the market. It was also a break in the dike, so to speak, for the Japanese. The software barrier had finally been broken.

Once that impenetrable barrier was gone, the Japanese felt that, like in almost all other electronic industries, it would only be a matter of time before they prevailed. After all, for some 20 years they've been generating and training far more technicians and engineers than the U.S. They've proven their superiority in engineering by crushing most of our radio, television, CB, high fidelity, tape and video recording, and other electronic industries.

The increasingly innovative electronic products, backed up by production facilities in nearby Korea, Taiwan, Hong Kong, and Singapore, where they have both low labor costs and a high degree of automation, have destroyed one American industry after another. Is there anything we can see which will keep this from happening to the microcomputer industry?

I've been visiting the Asian electronic shows for the last three years and have watched the Japanese microcomputers start from way behind us (80 percent of the microcomputer sales in Japan two

years ago were American systems) and quickly leap ahead. Sales of American systems in Japan today are under 20 percent and dropping fast. And that despite a good deal of cultural pressure in Japan to buy American products. It didn't take long for the Japanese to not just catch up with us technically, but to go right on past us. By 1980 I was seeing microcomputers that were substantially ahead of our designs. You'll see what I mean when you look over new entries from Panasonic, Sony, and so on.

Unless we here in America make a major effort to interest and train computer technicians and engineers, I see no reason why we will not quickly lose another industry to Japan. The one last barrier to the Japanese computers has been broken, courtesy of IBM, and there is little we can do about it.

Is there any way to patch up the software dike? No—once IBM broke it the way was open and nothing will ever shut it again. Worse, the growing number of systems, all working on the same sort of software, will tend to kill the development on non-CP/M software, thus in the long run finishing off computer systems not able to use CP/M.

Another problem this brings to a head is this: With all of the new systems running on essentially the same body of software, it will be small technical innovations that may determine computer sales rather than the total package, as heretofore—again playing into Japanese hands. The Japanese system of attracting teenagers to technical careers through ham and computer clubs in their high school years, where most of our kids are spending their time on drugs, disco, and driving, puts us at a terrible disadvantage.

One more thing to think about, as if you needed the aggravation. If the reports in *Fortune* magazine are right, the Japanese have a 10-point IQ lead over us as a group, so on the average they are going to be able to outsmart us in business as well as technology. It may be about time for us to take a good look at Intelligence and make a major effort to use the brains we do have for a change. It may be time for us to make



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some major changes in our educational process.

It isn't that we don't have a good supply of brains; it is more that we put little stock in 'em and do little to take advantage of the few high IQ people we do have. Most of our large corporations, our government, and our military are set up to prevent anyone with high intelligence from getting ahead. The high IQ person, generally, is an innovative thinker—a trouble maker, if you will. Large corporations, the military, and government organizations are not set up to cope with anything but routine, so the promotions go to those people who cause the least trouble. What comes out on top? Generals, admirals and presidents of corporations who have never had any ideas or made waves. The intelligent people, for the most part, have not been successful.

One of the most startling aspects of the Mensa society, a group of the high IQ people (top 2 percent in intelligence), is the lack of successful people. If you read much about how to be successful you'll find that intelligence is not a significant factor in success. I don't think it is going to be a factor until the need for having intelligent people is recognized and something done to take advantage of their abilities.

Now that we seem to be up against a race of substantially more intelligent people, perhaps we will be able to face this situation and cope with it. If we do, it will probably be the first time we, as a country, have reacted intelligently to a problem. No, the odds are that we will do as we always have, refused to face the problem and set up barriers against even discussing it.

Logic says that the Japanese are going to be able to take over our microcomputer field as they have so many others. How long will it be before IBM computers are designed in Japan and built in the Philippines? This is the route that virtually every American electronics firm has taken. Where are G.E. radios made? Westinghouse? and so on...!

With the emphasis off of the software support, the marketing and promotion of hardware can ignore the differences between systems and concentrate on emotional approaches.

It is difficult for me, after seeing my country being the world leader in technology for so many years, to come to grips with the emergence of Japan—and their passing us. We've come a long way in the last 200 years, but the changes our country has seen are small compared to the changes Japan has experienced in the

same time. This speeding up of change seems to be carrying them on past us, leaving us behind.

In the past, we have done exceptionally well with what we've had to work with. We got a good start because the people who came to America at first were the adventurers—the pioneers. They brought along the Protestant work ethic. But then, about 100 years ago, Europe found that America was a great place to dump all of its losers, who came over here by the millions. They prospered when exposed to the almost unlimited opportunities here. Some came because they were persecuted in Europe, some because they just couldn't make it there. Here, with everything growing rapidly, it was difficult to fail.

Today the pioneering spirits seem to have been smothered. We have succumbed to big business, big government, and big military. Our whole educational system is geared to provide the fodder for this massive destroyer of intellect. We are forced to watch helplessly while big business, with the blessing of big government, takes over every successful entrepreneur. Our whole tax system is designed to discourage and punish success, while protecting our giant corporations.

I didn't mean to get into a pontification on the problems of America, though I can see them destroying our American microcomputer industry. There are close to 100 makers of microcomputer systems in America today. But how many of them do you know? You, like I, tend to think about and recognize the giants and forget the small firms. When we see IBM, Tandy and Apple advertised on tv, do we think in terms of perhaps buying a system where we don't have to ante up for those commercials? Or do we, sheeplike, think IBM, Tandy, and Apple?

How long before the Sanyo girl (an American) will be singing to get people to buy Sanyo computers? Next week, I'll bet.

You know, IBM, which made all of this possible, may have opened a Pandora's Box this time that can destroy even them!

The Japanese have one additional advantage over most American firms. The Japanese, lacking a large domestic market for most of their products, tend to think in terms of export far more than do American firms. Yet if we look at the world markets we see that Japan, which is almost closed to us now for computers, has 110 million people. The U.S. has about 220 million. Europe has 320 million, roughly. Remembering that each increase in production volume lowers the unit cost, it is immediately obvious that a firm selling to a population of 660 million is going to be able to underprice one selling to 220 mil-

lion. This is why Europe is such an important key to the survival of microcomputer firms.

Most of the Japanese firms are already in Europe, giving them a decided advantage over our firms. True, the European market is still a year or so behind ours, but this merely means that entry is far less expensive. A couple years ago a new U.S. firm could start up in microcomputers for a couple million dollars and expect to be successful. Today, in the U.S., it might take 100 times that to break in. Europe can still be bought for perhaps a \$10 million entry fee this year. Next year it is going to be \$100M and the year after perhaps \$1B.

There is nothing simple about coming out on top these days.

Sony Enters

A well-kept secret in the industry is the intention of Sony to bring out a microcomputer. An innocuous invitation to see a new Sony product in New York resulted in my introduction to their SMC-70.

Being a Sony Typewriter devotee, I thought that the new Sony microcomputer was a natural development of that instrument. Indeed, the keyboard of the new Sony microcomputer is remarkably like the Typewriter—light, functional, and complete.

The computer, which I'm sure you'll be reading about in great depth, is Z80 based and thus ready to run most of the Basic and machine-language Z80 programs with a few minor changes. But mindful of the IBM, Sony has designed their bus so an 8086 CPU can be plugged into a slot in the back for 16-bit processing.

Sony seems to have done their homework well. I was surprised to find them leaving little out of the package that one might want. I was even more surprised at the reasonable price tag. The SMC-70 with dual disks (520K) is smaller than the Apple II and sells for around \$2,600. It uses the new Sony 3½-inch disks.

They fired it up and amazed me with their color graphics. Show me the businessman who is going to be able to stop himself from getting one of these! Color for office computer systems is unstoppable. There are just too many applications where color is an important dimension. In an inventory program color can show instantly what items are back-ordered, which are in short supply, and which are in oversupply. Without color to bring this dimension, you would have to look through all of the items or resort to flashing signals, foreground-background displays, and so on. Color is far better.

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color to show prepayments, over 30 day accounts, over 90 days, and so on. The information jumps right out at you. The same goes for accounts payable. Overdue accounts can be shown easily, as can those in dispute, overpayments, and so on.

When it comes to graphing sales you often want to see several sales curves at one time to get a perspective on them. Without color you have a problem. I love to show the rise in advertising for the combination of *Microcomputing* and *80 Micro*, showing our continued strength. Graphs without color are a dying breed.

For the TRS-80 owner this means eventually getting a color graphics board. Or one could go the Color Computer route, if users will get busy and develop ways to get more use from this powerful system.

How long before we will have some color available for the Model 16? I'd say that this is a nice niche for a new firm. There is going to be a big need for that in about a year, so now is the time to get going with the development and marketing. Black and white computers (or green) are going to be as popular as B&W television sets in a couple of years.

With over 80 microcomputers being advertised in the recent magazines I thought that perhaps we had enough systems available. But this doesn't seem to stem the tide, despite the cost of getting into the market these days as compared to four or five years ago.

Today, for any real hope of success, a computer firm is going to have to invest several million dollars in the marketing. A key item is service, as we owners of TRS-80s are all too well aware. New firms have to come up with some workable system for providing fast service. Then there is software support, without which a computer just doesn't compute. This is still one of the weakest links in the chain of most systems.

A Sony Magazine?

When the IBM came out there was a lot of speculation about the need for a magazine to support the product. There still is a lot of discussion. The success of this magazine in supporting the TRS-80, helping about a thousand small firms to grow up with the computer, has been one of the strongest aspects of the Radio Shack computer. Just look at the Apple, with several small magazines instead of one large one—no comparison to the after-market for the TRS-80. Apple could do far better, I think, if there was one substantial magazine supporting their associate industry.

But, as Radio Shack has discovered, a supporting magazine can be both a fan-

tastic blessing and a pain. Sure, *80 Micro* has helped increase the sales of TRS-80 systems substantially. But it has also been a lever to force Radio Shack to be more responsive to the market and not be quite as dictatorial as they had been.

Billion dollar corporations, for the most part, seem often to hold the customers in contempt. They can be very difficult to deal with. But a magazine read by a substantial part of the firm's customer base is something that has to be reckoned with. Our most recent survey shows 260,000 TRS-80 owners reading *80 Micro*!

Thus it's a question of whether the bottom line of sales is more important than corporate secrecy and politics. Tough choice at times. Apple has kept their supporting magazines small (or perhaps it was the magazines which did this); the result has been far from the independent press that *80 Micro* has been for Tandy.

Today, with the microcomputer market as large as it is, it takes a good deal of investment to get a new magazine started. It's a lot different from back in 1975 when I started *Byte* or in 1976 when I started *Microcomputing*. It's not as difficult as trying to field a new computer, but darned near.

I think it's clear that for a system to really have strength and outside vendor support there has to be a strong independent magazine for it. Will such develop for IBM? For Sony? For DEC?

Tandy Secrets

I've been getting to quite a few computer shows. It's a way for me to see what is going on, talk with readers, meet the small businessmen in the field (few of the major firms come to most of these shows), and rap with my fellow editors.

With all due respect to Radio Shack's Mr. Jon Shirley and his heated blast at Wayne Green in the April issue of his *Microcomputer News*, I found that the other editors in our field have had the same experience as we have. They were telling me of time after time when they had tried to get confirmation or denial of rumors from Radio Shack, only to be met with lies or evasions.

Just days before Tandy announced they were replacing the Model III for the Model I, questions about the continued production of the Model I were met with assurances that there were no plans for discontinuing it. No, if Radio Shack would be honest with the press they would get fair treatment. But as long as they feel it necessary to deceive the press, they are going to have to live with the results.

It was somewhat comforting to find that everyone else in the field seems to be having the same problem we do. ■

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Why is a Model 16 like a bowling ball?" "Because you can get the same amount of software for each!"

So goes the joke making the rounds at 1 Tandy Center in Ft. Worth these days. It points out, in a black-humor sort of way, that all is not well with the Model 16.

Six months ago, Radio Shack appeared to take the lead in the 16-bit computer derby by announcing its Model 16. Today, that early lead has been squandered. The Model 16 is now seemingly out of the running against the likes of IBM, NEC, Victor, North Star, Corvus, and the other 16-bit computers who've jumped aboard the CP/M bandwagon.

How did Tandy lose this lead? Why is there still no Model 16 software? Is it true that the Model 16 doesn't have an operating system (see news story on page 300)? Is Tandy in some kind of trouble?

These are questions that need to be pondered. Tandy stock has declined recently and many Radio Shack shareholders are worried. They greeted the announcement of the Model 16 with enthusiasm, and they had a right to. But where is that enthusiasm today?

Low Morale

Like any major corporation, Tandy has its problems. Until 1978, the company was run by the charismatic Charles Tandy, who was a genius at marketing. Tandy, who was 82 when he died, was of another generation of Americans, and his management style reflected his values. He espoused a philosophy of hard work, long hours, and customer loyalty, and followed the social and political beliefs of his native Texas. Even today Tandy's management includes few women and minorities.

Former employees of Radio Shack claim that the company pays below industry average salaries for programmers and engineers. Many Tandy employees often work a 45+ hour work week, including Saturdays, because the company understaffs most of its departments. One current employee calls the company a "white collar sweat shop." A former Customer Service representative claims that her only training

for a difficult job consisted of being handed a Level II Manual and told to read it.

These reports, while founded in reality, are no doubt exaggerated, especially when passed on to outsiders. Americans, after all, love to gripe about their jobs. Still, when added together, these reports begin to paint a picture of a Radio Shack management style that would seem to be anachronistic in the 1980s workplace and to engender low employee morale. This low morale is aggravated in a number of ways.

There has been in-house rivalry between the systems software and the applications software groups. When the hard-disk operating system was being developed, the systems group kept the applications group in the dark to the point that the hard disk version of Scripsit had to be revised several times, because it used areas of memory needed by the hard disk OS. The rivalry between these two groups was apparently exacerbated by the location of the systems group on the 10th floor of the Tandy office building while the applications group was on the ninth. The two groups have recently been moved onto the same floor in an effort to improve cooperation and efficiency.

Rivalry or not, software support has never been a Radio Shack strong point. Ed Ellickson of Gower-Ellickson & Associates of Atlanta, GA, has characterized Radio Shack hardware as "brilliant." But he has never been impressed with the company's software. According to Ellickson, "Tandy just doesn't have the support people to make their machines do what they were built to do."

For example, Ellickson has examined the Model 16 thoroughly and feels that the hardware has been designed to accommodate as many as eight terminals, although Radio Shack has advertised the system as accepting only two additional terminals.

The Model 16's Future

So where does this leave the Model 16? It would appear that Tandy has no significant plans to produce applications software for the Model 16. Once a multi-user operating system is available, the company will prob-

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ably wait for outside software developers to write the applications programs and submit them to Radio Shack for publication. In other words, the company will allow the Model 16 software base to develop in much the same way as the other computers in its line—by waiting for the machine's users to write the software.

As far as a multi-user operating system is concerned, it is a safe bet that it will be developed outside the company. A Radio Shack spokesman, when asked recently if the company was negotiating with Microsoft for a Model 16 version of the Xenix operating system, replied "No comment." Similar "no comments" were offered in response to questions about negotiations with Ryan-MacFarland and Digital Research. This would seem to indicate that negotiations are in fact under way.

Steve Williams, a former Tandy programmer now working on CP/M68000 for Digital Research, thinks that Charles River Data System's UNOS is the leading candidate. UNOS is a Unix-like operating system developed by CRDS for their own MC68000 based systems.

Chris Larsen of Microsoft also declined to comment about any possible negotiations with Tandy about the Model 16, but did state, "I have high confidence that there will be a Model 16 version of Xenix, if not through Tandy, then as an independent product of ours." The 68000 version of Xenix has already been written and Larsen says it takes "three to six months to adapt it to a specific hardware system."

Mike Blaisdell at Phase 1 Systems reports that Oasis-16 is also under development and should be ready by next spring.

So a number of good operating systems will be available for the Model 16, just as several good operating systems are available for the Models I, II, and III.

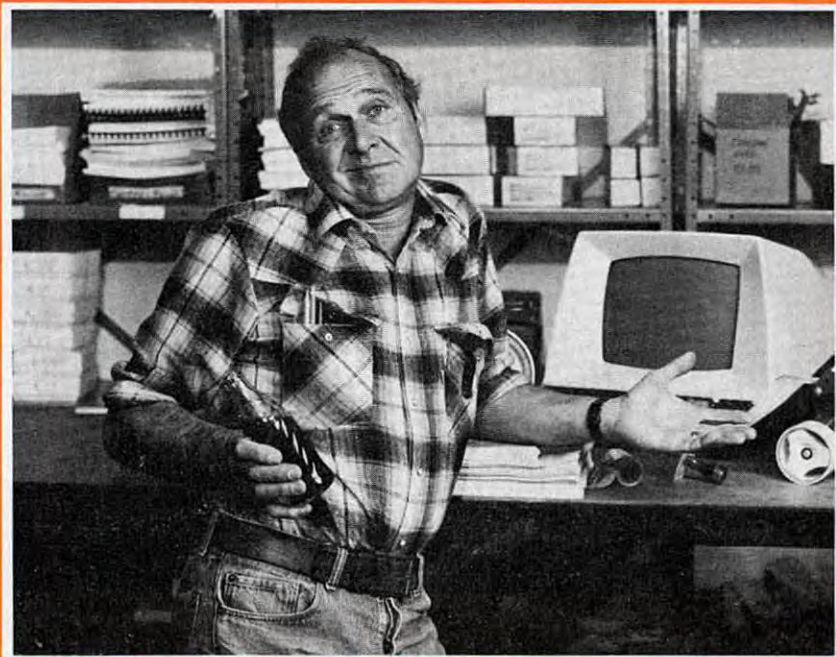
Once this happens, will it be too late for Tandy's new machine to get back into the 16-bit computer fray? Will the name "Radio Shack" be able to sustain market confidence while applications programs are feverishly being written in living rooms and basements across America? Can Tandy survive if it aims its marketing at middle America and ignores the Fortune 1000 companies?

The current situation will make it difficult for a buyer to select the Model 16 as his new computer system. Any useful applications software would be at least a year from the marketplace. Many good 16-bit computers, with software, are available today, and more good software will be written for those machines in coming months.

The powers that be at Radio Shack seem to feel that they have hit upon the formula for success in the American computer market. The formula worked once in the boom period of 1979-1981, when there was much less competition and the market was a hobbyist rather than a business market.

Tandy's strength, however, is marketing. The Model 16 will test that strength as it has never been tested before. ■

Butch Brown believed "logic seeking heads" lived in the hippie district.



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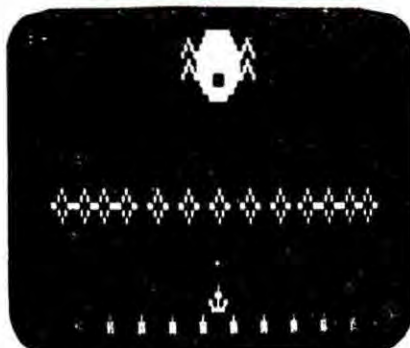
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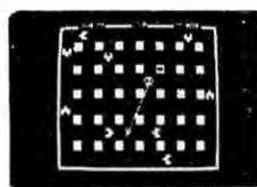
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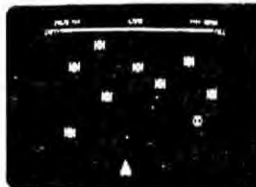
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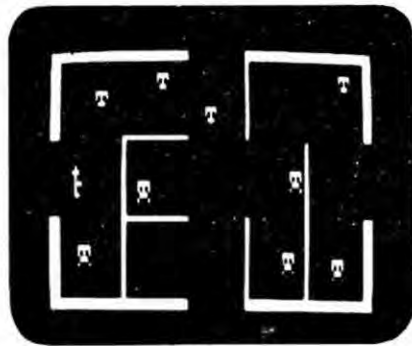
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80 INPUT

"It's a shame that the TRS-80 microcomputing publication staff members feel they have to resort to sex to sell their merchandise."

Give Us Basic

80 Micro is outstanding. Your March issue with your editor's choice column including graphics by Gesamte and Commander was the best I've read, especially the Commander program (in Basic) which allows the user flexibility.

Based on your promise to provide more and expanded graphics by Commander in the May issue I waited impatiently for the arrival of the magazine.

When the magazine arrived I immediately looked for the promised Commander article. The advanced graphics were beautiful and the theory lecture was outstanding, but there was no program—I have to wait for it in the June issue. But the real blow is that the program will be in machine language because in Basic it lacks speed. It's unfair to ask a segment of your readership to spend \$89.95 for an SDS-80C in order to enjoy the genius of Jake Commander.

I'm in no hurry; let the Color Computer take its time. Please use Basic in the program in the June article, or at least give those of us, who are already draining the family finances for peripherals, some part of the advanced graphics Commander program in Basic.

Also please give us more graphic/business programs and articles for the Color Computer.

*Jim St. Croix
Orlando, FL*

Glad you enjoyed the article. Your comments are appreciated and I hereby take note. I'll get to work on a pure Basic version but some of those patterns may take three or four hours to draw.—J.C.

Novices Left Behind

I have been a faithful and avid reader of 80 Micro for more than a year. A good friend introduced me to your magazine and I've been in love ever since. I back-ordered every issue and I've been going through them in my spare time. When comparing the earlier issues with the

present, I have discovered a disappointing trend. It seems that you are slipping away from the novice and hobbyist and moving toward the businessman and professional. The early issues are packed full of useful, interesting, informative and enjoyable programs and utilities. What has happened to them? Where have they gone? You have expanded the general articles, but at what expense?

Robert C. Foran

Well it's certainly difficult to please all of the people all of the time, isn't it? We please the professional audience and disappoint the hackers. We have no intention whatsoever of abandoning the novice but do anticipate in our third year of existence that our total audience will be a notch or two higher than a year ago.

In the meantime we're trying to cater to everyone from neophyte to pro.—J.C.

Don't Bet on It!

Just when I thought computer people had devised every possible way to reduce my bank balance, along comes Ronald Bobo with his slick program, "Computer Racing Form" (80 Micro, May 1982), to further deplete my funds.

As always, I try to improve all programs to make them easier, faster and equally efficient. I managed to do this with Mr. Bobo's program. I noted that the Daily Racing Form has three professional handicappers who daily suggest three possible winners in each race. I wrote a very short program in which all 18 suggestions are entered, a RND(18) statement is looped three times and three most likely winners are printed. I found that this program was shorter to write (only eight lines), easier to use and equally accurate. On several controlled tests, both programs managed to lose all the money equally fast. The thing that surprised me was the consistency. Both programs lost all the money every time.

I did build in a neat feature in my program. After all betting recommendations have been made, my TRS-80 says "Don't

bet at all. Put money in cookie jar." Following this advice I manage to win some new software once in a while.

I did enjoy Mr. Bobo's program and compliment him. Well done.

*Paul Henry
Yorba Linda, CA*

Pornography?

The April 1982 issue of 80 Micro is a very offensive publication.

It's a shame that the TRS-80 microcomputing publication staff members feel they have to resort to sex to sell their merchandise. Our family, including my 11-year-old boy, literally pores over the magazine for games, new products, and so on. Your publication is a fine one and can stand on its own merit without appealing to the base human sexual instincts of its readers.

If your publication continues to advertise pornography we will have to terminate our subscription.

Please have your publication appeal to the goodness in man. Thank you for your cooperation in this matter.

*Mrs. Charles J. Crowell
Oxnard, CA*

We've carefully examined the illustrations in question, and our base human sexual instincts remain untillated. Perhaps we deviate from the norm, but it takes more than a cartoon of a partially clad woman to get us worked up.—Eds.

Z80 Microprocessor Bugs

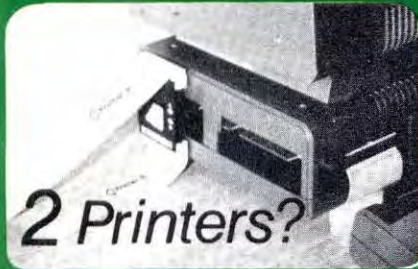
I am writing to advise readers of a problem I have found with the Z80 microprocessor while using CP/M's DDT.

Figure 1 shows two areas of memory and the registers initialized to a known state. I set the stack area pointed to by the SP (stack pointer) to 88H and set the SP to 4445H.

After the program is run, an instruction to load the HL registers from locations 6663H and 6664H is executed and the

NOW MODEL I AND MODEL III!

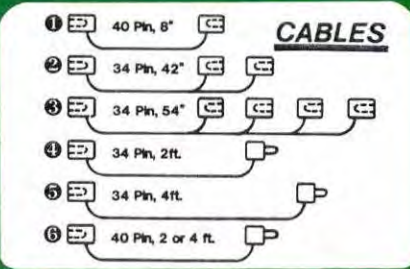
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2 Printers?

PRINTSWITCH

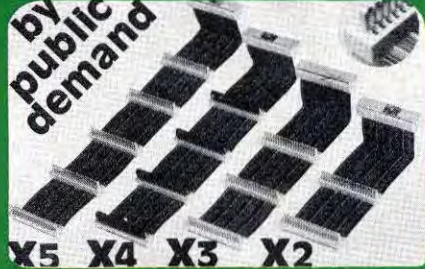
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IBM and all the "biggies" are using green screen monitors. Its advantages are now widely advertised. We feel that every TRS-80 user should enjoy the benefits it provides. But **WARNING:** all Green Screens are not created equal. Here is what we found:

- Several are just a flat piece of standard colored Lucite. The green tint was not made for this purpose and is judged by many to be too dark. Increasing the brightness control will result in a fuzzy display.
 - Some are simply a piece of thin plastic film taped onto a cardboard frame. The color is satisfactory but the wobbly film gives it a poor appearance.
 - One "optical filter" is in fact plain acrylic sheeting.
 - False claim: A few pretend to "reduce glare". In fact their flat and shiny surfaces (both film and Lucite type) ADD their own reflections to the screen.
 - A few laughs: One ad claims to "reduce screen contrast". Sorry gentleman but it's just the opposite. One of the Green Screen's major benefits is to increase the contrast between the text and the background.
 - Drawbacks: Most are using adhesive strips to fasten their screen to the monitor. This method makes it awkward to remove for necessary periodical cleaning. All (except ours) are flat. Light pens will not work reliably because of the big gap between the screen and the tube.
- Many companies have been manufacturing video filters for years. We are not the first (some think they are), but we have done our homework and we think we manufacture the best Green Screen. Here is why:

- It fits right onto the picture tube like a skin because it is the only **CURVED** screen **MOLDED** exactly to the picture tube curvature. It is Cut precisely to cover the exposed area of the picture tube. The fit is such that the static electricity is sufficient to keep it in place! We also include some invisible reusable tape for a more secure fastening.
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 - We are so sure that you will never take your Green screen off that we offer an unconditional money-back guaranty: try our Green Screen for 14 days. If for any reason you are not delighted with it, return it for a prompt refund.
- A last word. We think that companies, like ours, who are selling mainly by mail should list their street address, have a phone number (for questions and orders), accept CODs, not every one likes to send checks to a PO box, offer the convenience of charging their purchase to major credit cards. How come we are the only green screen people doing it? Order your **ALPHA GREEN SCREEN** today. \$12.50

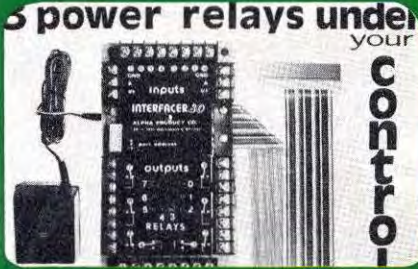


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stack area is modified as shown in the last line of the printout.

It appears that the equivalent of a PUSH PSW, POP PSW sequence has been executed. However, the executed instruction, which is a legal Z80 instruction, should not modify the stack area.

Normally, this does not cause difficulty in a program. If the stack is given plenty of room, and is accessed via PUSHes and POPs, the two bytes below the SP do not contain valid data. I found this problem because I was using the memory area immediately below the stack and consequently zapped the valid data.

I repeated the test using different values and in different memory areas. It also works (fails?) with the LHLD and SPHL instructions. I tried the same tests on a TRS-80 Model I, a Northstar and an S-100 system.

*Gavin Brickell
Auckland, New Zealand*

No, Gavin, you haven't discovered some long dormant bug in the Z80 micro-processor. What you have discovered is that your monitor, in fact most monitors, enables you to establish breakpoints in a program by inserting a Call to the monitor

at the physical location of the breakpoint. Then, when the call is encountered, the program counter is pushed onto the stack so that the monitor will know where the breakpoint occurred. This program counter value is the value you've encountered in your tests on the stack in the three systems you've examined.—80 Micro Tech Staff

Disable ROMPAK Autostart

There are various ways to disable the ROMPAK autostart on the Color Computer, but most involve hardware mods, such as trace cutting, taping, or special (expensive) cables. A much simpler way is to execute a POKE in Basic which prevents an autostart until you do another POKE or an EXEC.

A ROMPAK makes its presence known to Basic when its insertion shorts the Q clock signal to the cartridge interrupt pin, forcing an interrupt. This Basic interrupt routine jumps to the starting address of the cartridge, \$C000 (49152 decimal). It can be turned off by clearing bit 0 of \$FF23 (65315 decimal).

PEEKing \$FF23 when you turn on the computer gives a result of \$37 (55 decimal). The binary equivalent of this number is 00110111. The result of clearing bit 0 of this number gives 00110110, or \$36 (54 decimal). So, POKEing \$FF23 with \$36 should do the trick. Do a POKE 65315,54. Then plug in a cartridge. Basic will continue normally. The contents of the ROMPAK are now part of memory from \$C000 to \$FEFF (65297 decimal). You can PEEK this area, disassemble it, and generally do anything with it that you can do with the Basic ROM.

It is very easy to restart the cartridge: press reset; or EXEC 49152; or POKE 65315,55; or turn the computer off and on again.

*Alexander Benenson
New York, NY*

Chip Replacement Policy

Our repair people point out that in my reply to Richard Bates' letter ("80 Input," May 1982), I said we will "replace defective chips (non-Radio Shack) as required." Poorly stated! I should have said "We won't change non-Radio Shack RAM chips just because they're not ours. However, if any are defective, we will change either the entire set or none, at the customer's option. We do this because we don't feel mixing types or brands of chips is good service practice."

*Ed Juge, Director
Computer Merchandising
Tandy/Radio Shack
Fort Worth, TX*

Storybook Update

We appreciate very much the publication of a review of our first storybook, *Space Waste Race*, in your May 1982 issue (p. 42). Mary Gasiorowski's review takes us to task for several "bad points" in the program, among them: vocabulary, TRS-80 graphics, "interesting but trivial" games, and the "age-appropriate" nature of the story content.

Regarding vocabulary, Ms. Gasiorowski says in the review, "The instructions suggest the program is designed for non-readers but the nine-line story includes such vocabulary as 'collecting,' 'jealous,' and 'imagine.'" We don't believe "non-readers" can read. We're sorry you thought our instructions were meant to have them read it! It's a storybook! Storybooks have always been read to

```

X
PRE-RUN REGISTERS
COZOMOEIOI A=AA B=BBCC D=DDEE H=0000 S=4445 P=0100 LXI B,0FBC
-D6660,666F
6660 11 22 33 44 55 66 77 99 00 AA BB CC EE FF 11 . "3DUfW...
-D4440,444F      TO HL
                STOCK AREA PRE-RUN
4440 88 88 88 88 88 88 88 88 88 88 88 88 88 88 88 88 ...
-A5000          SP
5000 NOP
5001 LHLD 6663
5004 NOP
5005
-G5000,5004 EXECUTE
*5004
-X
POST-RUN REGISTERS      CORRECT
COZOMOEIOI A=AA B=BBCC D=DDEE H=5544 S=4445 P=5004 NOP
-D6660,666F
6660 11 22 33 44 55 66 77 99 00 AA BB CC DD EE FF 11 . "3DUfW...
-D4440,444F
4440 88 88 88 88 02 AA 88 88 88 88 88 88 88 88 88 88 ...
                CHANGED SP
    
```

Figure 1

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To see for yourself how amazing the ESF system is, or for more detailed information, call us toll-free at **800-538-8559** (inside California **408-737-7111**) and take advantage of our 30-day money-back return policy. Copies of the 80-page manual are available for \$4.95 (which you can credit towards an ESF), and while you're on the line ask about our equally amazing 64K RAM/ROM board for the Model I.



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"The major weakness with Space Waste Race is the instructions."

younger children by others. We were even hoping for a renaissance of this fine tradition among modern age, computer-using families! Where she concludes that "it will not replace parents reading to their children," we can only say hurrah! But she misses the point: *Space Waste Race* was not intended to replace such activity; it was intended to encourage it!

Our stories use vocabulary that fits. It's a writer's job to bring off an idea in exactly the right language. That's true whether a word goes spinning off over a reader's head or pokes him right in the bellybutton. What's wrong with getting kids to deal with words they've never seen or heard or used? How else can they learn them? Storybooks of the Future wants to expose kids to more exacting, visually-supported language no matter whose level of vocabulary it's on! Part of the fascination for language comes from hearing and seeing words you can't understand. Children will learn them especially if they come in a storybook where all the action can be seen and heard to help with understanding! They can't learn words they've never seen or heard!

What's wrong with TRS-80 graphics as cartoons? TRS-80 computer art may not be television, but using low-resolution graphics for cartoon-like animation isn't like doing true-life photography, either. If Ms. Gasiorowski wants high resolution, she'll have to wait for our Atari version! But give the TRS-80 a break. Even its graphics can be used to advantage, if used well. Another critic called *Space Waste Race's* graphics superb on the Model III and "very good" on the Model I. If she doesn't think ours are very good, well, we can live with her opinion—especially if she's never done graphics!

Ms. Gasiorowski said "The games are interesting but trivial; they could be more developed." How trivial is a little kid's mind? At the same time Ms. Gasiorowski wants to limit children's vocabulary because of their age, she also wants to lift their mental powers to an adult's level. I suggest she try it with some pre-schoolers or early elementary children before letting her adult impressions get carried away.

We take full responsibility for mislead-

ing Ms. Gasiorowski by calling them "games." In our newly released *Better View a Zoo*, we separate the learning activities from true games. In it, *Around the Zoo* is a true arcade-style game designed especially for little kids! There are four activities and two games. The activities in *Space Waste Race* came about from actual use with children in homes and schools.

As for Ms. Gasiorowski's criticism of the "age-appropriateness" of the story content, she may be right. Perhaps some people don't like their children dealing with stories about a "garbage moon" making our real moon jealous. But weren't we humans considering sending our garbage out to space not long ago? It may not be "age-appropriate" in Ms. Gasiorowski's eyes, but many little ones think it's hilarious! Our second storybook, *Better View a Zoo*, is about a little boy and a little girl in a jungle, with panthers, tigers and snakes. What if letters hid in jungles? What if snakes could teach directions? What if tigers hid in "alphabet grass?" I think even Ms. Gasiorowski will believe it's age-appropriate.

Space Waste Race is intentionally "very interactive." Storybooks of the Future is trying to get younger kids interested in using computers, in order to give them an early start in computer literacy. We believe it's not only a novel idea but a whole new direction, totally opposite that of computer-assisted instruction! We call it "in-context" learning, education that uses stories to teach concepts and encourages active participation in the process.

We do appreciate Ms. Gasiorowski's pointing out some flaws in the design of one of the games. However, she may have reviewed a pre-publication version, not the released version.

Many of her criticisms have already been changed in the version that purchasers have. If this is the case it's unfortunate that many readers will look at the review and dismiss Storybooks of the Future as "trivial." It's even more unfortunate to think that parents who read her criticism will deny their children some exciting learning experiences.

John D. Perron, Ph.D.
Publisher

Storybooks of the Future
Santa Clara, CA

Reviewer Replies

Do not assume that consumers will know the best use of your product—the

purpose of the instructions is to spell it out! If you want parents to be actively involved in the program with their children, then say so.

Since Mr. Perron now lets out the secret that parents are supposed to be involved, I see less problem with the vocabulary. With an adult present to pronounce and explain difficult or new words, a child can greatly expand his vocabulary.

The TRS-80's low-resolution graphics are limited. At a time when children are becoming increasingly computer-sophisticated, many will be quickly bored with block pictures. I know—I have done graphics.

I'm glad to hear the games will instead, and more appropriately, be called learning activities. The adult's presence may also enhance the use and development of those activities.

*The publisher's comments shed a little more light on the program; after reading them, I feel the major weakness with *Space Waste Race* is the instructions. Mr. Perron, rewrite the instructions to include many of the things you've said here, especially the parental participation, and you do have a worthwhile program. I look forward to seeing more and improved Storybooks of the Future.*

Mary Gasiorowski
Nashua, NH

A Pat on the Back for Radio Shack

80 Micro's readers (and editors) have not always been generous with their praise of Tandy's service and software. Here are a few letters giving Tandy a hand-shake and a thank you.—Eds.

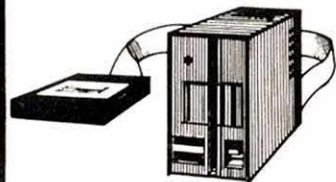
Ever since receiving my first issue of *80 Micro* I have read in the Input column a very large number of letters that criticize, demean, and insult Radio Shack and its parent company Tandy Corp. It's time that someone gives them a well-deserved pat on the back.

I own a TRS-80 Model I that I purchased in mid-1978 from my local Radio Shack. From the day of the sale I have received nothing but good, courteous service from both the sales and service departments of the company. Although there were some bugs in my original hardware (cassette volume, buffered cable, and so on) my local Radio Shack store provided the modification and upgrades quickly and with no hassle.

Admittedly, some Radio Shack soft-

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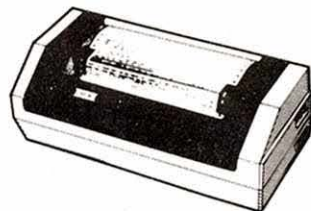
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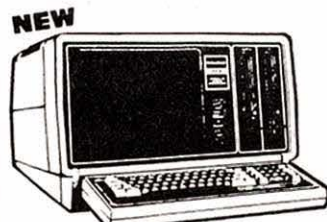
Smith Corona TPI
Daisy Wheel \$599



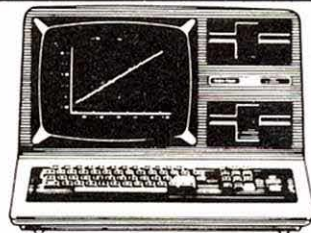
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†MIII R.S. Drive 0 Tandon Drive 1

‡Color Computer 64K requires
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ware is bug-ridden, but I have never had any problems with returning or upgrading any Radio Shack program. Every large company, regardless of the business it's in, has problems and drawbacks, but I believe that Tandy Corp. has done an excellent job in bringing us the world's best personal computers.

*Jon VonTobel
Las Vegas, NV*

Stop the Crusade

I have subscribed to *80 Micro* from the first issue and am extremely pleased with the magazine's quality and content. However, after receiving the May issue, I felt compelled to write about what seems to be a crusade on the part of Wayne Green, some of his staff and many of my fellow subscribers. I am referring to the continual, unrelenting attacks *80 Micro* mounts against Radio Shack's marketing and service policies.

Whether Wayne likes it or not, Radio Shack won't carry his magazines. If Tandy does not wish to accept the help Mr. Green believes outside suppliers of software and hardware can offer in increasing the market for their products, then so be it. They are a very successful firm and are well aware that any computer user has access, through many magazines and computer stores, to all types of non-Radio Shack equipment. I don't know if they are right or wrong in their marketing policies but I am bored by your continual tirades on this issue.

I also am sick and tired of reading letters like the one from Dorothy Mooney ("80 Input," May 1982). She can't understand why Radio Shack is less than helpful in solving her problems or why her hodgepodge of various manufacturers' parts doesn't work correctly. She even blames Tandy for its failure to support the system. How can Radio Shack be responsible for servicing a machine with home-brew mods, foreign operating systems, modi-

fied boards and all the other "improvements" that several hundred thousand owners make?

I have always been more than satisfied with the help and service I have received from Tandy personnel. I bought my machine from them in 1978 and have never had a problem they weren't willing to solve. They have always been courteous, efficient and reasonable. This includes the local store in Santa Monica, the Beverly Hills Computer Center and their Texas telephone staff. I don't buy "foreign" hardware, even if it's a bit cheaper because I realize that if a computer contains parts from two vendors it is very difficult to determine which of them is responsible for problems. For my money, I'll go with Radio Shack.

*Steven Gross
Los Angeles, CA*

Flawed Marketing Techniques

I would like to congratulate Mr. Green on his fine editorial ("80 Remarks," May 1982) chastising Radio Shack for their irrational refusal to acknowledge the existence of any other software, hardware or for that matter any product designed to enhance the use of their computers. I have written to Mr. Jon Shirley to express my support for Mr. Green's suggestion that they review their marketing techniques and perhaps include some non-Tandy material in their inventory.

In defense of Tandy's policies I must point out that any product sold in company stores has to be backed by that firm or there will certainly be dissatisfied customers. This consideration has led to Radio Shack's policies toward the programs and accessories made by others.

I find it disturbing that because of a massive advertising campaign Apple computers have taken the lead over the TRS-80s. TRS-80s are superior in many, many aspects, most notably value per

dollar. If you are interested in doing the things that motivated men to create "thinking machines" then I feel the TRS-80 Model III is unquestionably the best value.

*Clifford I. Knight
Manomet, MA*

Color Computer Enhancements

Mr. Gilleo's letter in the April issue conveyed the impression that reliable operation of the Color Computer in the address-dependent rate mode could be assured by replacing the MC6821 PIAs with MC68A21s. Not so! Even with MC68B21s various sorts of failures (e.g. thermal problems) can still occur. The problem seems to have to do with timing complications caused by capacitors on the E and Q clock lines. I don't know why the capacitors (C73 and C75) were included in the Color Computer design, but removing them has led to reliable operation at high speed in every CC I've tried (about six to date). Additionally, removing C85 allows operation of the Radio Shack disk system at high speed. (However, performing actual disk I/O at high speed isn't recommended).

Also, it is possible to enhance the 64K modification (see "Ram Wars," *80 Micro*, March 1982) to make the upper 32K accessible to the user. Here are the necessary steps:

- Bend up pins 11, 12 and 13 of U29
- Bend up pin 5 of U11
- Connect U29 pin 11 to TP1
- Connect U29 pin 12 to U29 pin 8
- Connect U29 pin 13 to U11 pin 5

This mod fixes a quirk in the SAM which causes ROM selection on write when in the all RAM map type. Normal computer operation will be unaffected. The machine-language program (Program Listing 1) puts Basic into RAM, selects the all RAM map type, and returns to Basic. Once this program is executed, Basic may be modified, and machine-language programs may be placed in high RAM (above \$D7FF for disk systems, or above \$BFFF for non-disk systems).

This program may be placed anywhere in free RAM (\$1000-\$7FFF). Keep in mind that pressing reset returns to the ROM map type, and any changes or additions you may have made to ROM areas or high RAM will be lost.

*Robert Brooks
St. Louis, MO*

```

ORCC    #$50      ;DISABLE INTERRUPTS
LDX     #$8000    ;POINT TO EXTENDED BASIC
LOOP   LDD     ,X    ;GET DATA FROM ROM
        STA    $FFDF ;SELECT ALL-RAM MAP TYPE
        STD    ,X++  ;PUT DATA IN RAM
        STA    $FFDE ;SELECT ROM MAP TYPE
        CMPX   #$D800 ;END OF ROMS? ($C000 IF NON-DISK)
        BLO   LOOP  ;NO, KEEP GOING
        STA    $FFDF ;YES, SELECT RAM MAP
        ANDCC  #$AF  ;ENABLE INTERRUPTS
        RTS     ;AND RETURN TO BASIC
    
```

Program Listing 1

DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES DISK DRIVES



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327

Support the Color Computer

The following is an open letter to Jon Shirley of Radio Shack.

In the April *TRS-80 Microcomputer News* you severely castigated Wayne Green for his January 1982 80 Remarks column. You chastised him for not calling and say that, had he called, he would have received "... a denial so strong that he might not have published such rubbish..." Did you ever stop to think that your attitudes as well as Wayne's need examining?

Frankly, Mr. Shirley, I wish we Color Computer owners could vote on who was to hold the position you now occupy. Given my choice, I would much rather have Wayne Green as vice president of merchandising. I'll bet that if he were, Radio Shack's sales would not have been passed by Apple's. Have you noticed Apple's attitudes are much like Mr. Green's? Instead of acting like they are afraid of losing a \$40 ROM pack sale, they are pleased to give out any information. Instead of losing a few dollars they have gained an even stronger foothold in the market.

Now, about your six-figure Color Computer advertisements: I have never seen anything featured in these ads except a \$400 game computer and miscellaneous Atari-arcade-type ROM packs. I have nothing against playing computer games, but when are you and Radio Shack's other executives going to realize that we are not all stupid dolts who dream of nothing but playing Dino Wars and Project Nebula?

I know several programmers and engineers who work for Sperry and Motorola. I got very tired of explaining that my computer was not a "Trash-80" and that it used a 6809E microprocessor. This revelation alone amazed them; they had no idea such a sophisticated chip was being used already. If only you had included 6809 in the name of the computer instead of relegating it to the ultra fine print at the bottom of the page!

I was about to buy either an Apple II or an Atari 800 until my brother gave me a demonstration of his 16K Extended Color Computer. After his demonstration I never gave the other computers another thought. If only Radio Shack had told me what he did, it wouldn't have taken me so long to make a decision.

Unfortunately, after I bought the computer I found that:

- Radio Shack feels it can single-handedly supply all software needs, hence all company stores are not allowed to carry anyone else's software.

- Radio Shack wants to be the only one to give out (or not give out) information on the computer; therefore, company stores

"All known micro-circuits are subject to error."

are not allowed to carry outside publications.

- Even when Radio Shack gives out information on the computer it is often incomplete. The *Color Computer Technical Reference Manual* is a case in point. I eagerly looked at the memory map only to discover that while all the upper addresses were given in very good detail, all the important lower addresses were represented by a single vertical arrow. Do me a favor and look at *80 Micro*, June 1981, page 210, Table 7. That's a memory map!

Now, would you do me, yourself, and all Color Computer owners a favor? Look at the Color Computer (try a 16K Extended; the 4K game computer is not your only model); ask questions about it; use it; compare it to the competition; then, see that it is advertised accordingly. If you had done that in the first place, Apple would have more than one bite out of its logo.

In all fairness I must compliment you on your April 1982 *Micro News*; at last, you gave us a line feed program, an answer to machine-language backups, and a method for merging Basic programs. This is much better than the Space Alert programs I'm used to seeing.

Douglas Leany
Henderson, NV

Computers Make Mistakes

Contrary to the published opinion of author Gary Dillio ("Technological Destiny—Part 2," *80 Micro*, May 1982), computers make mistakes. My job is to travel across this country and pick up the pieces after a certain brand of computer has made a mistake. Anyone who has a Model I Radio Shack disk system has by now experienced the phantom re-boot and the loss of a key item in a disk file, or worse.

Even if the hardware is perfect, there is the cosmic-ray effect. Cosmic rays can go through almost any shielding, but will sometimes stop for almost nothing. When a cosmic ray does stop, its motion is converted to other forms of energy and its electrical charge is imparted at the site of impact. If a microchip junction is in the process of making a decision at that exact instant, the charge from the ray can alter

the level in the chip at one junction. This results in a false output from the device. This does not happen often, but it does happen.

For this reason, all known microcircuits are subject to an occasional error. As the cycle times get shorter, the junctions get smaller, and the amount of power used is reduced, the devices become more open to cosmic-ray error. At present, the cosmic-ray effect is a guarantee that no computer will be entirely free of error.

Heat, static and parts failure add to the ways in which a computer can give errors. The design of the hardware and software can change the odds of these errors causing problems. Parity and checksum are two well-known methods of checking for some of these errors.

In all fairness I must agree with Dillio that the computer gets too much blame for the errors of humans. A well-run computer operation keeps the needed backup copies and input documents on hand to survive the computer errors as well as the human errors. We should be just as skeptical of "the computer made a mistake" as we would be if someone said "the Devil made me do it." Let us not fight the "computer error" lie with another lie.

Hal D. Story
Bolingbrook, IL

Gary Dillio Replies

In my article I did state that "computers do not make mistakes." Unfortunately, Mr. Story took my comments too literally. The point I was attempting to make was the vast majority of mistakes attributed to computers are, in fact, human errors.

Perhaps Mr. Story misunderstood me because of our differing perspectives—his, I assume from his letter, being hardware oriented, mine being software oriented. I do not call a re-boot a mistake but, rather, a malfunction; nor would I fault my computer for static electricity error that may have occurred when I failed to properly ground my equipment.

I hope my VISA billing clerk doesn't read Mr. Story's letter. I would cringe to hear him blame that erroneous charge on cosmic rays.

Mr. Story's letter has validity and perhaps I should not have used absolute language in the series. I hope readers understand that a six-part introduction to data processing does not allow me the luxury to explore subjects in detail and thus some statements may not contain enough explanatory comments. For this I apologize in advance.—Gary J. Dillio

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The Trouble with TRS-DOS.

Although TRS-DOS is an excellent operating system, it has one major disadvantage. When compared with CP/M, TRS-DOS locks you into a limited and possibly dead-end course. When you are ready to upgrade to a new computer, it is likely that none of your present software will run on the new machine. All of the time and money you have invested in TRS-DOS software will be lost.

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Over the past year, a number of powerful competitors have introduced new microcomputers. Most people will instantly recognize the names of Xerox, IBM, Hewlett-Packard, Digital Equipment and Zenith. The Japanese companies, Sony, NEC, Sanyo, Toshiba and Sharp, are equally well-known. Together, these companies have committed over a billion dollars to compete effectively in the micro market. TRS-80 owners should be aware that every one of these companies has chosen CP/M for their standard operating system. Over the next few years, these companies will sell millions of CP/M computers. Considering these facts, it is clear that CP/M is the operating system of the future.

Apple and Commodore Offer CP/M.

In a recent press conference, the Apple Computer Company stated, "The largest installed base CP/M system in the world today is the Apple II with the Z80 card from Microsoft." In a recent full page ad in the Wall Street Journal, Apple announced CP/M for the Apple III. Commodore, refusing to be left behind, has recently announced their "Emulator" series of computers that support CP/M. There are even rumors that the new Tandy 16 will support a version of CP/M.

CP/M for the TRS-80.

Converting to CP/M offers the TRS-80 owner many advantages. The TRS-80 immediately becomes capable of running twice the software of any other computer on the market. Perhaps more importantly, CP/M permits software portability. Unlike TRS-DOS programs, CP/M programs can be directly transferred to your next computer. The savings in time and software costs can be quite significant. CP/M conversion can easily pay for itself with the money saved on one or two software purchases. The sooner you convert to CP/M, the more you stand to save.

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The Omikron "Mapper" offers the ideal step to upgrading to a newer, more powerful computer. With the "Mapper," your TRS-80 can run both CP/M programs and TRS-DOS. With CP/M, you can build a software library that's fully compatible with the newest CP/M business computers. All of the time and money you spend on selecting, purchasing, and learning CP/M software can be considered an investment in the future. In addition, your old TRS-80 can gain a new lease on life as a fully compatible back-up unit. Consider all these points carefully. The Omikron "Works" package offers the best solution for protecting your investment in the TRS-80. By choosing the "Works," you can purchase a "Mapper" and also receive over \$1,000 worth of top-quality CP/M software. Value, Utility, performance — Omikron offers you more than ever before.

COUGAR ... Omikron's Users Group.

CP/M has always been the standard for business and professional use. This market has always demanded high quality and high performance. The high prices for CP/M programs reflect the additional effort required to develop top-quality software products. To help our customers afford CP/M software, Omikron has formed Cougar, our official users group. Through Cougar, Omikron can purchase software products in large volume. This allows us to offer our customers some of the best CP/M software in the industry at greatly reduced prices.

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Omikron has sold more CP/M conversions than all of our competitors combined. Omikron was the first in the market with a CP/M conversion. Omikron has continued to lead the market for one simple reason — our total commitment to our customers. Only Omikron offers a "Works" type introductory package. Only Omikron has a "Cougar" type users group for long-term savings. Our hardware has always been designed with reliability first. Our software is well designed, complete, and bug free. Our technical hot line assists those with problems. Finally, our exchange policy has enabled our customers to upgrade to our new designs for much less than the cost to new customers. When you buy from Omikron, you buy from a company with a proven record of dedication and success.

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80 DEBUG

"Connect the plotter to the output of an 8-bit output port."

The Plot Thickens

I have received many phone calls and letters in response to my article "Digital Doodles" (80 Micro, January 1982) all asking the same question: "How do I connect the plotter to the computer?" After rereading the article I found I never mentioned that problem. Let me answer the question now.

You must connect the plotter to the output of an eight-bit output port. The input to this port should connect to the main bus of the TRS-80. Figure 1 shows a schematic of the port I use with my plotter. Although it has two output and 1½ input bytes, the plotter needs only one output byte. This

port requires a +5V dc power supply. I recommend you build a separate power supply for the port.

Alan Sehmer
150A Lorretta Drive NW
Corrales, NM 87048

Snow Shovel" (80 Micro, March 1982). All references in the article to Z75 and Z75A should read Z74 and Z74A, respectively. Fortunately, the error affects only the optional buffer circuit. The circuit itself is correct; the only error is in which chip the 74LS125 should be piggy-backed on.

Brian Smith
6770 Halifax St.
Burnaby, British Columbia

Out of the Pit

There is an error in my article, "Video

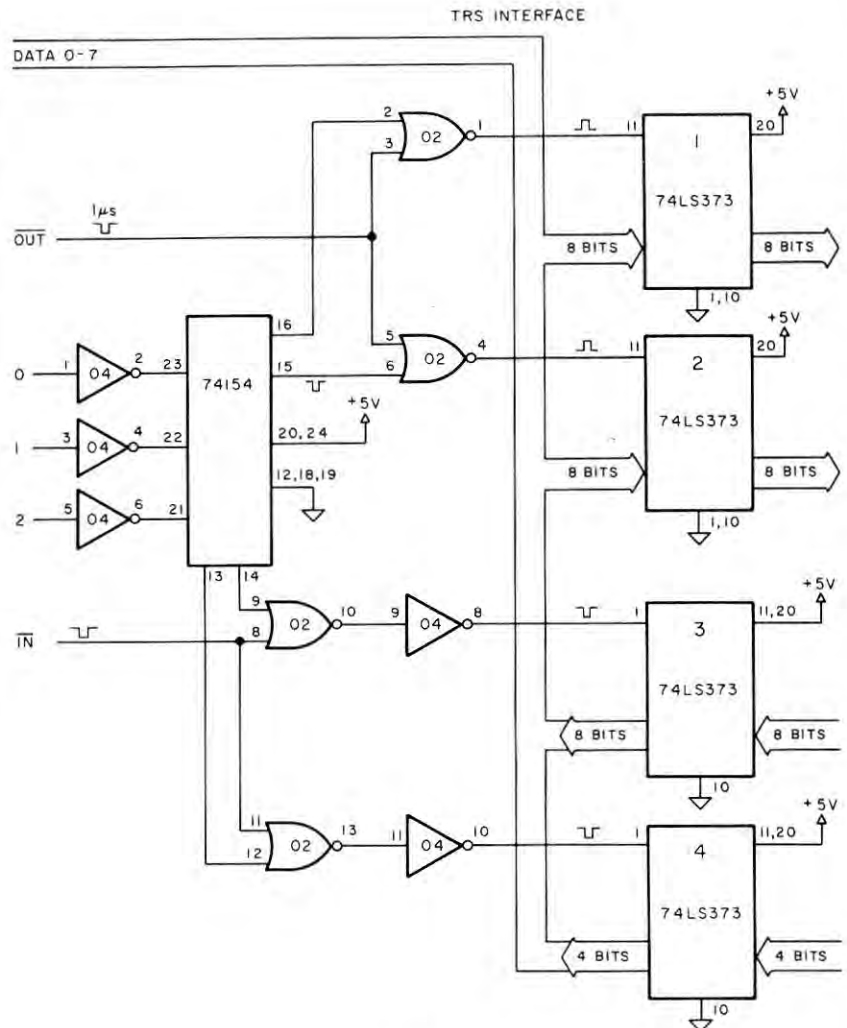


Figure 1

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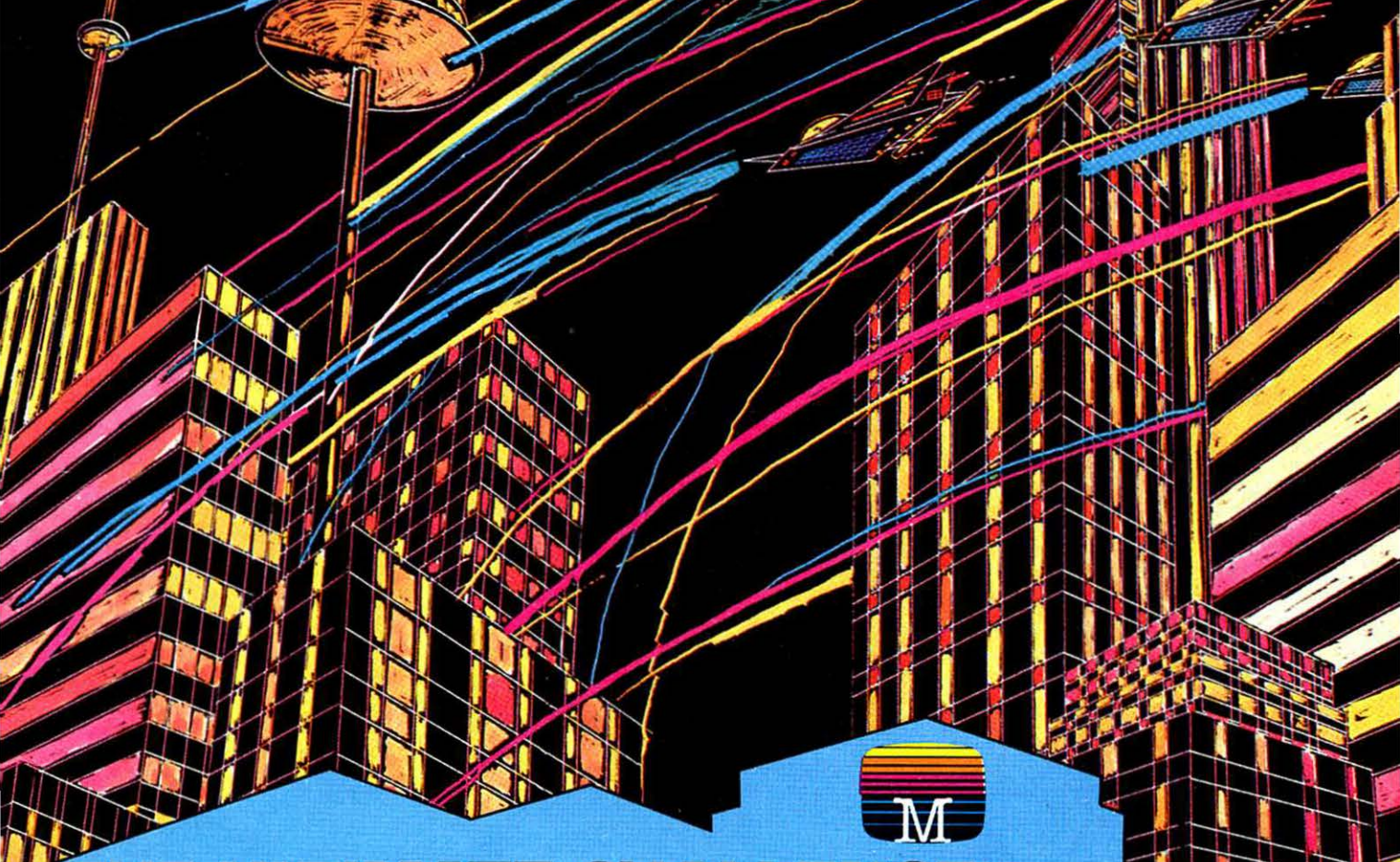


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FORCE, stretching your skills and imagination beyond this planet, is undoubtedly the fastest and most complex game you will ever see!

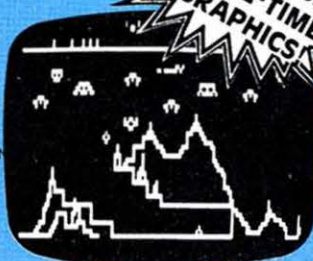
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Actual TRS80* screen 250

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The program listing accompanying Randolph Fontenot's article "Computer Repeat" (80 Micro, April 1982) was misprinted. The complete listing follows.—Eds.

```

10 *****
20 *** **
30 ** COMPUTER-REPEAT FOR LEVEL 2 TRS-80 **
40 ** BY RANDOLPH FONTENOT JAN 1981 **
50 ** 734 CHOCTAW DRIVE **
60 ** OPELOUSAS, LA 70570 **
70 ** **
80 *****
90 CLEARL50:INPUT"DO YOU WANT INSTRUCTIONS, Y/N";A$
100 IF A$<>"Y"THEN190
110 CLS:PRINT@16,"INSTRUCTIONS FOR COMPUTER-REPEAT":PRINT
120 PRINT" COMPUTER-REPEAT IS A GAME OF SKILL AND MEMORY. YOU
WILL BE"
130 PRINT"SHOWN A SEQUENCE OF RANDOM LETTERS AT THE CENTER OF TH
E SCREEN."
140 PRINT"WHEN THE QUESTION MARK APPEARS, CAREFULLY REPEAT THE S
EQUENCE"
150 PRINT"OF LETTERS."
160 PRINT" IT IS A REAL CHALLENGE TO WIN AT SKILL LEVEL 5! GO
OD LUCK!":PRINT
170 INPUT"ARE YOU READY TO ACCEPT THE CHALLENGE OF COMPUTER-REPE
AT, Y/N";A$:IF A$="Y"THEN190
180 INPUT "PRESS <ENTER> WHEN READY";A$
190 INPUT"ENTER SKILL LEVEL, 1-5";SL:MY$=""
200 IF SL=1,N=4 ELSEIF SL=2,N=8 ELSEIF SL=3,N=16 ELSEIF SL=4,N=3
2 ELSEIF SL=5,N=64 ELSE GOT0190
210 CLS:PRINTCHR$(23):PRINT@16,"COMPUTER-REPEAT":PRINT@470,"=="
<=="
220 FORI=1TON
230 L=RND(25)+65:MY$=MY$+CHR$(L)
240 FOR Z=1TO LEN(MY$)
250 PRINT@478,MID$(MY$,Z,1)
260 FORX=1TO500:NEXTX
270 PRINT@478," "
280 FORX=1TO500:NEXTX
290 NEXTZ
300 PRINT@478,"?":YOUR$=""
310 FORX=1TO LEN(MY$)
320 Y$=INKEY$:IFY$=""THEN320
330 YOUR$=YOUR$+Y$
340 NEXTX
350 IF MY$=YOUR$ THEN NEXTI ELSE CLS:PRINTCHR$(23):PRINT`448,"YO
U LOSE AT SKILL LEVEL ";SL:I=N:GOTO370
360 CLS:PRINTCHR$(23):PRINT@448,"YOU WIN AT SKILL LEVEL ";SL:PRI
NT"CONGRATULATIONS !!!"
370 INPUT"PLAY AGAIN, Y/N";A$:IF A$="Y" THENGOTO190ELSE CLS:END

```

The program "Kings and Catapults" from page 326 of the February 1982 issue contains errors. The last few bytes of line 9020 were listed incorrectly. Lines 9205, 9225, 9230 and 10000 contain PRINT@ statements which will not work with the older Model I ROMs. Program Listing 1 corrects these errors.—Eds.

```

9015 POKEL6108,172:POKEL6082,140:FORX=16240TO16428:POKEX,191:NEX
T:POKEL6186,191:POKEL6175,191:POKEL6107,140
9020 PRINT@896,U$;:POKEL6301,131:POKEL6302,131:POKEL6271,131:POK
EL6272,131:IFH=1THEN9060ELSEIFH=2THEN9080ELSEIFH=3THEN9090ELSEIF
H=4THEN9120ELSEIFH=6THEN10000
9225 PRINT@A,"*";:PRINT@A-65,"*";:PRINT@A-129,"*";:PRINT@A-19
2,"*";:FORX=1TO10:NEXT:PRINT@A," ";:PRINT@A-65," ";:PRINT@A-12
9," ";:PRINT@A-192," ";:RETURN
9230 LL$=CHR$(176):A=763:FORX=1TO11:A=A-66:PRINT@A,LL$;:FORU=1TO
20:PRINT@A+66," ";:NEXTU,X:FORX=1TO13:A=A+62.5:PRINT@A,LL$;
9235 FORU=1TO20:PRINT@A-62.5," ";:NEXTU,X:PRINT@A,"*";:PRINT@A-6
5,"*";:PRINT@A-126,"*";:FORX=1TO9:PRINT@A," ";:PRINT@A-65," ";
:PRINT@A-126," ";:PRINT@538,"MISSED":RETURN
10000 LL$=CHR$(176):A=706:FORX=1TO11:A=A-62:PRINT@A,LL$;:FORU=1T
O20:PRINT@A+62," ";:NEXTU,X:FORX=1TO13:A=A+67:PRINT@A,LL$;
10010 FORU=1TO20:PRINT@A-67," ";:NEXTU,X:PRINT@A,"*";:PRINT@A-65
,"*";:FORX=1TO10:PRINT@A," ";:PRINT@A-65," ";:PRINT@538,"MISSE
D":RETURN

```

Program Listing 1

Percom Disk Storage

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Percom's DOUBLER II* tolerates wide variations in media, drives

GARLAND, TEXAS — May 22, 1981 — Harold Mauch, president of Percom Data Company, announced here today that an improved version of the Company's innovative DOUBLER* adapter, a double-density plug-in module for TRS-80* Model I computers, is now available.

Reflecting design refinements based on both theoretical analyses and field testing, the DOUBLER II*, so named, permits even greater tolerance in variations among media and drives than the previous design.

Like the original DOUBLER, the DOUBLER II plugs into the drive controller IC socket of a TRS-80 Model I Expansion Interface and permits a user to run either single- or double-density diskettes on a Model I.

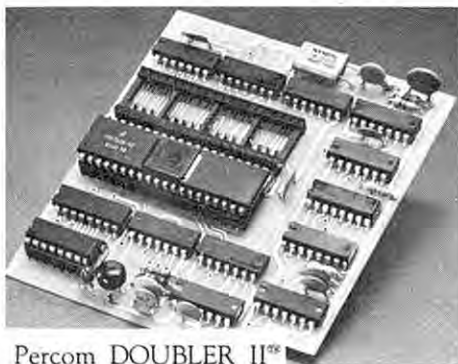
With a DOUBLER II installed, over four times more formatted data — as much as 364 Kbytes — can be stored on one side of a five-inch diskette than can be stored using a standard Tandy Model I drive system.

Moreover, a DOUBLER II equips a Model I with the hardware required to run Model III diskettes.

(Ed. Note: See "OS-80*: Bridging the TRS-80* software compatibility gap" elsewhere on this page.)

The critical clock-data separation circuitry of the DOUBLER II is a proprietary design called a ROM-programmed digital phase-lock loop data separator.

According to Mauch, this design is more tolerant of differences from diskette to diskette and drive to drive, and also provides immunity to performance degradation caused by circuit component aging.



Percom DOUBLER II*

Mauch said "A DOUBLER II will operate just as reliably two years after it is installed as it will two days after installation."

The digital phase-lock loop also eliminates the need for trimmer adjustments typical of analog phase-lock loop circuits.

"You plug in a Percom DOUBLER II and then forget it," he said.

The DOUBLER II also features a refined Write Precompensation circuit that more effectively minimizes the phenomena of bit- and peak-shifting, a reliability-impairing characteristic of magnetic data recording.

The DOUBLER II, which is fully software compatible with the previous DOUBLER, is supplied with DBLDOS*, a TRSDOS*-compatible disk operating system.

The DOUBLER II sells for \$219.95, including the DBLDOS diskette.

~~\$219.95~~
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The Percom DOUBLER II is available from authorized Percom retailers, or may be ordered direct from the factory. The factory toll-free order number is 1-800-527-1222.

Ed. note: Opening the TRS-80 Expansion Interface may void the Tandy limited 90-day warranty.

All that glitters is not gold

OS-80™ Bridging the TRS-80* software compatibility gap

Compatibility between TRS-80* Model I diskettes and the new Model III is about as genuine as a gold-plated lead Krugerrand.

True, Model I TRSDOS* diskettes can be read on a Model III. But first they must be converted and re-recorded for Model III operation.

And you cannot write to a Model I TRSDOS* diskette. Not with a Model III. You cannot add a file. Delete a file. Or in any way modify a Model I TRSDOS diskette with a Model III computer.

Furthermore, your converted TRSDOS diskettes cannot be converted back for Model I operation.

TRSDOS is a one-way street. And there's no re-treating. A point to consider before switching the company's payroll to your new Model III.

Real software compatibility should allow the direct, immediate interchangeability of Model I and Model III diskettes. No read-only limitations, no conversion/re-recording steps and no chance to be left high and dry with Model III diskettes that can't be run on a Model I.

What's the answer? The answer is Percom's OS-80* family of TRS-80 disk operating systems.

OS-80 programs allow direct, immediate interchangeability of Model I and Model III diskettes.

You can run Model I single-density diskettes on a Model III; install Percom's plug-in DOUBLER* adapter in your Model I, and you can run double-density Model III diskettes on a Model I.

There's no conversion, no re-recording. Slip an OS-80 diskette out of your Model I and insert it directly in a Model III.

And vice-versa. Just have the correct OS-80 disk operating system — OS-80, OS-80D or OS-80/III — in each computer.

Moreover, with OS-80 systems, you can add, delete, and update files. You can read and write diskettes regardless of the system of origin.

OS-80 is the original Percom TRS-80 DOS for BASIC programmers.

Even OS-80 utilities are written in BASIC. OS-80 is the Percom system about which a user wrote, in Creative Computing magazine, "... the best \$30.00 you will ever spend."[†]

Requiring only seven Kbytes of memory, OS-80 disk operating systems reside completely in RAM. There's no need to dedicate a drive exclusively for a system diskette.

And, unlike TRSDOS, you can work at the track sector level, defining and controlling data formats — in BASIC — to create simple or complex data structures that execute more quickly than TRSDOS files.

The Percom OS-80 DOS supports single-density operation of the Model I computer — price is \$29.95; the OS-80D supports double-density operation of Model I computers equipped with a DOUBLER or DOUBLER II; and, OS-80/III — for the Model III of course — supports both single- and double-density operation. OS-80D and OS-80/III each sell for \$49.95.

Circuit misapplication causes diskette read, format problems. High resolution key to reliable data separation

GARLAND, TEXAS — The Percom SEPARATOR* does very well for the Radio Shack TRS-80* Model I computer what the Tandy disk controller does poorly at best: reliably separates clock and data signals during disk-read operations.

Unreliable data-clock separation causes format verification failures and repeated read retries.

CRC ERROR—TRACK LOCKED OUT

The problem is most severe on high-number (high-density) inner file tracks.

As reported earlier, the clock-data separation problem was traced by Percom to misapplication of the internal separator of the 1771 drive controller IC used in the Model I.

The Percom Separator substitutes a high-resolution digital data separator circuit, one which operates at 16 megahertz, for the low-resolution one-megahertz circuit of the Tandy design.

Separator circuits that operate at lower frequencies — for example, two- or four-

megahertz — were found by Percom to provide only marginally improved performance over the original Tandy circuit.

The Percom solution is a simple adapter that plugs into the drive controller of the Expansion Interface (EI).

Not a kit — some vendors supply an untested separator kit of resistors, ICs and other paraphernalia that may be installed by modifying the computer — the Percom SEPARATOR is a fully assembled, fully tested plug-in module.

Installation involves merely plugging the SEPARATOR into the Model I EI disk controller chip socket, and plugging the controller chip into a socket on the SEPARATOR.

The SEPARATOR, which sells for only \$29.95, may be purchased from authorized Percom retailers or ordered directly from the factory. The factory toll-free order number is 1-800-527-1222.

Ed. note: Opening the TRS-80 Expansion Interface may void the Tandy limited 90-day warranty.

80 AID

"People in school media centers have some unusual decisions to make concerning computers in their work."

Model II Programs Wanted

I am compiling a book of programs for the TRS-80 Model II and am seeking contributions from anyone who has written or modified programs for this machine. Any type of program is welcome—Assembly language SVC calls, games, graphics, education, business or what have you.

I prefer programs written in Basic that will operate on TRSDOS 1.2 or 2.0, although I will also consider programs for CP/M. I need a clean listing of the program along with a description of what it is supposed to do.

I will contact anyone who submitted a program after it has been selected for inclusion in the book. Any program not selected will be returned to the owner.

*Jesse W. Baker
P.O. Box 145
Fort Kent, ME 04743*

AJ 841 Help

In his review of the Anderson-Jacobson Selectronic 841 ("80 Reviews," April 1982) Robert A. Batty correctly stated that "The program does not automatically underline." The Lazy Writer word processing program does underline and double spaces; just set the line feed counter to 3.

I would like to hear from users who have attached the AJ 841 to their system. I am interested in sharing ideas on driver routines.

*Mark T. Grunau
259 N. Capitol #257
San Jose, CA 95127*

Typewriter Interface

We have purchased a 32K Color Computer and have on hand a new IBM Electronic Model 50 typewriter.

We are now putting out a little paper and typing it on the typewriter. To justify it we must type it twice. We are looking to connect the computer to the typewriter and use a word processing program to

type the body of the paper.

Do you know of any available link for proper operation of this type of setup, or any information that might help us?

*Barry Wind
7780 N.W. 41 St.
Hollywood, FL 33024*

Disable Data and Time Prompts

In response to Tony Nardo's question printed in the February issue of this column, here is the way to disable the date and time prompts in TRSDOS 1.3. Place the TRSDOS disk you want to patch in drive 0 and type PATCH *0:0 (ADD = 4EA9, FIND = CA, CHG = C3) from TRSDOS Ready. If you need to apply the patch to a number of disks make a build file out of it. Change the *0:0 to *0:1, place the disk to be patched in drive 1, and execute the build file by typing DO PATCH or whatever you name the file. You can easily reverse the patch by switching the values in the FIND and CHG parts of the patch.

*John Ratzlaff
Mount Pisgah Academy
Chandler, NC 28715*

Double Trouble

How can I resolve a conflict between Omikron's Mapper II 8-inch disk controller board and Percom's Doubler II double density disk controller board? Both these boards integrate the 1771 disk controller chip on their board to achieve their function. Is there a way to plug these boards into each other? I need the advantage of a double density operating system (for the data separator circuitry and expanded disk space) but would like to retain the Mapper II for an eventual addition of some 8-inch drives.

My problem came about when I purchased a second Model I system and combined the best features of the two sys-

tems which include the Mapper II and Percom Doubler boards. I am currently using the system with the Mapper II board, but that leaves approximately 30 percent of my programs and files inaccessible because they are in the double density mode. In addition, another 20 percent of my programs and files are inaccessible because they are on drive 1 which has reliability problems without the data separator circuitry embodied in the Doubler II.

How can I salvage my drive 1 and double density files without throwing away the 8-inch drive capability?

*Al Peponis
435 Monaco Avenue
Union City, CA 94587*

Media Center Management

I just read Judith Dzedzy's letter concerning the use of micros in school library media centers ("80 Aid," April 1982). Our company is involved exclusively in the development and management of school media centers; even though we are a communications firm—not a software house—we do sell some of our TRS-80 media center utility software. We have discovered that people in school media centers have some unusual decisions to make concerning computers in their work—decisions even more basic than software concerns. Since we have faced this situation so many times we have written a pamphlet to help make computer decisions easier for media center managers (or anyone else concerned with computers in management). Normally we sell the brochure for \$1, but we will send any of your readers a copy free if they write to us and enclose a self-addressed stamped envelope.

We are interested in corresponding with professionals in this field and in developing management techniques, computer applications and materials to help them manage their media centers.

*Zack T. Hinckley, President
Atlantis Creative Enterprises
P.O. Box 3727
Cocoa, FL 32922*

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Common Routines

I enjoy the challenge of machine language programming, but hate to write routines to perform a task the TRS-80 can do itself. For example, I spent weeks writing my own CLS routine until I stumbled upon CALL 01C9H. Can anyone supply me with a list of these subroutines and the requirements needed to call them? I need a routine for SET, RESET and POINT.

Jon Seymour
2216 Northeast Seventh St.
Ocala, FL 32670

Try Harv Pennington's book *Microsoft Basic Decoded and Other Mysteries*. This lists and even explains the ROM calls. —Eds.

Manufacturer's Identity Needed

I am trying to identify the manufacturer (name and address) of the dot matrix printer I am using so that I can write to them for the manuals on this machine.

The name on the printer is MI2 Corporation (that's MI squared). This printer has only one other label on it; the serial number plate bears the title "Binder Magnete."

The printer is capable of much higher speeds than its current 300 baud setting and it may also have a portfolio of various type fonts.

Kenneth H. Bogert
2 Alan Lane
Mine Hill, NJ 07801

West German User Group

I wish to contact TRS-80 owners in the Schweinfurt-Wuerzburg area in West Germany, especially US soldiers, to establish a user group. My system consists of a TRS-80 Model I, Level II, 48K RAM, 40-track floppy and an Epson MX-80.

Ludwig Clement
Hermann-Barthelstr.5
8720 Schweinfurt

Optical Pen

My wife works in a small school library, and recently she heard that someone has come out with an optical pen which will read a library member's account number directly into an Apple computer.

Does anyone know the name of the manufacturer or manufacturers of such a device?

Since the school has some TRS-80 microcomputers, I am wondering if anyone has such an optical pen that can be used on them, and if so, on what model.

William Stroh, III
9 Sinclair Terrace
Short Hills, NJ 07078

Optical Reader Interface

I am attempting to interface an IBM 1230 Optical Reader to a TRS-80 Model II. I would appreciate hearing from anyone who has or intends to do the same.

Louis M. Ferrari
3919 Octave Drive
Jacksonville, FL 32211

National LNW User Group

Due to the great demand for the exchange of information on the LNW, the LNW User Group of the SCCA is accepting members on a national basis. We will publish a bi-monthly newsletter covering software reviews, hardware mods, applications of the LNW Mod I and Mod II and more. Membership dues including subscription to the newsletter are \$25. Contact me at the address below or call on the voice line (516) 924-5179, or if you have a modem call the BBS at (516) 924-8115.

James M. Edwardson, President
Suffolk County Computer Association
Rt. 1 Box 244 Mill Road
Yaphank, NY 11980

Hi-Speed Mod Problems

I have a Model I, Level II with the new ROMs, the interface with additional 16K, one MPI-51 disk drive and an Epson MX-80 printer. I use NEWDOS80 Versions 1.0 and 2.0.

I recently incorporated the Hi-speed mod from the February 1980 issue of *80 Micro*. The computer selects HI or LO fine and the speedup is approximately 65 percent. Now the problem.

If I have booted in Ver. 1.0 and try to key in Hi-speed, as soon as I hit enter I get a spontaneous re-boot. If I try to boot Ver. 1.0 while in Hi-speed, I get repeated re-booting attempts, but no full re-boot. When I try to run certain games (Defense Command, from Big Five, and Invaders, from Level IV)

while using Ver. 2.0 with Hi-speed engaged I get spontaneous re-boot.

How can I solve the problem?

Don Giroux
65 Friendly Lane
Shalimar, FL 32579

Empty Art Gallery

I have a TRS-80 Color Computer 16K Extended Basic ROM 1.1 and an Epson MX-80 with Graftrax and interface board #8150 with 2K buffer. I want to draw a picture on the screen using a short program such as Polygon or Joystick Draw and then print the result. Also, I have the art gallery ROM-PAK and I would like to draw or create a picture, then save to tape and load it back in and print it. Is this possible? I have the cassette screen print program and the 8-bit driver cassette that Radio Shack distributes but they have not given the results I wanted. Any help you can give me will be appreciated.

Mike Davis
6166 Char Mar Drive
Westerville, OH 43081

Tanktics Help

I have Avalon Hill's Tanktics game and would like to convert the POKE statements to their Basic or Assembly language equivalent in order to understand the algorithm of the game. Does anyone have any information on how to do this?

I also have an Epson MX-80 with tractor-feed only. I am interested in hearing of any solutions to the problem of printing envelopes without resorting to mailing labels (if there is one).

Robert Bauer
4059-L Donald St.
Eugene, OR 97405

Versafile Help

I own a TRS-80 Model I, 48K with disk drives. I installed the Percom Doubler some time ago and it runs very well. But I am disappointed because the Radio Shack program Versafile does not run with DBLDOS. When I write a record the previous records of the file are killed and disappear. Does anyone have a patch to correct this problem?

Jacques Deschamps
14 Passage Duguesclin
75015 Paris
France

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the manual:

"It definitely rates the first '10' given to any documentation reviewed in this column." (A.A. Wicks, COMPUTRONICS, October, 1981)

the software: "An excellent Word Processor" (D.H.); "Absolutely fantastic" (S.E.S.); "You have features that I cannot duplicate on my \$14,000 system" (J.B.)

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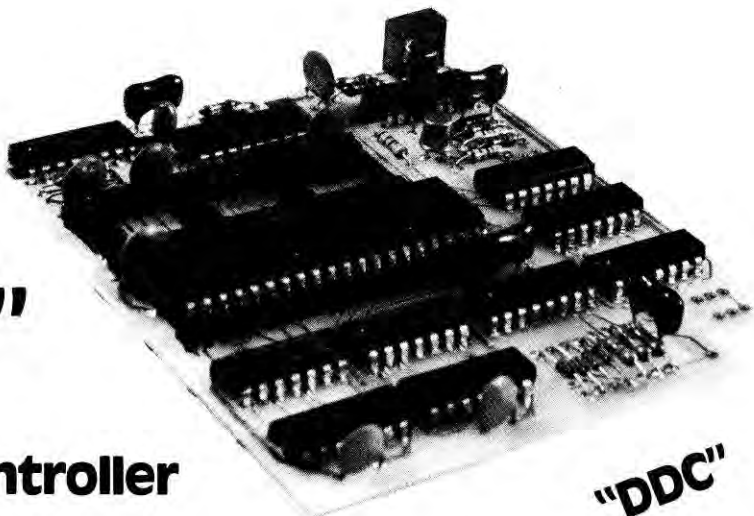
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★ Test Proven

Tests were conducted on AEROCOMP'S "DDC", Percom's Radio Shack TRS80*** Model I, Level 2, 48 K with Tandy (Siemens Model 82). Diskette was Memorex 3401. To determine performance under adverse conditions. The test consisted of formatting 40 tracks on the diskette. The pattern was chosen because it is recommended as the best attempt was then made to read each sector on the diskette. 1.0, with Double Zap, Version 2.0. Unreadable sectors were noted on each double density controller and the data averaged. Test results are shown in the table.

★ Features

TRS80 Model I owners who are ready for reliable double density operation will get (1) 80% more storage per diskette, (2) single and double density data separation with far fewer disk I/O errors, (3) single density compatibility and (4) simple plug-in installation. Compatible with all existing double density software.

★ Value

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\$179.95 for "DDC" complete with DOSPLUS 3.3D

\$229.95 for "DDC" complete with LDOS

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A. Brandwein, D.D.S.
New York, New York
I received your (DDC) on 11/07/81... to my astonishment the first attempt to copy my system disk was successful... prior to purchasing your double density board I had tried LNW's and Percom's boards without success. My drives are the oldest RS ones that came out... The serial numbers are below 33000. Percom numbers that should have... numbers above 70000 for double density to work... Yours truly, A. Brandwein

★ TEST RESULTS ★

MFR & PRODUCT	SECTORS LOCKED OUT (AVG)
AEROCOMP "DDC"	0
PERCOM "DOUBLER II"	18
PERCOM "DOUBLER A"	250
LNW "LNDOUBLER"	202

Note: test results available upon written request. All tests conducted prior to 8-25-81 Aerocomp's 14 day money back guarantee applies to hardware only. Specials will be prorated. Shipping \$2.00 in Cont. US. See opposite page for details.

Data Separators

The advances that make the "DDC" great are incorporated in the new AEROCOMP Single Density and Double Density Data Separator ("DDS").

★ Has your original manufacturer left you holding the bag?

If you already own a Percom "Doubler A", "Doubler II" or LNW "LNDOUBLER", the AEROCOMP "DDS" will make it right. Look at the test results:

MFR. & PRODUCT	SECTORS LOCKED OUT	
	WITHOUT "DDS"	WITH "DDS"
PERCOM "DOUBLER II"	18	1
PERCOM "DOUBLER A"	250	0
LNW "LNDOUBLER"	202	0

Note: Same test procedures as "DDC".
* Trademark of Percom Data Co.
** Trademark of LNW
*** Trademark of Tandy Corporation

★ "DDS" \$49.95
(Use 1791 chip from your DD controller)

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(Shipping \$2.00 Cont. US - see opposite page for details)

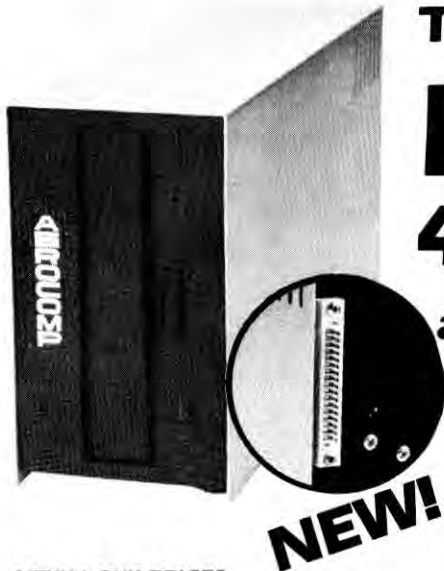
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I don't often write letters such as this, but I feel I should in this case . . . I am surprised and pleased with your DDS. It is not often a product is better than one expects . . . This (these) test (s) used a Percom Doubler "A". (Test without DDS installed showed many errors). (With DDS) not one error!!! After ten (10) tests of formatting and verifying and zeroing NOT ONE FAILURE OR LOCK OUT. Great!!!

Phil Gnad
Kansas City, Kansas
Phil Gnad

See opposite page ▶▶▶▶▶



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80 ACCOUNTANT

by Michael Tannenbaum C.P.A.

"Increasing numbers of software vendors are aiming for a wider market than just Tandy hardware."

This year I presented a seminar on the feasibility of integrating word and data processing. The attendees were equally divided between word processor owners and would-be owners. The would-be owners appeared quite confused. They could not understand how a computer can be both a word processor and a general-purpose computer.

Any programmable computer can become a word processor with appropriate software. However, it may be precluded from word processing applications because it lacks a letter-quality printer.

A computer intended for word processing may, if programmable, be converted to general data processing use. However, it may not be suitable for data intensive applications because it lacks adequate disk storage.

A computer intended for both functions will often be more expensive and less efficient than dedicated devices. For example, if word processing is the only application, a Model III can be used at a fraction of the Model II cost. However, with just over 300K of disk storage, it should not be used for applications such as accounting recordkeeping. For these accounting applications, a Model II equipped with a Line Printer V has greater output than one with a Daisy Wheel II.

In data processing there is no such thing as a free lunch... yet. Advances in printer and disk technology may change this in the near future. Many new dot-matrix printers already have excellent quality, and each new generation brings further improvements. Floppy disks have greater capacities each year and prices of small Winchester drives are coming down. I suspect Tandy may soon introduce small units the size of the Model III with built-in 5-megabyte hard disks. The market is certainly ready.

The Model 16

With respect to new devices, the Model 16 is starting to appear in computer centers. The new unit is quiet—the Model II is much noisier in comparison.

The Model 16 owes its comparative quietness to the new thin-line drives.

Unlike the Model II drives, the thin-line drives use dc motors which run quietly and turn off automatically if not being used. Unfortunately, the automatic turn-off feature is causing problems. The drives must be rotating at the proper speed to record data accurately. Data written on the disk while the drive is under the proper speed will be lost. The software has to detect when the disk is at the right speed. This is not an easy task, but the problem will be overcome in time.

Model 16 drives are much quicker than Model II drives. The track-to-track access rate is up to five times faster than the Model II expansion interface drives. The computer also is faster in its Z80 mode than a comparative Model II. Our benchmark tests ran seven percent faster on the Model 16. It will be interesting to try the benchmark test again when Basic is available for the 68000 processor.

Another advantage of the Model 16 is its cool green screen. What a difference that makes! I hope Model II owners will be able to retrofit their computers with this new tube.

I examined an early version of the Model 16 and enhanced Model II operating system. Many of the commands and features are similar to the hard disk operating system. However, the real shocker was the elimination of a one-drive backup routine. This will make ownership of a one-drive Model 16 a difficult affair unless a hard disk is purchased at the same time. I suspect that one-drive Model 16s will be as rare as 32K Model IIs (ever see one?).

Model II and CP/M

The Model II is far from obsolete. The availability of the enhancement module will keep the old Model II around for quite awhile yet. In addition, the large population of Model IIs is starting to attract vendors with new plug-in cards. One such vendor is Veritas Technology Inc., 2375 Zanker Road, Suite 245, San Jose, CA 95131, who recently announced an 8086 card for the Model II. With this device, the Model II will be able to run CP/M 86 and provide support for the IBM Personal Computer market.

The Model II's ability to operate systems other than TRSDOS is one of its

most important attributes. Tandy is not the only source for Model II software. More than half of the Model II owners do not use TRSDOS and Tandy software; they use CP/M and CP/M-based software. CP/M is attractive because much good business software is only available for use with this operating system.

If you have never explored the world of CP/M software, you are in for a very pleasant surprise. The variety is simply astounding. Before you can use any of this software you must purchase the CP/M operating system. CP/M is available from Lifeboat Associates in New York and Pickles and Trout in California. Both organizations offer CP/M systems tailored for the Model II.

CP/M was designed for equipment whose display is separate from the CPU. In this configuration, the CPU communicates with the display via a high-speed serial link. In the Models II and III the video display is integrated with the CPU and accesses memory directly. In the Model III the video memory is mapped into the normal memory space and can be addressed just like user memory. In the Model II, the video memory is a separate area that is not user-accessible. Access to this area is only through the operating system. This memory mapping has allowed fast and complete control of the video display. This control has been difficult to duplicate in remote displays.

Because of display limitations CP/M-compatible systems do not, as a rule, have fancy video presentations. A notable exception is SuperCalc by SORCIM. SuperCalc is a visible calculator program similar in concept and presentation to VisiCalc. However, VisiCalc, designed for memory-mapped displays, updates the screen faster. SuperCalc, designed for a CP/M environment, has to accommodate many terminals and communicates with the built-in display of the Model II in serial fashion.

Snazzy displays are not the only criteria for judging useful software products. SuperCalc is a fine second-generation calculator program that in several ways surpasses the current version of VisiCalc.

The SuperCalc version available for the Model II contains logical commands just

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3. Would you like to have a tool that will allow you greater flexibility in managing your own or your company's money?
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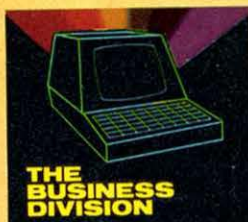
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now offered in the latest versions of VisiCalc. The new VisiCalc versions have not been made available for the Model II.

Tandy has not released any new software for the Model II soft or hard-disk system in recent months. This lack of new TRSDOS software is reflected in the programs that I have received for evaluation. Most are CP/M-compatible. Although TRSDOS is not obsolete, increasing numbers of software vendors are aiming for a wider market than just Tandy hardware. Almost all popular computer systems either are or can be made CP/M-compatible. Only Tandy equipment is TRSDOS-compatible.

Offbeat Accounting Applications

The latest CP/M additions to my library include, in addition to SuperCalc, Wordstar, and Dbase II, the CPAides tax preparation system and an oil and gas accounting system.

The oil and gas accounting system (Well Accounting by Business Computer Systems, 2709 Shannon, Bethany, OK 73008) is an interesting application. Oil and gas producers often operate properties that have many owners. These owners of fractional interests must receive detailed reports of revenue and operating expenses. To complicate matters, the owner of the fractional share can have a working interest, a royalty interest or both in the oil property.

The information supplied to the oil property owners must have sufficient detail so that they can meet Internal Revenue Service recordkeeping requirements for reporting oil and gas income. Each owner is entitled to the details of oil and gas sales, disbursements, windfall profits and other tax payments and drilling expenses incurred. Based on the amounts reported, the owners could be entitled to depletion allowances.

To maintain the complex records and comply with these reporting requirements, a computerized recordkeeping system is quite desirable. This system is designed to run on a three-disk Model II using the CP/M operating system and is available for \$2,300. Combinations of wells and participants are limited to 5000 entries. With this structure, the system can handle 100 wells with 50 participants or 10 wells with 500 participants and any combination in between.

The base system includes an Accounts Payable module that can handle up to 1000 line items and 2000 invoices for the current period. The account capacity was not indicated. Since joint interests are often billed, there is a link to a joint interest billing and participant Accounts Receivable module. This module has a

capacity of 2500 participant accounts receivable records. If desired, the system can be arranged to offset well expenses against income when calculating income distribution amounts. The system generates all required participant and owner history reports.

This system is not a complete accounting system since the base system does not include the general ledger and financial reports. These features are currently under development and will be available in the future for extra cost.

If you have clients that are oil and gas producers this system bears investigation. Unfortunately, if your clients are owners the features of this system will not be as appealing. The system is designed to be driven by entry of actual data such as sales of oil and gas and purchase of expense items. If information is entered in this way, the system will maintain records for each well owner almost as a by-product of data entry. The system does have a means to bypass the normal sales and expense entry routines and post activity directly to a participant's account. However, if this method of data entry is used, none of the automatic calculation and editing features of the regular data entry routines are available. This greatly increases the chance for error. Business Computer Systems is modifying the system to accommodate well owner's recordkeeping requirements. This new system should be available soon.

Another example of the new wave of software is specialized software for the veterinarian. A company called VCC, located at 24 Newbridge Road, East Meadow, New York 11554, is offering a series of programs designed to aid the vet increase his income and manage his practice more effectively. These programs are available in modules and cover client data, vaccination reminders, vaccination analysis and mailing management. An additional subsidiary of VCC, VETSBUY offers an automated central buying service and electronic mail system for the vet. All equipment used is available from Tandy.

In the past two years, I have written this column for all TRS-80 business program users. This has required enormous amounts of time both to research the software products discussed and to write an understandable description of my findings. Due to the pressure of my professional activities, I can no longer continue to devote this time on a monthly basis. Accordingly, this is the last regular column of the 80 Accountant. I have had a great deal of fun with this column, and expect to continue contributing accounting articles and reviews in the future. Many thanks for your interest and support. ■

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SOFT BITS

a basic/assembly column

by Roger Fuller

Last month I discussed a short routine to swap string pointers in Basic. This month I present a routine to offset by a fixed amount the pointers in a string array.

Whenever a sort is done on a data base, the program must know what key is to be used. For example, if you need to know the median score for a group of test scores, all scores must be sorted. The median can then be found by determining which value has as many scores above it as below it. The only information needed are the actual values, or scores.

If the names associated with the scores are important, the sort must move the names that correspond to the scores to be swapped. The routine I am about to show you requires that string reorganization not take place and that strings in the array not be reassigned. Using the swap routine from last month meets these requirements.

Whenever a good programmer begins writing a program, he defines the input and the output to his program. In effect his code is the meat of an I/O sandwich. This is why some programmers are called hackers or butchers as the case may be.

Our input shall consist of these items:

- The address of the beginning of the target array.
- The desired offset value of -128 to +127 bytes.
- The number of elements to adjust.

In order to keep the code neat and tidy put the first value in the USR argument and the second two in the three bytes of the string pointer for the zero element of the array. We need to do this from Basic before calling the offset routine.

Disk Basic has RSET, LSET, and MID\$. These commands insert strings into other strings, provided the target string is not within the Basic program text itself. Since these statements are not available in Level II, the offset demo uses another way of assembling the data strings.

The CMD 0 statement in Model III Disk Basic, and some other operating systems, is ideal for using this offset routine. The CMD 0 statement sorts a string array by moving the pointers. Level II-only systems can substitute a Basic sort with the swap

routine or one of the common machine-language sorts available.

Both those with and without disks can use the string sort to sort numeric values. The trick is to reverse the order of bytes in a numeric value. The reverse string routine in one of my previous columns works well for this job. Remember, negative values always come last in such a sort since they have the first bit set in a reversed string.

In the demo program I used the CHR\$ function to illustrate this concept of sorting numerics as strings. The use of a single-byte numeric makes Level II compatibility a snap. The scores are stored as the first character in a string. The person's name will be the second and subsequent characters in the string.

The proper procedure to use this routine would be to load the values needed, call the USR routine, sort the array, and call the USR routine to reset the pointers back to their original values. Examine the Basic demo program in the listing before reading the following explanation.

Since the first element in the array contains the three control bytes, we need to call 0A7FH to obtain the address of these values. An XOR A zeros the accumulator without using a zero byte. This allows us to embed the machine code in a Basic string constant. A LD C,A zeros register C. The LD A,(HL) gets the offset length.

Now we need to test for a positive or a negative offset value. This is done by the SUB 80H. If the result is negative the carry flag is set. In other words a value of 128 to 255 clears the carry flag. Since A is zero an ADC A,A would leave A equal to one if the carry flag was set and zero if the carry flag was not set. Therefore a positive offset produces a value of one in the accumulator and a negative offset leaves it a zero.

A DEC A makes A equal to 00H if the offset was positive or FFH if the offset was negative. The LD B,A positive makes BC a word value equal to the offset. For example, a positive offset of five produces the value of 0005H for BC while a negative offset of five produces a value of 0FFFAH for BC. Now adding BC to the value of the last two bytes in a string pointer offsets the beginning of the string the appropriate

value.

Since the string length will always be equal to or greater than needed and the strings will be in place, there is no need to adjust the length byte.

All that is left to do is get the number of elements in the array to offset. An INC HL points to the LSB of the value and a LD E,(HL) gets it. Another INC HL points HL to the MSB of the value and a LD D,(HL) gets it. Now the DE register pair contains the number of elements to sort and the HL register points to the byte just before the first element's pointer. All of this is done by the following code:

```
CALL 0A7FH
XOR A
LD C,A
LD A,(HL)
SUB 80H
LD A,C
ADC A,A
DEC A
LD B,A
LD C,(HL)
INC HL
LD E,(HL)
INC HL
LD D,(HL)
```

The next section of code is the actual offset loop. One mistake inexperienced programmers make is in not being careful about zeros. The first thing this loop does is to test for zero elements to offset. If there are no more elements to sort, the routine returns control to Basic. This exit in the middle of the code is convenient but violates a tenet of structured programming: Exits must be the last statement in a section of code.

Notice the use of the \$ to represent the address of the current instruction. Some Assembly novices and even a few old hands get tripped up by this convention. In an assembler, the \$ represents the address of the instruction containing it, but it is assembled using the address of the following instruction for relative jumps. Thus a JR \$+5 assembles as 2003H, not 2005H.

The first operation after the zero elements test is to save the count by a PUSH DE. Next a pair of INC HLs move past to the string-length byte and onto the LSB of the address of the first byte in the actual

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SOFT BITS

string. Here an LD E,(HL) followed by an INC HL and LD D,(HL) places the pointer at the first byte into the DE register pair. An EX DE,HL followed by an ADD HL,BC adjusts the pointer to the desired number of bytes. The HL register pair now contains the value of the adjusted pointer.

Another EX DE,HL allows us to use the original HL array pointer to load the MSB of the new adjusted string pointer back into its proper place with an LD (HL),D. A DEC HL followed by an LD (HL),E updates the LSB of the string pointer. Next HL is moved back up by an INC HL to point to the byte just before the next element's length byte (the original condition of the entry into the loop). A simple POP DE restores the counter and a JR back to the beginning of the loop wraps it all up:

```

LOOP  LD  A,D
      OR  A
      JR  NZ,S+5
      LD  A,E
      OR  A
      RET Z
      PUSH DE
      INC HL
      INC HL
      LD  E,(HL)
  
```

```

INC  HL
LD   D,(HL)
EX   DE,HL
ADD  HL,BC
EX   DE,HL
LD   (HL),D
DEC  HL
LD   (HL),E
INC  HL
POP  DE
JR   LOOP
  
```

There is a short section of the above code that could be modified with a sav-

ings of four bytes. It is an exercise for those who always want to make things better.

Now for a change of pace, I want to thank all those who have written with suggestions. If you have something that you would like explained that is not covered well in most books, please send it to me.

Scripy, a page-sized, cursor-oriented text editor I wrote, has generated more mail than expected. I would love to see how some of you are using it. ■

```

10 '-----
20 '
30 ' OFFSET ROUTINE FOR STRING ARRAYS      PUBLIC DOMAIN
40 '
50 '-----
60 '
100 CLS : CLEAR 1000 : DIM N$(10),N%(10)
120 FOR L% = 1 TO 10 : READ N$(L%), N%(L%) : NEXT
130 FOR L% = 1 TO 10 : N$(L%) = CHR$( N%(L%) ) + N$(L%) : NEXT
150 GOSUB 65529 :K% = VARPTR(U$) : L% = PEEK(K%+1)+256*PEEK(K%+2)

160 FOR K%=0 TO 40 : READ B : POKE L% + K% , B : NEXT
170 DEFUSR1 = L% ' IF DISK BASIC
180 ' LEVEL II: POKE 16526, L% AND 255 : POKE 16527, L% / 256
190 PRINT"RAW DATA"TAB(21)"SORTED BY NAME"TAB(42)"SORTED BY SCORE"
200 *****

210 K% = 64 : GOSUB 4000 ' DISPLAY RAW DATA
290 PRINT@896,; : INPUT "PRESS ENTER TO SORT BY NAMES";A$
300 OFF = 1 : NE = 10 : GOSUB 2000 ' SORT BY NAMES
310 K% = 85 : GOSUB 4000 ' DISPLAY SORTED BY NAME
390 PRINT@896,; : INPUT "PRESS ENTER TO SORT BY SCORES";A$
400 OFF = 0 : NE = 10 : GOSUB 2000 ' SORT BY SCORES
410 K% = 106 : GOSUB 4000 ' DISPLAY SORTED BY SCORES
500 GOTO 500
999 *****
1000 DATA "SMITH, JOHN",85
1010 DATA "JONES, MARTHA",79
1020 DATA "GRAHAM, BILL",99
1030 DATA "FERRIS, SAM",90
1040 DATA "WILLIAMS, BRAD",70
1050 DATA "OWENS, JILL",58
1060 DATA "SCOTT, CHARLES",32
1070 DATA "MANFRED, FRED",88
1080 DATA "WEBSTER, WAYNE",80
1090 DATA "NEWTON, STEVE",72
1100 '
1110 DATA 205,127, 10,175, 79,126,214,128,121,143
1120 DATA 61, 71, 78, 35, 94, 35, 86,122,183, 32
1130 DATA 3,123,183,200,213, 35, 35, 94, 35, 86
1140 DATA 235, 9,235,114, 43,115, 35,209, 27, 24,232
1999 ***** OFFSET & SORT ARRAY
2000 GOSUB 3000 : N% = NE : CMD "O", N% , N$(1)
2010 OFF = 256 - OFF AND 255 : GOSUB 3000 : RETURN
2020 ' USE AN APPROPRIATE SORT IF CMD "O" IS NOT AVAILABLE
2999 ***** SETUP OFFSET AND NUMBER OF ELEMENTS
3000 L% = VARPTR ( N$(0) )
3010 POKE L%, OFF ' OFFSET = 1
3020 POKE L%+1 , NE AND 255 ' LSB OF ELEMENTS TO OFFSET
3030 POKE L%+2 , NE /256 ' MSB OF ELEMENTS TO OFFSET
3040 L% = USR1( VARPTR ( N$(0) ) ) : RETURN
3999 ***** DISPLAY SCORES/NAMES
4000 FOR L% = 1 TO 10
4010 PRINT @K%+L%*64, ASC(N$(L%)); MID$(N$(L%),2,255);
4020 NEXT
4030 RETURN
65528 '----- USR STRING -----
65529 U$="12345678901234567890123456789012345678901" : RETURN
  
```

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480

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Of course, you may be able to "force-fit" an application into some existing canned program you have, but to really get results, you need a separate application program to run on your computer.

Until now, that meant you were forced to pay money for application software off the shelf, or if you could afford it, have it custom written for you, or, if you are qualified, do it yourself...spending endless hours figuring it out and writing it. Now, your computer can write individual application programs for you. These programs are each separate, unique software programs that run in standard Basic on your computer.

A company named FutureSoft has developed this exciting and long awaited remarkable working tool for you. There are two versions called *Quikpro+Plus* and standard *Quikpro*. Both of them create unique separate Basic programs for you...to do exactly, precisely, what you want to do. And listen to this...you create a new program in minutes instead of hours.

You can quickly generate a new program when you want it. You can generate thousands of different unique programs, each one standing alone as a complete program that runs in Basic. Best of all, you do not have to be a programmer to do it. The *Quikpro* software becomes your personal programmer, waiting to do your work for you any time of day or night you choose to use it.

The custom programs you generate from this software provide for: Data Entry, Additions, Changes, Record Locating & Searches, great variety of Computations, and Report Printing (if you have a printer). It lets you decide what data to manipulate and how to manipulate it. It lets you decide the formats you want to appear on your screen and/or to print out in a report. It lets you use differing formats on the same data base. It lets you make calculations from data within records without altering the data base. It lets you report results with or without including the base data from which results were calculated.

All this is included in the ability/power of the program you create. You do it by simply answering questions that appear on your screen. Instantly, the *Quikpro* software instructs the computer to perform complex and



error free instructional sequences. You get the immediate benefits of professionally written software for your application.

The resulting custom program is truly a separate Basic program. You can list it, you can modify it, you can actually see what makes it tick. You can even ask it to print out its own operating instruction manual so others can run it for you. Finally, you can really tap the speed and power of your computer the way you really want. You can create new programs for every use you have in Business, Science, Education, and Hobby areas. And you can start now.

The software is available immediately from the creators. It comes in two versions. If you want to generate separate Basic programs with all the data handling plus Calculations and Report Printing features, you want *Quikpro+Plus*. Specify to run on TRS80 Model I and Model III at only \$149; to run on TRS80 Model II at \$189.

If you do not need Calculation ability or Report Printing in the separate Basic programs you will create from this program generating software, then standard *Quikpro* will do the job for you. Standard *Quikpro* to run on TRS80 Model I or Model III is \$89; to run on TRS80 Model II is \$129. (Later on you can always trade up to the Plus Versions for only the cost difference between the two).

Both programs are available to run on many other computers besides TRS80. Details are available by calling or writing.

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News From KITCHEN TABLE SOFTWARE, INC.

by David Busch

"Cost-conscious software purchasers will appreciate KTI's generic software."



Cost-conscious software purchasers will appreciate Kitchen Table Inc.'s generic software. These programs—packaged in plain white disk envelopes and unlabelled cassettes—eschew costly extras like documentation, menus, error traps and debugging.

Generic Game is a graphics encounter with aliens and space ships. As near as I can determine, the object is to shoot the space ships or capture the alien's king before losing all your pawns. Game counts on the honor system for scoring and because its rules are generated through a RND routine, each game is a little different.

Generic Utility performs many useful functions, but I am not able to determine what they are. However, in benchmark testing, it operated faster than similar programs. The software will accept any command you can think of and respond by starting up your disk drives, flashing hexadecimal numbers on the screen, and changing the setting of your RS-232 board. Some commands cause the keyboard to become warm to the touch, while others increase the CRT's brightness tenfold. While I'm not certain why this is desirable, I was impressed with the utility's complexity.

Input for the Generic Business Program may include invoice numbers, quantity shipped, check numbers, amount paid, employee time card information, inven-

tory data, and airline schedules. The information is sorted, compiled, alphabetized, and processed, then dumped onto random-access disk files that can't be retrieved. Although the program issues no useful reports, KTI maintains no company using the software has ever been successfully audited.

Generic Realtime Operating System Software is DROSSDOS stripped of its good parts. No utility programs are provided with GROSSDOS and a user must furnish his own Disk Basic. File handling, directories, copying, formatting and cursor display are not supported. Only one module is supplied: BOOT/SYS. It allows the user to boot-up the GROSSDOS banner. This simple operating system is well suited to the newcomer who gets confused when the ready prompt asks for input and he can't think of what to do next.

Generic Bulletin Board is possibly the world's first manually operated BBS. The sypop must sit at a computer at all times to answer the phone, transmit the menu and other choices to callers, and enter messages into the system. This makes for a remarkably friendly bulletin board. I called recently and to my read-messages command, I got: JUST A MINUTE WHILE I FINISH THIS SANDWICH. The program enables users without an auto answer modem, host terminal program, and other expensive extras to operate a bulletin board system.

While we're on telecommunications, I should mention Kitchen Table's new TLS-8E Owner/Operator Technical Hotline (TOOTH), which allows users to chat with a qualified Kitchen Table technician or engineer. I tried the number last week and am reproducing the exchange below:

—Hello. This is my first time on the hotline.

—I see. What is your problem?

—My TLS-8E is acting funny.

—Could you be more specific?

—Well, my computer seems to be losing data frequently.

—Do computers trouble you?

—Yes, that is why I turned to you for help.

—We were discussing you, not me.

—No, I just wanted to see if I had a RAM problem.

—Are you saying no just to be negative?

—I never dreamed that you would be such little help.

—What does that dream suggest to you?

—I am disgusted.

—Did you come to me because you are disgusted?

I suspect I called during the technician's lunch hour or chatted with a file clerk or other unqualified person.

Readers' Queries Answered

Questions continue to pour in about KTI's fictitious products. As a result, I've been forced to devote some valuable space to answering them.

Q. I've been using KTI's 7.5 gigabyte hard disk drive for six months. I find it takes two hours to read the directory. What can I do?

A. Hold on! Kitchen Table is introducing the first-ever "Menu Oriented" directory making it no longer necessary to read the entire KTI-7500 directory, which averages 127 pages.

Q. Double density does not provide adequate storage for me and I cannot afford a KTI-7500. Suggestions?

A. Yes. Users of DOUBLOON II can remove the 1791 chip and insert a second double density converter in its place. The result: quadruple density! You may also purchase KTI's quadruple density board, the QUADROON.

Q. What is the largest single data file that has ever been compiled?

A. Using the KTI-7500, I have squeezed a listing of all my creditors on a single hard disk drive. The second largest file consists of the text of all Wayne Green's editorials.

Q. Why is a 4-bit microprocessor used in the KTI Pockets Computer?

A. Because it costs 50 cents, a 50 percent savings over a 6-bit microprocessor.

Q. I wish to backup my KTI-7500 data files. I don't own a video recorder but my neighbor does. Can you tell me how to do this?

A. The correct command is ROUTE Hard Disk to Neighbor's VCR. You don't have to connect the two devices. Set the switch on the top of the KTI-7500 to channel 2 or 3 (whichever is not used in your area) and orient your neighbor's antenna toward your computer.

Q. I am a reviewer for a competing computer magazine. Could you put me on your mailing list to receive your new releases? I would also like complimentary review copies of all your software. Although my reviews would be unbiased, I would appreciate a monthly complimentary check for \$200 to partially subsidize the extensive testing that I do. I also believe I would do a much better job than that jerk who writes those columns for 80 Micro.

A. Kitchen Table deeply appreciates your interest and would like to return the favor by pointing out a small error you may have not noticed. You have supplied different social security numbers to several magazines you did work for in 1981. Don't bother to fix this oversight. We have forwarded your name to the only government agency which can be counted on to get things done—the IRS.

—Signed, The Jerk. ■

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COMMANDER 80

"The trademark nonsense seems to be everywhere you look in the software business."

What is all this craziness? Am I witnessing an aspect of the microcomputer industry that resembles a Monty Python* episode? And excuse me, BBC; don't mind my mentioning that classic without giving a trademark credit for it. They probably won't mind; they're not so dumb. But maybe I'd better, just in case.

The craziness I refer to is all the trademark nonsense that seems to be everywhere you look in the software business. A credit here, a credit there. Here a credit, there a credit, everywhere a plug or credit. It's getting so that when you read some advertisements or software documentation you receive a half page or more of stars, asterisks, double-asterisks, obeli, daggers, squiggles and marginal fingers. All attempt to give due credit to a product's manufacturer, but are tinged with self-interest. Authors must protect themselves against possible action by the mentioned manufacturer—action which some companies threaten to take. I've yet to see action taken against anybody, though. So do they really mean it? Could they get away with it? Should they be allowed to?

My first contact with this problem happened a couple of years ago in England. At that time I was selling TRS-80* software via advertisements in a computer magazine. All was going well. I had a good working relationship with my local Tandy store manager, and I was earning a reputation as a consultant capable of supporting Tandy products.

After a few uncomplicated months of advertising, my friendly store manager told me diplomatically that Tandy was requiring all advertisers to give credit for mention of the name TRS-80. There I am supporting their product (and selling a few into the bargain) and then they hang a veiled threat over me. Thanks for nothing guys—and they wonder why they're called "Big Brother." (Big Bother was probably more appropriate.) If they tried that now that a couple of years have

elapsed, I'd be tempted to advertise my software for the "Trash-80," which, presumably, is not trademarked. Would that have made them happier than omitting a credit? I rather doubt it.



"Any really successful product aspires to one of the greatest accolades of all—to become a household word."

Another Story

A well-known publisher (who shall remain nameless) had a successful magazine for computerists. This magazine, which shall remain nameless (saves on credits, you know), had many articles

dealing with a well-known operating system. This shall not remain nameless. It was CP/M*. Because CP/M is such a success for its publisher, it happens to be mentioned frequently in magazine articles and this particular magazine was no exception.

Most manufacturers would be happy enough just to have their products mentioned, but not Digital Research. They felt that since the product name of CP/M belonged to them, they were entitled to be credited for its use in any articles which referred to it. (Because it was their trademark, I presume it was indeed their privilege.)

The well-known publisher, however, had other ideas. He was not about to be informed what he could or couldn't publish. (Because it was his magazine, I presume it was indeed his privilege.) He had an interesting solution. He replied that if the omission offended them, the name CP/M would be dropped from all articles. What good would that do, eh?

This brings up another point about trademarks. Any really successful product aspires to one of the greatest accolades of all—to become a household word. Names like Kleenex and Formica are not only household words, they've been absorbed into the vocabulary of the USA. When was the last time you saw a credit for Kleenex or Formica? In England, the word "Hoover" is used by many people as a synonym for "vacuum cleaner" and it's common for someone to be caught Hoovering a carpet.

My contention is that the screws being put on the software industry by all its vendors may prevent their product names from becoming household words. Maybe they don't care, but I think it would behoove someone like VisiCorp to have the word "VisiCalc"* in common parlance rather than "electronic spreadsheet," which appears to be gaining ground.

Now, VisiCorp (formerly Personal Software although it retains that trademark) is

* Monty Python is a trademark of the BBC.

* TRS-80 is a trademark of Tandy Corp.

* CP/M is a trademark of Digital Research.

* VisiCalc is a trademark of VisiCorp.

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COMMANDER 80

a typical case of extreme trademarking. They went to the trouble of trademarking the prefix "visi." So, tough luck to anybody that has a visual program, because "visi" is out of the vocabulary of the human race. I do think it's fair that a product name such as VisiCalc is afforded protection from unfair usage by other companies, but "visi"? What if I write a Basic line editor program which has some particularly visual features. Now, let's see. Basic Line Editor. Yes that's BLE but that's a little boring. What about the visual aspect?... Can't use "visi." Or can I?

What about visi-BLE? Yes, I'll call my program "Visible"! Now what's VisiCorp going to do? It appears that the human race had first dibs there. Come on somebody! Release a program called "Visible." I want to watch the feathers fly.

If you think this is crazy, what about the story that was circulating a couple of years ago? Zilog was apparently very happy with the success of their microprocessor, the Z80*. Naturally, Z80 is their trademark and rightly so. Next they came out with the 16-bit Z8000* microprocessor and made sure that the name was pro-

tected. According to my sources, Zilog decided they'd go for it. They'd trademark the letter Z! The ultimate! Just think, another 25 letters and there'd be no more to go around. Companies would have to start using punctuation marks. Eventually, even the asterisk used to give credit would be some daft company's trademark. Reports are that Zilog was thwarted in its ridiculous attempt.

Trademark Mania

The event that led me to spout off on this subject is another example of trademark mania and a good chance for me to get my boot in.

Imagine the staff of *80 Micro* working like idiots (I use the term advisedly) towards a particularly popular issue—the yearly games edition. The cover of the magazine is artistic, flashy, topical and reflects the contents. It was months in preparation. Just prior to deadline, the final version comes back from the artist looking like a million dollars.

But oh-oh, what's that? We were too topical. There, in the maze on the cover, is a PacMan* (fleeing the dots instead of eating them!). Grown men* and women* (people) start running around in ever-decreasing circles. Doesn't the PacMan* symbol belong to Bally-Midway? Our legal department is asked. Better safe than sorry, they say. Just before deadline the whole thing goes back to the artist, and we end up with a gnashing tadpole fleeing the dots and looking for all the world like a young, half-matured PacMan*. It's still obvious which game is alluded to, but *80 Micro* doesn't want to step on anyone's toes.

Surely it's silly that a bunch of professionals (artists, journalists, and technical staff) could find themselves in such a ludicrous situation, all because of a yellow circle with a pie-slice missing and a dot added! How can anybody get away with trademarking that?

Please, can we have some sanity? How about not suing people who support your product in their documentation and mention it by name? Please? Then maybe we can be rid of these half pages of stupid credits that nobody reads or wants. If we continue at the current rate, we'll soon see more documentation devoted to credits than to the operation of the software. ■

* Z80 is a trademark of Zilog.

* Ditto Z8000.

* PacMan will never catch on.

* Men and Women are trademarked by a higher authority than any of the above.

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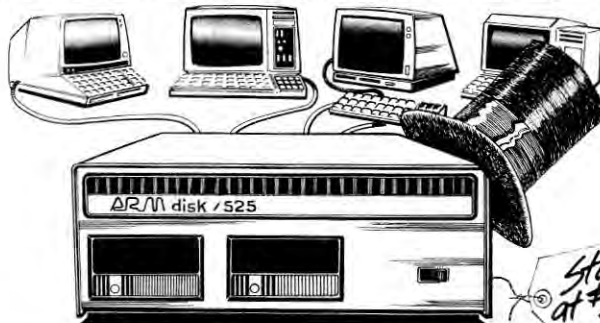
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Birth of a legend.



Epson.

A whole new generation of Epson MX printers has just arrived. And while they share the family traits that made Epson famous — like unequalled reliability and ultra-fine printing — they've got a lot more of what it takes to be a legend.

For instance, they've got a few extra type styles. Sixty-six, to be exact, including italics, a handy subscript and superscript for scientific notation, and enough international symbols to print most Western languages.

What's more, on the new-generation MX-80, MX-80 F/T and MX-100, you get GRAFTRAX-Plus dot addressable graphics. Standard. So now you can have precision to rival plotters in a reliable Epson printer. Not to mention true backspace, software printer reset, and programmable form length, horizontal tab and right margin.

All in all, they've got the features that make them destined for stardom. But the best part is that beneath this software bonanza beats the

Uh...three legends.

heart of an Epson. So you still get a bidirectional, logical seeking, disposable print head, crisp, clean, correspondence quality printing, and the kind of reliability that has made Epson the best-selling printers in the world.

All of which should come as no surprise, especially when you look at the family tree. After all, Epson *invented* digital printers almost seventeen years ago for the 1964 Tokyo Olympics. We were

the first to make printers as reliable as the family stereo. And we introduced the computer world to correspondence quality printing and disposable print heads. And now we've given birth to the finest printers for small computers on the market.

What's next? Wait and see. We're already expecting.

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FEATURE	ORIGINAL MX-80	GRAFTRAX-80*	ORIGINAL MX-100	MX-80 with GRAFTRAX-Plus	MX-80 F/T	MX-100
Bidirectional printing	X	X	X	X	X	X
Logical seeking function	X	X	X	X	X	X
Disposable print head	X	X	X	X	X	X
Speed: 80 CPS	X	X	X	X	X	X
Matrix: 9 x 9	X	X	X	X	X	X
Selectable paper feed			X		X	X
PAPER HANDLING FUNCTIONS						
Line spacing to n/216		X		X	X	X
Programmable form length	X	X	X	X	X	X
Programmable horizontal tabs	X	X	X	X	X	X
Skip over perforation			X	X	X	X
PRINT MODES AND CHARACTER FONTS						
96 ASCII characters	X	X	X	X	X	X
Italics character font		X		X	X	X
Special international symbols				X	X	X
Normal, Emphasized, Double-Strike and Double/Emphasized print modes	X	X	X	X	X	X
Subscript/Superscript print mode				X	X	X
Underline mode				X	X	X
10 CPI	X	X	X	X	X	X
5 CPI	X	X	X	X	X	X
17.16 CPI	X	X	X	X	X	X
8.58 CPI	X	X	X	X	X	X
DOT GRAPHICS MODE						
Line drawing graphics				X	X	X
Bit image 60 D.P.I.		X	X	X	X	X
Bit image 120 D.P.I.		X	X	X	X	X
CONTROL FUNCTIONS						
Software printer reset		X		X	X	X
Adjustable right margin			X	X	X	X
True back space		X		X	X	X
INTERFACES						
Standard — Centronics-style 8-bit parallel	X	X	X	X	X	X
Optional — RS-232C current loop w/2K buffer	X	X	X	X	X	X
RS-232C x-on/x-off w/2K buffer	X	X	X	X	X	X
IEEE-488	X	X	X	X	X	X

*Tandy TRS-80 block graphics only available with GRAFTRAX 80.

ABCDEFGHIJKLMNOP abcdefghijklmn ABCDEFGHIJKLMNOP abcdefghijklmn 01234
 ABCDEFGHIJKLMNOP abcdefghijklmn ABCDEFGHIJKLMNOP abcdefghijklmn 01234
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ABCDEFGHIJKLMN abcdefghijklmn ABCDEFGHIJKLMNOP abcdefghijklmn 0123456
 ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 01234567
ABCDEFGHIJKLMN abcdefghijklmn ABCDEFGHIJKLMNOP abcdefghijklmn 0123456
 ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz ABCDEFGHIJKLMNOPQRSTUVWXYZ abcdefghijklmnopqrstuvwxyz 01234567

80 CALENDAR

September

- 5-9 The European Association for Microprocessing and Microprogramming, Paris. **Euromicro '82** Haifa, Israel.
- 5 Central Pennsylvania Repeater Association Inc., Harrisburg, PA. **Ninth Annual Hamfest/Computerfest** Harrisburg Farm Show parking lot.
- 7-10 Management Science America Inc., Atlanta, GA. **Interact I: A Convention Users of Cash Management Systems** Atlanta Hyatt Regency Hotel.
- 9-12 Personal Computer World, London, UK. **Fifth Personal Computer World Show** Barbican Center, London, UK.
- 11-12 Kengore Corporation, Franklin Park, NJ. **New Jersey Microcomputer Show and Fleamarket** Holiday Inn, North Passenger Terminal, Newark International Airport.
- 13 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Motorola Headquarters, Schaumburg, IL.
- 14 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Harley Hotel, Independence, OH.
- 16 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Preston Wood Country Club, Dallas, TX.
- 17 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Fiesta Inn, Tempe, AZ.
- 21-24 Integrated Computer Systems, Santa Monica, CA. **Computer Graphics Course** Washington, DC.
- 23 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Hilton Westchase, Houston, TX.
- 28 Motorola Inc., Phoenix, AZ. **Semi-**

- nar on 8-bit MPUs** Sheraton Inn, Rochester, NY.
- 29 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Hilton Inn, North Syracuse, NY.
- 30 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Howard Johnson's, Monroeville, PA.

October

- 1 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Holiday Inn East, Wichita, KS.
- 1-3 Philadelphia Area Computer Society, Philadelphia, PA. **Philadelphia Area Computer Show** Philadelphia Center Hotel.
- 8-11 Northeast Expositions Inc., Chestnut Hill, MA. **Electronica: Personal Electronics and Home Entertainment products** Hynes Auditorium, Boston, MA.
- 19 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Holiday Inn, Ft. Washington, PA.
- 20 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Stratford Inn, Stratford, CT.
- 21 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Sheraton Smithtown Inn, Smithtown, NY.
- 22 Motorola Inc., Phoenix, AZ. **Seminar on 8-bit MPUs** Sheraton-Lexington Motor Inn, Lexington, MA.
- 24-26 Texas Association for Educational Data Systems, Austin, TX. **18th Annual Convention** Villa Capri Hotel, Austin, TX.
- 25-27 Association for Computing Machinery, New York, NY. **Annual Convention** Dallas Hilton Hotel.

- 30-2 The George Washington University, Office of Continuing Medical Education, Washington, DC. **Symposium on Computer Applications in Medical Care** Sheraton Washington Hotel, Washington, DC.

November

- 9-10 Saginaw Valley Chapter of Data Processing Management Association, University Park, MI. **Ninth Great Lakes Computer Expo '82** Civic Center, Saginaw, MI.
- 7-9 New York State Association for Educational Data Systems, Ardsley, NY. **17th Annual Conference of the NYSAEDS** Americana Hotel, Albany, NY.

Coming Next Month

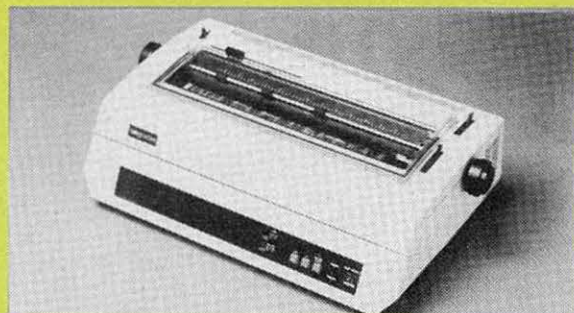
If ever there was a use for microcomputers—business is it. Next month's issue is filled with nuggets of information for the small businessman.

Color Computer users will be interested in what a little money, Radio Shack's Color File, and a few program kernels can do for a small inventory system.

80 staff member Kerry Leichtman's feature reveals a unique use for the Model II and III—assembly line work. Writer Tim Daniel gives some in-depth info on using micros in your small business; just what are they capable of?

Programs that tabulate market research, quality control, return on investment, production and earning curves, expense accounts, and tax returns are also waiting for you within our October issue.

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DOSPLUS 3.4 is the Disk Operating System for serious Model I or III users—people who never compromise performance for price. Yet **DOSPLUS 3.4** costs no more than comparable DOS's. And it's loaded with features like:

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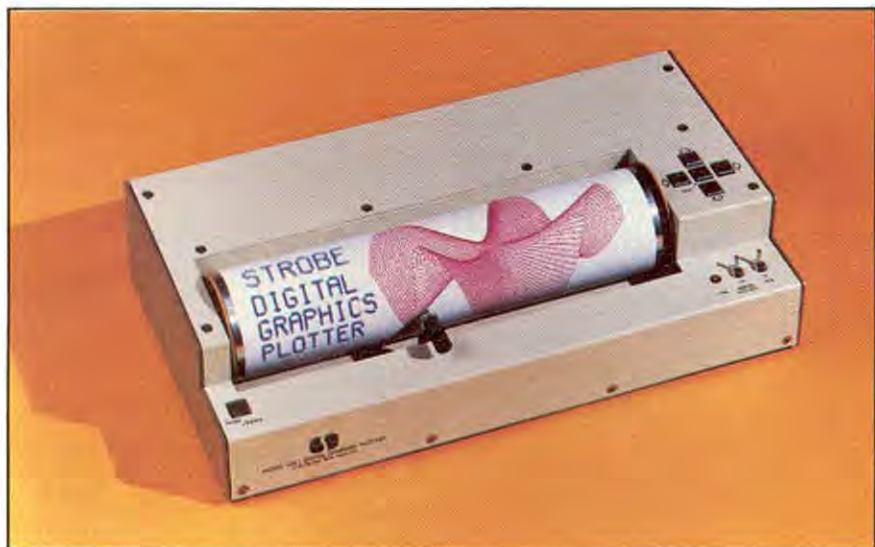
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80 REVIEWS

edited by Janet Fiderio

"The Strobe 100 drum plotter is easily the most inexpensive on the market at \$785, but that shouldn't fool you. It is accurate to .002 of an inch... or about 50 microns."



The Strobe 100 Digital Plotter

Strobe Incorporated
897 Independence Ave., Bldg. 5A
Mountain View, CA 94043
\$785 Strobe 100 Plotter
\$110 Model I Plotter Interface
\$350 Model III RS-232 Interface
\$70 PASP Software

by Bruce Powel Douglass

A digital plotter is a device that draws pictures. It is specifically designed to make plots rather than to print characters. The Strobe 100 is a digital plotter that is driven by computer; that is, it gets its instructions from the computer. It has interfaces available for a number of computers including the Model I.

There are two types of digital plotters: the flat bed and the drum. This refers to how the paper is attached to the plotter. A flat-bed plotter has a flat bed on which you place the paper. The drawing pen then moves around the paper according to the commands it receives. The other type of plotter is called a drum plotter, since the paper is attached to a revolving drum. The pen moves only laterally, while the drum moves to position the pen vertically. There

is no intrinsic superiority of one type over another.

The Strobe 100 drum plotter is easily the most inexpensive on the market at \$785, but that shouldn't fool you. It is accurate to .002 of an inch (1/500 of an inch or about 50 microns). That means that the error made in drawings is considerably less than the thickness of the pen line! It uses a four-phase stepping motor to achieve this high resolution. The drum can take paper up to standard 8½ by 11 inches, and the plotter can use standard pens. It does this by having a pen holder that threads the plastic-shank pens, and thereby holds them in place. Unlike some plotters which require a specific brand of plotter pen (usually expensive), you can use a variety of pens with the Strobe 100. Table 1 lists the plotter's technical specifications.

With the plotter you get several different colored pens and a special paper that is well suited to plots. You can use normal typing paper, but very porous paper has a tendency for the ink to spread, and thus diminishes the quality of the plots.

Connecting the Strobe 100 is easy if you get the TRS-80 interface. You simply plug the interface plug into your expansion in-

terface. It doesn't use the standard Centronics printer port or the RS-232 port, so you may still have your printer(s) connected while running the Strobe 100. They have developed a new RS-232 interface (\$350) which will place the routines in a PROM, and this can be used with the Model III. The Strobe 100 can directly interface with the TRS-80 or the PMC-80 and PMC-81 if you get the proper interface (\$110).

The Strobe 100 can digitize data. That means you can place a pre-drawn graph, figure or photograph on the plotter drum and get the coordinates of points on the figure. To do this, you simply enter the digitizing routine provided (or write your own) and use the driver keys on the plotter to position the pen over the appropriate point on the graph. Then press enter on the plotter. The software will store the coordinates of the point. In this manner, maps or pictures can be digitized and stored in the computer as an array of (X,Y) coordinate pairs.

The Hardware Manual

The Strobe 100 comes with a decent manual. The manual is well produced and fairly well written. It contains general information on specifications, connecting the plotter, and setting it up. Another section of the manual is devoted to machine-language driver routines, and includes flowcharts and listings for Z80, 8080 and 6502 CPUs. The last section is on the standard 90-day warranty, and hardware information, such as replacement parts and schematics.

The section on the machine-language driver routines is particularly useful. It is well done and easy to follow, particularly if you've had some Assembly-language programming experience. The driver listings are documented with flowcharts and commented lines and should be helpful in designing custom drivers.

The Software

While I am quite enthusiastic about the hardware, I am a bit more subdued about their software package. It provides most of the things you want your plotter to perform, but it does so at a basic level. It pro-



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(BY WILLIAM DEMAS)

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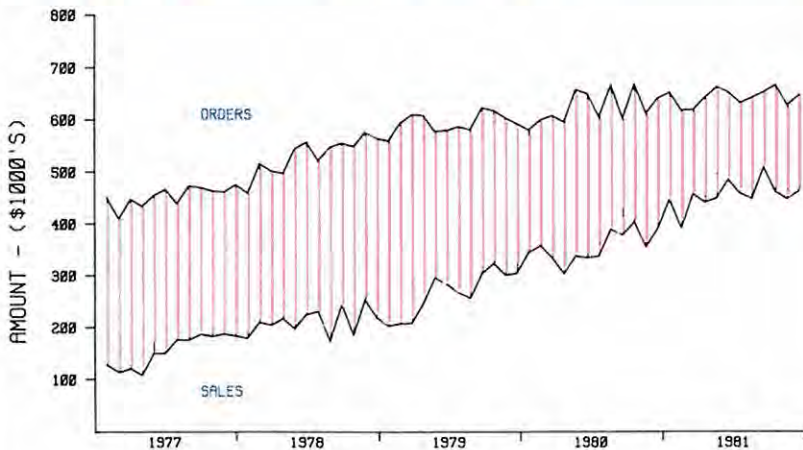
32K DISK (\$24.95)

MODEL I & III

TAPE VERSION WILL NOT TRANSFER TO DISK

Paper size:	8½ by 11 inches
Plotting area:	8 by 10¾ inches
Pen velocity:	3 inches per second
Minimum step size:	0.002 inches along X and Y axis
I/O requirements:	parallel TTL
Physical dimensions:	3½ inches high, 16¾ inches wide, 8½ inches deep
Weight:	9½ pounds
Power requirements:	115 or 230 Vac, 50/60 Hz, 40 W

Table 1



Two Examples of Output

vides some commands that are available from the machine-language driver, and these are available through USR routines. These are well documented, and with just a little work, they can be used in many creative ways. Basic programs accompany the machine-language drivers, but they are meant more to demonstrate the plotter's capabilities than for actual use. They can be used, but they may not be flexible or powerful enough for many applications. Non-programmers interested only in using their computers will find the Strobe 100 plotting software difficult to use.

Three plotter drivers are supplied on disk, one for each of the three possible memory configurations on the TRS-80 Model I. There are also three versions of the utility subroutine that may be merged with your Basic programs, one for each memory size. The other four programs are also Basic programs, but are not saved in ASCII format. These drivers are called by USR routines. A much more utilitarian approach is to take over the syntax error rou-

tine and add the commands to regular Basic, as a number of other programs do. The USR approach is serviceable, but a bit more clumsy than necessary.

The driver supports a number of plotter functions: plot vector, seek, and alphanumeric character draw. The first USR function plots the points. This can be done with the pen down (draw the line) or pen up (don't draw the line). The second is used in digitizing the data, and the third draws characters of virtually any size.

The plot routine requires three parameters, two of which are the X and Y coordinates. The third refers to pen state, and allows you to execute a move rather than a draw; that is, you can put the pen at a new location on the paper with or without drawing the line between the new point and the previous one.

The seek routine must be called before you can digitize data. The driver keys on the plotter don't work unless you have entered this routine. Once you have called this routine, you may move the pen to any

position on the paper and enter that point with the enter key located on the plotter itself. This routine is also used in setting up the plotter initially for the graph.

The character plotting routine is the most useful. You can set the size of the character to be plotted and draw characters so small that you cannot read them all the way up to a single letter so big that it fills the paper. You may draw your characters horizontally, as in normal writing, or vertically. This is extremely useful in labeling graphs and plots. One thing that is missing is a character-generator routine for users to create their own characters easily. The character-drawing routine does not produce lowercase characters, although it can produce some special characters. It would be nice if you could define your plotting characters easily and store them in a disk file. Then you could easily add Greek, Korean or Japanese characters and mathematical symbols to your plots.

The manual that accompanies the software package is well written and produced. It describes the programs in detail, including a description of the variables and USR functions used. One minor flaw is that when it runs you through the examples, it states you must position the paper, but it doesn't tell you where to position the paper. You should place the pen at the bottom of the paper for the programs provided.

The most useful Basic program provided with the software package is DRAW8/BAS. This subroutine plots a number of curves on a common graph format. Its use is described in detail and sample sessions are provided complete with pictures of the resulting graphs. It allows you to draw and label axes (labeling both in the horizontal and in the vertical directions), draw a grid, use various special symbols for graphing (as well as regular uppercase alphanumeric characters) and plot by connecting the symbols. You may plot on linear, log-linear, or log-log plots, with a reasonable amount of ease.

With DRAW8, you may choose the type of line to be drawn: solid with no symbols, symbols but no line, solid line and symbols, and dashed line and symbols. You may plot with default ranges and scales, or you may interactively choose them. DRAW8 is quite useful, but not as flexible as it might be. There is nothing to stop a user from generating his own programs using these subroutines, and in fact, it is encouraged.

I am impressed with the plotter and highly recommend it to anyone who needs quality plots but has a limited budget. ■

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Super Color Writer 1.0
Nelson Software
P.O. Box 19096
Minneapolis, MN 55419
Color Computer
\$99.95 disk, \$74.95 ROM pack
\$49.95 cassette

by John P. Mello Jr. and Jake Commander
80 Micro staff

Veteran hackers, who remember the Cenozoic Era of personal computer word processing, must be scratching their heads in wonder over how fast software for the Color Computer has come of age. Nothing illustrates that coming of age better than this offering by Nelson Software.

Super Color Writer is a machine-language program allowing you to edit text anywhere on your screen. It contains most editing functions found in high-powered word processors. You may—

- Insert text by the line or character;
- Delete text by character, line, or block;
- Locate, change or delete any string of characters; and
- Copy, move or delete text blocks.

When you load Super Color Writer, a multi-colored billboard is displayed on the CRT, then the program enters the text mode. There the screen is black with a green command line across the top. You enter the command mode by hitting clear twice.

From that mode you can clear all text from the buffer, or before or after the cursor. You also activate the locate function from this mode. A string may be located exactly as you type it in or you may "mask" the search so it will ignore upper-lowercase distinctions. According to the documentation, "wild card" characters may also be inserted in a search string, but this was unworkable in the copy of the program we tested.

The only way to clear all the text in the buffer is through the Clear command or cutting the power to the computer. We reset our CC with text in the buffer and Super Color Writer and the text were still there after reboot. "This is a bomb-proof word processor," Dan Nelson told us. "It's made so you won't lose your text if a child stuffs Dino Wars in the side while you're word processing."

In the text mode, the cursor is moved left, right, up and down by pressing the appropriate arrow keys. Then there are nine additional cursor movement functions activated by pressing clear and a letter: bottom or top of CRT, start or end of text, start or end of line, back or ahead 15 lines, and pre-set tabbing at 5, 8, 16, 20, and 24 spaces.

The documentation for commanding the cursor to the top or end of the text was transposed. Because the command structure of the software is very logical—one of the things that makes it very "friendly"—this slip up was fairly obvious. Instead of hitting clear, shift-up arrow, to go to the end of the text, you should use clear, shift-down arrow, and vice versa for going to the start of the text.

Anyone using their CC with a black and white monitor will have difficulty using this program. It uses colored blocks to identify functions and modes: white when clear is hit, blue for character insert, orange for a block marker, yellow for a header, red for a footer and so forth. This makes it very easy to pick out things when scrolling text and in keeping track of what mode you're in.

Most control functions take two keystrokes. We found this improved typing speed over word processors where two keys had to be held down simultaneously to activate those functions. This should also charm hunt and peck typists.

Once we began typing, we found the major flaw in Super Color Writer: it has no lowercase character set. Uppercase characters are displayed as light capitals on a black background and lowercase as dark capitals on a light background.

Super Color Writer's chief competitor, Telewriter (produced by Cognitec of Del Mar, CA), addressed that problem by incorporating a software-generated lowercase character set in its word processor. Dan Nelson said his firm rejected that option so there would be more memory for text. According to an 80 Micro review of Telewriter (May 1982), there are only 2,200 characters (less than two pages of double-spaced typed pages) available for text after that program is loaded in a 16K Color Computer. After loading Super Color Writer in a 16K machine, we found 8,446 characters available for text. (The high resolution screen used for Telewriter's lowercase uses 6K.)

Another alternative to the upper-lowercase problem is Word Processing Lowerkit, designed by Dennis Kitsz and manufactured by MSB Electronics in Barre, VT. However, this hardware modification is not entirely compatible with Nelson's word processing software. We found some characters generated under the Kitsz mod were misinterpreted by Super Color Writer.

While typing with Super Color Writer, you can turn up the sound on your tv set and hear a beep each time you strike a key.

If you make a mistake, you can back up and type over it. Forget something? Press clear, I, and insert a character; clear, O,

and the line opens up for larger insertions. In addition to deletion by character, line and block, you may also delete all of a line before the cursor or after the cursor.

Super Color Writer, like Telewriter, allows only one block of text to be manipulated at a time. But its block commands are simpler and more powerful than its competitor's. When manipulating text blocks with Telewriter, you first mark the end of the block using one set of keystrokes, then go to the block's beginning, using one set of keystrokes for a delete and another set for a move. With Super Color Writer, the same keystrokes are used for marking the start and end of a block. Once marked you can delete, move, or copy the block with pairs of keystrokes. And unlike Telewriter or Model I or III Scripsit, Super Color Writer contains a true block move. When it moves a block, it erases the original block automatically.

The word processor automatically chains files in memory. If you have one file there, you can load as many more as you want until the memory is full. This wrinkle proved very valuable in dealing with the vagaries of CLOADing.

Color Computer files are stored in blocks. As a file is loading, you will notice in the upper left corner of the screen an F alternates from black on green to green on black. When the F is green on black, a data block is being loaded. By counting the blocks or paying close attention to your tape counter, you can identify the bad block in a tape load. When Super Color Writer encounters a bad block, it stops loading, but the good blocks are kept in memory and displayed on the screen. You can try to load the rest of the file—either starting at the bad block or skipping it—by reloading it, stopping it when its file name appears above the command line, and fast forwarding the tape to the spot where the load erred the first time.

Another feature of this word processor is it allows you to write Basic programs, save them in ASCII format and run them under Basic. This is handy because the full screen editing commands of a word processor are superior to the line-oriented ones of Basic.

Super Color Writer also gives you a function you can program. You can choose to include in this function up to 28 commands, functions, keystrokes or modes, and have them all executed up to 65,535 times automatically. This comes in useful for cassette file linking, where you tell the computer how many files you want loaded and printed and it does it without you touching the keyboard again.

Nelson Software's word processing program has functions for headers, foot-

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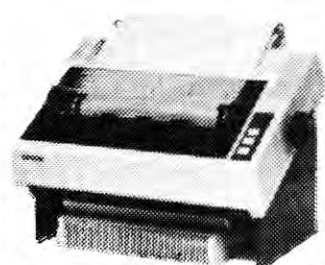
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ers, automatic centering, and including printer codes for your printer's special features. If your printer has features like underlining, expanded print fonts and italics, this word processor allows you to put the control codes for those features in the text. In Scripsit, these codes must be inserted while the machine is in Basic, which limits their use.

The printing section of the documentation is sketchy. The authors, Dan Nelson explained, assume users have intimate knowledge of their printer before using Super Color Writer.

The software has default values set for perfectly centering text on an 8 1/2-inch by 11-inch piece of paper. However, you may set your values for margins, justification, page numbering, page length, and header and footer location. You can also pause printing by hitting the space bar during a print run.

Super Color Writer is designed to operate out of the serial port of the Color Computer. It will not work with CPRINT, a parallel printer interface that plugs into the ROM-pack port manufactured by Micro-Labs Inc.

Version 2.0

As state of the art as Super Color Writer 1.0 is, Nelson Software has already released 2.0 which features:

- A window mode allowing you to see your text exactly as it will be printed;
- Free format cassette file linking—as each file is loaded and printed, the computer automatically sets the page numbers and does other formatting chores;
- Disk file linking for the disk version;
- Automatic disk file verification each time a file is saved;
- Headers and footers on odd or even pages;
- Three programmable functions;
- A flush right margin;
- Memory used and memory left display;
- No-print markers, allowing you to mark blocks of text you don't want printed in a document;
- Print pause markers, allowing you to stop printing and change the print thimble to another font like italic; and
- Six programmable tabs.

The new version also addresses a problem 1.0 had with the Okidata Microline 80, making it no longer necessary to instruct the system to send line feeds with carriage returns to the printer.

So Color Computer owners brace yourself, a good word processing program is going to get even better. ■

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**55 Color Computer Programs
for the Home, School & Office**

Ron Clark
ARCsoft Publishers
Woodsboro, MD 21798
Softcover, 127 pp.
\$9.95

by Scott L. Norman

Ron Clark's *55 Color Computer Programs for the Home, School and Office* is one of the few much needed books devoted exclusively to the Color Computer. Unfortunately, few of the programs it contains go beyond the level of the exercises presented in the Color Basic and Extended Color Basic manuals.

The book is divided into six major sections and includes an appendix which essentially duplicates the operator's information cards for the Color Computer. The principal headings are Business Programs, Programs for Students, Programs for Teachers, Music Programs, Programs

for the Home, and Graphics Art.

The Business Programs section contains 14 programs, plus a cutsie "Executive Go/No Go" which returns a yes or no answer depending on the value of a random number. The programs have a businesslike air to them but suffer from a generally simplistic approach. They seem to be intended for a 16K cassette system (although many of them would probably run in 4K); few people would choose such a system for business purposes. There is nothing here about file handling, although even a cassette recorder gives you the ability to work with sequential files. Instead, all information is meant to be entered from the keyboard at run time.

The real value of this section is educational—students at the high school level can get a feel for the elements of business computer applications. They will learn only the elementary use of Extended Color Basic. For example, the Profit Graph program uses the Draw command to draw a title and label the axes; however, Mr. Clark does not use the most elegant or quickest way to accomplish this. He spells out the

question incorrectly, the computer reveals the answer to you; there is no storage of missed questions for subsequent review. Other student programs include math flashcard drills and a graphing routine.

Teachers fare a little better than students. Two of the four programs for teachers deal with examination score evaluation and perform useful functions. Once again everything must be entered from the keyboard. The last two programs in this section are an elementary bubble sort for alphabetizing a list of names, and the skeleton for one of those question-and-answer drills from the student programs.

Roughly half the book is devoted to recreational programs, namely those which generate music, draw pictures, and perform miscellaneous domestic calculations. These are moderately amusing, but offer the purchaser little of real value.

The fundamental problem I found when evaluating this book was determining for whom is it intended? The Color Computer is becoming relatively sophisticated (extended memory and disk drives are readily

"The real value of this section is educational—students at the high school level can get a feel for the elements of business computer applications."

commands for drawing the letter E four times; he could have defined them once as a string variable and then called them with the Execute (X) subcommand.

Many of the student programs fare little better. Four are devoted to simple quizzes in which an item and its match are read from a data statement. If you answer the

available), and with this growth in sophistication there is a need for literature which will help owners make full use of this machine's capabilities. Unless a Color Computer owner feels a need for additional programs much like those in the manuals, there is little to be learned from this particular collection. ■



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by Mark E. Renne

The Institute is a very unique entry into the game market from the company that brought us 3-D adventures. It is *not* 3-D nor does it have any similarity with Asylum, Labyrinth or Deathmaze. Graph-

ics are used in the game only for decoration or to signify dramatic changes in the plot. However, it's one of the finest adventure games I've ever played.

The disk version is self-booting on either Model I or III and is supplied on a quality disk. There are 10 sections, zero through nine, on which to save games in progress and a lengthy comment to describe where you left off. Saving and loading games is fast and easy.

The game features a hybrid screen, a cross between the now famous split-screen and a new concept. At the top are visible items, if any, a description of the

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room or its contents is next. Your input is entered at the next level followed by an area which displays the result of "talks," "listens" or special happenings. This last area is where the most important information is shown. "Talk" and "listen" are commands that most adventures do not use; in this adventure they are probably the most important. That's right, you talk to characters (dwarves, counselors, mid-gets) and they talk back. If you don't keep your ears open, you'll never get anywhere.

Exits are usually not shown at all. Upon arriving in a room, you normally look about to receive more information. Sometimes a door or another exit shows up—sometimes not. To examine an item, you "look" at it and if you're lucky you will find something interesting. There are many exits that are not indicated in any manner at all. These are found by trying all directions from each room. Nobody said this game was easy.

The input routine is very critical, descriptions must match exactly or no action occurs. For example, "get bottle" will not pick up the red bottle. However "get red bottle" works fine. The clues within

"The input routine is very critical, descriptions must match exactly or no action occurs."

the game and actions required are very subtle. The syntax of the game is also different from other adventure games. Instead of "I can't do that yet," the game responds with "Not now." Multiple "looks" are required for shelves with more than one item, also.

The game has five different levels. The first one is your starting point at The Institute. By use of a strange powder you physically enter your dreams to complete your escape. Dreams include a giant forest on another planet, a voyage on the Titanic, an ancient temple, and a prehistoric forest. It's much like five adventures in one. Sometimes you must be killed to wake up or pass into the next dream. Also, if you're killed you keep whatever inventory you had and you start over—nice feature!

This game is tough for even experienced players. I enjoyed the changes in syntax, screen design and vocabulary. The "talk" and "listen" features add a whole new spectrum to the game. The graphics are well placed and serve a very worthwhile purpose. A hint sheet is also available for the weak of heart. For a 16K adventure, The Institute is one of the best. ■

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80 REVIEWS

The Basic Conversions Handbook for Apple, TRS-80 and PET Users

David A. Brain et al.

Hayden Books

Rochelle Park, NJ 07662

Softcover, 79 pp.

\$7.95

by Scott L. Norman

Here's a book which will be appreciated by anyone who likes to pick and choose from programs written for a variety of micros. The idea is simple: provide a series of glossaries permitting the owner of one of the three computers mentioned in the title to translate Basic programs written for either of the other two. In particular, the book is concerned with the Apple II and the TRS-80 Models I and III. As a Color Computer owner, I still found it very useful because of the amount of information included.

The book comprises four chapters and three appendices, crammed into 79 pages. The first chapter is a short introduction to the ideas of translation. It is the second chapter, however, that will get the heaviest workout from TRS-80 owners. It deals with the details of translating Applesoft II and PET Basic programs into TRS-80 dialect. A separate table for each conversion is provided. The commands are listed alphabetically. Another informative table explains specific Apple PEEKs, POKEs and CALLs so you can decide how

(or whether) to approximate them if they come up in a translation. The great joy of this chapter is that Apple commands are explained in detail. I find this especially useful because the Color Computer can approximate some of these commands better than the other TRS-80s. As a result, the book effectively serves for direct translation from Applesoft II into Extended Color Basic; there need be no intermediate Level II translation.

The remaining chapters follow the same format, but in less detail: TRS-80 and PET into Apple II, and TRS-80 and Apple into PET. Again, the authors have done a thorough job, including just enough detail to let the would-be translator make intelligent decisions about reworking published programs.

The book concludes with appendices covering subroutines that allow a (non-Color) TRS-80 to simulate specific Apple and PET commands. Also included are examples of complete program conversions, and useful charts concerning video screen coordinates and the PET graphics set.

This is a good, non-flashy example of a book which can add much to the enjoyment of your computer. I've found its principal value has been in the translation of games and other graphics-oriented programs; others may find it useful in other ways. I regret only that the limited market has made it necessary for the publisher to charge \$7.95 for what amounts to a paperback dictionary. ■

Sooperspooler

Compulink

1215 Ravenwood Rd.

Boulder, CO 80303

\$349

by Ken Knecht

Other than the cute name, I like everything about Compulink's Model SS-1000 Intelligent Printer Interface.

This handy box is a hardware spooler. It quickly gobbles up printer data from the computer and passes it on to the printer at the printer's normal rate.

Until I started using this device I spent a lot of time waiting for the printer to finish an LLIST, Scripsit to finish a document, or for a report to finish printing. Now I can get on with my computing while the Sooperspooler feeds the printer. This handy device has increased my productivity by 20 percent or more.

I am using the spooler with a TRS-80 Model III and a Radio Shack Line Printer VIII. The cable that came with the spooler and the connectors on the spooler enabled a painless hook-up. (If you decide to purchase one of these spoolers I suggest contacting Compulink to be sure you get the right cables and connectors. The

*"Other than the cute name,
I like everything about Compulink's
Model SS-1000 Intelligent Printer Interface."*

gentleman I talked to was very knowledgeable and friendly.)

The spooler normally comes with 16K and is set up for a parallel printer. Options include increasing the memory to 62K (which I intend to do) and adding RS-232 I/O.

The spooler accepts data from the computer at 3,000 characters per second. It doesn't take long to swallow a long listing and quickly return computer control back to you.

Besides its spooling capacity the interface lives up to its "intelligent" description. The front panel has three pushbuttons and a two-digit LED display. The display tells you how much data is in the buffer yet to be printed in K-bytes. A reset pushbutton is provided which allows canceling a printout. The other two buttons control space compression and paging. When pressed, the space compression button lights a tally LED and then compresses consecutive spaces for storage. It expands them again when feeding the printer.

The paging button lights a tally LED and limits the number of printed lines on a page to 62, and then does four line feeds before starting the next page. This neatly skips over the perforations in your fanfold paper. If you press the paging and space compression buttons at the same time, the self-test mode is initiated which checks the ROM and RAM in the spooler printing the test results.

Many more features are available that can be initiated from software or set before the program begins. These commands begin with a 28-decimal character followed by the appropriate data. These spooler commands are not passed along to the printer. The initial CHR\$(28) can be changed to any character from zero to 31 if necessary.

The spooler can number pages and will put the heading of your choice on each. You can set the number of lines per page (default 66) and the number of printed lines per page (default 62). You can set the line width (default 80) by setting the width of the left-margin and the right-margin column. Overflowed lines (longer than the line width) such as the result of a program LLIST can be indented (default 5).

The form-feed character (CHR\$(12)) can be changed to another character from 0-31. In fact, the input character (from the computer) and the output character (to the printer) can be different.

You can change a *hard* form feed from the computer to a *soft* form feed to the printer. For example, a CHR\$(12) received from the computer can be converted to the proper number of line feeds to simulate the form feed to the printer.



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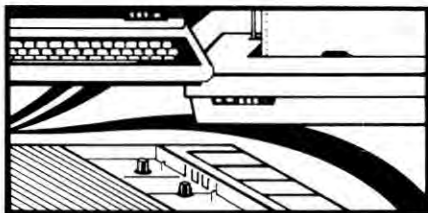
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The spooler passes along any characters between a CHR\$(27) (usual printer escape character) and the following CHR\$(13) (carriage return) without checking them for a CHR\$(28) and a spooler command.

You can also use the spooler to print single pages, pausing after each one so you can insert another sheet of paper. Finally, there is a software command to ignore any preset hardware or software commands and any subsequent software commands storing and passing along all



data precisely as received. This is good for printing graphics where some of the graphics characters can be confused with

spooler commands. I use this feature to print a logo using the graphics ability of the Line Printer VIII. Pushing the *hard* reset button on the rear of the spooler escapes this mode.

I received my spooler six days after my telephoned order and it worked perfectly on arrival. I had it running about 10 minutes after I unpacked it. The documentation is complete with plenty of technical data and is easy to read. The spooler is a handsome and useful addition to my system. ■

INTASM 2.0
Singular Systems
810 Stratford
Sidney, OH 45365
Models I & III
\$20

by Joel Benjamin

Why do more people program in Basic than in Assembly language? Is it

because Basic is more powerful and flexible, or because it is faster and takes less memory? No—Assembly language has all these advantages; the reason for Basic's popularity is that it's so much easier to use.

Part of the difficulty of learning to program in Assembly language is that such a large first step must be taken. A programming aspirant must first gain at least a mild familiarity with Assembly mnemonics from literature, then purchase, for a hefty price, an assembler and learn its operation and syntax.

It is remarkable how few products have been designed to help Basic programmers clear these initial hurdles. Enter Singular Systems, stage right with INTASM, a mini-Assembly-language development system. INTASM is composed of two machine-language modules, ASM1 and ASM2.

ASM1 is an Assembly-language interpreter which recognizes a limited subset of Z80 Assembly-language source statements. The Basic editor composes a program consisting of a combination of Basic statements, Z80 Assembly instructions, machine code, break points, and single-stepping commands.

ASM2 is a mini-assembler which accepts the same source instructions as ASM1 and assembles them into memory for subsequent execution.

1K, 32K and 48K versions of these programs are supplied on tape in Level II system format. They are disk compatible and can be dumped to disk by using a utility such as TRSDOS' Tapedisk. The programs are run by loading one of them into your machine and entering Level II or Disk Basic. Reserve memory so Basic doesn't

stomp on the machine-code module stored in high memory.

Another admirable feature of INTASM is that it has no new editing commands to learn—the same old Basic ones are used. There are only 54 out of the Z80's more than 700 mnemonic codes to learn, but you do have the option of executing other instructions if you want to enter their machine codes.

You are not limited to using only hexadecimal numbers—INTASM accepts base 10 constants. You can reference instructions with line numbers, so instead of jumping to or calling a memory location, you jump to or call a line number. This makes up, in part, for labels not being supported. The break and shift @ keys operate during the execution of ASM1 just like they do in Basic, making it a simple matter to stop program execution. The jump from the Basic to the Assembly portion of the user's program is made with an ordinary user call, and the return is made by adding the command, Basic. Once your program is written in ASM1, it can be run by simply entering the Basic command, Run.

ASM1 has two instructions which help locate bugs. You can use the Break instruction within the program to interrupt the program flow. This causes the current register contents to be displayed on the screen. You now have the option of continuing or returning to Basic. The Step-On instruction executes the program one step at a time. Effectively, a Break is executed from that point on until a Step-Off instruction is entered. You can use the single-step option to follow each instruction's effect on the registers. This not only helps in

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```

10 POKE 16526,0:POKE 16527,96
20 X=USR(30):END
30 CALL 01C9H ;REM ROUTINE TO CLEAR SCREEN
40 BASIC ;RETURN TO BASIC
    
```

Program Listing

debugging, but it's also just about the fastest and easiest way to gain familiarity with each Z80 instruction's function.

Once you have gained some experience programming with ASM1, you can get the feel of working with an assembler by using ASM2. You use the same mnemonics, but this time you are required to assemble your program before running it.

A sample program which can be written and run in the 16K version of ASM1 is shown in the Program Listing. Line 10 tells Basic where INTASM resides. Line 20 transfers execution from Basic to the Assembly-language routine located at line 30. The USR parameter is used to identify the line number. Line 30 is the beginning and end of our unambitious Assembly-language subroutine. It clears the screen for future bigger and better things. Line 40 is essentially a return execution to Basic. It is all very logical and consistent with familiar Basic procedures.

There are two sides to every coin. With

"You can use the Break instruction within the program to interrupt the program flow."

all the advantages INTASM has, there are a number of drawbacks as well. It is definitely easy to use, but the very features that make it simple also limit its power. The most obvious of these features is the limited number of mnemonic codes it accepts; 54 out of over 700 instructions is a very small subset. There are many unsupported Z80 instructions whose functions must each be accomplished by twisted contortions of INTASM's bare commands. For example, it recognizes LDIR but you cannot use LD BC, NN or LD DE, NN to load the BC or DE registers. Since LDIR's operation depends on the contents of these registers, and there is no single instruction to load either of them, LDIR loses a lot of its ordinary ease of operation. Although it is very convenient for debugging purposes to assemble to memory, INTASM does not have the ability to assemble to disk. This prevents you from using your Assembly-language routines independently from INTASM.

ASM2 limits the user to only 1900 bytes of machine code and 80 bytes of stack

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space. Although there is quite a bit you can do within these confines, it does place an absolute limit on the size of your programs, which is much smaller than that allowed by ordinary assemblers.

Since INTASM seems to be designed primarily as an aid for Basic programmers to learn to write their first programs in Assembly language, these limitations are not as severe as they might at first appear. Once familiarity is gained with the subset of mnemonics, their effects on the registers and flags, the operation of the ASM2 assembler, and the use of break points to debug Assembly-language programs, the user may set aside this beginner's aid and purchase an assembler and an interpretive monitor/disassembler such as TASMON or MACRO-MON.

INTASM is an excellent programming aid which definitely helps beginners taking their first few groping steps toward becoming the Assembly-language superstars of tomorrow. For \$20, it is well worth its price. Keep in mind, though, that it is meant as only a temporary means to gain familiarity with Assembly language. ■

H-O-R-K-S
Edu-Ware East
P.O. Box 336
Maynard, MA 01754
\$24.95 cassette
\$29.95 disk

by Wynne Keller

H-O-R-K-S, (Home Office Record Keeping System) is a bookkeeping system for those with complicated financial lives. It doesn't balance the checkbook or reconcile the bank statement, but it organizes financial records so you can find out where the money goes as well as where it comes from. The minimum system required is a Model I or III with 32K and one disk drive; the Model I holds about 800 records, and a Model III about 2000.

Before you use the program, choose credit and debit account names. You're allowed a total of 33 credit and 33 debit ac-

counts; some credit accounts might be salary, interest or dividends. Expenses include all the categories for itemized deductions on an income tax return, as well as standard household expenses. Name these accounts the first time you run the program, and you can change the names later if necessary; however, any dollar amounts in an account will remain after a name change. For this reason, only change names at the end of the year. Think carefully about which expense/income categories you need before beginning.

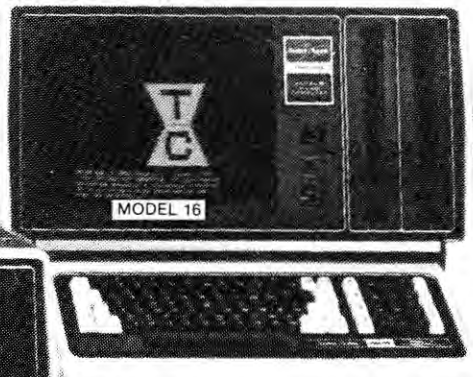
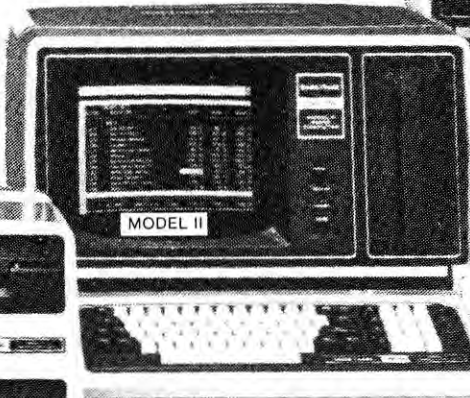
After the program is initialized with account names, transactions can be entered. Each account name and its code number is displayed on the screen for reference. Type the date of the transaction, item, amount, tax and account code number. A transaction might correspond to a check you've written, or it might be a cash expense, or income. If you wrote a check to a grocery store, but the total amount wasn't all food, you might want to enter

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that check as two transactions, one for food and one for household supplies. After the entry is complete, you're allowed to correct any errors. If an error is not corrected at this point, it can only be corrected later by using the audit function. The audit feature records all changes made in a file, storing the old and the new information.

Several printouts are available. Those most appreciated at income tax time are summaries by account. For example, if contributions were an expense category, a list of all contributions, with a total, is easily obtained. Transactions can be printed by the month, or continuously for the entire file. A profit/loss statement totals expenses and subtracts them from income, giving the balance. All printouts are available on screen if there is no printer. The program tallies the tax on any item separately. This feature can be used to prove sales tax paid throughout the year, if you feel your sales tax expense exceeds the IRS charts. If you derive part of your income from sales of taxable goods, use the tax feature to figure the amount you must

pay the state for your sales.

This is a useful program, but there are some aggravations, which are apparent when you use audit file. The more changes you record in the audit file, the fewer expenses/credits will fit on the disk, so it is important to keep audit changes to a minimum. Unfortunately it's easy to add audit changes unintentionally from inadequate error trapping in the program.

For example, the date must be entered as dual digits separated by a comma (12, 31, 81). Since this is an unusual format, it's easy to forget and type 12/31/81. There's no error trap for this, and the program scrolls the screen and prints two question marks, looking for the rest of the date. If you compound the mistake by typing the whole date, you get an "extra ignored" message and the date will be garbage. You can fix this error at the end of the transaction, but the screen is still missing the top two lines, which show the account names and code numbers. Pressing enter during transaction entry duplicates the previous entry. Pressing enter for the date duplicates the current

date, not the previous entry's date. This is confusing until you get used to it; if you make a date error and fail to notice it, the audit function won't correct it later.

The only way to correct a date error is to delete the transaction and retype it. Unfortunately this is learned by trial and error, and each trial is recorded by the audit function. It's easy to type in the tax for one item, and then press enter for the tax on the next item, forgetting this duplicates the same tax for the second item, rather than giving a zero tax.

Select printouts one at a time; you cannot ask for printouts of all expense accounts and then walk away. Paper must be adjusted manually between each printout. There is no sort, so all entries are printed in the order they were typed.

In a business environment, this program would cause too many errors and is too awkward to use. It is marketed for the home office, and as such, is a good buy. For the money, the program is very useful, and could help organize a complicated personal or sideline business/hobby budget. ■

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Don't
Rodney Zaks
Sybex
2344 6th St.
Berkeley, CA 94770
Softcover, 200 pp.
\$11.95

by Tim Daniel

Is your software unreliable? Does your computer behave erratically? Perhaps the problem is not in the program or the hardware. Maybe the difficulty lies with you, the user. Starting with the premise that computers are reliable, *Don't* explores how the human element can contribute to the successful operation of a computer.

Author Rodney Zaks makes a very good

point with his unusual choice of a title. Much of the secret to reliable computer operation can be expressed in the form of don'ts. Luckily the book's 200 pages also delve into some of the positive aspects of computer housekeeping. However, in the end, *Don't* is a sobering tale, one that may save you a lot of time and money if you heed its lessons.

Much of *Don't* is devoted to computers in business settings. Discussions about hard disks, computer security and the design of a computer room are not going to appeal to a hacker. Hobbyists, however, will find familiar advice in the chapters on floppy disks and electrical problems. As a further gesture, each chapter includes a box that lists specific tips for the home computer user.

Don't appeals to the thinking reader. In-

stead of supplying you with a multitude of checklists, Zaks wants his readers to know why they shouldn't smoke near their computer or leave a disk out of its jacket. A knowledge of computer jargon is helpful but not necessary. With the exception of a few problems that are left unexplained or unsolved *Don't* is easy reading. Cartoons and photos help to break up the pessimistic text.

If you are going to spend \$10,000 or \$20,000 for a business system, *Don't* is required reading. Salesmen and manufacturer's literature will provide you with plenty of assurances, but in the end it's your computer and your problem. Hobbyists who are plagued with unexplainable failures just might find some answers in *Don't*. In any case the \$11.95 cover price is an inexpensive way to peace of mind. ■

Color Computer Disk System
Tandy/Radio Shack
Fort Worth, TX
Cat. #26-3022
\$599
by Jake Commander
80 Micro staff

Those Color Computer owners amongst you that have been struggling with tape systems need struggle no longer. I've been trying out the Color Computer Disk System for over two months and consider it to be a reliable piece of equipment. Anyone that's already gone the disk route knows that it's more than a luxury; it's a downright necessity. The increase in reliability and the savings in time more than justify the extra cost.

The advantages of disk versus tape are well known by now, but for the newcomers, here's a rundown of the main advantages. The ability to perform loads and saves at high speed is the main benefit to any disk user. Since any program you develop has to be stored somewhere while the computer is not being used, this is the most obvious advantage to owning a disk unit. Compared to tape I/O, a disk can be many times faster; in a test I made of a 10K program, it took one minute, seven

seconds to save on tape and nine seconds to save on disk. Subsequent loading took one minute, seven seconds from tape and 7.5 seconds from disk. The advantage in speed is made obvious by these figures, but there's another important gain with disk—reliability.

The tape system used in the Color Computer is fairly reliable (and faster than the Model I) but suffers from the inherent limitations faced when recording any digital information on an audio machine. Audio recorders are made to do just that; record audio information, usually in the form of music and speech. In order to save digital information, the data (consisting of a stream of zeroes and ones) has to be converted to audio tones; one tone for a zero and another for a one. This is asking a lot of a low-cost cassette recorder. Although it's possible to achieve a satisfactory degree of reliability, problems occur all too often and always at the wrong time.

Disk systems, however, are designed to record the binary information directly as magnetic pulses without an intermediate conversion to audio tones. A stage left out from the electronics is a stage that can't go wrong, which in itself improves reliability. Add to that the fact that disks are fine tuned to record bits of data at high speed and you're talking the difference between

a kludge and the real thing.

Last but not least on the list of advantages is the ability to perform random-access I/O on a disk file (more correctly referred to as direct access in the manual). This means that it's possible to create a file consisting of a number of records and then access any of those records at random without having to step over unwanted records. On a file of sequential records (as on tape), a required record can only be accessed after skipping all records in the file that are in the way. The direct-access feature allows for much more efficient access—it's no longer necessary to read 99 records to get at the hundredth.

The Color Computer Disk System comes in a box containing a disk drive, a connector cable, a blank floppy disk, an owner's manual, and a cartridge which fits in the slot at the right side of the keyboard. You won't be able to use any peripherals that use the cartridge slot as it is commandeered by the disk I/O cartridge. This is something that Radio Shack could have engineered their way out of if they'd wanted to. I'm puzzled as to why they didn't continue the bus on from the back of the cartridge to allow further expansion to take place.

The whole thing seems a little overpriced in view of the current prices being charged for disk drives, but the Radio Shack people have proven their marketing strategy to work. You either buy the approved product and remain in the fold, or buy from a cheaper, alternative source and take the risk of being on your own.

Hooking up the drive is simple. Turn the computer off, insert the cartridge in the slot, connect the drive cable between cartridge and drive, and plug in the drive and

“... the Radio Shack people have proven their strategy to work. ... buy the approved product and remain in the fold, or buy ... cheaper ... and risk being on your own.”

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- Transfers old files over to our system. ← **LOOK!**
- Zip order is "sub-alphabetized".
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- Supports 9 digit zips, **Canadian zips**, and foreign abbrev.
- Backup data disks are easily updated as entries are created, edited, or sorted...extremely useful!!
- Optional reversal of names about commas. This permits disk storage in last-name-first order to facilitate meaningful alph order while the printout will be in "natural" order.
- Permits telephone, account, and/or serial numbers, etc.
- Prints on envelopes or on labels, 1, 2, 3, or 4 across.
- Test label/envelope printing lets you make horizontal and vertical adjustments with ease.
- Master printout of your list in several formats (not just a rehash of the labels)...extremely useful.
- Selective printing by specific zips or by zip range.
- Editing is simple and fast...automatic search. Batch transfer of edited entries to backup disks.
- Optionally provides for duplicate labels.
- Deleted entries have "holes" on disk filled automatically and alph. order is still maintained!
- System adjusts to any DOS.
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Produce large (reduced 50% here) attention getting signs.

```

SSSSSSSS  TTTTTTTT  00000000  PFFFFFFF  LL  00000000  00000000  KK  KK
SS  SS  TTTTTTTT  00  00  PP  PP  LL  00  00  00  00  KK  KK
SS  TTT  00  00  PP  PP  LL  00  00  00  00  KK  KK
SSSSSSSS  TTT  00  00  PFFFFFFF  =====  LL  00  00  00  00  KKKK
SSSSSSSS  TTT  00  00  PFFFFFFF  LL  00  00  00  00  KKKK
SS  TTT  00  00  PP  LL  00  00  00  00  KK  KK
SS  SS  TTT  00  00  PP  LL  00  00  00  00  KK  KK
SSSSSSSS  TTT  00000000  PP  LLLLLLLL  00000000  00000000  KK  KK
    
```

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Form Letter	<input type="checkbox"/>	Fast Sort & Alph	<input type="checkbox"/>	Football Scout	<input type="checkbox"/>
Model I	<input type="checkbox"/>			Model III	<input type="checkbox"/>

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80 REVIEWS

switch it on. All that remains is to switch the computer on. You will be greeted by a new message telling you that you're now running under Disk Extended Color Basic. A whole series of new features now awaits you.

For users of other microcomputers, the first surprise on powering up is that the familiar sound of the disk loading a bootstrap loader is missing. With the Color Computer, the disk operating system is already in the ROM contained in the cartridge. This has a couple of advantages such as not wasting disk space with the operating system code and keeping the DOS code inviolate against any reckless POKEs or errant machine-code programs. The disadvantages are that the DOS is unchangeable (being in ROM) and the memory used by the DOS is unavailable for any other use. This is a typical computer trade-off; the good part in this case is that the DOS is always available, uncorrupted and ready to go.

The drive unit itself is manufactured on behalf of Radio Shack in Japan and no labels on the outside give away the producer. You take what you're offered as it's not possible to buy the system without at least one drive. However, the drive has a good solid feel about it and I've had no problems in the time I've used it. I also have a second Shugart drive hooked up to the computer and this has also performed without error.

It's possible to have up to four double-density, 35-track drives connected, although the cable supplied is only configured for two. A second drive is more of a luxury on the Color Computer than it is on the Models I and III because the same amount of room is available on the first drive as on the others; 35 tracks of 18 sectors at 256 bytes per sector—that's a total of 156K (excluding the directory track). Of course, if you have large files, you may

need to spread them across two disks. The convenience of backing up from one drive to another without having to swap disks is one undeniable advantage of having more than one drive.

The documentation supplied comes in the form of a standard 8.5 by 11-inch soft-cover book. But why is this documentation a standard size when the other two Color Computer manuals measure 11 by 8.5—the other way around! I now have a hodge-podge of manuals on my shelf and I'm hereby kicking up a fuss. Seriously, it would have been so much tidier if all the documentation came in the same format; preferably 8.5 by 11-inch loose-leafed manuals with holes for a three-ring binder. Then the whole thing could go in one cover and it wouldn't be necessary to have umpteen manuals spread all over the work area.

Now that the dust has settled from that tirade let me say that the manual for the disk system is extremely well written. It's most definitely aimed at the novice and patiently goes through the A to Z of using disks in a most understandable manner. The style is in keeping with the other manuals with plenty of use of cartoons to help break up the monotony. This format makes the manual a little difficult to use as a reference as you may have to wade through a few dozen smiling floppy disks in an attempt to get what you're after. On the other side of the coin, the manual is well indexed and contains eight appendices to make referencing easier. The book contains a useful section on using the disk from machine-language programs, which is written in the same easy style and could be understood by relative beginners.

The Color Computer Disk System is reliable, easy to use, a wee bit expensive but the only way to go if you're serious about getting the most out of your Color Computer. ■

Penetrator
Melbourne House Software
6917 Valjean Ave.
Van Nuys, CA 91406

Models I & III
\$24.95 disk or cassette

by Michael E. Nadeau
80 Micro staff

Penetrator is a state-of-the-art game for the TRS-80 loosely based on the arcade game Defender. You are the sole survivor of a fighter squadron whose mission is to make it through four defense rings and blow up an illegal cache of neutron bombs. Along the way you face

anti-aircraft missiles, radar installations and paratroopers; it's enough to give Al Haig goosebumps.

This is a game of skill; your craft always moves forward with only momentary thrust and braking at your disposal. Your weapons are forward missiles and bombs, via the right arrow and space bar respectively. Timing is critical on the bomb drops; they are used primarily on the radar installations you must destroy to avoid detection. The bombs are also your only means of destroying the neutron bombs.

The landscape is as treacherous as your enemies. Certain spots require precise braking and maneuvering. In many

places there is no room for error, especially if you have to avoid missiles as well.

But this is where the best feature of Penetrator comes in: You may make custom landscapes to suit your ability. You can remove difficult areas and add or subtract missiles and radar bases. (The paratroopers appear only in the last defense ring in proportion to the number of other defenses you leave there.) This landscape editing takes a few minutes, but it is a unique way of providing different difficulty ratings in a computer game.

Another good feature is the training mode. You may play continuously until you get the hang of the game; it's as close to immortality as you'll get.

While the action is fast, I have seen faster. The game is still quite challenging, though.

Sound, Graphics, and Documentation

The graphics in this game are very similar to Adventure International's Eliminator, except for the display you get after destroying the bomb cache (something like Fourth of July fireworks). The graphics

"You may make custom landscapes to suit your ability. . . . This landscape editing takes a few minutes, but it is a unique way of providing different difficulty ratings."

ics are about as good as is possible on the TRS-80.

The sound is great; you get snappy little tunes at the beginning of each game and a triumphant number after blowing up the bomb cache. The only game program I have seen that compares with this game's sound is Voyage of the Valkyrie.

The documentation is better than it probably has to be. Many similar games use a one or two-page flyer-type instruction sheet. Penetrator's documentation is in booklet form and can be read in a couple of minutes.

Advice for Improvement

Although I enjoyed this game, I have

one suggestion for improvement; I didn't like having the thrust and fire control on the same key (right arrow). This prevents firing while thrusting and occasionally results in an unwanted thrust. Although I didn't use a joystick, I don't see how the fire/thrust method using one would be an improvement: To fire you jiggle the stick to the right and hold it continuously for thrust.

I would prefer using the enter or clear key as well for firing, though I don't see any easy way around this situation on the joystick.

Penetrator is a very well done game program and worth the asking price. ■

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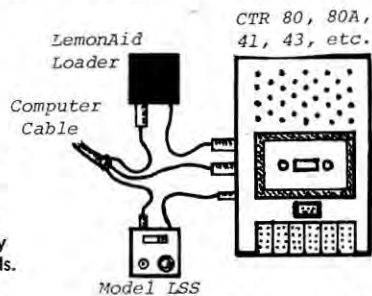
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Color Berserk
 Mark Data Products
 Mission Viejo, CA 92691
 \$24.95 cassette
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Cave Hunter
 Mark Data Products
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by **Kerry Leichtman**
 80 Micro staff

Neither Color Berserk nor Cave Hunter break any barriers in their use of the Color Computer's sound capability, nor do they startle you with graphic displays. But they are entertaining. After all, there's more to games than graphics and sound. There's action.

Cave Hunter

Cave Hunter's playing screen is a blue square maze (representing cave passages). You, the hunter, a flat four-legged

green crab-like creature, are positioned at the top of the maze over an opening. At the bottom of the maze are four gold treasures. Your mission is to, one at a time, retrieve the treasures and safely deposit them outside the opening at the top.

Of course there's competition. Not for the gold but for right-of-passage through the maze. Your competitors are also flat and crab-like. There are three of them, green, purple and orange. The three nasties work together to corner and snuff you out. When they do get you, your gold treasure is left at the scene of the snuff.

You have allies. There are four red boxes, called power deposits, in the maze. If you move your crab through one of

"Cave Hunter's strategy is twofold. The first. . . use your power deposits judiciously. Second. . . try to get the treasure as close to the top as possible. . ."

them, you become Super Crab! Your hunter turns from green to red. And while red you get to stomp the bad guys.

That's what I did at first, but there's no real advantage in doing that. Before you know it you're green again and the buggers are swarming all over you. It's a better idea to use the red armor as an opportunity to safely scoff your gold treasures to your lair at the top of the maze.

Cave Hunter's strategy is twofold. The first is obvious; use the power deposits judiciously. Second, if you're going to get snuffed, try to get the treasure as close to the top as possible so your next hunter won't have to go too far to retrieve it.

Color Berserk

In Color Berserk, the part you play is that of a human; a refreshing touch. You walk from room to room, each configured differently and with electrified walls, zapping hostile humpbacks. The humpbacks fire lasers at you. You return fire by pointing your joystick in the direction you want to shoot and pressing the fire button. The complication here is that pointing your joystick at your target also propels you toward it. The humpbacks dissolve slowly, so if you're too close you have to do some hasty backtracking while he goes "phifft."

Evil Orville follows you like a demented balloon throughout the game. There's nothing you can do about Orville; he's impervious to attack. Evil Orville, graphically speaking, is a floating smiley face. You know the kind: the round yellow face with the two black dot eyes and wide smile. The same face that appeared on every bumper sticker, every print and television ad, on beach towels, clothing and "Have a nice day" buttons. Just once I'd like the opportunity to blast that manic face with a laser. It would have been a nice touch to allow me that pleasure.

The graphics in Color Berserk are better than those in Cave Hunter. Although the graphics are not all that special, both games do have nicely done opening displays. The sound is not very exciting in either. Both games require joysticks: one for single play and two for doubles. They are not play-once-and-shelf-games. High scores take practice, and low scores are not tolerable. ■

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EPS-80 Word Processor
ETF-80 Electric Typing Fingers
Personal Micro Computers Inc.
 475 Ellis St.
 Mountain View, CA 94943
 \$999 (OEM) EPS-80
 \$495 (OEM) ETF-80

by John P. Mello Jr.
 80 Micro staff

For people who do a lot of writing, Personal Micro Computers is making an offer that's difficult to ignore: a word processor for under \$1,000.

The EPS-80 is a work-alike version of PMC's work-alike TRS-80 Model I, the PMC-80. However, the EPS system has 20K of ROM—12K containing Microsoft Basic and 8K with Michael Shrayner's Electric Pencil—and 48K of RAM.

The EPS-80 also contains a built-in high-speed cassette deck for tape saves and loads at 4,000 baud, more than 10 times faster than the TRS-80 Model I rate.

An eye-saving feature of the EPS-80 is its Zenith monitor with green phosphor screen, which can display 32 or 64 characters per line.

For printouts, the EPS-80 is advertised with either PMC's DMP-85 dot-matrix printer (a work-alike C. Itoh 8510/NEC 8023) or the EFT-80 actuator, which works with IBM-like typewriters. I tested only the actuator with a Silver Reed 213C typewriter.

Although tape-based word processors are the most inexpensive in today's market, they have major disadvantages. Loading a word-processing program at

“However, there is a disadvantage to a resident word-processing program: If you don't like it, you're stuck with it.”

300 baud is painfully slow. And before the advent of Color Computer word-processing, most good programs required a minimum of 32K of RAM. The EPS-80 addresses those disadvantages with its high-speed cassette deck and resident word-processing program.

I found the built-in fidelity audio recorder as fast as touted by PMC and experienced no bad loads during the three weeks I tested it. An attractive feature of the recorder is a volume level meter. It allows you to load tapes without hearing them. The ear-splitting whine of a tape being loaded may be music to some enthusiasts, but it's strictly audio torture to me.

Having Electric Pencil in ROM beats waiting three minutes for a 16K word-processing program to load. When you turn on the EPS-80, you get the message: (B)ASIC OR (E)LECTRIC PENCIL? Hit E and you're in Pencil.

However, there is a disadvantage to a resident word-processing program: If you don't like it, you're stuck with it. And since word-processing programs are always being updated, even if you start with state-of-the-art software, it won't be that way long. In the case of the EPS-80, it contains one version of Pencil, while a newer version, 2.0, is already on the market.

I found several things disconcerting about the version of Pencil in the PMC word processor:

- The blinking cursor is a constant source of aggravation.
- There are no centering and footer functions.
- Characters repeat themselves if a key is held down for more than half a second. In the course of typing, this creates a quasi-key-bounce effect.
- If you type too fast, you lose letters on inserts and word wraps.
- Having the down arrow as the control key for numerous functions is an awkward arrangement.
- All tabs are set eight spaces apart and cannot be altered.

On the hard output end of things, PMC's electric typing fingers required some patience to install. Two metal mounting pieces with adhesive on their bottoms are

placed on either side of the space bar. Two screws on the bottom of the actuator fit into the mounting pieces; two screws on the top rest on the metal ledge above the top row of typewriter keys. You must adjust the screws, so the plastic typing fingers are between .02-.08 inch above the typewriter keys.

After a certain amount of trial and error, I got the actuator to work and work faithfully, pumping out 12 characters per second. This may seem slow for people accustomed to fast dot-matrix printing, but once you compare the quality, you might find the wait worthwhile.

There are a few things to keep in mind when using the typing fingers. Left and right margins must be set manually. If you set the right margin too short, you will lose all the characters from the point the margin is hit to the point where the computer finds a carriage return or line feed. Also, the Silver Reed, like the IBM, will double space even when the single-space command is chosen. This is easily rectified by using SX instead of S1 when formatting. The SX command suppresses line feeds following carriage returns. This can also be accomplished by manipulating switches on the ETF.

One of the biggest drawbacks of the EPS-80 is the amount of radio frequency interference it emits. To my surprise (and my neighbor's chagrin), the word processor completely blocked out channels 4, 5 and 7, and distorted the picture on channel 2. It did not interfere with UHF stations.

I tried to limit the RFI. I wrapped the CPU in aluminum foil. I still got interference. Then I bought six aluminum deep roaster pans, formed a cocoon around the CPU, sewed the pans together with number 20 bailing wire, and grounded the wire to a radiator. That allowed me to get audio from the tv but the picture was still unrecognizable. And the neighbors still complained.

When I called PMC about this problem, one of their technical people explained that tv signals in my area may be weak. All the stations I receive originate in Boston, more than 60 miles away. So as a point of comparison, I brought home a Model III and Color Computer to see if I got RFI from them. I did, but not to the extent I did from the EPS-80.

Despite the drawbacks of the EPS-80, PMC deserves kudos for releasing a “serious” micro aimed at the low end of the market—especially in light of recent trends, which seem to demand a low-end micro be a game machine first and computer second. So if you intend to get into bargain-basement word processing, the EPS-80 deserves your attention. ■

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51 x 24 DISPLAY

The Color Computer is an incredibly powerful and versatile computer, but for text editing it has some major drawbacks. The small 32 character by 16 line screen format shows you too little of the text and, combined with its lack of lower case letters, bears little resemblance to the way text really looks on the page. Reverse video in place of lower case just adds confusion.

Telewriter eliminates these shortcomings with **no hardware modifications required**. By using software alone, Telewriter creates a new character set that has **real lower case letters**, and puts 24 lines of 51 characters on the screen. That's more on-screen characters than Apple II, Atari or TRS-80 Model III. That's more than double the Color Computer's standard display.

FULL SCREEN EDITOR

The Telewriter editor is designed for maximum ease of use. The commands are single key (or single key plus control key), fast, and easy to remember. There is no need to switch between insert modes and delete modes and cursor movement modes. You simply type. What you type is inserted into the text at the cursor, on the screen. What you see on the screen is always the current state of your text. You

can move quickly through the text with one key cursor movement in all 4 directions, or press the shift key simultaneously for fast, auto-repeat. You can jump to the top or bottom of the text, the beginning or end of a line, move forward or backward a page at a time, or scroll quickly up or down. When you type past the end of the line, the wordwrap feature moves you cleanly to the next.

... one of the best programs for the Color Computer I have seen . . .

— Color Computer News, Jan. 1982

You can copy, move or delete any size block of text, search repeatedly for any pattern of characters, then instantly delete it or replace it with another. Telewriter gives you a tab key, tells you how much space you have left in memory, and warns you when the buffer is full.

FORMAT FEATURES

When it comes time to print out the finished manuscript, Telewriter lets you specify: left, right, top, and bottom margins; line spacing and lines per page. These parameters can be set before printing or they can be dynamically modified during printing with simple format codes in the text.

... truly a state of the art word processor . . . outstanding in every respect.

— The RAINBOW, Jan. 1982

Telewriter will automatically number pages (if you want) and automatically center lines. It can chain print any number of text files from cassette or disk without user intervention. You can tell it to start a new page anywhere in the text, pause at the bottom of the page, and set the Baud rate to any value (so you can run your printer at top speed).

You can print all or any part of the text buffer, abort the printing at any point, and there is a "Typewriter" feature which allows you to type straight to your printer. Because Telewriter lets you output numeric control codes directly (either from the menu or during printing), it works with any printer. There's even a special driver for the Epson MX-80 that lets you simply select any of its 12 fonts and do underlining with a single underline character.

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Because Telewriter makes using cassette almost painless, you can still have a powerful word processor without the major additional cost of a disk. The advanced cassette handler will search in the forward direction till it finds the first valid file, so there's no need to keep retying a load command when you are lost in your tape. The Verify command checks your cassette saves to make sure they're good. You can save all or any part of the text buffer to disk or cassette and you can append pre-existing files from either medium to what you have in the buffer already.

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80 REVIEWS

Snapp Spooler

Snapp Inc.

3719 Mantell Ave.

Cincinnati, OH 45236

Models I, II, III

\$100

by Alan Moyer

Snapp Inc. calls this product "A Performance Enhancement Software Package." I thought that an excellent description of what a spooler is and does. Spooler stands for simultaneous peripheral operations on-line, and in the case of this printer spooler it means that the computer and printer work at the same time. Therefore system performance (and in most cases, program speed) is enhanced by making the computer and printer more efficient.

Whether you need a printer spooler depends on the type of computer work you do. If you're a hobbyist, a spooler is an extra nicety. If your plans are business computing with printouts a spooler is nearly essential.

My wife and I use a production program to generate weekly reports. With each program run, the machine computes, prints, computes, prints, and so on several times. Using a printer spooler we have gained 15-200 percent in execution time without making any program changes. This gain is significant as our business increases. We estimate another 10 percent gain when the program is modified to take advantage of using the spooler. (Of course, gains with other programs will differ.)

Another program we use makes frequent disk accesses with printing in-between, typical of any mailing-list program. Using the spooler with this program "as-is," we noticed a 25-percent speed increase due to the overlapping of printing and disk accessing. We were impressed

with the speed increase and pleased that our programs run unmodified. Snapp points out that programs that POKE data directly to the printer address (37E8H) will scramble the output and need to be changed, since the spooler continually uses the printer address.

The Snapp Spooler is available for the Models I, II and III. The Model I version comes with 42 different spooler versions. Each version is geared to a specific memory size/buffer size and automatically initializes itself and sets memory size. Some versions allow high memory routines to remain unaffected. The biggest problem is choosing which one to use. What buffer size you choose depends upon how much you use the printer and how much memory you can give up to the print buffer. With our production program running on a 48K machine, we started with a 4K print buffer. As need for more variables memory increased, we used a 2K buffer size with no noticeable speed loss.

If you own a Line Printer III with the motor on/off hardware installed, Snapp includes a program that patches all 42 versions of the spooler to operate this feature. Early versions of NEWDOS didn't respect the top of memory pointers, so Snapp includes a patching program that applies Apparat's recommended patch to NEWDOS and corrects the problem.

The spooler incorporates the Radio Shack LPC driver, which is needed to run with their printers. (This feature modifies the system to ignore LPRINT commands without print data following it.)

We use a Line Printer VI and wanted to use the graphics characters, but found that the spooler filtered them out (associated with the LPC feature). Bob Snapp quickly provided a patch to correct the problem and will provide it for other users with similar needs. I've found this customer support typical of Snapp Inc., and refreshing in the software field. ■

SFINKS 3.0

William Fink

Suite 24B

1105 N. Main St.

Gainesville, FL 32601

\$39.95

by Joel Benjamin

The nice thing about microcomputer chess programs is they play when you want them to. When you've had enough, that's okay with them too. I've been searching around for just such an obliging chess opponent to run on my Model I TRS-80.

Although I've played with a number of

micro-chess programs, most of them play so poorly or inconsistently that I lost interest pretty fast. Imagine playing 15 moves in a closely contested game only to have the program give away its bishop for no compensation. These frustrating experiences helped me to appreciate SFINKS 3.0.

SFINKS 3.0, written by Bill Fink, comes on a copy protected disk or cassette for either the Model I or III TRS-80 with at least 32K of memory.

The first thing you notice about the game is the clear unambiguous graphics portrayal of the pieces. The low-density graphics display of the TRS-80 presents

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an almost insurmountable obstacle to portraying chess pieces on the screen without distorting their identity, color, or the color of the square upon which they're resting. Many strategies have been used to solve this problem but SFINKS has the least distortion of any TRS-80 chess graphics I've seen.

If you are interested in a printout of the moves in your upcoming game, put your printer on line and the moves are printed out as they are played. If you put your tape recorder on record and plug in an earphone, you'll hear some beeps every time it's your turn to move. This is nice if you want to read a book, write a poem, or design a cyclotron while you're waiting for SFINKS to move.

You begin the chess game by choosing your color and level you'd like SFINKS to play. Each level corresponds to a maximum individual move time. There are nine levels. Level 1 is speed chess with the program taking only six seconds per move. Level 7 gives SFINKS a maximum of two minutes and 50 seconds for each move. Level 9 is used for analysis and postal chess. It analyzes continuously until you tell it to make its move.

You indicate your move in standard European algebraic notation. Columns are labeled with the letters A through H and rows with the digits 1-8. White's queen rook initially rests on the square A1, and black's king rook is on H8. When you move, indicate the square from which and to which you're moving. For example, the first move in a king's pawn opening is E2-E4.

To help those who are used to the P-K4-style notation, the edge squares have little digits and letters embedded in them. Another thoughtful touch is the program's automatic supplying the dash in each of our moves. Press E2 and voila, a dash appears, whereupon you enter the destination square and then press enter. If you change your mind before pressing enter, clear erases the entry leaving time to input a more sensible move.

The chess board uses three quarters of the screen. The left side of the screen displays the level of play, the last 12 moves, the move currently considered best by SFINKS, and the time being taken for the current move. The time display gives you some indication of how soon SFINKS will make its move.

You can force SFINKS to immediately make the move it has so far determined to be the best by pressing the @ key. This saves a lot of time and gives you a greater measure of control over the course of the game. The move that SFINKS makes when you press the @ key is usually, but not always, the move it is displaying. This

is a drawback because you don't know for sure what its response will be. The reason this happens is because the display doesn't distinguish between a move already determined to be best and a move being considered.

If you press S when it's your turn, SFINKS recommends a move. If you want to make the move it displays, press enter. The move is made but, unfortunately, the board display remains unchanged until SFINKS makes its own move. This same thing occurs any time your move has been anticipated by SFINKS. It is a bit annoying having to stare at a board that has not been updated. If you'd rather make a move other than the one SFINKS recommends, press clear and enter your move. This is a very helpful and instructive feature. You'd be amazed at how many good moves you overlook that SFINKS points out. When your move is more or less forced, pressing S saves you from having to press four keys to enter your move.

SFINKS has a special edit mode that allows you to take a move back, change levels or colors, or set up any position. You can start from the current position or from a clear board if you wish. The editing commands are easy and straightforward; just enter the square and the piece that will go there. For example, to place a white queen on C3, enter C3-WQ. To remove this queen from this square enter C3.

SFINKS plays the strongest game I've encountered on a micro. I would estimate

its rating at 1,700 when it takes a maximum of about two minutes per move in levels 5 through 7. One reason for this strength beside the sophisticated move-choosing algorithm is that it thinks on the opponent's move. This enables it to examine many more moves than it would ordinarily be able to.

Although SFINKS is a remarkably good micro-chess program, there are a number of features I wish it had. I would like to be able to decide to print out a game after it has been played rather than having to print out each move as it is played. It should be possible to print out a position as well as a list of moves. The display should be updated every time a move is made whether or not it has been anticipated.

Two moves should be displayed while SFINKS is thinking—the move it is considering and the move it has determined is best. The latter move would be definitely made if the @ key is pressed. The chess clock should keep track of the cumulative game time as well as the time for each move. It would be nice if all the moves could be stored in memory so the course of the game could be retraced and analyzed. A save-to-disk option would enable a game to be continued or analyzed at a future date.

Regardless of my wish to see SFINKS do more than it does already, what it does now is quite remarkable. I highly recommend it as a good chess opponent and a learning tool to improve your game. ■

Autobasic
Schneider Enterprises
1252 N. Brownslake Road
Burlington, WI 53105
\$195

by Bruce Powel Douglass

Autobasic is a Basic program that writes Basic programs. You would think that for \$195 the program would solve all your programming problems with a minimum of effort. You would be wrong.

In spite of the manual's debilitating limitations, the program has potential.

Autobasic comes on disk with three programs, ABAS, ABRUN and SUBR and a minimal DOSPLUS operating system. This is nice for TRSDOS users, since TBASIC allows almost 40K of useable RAM for Basic.

ABAS is the main program, and to run it, you load TBASIC (Tiny Basic) and run ABAS. It presents you with a menu of several options, including: entering equations from keyboard; loading program elements from disk, saving program elements to

disk, correcting the elements, reordering the elements, reordering the equations, reordering the equations for a subroutine, and entering a recursive conditional structure.

The program accepts Basic equations as keyboard input and writes the program using these. Autobasic distinguishes between simple and array equations; the former contain all simple variables and the latter contain one or more arrays.

ABAS writes the file to disk and ABRUN compiles it into Basic form. ABRUN routes all output to the printer, screen or to a disk file. Once this file is read in (from PFILE), it is operated on and then written to disk (in WFILE). Then, the created program is loaded and executed.

The program puts in a Let statement for assignment statements making it difficult to use the finished program. For example, if you are trying to insert a DEFFN statement, you'll get a syntax error on "LET DEF FN F(X) =".

All array equations are placed inside a loop like:

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PAGE END allows the user to discover where pages will end, when they are printed, without actually printing.



Special commands allow the printing of a single page anywhere in the text, with correct page number, footer, and header, without the use of copy-markers. A special command will reset the default format parameters, to allow use of copy-markers without having to insert a format line to adjust for format changes.

FOLIO format enables one to produce print-outs in two or three columns per page, as for newsletters, indices, etc. FOOTNOTES, footers, headers, and PAGE END will work correctly.

Access to disk directory and ability to kill files from within DAISY, without losing any text.

Special code in the text will stop printing until user restarts it; use it to change print wheels. One can insert up to 60 characters of text at this point, as for form letters.

Special print-outs allow one to keep records of DAISY commands used to create a certain effect.

Flaws in SCRIPTSIT's widow suppress are corrected. SCRIPTSIT's problem with typing two spaces after a period is fixed. SCRIPTSIT's scrolling speed is doubled, with instructions for user modification.

CAUTIOUS BUYERS: We invite you to buy the DAISY manual. This is without a doubt one of the clearest, most well-written manuals ever produced for **any** piece of software. Over 110 pages. **Indexed.** In a custom 3-ring binder. We will credit the full \$10.00 price when you decide to buy DAISY.

DAISY REQUIRES: A TRS-80 Model I or Model III with 48K, at least one disk drive, and a copy of **Model I SCRIPTSIT.** Please specify which machine and how many drives in your system.

QWERTY 3.0 is also available for the Centronics 737, 739, and Lineprinter IV.

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```
1000 FOR X=1TO Z
1010 LET A(X)=B(X)+C
1020 NEXT
```

which is most often not efficient.

There is no simple way to enter iterative For...Next schemes for non-array equations within Autobasic or for grouping the array equations within a single For...Next loop.

The conditional format only allows comparison of a variable to a constant. The created programs are not written in a time-efficient or memory-efficient manner for iterative programs, and you cannot use the program flexibly to create such a structure.

The program lets you write subroutines fairly easily, and asks you how many times you want to run each subroutine? The manual didn't mention this query at all. The first time I read it I thought it was asking if I wanted to iterate each time the subroutine was called. Actually, it is asking for the number of GOSUBs to put in the program referencing this subroutine. After this query, you are asked for the equation numbers after which this subroutine call is to be made. There is no simple way to review the equations in their current format, since if you enter an editing function, it forgets its previous state of existence in terms of the new ordering of the equations or the subroutine calls.

This is a problem with the equations' reordering. The program allows you to reorder these equations but not to reorder and place in a subroutine. If you do, it forgets its new order. If you enter the subroutine first, when you reorder your program it

forgets that you have a subroutine.

Autobasic has some good features that, if properly implemented, are a great addition for a programmer to write error-free code.

An example of a good routine is the SUBR which lets you enter subroutines. Since you will have trouble matching the variables, this routine allows a global editor to change all occurrences of the variable to some other variable, and will not make these changes inside of Basic reserved words. You can, therefore, change T to G without changing GOTO to GOGO. As implemented, you can use a full-screen editor better for Basic than Autobasic (and much cheaper, too), but if Autobasic is rewritten so that it is a useable product, you will appreciate this feature.

You can keep a subroutine library on disk in a sequential file and use it with your main programs. The SUBR program lets you list the names of these subroutines and their statements. You can then have ABAS merge them with the created program for a finished product.

A Solid 1 Manual

On a scale from 1 to 10, the manual rates a solid 1. It was totally unreferenced, with no table of contents, no index, and no page numbers. The manual is poorly written and difficult to read.

The manual is about 45 pages long (about 30 pages are dedicated to examples), all uppercase, and a poor xerox of dot-matrix print. The lines can be read, but they require effort.

The programs are menu driven, and the manual prints a paragraph or two on each

menu option. Sometimes the information is adequate to operate the menu option, but more often it is not.

The 30 pages of examples are easy to follow, but that doesn't alleviate the problem of using options not mentioned in the manual or using them in a different order than the examples show.

The manual also neglects a sufficient discussion of the DOS that accompanies the ABAS program. For example, how do you return to DOS? CMD"S", ala TRSDOS, won't do it. This information is required in such a manual, but in this one it is omitted.

Limitations

Only single-dimensioned array variables are allowed. Autobasic does not support DEF FN, and I/O is not supported to disk or cassette. The program is also not error-trapped; entering a routine out of sequence (the manual doesn't mention the correct sequence) often leads to re-dimensioned array errors causing the program to quit and exit to command mode, and entering invalid data is not checked.

The program contains some logic errors, such as: the reordering doesn't work under some circumstances, and the program incorrectly parses some statements with parentheses, such as $df = (d1 - d2)/h$, and thinks that this is an array equation.

The utility of such a program rests in the ability of the user to produce useable code, which requires that his questions be answered quickly and completely by the program documentation.

This was a frustrating product to review. It was difficult to operate the program

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232

adequately, mostly due to the quality of the documentation. If a programmer like myself has trouble following this program, what problems will a novice have?

Learning to use Autobasic will not be pleasant. I can write code faster with a full-screen editor such as XBE (Computer Applications Unlimited) or Edit (Allen Gelder Software) than I can using Autobasic, particularly with its limitations.

The program has great potential if these major problems are removed. The approach taken by Mr. Schneider for Autobasic is fine and potentially useful; but the limitations are so debilitating that I cannot recommend its purchase. It is not a professional product and certainly not worth \$195 (\$50 would be reasonable if the manual was totally rewritten). I say that because the user's logic-flow control is limited, and most of the time, he will have to edit the programs. I hope these suggestions can be incorporated into an Autobasic revision. With some work, this could be an excellent product. ■

DSMBLR
Misosys
 5904 Edgehill Dr.
 Alexandria, VA 22303
 \$20 disk
 \$15 cassette

by Tim Knight

The best thing about DSMBLR is its wide variety of commands and flexibility. Even the tape version came with

"The best thing about DSMBLR is its wide variety of commands and flexibility. Even the tape version came with three programs..."

three programs to suit the needs of different memory sizes.

I reviewed the tape version, and found it to be worth much more than the modest price.

The commands are broken into three groups: control, output and special. The control commands include the following:

● **B**—Basic, returns you to the Basic Ready prompt.

● **C**—Clear, completely clears the symbol table of the disassembler.

● **E**—Equate, toggles the equate statements (EQU) on and off—an unusual feature for a disassembler.

● **S**—System, similar to Basic's System command, S loads a system (machine language) tape, finds the start and end addresses, and readies the program for disassembly.

● **T**—Test, similar to the S command, except merely the start and end addresses are loaded into memory.

The output commands are even more thorough, and include:

● **S**—Outputs the disassembled listing to the screen. (The output on all of these functions, including S, outputs memory address, contents of memory, line number, symbolic table, disassembled instruction, and character output.)

● **T**—Tape output. This outputs the source code to tape for later use and possibly modification using an editor/assembler.

● **P**—Printer output. Outputs the disassembled listing to a printer. The printer output titles and formats pages very nicely!

The special commands are:

● **Clear**—The logical interrupt for any prompt.

● **Break**—Interrupts command request entries.

● **Shift@**—As in Basic, this stops a continuous scroll (listing).

The only shortcoming I see in this program is that the data elements and ASCII strings are transformed into Z80 instructions. Data will be interpreted as something else, making modification necessary. This is not serious and will not present a problem to most programmers.

The program and documentation were made specifically for those with a knowledge of machine language. If you have this knowledge, are on a tight budget, and have not been able to find a good disassembler, this is the program for you. DSMBLR is top quality for the Model I or Model III tape or disk user. I recommend it to any serious machine-language programmer. ■

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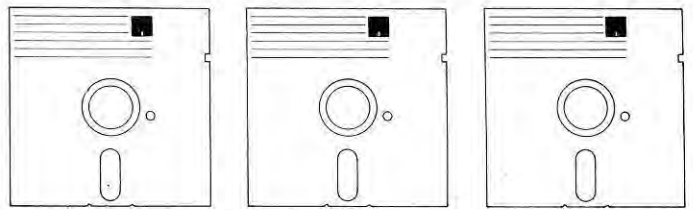
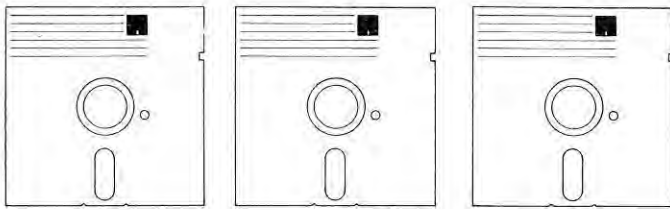
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Review Digest

Telematic Society: A Challenge for Tomorrow, James Martin, Prentice-Hall, 244 pp., \$12.95;

The Information Society as Post Industrial Society, Yoneji Masuda, World Futures Society, 171 pp., \$12.50.

"When read together. . . *Telematic Society* and *The Information Society* present an intriguing look into the future of telecommunications and computers from two slightly different perspectives. Martin concentrates on the nuts, bolts, and hardware. . . Masuda describes a plan for a new 'information society' . . . a 'Computopia' or Computer Utopia. Both authors say the primary barrier is not technical, but political, social, economic, and lack of willingness to do it." *Personal Computing*, May, p. 143.

Snapp II: Machine Language Extensions, Snapp-Ware, 3719 Mantell Ave., Cincinnati, OH 45326.

"If you regularly write programs using TRS-80 Model II Basic, you will probably find one or more of Bob Snapp's utility packages useful to you." *Infoworld*, May 31, p. 37.

Stocks and Bonds, Model I & III, Avalon Hill, 4517 Harford Rd., Baltimore, MD 21214.

"Stocks and Bonds is a stock-market-simulation game that. . . uses fictitious securities that are too superficially described to interest an adult with actual market experience." *Infoworld*, June 7, p. 44.

Special Delivery, Model I & III, Software Concepts, Dallas, TX 75230.

" . . . the merge process is the main reason that Special Delivery is more than just an ordinary mailing-list program. . . It takes some practice to become familiar with. . . but the results are worth it." *Creative Computing*, June, p. 84.

Jabbertalky, Models I & III, Automated Simulations Inc., P.O. Box 4247, Mountain View, CA 94040.

"Jabbertalky plunges you into an exploration of the syntactic and semantic possibilities of the English language. . . grammar. It is one of the most powerful educational-tool programs I have yet seen. . ." *Classroom Computer News*, May/June, p. 66.

Ribbit, Models I & III, Piccadilly Software.

"Piccadilly Software's Ribbit is the first of what I'm sure will be an army of imitations of the popular Frogger arcade game. . . Unfortunately Ribbit is a poor imitation (perhaps intentionally), whose graphics and keyboard action leave much to be desired." *Infoworld*, June 14, p. 25.

Colne Robotics Armroid, Model I, Colne Robotics, 207 NE 33rd St., Fort Lauderdale, FL 33334.

"The Armroid is a low-cost manipulator with good dexterity and maneuverability. . . A machine-language cassette for the Model I, Level II comes with the Armroid. . . The kit form, besides being less expensive, enables the person assembling the device to understand the principles of the robot." *Byte*, May, p. 286.

Copyart, Model I or III, Simutek Computer Products, 4897 East Speedway Blvd., Tucson, AZ 85712.

"Copyart is a word processor with some fancy graphic capabilities. . . All of you who have had a love-hate relationship with Radio Shack's Scripsit. . . should be delighted with Copyart, for it has all of Scripsit's virtues with none of its faults or limitations." *Infoworld*, June 28, p. 72.

Basic BASIC—English Dictionary: For the Apple, PET, and TRS-80, Larry Noonan, Dillithium Press, Beaverton, OR, 150 pp., \$10.95.

"*The Basic BASIC-English Dictionary* is a welcome reference guide that defines the minor and major differences between the BASICs used in. . . the Apple II, the PET, and the TRS-80 Models I and II. It also explains how readers can easily modify programs. . ." *Personal Computing*, July, p. 150.

Using Programmable Calculators for Business, C. Louis Hohenstein, John Wiley and Sons Inc., 605 3rd Ave., NY, NY 10016, 296 pp., \$10.95.

"As a microcomputer (TRS-80 Model I) and calculator (Hewlett-Packard HP-38E) user, I found *Using Programmable Calculators for Business* to be a refreshing and practical manual for saving time and making money." *Desktop Computing*, July, p. 150.

Tawala's Last Redoubt, Model I & III, Broderbund Software, 1938 Fourth St., San Rafael, CA 94901.

"Tawala's Redoubt. . . is the fourth and most challenging adventure so far in the Galactic Saga series. I highly recommend this game for those with a daring and resourceful will, for those who are able to see the forest because of the trees, and for those who can remain undaunted by an occasional defeat." *Byte*, June, p. 235.

The Mind's I, Edited by Douglas R. Hofstadter and Daniel C. Dennett, Basic Books Inc., 501 pp., hardcover \$15.50.

"The Mind's I is charming, thought provoking, fanciful, and sometimes frightening. . . The book starts off slowly but gains momentum as it progresses from defining what is meant by *self*, to discussing the concept of soul, to integrating the working of the mind with computer software, and finally to arguing back and forth about the notion of free will. . . The combination of Hofstadter, a mathematician and computer scientist, and Dennett, a philosopher, makes for a truly unique dynamism." *Popular Computing*, May, p. 108.

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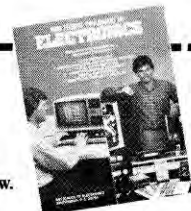
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Who's got what and which one's for you.

Word Processing— An In-Depth Look

Dan Robinson
1625 Higgins Way
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MODEL I / III



*Dan Robinson has toiled for several months compiling what we consider the definitive article on word processing for the TRS-80 Models I and III. We have divided the article into five sections: an introduction, CP/M-based programs, higher-priced programs such as *Scriptit* and *Newsprint*, lower-priced programs, and spelling checkers. There are also a few related odds and ends thrown in. We hope you find this piece informative.—Eds.*

Word processing is the drudge remover of written communication. Much of our correspondence, particularly in business, is highly repetitive. (Dear Mr. Smith. . . Thank you for your order of the 25th. . . Dear Ms. Jones. . . Our records indicate that your payment is past due. . .) A word processor permits creation of a standard letter for these applications, changing only the few words applicable to the particular communication.

Furthermore, word processing makes even the hunt-'n-peck typist fearless. Corrections are painless—no more correction tape, no more razor-blading the ditto master or daubing fluid on the stencil, no more erasing six smudged carbons with a metal shield between them, and no more fear of saying to your secretary, "Would you add 'the meeting is 9 a.m. Friday' and retype the letter?"

A word processor lets you delete any-

thing from a character to a paragraph, or to relocate or insert (try *that* on a typewriter). The text may be saved on disk or tape for later use, or may be printed with a number of options.

Some word processors, such as those written in Basic, are limited to a specific number of characters on each line and you must edit line by line. Most programs are character oriented, with a constant stream of letters and symbols. Some of these are presented on the screen in a formatted presentation exactly as they appear in the printed text complete with right-justification.

Since one of the main purposes of word processing is to conserve time in written communication, most programs are written for disk systems. Those written for tape aim at limited-memory computers and accommodate fewer features.

A number of popular word processors have spawned commercial patches to give them added capabilities. Others already have these features, and can send codes to smart printers that change type fonts, provide subscript and superscript, provide boldface headings, and so on. A few even create an index or table of contents of lengthy documents.

Such exotic capabilities are not for everyone. Added features mean added cost, less text memory available, more complex commands to remember, and usually slower operation. The word processor that is

capable of multi-chapter technical manuals or a graduate school thesis is not necessarily the best for someone who has a large volume of one or two-page letters to produce. Others must tailor their choice to meet their special requirements.

Still another factor in the selection is the availability of support software. Some word processing programs are compatible with software that personalizes a form letter and integrates it with a mailing list. Others compensate for those who can't spell; the program checks it for you.

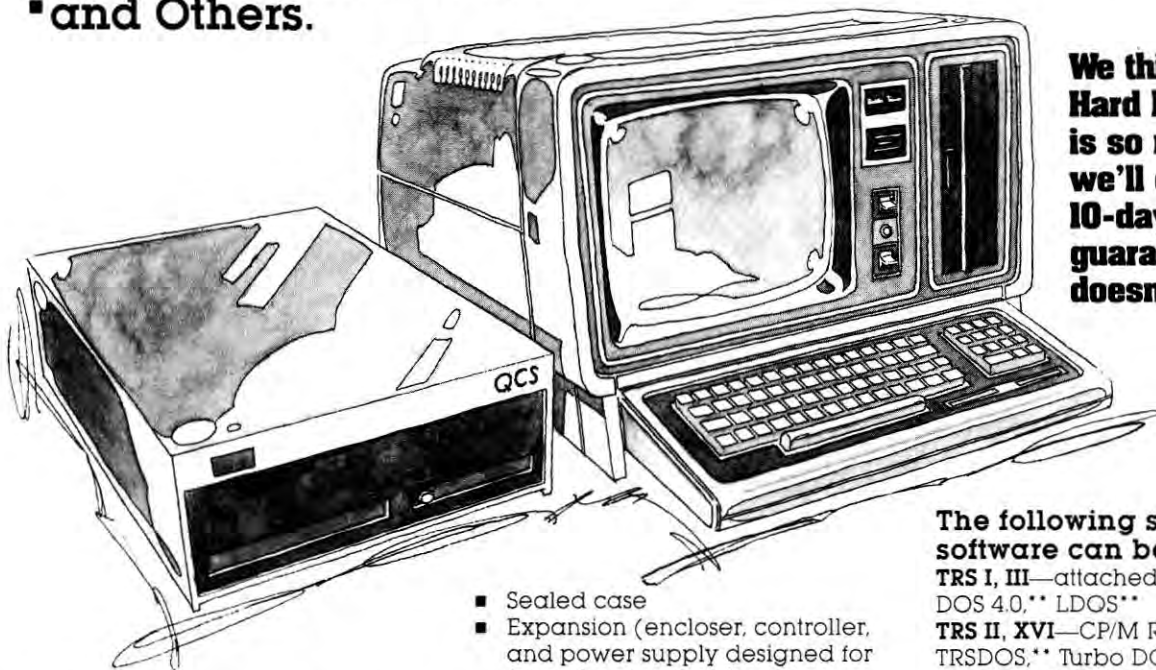
CP/M is the operating system of business, and its word processing programs are in a category by themselves. All others can be divided into categories that include the high-priced, full-function word processors; medium-priced programs with the most often needed capabilities; and the budget-priced software for limited use. All of them deserve a niche on the software shelf.

Which One for Me?

Choosing the best one for you is the hard part. Word processing programs are complex, and the cost of putting out a big program is enough to keep weak ones off the market. The choice is based on cost, features, and personal preferences.

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Glossary of Word Processing Terms

Overtyping: Most corrections are made by moving the cursor to the desired location and typing over the text to be corrected.

Cursor: Cursor movement to the area to be worked on is generally done with the arrow keys. Some word processors can also move the cursor forward or backward by word, sentence or paragraph or to the occurrence of a specified character or symbol.

Scrolling: Since the text is seldom small enough to fit on the 16 lines available on the TRS-80's monitor screen, the word processor must contain commands to scroll the text into the viewing area, both forward and backward. Some permit a quick jump to the beginning or to the end of the text, and some move an entire screen at a time.

Wraparound: If a word is too long to fit on the current line, wraparound places the word on the next line of the video screen.

The popularity of Wordstar is such that if you were to hire an employee with word processing experience on a micro, that experience would probably be with Wordstar. On top of this is the mutual support that the Micropro family provides: Spellstar, Mailmerge, Datastar and others.

In standard TRS-80 programs, my choice would be Electric Pencil 2 if the task is routine letter writing, for no program is easier to learn or simpler to use. Scripsit fans will find that Flextext is probably the best enhancement program available unless they need to create the footnotes and scientific formulae that Qwerty provides.

For more ambitious word processing, such as manuals and books, Lazy Writer enhanced with LZ Patcher is a good choice, although the automatic indexing of Newsprint makes it a close contest. If graphics are included in your word processing requirements, nothing can touch Copyart.

In the low-price market, cassette Scripsit would be my pick, although if the budget is really tight you might consider Wordslinger.

One comment on customer support: Being a reviewer, I don't imagine that I was always treated the same I would have been as a customer. However, some gave outstanding support and I'm certain by their attitudes that they treat their customers the same. The list includes the producers of Copyart, Newsprint, Electric Webster, Hexspell 2, Lazy Writer, Electric Pencil 2, Grammatik and Xtra Special Delivery. With these firms, you won't be forgotten the moment your check has been cashed. ■

Block Moves: Entire blocks of text may be marked and moved to another location, deleted or duplicated. Some word processing programs can accommodate a number of blocks at one time, allowing exchanges or a total reordering of the text.

Search: The global search function locates the place in the text of a specified string of characters. If a standard letter has a string of "Name," each occurrence is found by the search function of the program. An expansion of this capability is the search-and-replace function that locates any given number of (or all) occurrences of a string of characters and replaces it with another. Thus "Name" can be changed to "Mr. Smith" throughout the text with a single command.

Tabs: Tabs may be set to align columnar data in some word processing programs.

Video Width: The width of the video display, or window, may be changed so the text is seen much as it appears in the printed text. This is particularly useful when data is presented in columnar form or when hyphens are used.

Hyphens: Some word processing programs support conditional, or soft, hyphens; if the entire word will not fit on the printed line, the word is broken at the conditional hyphen location and a hyphen printed. If the entire word will fit on the line, the soft hyphen is ignored.

Unbreakable Spaces: If an unbreakable space, say, between a person's initials and his name, is specified, the entire name appears on the next printed line if there is insufficient room for it on the line above.

Margins: Left and right margins may be specified, as well as the number of blank lines left at the top and bottom of each page.

Headers and Footers: A header appears at the top of each page of printed text while a footer is at the bottom. They are useful as titles and may contain such information as the report date or department issuing the document. They often include chapter headings and page numbers. Usually an option exists to print them on odd, even or on all pages much as they might appear in a book. Formats can usually be changed in conjunction with headers or footers to adjust the margins.

Indentation: If supported, a specified number of blank lines appear between paragraphs and the new text is indented. The program may include reverse indentation which permits a title or number with the adjacent block of text aligned inward, as required in an outline.

Comment Lines: Lines may be included in the text as notes or instructions to the operator that are not normally printed.

Control Codes: The program may support control codes to use such special printer abilities as condensed printing, italic or double-wide fonts, boldface type or graphic characters.

Widow Lines: You don't want to end a page with the first line of a new paragraph or begin one with the last partial line of a paragraph. Some word processing programs let you specify how many such lines are acceptable.

Justification: A program usually offers right-justification, where additional spaces are added within the line to provide even margins on both sides. Some also provide an even margin on the right with a ragged left edge, as in some poetry. Or the text may remain unjustified. A few programs take on the ambitious task of justifying proportional font printing. Some center a line or block of text horizontally, and may center text vertically as well.

Chaining: A word processing program may be able to chain files so a large body of text, such as a technical manual, may be printed without interruption of page numbers or without the need to repeatedly specify headers, footers or print formats.

Formats: The program must control the appearance of the printed text, letting you specify items such as the number of lines to be printed on each page, the width of text, and single or multiple spacing.

File Handling: A word processing program should be able to save and load a file using cassette or disk. The ability to read a disk's directory, determine its free space, and kill old files to make room for new is important.

Printing: The word processing program always supports a parallel (Centronics) printer. Some also operate through the RS-232 port to operate serial printers or function with the popular Small Systems Software TRS-232 printer driver through the cassette port.

MULTI-USER OASIS HAS THE FEATURES PROS DEMAND. READ WHY.

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Model I/III Word Processing—CP/M

CP/M is the operating system of business because CP/M (Control Program for Microprocessors) was written by Digital Research and based on the 8080 central processing chip. The 8080, like the 8008 before it, is an ancestor of the Z80, which is the heart of many present-generation microcomputers, including the TRS-80. Since the Z80 chip was designed to be upward compatible with its predecessors—it accepts their older instructions as well as its own newer ones—CP/M can handle yesterday's software as well as tomorrow's.

CP/M instructions begin at address zero, and to function on the Model I or Model III, special hardware is needed to skip the first 16K of read-only memory where Basic resides. Since the TRS-80 is memory mapped, the device must also re-reference the keyboard, video display and the disk controller chip.

The device used to inspect Wordstar was Omikron's Mapper I. The Mapper simply plugs into the Z80 socket within the keyboard unit. After turning on your computer or resetting, the user is provided with a choice of CP/M or TRS-80 modes. In the TRS-80 mode, the computer acts as before, while in the CP/M mode the re-referencing takes place so the CP/M programs function up to the 48K limit of the computer.

The Omikron package is priced at \$399, which includes not only the Mapper I but also Wordstar, CBASIC, CP/M 2.2 and MBASIC-80. The software package alone totals \$1,232 at retail prices, so the Omikron package provides a bargain entry into CP/M.

Wordstar
Micropro International
 1299 Fourth St.
 San Rafael, CA 94901

Wordstar is written for business where

MODEL I / III

time—literally—is money. To handle large bodies of text, portions of documents are read to or from a file during the text entry or editing, and the size of a file is limited only by the capacity of the disk. The printing is normally accomplished from the disk; spooling permits the computer to perform other tasks while the printing is being accomplished.

Wordstar permits a great deal of control over the word processing function. For example, 18 commands exist for cursor movement: right or left one character or word, to the top or bottom of the screen or to either end of the file, up or down a line, to the beginning or end of a marked block, to the right or left end of a video line, to the beginning of the last find/replace, to the position prior to the previous command, or to one of 10 marked positions in the text file. Frequently used commands take two keystrokes, but most require three: holding the down-arrow control key while pressing Q and then E moves the cursor to the top of the screen.

Learning so many commands would be a major chore were it not for the on-screen help menu. The menu details the major controls and identifies other help menus that may be called up when needed. The level of help may be set so the experienced operator has a full screen for text, calling for assistance only when needed.

The top of the display shows the current page and line number on which the operator is working together with the cursor location on the line. A ruler identifies margins and tab stops, and a dashed line appears at page breaks.

Editing commands include deletions of a character right or left of the cursor, a word, or an entire line. Deletions may also be made from the cursor to the beginning or end of the line. Overtyping makes corrections, and an insert mode may be toggled.

The display is within the margins in a justified form much as it appears in print. If an insert has expanded a line beyond the screen edge or if a print format wider than the screen is used, a plus sign indicates that more text remains. When the paragraph is reformed, the cursor stops at a word that extends beyond the margins to provide an opportunity to insert a homograph or soft hyphen. If needed, the word is broken and the hyphen displayed; otherwise the unhyphenated word appears on the printed line. If no hyphen is inserted, the word drops to the next line.

Scrolling of the display is by line or screen in either direction, and like most commands may be set to repeat.

Blocks of text may be marked and then moved, copied or deleted. Marked blocks may also be read into a file to be included in other text files, or such blocks may be reaccessed into the current file. Strings of characters may be located, optionally independent of whether they are upper or lowercase or whether they are a partial or a whole word.



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The strings may be replaced under individual control for a specified number of occurrences, or automatically throughout the file.

Formatting commands embedded within the text can set the top and bottom margins. Lines may be centered, right-justified, or may remain uneven. Tabs may be set and cleared, paragraph indentation specified, and line spacing set from one to nine.

Wordstar permits conditional page breaks to keep a body of text together on one page. It supports sub and superscripts, as well as boldface, double-strike, underlining, non-breakable spaces, and non-printing comment lines.

The program permits displaying text with strikeout should it be necessary to depict revised data. An overstrike capability allows printing one character on top of another to create special symbols or foreign-language accent marks.

Page numbers may be specified or omitted on certain pages such as chapter headings. Micro-justification is supported for proportional-spaced daisy-wheel printers, and four user commands may be patched to call on special printer functions.

Number tabs that align decimal points in a column may be set. Columnar block moves are supported, providing a unique capability to print two narrow columns of text side by side such as in an index, technical manual or newsletter.

Wordstar includes commands to integrate Spellstar, Mailmerge and Calcstar.

"Documentation is hefty..."

Files may be chained for continuous printing, and if desired, only a specified range of pages may be printed.

Documentation is hefty and only fairly readable, but a new *Wordstar Training Manual* has been produced, and a quick-reference card and extensive help files ease the task of learning this comprehensive word processing program. Wordstar is still the standard for business word processing.

Mailmerge and Supersort Micropro International

Mailmerge is a companion program to Wordstar, designed to integrate data into form letters. It can be used for a direct-mail advertising blitz with lists such as those sold by Ma Bell, or with your own customer roster, to ease the burden of repetitive correspondence.

Mailmerge takes information from a data file and inserts it into a text file while it is being printed. A customer's name or address may be included in a standard letter anywhere it is required, the letter printed, and

then the next customer is processed. Mailmerge's insertions automatically reformat paragraphs so variable input data doesn't alter margins, justification and the like. Insertions may be from disk or from the keyboard, and can range from a single word to an entire file. Material may also be noted at the beginning of the text for inclusion at multiple locations during printing. User prompts ask for keyboard input, and multiple copies of a document may be specified.

In printing form letters, the file might begin something like this:

```
.DF ADDRESS1.DAT
.RV COMPANY,ADDR1,CITY,STATE,ZIP,NAME
.AV DATE
```

&DATE&

```
&COMPANY&
&ADDR&
&CITY&,&STATE&
&ZIP&
```

Dear Mr. &NAME&,

As &STATE&'s leading ice cream distributor, ...

The .DF ADDRESS1.DAT specifies the file from which variable data is taken to be included in the form letter. The .RV COMPANY,ADDR,CITY,STATE,ZIP,NAME identifies the variable names that are used in the letter, and the .AV DATE prompts the operator to insert the date from the keyboard before each letter is typed. The &NAME&



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shows where data from a given field is inserted. The completed text might look something like this:

August 1, 1982

Goopy Ice Cream Sales, Inc.
1234 Tasty Lane
Fargo, North Dakota
56789

Dear Mr. Overshoe,

As North Dakota's leading ice cream distributor, we are certain that you would be interested in sampling our new Texas Special: Jalopeno Ice Cream Topping...

The file from which the data is taken would have corresponding entries such as "Goopy Ice Cream Sales, Inc.," "1234 Tasty Lane, Fargo, North Dakota, 56789, Overshoe for each record. The data file may be created with Wordstar or Datastar, another of the Micropro family.

In the foregoing example, if .SV DATE, August 1, 1982 had been used instead of the .AV DATE entry, the user would not have been prompted and August 1, 1982 would have appeared at all locations where &DATE& was found.

With Mailmerge, an entire file may be inserted in the text to include standard or boilerplate paragraphs. These may contain specifications for variable data, just like the rest of the text being processed. Up to eight levels of nested files may be called. Files may also be chained for printing with a prompted halt, if necessary, to change disks.

Print-time formatting can be changed by Mailmerge to alter margins, justification and so on; Mailmerge can be set to print labels or envelopes.

Supersort is another of the Micropro utilities designed to work with Wordstar. It can sort Mailmerge and other data files. A specified range of data may be chosen (such as zip codes in the 94000 to 94999 area) for sorting. Up to 32 files may be merged into a single unit even if they are in formats as different as binary and ASCII, have variable length fields or even differing numbers of fields in each file. Sorts within sorts may be specified, such as alphabetically within zip code, and up to 32 sort keys may be specified.

It is the integration of Mailmerge into Wordstar that gives the program its strength. Combined with Supersort, the result is a powerful team that greatly extends the capability of any office's word processing capabilities.

(Microproof, Electric Webster and Proofreader function essentially the same under CP/M as they do in the standard TRS-80 configuration. Their operation is discussed in the spelling-checker section.)

Spellguard
Innovative Software Applications
P.O. Box 2797
Menlo Park, CA 94025
\$295 CP/M disk

Spellguard is the most popular CP/M dictionary program on the market. It checks and corrects the spelling in a text file using

a vocabulary of some 20,000 well chosen words. The program presents a clear menu that includes help tables to assist the newcomer, and is supported by utilities to create additional dictionary files for use with Spellguard.

From the menu, the writer identifies the text file that is to be processed and then sits back to watch Spellguard work. The program reads the file, eliminates duplicates, checks the words against the dictionary, and identifies the mismatches. Spellguard isn't stymied by hyphens or apostrophes, as it checks for the word both with and without them before declaring the word an error. All processing is performed quickly, and progress is constantly displayed on the screen.

The next phase is the word review, operated under a new menu with each unidentified word shown on the bottom of the screen. The options are to add the word to the dictionary, ignore the word, or mark the word for later correction. The user may also backtrack to the previous word, call for a help file, or exit to a special review.

If a word is spelled correctly and may be used in the future, the normal choice is to add it to the vocabulary. If it is a name or address which will not be used again, it is better to ignore the word rather than clutter the dictionary. If the word is indeed an error, marking it adds a symbol such as @ to the error so the word processor's search function may find and correct it.

The help file can be called from any menu, and can be set at the expert level to give a gentle reminder or to the beginner level for detailed assistance. At the higher level, Spellguard operates with abbreviated instructions and at a higher speed. As Spellguard is invoked from CP/M, the name of the file to be processed may be passed to the program.

The special word review is a quick means to add, mark, ignore or list all remaining unidentified words. This choice may be desirable when building a new dictionary file, to review the incorrect words in their context, or to have a printout to take to Webster's.

Spellguard has utilities to reorganize the dictionary files, permitting words to be deleted from the vocabulary, or to combine two dictionaries. A new dictionary may also be constructed of words that are unique by subtracting one vocabulary from another. The initial 20,000-word dictionary is compressed into about half of a 40-track disk, and the same compaction techniques are applied to the user-created dictionary files as well. All or a range of words from a dictionary file may be sent to the screen or printer for review.

Three sets of default tables may be maintained on the disk and chosen for differing applications. These determine what dictionary files to use, what marking symbol to employ, and whether to write the marked words to the original or to a back-up file.

Disk directories may be read from within the program, and included is a maintenance utility that can verify that no stray bits have

crept in to damage the program. It is also used to install updates or zaps in continuing program support.

The documentation has a professional look, and is clear and direct. Its 114 indexed pages serve as both a tutorial for the beginner and a solid reference work for the experienced operator.

In a test against the list of the 100 most frequently misspelled words, Spellguard failed to recognize only *benefited*. In a list of the next 550, the program lacked a total of 33. These included *accompanies*, *disillusioned* and *pamphlets*.

Spellguard is fast and accurate, and an important addition to any business' word processing software.

Spellstar **Micropro International**

Spellstar's major advantage is that it is fully integrated into Wordstar, and may be called up from within the word processor with the text file set for proofing. It contains an initial vocabulary of some 20,000 words and permits checking of both alternate and supplemental dictionaries.

The proofreading session begins by sorting the words and eliminating duplicates. The progress of the review is displayed on the screen, showing the number of words in the document, unique words, the size of the main and supplemental vocabularies, the number of words checked thus far, and the total of misspelled words encountered. Soft hyphens are ignored, and words separated by a hard hyphen are treated as two distinct words.

In its second phase, Spellstar displays each questionable word with a menu format. Program options include adding the word to the dictionary, ignoring, bypassing or marking words for correction. The last 20 words marked as "add" or "ignore" are remembered by Spellstar and are handled automatically each time they are encountered in the text.

If the selection is to mark the words for correction, then an @ prefixes the word. When the document has been proofread, control is passed to Wordstar.

In its correcting phase, Spellstar halts at each marked word so Wordstar's editing commands may be used to change it. Bypassed words may be seen and judged in context. On completion, the corrected file is given the original file name while the text containing the errors becomes a back-up file, and the text is ready for printing.

Words selected to be added to the vocabulary may be sent to either the main or supplemental dictionary. The program also allows deleting or listing words in a vocabulary file as a part of Spellstar's dictionary maintenance routines, and special main dictionaries may be purchased or created for use instead of the main dictionary supplied. All dictionary files used employ compaction techniques to conserve disk space.

For the dedicated Wordstar user, having a fully integrated dictionary program makes Spellstar an automatic first choice. ■

For those with sophisticated needs.

Word Processing— Deluxe Versions

Michael Shroyer's Electric Pencil is the granddaddy of microcomputer word processors. With the faults of pioneer software, it's still one of the most popular programs ever written. IJG's Harv Pennington, who is bringing out a new generation Electric Pencil, estimates that there are some 50,000 copies of the original Pencil out there somewhere. Only about 10 percent came across the counter; the rest were bootlegged. "It's a tribute to their intelligence," he says. "They only steal the best."

The key to its wide acceptance is the ease with which Pencil may be learned and used. This summer, my wife had the worries over leaving our home vacant for a week while we vacationed in Japan. So, I rented a high-school student. He was to do word processing for me at our home, and since he was familiar with the TRS-80, I gave him all of 10 minutes of instruction on using Pencil. I adjourned to the next room to push papers while he got an hour's practice, during which he asked about three questions. When we returned from vacation, not only was our house secure, but he had added many pages to my study of the Ottoman Navy in World War I—something I just didn't seem to have time to get to myself.

Electric Pencil has been the basis of a number of word processing auxiliaries, including several dictionary programs. Cornucopia Software's Microproof includes a patch option to call the program from within Pencil. Other exotic programs like Xtra Special Delivery from Software Concepts use Pencil files to personalize form letters from a mailing list and can even write entire paragraphs from simple embedded codes in the text. Exatron markets a patch to operate Pencil with their Stringy Floppy.

The Electric Pencil Modification is perhaps as famous as the program itself. Pencil's brief documentation includes instructions that permit a \$5 lowercase conversion. This consists of adding the control key and piggybacking a memory chip within

MODEL I / III

the CPU. With this modification, the keyboard operates in Pencil like a standard typewriter with no reversal. Without the modification, Pencil uses the shift key for control of uppercase-only text.

Unlike Scripsit with a half dozen patch programs to cure its ills, only Pencil Plus is available as an enhancement to Electric Pencil. This is so because Pencil defends itself from predators by making block moves of its code all over the place, blanks out potential patch areas, and takes command of the keyboard. No ROM routines are used, and there are excessive jumps and calls that are difficult to follow.

Still, for all its faults there is no program on the market that is as easy to learn and use as Pencil. If the word processing requirement includes a large number of ordinary business letters, then the venerable Pencil is hard to beat.

The ads that you've seen which proclaim, "I Love my Electric Pencil" aren't far wrong.

Codes II
For Electric Pencil 1.0
Nelson Software Systems
P.O. Box 19096
Minneapolis, MN 55419
Model I
\$19.95 cassette
\$24.95 disk

Codes II is a simple but ingenious why-didn't-I-think-of-that way to embed special printer codes into Electric Pencil files. With Codes, it is possible to shift Pencil printing into double-width character fonts for those printers capable of it. Condensed, emphasized, double-strike or Grafrax-supported italics are possible on such printers as the MX-80.

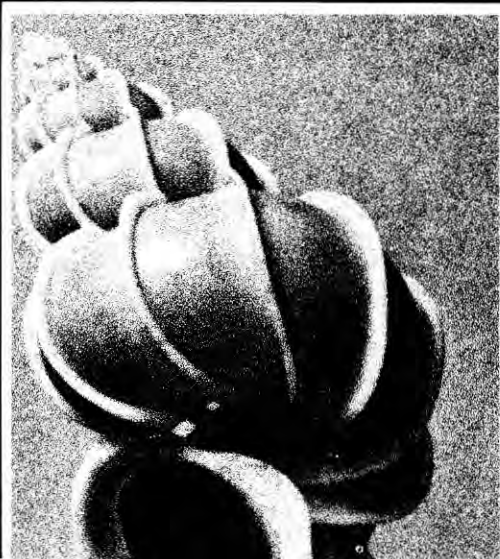


Codes II is a text file containing embedded machine codes for many of the popular smart printers. The user simply deletes the codes for all printers but his own and makes a personalized Codes file. This may then be loaded into Pencil prior to the file to be printed. Using the block-move facility, the particular code needed can be moved to the location where the printing is to be changed.

Since Pencil can't alter its margins from within, use of wide or narrow fonts requires a bit of judicial planning. Justified text might be a bit askew using Codes, but it is a small price to pay to be able to use the full range of printer capabilities with a favorite word processor.

Pencil Plus
For Electric Pencil 1.0
Dan Robinson
1625 Higgins Way
Pacifica, CA 94044
Model I
\$40 disk

I'm partial to Pencil Plus because (blush) I wrote it. Perhaps it was jealousy of the half dozen patches that made Scripsit do so many wonderful things. Maybe it was pity seeing old favorite but old-fashioned Pencil lie there alone in ragged and skimpy old clothes. Maybe it was disappointment in seeing Electric Pencil 2.0 born as limited as its father. In any event, having seen the features of dozens of word processing pro-



basic' ^(PRIME)

"Good order is the foundation of all good things."

EDMUND BURKE

WHAT IS basic'?

basic' is a completely structured extension of the BASIC language designed to assist the serious programmer in the writing and debugging of new computer programs. It is a set of tools that facilitate the development of well-structured code which is easy to read and maintain.

Blocks of code are indicated by a unique indentation convention, eliminating the need for extraneous statements (such as BEGIN, END) and line numbers.

basic' control statements are simple, but powerful and complete, and include the usual IF, ELSE and FOR. Added statements are REPEAT/UNTIL, PROC/DO, and CASE. The UNTIL statement is very powerful since it can occur anywhere in a REPEAT block—beginning, middle or end. UNTIL can also appear in a FOR block. The CASE statement can work with any expression—string or numeric. ELSE can also be used with CASE as an "everything else" condition. PROC and DO permit the defining and invoking of named subroutines. The listing below graphically illustrates the difference between basic' and BASIC.

basic' VS. BASIC & PASCAL

A basic' program is logically simpler than its BASIC counterpart. Its logic is easily apparent to anyone reading it. Even large and complex programs remain readable and maintainable.

PASCAL is a very good, if somewhat wordy structured language. However, PASCAL's great disadvantage lies not in the language itself, but in its microcomputer implementation. PASCAL is compiled, and compilers are fine for producing faster-running (although larger) programs.

Compilers are deficient, however, in the area of program debugging. On the other hand, interpreters excel in debugging since they allow the programmer to query the state of the program after a bug has occurred. Professional programmers know that the bulk of software development time is spent debugging code. Since time can mean money, an efficient debugging environment is critical.

basic' uses the BASIC interpreter already available on your own microcomputer for efficient debugging. If faster execution is required, a basic' program can later be compiled by an available BASIC compiler—but only after it is debugged and running.

HOW DOES basic' WORK?

A basic' program is written via editor', a full-function text file editor optimized for programming, and is then processed, or translated into a normal BASIC program.

editor' recognizes the basic' control statements and automatically indents the text to the appropriate level. The editor' display always reflects the current state of the program text. The listings produced by the processor (see below) are exceptionally well-ordered. Comments are automatically right justified for ease of reading, block indentation reveals the flow of control, procedures are separated by white spaces, and an extensive cross-reference is provided. Once the translation is produced, debugging can take place using the existing BASIC interpreter. When bugs are detected, patches can be applied to the translation. It is usually possible to correct from 5 to 10 bugs in translations before having to reprocess the basic' source program.

HOW CAN I GET IT?

basic' is now available for the APPLE, TRS/80 and IBM PERSONAL COMPUTER. Inquire at your local computer dealer or order direct using the handy order form below. You may also call TOLL-FREE and charge to your VISA or MASTERCARD.

If you would like more information, basic' documentation may be purchased separately for \$10 which will be credited against purchase price.

! b a s i c ' !

```

PRINT "ASCII CHARACTER TABLES"           | HEADING
REPEAT
  INPUT "FROM,TO : ",N,M
  UNTIL N=0 AND M=0                       | DOUBLE ZEROES TO QUIT
  DO TABLE                                | PRODUCE A TABLE
END
-----
PROC TABLE                               | OF ASCII CHARACTERS FOR CODES N THROUGH M
PRINT "CODE", "CHAR"                     | PRINT HEADINGS
FOR I=N TO M
  UNTIL I > 127                            | UPPER LIMIT
  PRINT I,                                 | CODE
  IF I < 32                                | CONTROL CODE
  CASE I
    # 13                                   | CARRIAGE RETURN
    PRINT "(RTN)"
    # 27                                   | ESCAPE
    PRINT "(ESC)"
  ELSE                                     | ALL OTHERS
    PRINT "(CTRL)",CHR$(64+I)
  ELSE                                     | PRINTABLE CHARACTERS
    PRINT CHR$(I)

```

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501
BOM 9/82

grams, I set about to cram the best of them into Pencil Plus.

Pencil Plus modifies Electric Pencil to embed printer codes in the text to permit switching type fonts. Mix-'n-match within a line, even with graphic characters, is supported. Headers can contain their own type style. Wide font printing continues on the MX-80, line after line, until turned off. The left margins are evenly maintained no matter which font is in use.

Format parameters can be included in the text to set margins, line and page lengths, line spacing or justification. Files may be chained for printing with Pencil Plus and comment lines are included. Input from the keyboard during printing is supported.

Pencil Plus does not erase the print parameters when a new program is loaded or when the text buffer is cleared. With bad loads (DOS Error 22 problem), it saves what text it can. Programs protected in high memory are respected.

All programs on a disk directory may be read as can disk free space. Although /PCL is still the default file extension, any may be used during saves and loads.

The limits on format parameters have been removed, and non-keyboard characters may be sent to the printer—even graphics. Conditional hyphens are included, and those without a special control key may use the clear key instead. The hard part was writing Pencil Plus to make the changes internally without reducing the text area by a single byte.

I'm rather proud of Pencil Plus, and by the time this finds its way into print I expect to have Pencil Plus 2.0 completed to provide the same capabilities for Electric Pencil 2.0.

Electric Pencil 2.0

IJG Inc.

1260 West Foothill Blvd.

Upland, CA 91786

Models I & III

\$89.95 disk, cassette or wafer

Electric Pencil 2.0 is bound to bring joy to Pencil fans. The combined work of program author Michael Shrayner and well known computer entomologist Harvard Pennington, Electric Pencil 2.0 cures most of the deficiencies of its parent program. One only wishes that more of the planned new features were included in the present release.

The changes are more in the form of polish on an old favorite. Those without a control key may now use clear, and conventional DOS commands like Save and CLOAD have replaced DS and R. The search function now halts over the sought-for string rather than at the beginning of the line, and a search-and-replace may be made selectively as the text is viewed. Form feeds and carriage returns can be included in string searches.

One or two commands have moved on the keyboard, and a hard space is now supported; it won't be touched during justification. A concatenation feature is included to

“Electric Pencil 2.0 is bound to bring joy to pencil fans.”

prevent data spread over more than one line from being broken, as might be needed with columnar data.

Print and system menus have been separated and greatly expanded without appreciably reducing text space by means of overlays. The system menu now displays the word and paragraph count without being asked, and free bytes in the buffer are displayed. Cursor speed may be set and the Model III tape baud selected. The print format used may be saved with the text file so that margins do not have to be reset when it is again loaded. When the file is cleared from the buffer, the format parameters are retained.

Although the /PCL extension is still the default, Pencil 2 loads and saves files with any extension, and entire directories may be read from disk. A setup utility permits saving custom default values with the Pencil program, and user-written print drivers may be incorporated in the system.

Most of the Pencil 2 improvements are in the form of escape hatches that the original version lacked. (“Bullet proof,” says Mr. Pennington. “Bullet proof,” agrees evaluator Dennis Kitsz.) The bad loads that used to produce DOS error messages but no text are no longer fatal, for Pencil 2 does not clear the buffer on a bad load; it saves what it can. The break key enables users to bail out from cassette operations or printer hangups, and if one finds himself back in DOS or Debug there is a reentry vehicle that brings back Pencil and hopefully the text file as well.

If an attempt is made to save a file with the cursor at other than its beginning, a warning leaps onto the screen. Even an open drive door can't crash Pencil 2.0.

IJG's attitude is supportive, and they intend to reveal the family secrets with publication of an *Electric Pencil Handbook* by summer. It will include the complete and commented source code of Electric Pencil 2.0 so programmers may customize the program to suit their every whim.

A nice touch in Pencil 2 is the inclusion of a command to turn the cassette player on and off as you type so it may be used to retrieve dictated text material.

Electric Pencil 2.0 boots up to a snappy looking billboard presentation. The documentation is 123 pages of clear instruction for the beginner or reference material for the experienced Pencil pusher. It includes pages of helpful hints and tips, and even guides users through editing and printing of Visicalc and Basic files.

One doesn't have to be a supersonic typist to find the start of every line short a character on the Model I with its slow clock speed, but a zap to send the keyboard to a type-ahead buffer is in the works to cure the problem. The new features that have recently appeared in other word processing programs are still over the horizon, but planned are support programs that will integrate a spelling checker; an RS-232 communications package; a voice-synthesizer version for the visually handicapped; a type-setting utility; a program to load, edit and print EDTASM and other file types; a graphics-printing utility; and drivers for most popular printers.

Another module is envisioned that will allow Pencil to change format parameters and send printer codes from commands embedded within the text, integrate data from other files, and chain-print documents. If this utility were incorporated in the present version, it would be about all that anyone could ask for. Still, at Pencil's price one can add a handful of utilities and still undercut such big-dollar programs as Superscript.

The new features are still in the future. For all of the old Pencil fans who have been waiting, you'll have to be content with a bug-free Pencil 2.0 and wait a little longer for the next installment.

Scriptit

Radio Shack

Models I & III

\$99.95 disk

\$39.95 cassette

Scriptit is widely regarded as one of Radio Shack's best software efforts. Like other Tandy programs, Scriptit comes as a training course with a trio of audio cassettes to lead the user through the lessons provided on the disk or on other cassettes.

Scriptit boasts an attractive display, consisting of 14 text lines above a solid bar. Beneath the bar appear command prompts called by the break key. If tabs have been set, their location is noted as dots in the command bar.

The cursor moves with the arrow keys. With a shifted left or right arrow, the cursor moves to the margin while a shifted up or down arrow moves to either end of the text. The @ key is used as a control key in conjunction with others to perform various functions such as insert, delete or exchange. Scriptit permits deletion of a character, word, sentence, paragraph or a marked block of text. Two insertion modes exist: one for single, another for multiple characters.

Control C identifies the beginning of a paragraph, inserts the specified number of blank lines, and indents the selected number of spaces. Control V forces a form feed and identifies a new page. Adjacent words or paragraphs may be exchanged. Blocks of text may be marked and named, and then inserted, deleted or exchanged by name. Text strings may be located, re-

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"For an early generation word processing program, Scripsit's not bad at all."

placed or deleted.

Scripsit's video width may be set to match that of the printer to aid in using tabs and inserting hyphens. When the video width is narrower than the text, window commands are used to scroll the text from side to side for viewing.

Format lines may be embedded within the text to override the print defaults. Thus it is possible to change the left, right, top or bottom margins during the printout. Line

spacing may be altered, justification turned on or off, text centered or printed flush right. Printing may be set to begin or end at a specified point, or to skip marked blocks of text. Widow lines can be suppressed so the first line of a new paragraph does not appear as the last line on a page.

Scripsit prints text vertically centered on a page, and comment and format lines can be optionally printed. Both headers and footers are supported and may be set to

print on odd, even or all pages. Both parallel and serial print drivers are included and there are instructions for creating custom drivers.

Scripsit permits appending files to the resident text being processed, and Basic ASCII files may be loaded and saved back to disk. The program's major disadvantage is the need to return to DOS to read a directory, determine free space or to kill a file unless NEWDOS80 is used with its MINIDOS function.

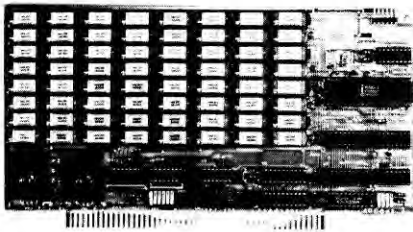
Radio Shack's instruction manual, in conjunction with the tapes, is a very thorough training package. Without listening to six hours of lectures, however, the manual does not quite stand alone. Moreover, once the training wheels have been removed the manual isn't well suited for reference. But there are a half dozen pages of summarized instructions and a quick-reference card comes with Scripsit. The package also includes keyboard labels to identify the various command keys for those of us who have trouble remembering that S stands for insert, and that Z stands for word.

Scripsit requires several keystrokes to perform common functions. For instance, to insert more than a single character requires the sequence Control S, Control X, (insert text), clear.

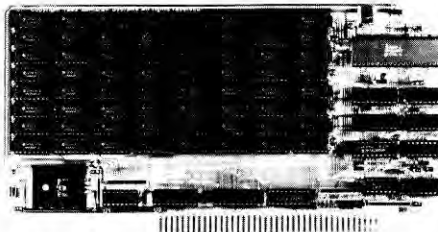
Scripsit can read other standard text files, such as Electric Pencil, and is compatible with auxiliary word processing programs such as Microproof and Special Delivery. A patch exists to operate Scripsit with the Exatron Stringy Floppy.

Unlike Pencil, Scripsit can keep up with the fastest typist and Scripsit's printing and formatting commands are clearly superior. For an early generation word processing program, Scripsit's not bad at all.

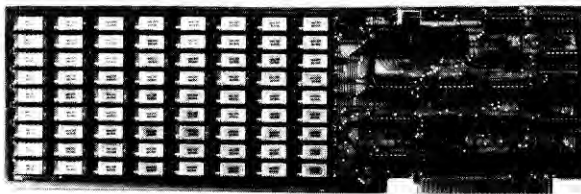
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**Flextext/80
For Scripsit
Apparat
4401 So. Tamarac Parkway
Denver, CO 80237
Model I
\$34.95 disk**

Flextext/80 is a printing utility that operates with a self-patched copy of Scripsit to offer a wide variety of printing capabilities. The program comes in separate versions for Microline 80 owners and for those with the MX-80/Grafrax combination.

Flextext permits mixing of normal, compressed, elongated and italic fonts in any combination the printer can support. Moreover, the program maintains the margins in the standard 10 characters-per-inch setting, regardless of the type font in use, to ensure uniform left margins. Elongated characters, which are reset in the MX-80 at the end of each line, are reactivated until halted by a user code. Emphasized and double-strike modes are supported.

The program can send half line feeds, and is capable of producing sub and super-scripts. Tabs may be set, and line spacing

may be changed from six lines per inch to 7/72 and eight lines.

If headers or footers change the type style from that in the main body of text, Flextext changes it back again on resumption of text printing. Ten additional characters can be sent to the printer that do not appear on the TRS-80 keyboard, and graphics can be printed.

It would be asking too much of such a program to be able to justify lines of mixed type fonts, such as compressed and elongated, but lines of any single type font are justified under Flextext and, surprisingly, so are combinations of normal and elongated fonts.

The program permits users to exit to DOS to perform any needed task and then return to Scripsit with the text intact.

Flextext is an excellent patch program for Scripsit, and it enables owners of the Microline 80 and MX-80 and Grafrax to utilize the full capabilities of their printers.

**Superscript
For Scripsit
Acorn Software
634 North Carolina Ave., SE
Washington, DC 20003
Models I & III
\$50 disk**

Superscript overcomes some of Scripsit's shortcomings with a patch that permits

*"Flextext is
an excellent
patch program
for Scripsit."*

reading of the directory and killing of files from within the program. It also features key repeat and permits the operator to insert text in unjustified lines during printout (as in filling in the name and address in a letter salutation).

If the printer supports forward and reverse half line feeds, sub and superscripts may be printed. And if it recognizes the backspace character then underlining, boldface and slashed zeroes become possible with Superscript. The program also introduces unbreakable spaces to Scripsit, and permits sending special characters that do not appear on the TRS-80 keyboard such as braces and brackets.

For printers such as the MX-80, elongated and compressed fonts are supported as is emphasized printing in the normal font. No special routines exist as they do in new-generation word processing programs to continue wide-font printing beyond the current line or to mix different print fonts within a single line.

Superscript includes a half dozen drivers for popular printers, and information is provided for using custom drivers as well. A new driver has been added for the MX-80 with Grafrax to add underlining, italics and slashed zeroes. Superscript patches Model I Scripsit for use on both the Model I and III.

**Scriplus
For Scripsit
Quality Software Dist.
11500 Stemmons Expressway
Suite 104
Dallas, TX 75229
Models I & III
\$24.95 cassette or disk**

Scriplus is a modification to Scripsit that permits the use of the entire range of a smart printer's special capabilities. The program embeds special codes in the text that are sent to the printer to initiate elongated, compressed or italic fonts or to begin emphasized or double-strike printing. If the printer can underline or print graphics, Scriplus makes it possible. If the printer accommodates reverse and forward half line feeds, then sub and superscripts can be printed.

When changing character width, care must be exercised in setting margins. Justification with mixed type fonts is likely to produce undesired results and is best accomplished manually.

Scriplus adds the ability to read an alpha-

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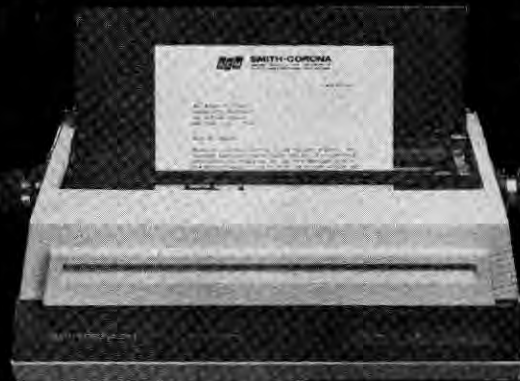
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betized directory without exiting Scripsit, and operates under all DOS programs with the exception of NEWDOS80. The program "patches" Scripsit/UC or Scripsit/LC for the Model I and Scripsit/CMD for the Model III.

Scriptr
For Scripsit
Pioneer Software
1746 NW 55th Ave. #204
Lauderhill, FL 33313
Models I & III
\$40 disk and cassette

Scriptr allows the writer to jump from the word processor to DOS and back again. The program permits output of special printer codes to any parallel printer and includes preprogrammed functions for the MX-80 and Microline 80.

Printers capable of wide or compressed fonts, italics, emphasized or double-strike can operate under the Scriptr patch, even with justified text. The program may be run with output to the printer suppressed to locate format errors and page breaks. Selected pages can be printed from the text with proper headers and page numbers included.

Scriptr permits graphic printing, and incorporates a pause feature that allows input from the keyboard during printout (such as in form letters).

Limited editing is permitted during printout, and a macro facility allows printing such things as graphic borders with the text. Scriptr supports underlines, and allows setting of a wide range of scrolling speeds for screen display.

A half dozen sample programs are included to tutor the writer while learning Scriptr.

Scriptmod
For Scripsit
MG Products
P.O. Box 7544
Tulsa, OK 74105
Models I & III
\$39.95 disk

Scriptmod employs an unusual technique to patch Scripsit so it sends smart printer codes. Commands are inserted in the format lines that contain the code. Each time a control code is to be sent, a control T (@T) must be typed in the text at the location where the change is to take place. This puts a 60 hex character on the screen either as an accent grave or British pound sign, depending on the character generator.

This procedure requires using a table of print values, but does permit the program to send all possible codes. One difficulty encountered is that the @T is recognized as a space with lower codes and plays havoc with right-justification. Another problem is the use of a backspace character for such items as slashed zeroes. Margins and line lengths require special attention when using differing width fonts, such as compressed or expanded type.

The technique does permit Scriptmod to

send graphic codes, forward and reverse half line feeds for sub and superscripts, boldface and underlining, italics, emphasized printing, and various width type fonts for those printers with the capabilities. Scripmod contains 32K and 48K versions, and another for use with the Epson MX-80.

Scripmod permits reading the disk directory without exiting from Scripsit.

Qwerty 3.0
For Scripsit
Med Systems Software
P.O. Box 2674-T
Chapel Hill, NC 27514
Models I & III
\$74.95 disk

Qwerty is a special application patch to Scripsit written for scientific printing on the Line Printer IV (Centronics 737 and 739). It features non-justified proportional print, and by using super over subscripts can produce scientific formulae. By backspacing and overprinting, Qwerty can present a fair facsimile of symbols and Greek letters used in mathematics, physics, chemistry, engineering and the like. An extensive library of symbols is included in Qwerty with commands to produce user-tailored symbols as well.

Through its table function, the program can create matrices and determinants. Its folio routine uses normal or condensed print and reverse line feeds to print either two or three narrow columns such as a newsletter or index might use.

Qwerty also has provision for including up to 800 characters of footnotes per page. The program can format a document and shows the location of page beginnings without actual printing to assist in the layout of text. Qwerty works with condensed or expanded print, and although designed for proportional spacing it also works with normal fonts.

The documentation is thorough, but its authors have coined new phrases that make the manual tedious to follow. One must learn that Quad means hit the shift and enter keys at the same time. Yen is shift and break together, and so on through Mod, Und, Res and Less.

Qwerty comes in single and dual-disk editions, and separate versions have been prepared to support the Line Printer IV, Daisy Wheel II and the Line Printer VIII.

With an appropriate printer, Qwerty performs as advertised. If you require formulae in word processing, footnotes, or two-column text, Qwerty can accomplish the task.

Lazy Writer
Soft Sector Marketing
6250 Middlebelt
Garden City, MI 48135
Models I & III
\$175

Lazy Writer is a full-function, second-generation word processing program. Author

David Welsh of ABC Sales has packed every feature he could think of into the program, and the result is a highly sophisticated piece of software in both Model I and Model III versions.

My notes listing the commands and their functions ran to six pages, but don't let that scare you; you don't have to use them all. For most purposes, only a handful of instructions are required. The remainder exist for the most exotic print formatting control of any of the present word processing programs.

To cram all of these features into the program and still leave room for 5,400 words of text in a 48K computer required that Lazy Writer be written in modules. One exists for text entry and editing, another for disk file manipulation, and a third for the printing functions. Utilities are provided to rescue lost text, to remove non-standard codes from Scripsit files, and to set individualized printer parameters. There are printer drivers for parallel, serial and TRS-232 operation and an RS-232 package for sending and receiving text by means of a modem.

Lazy Writer displays 14 lines of text on the screen followed by the command bar, which shows the present mode. Below, in the text-entry mode, is the present number of characters in the text file, the unused capacity, and the cursor location. In the edit mode, the line is broken and shows the current function being performed, while beneath the line is the cursor position and the line length. The break key toggles back and forth between text entry and edit modes.

Those without a lowercase modification but with printers capable of lowercase can generate both cases in text files to be printed. Text appears as uppercase on the screen until the semicolon is typed with the clear control key. Then capital letters are displayed as 's.

During printing, the print menu appears at the top of the screen with the number of bytes yet to be printed. The bottom half of the screen scrolls the formatted lines as they are sent to the printer.

A limited number of editing commands are available in text entry that permit insertions and deletions, change case, load and save files, underline and call up the special function keys.

The video width may be set to match the printer's, using wraparound with the overflow on the following line by itself. Users may see how their completed copy will look, and can insert conditional hyphens and non-breakable spaces in the proper places.

In the edit mode is a full range of commands to insert, delete, find or move text. With deletions, for example, it is possible to delete a single character, a word, a sentence, a paragraph, a marked block, a video line or all text up to the occurrence of a specified character. If an "oops" is discovered before hitting enter, the text may be recovered a character at a time with the left arrow, or the entire deletion may be aborted with the break key. A deletion requires at least three keystrokes.

A unique feature is the X-key command.

With this, 10 keys can be programmed with up to 20 keystrokes each to perform a mini-chain series of commands. These preset keys can be saved and reloaded as a file for future use, as can user-specified defaults for tabs, margins and so on.

Tabs may be set for neat columnar printouts, and the program can send codes that the printer supports, but are not on the keyboard. A selection may be made to add a line to the present page before a form feed is sent, preventing a half line at the top of the following page. Lazy Writer's headers and footers can be set for odd or even pages as they would appear in a book, and can contain codes to adjust the margin with each occurrence. In a bound report, for example, the front of the page requires a wider margin on the left, the back requires a wider margin on the right.

Blocks of text may be marked for movement or deletion. What's more, these blocks may be named so they can be rearranged by including their name in the block-move command. The cursor position may be memorized and then returned to from anywhere in the file, greatly facilitating the block moves.

A help file may be called up at any time. The file may be added to or deleted from, presenting only the information that the user requires; the file shrinks as you gain familiarity with Lazy Writer.

Files may be displayed a screen at a time from disk without destroying the resident file, and may be loaded beginning at any point in the new file. If the cursor was at the start of the original text, then the text will be overwritten. Otherwise, the new data is appended to the old, starting at the cursor position.

One of the program's most impressive capabilities is it permits smart printers to respond to commands embedded within the text. If the printer has the capability, Lazy Writer text can include sub and superscripts, boldface, underlining, wide or condensed print fonts, italics or double-strike printing as well as graphics.

Embedded commands are also used to indent blocks of text, to center, or to change line spacing. Reverse or hanging indents are supported.

Separate files may be listed for chained printing, and formatted files may be saved to disk for spooling to the printer at a later time.

Lazy Writer inverts the lower/uppercase convention of other text files, such as Electric Pencil, and uses no terminating byte. It has a command to change the case of the entire file, but incompatibilities may still exist that will create difficulties when using auxiliary programs with Lazy Writer. One version of Cornucopia Software's Micro-proof dictionary program will run with Lazy Writer, and other vocabulary programs such as Hexspell appear to work with its files. Lazy Writer's inverted capitals run into problems with one feature of Grammatik unless saved with letter case changed.

The manual is well written and complete, and a quick-reference card helps the user to

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become familiar with the program. Mr. Welsh has offered updates as bugs are corrected or new capabilities added, and the second issue of the *Lazy Writer Newsletter* is in print. Data sheets to help customize printer drivers are being prepared, with those for the MX-80 and the Microline 83 already completed.

The latest version of Lazy Writer has taken on the difficult task of justification with proportional-spaced printing, and was used in the preparation of a new manual. A little polish has been added to several features to accommodate users' requests, such as allowing data in headers and footers to be spread apart to the two margins.

Different uses of commands in the text and edit modes are a little difficult to get used to, particularly the arrow keys that so many habits are based on. In the edit mode, the arrows work normally except that shifted right or left arrows accelerate the cursor's speed, and a shifted up arrow moves to the beginning of text. In the text mode, however, a down arrow produces a line feed, a right arrow is a tab when at the end of the file, and an up arrow sends you to the edit mode. Only in conjunction with the clear key do the up and down arrows perform to move the cursor in the text-entry mode.

Short, simple printing (such as a common business letter) can be a little tedious waiting for the overlay modules to load. For complex printing tasks, however, Lazy Writer is hard to beat. A technical manual, graduate thesis, long report or The Great American Novel can be printed with Lazy Writer.

**LZ Patcher
For Lazy Writer
Imaginity Inc.
13423 Desert Hills NE
Albuquerque, NM 87111
Model I, disk**

LZ Patcher modifies version 1.9 of Lazy Writer in a manner that many users will find pleasing. Those of us who could never remember if we were in text-entry or edit mode when we hit an arrow key and found ourselves sent to parts unknown will appreciate the standard cursor movement. The arrows are controlled in the same fashion whether in text-entry or edit modes.

Unshifted, they move the cursor in the selected direction. A shifted right or left arrow moves the cursor to the end or beginning of the line, while a shifted down arrow goes to the end of the text file.

The old functions are still there, of course; a combination of the clear and enter keys causes the current character to be overwritten with a line feed.

The ! key, which all of us treated with trepidation, no longer erases to the end of text (this is handled by clear, e), but instead invokes MINIDOS with NEWDOS80.

The thumb twiddling that took place dur-

ing loading of the various overlays (edit/print/file) is substantially reduced, and Lazy Writer is now much more suitable for short files, such as a business letter.

All in all, LZ Patcher makes an excellent word processing program even better.

**Newsript
Prosoft
Box 839
North Hollywood, CA 91603
Models I & III
\$124.95 disk**

Newsript has about every feature anyone could ask for in a word processor. It is a machine-language program with a Basic file manager, and is the first to support proportional printers such as the Radio Shack Daisy Wheel II and the Centronics 737 and 739.

The program comes complete with the TDOS operating system, a mini-version of DOSPLUS. It also operates with LDOS and NEWDOS80, and most features also function under NEWDOS+ and TRSDOS. Newsript can operate with a single disk drive, and supports all of the special features various smart printers are capable of such as sub and superscripts, boldface, and so on.

Newsript comes with a pudgy 173-page manual and a quick-reference card. The Model I version comes on two disks, and the Model III on one. Like other second-generation word processing programs, Newsript is written in separate text-editing and printing modules to provide a full range of features while still leaving adequate space for the text file.

The program permits chaining of files for printing lengthy documents, and can output printer characters that are not on the TRS-80 keyboard. Two functions may be specified with the X or Y commands to speed editing.

Newsript requires that everything be performed by a command typed into the text. For example, the program won't accept an enter as the completion of a paragraph and automatically begin the following text on the next line; .PP must be typed in on its own line to indicate that a new paragraph is to begin.

Since part of the program is in Basic, it can now and then run into the TRS-80's garbage-collection delay while the string storage space is adjusted, but in version 7.0 this has been reduced to practically no time at all. Printing is slowed somewhat since each line is read from disk, interpreted and formatted before it can be sent to the printer, but new releases incorporate an internal print buffer to eliminate this delay. Reading files or writing to disk takes a little longer than with pure machine-language word processors, but inputs from the keyboard go to a type-ahead buffer to ensure that the typist cannot outrace the program.

Newsript has two regions for instructions during text entry or editing. One of these is the line manipulation area (LIMA) that permits insertion, deletion or replica-

GRAPHICS

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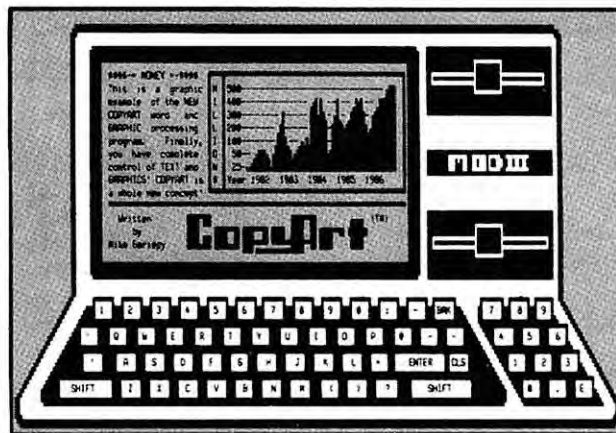
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(Headline and illustrations produced on CopyArt)

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tion of lines and is used to place markers for block moves. The other is the command line at the top of the screen where instructions may be entered to save or load files, read a directory, or transfer to the print module. Here, too, are commands to scroll, search or change strings and to adjust the video width and viewing area.

Instructions embedded within the text control margins as well as line and page lengths. Indentation and hanging indents are supported and tabs may be set. Odd or even page headers and footers are provided for as are widow lines and unbreakable spaces. Comment lines may be included.

When the text is ready for printing, there are a number of options available to the operator. Lines may be numbered in the margin (handy for such things as legal briefs and contracts). Last-minute changes may be made by a mini-edit mode, and line spacing may be changed from that commanded in the text. A good feature is the ability to print only a range of pages or a single page in the middle of the document that didn't come out as the user had desired during the first printing.

The program supports conditional hyphens, and special control codes may be sent to change printer fonts.

Newscrip has several unusual capabilities. One of these is the creation of an index. The normal, tedious method of indexing is to print the text, perform a word search, compare the video location of the word with the printed text to find the page on which it is printed, and write another file using the manually collected data. With Newscrip, a word search may be performed and a command issued each place it is found to include it in the index. An alternative is to create the word list with Edit and Call on Newscrip's index-generator utility to embed the indexing commands. A printing utility for the index alphabetizes the list and merges the page references in ascending order before printing. A similar capability exists for preparing a table of contents.

Another unique feature of Newscrip is the ability to embed files. Frequently used standard text can be included without repetitive typing, such as a logo complete with printer codes or lengthy paragraphs that begin with "Your payment is 30 days past due..."

Prosoft's program has yet another unusual feature: It can interrupt printing to accept lines from the keyboard or from a disk file to create personalized form letters. The disk file entries may be coded so that only those matching the specified code requested in the text are called upon.

Newscrip offers a \$29.95 mailing-labels option that selectively prints labels from the same type of list as used in creation of its form letters. Another option is a \$50 utility for the Diablo and Qume proportional daisy-wheel printers, and yet a third is a patch to operate Microproof from within Newscrip. A new package integrates J.F. Consulting's G.E.A.P. for inclusion of fancy graphics in the text.

Newscrip is a very powerful word processing program. The disadvantages of Basic are not quite overcome by machine-language routines, and one wishes for keyboard entries rather than embedded commands for such items as paragraph termination. But some of Newscrip's features are found nowhere else. The ability to embed files, to accept data from the keyboard during printing, and to create an index are important functions which may fulfill a word processing requirement that no other program can.

“... some of Newscrip's features are found nowhere else.”

Pensawrite 2
4441 West First Ave.
Vancouver, BC V6R 4H9
Canada
Models I & III
\$79.95 disk

Pensawrite 2, unlike its little brother, is a character-oriented machine-language word processor. It is written in separate modules, and passes the text file back and forth by writing it to and reading it from disk.

It can operate with a single drive, and has a capacity of 26,000 characters on a 48K machine. It features a file-linking capability to print lengthy documents and includes enhancement utilities to facilitate letter writing, report generating, mail list and financial report preparation.

The Pensawrite 2 display permits a dozen lines of text bracketed between solid bars at top and bottom. The top line displays such information as the number of characters presently in the file and remaining memory space. The bottom line shows the present mode and provides space for file-specs and error messages.

From this command mode, disk functions may be performed to read directories, determine free space, kill files, set date and time, select configuration defaults, call up a rudimentary help file, or proceed to one of the enhancement utilities described above. From the command mode, you can also proceed to the edit and print modules.

Within the edit module are commands to read and write files as well as to perform some of the disk functions available under the command mode. The major section, however, is the modify function (MOD).

MOD uses shifted letters to control the various functions: A permits adding text, and no characters seem to be lost even with high speed typing. D deletes, the key repeats, and the deletion speed increases if the shift key is also pressed. W and D together delete entire words, while S and D delete sentences.

R replaces and G performs the global

search-and-replace functions. I inserts text. Strangely, insertions appear to take place at the position immediately beneath the cursor, while deletions occur at the location to its right.

S is the search command, and a question mark added provides a count of the specified string. Single blocks may be marked and moved with Pensawrite 2, and 20 keys may be coded with user-specified commands.

Cursor control is performed with repeating arrow keys, and their speed is doubled if the shift key is also depressed. Holding W and a left or right-arrow key moves a word at a time. Tabs may be set to facilitate columnar reports.

In the print mode, defaults are used unless text parameter codes are encountered. Pensawrite 2's embedded codes can set margins, line and page lengths, control justification, line spacing and page numbering. Two lines of headers and two of footers may be used, and printer control codes may be sent to make smart printers jump through their hoops. Files may be linked for printing long documents.

The utilities include one to edit and print Basic ASCII files, one pre-formatted letter file, a mail-list writing and sorting utility, and a report-generation program with alternating headers and footers. Last is a formatted financial report producer that presents numeric data in a manner similar to the Print Using function of Basic.

Softtext and Softscreen
Aspen Software
P.O. Box 339-M
Tijeras, NM 87059
Model I \$69 each disk
Model III 675 each disk

Softtext is a text-formatting program that operates with the Softscreen text editor. As a team, they accomplish what other word processors do in overlay modules within a single program.

Softtext requires command lines embedded within the text to perform such functions as beginning a new paragraph or underlining. The program supports widow lines, so a single line of a new paragraph doesn't end a page. It also features non-splittable spaces so that Mr. R. M. Nixon won't have his name separated from his initials. There are hanging indents for outlines, and proportional spacing is supported.

It is the only word processing program known to have provision for footnotes (other than a Scripsit patch), so important comments appear on the same page as their reference.

Softtext's features include the capability to output boldface, send printer control codes, and to center lines of text. It adjusts margins for printing on the front or back pages alternatively, as they would appear in a book. Headers and footers are fully supported, and Softtext has an index-producing capability.

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✓ 12

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The program can merge lines from other text files or accept information from the keyboard during printing to produce personalized form letters. If desired, only a specified range of pages from within the document may be printed.

Softscreen, the text editor program, is line oriented. Newer versions permit an optional wraparound display on the Models I and III as the program does on the Model II; lines longer than 64 characters are displayed on the video line below.

The enter key must be pressed at least once every 240 characters to terminate the line. Cursor control does not use the arrow keys in the normal sense; instead U (up), D (down), L (left) and R (right) move the cursor. Since the keys do not repeat under TRSDOS, cursor movement is somewhat tedious, but key repeat functions under all other DOSes. The up and down arrows also move the cursor, and the right arrow moves the cursor one word to the right. However, the left arrow deletes the character to the left of the cursor. A shift, left arrow moves the cursor back one word, a period moves to the right end of the line and a comma to the left of the line. The cursor can also be scrolled one half or a full video screen forward or backward or to either end of the file.

Block moves require that each line to be moved be marked, and the same is true of block duplications. The program can delete single characters and partial or full lines. The last cursor position is placed in memory and may be returned to after performing such tasks as a string search.

The insertion mode doesn't seem to drop any characters as Electric Pencil does, but changes must normally be made via deletions and insertions rather than by overtyping.

Although Softtext includes utilities to convert Pencil and Scripsit files for printing, the process is rather tedious on a regular basis. Softscreen is needed to make Softtext work.

Two text files come as tutorials with Softscreen, and a file exists on the Softtext disk to set the options for the printer type.

Copyart
Simutek Computer Products
 4877 E. Speedway Blvd.
 Tucson, AZ 85712
 Models I & III
 \$149.95 disk

Copyart is a word processor with a difference—its fantastic graphics capability, which allows the creation of billboard characters, boxes and computer-drawn artwork.

The program is patterned after Scripsit, and uses the same text display above a command bar. Format commands in the text are typed in the same manner, and the familiar @ is the control key. Copyart has chosen more logical key combinations, however, and the D key deletes, the I inserts, and so on. Last one forget, a help file is available.

Copyart supports proportional justifica-

tion on the Centronics 737-739 Line Printer IV-VIII. Disk file commands may be called from within the program to read a directory, determine free space, and to load, save or kill a file.

Text files may be chained for printing, and the program supports boldface type and underlining.

Copyart employs an unusual device to deter piracy; a coded key is supplied with each copy of the program to be inserted in the cassette port. Although the program will not run without it, unlimited backups of the software may be made.

The graphics capabilities of Copyart are dazzling. (Even daisy-wheel printers achieve pseudo-graphics by printing a # over a 0.) There are two graphics modes employed with Copyart. Both permit the creation of graphics that are printed as integral parts of the completed text.

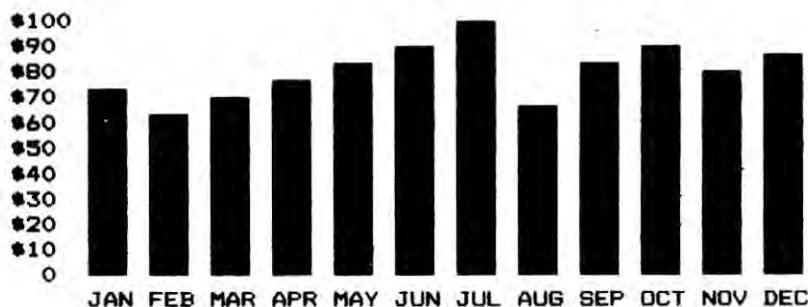
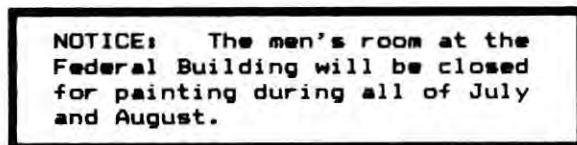
Control Y prompts text to be typed below the command bar. When it has been entered, a query asks for the height, width, direction (horizontal or vertical) and whether the letters to be printed as positive or negative characters. In a moment, the letters commanded appear on the screen, ready to be sent to the printer exactly as they have been shown. (See Fig. 1.)

The screen width, or window, may be set up to 255 characters to accommodate wider graphics. These can even be set to print in a dense condensed mode on printers like the Epson MX-80 and the Okidata 82A.

The second graphics mode is very much like Radio Shack's early Draw 1-2-3. In this mode, the cursor may be moved with the arrow keys leaving a trail of graphics behind it. It allows for movement without creating graphics or for erasing mistakes. The utility permits the user to create bar charts,



Figure 1



1981 Sales (x 1000) Nebraska Prune Canning Co.

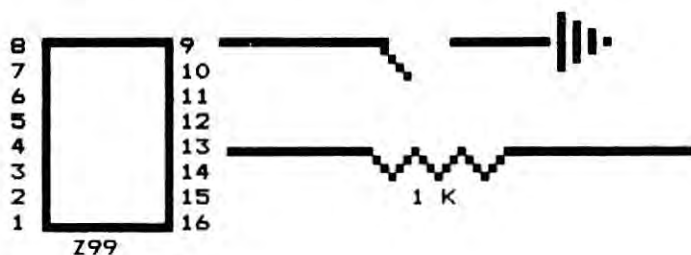


Figure 2

RUN BASIC PROGRAMS AT SUPER SPEED

WITH ZBASIC 2.2.

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BELIEVE IT OR NOT WE'VE ADDED MORE NEW FEATURES to the ONLY INTERACTIVE BASIC COMPILER for the TRS-80!

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- ZBASIC 2.2 compiles the ENTIRE PROGRAM into to Z-80 machine language. (Not 8080 code or a combination of BASIC and machine language like some other compilers.) Clumsy LINKING LOADERS, and RUNTIME MODULES are not needed; ZBASIC 2.2 creates a ready to run MACHINE LANGUAGE program.
- NO ROYALTIES imposed on registered ZBASIC owners.
- Typical COMPILATION TIME is TWO SECONDS for a 4K program.
- Use TRS-80 Basic to write ZBASIC programs!
- Compile many existing programs with only minor changes. (Some BASIC programming experience is required.)
- Fully compatible with both the Model I and the Model III. Mod I compiled programs work on a MODEL III, and visa-versa. ZBASIC works with NEWDOS-80, NEWDOS+, DOSPLUS, LDOS, MULTIDOS, ULTRADOS, TRSDOS etc.
- BUILT-IN and much improved MUSIC and SOUND EFFECTS commands.
- Improved CHAINING for disk users.
- TIME\$ now available on DISK version.
- ZBASIC 2.2 now has an INPUT @ command (similar to PRINT @).
- The TAB function will now tab 255 columns on a printer. (BASIC cannot tab past column 64.)
- NEWDOS 80 2.0 USERS can use the CMD "dos command" function!
- NEW and EASIER to useUSR COMMANDS.
- New math functions to calculate XOR and INTEGER REMAINDERS
- Logical STRING COMPARISONS are now supported.
- The disk commands INSTR, MIDS ASSIGNMENT are now supported on both DISK AND TAPE ZBASIC.
- DEFSTR is now supported.
- Eight disk files may be opened simultaneously; random, sequential or mixed.
- LINE INPUT#, is now supported
- Invoke the compiler by simply hitting these two keys: " ; -"
- NEW 100+ PAGE MANUAL WITH DESCRIPTIONS AND EXAMPLE.
- ZBASIC 2.2 Comes with CMDFILE/CMD program from MISOSYS, to allow appending or merging compiled programs and machine language programs from tape or disk.

ZBASIC 2.2 DOES NOT SUPPORT THESE BASIC COMMANDS:

- ATN, EXP, COS, SIN, LOG, TAN, and exponentiation. (However, subroutines are included in the manual for these functions.)
- ERROR, ON ERROR GOTO, ERL, ERR RESUME.
- No direct commands like AUTO, EDIT, LIST, LLIST ETC, although these commands may be used when writing programs.
- Others NOT supported: CDBL, CINT, CSNG, DEFFN, FIX, FRE.
- Normal CASSETTE I/O. (ZBASIC supports it's own SPECIAL CASSETTE I/O statements.)
- SOME BASIC COMMANDS MAY DIFFER IN ZBASIC. For instance, END jumps to DOS READY, STOP jumps to BASIC READY etc.
- MEMORY REQUIREMENTS: to approximate the largest BASIC program that can be compiled in your machine (at one time), enter BASIC and type: PRINT (MEM-6500)/2. Remember, you can merge compiled programs together to fill memory.

ZBASIC 2.2 SPEED COMPARISON DEMO

To help give you an idea how fast compiled programs are, we have included this demo program:

ZBASIC 2.2 DEMO PROGRAM

Time to compile and run complete program	: 0 MIN. 2 SEC.
BASIC Execution speed MOD 1, LEVEL II	: 7 MIN. 34 SEC.
ZBASIC Execution speed MOD 1, LEVEL II	: 0 MIN. 18 SEC.
BASIC Program size (WITHOUT VARIABLES)	: 895 BYTES
ZBASIC Program size (WITHOUT VARIABLES)	: 2733 BYTES

(Remember that the ZBASIC program includes an 1879 byte sub-routine package.) Program shown exactly as compiled and run in BASIC and ZBASIC.

```

10 '===== ZBASIC 2.2 EXAMPLE PROGRAM AND TIME TEST=====
20 CLS: CLEAR 100: DEFINT A-X: DEFSTR Z: DIM AA(64,24), Z(50): RANDOM
30 AA=100: BB=-1000: CC=3: DD=-3: EE=-9999: ST$="START TIME "+TIME$
40 FOR I=1 TO 127 STEP 2 : FOR J=47 TO 1 STEP -3: XX=POINT(I,J): SET(I,J)
50 XX=(I-J)/CC*(7+I+J) : XX=ABS(INT(RND(I*J)-AA)+7) : RESET(I,J)
60 XX=PEEK(I+J) : POKE 15360+I+J, J : OUT 255, J AND (3*J)+XX-INT(I)
70 AB$=STR$(I+J) : BA$=LEFT$(AB$,2) : AA(I/2, J/2)=VAL(BA$)+AA*3
80 BA$=BA$+RIGHT$(BA$,RND(3)) : XX=INSTR(1,BA$, "9") : XX=SQR(I*J)
90 BA$=MID$(BA$,2,2) : MID$(BA$,1,1)=2 : IF XX THEN 100 ELSE CLS
100 IF LEN(BA$) > 3 OR SGN(XX)=1 AND ASC(BA$)=32 THEN PRINT "+++"
110 IF POS(0) < 62 THEN TRON: TROFF: PRINT ELSE XX=NOT(RND(99))+100
120 AS=INKEY$: IF AS="Y" OR AS="y" AND I > 120 THEN PRINT "TRUE.."
130 RESTORE : READA, C, Z (J), D: GOSUB 170: GOSUB 170: GOSUB 170: GOTO 210
140 NEXT : PRINT " " : NEXT I: CLS: PRINT 0512, ST$, "STOP TIME " : TIME$
150 STOP' ===== END OF MAIN TEST LOOP =====
160 DATA 12345, -1, "TEST", -9999
170 ON RND(6) GOTO 180, 190, 200, 180, 190, 200
180 RETURN
190 RETURN
200 RETURN
210 ON RND(9) GOSUB 180, 190, 200, 180, 190, 200, 180, 190, 200
220 GOTO 140
    
```

NOTICE ZBASIC 2.0 OWNERS: you can upgrade your ZBASIC 2.0 for no charge. Just send us your original diskette/cassette and a S.A.S.E with your registered serial number and copy of your invoice. We will send you ZBASIC 2.2 and updates to your manual.

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TRS-80 is tm of Radio Shack, a Tandy Corp.

surround a block of text with a box, or draw detailed diagrams and illustrations. (See Fig. 2.)

As a word processing program, Copyart is good. As a word processing program with integral graphics capabilities, Copyart is fabulous.

**Word IV and Word V
Micro Architect
96 Dothan Street
Arlington, MA 02124
Model I
Word V \$79 disk, 48K
Word IV \$49 disk, 32K**

Word IV and Word V are Basic printing programs operated under the Microsoft Basic Compiler's BRUN module. Both use text files created in Basic and saved on disk with the ASCII option. Text entered under Basic requires an apostrophe at the beginning of each line to identify it as a remark. They suffer the reversed-case storage limitation: Uppercase letters are saved as lowercase and vice versa, but can print both cases even if a lowercase modification has not been installed in the computer. Like other Basic word processors, the programs require that each line be terminated by enter.

Format lines in the Basic file are identified with a period and tell the program to set page and line lengths, margins and line

spacing. Word IV and Word V can also justify, center lines of text, and print page numbers and titles. Special characters may be output to control smart-printer functions such as lines per inch and condensed or wide character fonts.

Both programs require two disk drives. Word IV operates with 32K, Word V with 48K.

Word V is very like its brother, but does not require the apostrophe at the beginning of each line when using the optional editor. It includes a file/merge option to produce form letters from a mailing list for a personalized touch.

**Special Delivery
Software Concepts
13534 Preston Road
Suite 142
Dallas, TX 75240
Models I & III
\$125 disk
\$199 with Xtra**

Xtra Special Delivery gives mainframe capabilities to form-letter processing on the TRS-80. With it, businessmen can communicate through their mailing lists just like the big boys with codes calling up entire paragraphs suited to their customer.

Special Delivery includes two main programs: Mailform and Mailrite, both written in machine language. Mailform creates a mailing list in a clear, menu-driven format with controls to manipulate and search records, edit and sort them. Data fields include name, company, address, city, state, zip and two general data areas. Movement from one field to another is easily performed with the cursor keys, and errors may be signaled by a buzzer attached to the cassette port.

Mailrite combines a Mailform list with a text file created by such programs as Electric Pencil or Scripsit to produce tailored form letters. Mailrite recognizes codes embedded in the text file to insert data wherever it is desired. The last name, first name or full name may be taken from the mailing list and inserted anywhere identified within the text, and so may be the company name, address, city, state, zip or information from the two data fields.

Mailrite also recognizes codes to change margins from within the text as well as send special printer codes. The program supports underscore and boldface with printers that do not send line feeds with each carriage return. It includes a homograph or conditional hyphen—especially important where inserted data from a file is of variable length and line lengths are unknown.

It is with the Xtra option that Special Delivery enters the field of the mainframe computers. Xtra uses a keyfile to interpret Mailform codes during printout. The code VP may be identified to print out "Vice President," or 106 may represent an entire paragraph that begins, "The item which you ordered is not in stock at the present time. . . ."

The codes that Xtra uses can be located

in any of the fields. They are identified as being offset from the field's beginning by a stated amount, and the code length must be specified. Thus a large number of codes can be contained in any record and included in the form letter at will.

Xtra also permits printing of only a portion of a field, so additional data may be included. A Mailform record might look something like this:

NAME	Andrews, John S. _____ VP
COMPANY	789 Western Widget Works _____
ADDRESS	1234 Main Street _____
CITY	Buffalo Chip _____
STATE	NB _____ ZIP 10017
DATA 1	(212) 123-4567 _____
DATA 2	98765 high-quality widgets _____

Xtra could instruct Mailrite to ignore the VP in the name field and later use the code for a complete printout, the 789 in the company field could be skipped in the salutation and used to draw three separate paragraphs for insertion into the letter, such as the firm's annual sales. The NB in the state field could be expanded, the 98765 used for another five codes from Data 2, and the remaining text in the field could be printed. The result might look something like this:

Mr. John S. Andrews
Vice President
Western Widget Works
1234 Main Street
Buffalo Chip, Nebraska
10017

Dear John,

As a major manufacturer of high-quality widgets, with annual sales in excess of a million dollars, we feel that you would be interested in our patent for a non-slip spaghetti fork. . . .

The remainder of the letter could consist of standard text mixed with coded paragraphs and sentences tailored to the subject as well as the individual addressee.

Each keyfile can contain as many as 8,000 characters of coded numbers, words, sentences or paragraphs. It is no longer necessary to maintain a large number of separate form letters, or to spend great amounts of time in typing individual letters to meet the many circumstances that may be encountered. Writing contracts or legal briefs should be a snap with Xtra.

Xtra also includes a disk sort utility that maintains the order of a previous sort within, so names may be presented alphabetically within zip code, and so forth. There is also a Mailabel program to print the Mailform data on labels.

Xtra Special Delivery is a very impressive package for anyone who must communicate by means of a mailing list, and who doesn't want his form letters to look like form letters.

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Software Options Inc.
P.O. Box 970
Bowling Green Station
New York, NY 10274**

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Auto-Writer is a surprisingly simple program to merge a mailing list with a form letter. The beauty of the program lies in the fact that the user's favorite word processor can be employed to produce both the form letter and the mailing list. Thus all of the powerful editing and scrolling features, together with the search and replace functions, are available to help create the list and the letter.

Auto-Writer allows 1,000 records with up to 20 variable-length fields for each record, labeled as the user chooses. This information can be included anywhere in the form letter by enclosing the field name within coded parentheses. Additional data can be entered from the keyboard at print time, prompted on the screen.

The program includes both a Letter and a Report utility. Since the word processor itself isn't active at the time the letter is merged with the list and printed, Letter recognizes its own commands. These set line and page length; top, bottom and left margins; and form feed, line spacing and comment lines. One function reduces both margins to outline a body of text, and a page-end stop may be set. If none of these have been included within the form letter, default values are used. These can be changed at print time.

If an error is encountered during printing, the program stops, identifies the error, and provides the opportunity to edit the text. Auto-Writer's edit routine can even prepare the form letter, and its commands are very much like Electric Pencil's.

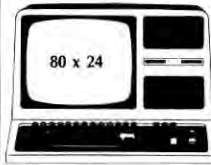
The Report program is similar to Letter except that a header with page numbers is included. Columns can be identified where data from the list is inserted. A selection may be made to align the data in each column against its left or right, or to center on decimal points.

Several other utilities are provided with Auto-Writer. Stats checks for errors and gives the number of records in a file, the format, and the field labels and lengths, sent either to the screen or printer. Select creates a new file containing only those records that meet the specified criteria using If, And and Or with <, >, =, <=, >=, <> to choose such items as zip codes within a certain range.

Sort organizes the file in ascending or descending order alphabetically or numerically using any field. Sort can use as a key such items as a zip code that lies at the end of a city/state/zip field, or the last name included in a name field.

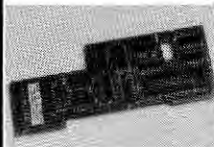
Even though a compiled Basic program, Auto-Writer seems to have good speed and bug-free performance. By press time, an enhanced version should be on the market that will include a two-level sort and a math pack for arithmetic functions. The ability to use such favorite programs as Electric Pencil or Scripsit to maintain a mailing list makes Auto-Writer a winner. ■

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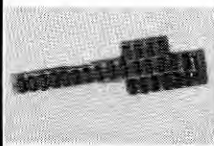
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SALT LAKE CITY, UTAH 84119 PHONE 801-967-2324

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For the letter writers.

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The Word Machine
GB Associates
 P.O. Box 3322
 Granada Hills, CA 91344
Models I & III, 16K
\$29.50 disk, Centronics version
\$19.50 cassette
\$35 disk, Epson version

MODEL I / III

The Word Machine is a line-oriented Basic word processor, produced in versions for both the Centronics/Radio Shack printers and the Epson MX-80.

The command menu presents options to add, display, edit, delete, format and justify text as well as to perform block moves and text entry from the keyboard. Files may be loaded, saved, and in the disk version directories may be read and files killed.

The Word Machine's special print commands are identified in the text file by starting lines with a slash or semicolon, and permit control codes to be sent to activate the various modes of the printer.

Lines may be centered, and data can be input from the keyboard during printing, such as in a letter salutation. Commands are present to reformat all or only a portion of the text, so blocks may be indented for emphasis.

Scrolling is supported, a search function has been incorporated, and block moves can be made but they are very slow. Text writing is line oriented, and the program uses Basic's edit functions. Edit commands require that the line number be specified.

During printout, The Word Machine allows page numbers to be specified, and a choice exists for single or double line spacing.

The cassette version suffers the limitation that other characters must be typed as substitutes for the commas and colons that Basic interprets as terminators.

Like most word processors written in Basic, The Word Machine is hardly suited to high-volume office work. If the writing task is limited to a few personal letters, however, The Word Machine may fill the bill.

Pensawrite 1
Pensadyne Computer Services
 4441 First Ave.
 Vancouver, BC V6R 4H9
 Canada
Models I & III
\$19.95 disk

Pensawrite 1 is a Basic text processor. It works with a single drive and only 16K. Pensawrite 1 handles large files by writing small blocks to disk as it goes along, halting text input periodically.

In text entry, editing is limited to the use of the backspace/erase key. Care must be taken not to exceed the screen width while typing or the program crashes. When text entry is completed, the disk file is formatted and optionally justified at the rate of about eight seconds for each line.

In the edit mode, line numbers must be given to list the text on the monitor screen, to delete lines or to make corrections. The file is then read until the line is found and presented. Pensawrite 1's corrections require retyping of the line, and since the justification is performed only in the text-entry mode, it must be performed manually during the replacement.

Pensawrite 1 allows files to be merged, and it includes a s-l-o-w block move.

When printing, Pensawrite 1 supports page numbers and titles. It accepts inputs for the number of characters per line, lines per page, and single or double-spacing. Segments of the file are read in once again to be sent to the printer.

Since most disk owners are likely to have more than 16K, one wishes Pensadyne had added a few more features to Pensawrite 1 and not opted to interrupt text entry by writing small bodies of text and back again. Still, at the price Pensawrite 1 can serve as an occasional personal letter writer.

Wordsmith
ABS Suppliers
 3352 Chelsea Circle
 Ann Arbor, MI 48104
\$20.95 disk and cassette

Wordsmith is another Basic line-oriented word processor packaged in versions for disk and for the fast-loading B17 tape operating system. Unlike most Basic programs, Wordsmith includes a wraparound feature that automatically places words too long to fit on the current line onto the next one during text entry. High-speed typists must slow a bit when using this program to avoid lost characters.

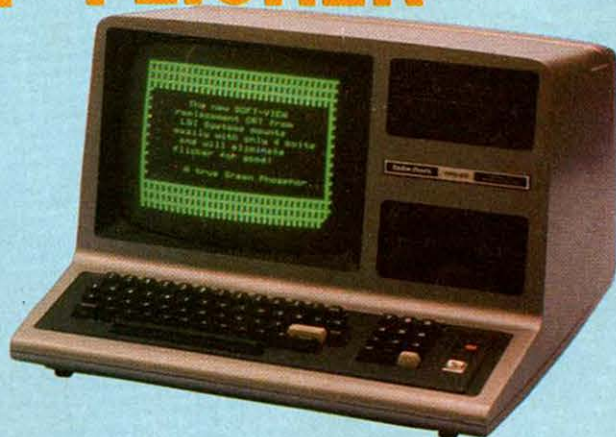
Wordsmith is designed for an Electric Pencil-type lowercase modification and includes its own lowercase driver, but also



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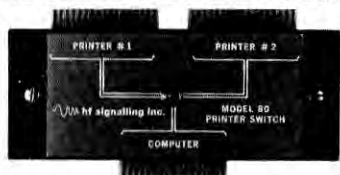
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hf signalling inc.

Administrative and Engineering Offices - P.O. Box 17510
Kansas City, MO 64130 - phone: (816) 931-4448

functions with uppercase-only machines.

The editing capabilities are fair, with full cursor control. Editing is performed primarily by line, and they may be inserted, deleted or moved. Characters may be deleted; overtyping is permitted, and if the line is not yet full, insertions are possible. At printout, lines may be centered or justified.

The print mode is tailored for the MX-80, but may be changed to suit any smart printer, sending commands for wide or condensed character fonts, emphasized or double-strike printing. Wordsmith is a suitable personal letter writer or can be used to publish an occasional newsletter.

Micro-Typit

Coolidge & Assoc.

1317 South Congress

Austin, TX 78704

Model I, 16K

\$25 cassette

The Wordslinger

Instant Software

Peterborough, NH 03458

Model I, 16K

\$29.95 cassette

Micro-Typit and The Wordslinger are written in Basic. Their aim at the 16K market limits them to only a few pages of text capacity, and both are primarily suited to letter writing.

Both programs use Basic strings to hold lines of text, and writers must keep one eye on the screen to terminate each line at the proper place with an enter. Text entry with Micro-Typit is signaled by a display of spaces remaining at the top of the screen to aid the typist in staying within bounds, while Wordslinger halts at the line limit and accepts only a backspace or enter. Wordslinger can keep up with a fast typist, but Micro-Typit hunt-'n-peckers must slow

down a bit for the program.

Both permit upper/lowercase copy on printers so equipped, but Micro-Typit displays only uppercase on the screen even if lowercase conversion is installed. Wordslinger incorporates a block cursor with key-repeating movement by the arrows.

Editing for the programs is line oriented; the writer must supply the line number or range of lines to be displayed, replaced, deleted or inserted. Micro-Typit includes a search-and-replace capability wherein a misspelled word can be replaced by the correct one, provided that the new word doesn't cause the maximum line length to be exceeded.

Wordslinger has an overtyping mode to change lines, but with Micro-Typit the entire line must be replaced for corrections.

Both programs can save text files on tape and load them back again, and both optionally right-justify text on printout.

For the non-disk writer on a budget who doesn't want to pay the price of Scripsit, Micro-Typit or Wordslinger may fill the bill. If so, Wordslinger appears to have an edge.

Letter-Writer

Astro-Star Enterprises

5905 Stone Hill Drive

Rocklin, CA 95677

Models I & III

\$37.99 disk

\$23.99 cassette

Letter-Writer is a Basic program, and as such is line oriented. Four lines of text are displayed on the screen double-spaced to display line widths of up to 80 characters. At the top and bottom of the screen are numbers to identify column locations, and there is space for a fifth line as it is being entered in the work area.

The program permits upper/lowercase text on unmodified Model Is by using shift, down arrow as a case-lock key, and signals uppercase by displaying @ on the lower right of the screen. The capital letters are shown above a double line in the work area, lowercase letters are shown above a single line. The number of characters that the buffer can still accommodate is also shown.

When a line is filled, the text automatically spills over to begin a new line. The arrow keys work in all directions to move the cursor, but a shifted right arrow opens the text for insertions while a shifted left arrow deletes a character.

Letter-Writer can copy a line or move a group of lines from one location to another, even to another file, giving the program form-letter capabilities. Lines can also be centered, and right-justification is supported. Optionally, line numbers can be included in the printed text. The program can also add and subtract columns of numbers for light bookkeeping work.

Like most Basic programs, Letter-Writer can't handle more than low-gear typing, but if your typing task is small Letter-Writer may suit your needs. ■

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And a grammar checker, too!

Word Processing— Spelling Checkers

I am a spelling simpleton, and the most reliable proofreading program I've found over the years is titled WIFE/CMD. Thus I was highly impressed last winter when the Dean of our local junior college told me of his soon-to-be-delivered IBM word processing machine: It had a vocabulary of 50,000 words! At probably a dollar a word, it was enough to impress any local taxpayer.

Now there are seven proofreading programs available for the TRS-80 Models I and III with ready-made dictionaries of up to 50,000 words—at a considerably lower price than IBM's. All of them are disk-based, using two or three program disks plus the text-file disk, with some swapping required. They all spot typos and search for misspellings, and all function with standard text files such as Scripsit and Electric Pencil.

None of the programs can fully replace proofreading, since they do not generally test numbers, non-letter characters or single letters. A word can only be checked to see if it is in the dictionary; if "black" were typed but "back" intended, the error goes undetected. But most typos that the proofreading programs miss are obvious to the user. Where the programs shine is in trapping those subtle spelling errors that, if we could recognize them, wouldn't have been made in the first place.

Hexspell 2
Hexagon Systems
P.O. Box 397, Station A
Vancouver, BC V6C 2N2
Canada
Models I & III
\$99 disk

Hexspell 2 was written by Hexagon Systems' Bernard J. Hughes as a Basic program operated under the Microsoft Basic Compiler. The program requires a two-drive, 48K system, and has a dictionary of almost 29,000 words that changes with use to fit the operator's most-used vocabulary.

MODEL I / III

Hexspell continuously displays the text being processed below a divider bar. The scrolling speed can be varied so proofreading may be performed while the program is checking for spelling errors. When an unrecognized word is encountered, the scrolling halts, the word is highlighted in the text, and it also appears above the divider bar.

The operator has the option of leaving the word as it was found, learning the word as a part of Hexspell's vocabulary, or replacing the word. When a replacement is made, the word is immediately checked again for correctness, so a little trial and error may make a trip to Webster's unnecessary. It is then replaced in the text file.

If a choice is made to learn the word, it may still be deleted at the completion of the session or made to replace a word in Hexspell's lexicon. New words go to the top of the list where they are checked first. Less frequently used words are pushed off the bottom of the list. This means that in time the spelling list will become fully tailored to the user's language.

A Clear utility erases the spelling list so a user may construct his own.

Hexspell was not designed to recognize prefixes and suffixes, so each form of the word must be included in the spelling list to be recognized. This limits the word list but prevents exception-to-the-rule errors from slipping by. Unlike earlier versions, Hexspell's vocabulary can be lengthened as well as changed by creating an extended word list with up to 22,000 additional words.

The new model permits proofing numerical data as well as characters, providing Hexspell with the ability to check such items as product numbers and formulae. The program is capable of dealing with

the foreign-language character set in the Model III.

As a compiled Basic program, Hexspell requires that the 12-gran BRUN module of the Microsoft Basic Compiler be on the disk. Any errors crash the program and display the compiler-error message requiring a new start. Because of differing Basic file-handling techniques, Hexspell provides zap information for BRUN for the various operating systems.

The program requires that both disks be used without write-protect tabs, so backups should be used. Hexspell appears a bit slow, and since a dummy file is written to the working disk, it must have free space equal to the length of the document to be processed.

Documentation is clear and complete with a few extra tips in an addendum.

Microproof
Cornucopia Software
P.O. Box 5028
Walnut Creek, CA 94596
Models I & III, 32K
\$59.50 disk

Microproof is a high-powered dictionary program, and boasts a 50,000 word vocabulary in a modular system. Added-cost extras include a correcting feature and patches to operate the spelling program from Scripsit, Electric Pencil, Lazy Writer, Newsprint or CopyArt.

The program requires 32K, and may be



used with a single disk drive with some disk swapping. The vocabulary is expandable up to the limits of the disk, and since compaction presses almost 1,000 words into a single gran, the potential number of words that can be processed is phenomenal.

Two program disks are used in addition to the disk on which the text file is located. Microproof recognizes prefixes, suffixes and hyphenated words, which greatly increase the power of the initial pocket-Webster sized vocabulary, although it lets some exception-to-the-rule words slip by.

The user may choose to identify words added to the spelling list as nouns, verbs, adverbs or adjectives so appropriate prefixes and suffixes are recognized. Thus "arrange v" tells the program to accept "arrange, arranges, arranged, arranging, arrangement, arranger, prearrange," and so on.

Philip Manfield spent 2,000 programming hours writing Microproof and he has developed a machine-language program that appears to work with any of the popular DOSes now on the market. With NEWDOS, however, early versions of the program tended to lop a little off the tail, so the addition of a few extra carriage returns was necessary in the text file. Later versions have corrected this problem and also added a means of purging the dictionary.

The program processes and proofreads the text file, coding its words and comparing them to the spelling catalog. A list of mismatched words is then presented on the screen and may be sent to the printer and to a disk file. Later each word may be entered into the word processing program's global search-and-replace function to make the actual corrections. A separate utility expands the spelling list.

If the correcting feature has been purchased, it presents the user with the unrecognized words one at a time with the option of replacing the word, leaving it as it is, or adding it to the dictionary. The operator may also choose to have the word presented in a limited context at the completion of the session to decide if it is correct.

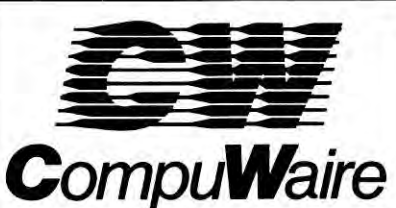
Those purchasing the separate patches may call Microproof from within the word processing program. If used in this manner, the file is written to the work disk for processing and must be saved again on completion of the session. Since the correcting feature takes a bit of space that would otherwise be available for the text file, lengthy files may be truncated. These longer files can be processed without the word processing programs being in operation.

Microproof processes a 1,000-word text file in about 1¼ minutes, not counting setup time.

The newly revised documentation is generally thorough and easy to understand. Cornucopia has been selected to author a version of Microproof for use with the new Electric Pencil 2. The program is truly top drawer, and I recommend it for any serious application.

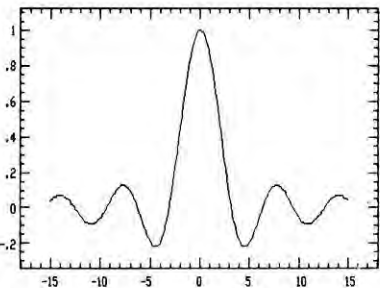
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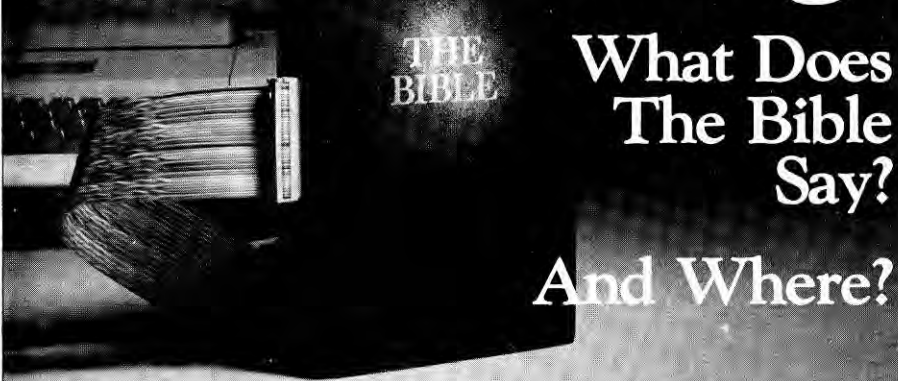
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Requires 48K, 1 disk drive, APPLE or TRS-80
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* Plus \$2.50 postage/handling
TRS-80 is a trademark of Tandy Corp.

Microproof's correcting feature is \$50.
CP/M for Models II and III is \$149.50.

Electric Webster
Cornucopia Software
Models I & III
\$79.50 disk

Electric Webster is the Cadillac of vocabulary programs. It is a new entry from Cornucopia Software with many of the same powerful features of Microproof but also with some important differences.

Webster employs a literal dictionary and does not use prefixes and suffixes to achieve its 50,000-word vocabulary. This prevents the exception-to-the-rule error from slipping by at the expense of some additional disk-space requirements. The errors Webster finds are displayed on the screen and can be sent to the printer.

With the correcting option, questionable words are displayed one at a time. The options are to correct the word, leave it as it was found, display the word in context, display the dictionary, or add the word to the user vocabulary.

If the correct spelling of the word is known, it may be entered and the program moves along to the next word. If the user is uncertain of the correct spelling, he can

*"Electric Webster
is the Cadillac
of vocabulary
programs."*

prefix his best guess with the @ symbol; if correct, the word is changed. But if the word is still in error, the program jumps to the display of the dictionary. The word list can be scrolled to locate the correct spelling of the word, and if found it can be automatically placed in the text in lieu of the error. Scrolling speed may be varied to suit the operator.

The choices of showing the word in context or adding the word to the dictionary function the same as with Microproof.

Another of Webster's utility options provides automatic hyphenation of a text file, and yet another offers simple grammatic, or style, checking of a document. Patches are available to integrate Electric Webster with Lazy Writer, Electric Pencil, Scripsit, Newscript or CopyArt. Integrated with a word processor, Electric Webster makes it possible to write a document; check it for typos, spelling and grammatical errors; automatically hyphenate the text; and send it to the

printer all in a single session.

The size of Webster's dictionary files may result in some disk swapping unless Model I or III double density is used, an 80-track or a third drive is available. Even so, Webster is a very fast program. A smaller (just under 30,000 words) main dictionary is available for users with limited disk capacity.

Early versions of Webster listed all hyphenated words or contractions as errors, but later versions are able to deal with them.

The automatic correcting feature costs \$70. The hyphenation package is \$50, and the grammar-checking package is \$35.

Proofreader and Proof-Edit
Aspen Software
P.O. Box 339, Dept. I
Tijeras, NM 87059
Models I & III
\$54 and \$30 respectively, disk

Proofreader has a 38,000-word vocabulary and can operate in a 32K, one-drive system with a bit of well prompted disk swapping. It works with any TRSDOS-compatible operating system on either the Model I or the Model III.

Proof-Edit corrects the errors in the text found by Proofreader, and can also be used in a two-drive system to update the master

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A B C D

A B C D



A B C D

A B C D

A B C D



a b c d

A B C D E

A B C D

a b c d



A B C D E F

a b c d

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dictionary.

Proofreader takes 4-5 minutes to process any length text file, and while rather slow it does seem to contain the words that most often are spelling problems. The vocabulary can be expanded with an auxiliary dictionary up to the limit of disk space in a rather loosely packed format.

One peculiarity of the system is that plurals are reduced to singular form prior to checking the dictionary and remain as singular entries in the list of unidentified words. Thus TRS-80 becomes TR in the correction list. This method of checking plurals can be disabled, but leaves a potential 10,000 plurals that will be identified as possible errors during the run.

Proofreader resides on two disks with Proof-Edit on another. Proofreader creates a list of errors displayed on the screen, and optionally the errors may be written to a disk file or sent to the printer.

At that point, Proof-Edit takes over. The original text is displayed line by line in context, halting as each word in the error file is encountered. The options at this point are to correct or mark the word. If the choice is to mark the word, the last character is replaced with a #, preserving the text's justification but making it possible to find the error with the word processor's find-and-replace function.

If the choice is to correct the word, a further selection may be made to accept the

*"Chertext . . .
is appropriate
for home use."*

word as it is spelled, correct the word throughout the document, learn the word and add it to the auxiliary dictionary, or correct the word only during the present occurrence.

The documentation is brief but clear and complete, and contains instructions for using the Mini-Ed utility to create auxiliary dictionaries and Dictedit to edit them.

**Chertext
Apparat
4401 South Tamarac Parkway
Denver, CO 80237
Models I & III
\$79.95 disk**

Chertext is delivered as a two-disk dictionary program tailored to fit the user's capacity. Single or double-density versions may be ordered for 35 to 80-track systems with vocabularies that vary from 10,000 to

just over 20,000 words.

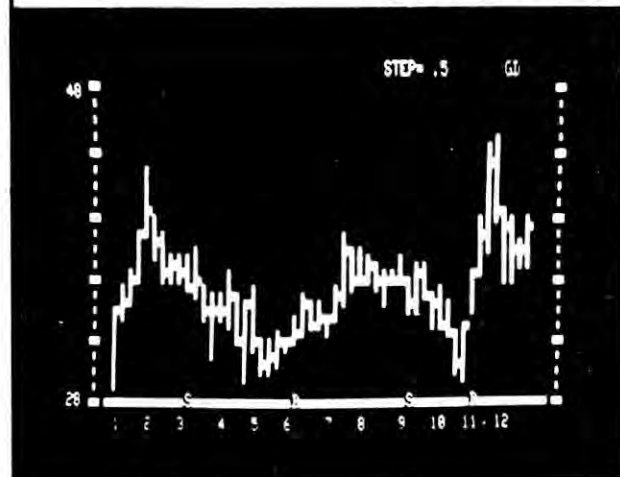
The program may be used as a stand-alone proofreader under NEWDOS or TRSDOS for Model I or III, or may be called up from a patched version of Scripsit. Like most of the other dictionary programs, Chertext makes its first pass at the text to eliminate duplicates and then compares the words found to its own vocabulary. This takes about 1½ minutes for a 100-word file. A selection menu is then presented that permits the user to ignore the word, add it to the dictionary, or mark the word in the file for subsequent review and change. If marked, the last letter is changed to the # character so it may be found and corrected with the word processor's global-search function.

Chertext includes the ability to list or update the dictionary manually. This must be done after each 250 user-added words. The documentation is brief but clear and complete.

Unfortunately, Chertext's word selection includes many that shouldn't be needed by even a poor speller (such as cat and dog) at the expense of words that would trip the average person. This choice may reduce the number of words falsely identified as errors, but it certainly increases the use of an old-fashioned, paper-printed type dictionary.

Since no compression techniques have been employed, the vocabulary is rather brief. Missing, too, is the ability to directly

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change the error without reloading and searching the file in the word processing program. Chertext may not suffice for office use, but is appropriate for home use and would be particularly suitable for a school environment.

Miz'Spell
Programs Unlimited
Dept. 881 M, Box 265
Jericho, NY 11753
Models I & III
\$49.95 disk

Miz'Spell is a twin-disk program written in Basic. It operates under the BRUN module of the Microsoft Basic Compiler, and has a vocabulary of more than 17,000 words with space for an additional 9,000. Special dictionaries may be prepared of 25,000 words.

The program functions on a single drive, and a lowercase driver is included in the program.

As a document is checked, questionable words are highlighted at the top of the screen with a six-choice menu: Ignore causes the program to accept the word as it is spelled, Learn adds it to the dictionary, Delete removes the word from the text file, and Exit abandons the checking process and returns to DOS. The Auto selection assumes that all unknown words are correct and adds them to the dictionary as a quick means of building a new vocabulary file.

The Change option accepts a substitute for the incorrect word and immediately checks the replacement against the dictionary file. In general, words entered in this manner were correctly checked and refused if wrong. But Miz'Spell seemed satisfied to accept plup, qwerty, blugs, klop and snuts.

At the end of the session, the user is given the opportunity to delete words from the dictionary. Words may be learned temporarily for the purpose of working with a certain file, but will not clutter the dictionary in the future. This is useful for dealing with names, addresses and the like.

Miz'Spell uses hash codes rather than storing the actual word, and there may be a now-and-then collision. Codes are stored in 85 areas of the dictionary, so some additions to the vocabulary may be refused even though the file has excess capacity elsewhere.

Scriptit Dictionary
Tandy/Radio Shack
Models I & III
\$149

This program was developed by Software Concepts Inc. of Stamford, CT, and Tandy sells it under license.

Scriptit Dictionary deserves an A+ for its word list, earning top score in the commonly misspelled words which it recognizes. The program provides 34,000 words in its dictionary for the Model I version and offers a 73,000-word capacity for the Model III. Supplemental dictionaries with 845 user

words may be created with 32K machines and 2,045 with 48K.

Scriptit Dictionary displays several lines of text flashing the word in question, with the error listed separately below. It provides an opportunity to skip, correct or add the word. If a correction is to be made, the cursor must be moved to the location that is to be changed; then you may add or delete a character, or truncate the word from the cursor onward. Rather than wait until the end of the session as in other programs, Scriptit Dictionary offers its bailout after each correction with "Are you sure? (Y/N)." Like most of the others, the program uses an output file to contain the errors it finds.

If a word is to be added to the dictionary, the program asks if s is an optional ending, so plurals are recognized without cluttering the file with duplicates. A maximum of 255 words may be added to the dictionary during each session.

In all, Scriptit Dictionary is a good program with a clean display, especially excellent capacity on the Model III, and is bug free. I have only a few picky points: Operation could be speeded if input errors during the correction process could all be handled at the end of the session rather than after each word; the 255-word limitation makes it difficult to create specialized dictionaries of industry jargon; and the hashing technique may let some garbage words slip through.

How the Programs Compare

The programs were tested against Lincoln's *Gettysburg Address*, Dr. Thomas Pollock's *The Hundred Words Most Frequently Misspelled*, his *The Next 550 Words Most Frequently Misspelled*, and this article. The results are shown in Table 1.

Proofreader missed words like *reminisce* and *excitable*; Microproof stumbled on *argument*, *existence*, *endure*, *changing* and *undoubtedly*. Hexspell failed to recognize *writing*, *honored*, *shall*, *afraid*, *especially* and *swimming*. Chertext erred with *believe*, *experience*, *thorough*, *resolve*, *peculiar* and *others*. *Acclaim* tripped up Miz'Spell, as did *bigger*, *equipped* and *minutes*. Electric Webster missed *nobly*, *benefited*, and *psychopathic*.

I have to tip my dunce cap to anyone who could write a dictionary program with its proofreading, spelling-checking capability to spot Pencil's dropped characters and my

own added ones. It's difficult to fault any of these seven ambitious programs, although their virtues are clear.

If one could have the best of all worlds, I would choose Electric Webster's massive expandable dictionary and speed together with Hexspell's instant check of a corrected word, full-text display and one-step correction. I would also add Webster's ability to display the dictionary on the screen, hyphenate automatically, and operate with a variety of operating systems and, if need be, with a single disk drive. To top it all would be Proofreader's word selection. If I could only have one, it would be Electric Webster.

To all of the two-fingered typists in the world, and to those of us who wasted our youth teasing girls instead of learning "I before E except after C," the dictionary utilities are the greatest programs to come along since Electric Pencil.

Grammatik
Aspen Software
P.O. Box 339-M
Tijeras, NM 87059
Models I & III
\$59 disk

Me? Need a grammar checker? I, master of the past-pluperfect tense, who has never dangled a participle, who used to read the dictionary at Lincoln Elementary School for recreation? Ahem. Yes, I do.

Grammatik is not so much designed to correct grammar as it is to point out elements of poor style. The program checks a text file for matches to its 500-phrase dictionary. These have been identified as being poor choices in written communication, although not always outright errors. As the document is reviewed, the text appears on the screen, pausing to identify each phrase as it is found and providing an alternative:

----->as of this date
 * At sentence 32 — 'W' — Wordy phrase
 * Suggestion: today

During the process, Grammatik also checks to see that each sentence begins with a capital letter and spots a capital within a word, opening quotes or parenthesis that don't have closing companions, and words and punctuation that aren't correctly repeated.

Options include sending only the list of

Words Not Recognized				
	A	B	C	D
Microproof	3	4	38	13
Electric Webster	2	1	22	53
Hexspell	15	16	127	54
Proofreader	1	2	8	9
Chertext	19	25	208	137
Miz'Spell	9	15	121	102
Scriptit Dictionary	3	0	14	61

Table 1

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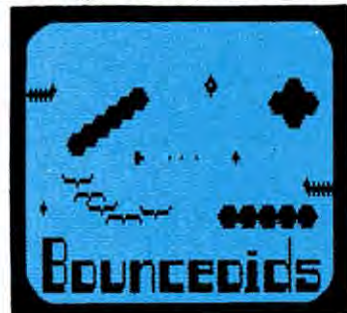
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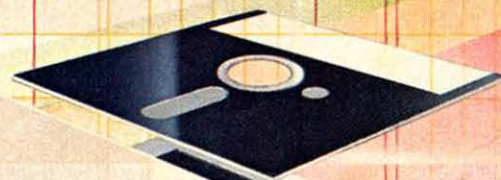
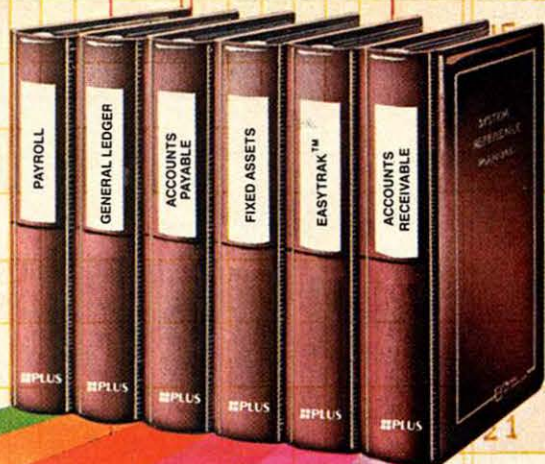
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errors to a disk file or to the printer, sending the text file to disk with the errors to the screen. The writer may choose to pause at each error or to complete the entire document non-stop. If errors are saved on disk together with the text, then the search-and-replace function may be used to locate and alter the phrases.

At the end of the document, a summary lists a number of facts about the text:

Summary for TEST/TXT / Problems detected: 12
 # sent: 65 ; # words: 1449
 avg sent len: 24.0 ; avg word len: 4.3
 # questions: 0 ; # imperatives: 0
 short sent (<14 wds): 20 ; long sent (>30 wds): 12
 longest 34 wds at sent #57 ; shortest 3 wds at #49
 to be's 45 ; prepositions: 183
 User category totals:
 NONE

The summary provides clues to the overall readability of the document; too many long sentences may make the text awkward, and too many short ones give a choppy appearance. If the average word is large, it may spell trouble if writing for children; if they are small, the writing may itself seem child-like. Unanswerable questions in text or too many exclamation points may not be desirable. If the longest sentence is indeed a long one, it may signal the need of repair work. The various forms of "to be" frequently get writers into trouble, and too many prepositions (especially I) may make the writer look like an egomaniac. The user category totals refer to as many as seven

"Perhaps Grammatik's most valuable application is defending a writer against his own expertise."

words that may be defined as a writer's weak points to beware of.

Perhaps Grammatik's most valuable application is defending a writer against his own expertise. In all of our professions, the jargon that is so natural to all of us is in danger of slipping unnoticed into the uncomprehending outside world. A dictionary file composed of our own buzz words provides strong insurance that we will be understood by the common folk.

An architect might well write to his colleague suggesting "bilateral equilateral fenestration," but when writing to the businessman who is paying for the building, he'd be better off to recommend, "that we have the same number of windows on each side."

Grammatik also includes a profile utility

that sorts the words in the text by number of occurrences and then alphabetically. This alerts the writer to over-used words and may provide a clue to revision.

A second phrase list signals writers when a potentially sexist phrase or word has slipped into the text (i.e., chairman). Additional dictionaries may be created to suit individual style requirements.

The error categories provided for by Grammatik include: archaic usage, unbalanced parenthesis or brackets, capitalization error, doubled word or punctuation, gender-specific term, informal usage (ain't), jargon or technical, awkward, commonly misused word, overworked or trite, punctuation error, redundant phrase, spelling error (special cases), trademark, improper usage, vague adverb, wordy phrase, or user-specified error type.

A mini-editor comes with Grammatik to create additional phrase dictionaries together with a utility to sort them.

Grammatik would be particularly useful to a number of technical people who now find themselves promoted to the paperwork level, or to foreign-born professionals who have to deal with upside-down English. It would be especially useful in a school environment, perhaps the English Comp or Journalism I class. But any member of jargon-filled profession who must communicate with the outside world will find Grammatik as the best defense against his own superior knowledge. ■

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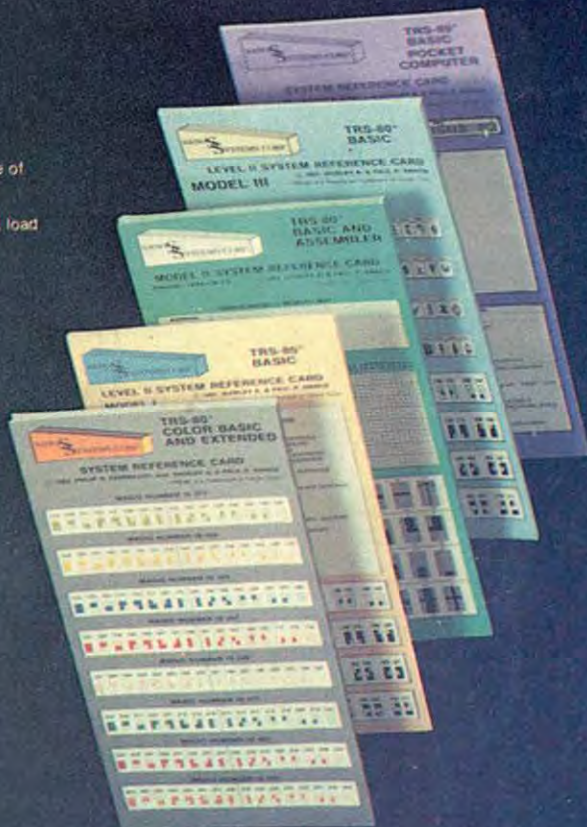
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This program has nothing to do with potatoes.

Sling Some Hash

Ken Knecht
1340 West 3rd Street #130
Yuma, AZ 85364

I have been experimenting with searching and storing items in a list. Hashing is one way to store and retrieve items in an unsorted list, while the binary search is useful in retrieving items from a sorted list.

Let's start with a list of 50 strings and a string array dimensioned for 63 items. The idea is to convert each string to a unique number between zero and 63. Each item will be placed in an

empty array element. If the strings to be input are not previously known, this can be difficult. Some strings are bound to convert to an already used number. To avoid a collision, the hashing routine should reconvert the string to an unused number.

A hashing routine that will generate unique numbers is needed.

Program Listing 1, my first try, works well for the first 37 words, with an average of only 2 collisions. However, shortly thereafter everything goes to pieces (Table 1).

An examination of the resulting array (Table 2), shows the words evenly spread throughout the array before they started running out of vacant places. In desperation, the program starts putting strings in vacant places at the high end of the array. When a later string hashing func-

tion points to that spot in the array, a collision is caused.

The Program

A 63 place array (a manageable binary number) keeps loading time short.

One of the numbers generated is Z in line 20. Assuming the first letter of every string is uppercase, this will be a number from 32-45.

Next the ASCII codes of letters in the string are totalled placing

the average (Y) in line 40. In line 60, 70 is subtracted from Y, giving a result between minus 5 and 20. Y is set to its absolute value if it is a negative number (ABS(Y)).

The program checks the array for a vacant space. In line 60, element Y is checked. If it is full add Y to Y/2 in line 80 resulting in a number between zero and 30. The first half of the array is now overlapped between zero and 20.

Y and Z are added in line 110,

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Basic Level II
Model I and III
16K RAM

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5 LPRINT"WORD", "KEYS", "SEEKS", "AVERAGE"
10 CLEAR5000:DIMS(63):A=0:DIMA(63)
15 FOR N = 1 TO 50
20 A=A+1:PRINTA;:INPUTBS:Z=INT(ASC(BS)/2):Y=127:B=1
30 FORX=1:TOLEN(BS)
40 Y=Y+ASC(MID$(BS,X,1))
50 NEXTX:Y=(INT(Y/LEN(BS)))-70:Y=ABS(Y)
60 IFAS(Y)<>" THENB=B+1:GOTO80
70 GOTO200
80 Y=Y+INT(Y/2)
90 IFAS(Y)<>" THENB=B+1:GOTO110
100 GOTO200
110 Y=(Y+2)AND63
120 IFAS(Y)<>" THENB=B+1:GOTO140
130 GOTO200
140 Y=(Z+2-27)AND63
150 IFAS(Y)<>" THENB=B+1:GOTO170
160 GOTO200
170 FORY=63 TO 0 STEP-1
180 IFAS(Y)" THENB=B+1:GOTO210
190 B=B+1:NEXTY:PRINT"NO MORE ROOM":GOTO210
200 PRINT"SEEKS FOR THIS ITEM";B:AS(Y)=BS:A(Y)=B
210 Y=0:Z=0:FORX=0:TO63
220 IFA(X)>0:THENY=Y+A(X):Z=Z+1
230 NEXTX
240 PRINT"AVERAGE SEEKS =" ;Y/2:GOSUB260
250 NEXT N:GOTO270
260 LPRINTBS,Z,Y,Y/2:RETURN
270 LPRINTCHR$(12);"POSITION","STRING","SEEKS"
280 FORX=0 TO 63:LPRINT X, AS(X), A(X):NEXT:END

```

Program Listing 1

WORD	KEYS	SEEKS	AVERAGE
NEELANDS	1	1	1
NEBEKER	2	2	1
NAGALA	3	3	1
MURRIETTA	4	4	1
NATHAN	5	5	1
NAVAJO	6	6	1
MURILLO	7	7	1
NALLEY	8	9	1.125
NAGLE	9	10	1.11111
NEAHR	10	11	1.1
MOYNES	11	12	1.09091
NATIONAL	12	15	1.25
MULLIGAN	13	17	1.30769
MURPHY	14	18	1.28571
NOYLE	15	19	1.26667
MUELLER	16	21	1.3125
MURRICK	17	23	1.35294
NOBRAWY	18	26	1.44444
MULDER	19	28	1.47368
MULLIN	20	30	1.5
NAYLOR	21	31	1.47619
MOTTER	22	33	1.5
MURRAY	23	35	1.52174
MORROW	24	37	1.54167
NORSE	25	39	1.56
HUNDY	26	40	1.53846
MYERS	27	41	1.51852
HOUNT	28	43	1.53571
HUNOZ	29	45	1.55172
MURRY	30	46	1.53333
MULLINS	31	49	1.58065
MONDAY	32	54	1.6875
MUTH	33	55	1.66667
MOSS	34	61	1.79412
MOXLEY	35	68	1.94286
NEAD	36	72	2
MOUNTS	37	80	2.16216
MOWEN	38	83	2.18421
NANCE	39	92	2.35897
NAVA	40	94	2.35
NASH	41	104	2.53659
NEEDLES	42	107	2.54742
NEECE	43	110	2.55814
NEBLINA	44	121	2.75
NEAL	45	133	2.95556
NAVARRO	46	136	2.95652
MUNK	47	151	3.21277
MUSIC	48	169	3.52083
MUSE	49	190	3.87755
HUMAN	50	214	4.28

Table 1

resulting in a range of 32-75. The computer will next AND with 63 to limit the number to 63 or less. This gives some overlap to the low end of the array if the number is greater than 63.

The last hashing try is to add $Z + Z - 27$ in line 140 resulting in 37-63. Now almost every segment in the array is covered by at least two hash functions. If none of these find the string a home, we are reduced to looking sequentially from 63 to zero for a vacant space and placing the number in it.

To search for strings, use the same hash functions looking for a match or vacant spot. The program will not perform if the string is not on the list. If a vacant spot did not show up using the first four hash functions there would have been 17 seeks (the first four hash functions plus 13-63 to 50, the first vacant

space). If the array were filled it would end up being searched, defeating the idea behind hashing.

The Binary Search

To find a given item in an ordered list, for example, a list of names in alphabetical order, another approach should be used. One such method is the binary search.

The binary search basically cuts the area to be searched in half until a match or a search area of zero is found. The zero indicates the item was not on the list. To illustrate this I used Program Listing 2. This program was more difficult to write than I initially had anticipated. Be sure not to have a name out of alphabetical order to save debugging.

Fifty names (in alphabetical order) are entered into the A\$ array with lines 30 and 40. Line 50

sets variables D and C to the center of the array, while line 60 requests the name to be searched for. The first comparison begins in line 70 and continues cutting the remaining list in half and searching until the match is found (line 80), the program aborts (line 90), or strings to test run out. In a list of 50 names a match should be found in six tries or less or abort on the seventh. A list of 100 names would take one additional try. A list of 800 names takes ten tries or less to find a match; the eleventh tells us the string does not appear on the list.

In line 60 an exception is made for a single case, the last name on the list. Using this search algorithm we have an example of Zeno's Dichotomy Paradox—if you keep covering half the remaining distance to your goal you will never get there. The program normally will not find this name.

A binary search is very efficient, the longer the list the more so; the only problem being the list has to be ordered (sorted) beforehand. If you have an ordered list, give binary searching a try. It uses little memory and saves searching endlessly through long lists. ■

```

5 LPRINT"STRING", "SEEKS"
10 CLEAR 5000:N=50:DIMAS(N)
20 PRINT"INPUT NAMES IN ALPHABETICAL ORDER":PRINT
30 FOR X = 1 TO N
40 PRINTX:INPUTA$(X):NEXT
50 D=N/2:C=D:ES="":A=1
60 INPUT"NAME TO SEARCH FOR":A$:IFA$(N)=A$THEN130
70 BS=A$(INT(C))
80 IFBS=A$THEN130
90 IF D<.5 THEN ES="NOT FOUND":GOTO130
100 IFBS>A$ THEN C=C-D/2:GOTO120
110 IFBS<A$ THEN C=C+D/2
120 D=D/2:A=A+1:GOTO70
130 LPRINT A$,A,ES:GOTO 50

```

Program Listing 2

POSITION	STRING	SEEKS
0		0
1		0
2		0
3		0
4		0
5	NATIONAL	3
6	NEEDLES	3
7		0
8		0
9		0
10		0
11	NAVARRO	3
12	NEECE	3
13	MULLINS	3
14	NOWERAY	3
15		0
16		0
17		0
18		0
19	NEELANDS	1
20	NEBEKER	1
21	MAGALA	1
22	MURRIETTA	1
23	MOMEN	3
24	NATHAN	1
25	NAVAJO	1
26	MURILLO	1
27	NACLE	1
28	NEAHR	1
29	NAYLOR	1
30	MOYNES	1
31	MULLIGAN	2
32	MURPHY	1
33	MOYLE	1
34	MUNDY	1
35	MYERS	1
36	MUELLER	2
37	MURRICK	2
38	MURRY	1
39	NALLEY	2
40	MULDER	2
41	MUTH	1
42	MULLIN	2
43		0
44	NUMAN	24
45	MOTTER	2
46	MURRAY	2
47	MUSE	21
48	MORROW	2
49	NORSE	2
50	MUSIC	18
51	NEAD	4
52	NAVA	2
53	MUNK	15
54	MOUNT	2
55	MUNOZ	2
56	NEAL	12
57	NEBLINA	11
58	NASH	10
59	NANCE	9
60	MOUNTS	8
61	MOXLEY	7
62	MOSS	6
63	MONDAY	5

Table 2

STRING	SEEKS	
ABS	5	
ADDITION	6	
AND	4	
APPEND	5	
ASC	6	
ASSEMBLY	3	
ATN	5	
AUTO	6	
BASIC	4	
BEDIT	5	
BINARY	6	
BREAK	2	
BREAKPOINT	6	
CALL	5	
CHAIN	4	
CHAINING	6	
CHANGE	5	
CHR\$	3	
CLOSE	6	
COM	5	
CONCATENATION	4	
COS	6	
CRT	5	
CRTG	6	
CRTI\$	1	
CRTR	5	
CRTY	6	
CRTY	4	
CVD	5	
CVI	6	
DATA	3	
DATE\$	5	
DEBUG	6	
DECIMAL	4	
DEF	5	
DELETE	6	
DEMONSTRATION	2	
DIC	6	
DIM	5	
DIRECT	4	
DISKETTES	6	
DISPLAY	5	
DIVISION	3	
DUMP	6	
DUPLICATE	5	
EDITOR	4	
END	6	
EOF	5	
ERROR	1	
EXP	7	NOT FOUND
GOTO	7	NOT FOUND
CONSTANT	7	NOT FOUND
AAA	7	NOT FOUND
DDD	7	NOT FOUND

Table 3

Controlling print density and size options of the MX-80 while in Scripsit.

Printing Perfection

John T. Phillip, MD
118 West Alosta #2
Glendora, CA 91740

Epson's MX-80 printer is one of today's best values. It features an easily replaceable print head that produces a 9 by 9 dot matrix, lowercase with descenders, 64 graphics characters, and a choice of four print densities and four print sizes.

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You can also vary print size. The standard (default) size is 80 characters per line. The condensed character size prints 132 characters per line. You can also print the characters double-width. If standard characters are printed double-width, the result is 40 characters per line. If the condensed character set is printed double-width, 66 characters are printed on each line.

Standard and standard, double-width characters may be printed with any of the four print densities. Condensed and condensed, double-width characters cannot be printed enhanced, but may be printed double-strike.

Table 1 lists the 12 options the MX-80 provides for printouts.

Software controls these options. You can insert LPRINT CHR\$(X) control codes into your programs to tell the printer what to do (see Table 2).

But what if you are using a word processing program like Scripsit? How can you use Scripsit to control the various print density

Density	Size	Characters/line
Normal	Standard	80
Enhanced	Standard	80
Double-strike	Standard	80
Enhanced, double-strike	Standard	80
Normal	Standard, double-width	40
Enhanced	Standard, double-width	40
Double-strike	Standard, double-width	40
Enhanced, double-strike	Standard, double-width	40
Normal	Condensed	132
Double-strike	Condensed	132
Normal	Condensed, double-width	66
Double-strike	Condensed, double-width	66

Table 1

LPRINT CHR\$(X)	Effect	Code
CHR\$(14)	Turn on double width	(SO)
CHR\$(20)	Turn off double width	(DC4)
CHR\$(15)	Turn on condensed	(SI)
CHR\$(18)	Turn off condensed	(DC2)
CHR\$(27);CHR\$(69)	Turn on emphasized	(ESC E)
CHR\$(27);CHR\$(70)	Turn off emphasized	(ESC F)
CHR\$(27);CHR\$(71)	Turn on double-strike	(ESC G)
CHR\$(27);CHR\$(72)	Turn off double-strike	(ESC H)

Table 2

First @T encountered	—	Move up one-half line
Second @T encountered	—	Move back down to baseline
First @B encountered	—	Move down one-half line
Second @B encountered	—	Move back up to baseline
@Y @T	—	Set 12 pitch
@Y @B	—	Set 10 pitch

Table 3

First @T encountered	—	Start enhanced printing
Second @T encountered	—	End enhanced printing
First @B encountered	—	Start double strike
Second @B encountered	—	End double strike
@Y @T	—	Start condensed printing
@Y @B	—	End condensed printing

Table 4

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and size options of a sophisticated printer like the MX-80?

Superscript from Acorn Software corrects Scripsit's defects and allows you to use the MX-80 to better advantage. This program applies patches to a copy of Scripsit so that the disk directory may be read (with the ?D command) and files killed (K command) without exiting Scripsit. The patched copy of Scripsit, really SCRIPSIT/LC plus SuperScript, is renamed SCRIPT/CMD.

SCRIPT/CMD provides specific printer drivers (machine-language programs that tell the printer what to do) for many of the text quality printers (such as the NEC Spinwriter Model 5530 and the Diablo). Superscripting, subscripting, changing the type pitch and boldface printing are all possible with SCRIPT/CMD. Since there are many other printers on the market, SCRIPT/CMD provides a custom parallel printer driver. You can customize this driver by setting up the driver program with the special codes that tell the particular printer to move the paper up a half line and then back to the baseline (for superscripting), to move down a half line, then back to the baseline (for subscripting), to change type pitch to 10 or 12, and others.

The MX-80 printer does not have those capabilities, but we can customize the printer driver with the codes for the different character densities and sizes the MX-80 can produce. In effect, when SCRIPT/CMD thinks it is sending the code to the printer for move up half a line, it is actually sending the code which the MX-80 recognizes as start enhanced printing, and so on.

SuperScript adds the control codes shown in Table 3 to Scripsit (remember, @ is Scripsit's control key). You can substitute MX-80 control codes for these to specify print density (see Table 4).

Producing a custom parallel driver for the MX-80 is simple. Follow the documentation for use of SuperScript, and select the custom parallel printer driver (RENAME CUSTOM/PAR DRIVER/CMD Enter). Answer the special questions as shown in Fig. 1. Note: You must answer the Set 1/120" Spacing (Bold): question with Enter. You *cannot* answer it with an MX-80 control code, be-

"Superscripting and subscripting are possible with SCRIPT/CMD."

cause it sends a mandatory backspace code (08 hex) when the boldface command (@Y @U) is executed. Since the MX-80 cannot backspace, this results in each letter being printed twice, or single letters separated by underline characters.

Points to Remember

After you have modified SCRIPT/CMD to use some of the MX-80's capabilities keep in mind the following points when you use these new control codes.

Control codes affect the *entire* line they are on when the line is printed. For example, you cannot print one word of a line enhanced and leave the others normal. Set the window size (W =) in Scripsit to the page width (right margin minus left margin) you will use on the printer *before* inserting the printer control codes into the text, so you can tell where the special features begin and end.

Starting codes (first @T, first @B, and @Y @T) affect the line they are on. That line will be the first line of enhanced, double-strike, or condensed printing. Ending codes (second @T, second @B, and @Y @B) also affect the line they are on, ending the special printing feature with that line. The line preceding the line with the ending

```
Superscript Up (-.5 LF): 1B 45 Enter
Superscript Down (.5 LF): 1B 46 Enter
Subscript Down (.5 LF): 1B 47 Enter
Subscript Up (-.5 LF): 1B 48 Enter
Set 1/120" Spacing (Bold): Enter
Set 12 Pitch (10/120 per char): OF Enter
Set 10 Pitch (12/120 per char): 12 Enter
```

Figure 1

code will be the *last* line with enhanced, double-strike, or condensed printing.

The control codes are not printed. They appear on the screen as graphics characters, but take up no space in the printout. Use @S (Scripsit's insert mode) to insert them anywhere in the line—even between the letters of a word if you want!

It makes a great deal of difference whether a @T or @B is the first or second control code encountered in the text since the control codes actually sent to the printer are different. All @T and @B codes look the same on the screen. SCRIPT/CMD remembers whether it has encountered @T or @B before, and the MX-80 remembers the last code it was sent (even if the printout ends or you stop printing by pressing clear in the middle of the text). When you resume printing, what you intend to be the first control code in the text may be interpreted as the second, since SCRIPT/CMD saw one in the previous printing. This results in the special features starting and ending at times you do not expect. If this happens save the text, reset the computer and reload Scripsit (SCRIPT/CMD). Reload the text, turn off the MX-80 and turn it on again. This re-initializes SCRIPT/CMD and the MX-80 cancelling all special features so the first @T or @B in the text will be the first encountered while printing.

Always use @T and @B in pairs in the text. When printing is complete, the MX-80 should be back in standard density, 80 characters per line. *A*lways add a last line to the text consisting only of control characters turning off all special features left on at the end of printing. This will ensure that the control codes will be interpreted properly during the next printout.

You can combine control codes. The first @T @B encountered will start enhanced, double-strike printing. The second @T @B will end it. If enhanced printing is already on, SCRIPT/CMD will add double-strike when it encounters a @B.

@B @Y @T starts condensed, double-strike. Another @B turns off the double-strike, leaving condensed, normal density printing. @B @Y @B ends both features.

You cannot combine condensed printing with enhanced printing. If SCRIPT/CMD encounters a @T while printing condensed characters it will then print enhanced, normal sized characters. The condensed character size will be cancelled. However, the next @T encountered will turn off the enhanced printing and resume condensed printing. The MX-80 remembers that condensed printing has never been cancelled with a @Y @B.

Superscript does not have enough "customizable" codes to include control of double-width printing from within Scripsit. The code to turn on double-width printing is OE; you may substitute it for another code when you customize the printer driver, but you will lose one of the other features. There is no need to include the code for turning off double width (14 hex), since it is automatically cancelled at the end of each line. ■

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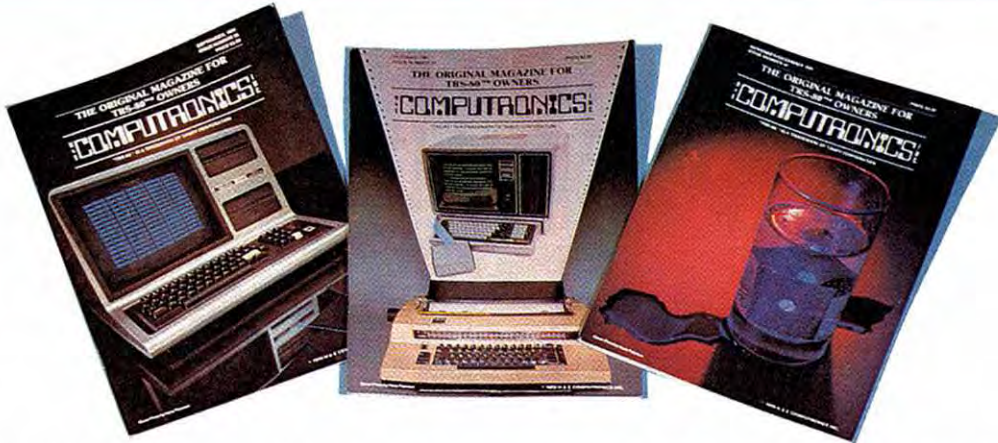
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3 DATE	Time between dates	61 DISCBAL	True rate on discounted loan
4 DAYYEAR	Day of year a particular date falls on	62 MERGANAL	Merger analysis computations
5 LEASEINT	Interest rate on lease	63 FINRAT	Financial ratios for a firm
6 BREAKEVN	Breakeven analysis	64 NPV	Net present value of project
7 DEPRSL	Straightline depreciation	65 PRINDLAS	Laspeyres price index
8 DEPRSY	Sum of the digits depreciation	66 PRINDPA	Paasche price index
9 DEPRDB	Declining balance depreciation	67 SEASIND	Constructs seasonal quantity indices for company
10 DEPRDDB	Double declining balance depreciation	68 TIMETR	Time series analysis linear trend
11 TAXDEP	Cash flow vs. depreciation tables	69 TIMEMOV	Time series analysis moving average trend
12 CHECK2	Prints NEBS checks along with daily register	70 FUPRINF	Future price estimation with inflation
13 CHECKBK1	Checkbook maintenance program	71 MAILPAC	Mailing list system
14 MORTGAGE/A	Mortgage amortization table	72 LETWRT	Letter writing system-links with MAILPAC
15 MULTMON	Computes time needed for money to double, triple, etc.	73 SORT3	Sorts list of names
16 SALVAGE	Determines salvage value of an investment	74 LABEL1	Shipping label maker
17 RRVARIN	Rate of return on investment with variable inflows	75 LABEL2	Name label maker
18 RRCONST	Rate of return on investment with constant inflows	76 BUSBJD	HOME business bookkeeping system
19 EFFECT	Effective interest rate of a loan	77 TIMECLCK	Computes weeks total hours from timeclock info.
20 FVAL	Future value of an investment (compound interest)	78 ACCTPAY	In memory accounts payable system-storage permitted
21 PVAL	Present value of a future amount	79 INVOICE	Generate invoice on screen and print on printer
22 LOANPAY	Amount of payment on a loan	80 INVENT2	In memory inventory control system
23 REGWITH	Equal withdrawals from investment to leave 0 over	81 TELDIR	Computerized telephone directory
24 SIMPDISK	Simple discount analysis	82 TIMUSAN	Time use analysis
25 DATEVAL	Equivalent & nonequivalent dated values for oblig.	83 ASSIGN	Use of assignment algorithm for optimal job assign.
26 ANNUDEF	Present value of deferred annuities	84 ACCTREC	In memory accounts receivable system-storage ok
27 MARKUP	% Markup analysis for items	85 TERMSPAY	Compares 3 methods of repayment of loans
28 SINKFUND	Sinking fund amortization program	86 PAYNET	Computes gross pay required for given net
29 BONDVAL	Value of a bond	87 SELLPR	Computes selling price for given after tax amount
30 DEPLETE	Depletion analysis	88 ARBCOMP	Arbitrage computations
31 BLACKSH	Black Scholes options analysis	89 DEPRSF	Sinking fund depreciation
32 STOCVAL1	Expected return on stock via discounts dividends	90 UPSZONE	Finds UPS zones from zip code
33 WARVAL	Value of a warrant	91 ENVELOPE	Types envelope including return address
34 BONDVAL2	Value of a bond	92 AUTOEXP	Automobile expense analysis
35 EPSEST	Estimate of future earnings per share for company	93 INSFIL	Insurance policy file
36 BETAALPH	Computes alpha and beta variables for stock	94 PAYROLL2	In memory payroll system
37 SHARPE1	Portfolio selection model-i.e. what stocks to hold	95 DILANAL	Dilution analysis
38 OPTWRITE	Option writing computations	96 LOANAFDD	Loan amount a borrower can afford
39 RTVAL	Value of a right	97 RENTPRCH	Purchase price for rental property
40 EXPVAL	Expected value analysis	98 SALELEAS	Sale-leaseback analysis
41 BAYES	Bayesian decisions	99 RRCONVBD	Investor's rate of return on convertible bond
42 VALPRINF	Value of perfect information	100 PORTVAL9	Stock market portfolio storage-valuation program
43 VALADINF	Value of additional information		
44 UTILITY	Derives utility function		
45 SIMPLEX	Linear programming solution by simplex method		
46 TRANS	Transportation method for linear programming		
47 EOQ	Economic order quantity inventory model		
48 QUEUE1	Single server queueing (waiting line) model		
49 CVP	Cost-volume-profit analysis		
50 CONDPROF	Conditional profit tables		
51 OPTLOSS	Opportunity loss tables		
52 FQOQ	Fixed quantity economic order quantity model		
53 FGEOVSH	As above but with shortages permitted		
54 FGEOQPB	As above but with quantity price breaks		
55 QUEUECB	Cost-benefit waiting line analysis		
56 NCFANAL	Net cash-flow analysis for simple investment		
57 PROFIND	Profitability index of a project		
58 CAPI	Cap. Asset Pr. Model analysis of project		

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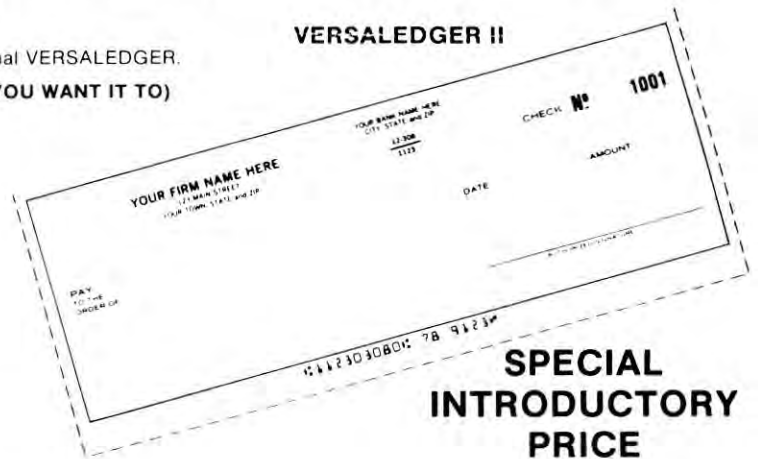
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VERSALEDGER II is a complete accounting system that grows as you or your business grows. To start, your **VERSALEDGER II** acts as a simple method of keeping track of your checkbook. Just enter your check number, date and whom the check is made out to. As you or your business grows, you may add more details to your transactions account number, detailed account explanations, etc.

- **VERSALEDGER II** is an expanded and enhanced version of our original **VERSALEDGER**.
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- **VERSALEDGER II** can be used as a small personal checkbook register. **(IF YOU WANT IT TO)**
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- **VERSALEDGER II** stores all check information forever. **(IF YOU WANT IT TO)**
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- **VERSALEDGER II** can handle more than one checkbook. **(IF YOU WANT IT TO)**
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- **VERSALEDGER II** prints balance sheets and income statements. **(IF YOU WANT IT TO)**
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HOW IT WORKS

VERSAPAYROLL is a complete menu driven payroll system that grows as you or your business grows. Your **VERSAPAYROLL** acts as a simple payroll system keeping track of all government required payroll information. Just enter the employees, **VERSAPAYROLL** will perform all the necessary payroll calculations automatically and display to totals on your screen. The user has complete control to accept the totals, to print or not print out a check and to post or not post the total to our **VERSALEDGER** system.

- **VERSAPAYROLL** automatically prints out your **PAYROLL** checks. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** allows you to override any payroll deduction. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** automatically posts all checks written to our **VERSALEDGER** system. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** allows the user to print out **PAYROLL** checks one at a time. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** allows the user to print out all your **PAYROLL** checks at the same time. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** gives you a summary of any employee's year to date payroll totals or all employee totals at any time. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** will allow you to correct any error made at any time and automatically refigure all totals. **(IF YOU WANT IT TO)**
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- **VERSAPAYROLL** allows for all of the standard deductions plus state, city and three miscellaneous deductions. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** prints all government required reports. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** permanently stores all **PAYROLL** transactions. **(IF YOU WANT IT TO)**
- **VERSAPAYROLL** HAS AN ALMOST UNLIMITED CAPACITY

Can handle up to 300 employees on a TRS-80 MODEL I, 600 employees on a TRS-80 MODEL III, 1200 employees on a TRS-80 MODEL II, 500 employees on an APPLE II, 600 employees on any single density 8" CP/M computer and almost unlimited capacity on hard disk systems.

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*** ESSENTIAL UTILITY PROGRAMS FOR EVERY TRS-80 OWNER ***

Facts About Racet Computes Utility Programs

- *** ALL PROGRAMS ARE WRITTEN IN MACHINE LANGUAGE
- *** ABSOLUTELY NO KNOWLEDGE OF MACHINE LANGUAGE IS NECESSARY TO USE ANY OF THE UTILITY PROGRAMS
- *** EACH UTILITY PROGRAM IS CALLED UP FROM **BASIC** USING THE SIMPLE BASIC COMMANDS PROVIDED
- *** EACH UTILITY PROGRAM COMES WITH A **RACET COMPUTES** INSTRUCTION MANUAL
- *** EACH INSTRUCTION MANUAL INCLUDES SEVERAL EXAMPLES OF UTILITY USAGE
- *** EACH UTILITY ALLOWS THE USER TO PERFORM CERTAIN BASIC OPERATIONS TEN, TWENTY OR MORE TIMES FASTER THAN THE EQUIVALENT BASIC ROUTINE (FOR EXAMPLE, **GSF** CAN SORT AN ARRAY OF 1000 RANDOM NAMES INTO ALPHABETICAL ORDER IN UNDER 9 SECONDS!!)

GSF (GENERALIZED SUBROUTINE FACILITY)

- SORTS 1000-ELEMENT ARRAYS IN 9 SECONDS
- SORTS UP TO 15 ARRAYS SIMULTANEOUSLY (MIXED STRING, FLOATING POINT AND INTEGER)
- SORTS SINGLE OR MULTIPLE SUBSTRINGS AS ASCENDING OR DESCENDING SORT KEYS
- READ AND WRITE ARRAYS TO CASSETTE
- COMPRESS AND UNCOMPRESS DATA IN MEMORY
- MOVE ARRAYS IN MEMORY
- DUPLICATE MEMORY
- FAST HORIZONTAL AND VERTICAL LINES
- SCREEN CONTROLS FOR SCROLLING THE SCREEN UP, DOWN, LEFT, RIGHT AND FOR GENERATING INVERSE GRAPHIC DISPLAYS
- ADDS PEEKS AND POKES (MODEL-II VERSION ONLY)

MODEL-I VERSION	\$25.00
MODEL-II VERSION	\$50.00
MODEL-III VERSION	\$30.00

DSM (DISK SORT MERGE)

- SORT AN 85K DISKETTE IN LESS THAN THREE MINUTES!
- SORTS LARGE MULTIPLE DISKETTE FILES ON A MINIMUM ONE DRIVE SYSTEM
- ALL RECORDS ARE PHYSICALLY REARRANGED-NO KEY FILES ARE REQUIRED
- SORTS RANDOM FILES CREATED BY **BASIC**, INCLUDING FILES CONTAINING SUB-RECORDS SPANNING SECTORS
- SORTS ON ONE OR MORE FIELDS IN ASCENDING OR DESCENDING ORDER
- FIELDS MAY BE STRINGS, INTEGER, BINARY INTEGER OR FLOATING POINT
- THE SORTED OUTPUT FILE MAY OPTIONALLY HAVE FIELDS DELETED, REARRANGED OR PADDED
- SORT COMMANDS CAN BE SAVED FOR REUSE
- SINGLE SORT, MERGE, OR MIXED SORT/MERGE OPERATIONS MAY BE PERFORMED
- SORTED OUTPUT MAY BE WRITTEN TO A NEW FILE, OR REPLACE THE ORIGINAL INPUT FILE

MODEL-I VERSION	\$75.00
MODEL-II VERSION	\$150.00
MODEL-III VERSION	\$90.00

KFS-80 (KEYED FILE SYSTEM)

- CREATE ISAM FILES (INDEX SEQUENTIAL ACCESS METHOD)
- ALLOWS INSTANT ACCESS TO ANY RECORD ON YOUR DISKETTE
- INSTANTLY RETRIEVE RECORDS FROM MAILING LISTS, INVENTORY, ACCOUNTS RECEIVABLE OR VIRTUALLY ANY APPLICATION WHERE RAPID ACCESS IS REQUIRED TO NAMED RECORDS
- PROVIDES THE BASIC PROGRAMMER THE ABILITY TO RAPIDLY INSERT OR ACCESS KEYED RECORDS IN ONE OR MORE DATA FILES
- RECORDS ARE MAINTAINED IN SORTED ORDER BY A SPECIFIED KEY
- RECORDS MAY BE INSERTED OR RETRIEVED BY SUPPLYING THE KEY
- RECORDS MAY BE RETRIEVED SEQUENTIALLY IN SORTED ORDER
- RAPID ACCESS TO ANY FILE REGARDLESS OF THE NUMBER OF RECORDS
- MULTIPLE INDEX FILES CAN BE EASILY CREATED WHICH ALLOWS ACCESS OF A SINGLE DATABASE BY MULTIPLE KEYS (FOR EXAMPLE, BY BOTH NAME AND ZIP-CODE)

MODEL-I VERSION	\$100.00
MODEL-II VERSION	\$175.00
MODEL-III VERSION	\$100.00

MAILLIST (A MAILING LIST DATABASE SYSTEM)

- IDEALLY SUITED FOR ORGANIZATION MAILING LISTS, PERSONAL ADDRESSBOOK, OR MAILING LISTS BASED ON DATES SUCH AS REMINDERS FOR BIRTHDATES OR DUES PAYABLE
- USED ISAM (INDEX SEQUENTIAL ACCESS METHOD) FOR RAPID ACCESS TIMES
- YOUR **MAILLIST** CAN ALWAYS BE SORTED AND MAINTAINED BY UP TO FOUR INDEX FILES (FOR EXAMPLE, NAME, ZIPCODE, DATE AND NUMBER)
- **MAILLIST** ALLOWS UP TO 30 ATTRIBUTES TO BE SPECIFIED (TO BE USED IN SELECTION OF SPECIFIED RECORDS WHEN GENERATING REPORTS OR MAILING LABELS)
- **MAILLIST** SUPPORTS BOTH 5 OR 9-DIGIT ZIPCODES
- PRINTING MAY BE STARTED OR ENDED AT ANY POINT IN THE LIST. THE USER CAN SPECIFY FIELDS OR CODES TO BE PRINTED
- CAPACITY IS 600 NAMES FOR MODEL-I, 3500 NAMES FOR MODEL-II, 38,000 NAMES FOR MODEL-III WITH HARD DISK DRIVE, 1200 NAMES FOR MODEL-III

MODEL-I VERSION	\$75.00
MODEL-II VERSION	\$150.00
MODEL-III VERSION	\$75.00

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HSDS HARD DISK DRIVE SOFTWARE

- MAKES TRSDOS COMPATIBLE WITH MOST HARD DISK DRIVES
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- IN BUSINESS TIME IS MONEY, AND ONE BACKUP IS WORTH A THOUSAND TEARS.
- WORKS ON SYSTEMS WITH 2 OR MORE DRIVES
- CAN REPLACE YOUR EXISTING TRSDOS 1.2 or 2.0 BACKUP UTILITY

MODEL II ONLY

\$75.00

COMPROC (COMMAND PROCESSOR)

- AUTO YOUR DISK TO PERFORM ANY SEQUENCE OF INSTRUCTIONS THAT YOU NORMALLY GIVE FROM THE KEYBOARD (FOR EXAMPLE, INSERT THE DISKETTE, PRESS THE RESET BUTTON, YOUR COMMAND FILE COULD AUTOMATICALLY SHOW YOU THE DIRECTORY, SHOW THE FREE SPACE ON THE DISKETTE, LOAD A MACHINE LANGUAGE SUBROUTINE, LOAD BASIC, LOAD AND RUN A BASIC PROGRAM, AND SELECT A GIVEN ITEM ON YOUR MENU, ALL WITHOUT TOUCHING THE KEYBOARD)

MODEL-I VERSION \$20.00
 MODEL-III VERSION \$30.00
 NOT AVAILABLE FOR MODEL-II

DISCAT (DISKETTE CATALOG SYSTEM)

- THIS COMPREHENSIVE DISKETTE CATALOGUING/INDEXING UTILITY ALLOWS THE USER TO KEEP TRACK OF THOUSANDS OF PROGRAMS IN A CATEGORIZED LIBRARY. FILE INCLUDES PROGRAM NAMES AND EXTENSIONS, PROGRAM LENGTH, DISKETTE NUMBERS AND FREE SPACE ON EACH DISKETTE. KEEP A COMPLETE CATALOG OF THE DIRECTORIES ON ALL YOUR DISKETTES IN ALPHABETICAL ORDER (SORTED ON EACH DISKETTE OR COMPLETE ALPHABETICAL LIST OF PROGRAMS ON ALL YOUR DISKETTES)

MODEL-I VERSION \$50.00
 MODEL-III VERSION \$50.00
 MODEL-II VERSION (SEE MODEL-II UTILITY PACKAGE)

BLINK (BASIC LINK FACILITY)

- LINK FROM BASIC PROGRAM TO ANOTHER SAVING ALL VARIABLES
- THE CHAINED PROGRAM MAY EITHER REPLACE THE ORIGINAL PROGRAM OR CAN BE MERGED BY STATEMENT NUMBER

MODEL-I VERSION \$25.00
 MODEL-III VERSION \$50.00
 MODEL-II VERSION (SEE MODEL-II UTILITY PACKAGE) \$30.00

INFINITE BASIC

- ADDS OVER 80 COMMANDS TO BASIC
- SORTING, STRING CENTERING/ROTATION/TRUNCATION, JUSTIFICATION, DATA COMPRESSION, STRING TRANSLATION/COPYING, SCREEN DISPLAY, SCROLLING, MATRIX OPERATIONS, SIMULTANEOUS EQUATIONS (THROUGH MATRIX INVERSION), DYNAMIC ARRAY RESHAPING

MODEL-I VERSION \$50.00
 MODEL-III VERSION \$60.00
 NOT AVAILABLE ON MODEL-II

INFINITE BUSINESS

- ADD ON PACKAGE TO INFINITE BASIC (REQUIRES INFINITE BASIC)
- ADDS PACKED DECIMAL ARITHMETIC WITH 127 DIGIT ACCURACY (-0.9999999999999999)
- COMPLETE PRINTER PAGINATION CONTROLS, AUTO HEADERS, FOOTERS AND PAGE NUMBERS
- BINARY SEARCH OF SORTED AND UNSORTED ARRAYS (INSTANT SEARCH OF AN ELEMENT WITHIN AN ARRAY)
- HASH CODES

MODEL-I VERSION \$30.00
 MODEL-III VERSION \$30.00
 NOT AVAILABLE ON MODEL-II

REMODEL-PROLOAD

- THE ULTIMATE RENUMBERING PROGRAM, RENUMBERS ALL OR PART OF A PROGRAM (ALLOWS PARTIAL RENUMBERING IN MIDDLE OF PROGRAMS)
- PARTIAL OR COMPLETE MERGE OF TWO CASSETTE PROGRAMS

MODEL-I VERSION \$35.00
 MODEL-III VERSION \$35.00
 NOT AVAILABLE ON MODEL-II

COPSYS

- COPY AND VERIFY ALL MACHINE LANGUAGE (SYSTEM) TAPES WRITTEN IN STANDARD FORMAT. IF YOU BUY A MACHINE LANGUAGE PROGRAM, COPSYS ALLOWS YOU TO EASILY COPY THE PROGRAM ONTO ANOTHER CASSETTE AS A BACKUP

MODEL-I VERSION \$15.00
 MODEL-III VERSION \$20.00
 NOT AVAILABLE ON MODEL-II

MODEL-II UTILITY PACKAGE

- ESSENTIAL FOR EVERY MOD-II OWNER
- RECOVER AND REPAIR FILES AND DIRECTORIES (BY JUST ENTERING A SINGLE COMMAND)
- XCOPY, SIMILAR TO COPY BUT CAN COPY ANY NUMBER OF FILES AT ONE TIME FASTER AND MORE ACCURATE THAN COPY SINCE RECORDS ARE COPIED IN GROUPS RATHER THAN ONE RECORDS AT A TIME. USING XCOPY YOU CAN COPY FILES THAT CAN NOT BE COPIED USING THE COPY COMMAND
- SZAP, PROVIDES THE CAPABILITY TO READ AND MODIFY ANY SECTOR ON A DISKETTE
- XHIT, CAN BE USED TO REPAIR A DISKETTE DIRECTORY
- DCS, DIRECTOR CATALOG SYSTEM IS A UTILITY FOR THE MANAGEMENT OF USER DISKETTES. SETS OF A MULTIPLE DISKETTE DIRECTORY FILE (WITH UP TO 1200 INDIVIDUAL FILE NAMES). ALLOWS SELECTIVELY LISTED OR PRINTED LISTS OF DIRECTORY FILES IN COMBINED SORTED ORDER (FOR EXAMPLE, LISTED ALPHABETICALLY BY DISKETTE, OR A COMPOSITE ALPHABETICAL LIST OF ALL YOUR DISKETTES)
- DEBUG-II, ADDS SEVERAL FEATURES TO THE PRESENT TRSDOS DEBUG UTILITY INCLUDING SINGLE INSTRUCTION CYCLE, AUTO (LOOP) BREAKPOINTS, SUBROUTINE CALLING, BREAK-KEY DETECTION AND MANY OTHERS

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\$150.00

MODEL-II DEVELOPMENT SYSTEM

- THIS PACKAGE IS A MUST FOR ASSEMBLY LANGUAGE PROGRAMMERS
- INCLUDES THE MICROSOFT EDITOR ASSEMBLER PLUS WITH ENHANCEMENTS FOR THE MODEL-II
- A COMPLETE DISASSEMBLER
- SUPERZAP FOR READING AND MODIFY ANY SELECTOR ON A DISKETTE

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MOD-II BASIC CROSS REFERENCE UTILITY

- LIST OR PRINT A SORTED CROSS REFERENCE TO ALL NUMBERS OR VARIABLES WITHIN A PROGRAM
- LIST OF PRINT ALL LINE NUMBERS CONTAINING A SPECIFIED STRING OF CHARACTERS

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User configurable? Each S.B.S.G. General Accounting System Module (except Order Entry) can be operated independently, or any of the modules can be combined in any configuration, providing a complete, coordinated system to fit the needs of your business.

The S.B.S.G. System allows you the maximum efficient use of available disk space. Each module will run on a standard 1 disk drive system (except for Model I systems, which require 2 drives). As you add more disk drives to your system, the amount of on-line data storage increases. Now here's an important fact . . . the S.B.S.G. General Accounting System "spans" your disk drives - that means that you can instantly access your data on any of **up to 8 disk drives** at any time! Since your S.B.S.G. Accounting System is user-configurable, it will work with 1, 2, 3, 4 or more disk drive systems - and it is fully compatible with most hard disk drive systems (at additional cost).

General Ledger

The General Ledger accounting system consolidates financial data from other accounting subsystems in an accurate and timely manner. Major reports include Trial Balance, Income Statement, Balance Sheet, a user-defined report, and more. All data is maintained and reported by month, quarter, year and previous three quarters. Transactions may be entered via direct posting and external posting generated by A/R, A/P, Payroll - or any other user source.

Accounts Receivable

The objective of a computerized A/R system is to prepare accurate and timely monthly statements to credit customers. Management can generate information required to control the amount of credit extended and the collection of money owed in order to maximize profitable credit sales while minimizing losses from bad debts. This system is invoice-oriented. Invoices can be entered before they're ready for billing, after billing, or even after they are paid. Accounts Receivable allows entry of new invoices, credit memos, debit memos, or modification or deletion invoice and allows for progress payment. The transaction information includes: type of A/R transaction, P.O. #, description of P.O., billing date, general ledger sales account #, invoice amount, shipping and transportation charges, tax charges, payment, and progress payment information. Reports include: summary or detail listing of invoices not yet billed, open items (unpaid invoices), closed items (paid invoices), and aging. Statements may be printed at any time and follow the format of nationally available forms.

Order Entry

The Order Entry Module was designed as a supplement to the Accounts Receivable Module, and will not operate independently. This system allows you to add, change, delete, list and print invoices; apply an invoice to correct customer account; generate computer assigned invoice numbers; note type (invoice credit memo, debit memo); record customer order number, invoice date, shipping date, FOB location, method of shipping, salesman, and payment terms; print selected number of shipping labels; enter, display and correct 10 lines of data per invoice, noting the part number, description, price, quantity

ordered, extension, taxable or not. It also allows the user to enter, display and correct invoice totals, noting the invoice subtotal, taxes, shipping and handling, with disbursement up to 5 General Ledger accounts; print a transaction report; maintain a terms code file in the system; update Account Receivable and generate summary report totals. It automatically coordinates to the Inventory Module (if used) to determine description, price and out of stock status, and to immediately deplete inventory stock. Price fields are easily modified to include percent or dollar discount.

Payroll

Payroll involves many complex calculations and the production of reports and documents, many of which are required by government agencies. The Payroll system performs all necessary payroll tasks including file maintenance, pay data entry and verification, computation of pay and deduction amounts, and the printing of reports and checks. State and Federal Tax changes are easily implemented by the user via menu prompting. In its link to General Ledger, each employee's payroll information is distributed to as many as 12 different GL accounts; system automatically posts to cash account.

Accounts Payable

The Accounts Payable system receives data concerning purchases from suppliers and produces checks in payment of outstanding invoices. Several reports are available to supply information needed for the analysis of payments, expenses, purchases and cash requirements. The Accounts Payable system is invoice-oriented. It handles new invoices, credit memos and even debit memos and allows modification and deletion of invoices. The flexible check calculation procedures allows checks to be calculated for a set of vendors, specific vendors or even specific invoices. The reports include open item listings and closed item listings (both detail and summary), debit and credit memo listings, aging, check register report (to give an audit trail of checks printed), and vendor listing and vendor activity. Update reports are useful for audit trails and checking for accuracy. Checks may be printed at any time and follow the format of nationally available forms.

Inventory

Status reports and minimum reorder reports help to reduce the potential hazard of overstocking which results in cash flow problems. Program selection allows the user to store data for inventory located at up to five separate sites (divisions), coding up to 9 sales people. Available reports include inventory master list, price listings, period and year-to-date sales, stock status, minimum reorder point and commission information.

Model I, 48K and 2 Disk Drives . . . \$195.00 Per Module
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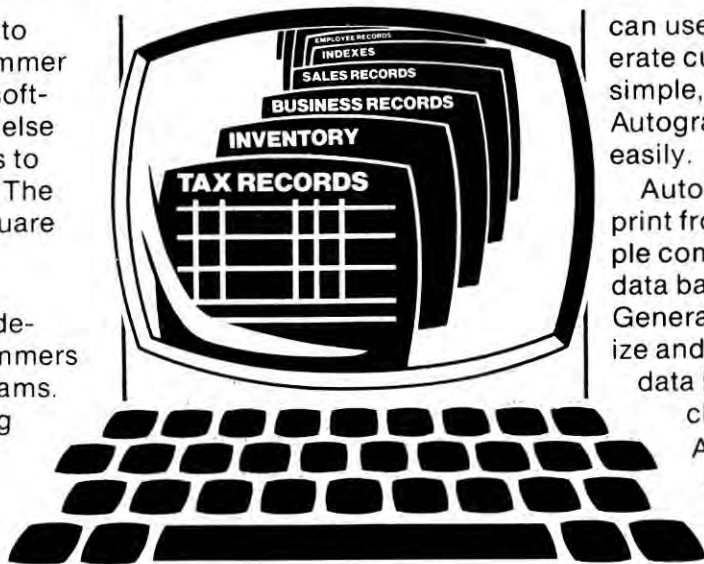
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Moby Dick Touch Typing Tutor

Michael D. Brown
102 Arch Street
Yorktown, IN 47396

Imagine a little man (Ishmael) in a rowboat with Moby Dick pursuing him. Above this scene, letters appear at random. If you type the correct letter, the little man rows a stroke. If you're slow or make an error, the leviathan gains.

This program will help you learn touch-typing key positions on the TRS-80 (it works on the Models I and III), and is an effective drill master. The motivating program makes practice less boring. You find you don't want the little guy to be swallowed by the whale, so you work harder and type faster.

Program Notes

An asterisk is displayed as added feedback for correctly typing a letter. To increase the whale's speed (the faster he goes, the more difficult the game), increase the value of SP in line 70.

If you are tempted to look at the keys, darken the room. ■

Michael D. Brown is a former English teacher who now operates a word processing business.

Learning to play arcade games well requires hours of practice (and many quarters). But why learn to destroy insects from outer space? Because it's fun!

It seems fun things are often useless. But why should useful things be boring? Harness some arcade-game energy and put it to use on an otherwise boring task.

The Key Box

Model I or III
4K RAM
Level II

```

10 'THE MOBY DICK TOUCH-TYPING TUTOR
20 'BY MICHAEL D. BROWN
30 '102 ARCH ST.
40 'YORKTOWN IN
50 '
60 CLS: CLEAR 1000: RANDOM
70 SP=1 'INCREASE SP TO INCREASE THE WHALE'S SPEED
80 R$=CHR$(190)+CHR$(157)+CHR$(172)
90 FOR N=1 TO 6: X$=X$+CHR$(191): NEXT
100 X1$=" " ' FOUR SPACES
110 W1$=X1$+CHR$(128)+CHR$(184)+CHR$(188)+X$
120 W2$=X1$+CHR$(190)+X$+CHR$(189)+CHR$(172)
130 B1$=CHR$(139)+CHR$(191)+CHR$(189)+CHR$(190)+CHR$(191)+
CHR$(188)+CHR$(189)+CHR$(188)+CHR$(188)+CHR$(159)
140 S$=STRINGS$(64,191)
150 WA=1
160 B$=CHR$(RND(25)+64)
170 A$=INKEYS
180 WA=WA+SP: IF WA<0 THEN WA=0
190 IF WA>51 GOTO 360
200 'DRAWING THE WHALE
210 PRINT@ 499-WA, W1$+STRINGS$(WA,191)
220 PRINT@ 563-WA, W2$+STRINGS$(WA,191)
230 PRINT@ 584, B$+CHR$(128)
240 W3$=X1$+STRINGS$(9+WA,191)
250 PRINT@ 627-WA, W3$
260 PRINT@ 703-WA, CHR$(191)+STRINGS$(WA,191)
270 PRINT@ 710, " "
280 IF INT(RG/2)=RG/2 THEN PRINT@ 710, R$ ELSE PRINT@ 711, R$
+CHR$(132)
290 PRINT@ 767-WA, CHR$(191)+STRINGS$(WA,191)
300 PRINT@ 831-WA, CHR$(191)+STRINGS$(WA,191)
310 PRINT@ 771, B1$
320 PRINT@ 832, S$
330 IF A$="" GOTO 170
340 IF A$<>B$ THEN WA=WA+1 ELSE WA=WA-4: PRINT@ 585, "": RG=RG+1
350 GOTO 160
360 'END OF GAME ROUTINE
370 J=15875
380 FOR NN=1 TO 3: J=J+64
390 FOR N=1 TO 9: POKE J+64+N,191: NEXT N
400 GOSUB 470: NEXT NN
410 CLS: PRINT CHR$(23): K=202
420 FOR N=1 TO 4: K=K+64: PRINT@ K, "CRUNCH"
430 GOSUB 470
440 GOSUB 470: NEXT N
450 CLS: PRINT@ 473, "BURP": FOR N=1 TO 600: NEXT N: CLS
460 PRINT "YOUR SCORE WAS: "; INT(SP*10*RG): END
470 FOR Z=1 TO 70: NEXT Z
480 RETURN
999 END
1000 A$=INKEYS
1010 IF A$="" GOTO 1000 ELSE PRINT ASC(A$)

```

Program Listing

Using Extended Color Basic for word processing.

Basic Word Processing

Louis J. Cutrona, Jr.
625 North Monroe St.
Ridgewood, NJ 07450

The TRS-80 Line Printer VIII and Color Computer make a powerful word processing system using my text editing program.

The most difficult aspect of producing a word processing program was deciding how to store the input. The Color Computer already has a perfectly serviceable input facility hard-coded in ROM; namely the Basic Operating System. When you turn the Color Computer on it is immediately awaiting input. If what the user enters begins with a number between 0 and 63999, the operating system assumes the characters following the number to be a line of Basic code. The operating system then stores the line for later execution. If the user enters a string of characters that do not begin with a number, the operating system sees the string as a Basic command and tries to interpret and execute the string right away.

Why not pretend the text I enter is a program and let the operating system take care of storing it in memory? Then all I need to do is enter the text in "lines" no more than 249 characters long (the maximum length of a line in an Extended Color Basic program). If

I start each line with a line number I can use Extended Color Basic's line editing capabilities to make changes to the lines in my text. This is not much of a price to pay for not having to write the input and storage facility myself. If I leave enough space between line numbers, I can then insert lines between existing lines already entered.

By letting Basic handle the input and most of the editing, all I would have to do is write a program to read the data out of memory where Basic had put it, format it and print it.

Extended Color Basic stores Basic program lines in memory in the following format:

2-byte address of the next Basic Line;
2-byte Basic line number (a 16-bit integer);

The body of the Basic program line; and a 1-byte end-of-line marker (hexadecimal 00).

A recent magazine article ("A Closer Look at the TRS-80 Color Computer," *Byte*, September 1981) gave me the last piece of information I needed: The address of the first Basic line in the program is stored in hexadecimal locations 19-1A (decimal 25-26).

I decided to place the formatting program in the high line numbers starting at line 10000 and use the low line numbers for text entry. Since it is more convenient to invoke the formatting program by entering the Basic command Run, rather than typing GOTO 10000, I chose line number 0 to branch to the formatting routine. Then I can use line numbers 1 to 9999 for text entry.

Development Strategy

The best way to begin a program is to start small: put together a stripped-down version of the desired final product. Once

that is running, you can keep and modify it to create the next version, or you can discard it. The next version you write will not begin from scratch because you can bring to bear the experience gained from tackling the small version.

This incremental approach has three advantages: You always have a working version of the end product (it may not do everything that the final version will do, but it will do the most important things); you will not be trying to debug too much at once (in particular, you will not be debugging minor functions before the major functions are running); if there is anything fundamentally wrong with the design, you will discover it early during program development.

Following this development strategy, version 1 of my program performed only one function: it printed the contents of all Basic lines between lines 0 and 10000. It printed them in 60 character lines without checking for word boundaries. Words were broken at the end of the line if the 60th character happened to be in the middle of a word. Version 1 contained the fundamental program logic needed to find the data to be printed and to follow the pointers, line to line, all the way to line 10000.

The second version corrected the major shortcoming of version 1—words being broken at the end of the line. When version 2 located the 61st character of text it checked if the character was a blank. If it was a blank it printed the line as is and started a new line. If the 61st character was not a blank, the program scanned backwards to the first blank character in the line, printed the line up to that blank and started a new line containing the characters after the blank.

Version 3 incorporated variable left and right side margins (LM and RM, respective-

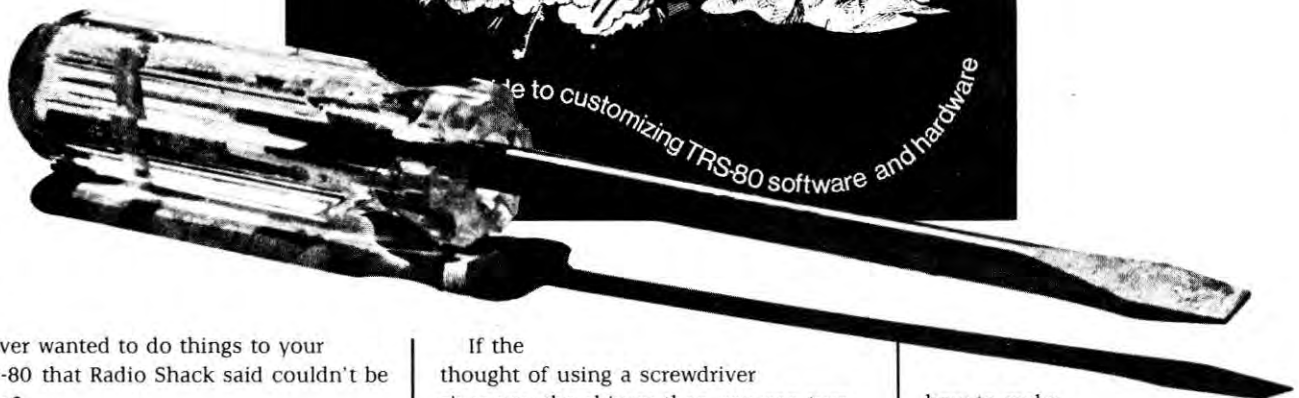
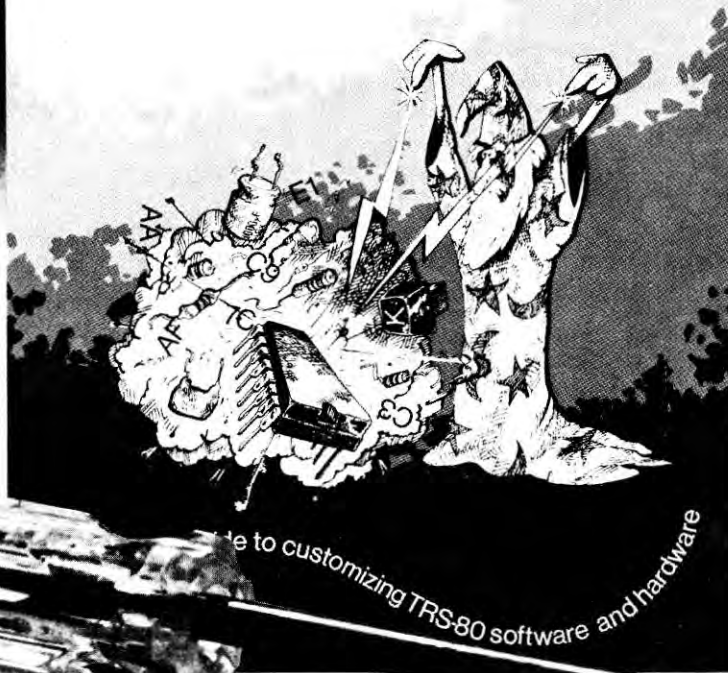
The Key Box

Extended Color Basic
Color Computer
16K RAM
Printer Required

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ly) and variable top and bottom page margins (TM and BM).

It soon became clear I would need format control instructions in the text: paragraph indent, new line and new page functions. These format control instructions had to be placed on separate lines. In order to identify these lines easily, the first character of each format control instruction is a period. I chose .in for indenting, .nl for new line, and .np for new page.

Faster, Faster

At that point, the program did what I wanted it to do, but program execution seemed rather slow. You can speed up a Basic program by squeezing out spaces and putting multiple statements on single lines, but I was not ready to destroy my program's readability. I decided to run the CPU faster and feed the printer faster.

As normally initialized by the Extended Color Basic ROM, the Color Computer accesses all memory addresses at a clock frequency of 895KHz. To make the CPU run faster, POKE 65495,0. This causes the CPU to run at 1.8 MHz when accessing addresses from hexadecimal 8000 to FEFF and FF20 to FFFF. For the remaining addresses (hexadecimal 0000 to 7FFF and FF00 to FF1F), the CPU runs at its normal 895KHz. When you speed up the processor in this way, you cannot use the Sound, CLOAD, or CSAVE commands. To return to normal

speed, POKE 65494,0.

To feed the printer faster, POKE 150,41.

The Color Computer normally sends data to the printer at 600 baud. This modification

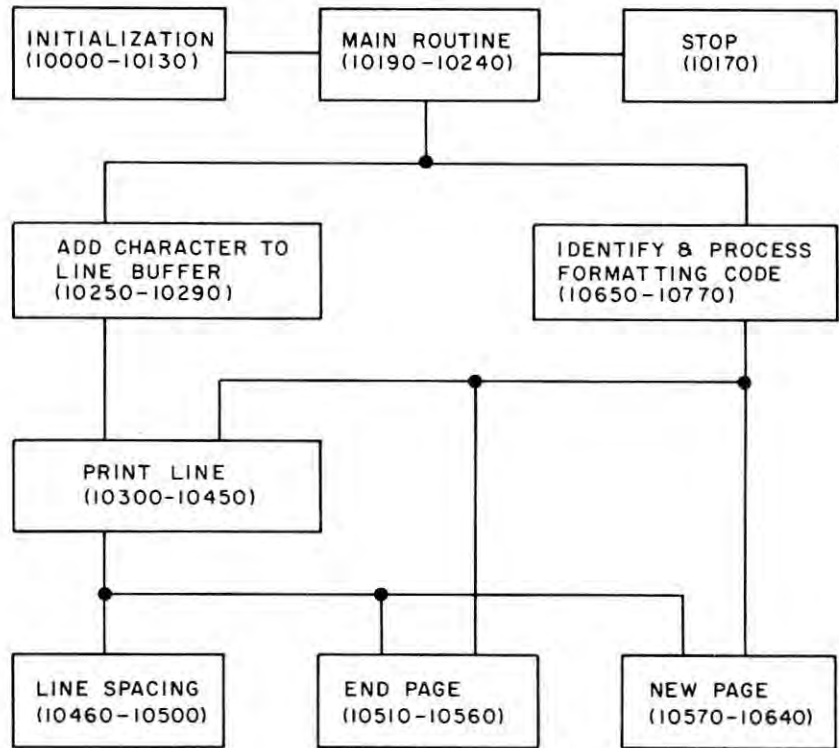
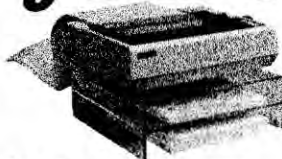


Fig. 1. Program Overview

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transmits data at 1200 baud (see pages 209 and 210 of Radio Shack's *Going Ahead with Extended Color Basic*). Your printer has to be able to receive at 1200 baud and you will have to configure it to do so. In the Line Printer VIII, this is accomplished by setting the function selection switch #2 to the Open side. The function selection switch is a DIP switch inside the printer, under the top cover, just behind the power lamp. The printer will not print any faster, but setting this switch reduces the amount of time it takes to send the characters to the printer.

A complication arises when you try both tricks together. Because the Color Computer transmits data through the serial interface under direct software control rather than using a special piece of hardware, when you change the processor's speed, you also alter the data transmission rate, which depends on the duration of a software timing loop. I did not want to write a serial interface driver routine to provide 1200 baud output while the processor is speeded up.

Instead I used this simple, but awkward solution. When program execution begins, I set the baud rate to 1200 and put the processor in fast mode. Whenever I am about to print, I put the processor back in normal mode. Once the printing is completed, I put the processor back into the fast mode. The net result is about a 75 percent speedup in program execution. I could speed the whole thing up immensely if I coded the program in machine language, but that would have taken much longer, and my objective was to program rapidly something that would work.

More Enhancements

Version 3 of my program worked well but it was missing several features: the ability to specify single or double spacing on output; the ability to print a heading and, optionally, a page number at the top of each page; the ability to start printing from a specific line number in the input text and print only those lines between that line and another specified line number; and the ability to specify that the printer is loaded with continuous form paper (for drafts) or would be loaded with single sheets (for a final copy). To handle the first two of these oversights, I introduced four more format commands to put into the text: .sg single spaces the following lines of text; .db double spaces the following lines; .pn numbers the following pages; and .px suppresses the numbering function for the following pages. I needed these enhancements because manuscripts I submit for publication have to be double spaced, page numbered, and my name must appear on every page. I decided to put the header information and the (optional) page number on the same line, with the header text at the left margin and the page number at the right margin. I made the setting of the header information a simple Basic assignment statement (to the page header string variable PH\$) within the program. If I want to leave the header blank, I leave the variable uninitialized. If I want to

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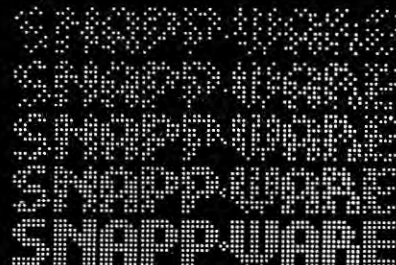
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have a constant heading, I assign the text of the heading to the heading variable.

I also added code to query the user for a range of line numbers to be printed; and I introduced a variable CF to indicate whether the printer is loaded with continuous form paper (CF = 1) or not (CF = 0).

REMARKS

I noticed that often, when I keyed in a long line of text and pressed enter, the cursor would disappear for a second or two before reappearing, and while the cursor was gone, I could not enter any text. This was somewhat annoying as it broke my typing rhythm and interrupted my train of thought.

When you enter a line the Basic interpreter analyzes it and identifies every Basic keyword, command, or operator and, in general, substitutes a special one-byte code for it. It even replaces one-byte operators (like - and +) by a different code. This can be annoying when you want to include a hyphen in your text or mention a Basic keyword like POKE or Print, because when you print the stored line character by character, you get peculiar, often unprintable characters where you had entered these reserved words or characters.

Basic does not analyze REMARKS. Once the analyzer finds REM or ' (apostrophe), it leaves the rest of the line alone. By starting every line containing a Basic reserved word or operator in it with an apostrophe (thus making the entire line of text a comment

from Basic's point of view), I could get Basic to store the text of the line exactly as I had entered it. I had to modify the program to handle this convention. The apostrophe is

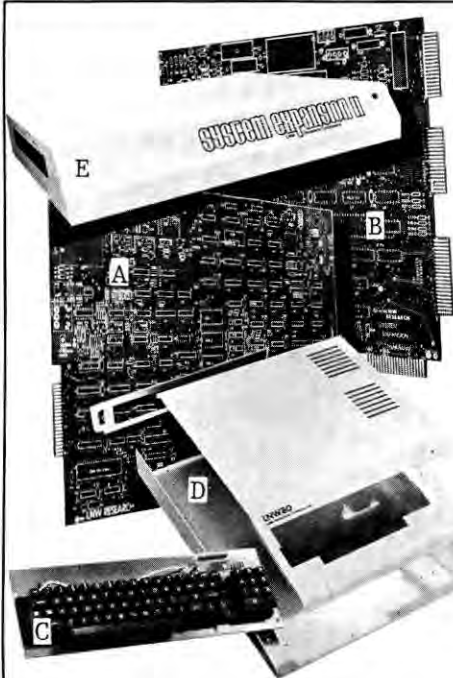
itself a Basic operator; Basic replaces the first one it finds in a line by two characters—a colon (:) followed by a hexadecimal 83. I added code to my program that checks

Program Listing

```
0 PCLEAR 1: CLEAR 300: GOTO 10000
10 .pn.db
20 'END OF PAGE
30 .in
40 'The End Page subroutine simply emits to the printer as many
line feeds as are necessary to space to the end of the current p
age.
50 'The End Page subroutine is called from the Line Print subrou
tine if there is no room in the text print area of the current p
age to print another line.
60 'The End Page subroutine is also called directly by the subro
utine to identify and process formatting codes in response to a
".np" (new page) formatting code in the text.
70 .nl.nl
80 'NEW PAGE
90 .in
100 'The New Page subroutine has two functions: 1) it requests t
he user to position the paper at the top of a new sheet, pausing
until the user hits <ENTER> to signal that the paper has been p
ositioned;
110 'and 2) it prints the page heading on the appropriate line a
t the top of the page (with or without a page number, depending
on whether or not the value of the format control variable PN is
zero).
120 'The New Page subroutine always pauses before beginning prin
ting on the first page (PG=0), and pauses before printing each s
ucceeding new page only if the format control variable CF is zer
o
```

Program continues

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✓ 33

to see if these are the first two characters of any line, and if so, to ignore them and continue processing with the next character in the line.

Since I did not always know when I began a new line whether or not the line would contain a Basic reserved word or operator, I began to put an apostrophe at the beginning of every line I entered. Since in 99 percent of the text I entered there were no Basic reserved words or operators, this turned out to be a good idea.

Program Variables

The variables in the program fall into two broad categories: format control (Table 1) and working storage (Table 2).

The format control variables are, in general, assigned a value in the initialization section of the program (lines 10000-10130) and remain unchanged during the execution of the rest of the program. The two exceptions are SP, the line spacing control variable, which you can change by placing a .sg or .db formatting control code in the text; and PN, the page number control variable, which is automatically incremented at the end of each page when a .pn formatting control code is encountered in the text, and which you can reset during execution by a .px or .pn formatting control code. I call PN a format control variable rather than a working storage variable because its initial value determines whether or not page numbering will be in effect by default when I run the program. If PN=0 page numbering will not occur unless and until the program finds a .pn formatting code in the text. If PN>0 then page numbering will be in effect, starting with page number PN until the program finds a .px formatting code in the text.

The working storage variables construct and hold intermediate strings and values during processing.

How the Program Works

Figure 1 gives an overview of the program's logical structure. Each box in Fig. 1 corresponds to a group of lines in the Program Listing. All boxes below the top row are implemented as subroutines and the connecting lines indicate the sections of the program from which each subroutine can be called.

Within the listing, each subroutine begins on a line that contains only a comment identifying the subroutine, and all calls to the subroutine are directed to that line. This convention ensures that I can always insert a line before the current first executable statement in the subroutine (a remark is not considered to be executable) without having to change the destination line number in each GOSUB it calls.

Initialization Section

The initialization section assigns values to all of the format control variables (Table 1). During initialization the user selects the range of line numbers to be printed.

As part of initialization, the program PEEKs at hexadecimal location 19 and 1A to obtain the address of the first Basic line,

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PDAT/UDATS—Permits user to do arithmetic on dates.

PK\$/UPK\$—Compresses strings to save disk space.

ETIMS—Shows the difference between two times.

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Program continued

```

130 '(which indicates that continuous form paper is not being used).
10000 'WORD PROCESSOR - INITIALIZATION SECTION
10010 CLS6
10020 POKE 150,41:POKE 65495,0
10030 CH$=" ";PH$="Louis J. Cutrona, Jr.":FC$="XX"
10040 IN=5:PN=0:SP=0:CF=1
10050 LM=13:RM=7:PW=80:LL=PW-LM-RM
10060 TM=4:HM=4:BM=6:PD=66:PL=PD-TM-HM-1-BM
10070 LN$=STRING$(LL+1,32):HD$=STRING$(LL-8,32):MID$(HD$,1,LEN(PH$))=PH$
10080 A=256*PEEK(&H19)+PEEK(&H1A)
10090 N=256*PEEK(A)+PEEK(A+1):A=N
10100 INPUT"PRINT FROM LINE NUMBER";FR
10110 INPUT"          THRU LINE NUMBER";TL
10120 IF TL>9999 THEN TL=9999
10130 CT=0:LN=0:PG=0
10140 'MAIN ROUTINE - GET NEXT LINE
10145 N=256*PEEK(A)+PEEK(A+1)
10150 L=256*PEEK(A+2)+PEEK(A+3)
10160 IF L<FR THEN A=N:GOTO 10140
10170 IF L>TL THEN GOSUB 10300:GOSUB 10510:POKE 65494,0:STOP
10180 P=A+4:CN=1
10190 'MAIN ROUTINE - GET NEXT CHARACTER
10195 C=PEEK(P):MID$(CH$,1)=CHR$(C)
10200 IF CN=1 AND CH$="." THEN GOSUB 10650:A=N:GOTO 10140
10210 IF CN=1 AND CH$=":" THEN IF PEEK(P+1)=&H83 THEN P=P+2:CN=3:GOTO10190
10220 IF C=0 THEN CH$=" ":GOSUB 10250:A=N:GOTO 10140
10230 GOSUB 10250
10240 P=P+1:CN=CN+1:GOTO 10190
10250 'ADD CHARACTER TO LINE BUFFER
10260 CT=CT+1
10270 MID$(LN$,CT,1)=CH$
10280 IF CT>LL THEN GOSUB 10300
10290 RETURN
10300 'PRINT LINE
10310 IF PG=0 THEN GOSUB 10570:PG=1
10320 IF LN>=PL THEN GOSUB 10510:GOSUB 10570
10330 LN=LN+1
10340 POKE 65494,0
10350 IF CT=0 THEN PRINT#-2:GOTO 10450
10360 FOR I=CT TO 1 STEP -1
10370 IF MID$(LN$,I,1)=" " THEN PRINT#-2,TAB(LM)LEFT$(LN$,I):CT=CT-I:GOTO 10420
10380 NEXT I
10390 IF CT>LL THEN I=LL ELSE I=CT
10400 PRINT#-2,LEFT$(LN$,I)
10410 CT=CT-I
10420 MID$(LN$,1,CT)=RIGHT$(LN$,CT)
10440 IF SP>0 THEN GOSUB 10460
10450 POKE 65495,0:RETURN
10460 'LINE SPACING
10470 II=PL-LN:IFII>SP THEN II=SP
10480 IF II>0 THEN FOR I=1 TO II:PRINT#-2:NEXT I
10490 LN=LN+1
10500 RETURN
10510 'ENDPAGE
10520 POKE 65494,0
10530 IF PL>LN THEN FOR I=LN+1 TO PL:PRINT#-2:NEXT I
10540 FOR I=1TO BM:PRINT#-2," ":NEXT I
10550 IF PN>0 THEN PN=PN+1
10560 POKE 65495,0:RETURN
10570 'NEWPAGE
10580 IF CF=0 OR PG=0 THEN CLS 8:INPUT"POSITION PAPER - HIT <ENTER>";AN$:CLS
10590 POKE 65494,0
10600 FOR I=1TO TM:PRINT#-2:NEXT I
10610 PRINT#-2,TAB(LM)HD$;
10620 IF PN>0 THEN PRINT#-2,"Page ";PN ELSE PRINT#-2," "
10630 FOR I=1 TO HM:PRINT#-2:NEXT I
10640 LN=0:POKE 65495,0:RETURN
10650 'IDENTIFY AND PROCESS FORMATTING CODE
10660 MID$(FC$,2,2)=CHR$(PEEK(P+1))+CHR$(PEEK(P+2))
10670 F=INSTR(" .nl.np.in.pn.px.db.sg",FC$)
10680 IF F=1 THEN GOSUB 10300
10690 IF F=4 THEN GOSUB 10300:GOSUB 10510:GOSUB 10570
10700 IF F=7 AND CT>0 THEN GOSUB 10300
10710 IF F=7 THEN MID$(LN$,1,IN)=STRING$(IN," "):CT=IN
10720 IF F=10 THEN INPUT"STARTING PAGE NUMBER";PN:IF PN<1 THEN SOUND 120,1:GOTO 10720
10730 IF F=13 THEN PN=0
10740 IF F=16 THEN SP=1
10750 IF F=19 THEN SP=0
10760 IF F<>0 AND PEEK(P+3)=46 THEN P=P+3:GOTO 10650:ELSE RETURN
10770 RETURN

```

which in this case will be line 0. Storing this address in the working storage variable A, the program then PEEKs at locations A and A + 1, which contain the address of the next Basic line (the first text line). This address is computed in the working storage variable N and immediately thereafter becomes the new value of A. The Color Computer micro-processor, a Motorola 6809, stores addresses in two consecutive memory locations (bytes) with the high order byte of the address in the lower numbered location. To obtain the address value stored in locations A and A + 1, multiply the contents of A by 256 and add the contents of A + 1. For Z80 machines, the low order byte of an address is stored first. Multiply the contents of A + 1 by 256 and add the contents of A. To adapt this program to one of the Z80-based TRS-80 machines, you will also have to find the location that machine uses to store the address of the first Basic line, since it is unlikely to be at the same location as in the Color Computer.

Main Routine

Immediately following the initialization section, the program enters the main routine. The main routine consists of two nested loops. The outer loop initializes processing of the line beginning at address A. It retrieves the address of the next line into N and the value of the line number into L. The inner loop picks up one character at a time from the current line and puts the character into the working storage variable CH\$. The location of the character to be picked up is in the working storage variable P (pointer to current character).

In most cases, once the program has picked up the character it calls the subroutine to add the character (CH\$) to the line buffer (LN\$), then loops to pick up the next character in the line.

If the character picked up is the first in the Basic line (CN = 1), then the program tests it to see if it is a period (.). If it is, the program calls the subroutine to identify and process formatting codes. If the first character in the line is a colon (:) followed by a hexadecimal 83 (the sequence indicating an initial apostrophe), the program skips over these two characters. If the character picked up is a hexadecimal zero (Basic uses this character to indicate the end of a line), then the program substitutes a blank character in CH\$ for the hexadecimal zero character, and calls the subroutine to add the character to the line buffer, makes the address of the next line (N) the address of the current line (A) and returns to the outer loop to begin processing the next line. The effect of substituting the blank character for the hexadecimal zero at the end of each Basic line is to put a space between the end of the last word on one Basic line and the start of the first word on the next line.

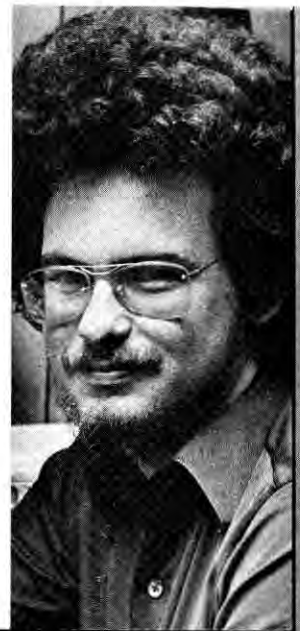
When the last line in the range of line numbers selected by the user during initialization has been processed, the program stops.

The subroutine to add a character to the

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line buffer generally appends the current character (CH\$) retrieved by the main routine to the end of the string of characters already in the line buffer (LN\$). The count of the number of characters currently in the line buffer (CT) is incremented, and the subroutine returns to where it was called, unless adding the current character has increased the number of characters in the line buffer beyond the text line length (LL). In this case the program calls the subroutine to print a line.

Whenever the program finds a Basic line beginning with a period (.), the main routine assumes the line contains one or more for-

matting codes and calls the subroutine to identify and process formatting codes. This subroutine looks at the contents of the line in groups of three characters. The program moves each group of three characters to the working storage variable FC\$, and compares it to a list of all possible valid formatting codes to identify it. Once the program has identified the format code, it takes the appropriate action. Table 3 lists the valid formatting codes and their effects.

Printing

The Print Line subroutine is called from the subroutine to add a character to the line

Page Numbering

PN Page Number: the number of the page currently being printed, if page numbering is in effect; if PN = 0 then page numbering will not be in effect unless and until you turn it on by a .pn formatting code in the text.

Line Spacing

SP Spacing: if SP = 0 then the printed output will be single spaced; if SP = 1 then the printed output will be double spaced. You can change the value of SP by formatting codes .sg (single space) and .db (double space).

Margin Setting (left/right)

PW Page Width: the maximum number of characters that can be printed on a line. (For the TRS-80 Line Printer VIII ordinary monospaced character set, this maximum is 80.)

LM Left Margin: the number of spaces to be left on each line between the leftmost possible print position and the start of printing on that line. (For the TRS-80 Line Printer VIII ordinary monospaced character set, a value of 13 will leave a 1 1/2 inch left margin.)

RM Right Margin: the minimum number of spaces to be left on each line between the rightmost possible print position and the last character printed on that line. (For the TRS-80 Line Printer VIII ordinary monospaced character set, a value of seven will leave a one-inch right margin.)

Margin Setting (top/heading/bottom)

PD Page Depth: the maximum number of lines that can be printed on a page. (For the TRS-80 Line Printer VIII in a character printing mode, this maximum is 66 for 11-inch paper.)

TM Top Margin: the number of lines to be left blank at the top of each page before the page heading/page number line is printed. (For standard six-line per inch printers, a value of four prints the heading/page number line about 3/4 inch down from the top margin.)

HM Heading Margin: the number of lines to be left blank between the heading/page number line and the start of the text on the page. (For standard six-line per inch printers, if TM is four then a value of four for HM will start the text on each page about 1 1/2 inches down from the top margin.)

BM Bottom Margin: the minimum number of lines to be left blank at the bottom of each page. (For standard six-line per inch printers, a value of six will leave at least one inch on each page between the end of the text on the page and the bottom of the page.)

Page Heading

PH\$ Page Heading: the text to be printed at the left margin in the heading/page number line printed at the top of every page. The page heading line is printed after skipping the number of lines specified by TM (Top Margin). After the heading line is printed, the text begins after skipping the number of lines specified by HM (Heading Margin).

HD\$ Heading Line: a string variable containing the Page Heading (PH\$) followed by enough blanks to obtain a length eight characters shorter than the maximum line length (LL). If page numbering is in effect when the heading line is printed, HD\$ is printed followed by the word Page and the value of PN (page number). If page numbering is not in effect, HD\$ alone is printed as the page heading.

Paragraph Indentation

IN Indentation: the number of spaces to indent the following line of text from the left margin after an .in formatting code is encountered. I use a value of 5.

Continuous Form or Single Sheet

CF Continuous Form: a value of one indicates that the printer is loaded with continuous form paper and the program will print continuously to the end of the text lines once the paper is initially set to the top of the first page. A value of zero indicates that printing is to take place on separate sheets of paper and the program will pause before beginning each new page to allow the user to load and position a new sheet of paper.

Text Line Length

LL Line Length: the maximum number of characters to be printed in a line of text. Line Length is computed from the left/right margin setting variables PW, LM, and RM.

Text Page Length

PL Page Length: the maximum number of text lines to be printed on a page. Page Length is computed from the Top/Heading/Bottom Margin Setting variables PD, TM, HM, and BM.

Range of Lines to Print

FR From Line Number: the number of the Basic line from which printing is to start; if there is no line with this number, printing will start from the first line with a higher line number.

TL Through Line Number: the number of the Basic line through which printing is to continue; if there is no line with this line number, printing will continue through the last line with a lower line number.

Table 1. Format Control Variables

buffer whenever the count of characters in the line buffer exceeds the maximum line length. In this case, the Print Line subroutine scans the contents of the line buffer from right to left, looking for the right-most blank character. When it is located, all of the characters to the left of the blank are printed. Any characters to the right of the blank are moved to the beginning of the line buffer and are printed at the beginning of the line when the line buffer is next printed. The line buffer character count, CT, is set to the number of characters moved. It is set to zero if none were moved.

At the beginning of the Print Line subroutine, the value of LN (the number of lines already printed on the current page) is tested to see if it is time to begin a new page. If so, the subroutine calls the End Page subroutine to eject the current page and then calls the New Page subroutine to begin a new page. Just before returning to its caller, the Print Line subroutine checks to see if multiple line spacing is in effect, and if so, calls the Line Spacing subroutine to print the correct number of line feeds.

The Print Line subroutine may also be called from the subroutine to identify and process formatting codes in response to a formatting code of .nl (new line), .in (indent paragraph), or .np (new page). In these cases, the call to Print Line prints all the characters currently in the line buffer, followed by the appropriate line spacing.

Line Spacing

The Line Spacing subroutine is called from the Print Line subroutine after a line has been printed. It is called only if the line spacing format control variable SP is greater than zero. The Line Spacing subroutine checks to see if there is enough space left in the text print area of the current page to hold the number of line feeds specified by SP. If so, the subroutine sends that number of line feeds. If not, the subroutine sends as many as will fit. In either case, the line count working storage variable, LN, is updated to reflect the number of line feeds actually printed. In Listing 1, the only possible values for SP are 0 (no space after printing the line buffer) or 1 (skip one line after printing the line buffer). The user may choose to initialize SP to any appropriate value in the initialization section by changing the value assigned to it there.

End of Page

The End Page subroutine sends to the printer as many line feeds as are necessary to space to the end of the current page. The End Page subroutine is called from the Line Print subroutine if there is no room in the text print area of the current page to print another line. The End Page subroutine is also called directly by the subroutine to identify and process formatting codes in response to a .np (new page) formatting code in the text.

New Page

The New Page subroutine requests the

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user to position the paper at the top of a new sheet; it pauses until the user hits enter to signal that he has positioned the paper. It also prints the page heading on the appropriate line at the top of the page (with or without a page number, depending on whether or not the value of the format control variable PN is zero). The New Page subroutine always pauses before beginning printing on the first page (PG=0), and pauses before printing each succeeding new page only if the format control variable CF is zero (which indicates that continuous form paper is not being used).

How to Use the Program

To make the maximum amount of storage available for your text, enter PCLEAR 1.

To set aside enough space for the various string variables, enter CLEAR 300. Now enter the program text (line 0 and lines 10000 through the end of the program listing), or CLOAD it if you have already entered and stored the program on cassette). You are now ready to begin entering text lines. A text line consists of a line number followed by a formatting code (see Table 3) or a line number followed by up to about 240 characters. The exact maximum seems to be 249, counting the characters in the line number and the initial apostrophe, but as a rule do not fill your lines completely or you will not be able to insert additional characters while editing such lines.

The line numbers you assign must be in the range 1-9999. Remember that shift 0

(zero) will put your keyboard into mixed upper/lowercase mode.

When you have entered your text and reviewed it and corrected it to your satisfaction, type Run, set the range of line numbers you want printed, and when the "Position Paper" message is displayed adjust the paper so that the print head is ready to print on the top line, and press enter. The text will be printed.

To save your text for later re-use, CSAVE the whole program (which now includes all of your text lines in addition to the executable portion). When you reload it at a later time, be sure to enter PCLEAR 1 before CLOADing or you will get an OM (Out of Memory) error message if your text (and hence your program) is too large.

On a 16K machine, about seven pages of double-spaced text will fit into memory along with the program and the necessary string work space. When you enter text lines, you should PRINT MEM every so often to see how much space you have left. When you get down to fewer than 400 characters of memory available, stop entering text.

If you forget to PCLEAR 1 before CLOADing your program you may get a SN (Syntax) error in line 0 when you try to run the program. If this happens, press the reset button on the back of the Color Computer, then enter run again. If you do not leave enough free memory when entering the text, you will get an OM error when you try to run the program. The only thing you can do in this case is to delete some text.

Enhancements and Variations

You can speed up processing dramatically by coding the program in Assembly language. If you do not want to do this you can remove REMarks and blanks from the program lines and combine as many statements as possible on each line.

For letter writing, use the Line Printer VIII's proportional typeface by sending a code sequence to the printer to select the proportional typeface before any characters are printed. Because the width of the proportional characters is smaller on average than that of the monospaced characters, you will want to adjust the format control variables LM, RM and PW. I find that setting the left margin (LM) to 27, the right margin (RM) to 10, and the page width (PW) to 126 gives a page layout roughly like that obtained with the monospaced character set using the values shown in the listing; namely, a 1 1/2 inch left margin, a 6 inch text line, and a 1 inch right margin. The right margin will still be ragged using the proportional type face, but its appearance is quite acceptable. If you want to use the proportional typeface add line 10025:

```
10025 PRINT#-2,CHR$(27);CHR$(17);
```

and change line 10050 to:

```
10050 LM = 27:RM = 10:PW = 126:LL = PW - LM - RM
```

LN\$ Line Buffer: a character string variable whose length is one greater than the maximum length of a line to be printed (LL). As each text character is retrieved, it is appended to LN\$ until the number of characters (CT) is greater than LL (in which case the line is printed out) or a formatting code is encountered that forces printing of the line regardless of its length (.in, .nl, .np).

A Address of Current Line: the location of the first character of the Basic line currently being processed. The contents of locations A and A + 1 is the address of the next Basic line. The contents of locations A + 2 and A + 3 is the value of the Basic line number, and the text of the Basic line begins with the character in location A + 4.

N Next Line Address: the address of the next Basic line after the line currently being processed.

CT Count of Characters: the number of characters in the print line currently being constructed in the Line Buffer (LN\$). When CT becomes greater than the maximum text line length (LL), it triggers the printing of the contents of the Line Buffer.

LN Line Count: the number of lines that have been printed in the text area of the current page (counting blank lines if double-spaced and blank lines caused by .nl formatting codes).

PG First Page Indicator: PG is initialized to zero in the initialization section of the program to indicate that no pages have yet been printed. When the first line of text on the first page is ready to be printed, the Print Line subroutine calls the New Page subroutine, which asks the user to position the paper in the printer before starting to print. Upon return to the Print Line subroutine, PG is set to 1 and on all subsequent calls to the New Page subroutine, the user is only asked to position the paper in the printer again if the continuous form indicator (CF) is zero (indicates that you are using single sheets of paper).

L Line Number (Basic): the value of the line number of the Basic line currently being processed.

P Pointer to Current Character: the address of the current character in the current Basic line.

CN Character Number (in Basic Line): the number of the character currently being processed in the Basic line. When CN = 1, i.e., the current character is the first in the Basic line, the program tests to see if the line begins with a period (.). If it does it calls the Formatting Code subroutine. If the line begins with a colon (;) followed by a hexadecimal 83 (the code sequence in Basic for an apostrophe signaling the beginning of a remark), character processing begins with the third character in the line.

C Character (numeric form): the numeric value of the current character in the Basic line.

CH\$ Character (string form): the current character in the Basic line. The character value of C.

I Index: a temporary variable used in subroutines. In the Print Line subroutine, it identifies and holds the character position of the rightmost blank in the Line Buffer (LN\$). In the Line Spacing, End Page, and New Page subroutines, it is a For...Next loop variable.

II Index (#2): a temporary variable used in the Line Spacing subroutine to hold the minimum of the number of lines to the end of the text area on the page and the number of lines to skip after printing the current line (SP).

ANS Answer: a dummy variable in the New Page subroutine where an input statement awaits an <ENTER> from the user to indicate that the paper in the printer has been manually positioned to the top of the page.

FC\$ Formatting Code: three characters, the first of which is a period (.), which may be one of the formatting codes the program recognizes.

F Formatting Code Index: a number indicating which, if any, of the recognized formatting codes is currently in FC\$. If F = 0 then FC\$ does not contain a valid formatting code.

Table 2. Working Storage Variables

.nl New Line: The current contents (if any) of the line buffer (LN\$) are printed and the paper is advanced one vertical line. The following characters in the text begin filling the line buffer from the leftmost position.

.np New Page: The current contents (if any) of the line buffer (LN\$) are printed, the paper is advanced to the end of the current page, and a new page begins. The following characters in the text will be printed on the new page.

.in Indent Paragraph: The current contents of the line buffer (LN\$) are printed. If the line buffer is empty, no printing takes place. The number of spaces specified by the format control variable IN (indentation) are placed at the beginning of the line buffer so that when the line buffer is printed, the following text will be indented on the line.

.pn Page Numbering On: The program queries the user for the page number from which page numbering is to begin. Page numbering will begin when the next page is printed.

.px Page Numbering Off: The format control variable PN (page number) is set to zero. The program will not include a page number in the heading line printed on the next and following pages.

.db Double Space: The program will double space all following lines when they are printed.

.sg Single Space: The program will single space all following lines when they are printed.

Table 3. Formatting Control Codes

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In this second article of the series, we will begin to explore the remaining Extended Graphics instruction set and introduce new programs for those instructions that have already been described. The new instructions are Get, Put, Circle and Draw.

Program Listing 1 (Hour Glass) is an example in very low-resolution (VLR) graphics to illustrate the use of algebraic equations to draw interesting designs on the screen. Like all Set graphics, it is slow. As with many of the program names in this series, the name Hour Glass is fanciful. Note that in line 40 the 6.28319 is two times pi.

Program Listing 2 is also in VLR graphics. It depicts a Playboy Bunny and could, undoubtedly, be improved. The screen could be stored on tape or disk for quick display using the method previously described.

The program is longer than usual owing to the numerous data statements. You need only enter them once. We'll use them in another program in high-resolution graphics to illustrate one use of Put and Get. The program can be used with Models I and III by altering the data statements and some of the other lines. Line 300 terminates

the frame and line 190 sets the number of frames displayed. You may change it as you wish. Line 310 assures that succeeding frames will not be in duplicate colors.

Put and Get

Let's consider the Put and Get commands and a few of their uses such as duplication of a screen section to another area or areas with or without redundancy. The Get instruction tells Basic to read an area of the graphics display and to place the information in a previously dimensioned array for possible future use. The format for Get is

```
GET (X1, Y1 - X2, Y2), Z, G
```

X1 and Y1 are the coordinates of the upper left corner of a rectangle which will encompass that portion of the screen we desire to store. X2 and Y2 are the coordinates of the lower right corner of that area. Z is the array previously dimensioned

and G tells Basic to store everything within that area.

Suppose we wish to store a section of a screen 20 units long by 20 units high—a very small area. If you dimension an array V(20, 20) as described in the *Extended Color Basic Manual*, Basic will reserve over 2,200 bytes of memory! This is because, although only integers are necessary, Extended Color Basic always stores numbers with nine digits of precision. Therefore, don't do it that way. Instead, use the method described in the Radio Shack newsletter by one of the subscribers.

The formula is

$$\text{array size} = \frac{(X\text{-dimension} + 1) \times (Y\text{-dimension} + 1) - 1}{M}$$

where M = 160 for PMODE 0
M = 80 for PMODE 1 or 2
M = 40 for PMODE 3 or 4

Therefore, you only need dimension V(10) for PMODES 3 and 4 although the formula calculates 11 (remember that the zero element is always reserved in arrays). The

The Key Box

Color Computer
16K RAM
Extended Color Basic

```
0 REM LISTING 1
20 CLS0
30 P=RND(8)
40 FORI=0TO6.28319STEP1.7453E-2
50 R=30*SIN(2*I)
60 X=R*COS(2*I)+32
70 Y=R*SIN(I)+31
80 SET(X,31-(Y/2),P)
90 NEXT
100 GOTO100
110 REM MEM = 146
```

Program Listing 1. Hour Glass


```

10 REM LISTING 2
20 DATA1,2,-1,0,2,45,50,-1,0,5,43,52,-1,0,7,41,52,-1
30 DATA1,9,37,50,-1,2,11,36,50,-1,3,13,34,49,-1,4,14,32,48,-1
40 DATA5,15,31,47,-1,6,16,30,45,-1,7,17,29,44,-1,8,19,28,43,-1
50 DATA9,20,27,41,-1,10,21,26,40,-1,11,22,25,38,-1,12,22,24,36,-1
60 DATA13,34,-1,14,33,-1,15,31,-1,17,29,-1,18,27,-1
70 DATA19,26,-1,16,28,-1,13,30,-1,11,31,-1,10,32,-1
80 DATA8,33,-1,7,34,-1,6,13,16,34,-1,5,12,16,35,-1
90 DATA4,12,16,35,-1,3,12,15,35,-1,2,35,-1,1,35,-1
100 DATA2,34,-1,3,34,-1,4,33,-1,6,33,-1,10,32,34,34,-1
110 DATA14,17,19,25,28,31,35,35,-1,15,19,23,30,36,36,-1
120 DATA14,18,21,21,24,30,37,37,-1,13,18,23,29,33,38,-1
130 DATA12,29,31,33,-1,11,13,17,17,19,19,22,22,24,31,-1
140 DATA10,11,17,18,22,22,24,29,29,-1
150 DATA22,23,26,29,-1,27,29,-1,28,29,-1
160 DATA500
170 CLS0
180 R=RND(8):N=R
190 FORL=1TO200
200 Z=-.65
210 RESTORE
220 Z=Z+.65
230 READX:IFX<0THEN220
240 IFX>300THEN300
250 READY
260 FORI = X+6 TOY+6
270 SET(I,Z,R)
280 NEXT
290 GOTO230
300 FORK=1TO2000:NEXT
310 R=RND(8):IFR= N THEN310
320 CLS0:NEXTL
330 REM MEM = 938

```

Program Listing 2. Bunny

result is that you actually need only a little over 50 bytes to store the area. However, always use the G instruction. You may be able to omit it sometimes, but beware; omitting it may not always work.

Now that we have our array, what can we do with it? We can Put it anywhere on the screen we choose. The command is Put with the format

PUT (X1, Y1) - (X2, Y2), Z, K
where K = PSET, Preset, And, Not or Or.

X1 and Y1 are the coordinates of the upper left corner of the rectangle—the destination target. Correspondingly, X2 and Y2 are the coordinates of the lower right corner. PSET means set all pixels in the area, and Preset means set them all to the background color (not very useful unless you wish to erase an area). And means that if a

Program Listing 3. Bunny 2

```

10 REM LISTING 3
20 PMODE3,1:PCLS:SCREEN1,1
30 DIMV(70)
40 M=1:R=RND(3)+1:N=R
50 FORL=1TO20
60 Z=0
70 SCREEN1,M

```

Program Listing 3 Continues

BEYOND-BASIC

```

10 REM Beyond-BASIC In Action
20 GOSUB "CLEAR SCREEN" ' See line 200
30 RESTORE 40 : DIM A(5) : MAT READ A
40 DATA 5,4,3,2,1 ' Data for array A
50 NU$="0123456789." ' Allow digits only
60 INPUT LEN=3, USING NU$, "ACROSS":X
70 INPUT LEN=2, USING NU$, "DOWN":Y
80 PLOT (0,0)-(X,Y) ' Draw a line
90 SHAPE$="PDPDRPRPUPUPLP" ' Define small square
100 INPUT USING NU$, "SCALE":A ' A=small, B=large
110 INPUT USING NU$, "ROTATE":B ' 0-360 degrees
120 PLOT (X,Y), S=A,R=B, SHAPE$ ' Draw the shape
130 DEF FNI (L0, HI, LOCAL N) ' Define a function
140 INPUT "ENTER A NUMBER":N ' to be this entire
150 IF N=L0 OR N=HI THEN 140 ' subroutine
160 RETURN N : FNIEND
170 PRINT FNI(1,10)+FNI(X,Y) ' Input 2 nums, add
180 SORT A : PRINT "SORTED ARRAY: ";
190 MAT PRINT A : DOS ' Return to TRSDOS
200 "CLEAR SCREEN" ' Named subroutine
210 CLS : POKE 3000H, "BEYOND-BASIC DEMO"
220 MAT 1 ' Ignore A(0) in MAT
230 RETURN
240 END

```

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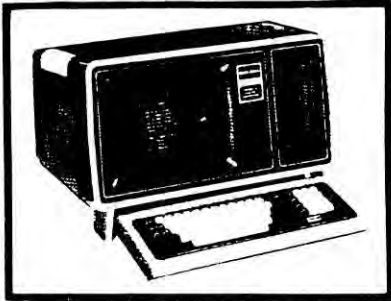
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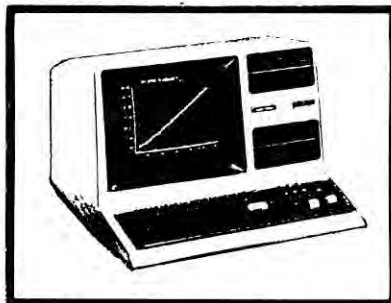
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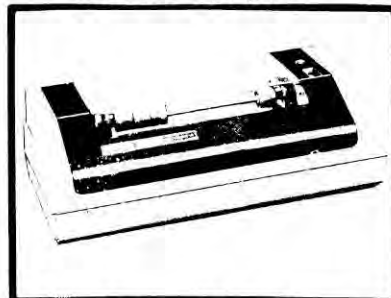
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Program Listing 3 Continued

```

80 PCLS
90 RESTORE
100 Z=Z+1
110 READX:IFX<0THEN100
120 IFX>300THEN180
130 READY
140 FORI = X TOY
150 PSET(I,Z,R)
160 NEXT
170 GOTO110
180 Z=Z+10:IFZ>155THEN200
190 REM
200 GET(0,0)-(52,52),V,G
210 PUT(0,70)-(52,121),V,PSET
220 PUT(0,140)-(52,191),V,PSET
230 PUT(64,0)-(116,52),V,PSET
240 PUT(128,0)-(180,52),V,PSET
250 PUT(192,0)-(244,52),V,PSET
260 PUT(64,70)-(116,121),V,PSET
270 PUT(128,70)-(180,121),V,PSET
280 PUT(192,70)-(244,121),V,PSET
290 PUT(64,140)-(116,191),V,PSET
300 PUT(128,140)-(180,191),V,PSET
310 PUT(192,140)-(244,191),V,PSET
320 FORK=1TO2000:NEXT
330 IFM=0THENM=1ELSEM=0
340 R=RND(3)+1:IFR= N THEN340
350 NEXTL
360 GOTO360
370 DATA1,2,-1,0,2,45,50,-1,0,5,43,52,-1,0,7,41,52,-1
380 DATA1,9,37,50,-1,2,11,36,50,-1,3,13,34,49,-1,4,14,32,48,-1
390 DATA5,15,31,47,-1,6,16,30,45,-1,7,17,29,44,-1,8,19,28,43,-1
400 DATA9,20,27,41,-1,10,21,26,40,-1,11,22,25,38,-1,12,22,24,36,-1
410 DATA13,34,-1,14,33,-1,15,31,-1,17,29,-1,18,27,-1
420 DATA19,26,-1,16,28,-1,13,30,-1,11,31,-1,10,32,-1
430 DATA8,33,-1,7,34,-1,6,13,16,34,-1,5,12,16,35,-1
440 DATA4,12,16,35,-1,3,12,15,35,-1,2,35,-1,1,35,-1
450 DATA2,34,-1,3,34,-1,4,33,-1,6,33,-1,10,32,34,34,-1
460 DATA14,17,19,25,28,31,35,35,-1,15,19,23,30,36,36,-1
470 DATA14,18,21,21,24,30,37,37,-1,13,18,23,29,33,38,-1
480 DATA12,29,31,33,-1,11,13,17,17,19,19,22,22,24,31,-1
490 DATA10,11,17,18,22,22,24,29,29,-1
500 DATA22,23,26,29,-1,27,29,-1,28,29,-1
510 DATA500
520 REM MEM = 1343
  
```

10 REM LISTING 4

20 CLS

30 AS=*** SNOWFLAKES ***:PRINT@15-LEN(A\$)/2,A\$;

40 FORJ=68TO478STEP8:PRINT@J,"*";:NEXT:FORI=1TO2000:NEXT

50 PMODE3,1:PCLS:SCREEN1,1

60 V=256/210:PI=3.141592654

70 FORE=1TO5

80 PCLS

90 FORK=1TO RND(5)+7

100 X=RND(48):Y=RND(48):R=SQR(X^2+Y^2):IFR>48THEN100

110 T=RND(48):Z=RND(48)

120 S=SQR(T^2+Z^2):IFS>48THEN110

130 GOSUB210

140 Y=-Y

150 Z=-Z

160 GOSUB210

170 NEXTK

180 FORI=1TO2000:NEXTI

190 NEXTE

200 GOTO70

210 W=ATN(Y/X):Q=ATN(Z/T)

220 FORJ=1TO6

230 W=W+PI/3:Q=Q+PI/3

240 X2=R*COS(W):Y2=R*SIN(W):T2=S*COS(Q):Z2=S*SIN(Q)

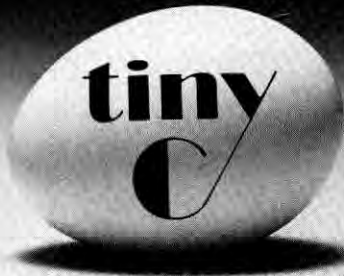
250 LINE(X2*V+128,Y2+96)-(T2*V+128,Z2+96),PSET

260 NEXTJ:RETURN

270 REM MEM = 510

Program Listing 4. Snowflakes

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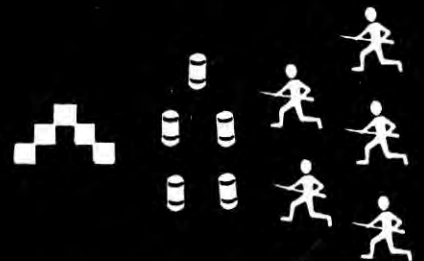
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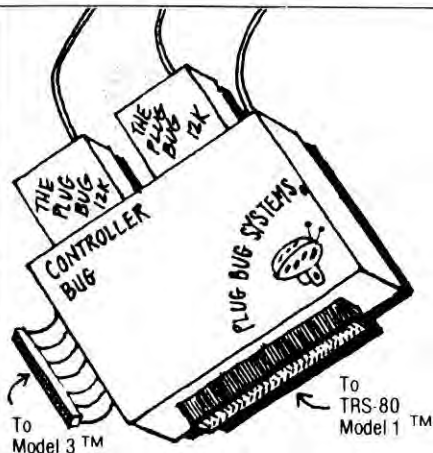
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```

5 REM LISTING 5
10 PMODE3,1:PCLS:SCREEN1,1
20 PI=3.14159:P1=PI*2:P2=PI/50
30 FORT=0TO P1 STEP P2
40 X1=COS(T)*100+126:Y1=SIN(T)*95+95
50 C=T+3*PI/4
60 X2=COS(C)*100+126:Y2=SIN(C)*95+95
70 LINE(X1,Y1)-(X2,Y2),PSET
80 NEXT
90 GOTO90
100 REM MEM = 203

```

Program Listing 5. Circle 1

pixel is on in both locations, leave it on else reset it to the background color. Not means that if Z contains a pixel on in the start location then reset the destination location else set the destination pixel. The color that is set is the one previously designated by the Color or Screen commands.

Program Listing 3 (Bunny 2) is an example of the use of Get and Put. To save time, load Bunny 1 and delete lines 170-320. Then type in lines 20-180 from Bunny 2. Lines 20 and 40 designate high-resolution graphics, dimension the array and set the screen counter. After the first bunny is drawn, the subsequent lines Get the picture and put it at 11 different locations. We will return to the use of Get and Put later.

Line

Before we examine the next high-resolution command we will consider a number of new programs utilizing the Line function. Program Listing 4 (Snowflakes) is another example of the use of mathematical func-

tions to produce interesting patterns on the screen. It draws ever-changing designs resembling snowflakes and is based on a program published previously in *80 Micro*. Try changing the PMODE and Screen to obtain different colors and resolutions and choose those that you like best.

Program Listings 5, 6 and 7 (Circle 1, Cir-

```

10 REM LISTING 6
20 PMODE4,1:PCLS:SCREEN1,1
30 A=388:B=103:C=90
40 AN=360/A
50 FORN=1TOA STEP4:T=N*AN
60 X=B*COS(T)+128
70 Y=C*SIN(T)+96
80 LINE(128,96)-(X,Y),PSET
90 NEXT
100 GOTO100
110 REM MEM = 155

```

Program Listing 6. Circle 2

```

10 REM LISTING 7
20 PMODE4,1:PCLS:SCREEN1,1
30 DEF FNZ(R)=N*B/57
40 A=1.007:B=44:C=10
50 N=0:R=C
60 R=A*R:T=N*B:N=N+2
70 T=FNZ(N)
80 X=R*COS(T)+128:Y=R*SIN(T)+96
90 IFX>191 OR X<0THEN130
100 IFY>255 OR Y<0THEN130
110 LINE-(X,Y),PSET
120 GOTO60
130 GOTO130
140 REM MEM = 219

```

Program Listing 7. Spiral

```

10 REM LISTING 8
20 DIMV(11)
30 PMODE3,1:PCLS:SCREEN1,1
40 CIRCLE(10,10),10
50 GET(0,0)-(20,20),V,G
60 FORI=0TO172STEP20
70 FORJ=0TO236STEP20
80 PUT(J,I)-(J+20,I+20),V,PSET
90 NEXTJ,I
100 GOTO100
110 REM MEM = 155

```

Program Listing 8. Grating

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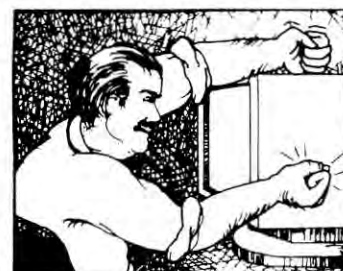
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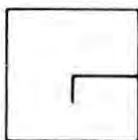
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cle 2, Spiral) might be called variations on a theme, but with different results in each case. Note that some fairly complex appearing patterns can be constructed with rather short, although not always simple, programs.

Circle

Now, to a new command that allows the construction of curved lines without the use of the slowpoke PSET. The command is Circle. This versatile command permits you to draw not only circles and ellipses, but also segments of circles and ellipses at high speed. The format is:

CIRCLE (X, Y), R, C, HW, S, E

where X and Y are the coordinates of the center of the circle and R is the radius. This portion of the instruction is mandatory, but the remainder is optional. C designates a color compatible with the PMODE designated. HW is a number from zero to 255 that sets the height-to-width ratio of an ellipse. The default is one, which gives a circle. Numbers less than one give an ellipse with the height less than the width. S designates the starting point of an ellipse or circle and may be any number from zero to one while E indicates the end point of the circle. S and E must both fall in the range of zero to one.

First, I'll illustrate some simple uses of the Circle command. Program Listing 8 (Grating) uses Circle, Get and Put to illustrate the use of these instructions to draw a screenful of circles. Program Listing

```
10 REM LISTING 9
20 PMODE3,1:PCLS:SCREEN1,1
30 FORY=20TO180STEP20
40 C=RND(3)+5
50 FORX=20TO244STEP20
60 CIRCLE(X,Y),10,C,3
70 NEXTX,Y
80 GOTO80
90 REM MEM = 112
```

Program Listing 9. Glass

9 (Glass) is an even simpler program using the HW option to obtain a stained glass window effect. Program Listings 10, 11 and 12 (Lace 1, 2, 3) use all of the options to draw lace-like patterns. Note that if any option is omitted and a subsequent option is chosen, the omitted option must be replaced with a

```
10 REM LISTING 10
20 PMODE3,1:PCLS:SCREEN1,0
30 R=10
40 FORI=10TO182STEP8
50 FORJ=10TO246STEP8
60 CIRCLE(J,I),R
70 NEXTJ,I
80 GOTO80
90 REM MEM = 100
```

Program Listing 10. Lace 1

```
10 REM LISTING 11
20 PMODE3,1:PCLS:SCREEN1,0
30 FORI=10TO244STEP10
40 FORJ=10TO180STEP10
50 CIRCLE(I,J),10,,1,.25,.75
60 NEXTJ,I
70 GOTO70
80 REM MEM = 105
```

Program Listing 11. Lace 2

```
10 REM LISTING 12
20 PMODE3,1:PCLS:SCREEN1,1
30 LINE(0,10)-(255,10),PSET
40 FORI=10TO244STEP10
50 FORJ=15TO181STEP10
60 CIRCLE(I,J),10,,1,0,.5
70 NEXTJ,I
80 FORI=11TO240STEP10
90 FORJ=12TO186STEP10
100 PAINT(I,J),7,8
110 NEXTJ,I
120 GOTO120
130 REM MEM = 184
```

Program Listing 12. Lace 3

```
10 REM LISTING 13
20 A$="L12D14R12
30 B$="R12D14L12U14
40 C$="D14R12
50 D$="U14R12D8L10BR4F6
60 E$="R12
70 PMODE1,1:PCLS:SCREEN1,0
80 COLOR3,1
90 F$="BM40,60"+A$:DRAWF$
100 F$="BM+12,-14"+B$:DRAWF$
110 F$="BM+22,0"+C$:DRAWF$
120 F$="BM+12,-14"+B$:DRAWF$
130 F$="BM+24,14"+D$:DRAWF$
140 F$="BM+10,-10"+E$:DRAWF$
150 F$="BM+14,-4"+B$+"BM+0,7"+E$:DRAWF$
160 F$="BM+12,-6"+B$:DRAWF$
170 GOTO170
180 REM MEM = 351
```

Program Listing 13. Color-80

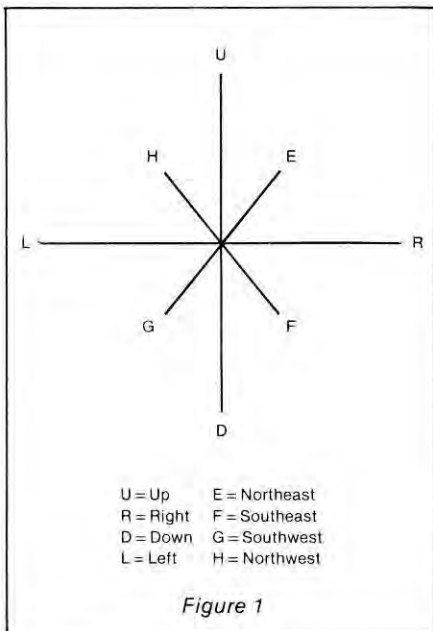
comma. If a color is not designated, the foreground color is the default. For example:

CIRCLE (X, Y), R, HW

is improper and should be entered as:

CIRCLE (X, Y), R,, HW

since C has been omitted. Program Listing



13 (Blanket) is another design using ellipses that resembles an Indian blanket.

Draw

We now come to the most complex of the high-resolution graphics instructions and the most versatile—Draw. It has advantages and limitations. Everything that can be done with Draw can also be duplicated, albeit in a much more cumbersome manner, with Line. Draw makes available 15 options, some of which are sometimes mandatory. (That is a contradiction in terms but the

```
10 REM LISTING 14
20 PMODE3,1:PCLS:SCREEN1,1
30 FORY=10TO180STEP10
40 C=RND(3)+5:IFR=C THEN40
50 FORX=20TO230STEP10
60 CIRCLE(X,Y),20,C,.3
70 NEXTX:R=C:NEXTY
80 GOTO80
90 REM MEM = 155
```

Program Listing 14. Blanket

```
10 REM LISTING 15
20 PMODE3,1:PCLS:SCREEN1,0
30 DRAW"BM88,76G36BM56,108D30R64U30H32
40 DRAW"BM120,108U64E20F20D94L38
50 DRAW"BM130,44D10L4U10R4BM142,44D10L4U10R4BM154,44D10L4U10R4
60 LINE(132,138)-(132,122),PSET
70 LINE(140,138)-(140,122),PSET
80 CIRCLE(136,122),4,,.5
90 DRAW"BM84,88D6R4U6L4BM68,124D12R6U12L6BM104,124D12R6U12L6
100 LINE(82,124)-(82,138),PSET
110 LINE(94,124)-(94,138),PSET
120 CIRCLE(88,124),6,,.5
130 LINE(0,138)-(255,138),PSET
140 PAINT(132,46),2,4
150 PAINT(88,110),4,4
160 LINE(0,146)-(255,146),PSET
170 GOTOL70
180 REM MEM = 461
```

Program Listing 15. Church

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meaning will become clear later.) Let's consider these options a few at a time with some programs to illustrate their use.

First, Basic considers the Draw function as though it were a string function, so quotation marks are required just as in string usage. In many respects, Draw can be manipulated in much the same fashion as strings.

The B option tells Basic to move the origin of the line that follows without drawing, i.e., B stands for blank. M is for move. Therefore,

```
DRAW "BMX, Y"
```

has the meaning *move from the present location to the coordinates X, Y but do not draw a line*. As with the string and Print commands, the trailing quotation marks are not required at the end of a line as a delimiter, since the end of line marker (zero) acts as a delimiter as it does in Level II Basic.

Program Listing 14 draws the word Color-80 on the screen and serves as an introduction to a method for putting characters on the screen in high-resolution graphics for use in games and for other purposes. Remember, characters *cannot* be used with this mode of operation. They must be drawn or otherwise fabricated as, for instance, with Line; but Draw is somewhat less tedious.

Color Basic and Extended Color Basic normally Clear 200 for string space when the computer is turned on, but if strings are stored in a program, it is unnecessary to clear string space. This is the same as in Level II Basic. It also has the virtue that garbage collection is eliminated for such strings and allows one to store machine language and graphics in sheltered positions within a program without reserving memory. The Color Basics are similar to Level II Basic in so many respects that many of their programming techniques are directly interchangeable.

In lines 20-60 we define a series of strings to be used for constructing characters on the screen. A\$, in line 20, issues the instruction L12D14R14 which means, as will be seen later, draw a line left 12 units, down 14 units and right 12 units to form the letter C. Later in the program this will be combined with the BMX,Y instruction to tell Basic where we want the letter to be placed on the screen. Similarly, strings B, C and D spell out the word "color" when properly oriented.

Line 70 sets the PMODE. Because we would like bold characters on the screen we use PMODE 1. Line 80 determines the color of the letters and the background. In lines 90-160 we construct strings and place them on the screen to spell Color-80. Line 90 instructs Basic to go to the coordinates 40, 60 and to draw A\$. In all of these lines, we are concatenating strings.

The first letter starts at the coordinates

```
X = 40, Y = 60
```

and subsequent letters are moved away

from the original coordinates using the format

```
BM + X, ± Y
```

A plus or minus sign is mandatory for the X movement but a plus sign is not necessary for the Y movement. In other words, instead of respecifying new coordinates for each alphanumeric symbol, we give the computer new coordinates relative to the last coordinates specified so that it is not necessary to work with graphics work sheets or to calculate the position of each letter. The original strings A, B, C and so on, were set up to make this easy. Lines 90-160 could equally well have been written in the form

```
XXX DRAW "BM + X, - Y" + B$
```

I will further illustrate methods for providing alphanumeric characters in high-resolution graphics in Part III of this series. The B tells the computer to move but not to Draw.

If the B were omitted, the result would be a hodge-podge. Semicolons in the strings are not required except when using substrings, which will also be discussed in Part III.

There are only eight motion options available other than MX, Y or BMX, Y. They are shown in Fig. 1. Consequently, the Draw instruction is, in a sense, restrictive, and you have to resort to the use of Line where an angle at other than 45 degrees is to be drawn.

Program Listing 15 (Church) uses the commands Draw, Line, Circle and Paint to draw a picture of a church with a bell tower. You may wish to enhance the image, at the expense of more memory, by adding additional detail to the picture.

Program Listing 16 (Squares) incorporates a new Draw option S called Size or Scale. The S option permits you to start with a basic figure and then enlarge or reduce it within the screen's limits. By placing it in a

```
10 REM LISTING 16
20 PMODE4,1
30 PCLS
40 SCREEN1,1
50 FORS=1TO62
60 S$="S"+STR$(S)+";"
70 DRAWA$+"BM10,100U20R20D20L20
80 NEXT
90 GOTO90
100 REM MEM = 114
```

Program Listing 16. Squares

```
10 REM LISTING 17
20 PMODE4,1:PCLS:SCREEN1,1
30 A$="S"
40 FORS=2TO46STEP4
50 C=127
60 D=INT(96+1.2*S)
70 B$=STR$(C)+", "+STR$(D)
80 DRAWA$+STR$(S)+"BM"+B$+"H10R20G10
90 NEXT
100 FORS=2TO46STEP4
110 D=INT(96-1.2*S)
120 B$=STR$(C)+", "+STR$(D)
130 DRAWA$+STR$(S)+"BM"+B$+"G10R20H10
140 NEXT
150 GOTO150
160 REM MEM = 249
```

Program Listing 17. Triangles

```
10 REM LISTING 18
20 PMODE3,1:PCLS:SCREEN1,1
30 A$="S"
40 FORS=2TO60STEP4
50 C=INT(127-1.3*S)
60 D=INT(96-1.2*S)
70 B$=STR$(C):C$=STR$(D)
80 DRAWA$+STR$(S)+"BM"+B$+", "+C$+"R10D10L10U10
90 NEXT
100 GOTO100
110 REM MEM = 172
```

Program Listing 18. Boxes

LYNN'S A/R SYSTEM

12 Intergraded Account Receivable Programs

Tested In Service For Over 3 Years

User's Comments: • menu driven • increased cash flow • saved over 50 hours a month in secretarial hours • almost completely eliminated billing errors • phone supported-ask for Ron.

LYNN'S A/R SYSTEM WILL

- print invoices
- tell you your a/r total, number of invoices outstanding, average per invoice
- tell you at any time how many invoices an individual account has open, the total amount owed, the average per invoice, the invoice date, and then invoice amount
- total sales on account for a given month, number of invoices sent, average sale per invoice
- how much an account purchased during month, how many invoices were sent, average invoice for month
- tell you what percent of sales an account is to total sales by month
- tell you what percent of a/r an account is
- print mailing labels for your accounts
- print statements at any time you want them (either individual or all accounts)
- print alphabetical hardcopy of accounts and account numbers
- print all items sold for month
- alphabetical sort of items sold by month
- this set of programs can be custom modified by you or us
- AND MUCH MORE!!

-AGING REPORT FOR LYNN'S A/R SYSTEM-

Aging Report 01/31/82 Page 1

Account	Current	30-60 Days	60-90 Days	90+ Days	Total
ABC Inc.	\$ 249.00	\$ 65.20	\$ 00.00	\$ 00.00	\$ 314.20
Old Co. Inc.	00.00	84.40	165.20	00.00	249.60
New Co. Inc.	97.75	00.00	00.00	00.00	97.75
Deadbeat Inc.	00.00	00.00	00.00	345.00	345.00
Totals	\$346.75	\$ 149.60	165.20	345.00	\$ 1,006.55

Aging reports can be compiled on a daily, weekly or monthly bases.

-LYNN'S CHECKBOOK-LEDGER SYSTEM

•Phone Supported Ask For Ron•

- saves hours of posting to general ledger
- almost completely eliminates mathematical errors
- menu driven
- 200 expense fields
- will handle 1,000 checks a month
- will print checks with option to enter handwritten checks
- will do reconciliation statement with hardcopy
- will print hardcopy of field totals both by month, year to date and end of year
- automatic account numbering
- automatic field entry
- will print hardcopy of checkbook register
- debit and credit memo entry
- alphabetical hardcopy of accounts payable and account numbers (machine language sort, very fast)
- AND MUCH MORE! •

LYNN'S

Account Receivable System	\$49⁹⁵
Account Receivable Aging Report	\$20⁰⁰
Checkbook Ledger System	\$69⁹⁵
Well's Data Base Manager	\$39⁹⁵

Add \$2.00 Freight and Handling.

Illinois Residents Add 6% Sales Tax.

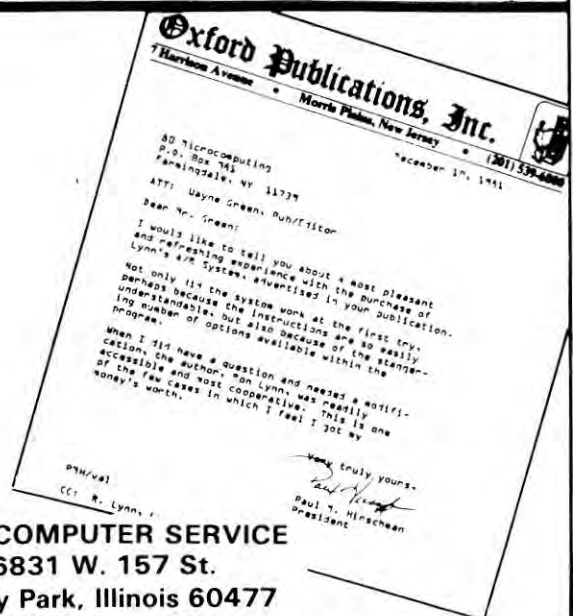
Send \$10.00 Per System
For Printouts and Documentation.
Credit Given on Order

Equipment Needed: 48K Model I or III,
Lineprinter, 2 Disk Drives.

The above programs will work on TRSDOS 1.2 and 1.3 for the Model III. NEWDOS, NEWDOS80, NEWDOS80 V2.0, LDOS and MULTIDOS for the Model I and III.

-DATA BASE MANAGER-BY WELLS

perfect tool for storing and maintaining mailing list, inventories, menus, collection records, article references, important dates, client records • all functions menu driven • easy to interface to word processors and communication programs • sort in ascending or descending order (fast machine language sort) • compact storage with minimum overhead • go from data base to visicalc and return • sort and select visicalc lines!! • interface to Radio Shack's "advanced statistical package".



LYNN COMPUTER SERVICE
6831 W. 157 St.
Tinley Park, Illinois 60477
(312) 429-1915

loop, a figure can be expanded (or decreased) by factors of 1/4 up to 255/4. Since we are working with strings, the S in line 40 must be converted to a string before we can

incorporate it into the Draw command. This is done in lines 60 and 70 by using the STR\$(X) instruction.

Program Listing 17 (Triangles) is another

method used to draw nested figures with the Draw instruction. You might want to try other methods for constructing strings in a more efficient and faster manner.

Program Listing 18 (Boxes) is yet another method for achieving the same ends. The factors 1.2 and 1.3 are used to adjust the spacings between the figures. They can be changed to achieve more interesting patterns. Colors may, of course, be changed within the loop using similar techniques.

Program Listing 19 (Colors) is an example of the use of Draw, Paint and Circle. Program Listing 20 (Sunburst) is another example of nesting that uses Circle. I added it merely to round out "Twenty Programs." The color combinations are rather spectacular. ■

```

10 REM LISTING 19
20 CLS:A$="COLORS 4":PRINT@47-LEN(A$)/2,A$;:GOSUB230
30 FORL=1TO4
40 PMODE3,1:PCLS:SCREEN1,P
50 DRAW"BM128,96NR95NE67ND95NF67NG67NL95NG67NU95NH67
60 CIRCLE(128,96),95
70 B=1
80 B=1
90 J=70:FORI=100TO190STEP25
100 Z=A(B)
110 PAINT(I,J),Z,8
120 B=B+1
130 NEXT
140 J=122:FORI=100TO190STEP25
150 Z=A(B)
160 PAINT(I,J),Z,8
170 B=B+1:NEXT
180 IFP=0THENP=1ELSEP=0
190 FORI=1TO1000:NEXT
200 GOSUB230
210 NEXTL
220 GOTO220
230 FORI=1TO8:A(I)=RND(3)+1:NEXT
240 IFA(1)=A(2)ORA(2)=A(3)ORA(3)=A(4)THEN230
250 IFA(5)=A(6)ORA(6)=A(7)ORA(7)=A(8)THEN230
260 IFA(1)=A(5)ORA(4)=A(8)THEN230
270 RETURN
280 REM MEM = 494

```

Program Listing 19. Colors

```

10 REM LISTING 20
20 PMODE4,1
30 PCLS
40 SCREEN1,1
50 A=1
60 FORI=1TO95STEPSA
70 CIRCLE(128,96),I
80 NEXT
90 FORI=1TO2000:NEXT
100 A=A+1:IFA>20THENEND
110 PCLS:GOTO60
120 REM MEM = 125

```

Program Listing 20. Sunburst

MARATHON  SOFTWARE

PIK'EM

1982



64%
ACCURATE

AGAINST
POINTSREAD
FOR 1981
SEASON
(Games 2-16)

A COMPLETE FOOTBALL PREDICTION PROGRAM FOR THE
1982 NFL PROFESSIONAL REGULAR SEASON STARTING SEPT. 12, 1982*

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ONLY 20 MIN. DATA INPUT PER WEEK WILL GIVE YOU THE EDGE ON EVERYONE**

CAN BE UPDATED FOR 1983



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DATA DISKETTE
COMPLETE INSTRUCTIONS

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TRS80 MODEL I/III
AT LEAST 32K

—FEATURES—

- DISPLAYS PREDICTED SCORES 210 GAMES
- DISPLAYS ACCUMULATED STATS EACH TEAM
- DISPLAYS AVERAGE STATS EACH TEAM
- GIVES PRINTOUT: PREDICTIONS—STATS—AVE.
- AUTOMATICALLY STORES DATA — NO 'SAVE'

* IF PROGRAM IS BOUGHT AFTER SEASON STARTS — ALL PREVIOUS STATISTICS WILL BE INCLUDED NO EXTRA CHARGE

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NAME _____
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CITY _____ ST _____ ZIP _____
PIKEM 24⁹⁵ PAYMENT ENCL
VISA MASTERCHARGE AC# _____
MY CARD EXPIRES:

**

DATA NEEDED TO RUN PROGRAM AVAIL-
ABLE IN LOCAL NEWSPAPERS OR CAN BE
FURNISHED BY MARATHON SOFTWARE

DEALER INQUIRIES INVITED

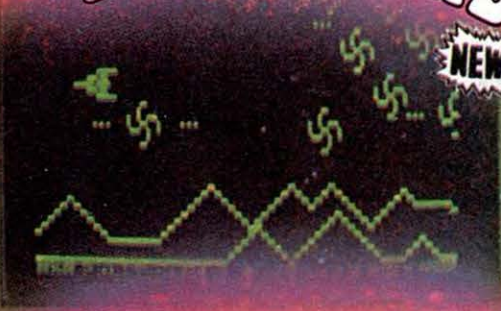
SEA DRAGON

NEW!



REAR GUARD

NEW!

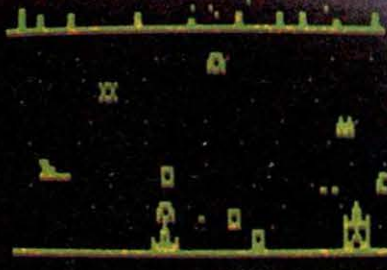


ARMORED PATROL



ENERGY 28 SCORE 1000

ELIMINATOR



JOYSTICK



COMPATIBLE

YOUR TRS-80 ISN'T SUPPOSED TO DO THIS!

Wayne Westmoreland and Terry Gilman have done it AGAIN!

The reviews are saying what the fans have known all along: "The Eliminator" and "Armored Patrol" are nothing short of fantastic. Read for yourself.

Byte Magazine (on Armored Patrol): "A real super job with the graphics."

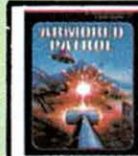
Byte Magazine (on The Eliminator): "The best thing to happen to the TRS-80 in a long time."

80 Microcomputing (on both): "This is state-of-the-art stuff."

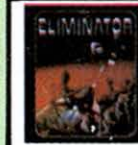
80 U.S. (on The Eliminator): "The graphics are vastly superior to that of any game currently available... it is slick, professional, and, without qualification, a blast."

And now, **two** new releases — and both are incredible arcade-style games. The TRS-80 is almost transformed into an arcade machine, performing Arcade Action Graphics(tm) like never before. Rear Guard and Sea Dragon are great fun and will provide you with hours of enjoyment. Both programs are available now, and all four are compatible with the Alpha Joystick!

Model 1 & 3 tape \$19.95
Model 1 & 3 disk \$24.95



ARMORED PATROL: You're in the command seat of an armored assault tank. Your mission: to search out and destroy an attack force of deadly tanks and lethal robots. Will your skill and advanced technology give you the edge to overcome the odds?
Armored Patrol Features: Simulated 3-D perspective, multiple player option, real time, sound and Arcade Action Graphics(tm) second to none.



THE ELIMINATOR: You're the pilot of The Eliminator, an attack class fighter that's squared off against hordes of attacking alien spaceships. It's your speed and weaponry versus their seemingly endless numbers. Can you possibly survive?
Eliminator Features: True Arcade Action Graphics(tm) and sound, "look ahead" radar function, real time, advancing play levels, hyperspace and disruptor functions.



SEA DRAGON: You're the captain of the U.S.S. Sea Dragon, a submarine of the Skate class. Your mission is to infiltrate a dangerous enemy-controlled channel. You must destroy rising underwater mines while avoiding wave after wave of additional dangers, including depth charges dropped by battleships, automatic lasers, and deadly enemy attack bases. You must successfully fight an unyielding enemy and an unknown undersea channel — and the only options are total victory or a salty grave.
Sea Dragon Features: Arcade Action Graphics(tm) and sound, 29 (!!!) screens of horizontally scrolling seascape, advancing skill levels and two player option. Early reviews are outstanding!



REAR GUARD: Waves of Cyborg ships are attempting to attack your fleet's crew pods. If they penetrate your defenses, they'll kamikaze your fleet. The enemy is relentless, your crew pods weaponless, your firepower endless. Are you made of the right stuff to successfully defend your fleet?! FIND OUT NOW!
Rear Guard Features: Incredible 3-D scrolling planet-scape, sound, Arcade Action Graphics(tm), nearly two dozen types of enemy craft, two player option and running high score.

Prices subject to change without notice



To order, see your local dealer. If he does not have the program you want, then call 1-800-327-7172 (orders only) or write for our free catalog.

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Palantir, Select, or Scripsit 2.0, which is best for you?

Three Model II Word Processors

**Palantir Word Processing
Designer Software**
3400 Montrose Blvd., Suite 718
Houston, TX 77006
\$499

**Select Word Processing
Select Information Systems**
680 Beach St., Suite 396
San Francisco, CA 94109
\$595

Scripsit 2.0
Tandy/Radio Shack
Fort Worth, TX
Cat. #26-4531
\$399

Paul Grupp
10 F1001 Esplonde Way
Casselberry, FL 32707

Shopping for some business programs is a simple proposition. Need a mail list program? Send for literature from several manufacturers. Then pick the one that meets your requirements for capacity, speed of data entry, sorting and printout format.

Of course, it's not that simple, but most will agree that certain types of programs lend themselves to objective comparison. Others, like serious word processors, are not as easy to evaluate in objective terms. Whether you are a secretary churning out business letters, a novelist creating the next bestseller, or a technical writer sweating over documentation, you're likely to have some very strong feelings about how your word processor should behave. Since all good word processors now produce comparable results, it is in the highly subjective area of user friendliness and interaction that they must be compared.

Bearing this in mind, I'll compare three different word-processing programs for the TRS-80 Model II. I found all three to be high-

quality, professionally produced products. Their manufacturers have made sincere and largely successful attempts to satisfy both beginners and hardened veterans. All three offer the usual cursor controls, scrolling, word wrap around, typeover, and insert and delete options. They also include text-formatting features such as left and right-justification of text, block movement, lock, deletion, tabs, headers, footers, full control over format, file merging, special printer controls, global search and replace, and so on.

Two of the programs, Select and Palantir, require CP/M. Scripsit 2.0 is supplied with TRSDOS. I offer no judgment on the relative merits of TRSDOS versus CP/M, except to point out that all three programs are designed to be self-contained. Once they are installed, you don't need to know anything about the operating system you are using unless you want to, so choice of operating system is less of a factor than it might otherwise be.

Installation

Getting a word-processing program up and running is the first stumbling block for any user, experienced or beginner. As it turns out, all three deserve high praise for ease of installation.

Palantir *must* be configured for a user's specific computer and terminal by the dealer before it can be used—a slight inconvenience for the mail-order customer, but also a positive assurance that everything is working correctly. When you get it back home, all you need to know is where to put the disk. One thing to keep in mind about CP/M programs is that the price you pay for CP/M's highly touted portability is possible confusion about the function of control keys. No two computers are exactly alike, so Palantir thoughtfully includes a keyboard map for 30 different computers, including the Model II. The instructions refer to specific keys by their function. You sim-

ply look up the function you want on the chart for your machine, and it tells you which key to punch.

The only other area requiring customization is printer selection. Palantir includes print drivers for a variety of printers, and these may be interchanged at any time, which is handy if you use more than one printer.

Select encourages purchasers to have their dealer configure the program for a specific system, but they also make it quick and easy for the end user to install. All you do is put a CP/M, MP/M or CDOS disk in one drive, the Select disk in another, and enter a single command. The program takes care of the rest, pausing occasionally to ask pertinent questions about your computer and printer. When it's finished, you'll have the Select and CP/M on the same disk, customized for your particular system. Unlike Palantir, Select requires that the printer be specified during installation, so if you have more than one printer, you'll need to make two or more copies of the program. Another small inconvenience is the lack of keyboard maps for specific computers. You may need to spend some time punching keys to figure out which key does what.

Scripsit, furnished with TRSDOS, is specifically designed for the Model II. Installation is a matter of putting the disk into the drive and flipping the reset switch. Tandy thoughtfully refrained from implementing a back-up protection scheme on Model II Scripsit, so you may make as many back-ups as you need. When it comes to printer interface, Scripsit is not quite as flexible as the other programs. If you have a Line Printer IV or Daisy Wheel II, everything is hunky-dory, but owners of other printers may or may not be able to use all their printer's special functions. If you are on good terms with Assembly-language programming (or know someone who is) you can use the information furnished in an appendix of the manual to write a driver to meet your printer's



After three years of selling my Model I and Model III programs, I've earned back my development costs. So I can lower the price.

Now I'm offering my Model I and Model III programs for \$75 each.

They've been checked out by thousands of TRS-80* users, most of whom get in touch with me, Irwin Taranto. Thousands of phone calls later, these systems are completely developed, checked out, glitch-free.

When people call, we've heard all the questions and we can answer them right off. I don't have to get on the phone and work through problems like I used to.

Since I'm getting off so easy, the least I can do is drop the price—50% for General Ledger, 25% for the rest.

These are my Model I and Model III programs:

Accounts Payable It links to the General Ledger, calculates and prints checks and makes reports. It's an invoice-linked system.

Accounts Receivable It keeps track of billed and unbilled invoices, open and closed items and aging. It prints statements and links to the General Ledger.

General Ledger It keeps track of time by month, quarter, year and the previous three quarters. It even includes a Cash Journal.

Inventory Control It gives an immediate read-out on any item inquiry, including quantity and dollar total.

Invoicing It prints your detailed invoices and links to Accounts Receivable and the General Ledger.

Payroll It keeps the files, computes pay and deductions, prints forms and checks, figures taxes, overtime and piecework pay in any state tax routine, and prints the 941-A and W-2 forms.

They're all yours, for \$75 each. You also need documentation when you run our systems. The Osborne books—one for Accounts Payable and Receivable, one for General Ledger, one for Payroll—cost \$20 each. Our invoicing book costs \$10.

Just send me the coupon, or call us toll free. We'll ship within 48 hours.

Please send me the following programs at \$75 each:

book

Accounts Payable		
Accounts Receivable		
General Ledger		
Inventory Control		
Invoicing		
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Add \$4.50 per order for handling		
6% tax (California only)		
AMOUNT ENCLOSED		

If you need the books, add \$20 each. The invoicing book is \$10.

Mastercharge Visa No. _____ Expires _____

Please send me information on other Taranto business programs, including TRS-80 Model II accounting systems.

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Company name _____

Address _____

City/State/Zip _____

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specific requirements.

Documentation

Programs as complex as these, no matter how good, must have well written documentation if they are to be accepted by today's demanding public. Few people are willing to spend half their lives figuring out something the manufacturer could have easily told them. All three programs do the job of educating the user reasonably well, although they use radically different means to achieve this goal.

In the first five pages, the Select manual takes you through the basics of copying the word-processing program onto a CP/M disk, backing it up, and loading the program. The user is then asked to put the manual down, and select the Teach option. What follows is a 90-minute interactive tutorial designed to familiarize the user with the fundamental concepts of Select. The user may elect to take the entire lesson in one dose, or spread the cure over several sessions. The tutorial is understandable and quite useful, although two separate copies of the program had identical technical problems—new pages of information occasionally appeared without clearing the previous screen, leading to confusion. It's also possible to get stuck in part of the tutorial and not be able to exit if you are dumb enough to forget what you are supposed to be doing. Still, it is a successful approach.

For those too impatient to sit through a tutorial, the rest of the 60-page manual is designed to be used as a reference work. An index is mercifully included.

The Palantir program also includes a step-by-step tutorial. In this case, however, it is the manual itself that does the teaching. Like other packages from Designer Software, direct instruction is interspersed with stories about the antics of the residents of Smallville, a town peopled with business people just learning to cope with the microcomputer age. The stories both entertain and pack an educational punch. In the past, other manufacturers' similar attempts to lighten instruction manuals have been counterproductive. The Palantir manual succeeds because it is so well done. It really works! About half the manual is dedicated to the tutorial. The other half is in reference form. No index is included. The copy we received was a preliminary release, so it is likely that the final format will be slightly different.

Many of us familiar with Model I Scripsit still remember the aggravation of trying to master a complex program whose publisher insisted that we sit through countless sessions with a handful of cassette tapes. No one will ever know how many have been driven to near-homicidal fury over that program's lack of written reference material. For Scripsit 2.0, the cassette tapes are still with us, but this time Tandy thoughtfully threw in a professionally written, designed and produced 80-page reference manual. The manual is wonderful—perhaps the best I've seen included with any software. It is

broken up into five logical sections by index tabs and a complete index is included. It is by far the best reference manual of the three programs reviewed—not because it includes more than the others, it just makes the information a lot easier to get to. I have no comment on the quality of the cassette tapes. Perhaps in reaction to unpleasant academic experiences, I suffer from a distinct aversion to learning anything from a cassette tape. Suffice it to say that a set of four very long tapes are furnished. The reference manual is so good that the tapes seem superfluous, except for the rawest of beginners.

Scripsit is also supplied with several sample files. If one picture is worth a thousand words, one sample file is worth at least 10 pages of documentation! In any word processor, there are several ways to achieve a desired result. These well-designed sample files illustrate techniques you might not otherwise think of.

Because of the indisputable value of entertaining text, Palantir (and the people of Smallville) has the most useful tutorial, with Select bringing up a close second (with high marks for interaction) and Scripsit lost in the bleachers (admittedly for personal reasons).

On presentation alone, the Scripsit reference manual is the most useful of the three, with Select once again a close second. Palantir's story-telling approach makes its manual a less successful reference work, particularly since it lacks an index.

Which One is Best for You?

I use word processing primarily for writing magazine articles and documentation for computer software. Virtually everything I write is either dumped through a modem or manually entered to typesetting equipment, so text formatting and pagination ability is not of critical importance to me. What I do require is the ability to handle extensive manipulation of text without technical details intruding on the creative process. Newsletter publishers or secretaries who use their word processors to create a finished product but don't need to massage their words as much are likely to have a much different idea of what makes a good word processor. I'll try to consider these different needs.

Ease of Use

In general Scripsit and Palantir are the easiest to master. Select is more complex than the other two, and I found it takes a little longer to grasp. It tends to have greater appeal to the technically astute user more than to the beginner.

Scripsit is the most elegant of the three. Whether or not it is efficient or easy to use seems to depend completely on individual experience. I find that most people learn the basics of Scripsit in a short period of time, without excessive reference to the manual. This has its drawbacks; it is easy to pick up habits that get the job done, but are inefficient and take far more time than is necessary.

For example, different types of commands are logically grouped in a number of appropriate menus. You don't have to try to remember every command—just which menu to find it on. This lets the beginner gain proficiency rapidly. Unfortunately, if you don't reread the manual carefully at some later date, you might never discover that you can cut the number of keystrokes needed by entering a direct command, or bypassing the display of one or more menus. In fact, you can use special keys to chain several commands together. There are several other areas in which there is more than one way to accomplish a task—the easy-to-remember way, and the fastest way. Users who never continue their education beyond the fundamentals usually describe Scripsit as a slow, unwieldy system. But once a user has lived with it for several weeks opinions tend to be very favorable.

One feature unique to Scripsit is its method of saving documents. Scripsit is page oriented, which means you display a single page at a time, formatted just as it will appear when printed. Whenever you select another page or execute any of several other commands, the file you are working on is automatically updated. You never have to remember to save your text because it is automatically done for you. On the other hand, before leaving the program, you must remember to return to the directory. Failure to do so can result in loss of data. Writers who cut their teeth on Model I Scripsit or Electric Pencil typically have a hard time remembering this important step.

Palantir superficially resembles Model II Scripsit in its basic functions, so veteran TRS-80 users tend to grasp it quickly. There are four simple commands used for disk I/O—Edit, Read, Save and Back-up. Edit creates a new file, Read loads a previously created file from disk, and Save stores the current file on disk. Back-up is an interesting command: It saves the file to disk, then reads it into memory again. It never erases the old file until the new one is successfully stored. I use this command every 15 minutes or so to reduce data loss in case of power failure.

Palantir's ease of use is not at the sacrifice of power or efficiency. Like the other two programs in this review, it is menu driven, reducing the amount of information a user must commit to memory. If Palantir resembles Model I Scripsit in the ease of use department, it also does several things in a similar manner to Model II Scripsit. For example, all three programs allow insertion, deletion, locking and movement of blocks of text. Select handles blocks in the traditional way—you place a marker at the beginning and the end of the block, and then do whatever you want with it.

Scripsit and Palantir allow you to place the cursor at the beginning of a block, and specify how much text you want in the block using simple commands. Text included in the block is highlighted by displaying it on the screen in reverse video. This is a more dynamic and efficient means of se-

lecting blocks than using markers.

User-defined Keys

Another feature of both Palantir and Scripsit is the user-definable keys. Each key holds up to 255 characters in Palantir, and 250 keystrokes in Scripsit. Scripsit offers 20 user-definable keys, and Palantir 36. To recall text, simply press a control key and the user-definable key. Whatever was stored will appear on the screen. This is extremely useful for printing addresses, names of companies, or anything else that is typed often.

Select can perform the same function in a limited fashion, but it is not as convenient to use as the other two. Palantir does not recommend including control codes in user-defined key text, but Scripsit has no such limitation. Used correctly, Scripsit's ability to chain several commands through a single key allows a user to customize his system for any particular need, which markedly improves Scripsit's efficiency.

Select offers some unique features as well. Most important is the inclusion of a proofreading dictionary and subprogram. The Select spell program works well, and allows you to add your own vocabulary to the dictionary. Unfortunately, no information is given in the manual on how many words the dictionary contains, how many can be added, or what the effect of adding a few thousand words has on processing speed. Hopefully this data will be printed in the next edition of the manual.

Scripsit also offers a proofreading program, but it is a separate program which must be purchased separately and installed by the user.

Both Scripsit and Select allow merging of and access to data from other sources. The Scripsit merge option is the easiest to understand and use, but Select's is far more flexible. Select includes system calls which permit it to load data files, and execute stand-alone programs from within the program.

Conclusions

All three programs are top notch. Select and Scripsit are the most versatile of the three, but the differences in capabilities are minor, and may not have any bearing on your needs. Palantir is the easiest to learn and use, particularly for beginning computerists, with Scripsit a close second. For creative writers who are primarily interested in the editing aspect of word processing, Palantir and Scripsit allow the greatest freedom from technical details during the writing process. From an economics point of view, Scripsit is the least expensive of the three, particularly if you don't yet own CP/M. Of course, if you have several machines you wish to use for word processing, Scripsit can't offer the portability of one of the programs which runs on CP/M. Whichever system you decide on, I offer three important words of advice to help you get the most from your system—Read the Manual! ■

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(PASCAL 80 does not implement variant records, pointer and window variables, or functions and procedures used as parameters.)

255



MX-80 and colored ribbons—unbelievable!

Printer Color Art

Francis S. Kalinowski
16 N. Alder Drive
Orlando, FL 32807

gram it for multicolor print runs. That is how I'm getting MX-80 color art printouts.

This article shows how to develop and print color art. A reusable main program abbreviates the MX-80's print control and graphic codes to simplify programming. The main program also provides in-progress instructions and fill-in areas for programming your own color print runs. Five fill-in programs are included as examples. These programs are made operable by adding the main program's statements. All pro-

grams are coded for use with an MX-80 operating in the MX-80 mode.

MX-80 Color Capabilities

Color ribbon cartridges can transform your MX-80 into a versatile color printer. Operated in its MX-80 mode, the printer can produce each color in four separate densities. The density modes include normal, double strike, emphasized and a combination of the latter two for maximum density.

If your MX-80 is still configured for the re-

Color printers are coming! Color printers are here! That's what recent press releases are stating in new-product sections of microcomputer magazines.

Three printers already announced use sectionalized, multiband or multicartridge color ribbons with software-controlled color switching during printout. Prices range between 9 and 12 kilobucks.

Still another printer (its price starts at \$899) can be equipped with a color option (\$399) which adds a PC board with motor and cam assembly, and a four-band color ribbon. This one looks like the bargain, but for most of us, getting one seems way on down the road financially.

In the meantime, there is other good news. Many of us can fake it with what we've got. Just add interchangeable color ribbons to an Epson MX-80 printer and pro-

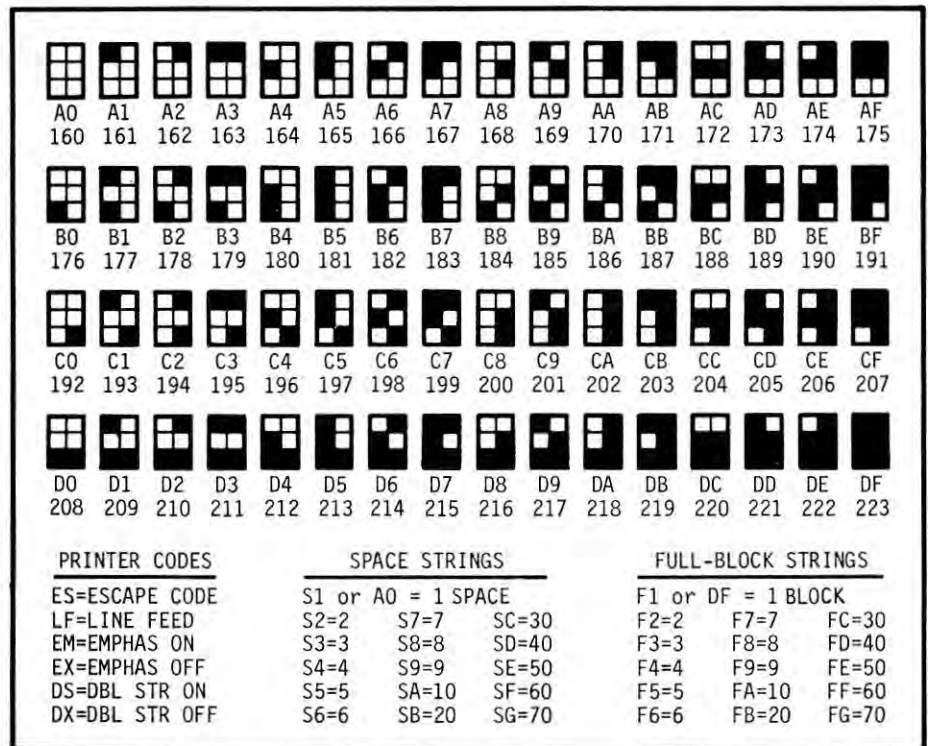


Fig. 1. Printer Color Art Programming

The Key Box

Basic Level II or Disk Basic
Model I or III
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(without Grafrax)

strictive TRS-80 mode, merely set the printer's internal dip switches exactly as shown on page 14 of the *MX-80 User's Manual*. The preceding page tells you how to remove the printer's cover for access to the switches.

Color ribbon cartridges are available in brown, blue, green and red. If your local computer store does not have the cartridges in stock, get them direct from the manufacturer: Aspen Ribbons, Inc., 1700 N. 55th Street, Boulder, CO 80301. Aspen just filled my second order of four color ribbons at \$14 per cartridge plus \$2.02 for UPS shipment.

Color densities can be obtained using Aspen ribbons and the MX-80's four print-density modes. Only one density may be used throughout any one print line. A separate color print run is required for each color density needed on a print line.

Intermediate colors or shades can be obtained by printing the same area with two normal-density colors. Additional variations may be obtained by overprinting a double-strike or emphasized color with a normal-density color. In either case, the lightest of two colors should be printed first, then overprinted with the darker color. The dark-over-light sequence minimizes contamination of lighter color ribbons.

Multiple print runs over the same paper area can combine various color patterns to produce colored chart and art printouts. Since the MX-80 prints and feeds paper in

one direction only, it must be turned off for ribbon change and paper backfeed between color print runs. Both tasks are performed easily.

Main Program

Printer Color Art (Program Listing 1) has three functional sections. One section provides all needed code conversions. Another section displays instructions for initial and subsequent color print runs. A middle section accommodates all graphic pattern codes to be printed during separate color print runs. Only the middle section need be changed for different color art printouts.

The main program uses 3.6K bytes with remarks and 3K bytes without them. All remark statements may be deleted without affecting program operation.

Initialization statement 1 clears string space, defines letters A through X as string variables, and defines Z as an integer. The statement then loops through the title and string coding routines described below.

Statements 1000 and 1010 display a program title. The title persists while graphic pattern, printer control and string codes are defined and stored.

The next four statements convert MX-80 graphic pattern designators CHR\$(160) through CHR\$(223) to hexadecimal codes A0 through DF. The conversions reduce each pattern's input requirement from nine to three characters so that up to 80 different

patterns will fit in an LPRINT statement. Successive two-character hex codes must be separated by semicolons.

I used hex values A0-DF because they correspond with the graphic patterns' assigned ASCII decimal values 160-223. Also, the hex values let me define 64 graphic patterns without the need for parentheses or dimensioning.

Figure 1 shows the MX-80's graphic patterns along with their program-defined hex codes and assigned ASCII decimal values. The hex codes specify individual graphic patterns in LPRINT statements for color print runs. The ASCII decimal values must be used when specifying five or more of one pattern by means of the STRING\$(n,c) function.

Figure 1 also lists all program-defined printer control, space string, and full-block string codes. The user may assign additional string variables to graphic patterns groups that recur more than twice during a color print run. The new variables should be placed in the first statement (100, 200 and so forth) for the print run.

Statements 1070 and 1080 define space and full-block string codes in increments of 1 and 10. The space codes provide a means for jumping between pattern print locations on a print line. For example, using SA;S5 between two pattern codes inserts 15 spaces between them. Similarly, using FA;F5 in a statement prints a string of 15 full graphic

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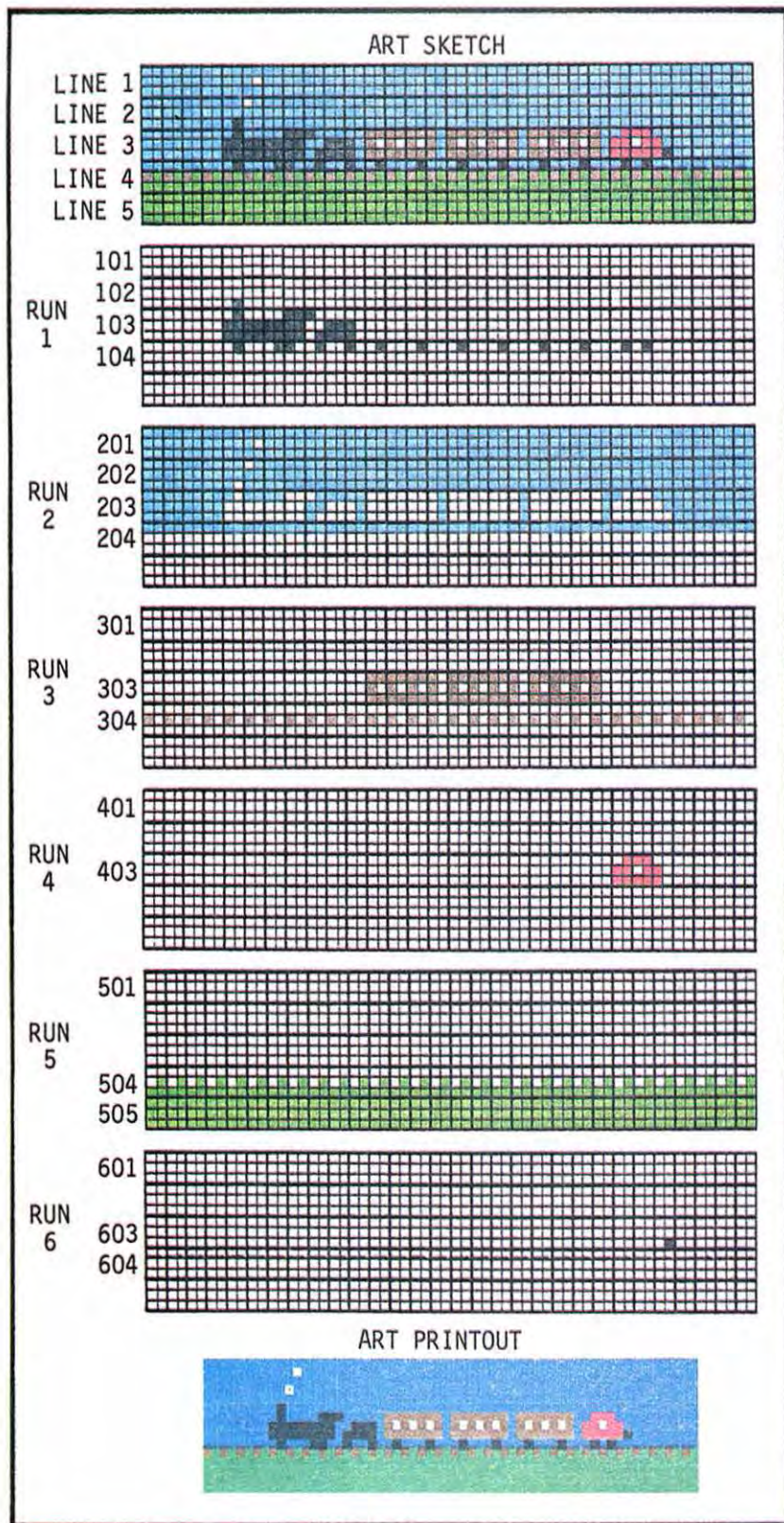


Fig. 2. Printer Color Art Development

blocks. These string codes use fewer bytes than their STRING\$(15,32) and STRING\$(15,223) equivalents.

Statement 1090 holds the title display about two seconds after all string codes have been defined and stored. This statement may be deleted to shorten title display time.

Statement 1100 provides the instruction heading for displays of subsequent color print run instructions. Initial instructions (statements 10 through 30) remain displayed until the P key is pressed for the first color print run.

Statements 40 through 70 provide updated instructions for subsequent color print

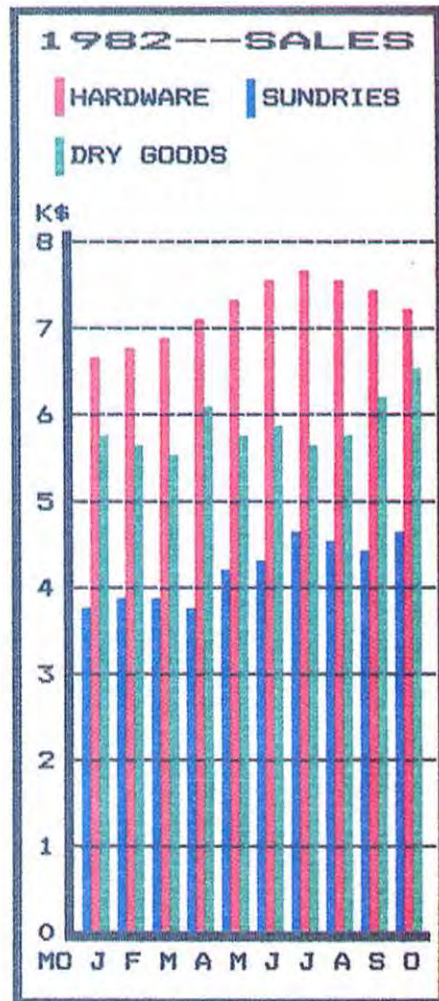


Fig. 3. Chart Art

runs. The instructions recur until statement 40 detects end flag "Done" and sends display control to statement 900. That statement displays a "Printer Art Done" message and moves the printed art image clear of the print head with five line feeds.

Printer Color Art may be run as is to verify its displays and uncover syntax errors. Several runs should be made for greater familiarization with displays that appear before, during and after various color print runs. Save a master copy of this main program for later reload and fill-in with color print-run statements.

A How-To Example

Figure 2 and Program Listing 2 (Train Art) show how Printer Color Art evolves from an art sketch, through programmed color print-run sequences to a final printout. Only one art sketch is needed as a basis for programming the various color print runs. Run 1 through Run 6 partial sketches are included in Fig. 2 to identify Program Listing 2 statements that specify print modes, line feeds and printable graphic codes.

Consecutive statement numbers are assigned to the print lines, starting with 101 for first run, 201 for second run, and so forth. Active statement numbers appear at



Fig. 4. Butterfly Art Variations



Fig. 5. Castle Art

the left end of all color run sketches. Line-feed codes in preceding statements provide jumps over blank (unnumbered) print lines. Consecutive numbering simplifies the location and correction of pattern errors in art printouts.

The best way to see how the color print runs are programmed is to compare art sketch lines with corresponding print line statements in Program Listing 2. See Fig. 1 to identify the various two-character codes used in the LPRINT statements.

String variable PC in the first statement

(100, 200, and so on) of each run defines the ribbon color used for the run. PC appears as the ribbon color in displayed instructions and in "Now Printing Color" messages.

Each LPRINT automatically produces a carriage return and line feed. In run 1 statement 101, for example, LPRINT advances the paper to print line 1 and EM turns on the printer's emphasized mode. Statement 102's LPRINT advances the paper to print line 2, code S4 moves the print head four spaces, and code C0 prints the top of the steam engine's smokestack. Statement 103

similarly advances the paper to print line 3, S4 moves the print head four spaces, then seven pattern codes print the engine and its coal tender. Finally, statement 104 prints all the train wheels.

At this point, displayed instructions tell you how to prepare for and start the second color print run.

Run 2 statement 201's LPRINT advances the paper to print line 1, F5 prints five full graphic blocks, D7 prints blue around the uppermost smoke puff, then FB;F4 codes print 24 more full graphic blocks. Since the

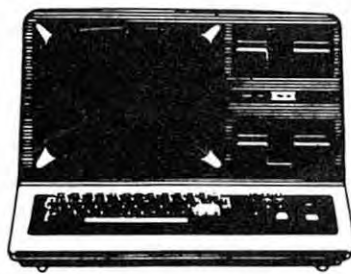
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printer was turned off and then on in response to instructions, it now prints blue in normal mode. Statement 202 and 203 pattern codes print lines 2 and 3 to silhouette the train in white. Finally, STRING\$(30,163) in statement 2304 prints 30 code A3 patterns to complete the blue sky background. The A3 pattern string overprints the train's wheels without noticeably changing their color. A graphic pattern's ASCII decimal value (163, in this case) must be used for the STRING\$ function.

Run 3 statement 301's LPRINT advances the paper to print line 1, EM turns on the emphasize mode, and LF moves the paper to print line 2. Statement 303's SA;S1 codes move the print head 11 spaces to line 3, then 12 graphic pattern codes print three brown passenger coaches. Finally, STRING\$(30,164) in statement 304 prints 30 railroad ties with code A4 patterns.

Run 4 is similar to run 3, except only line 3 is printed.

Run 5 statement 501 turns on the double strike mode with code DS, and its LPRINT + LF + LF advances the paper to print line 3. Note that plus signs are used to separate the line-feed codes since the MX-80 ignores any line-feed command followed by a semicolon. Statements 504 and 505 print the line 4 and 5 green foreground with STRING\$(30,216) and full-block code FC, respectively.

Run 6 statement 601 turns on the double-strike mode and line-feeds the paper to print line 2. Statement 603's SB;S5 codes move the print head 25 spaces, then C0 prints a rear deck on the caboose. The double-strike mode elongates the printed pixel's three vertical dot columns to simulate an iron railing. Statement 604's code DX turns off the double-strike mode, EM turns on the emphasized mode, and STRING\$(30,45) prints 30 hyphens to simulate a railroad track. The emphasized mode elongates the hyphens to reduce the small spaces between them. Two black print runs are used since the train's wheels (run 1) and the railroad track (run 6 hyphens) appear on the same print line (4).

Do not place the double-strike off code (DX) at the end of line you want printed in double-strike mode. Upon seeing the off code enter its input buffer, the MX-80 will immediately turn off the double-strike mode and print the entire line in normal mode. To turn off the double-strike or emphasized mode, place DX or EX in the next statement immediately after LPRINT.

Train art is printed using direct colors only. The one overprint (blue over train wheels) in run 2 print line 4 was used to shorten statement 204.

Printing Color Art

Printer Color Art requires a separate print run for each color used in the art. The printer paper's start position, established for the first print run, must be exactly the same for the remaining color print runs. A 20-pound white bond paper should be used. Thinner paper tends to buckle, spread and bleed through more easily so should not be used,

```

Ø ' INITIALIZE, THEN LOOP THROUGH TITLE AND CODING ROUTINES
1 CLS:CLAR1ØØØ:DEFSTRA-X:DEFINTZ:GOSUB1ØØØ:PC="BLACK"
9 ' STARTING INSTRUCTIONS
1Ø PRINT" 1. VERIFY THAT PRINTER POWER IS OFF.":PRINT:PRINT" 2
 . INSERT PAPER; ALIGN IT WITH FIXED INDEX MARK ON PRINTER.
2Ø PRINT:PRINT" 3. INSTALL ";PC;" RIBBON IN PRINTER.":PRINT:PRI
NT" 4. TURN PRINTER POWER ON.":PRINT
3Ø PRINT" 5. PRESS THE <P> KEY TO START ";PC;" COLOR PRINT RUN.
":GOTO1ØØ
39 ' NEXT COLOR PRINT RUN INSTRUCTIONS
4Ø IFPC="DONE"THEN9ØØELSEGOSUB11ØØ:PRINT" 1. TURN PRINTER POWER
OFF.":PRINT:PRINT" 2. BACKFEED PAPER AT LEAST 1/2-INCH PAST FI
XED INDEX MARK.
5Ø PRINT:PRINT" 3. INSERT SLIPSHEET BETWEEN RIBBON GUIDE AND PA
PER.":PRINT:PRINT" 4. PUT ";PC;" COLOR RIBBON IN PRINTER. REMO
VE SLIPSHEET.":PRINT
6Ø PRINT" 5. CAREFULLY ADVANCE PAPER TO EXACTLY ALIGN INDEX MAR
KS.
7Ø PRINT:PRINT" 6. TURN PRINTER POWER ON.":PRINT:PRINT" 7. PRE
SS <P> KEY TO START ";PC;" COLOR PRINT RUN.
79 ' <P> KEY MONITOR
8Ø P=INKEY$:IFP">"P"THEN8ØØELSECLS:PRINT@66Ø,"NOW PRINTING ";PC;"
COLOR.

```

```

85 '
  * * * * *
  * THIS STATEMENT IS RESERVED FOR PRINTER *
  * CODES TO BE USED IN ALL COLOR PRINT RUNS *
  * * * * *

```

```

9Ø RETURN
94 '
  * * * * *
  * P R I N T E R   C O L O R   A R T   *
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99 ' BLACK COLOR PRINT RUN SEQUENCE
1ØØ PC="BLACK":GOSUB8Ø
199 ' BLUE COLOR PRINT RUN SEQUENCE
2ØØ CLS:PC="BLUE":GOSUB4Ø
299 ' BROWN COLOR PRINT RUN SEQUENCE
3ØØ CLS:PC="BROWN":GOSUB4Ø
399 ' RED COLOR PRINT RUN SEQUENCE
4ØØ CLS:PC="RED":GOSUB4Ø
499 ' GREEN COLOR PRINT RUN SEQUENCE
5ØØ CLS:PC="GREEN":GOSUB4Ø
599 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
6ØØ CLS:PC="DONE":GOSUB4Ø
699 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
7ØØ CLS:PC="DONE":GOSUB4Ø
799 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
8ØØ CLS:PC="DONE":GOSUB4Ø
899 ' ART DONE MESSAGE AND PAPER ADVANCE
9ØØ CLS:PRINT@66Ø,"PRINTER ART IS DONE.":LPRINTSTRING$(5,1Ø):PRI
NT:PRINT:END
999 ' TITLE DISPLAY
1ØØØ CLS:PRINTCHR$(23):FORZ=12TO972STEP64
1Ø1Ø PRINT@Z,"PRINTER COLOR ART":NEXTZ
1Ø19 ' DEFINE GRAPHIC PATTERN HEX CODES
1Ø2Ø AØ=CHR$(16Ø):A1=CHR$(161):A2=CHR$(162):A3=CHR$(163):A4=CHR$(
164):A5=CHR$(165):A6=CHR$(166):A7=CHR$(167):A8=CHR$(168):A9=CHR
$(169):AA=CHR$(17Ø):AB=CHR$(171):AC=CHR$(172):AD=CHR$(173):AE=CH
R$(174):AF=CHR$(175)
1Ø3Ø BØ=CHR$(176):B1=CHR$(177):B2=CHR$(178):B3=CHR$(179):B4=CHR$(
18Ø):B5=CHR$(181):B6=CHR$(182):B7=CHR$(183):B8=CHR$(184):B9=CHR
$(185):BA=CHR$(186):BB=CHR$(187):BC=CHR$(188):BD=CHR$(189):BE=CH
R$(19Ø):BF=CHR$(191)
1Ø4Ø CØ=CHR$(192):C1=CHR$(193):C2=CHR$(194):C3=CHR$(195):C4=CHR$(
196):C5=CHR$(197):C6=CHR$(198):C7=CHR$(199):C8=CHR$(2ØØ):C9=CHR
$(2Ø1):CA=CHR$(2Ø2):CB=CHR$(2Ø3):CC=CHR$(2Ø4):CD=CHR$(2Ø5):CE=CH
R$(2Ø6):CF=CHR$(2Ø7)
1Ø5Ø DØ=CHR$(2Ø8):D1=CHR$(2Ø9):D2=CHR$(21Ø):D3=CHR$(211):D4=CHR$(
212):D5=CHR$(213):D6=CHR$(214):D7=CHR$(215):D8=CHR$(216):D9=CHR
$(217):DA=CHR$(218):DB=CHR$(219):DC=CHR$(22Ø):DD=CHR$(221):DE=CH
R$(222):DF=CHR$(223)
1Ø59 ' DEFINE PRINTER CONTROL CODES
1Ø6Ø ES=CHR$(27):LF=CHR$(1Ø):EM=ES+CHR$(69):EX=ES+CHR$(7Ø):DS=ES
+CHR$(71):DX=ES+CHR$(72)
1Ø69 ' DEFINE SPACE STRING CODES
1Ø7Ø S1=" ":S2=" ":S3=" ":S4=S1+S3:S5=S1+S4:S6=S1+S5:S7=S1+S6
:S8=S1+S7:S9=S1+S8:SA=S1+S9:SB=SA+SA:SC=SA+SB:SD=SA+SC:SE=SA+SD:
SF=SA+SE:SG=SA+SF
1Ø79 ' DEFINE FULL-BLOCK STRING CODES
1Ø8Ø F1=DF:F2=F1+F1:F3=F1+F2:F4=F1+F3:F5=F1+F4:F6=F1+F5:F7=F1+F6
:F8=F1+F7:F9=F1+F8:FA=F1+F9:FB=FA+FA:FC=FA+FB:FD=FA+FC:FE=FA+FD:
FF=FA+FE:FG=FA+FF
1Ø9Ø FORZ=1TO999:NEXTZ
11ØØ CLS:PRINT@2Ø,"I N S T R U C T I O N S":PRINT:RETURN

```

Program Listing 1. Printer Color Art

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INSTANT ASSEMBLER occupies less than 8400 bytes of memory. In a 16K machine this will leave you enough memory to write assembly language programs of around 2000 bytes. This and its module-linking feature make **INSTANT ASSEMBLER** ideal for users with only 16K machines. The instruction manual may be purchased separately for \$3, which will apply towards the purchase of the **INSTANT ASSEMBLER**. In addition to disk/I/O, the disk version includes a stand-alone version of the debugger.

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INSIDE LEVEL II is a comprehensive reference guide to the Model I and Model III ROMs which allows the machine language or **Basic** programmer to easily utilize the sophisticated routines they contain. Concisely explains set-ups, calling sequences, and variable passage for number conversion, arithmetic operations, and mathematical functions, as well as keyboard, tape, and video routines. Part II presents an entirely new composite program structure which loads under the **SYSTEM** command and executes in both **Basic** and machine code with the speed and efficiency of a compiler. In addition, the 18 chapters include a large body of other information useful to the programmer including tape formats, RAM usage, relocation of **Basic** programs, **USR** call expansion, creating **SYSTEM** tapes of your own programs, interfacing of **Basic** variables directly with machine code, and special precautions for disk systems. **INSIDE LEVEL II** was reviewed in the April 1982 issue of 80 Microcomputing which said "The book has no flaws; it is a perfect gem." Byte Magazine said "I recommend this book to serious machine language programmers."

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Paper edge and fixed index marks provide an accurate means for repositioning the paper between print runs. Establish these index marks as follows:

- Feed the paper into the printer and engage its pinfeed holes with the pins on both tractor-feed mechanisms.
- Lock the left feed mechanism. Leave the right mechanism unlocked to minimize paper buckling during print runs.
- Using the printer's paper-feed knob, advance the paper until the first fanfold crease moves up past the print head.
- Attach a short strip of white, sticky-back label to the outer rear surface area on top of the right feed mechanism. Position the label strip with its left edge adjacent to the printer paper's right edge.
- Using a fine-point pencil, draw a straight index line across the paper's edge and the fixed label strip. The two resulting marks will be used as paper repositioning indices for subsequent color print runs.

Load and start the Printer Color Art program. Displayed instructions tell you what to do in a specific order. The last instruction tells you to press the P key to start the first color print run.

New instructions appear after each color print run. These instructions tell you to turn the printer off, reposition the paper, insert a slipsheet, change ribbon, remove slipsheet, align index marks, turn printer on, and start the next color print run. Follow all instructions exactly and in the given order.

When instructed, rewind the paper by carefully backfeeding it with the paper-feed knob while gently pulling straight aft on the paper's trailing part. Use just enough rearward pull to eliminate paper slack in the print head area. Continue backfeeding in this manner until the paper's index mark moves at least 1/2 inch past the fixed index mark.

The slipsheet referenced in the instructions can be any thin piece of paper about six inches square. Inserted between the art paper and print head's ribbon guide, the slipsheet prevents accidental color smudging during ribbon changes.

When instructed, carefully advance the paper to exactly align its index mark with the fixed index mark. Carefully means very slowly during the last few clicks of the feed knob. One click too many can throw the next print run out of registration by one print dot. If you pass the fixed index mark, backfeed the paper about 1/2 inch (don't forget the gentle pull aft) and try aligning the index marks again.

Do not pull on or move any part of the paper during a color print run. Let the tractor-feed mechanism advance the paper normally. Any external tension on the paper may shift the slight clearance around feed pins and skew the paper out of alignment. Sudden misalignment will cause horizontal or vertical streaking during a color print run.

Displayed messages identify the color being printed. When the last print run ends, you will get a "Printer Art Done" message and five line feeds. That is it

until the program is restarted for another color art printout.

A color art printout with a wavy surface can be flattened and smoothed in two ways. It can be placed between two pieces of clean white paper and pressed with a clothing iron set to low heat, or placed under a stack of magazines overnight.

Doing Your Own Art

Printer Color Art requires some sketching material, color pencils, programming guides, and color ribbon cartridges. You may have to wait for ribbon cartridges if they are not available locally. However, you can start preliminary work and do the print-run programming with materials that are available.

You will need a sheet of graph paper for your printer art sketch. Get a sheet large enough to accommodate 80 graphic blocks horizontally and at least 35 blocks vertically. Using a black ball-point or nylon-tip pen, line the graph paper off in 2-by-3-pixel blocks, as shown in Fig. 2. Number the chart's print lines consecutively, starting with one at the top.

Take your newly completed layout chart to the nearest quick-print shop. They will reproduce it (up to 11 by 17 inches) for about 15 cents per copy. Save the original as a master for more copies when needed. Work

*"Color ribbon cartridges
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color printer."*

with the copies. You can tape two chart copies together for printer art sketches that exceed 35 print lines. Program Listing 1 can accommodate up to 99 LPRINT statements to fill as many print lines during a color print run. That is enough lines to sketch a skyscraper or a very tall sailing ship.

Lightly sketch your intended art's foreground, background and art shapes. When the sketch looks good, fill in all the layout chart squares (pixels) which form the art shapes. Also fill in the background and foreground with their respective colors. Your art sketch is ready for color-run programming when all its color areas are filled in.

A numbered guide strip or scale with block-width spacing marks can simplify the programming task. You can make one of these easily. Cut the bottom line of blocks off a layout chart copy, then paste or tape it along the edge of a cardboard strip. Number the guide strip's blocks consecutively, starting with one at its left end. Place the finished guide strip below the art sketch line to be programmed, and use it to get quick counts of consecutive spaces, full blocks, and pattern strings.

Program the least-used color for the first print run, starting with statement 100. Defer the most-used color for the last print run. The great amount of pin hammering during a large color area print run peens the paper and spreads it laterally. When a large color area is printed first, subsequent lesser area print runs may leave thin white gaps between adjoining colors. These gaps widen noticeably in right areas of color printouts.

In statement 100, make PC equal the color for the first print run. Insert the print-density code (EM or DS, if used) immediately after LPRINT of statement 101. Follow the print-density code with LF codes (if needed) or with codes for spaces and graphic patterns to be printed on line 1. Do not use a semicolon after any line-feed code; it will suppress the line feed. Separate line-feed codes with a plus sign.

See Fig. 1 for printer control, graphic pattern, space string and full-block string codes. Program all art sketch lines that have the first print-run color. Number the statements 100 plus the art sketch line number.

Program all remaining color print runs in the same manner, but starting with statement numbers 200, 300 and so forth. Make sure that the statement following the last color print run contains end flag: PC = "DONE."

Key in or load Printer Color Art first. If different, change PC = "BLACK" at the end of statement 1 to PC = "(your first run color)."

Key in all color print-run fill-in statements for your printer art. When done, list and visually check all your keyed-in statements. Look for and delete statements ending with semicolons. If one is left there, it will suppress a normal line feed. Look for accidentally inserted commas between graphic pattern codes. Left in, a comma will tab the next graphic pattern 16 spaces, leave a gap, and overflow the print line's graphic patterns to the next line.

Save the program; then try running the program with the printer off. You may be able to cycle through all the color print runs and uncover syntax errors that crept in during program key-in. I can verify Printer Color Art programs that way with an Epson cable between the MX-80 and the expansion interface parallel printer port. Your system hookup may also allow such dry runs of printer art programs. If not, and your TRS-80 locks up, turn printer on and press break.

After the program checks out, attempt your color printout. Compare the printed art with your original art sketch. Wrong patterns can be spotted easily and corrected by changing pattern codes in the bad print line's statement.

More Art Examples

A business chart can be very pleasant art when sales are on an upswing. And there is no need for a color plotter if you have an MX-80 with color ribbon cartridges. Figure 3 shows what can be done; Program Listing 3 shows how it is done. Using the double-strike mode for all vertical components of the chart minimizes tiny horizontal streaks

across these components.

The Chart Art program uses several For...To loops to print consecutive and identical print lines during print runs. It also defines and uses full-line string variables to print identical but separate lines.

In first-run statement 100, for example, string variable TB contains codes that print the chart's left and right edges with 24 spaces between them. Upon program start, statement 101 prints the chart's top edge, and then statement 102's For...To loop prints chart edge segments (TB) on print lines 2 through 8. At that point, statement 109's For...To loop starts printing the chart's outer edges and the K\$ vertical scale line on the next 24 print lines. Finally, statement 133 prints the month scale's horizontal line, 134's TB prints another pair of chart edge segments, and 135 finishes the chart's bottom edge.

Second print-run statement 200 defines LD as 21 hyphens. Statement 201's code EM turns on the emphasized mode for all alphanumeric characters and horizontal scale lines (hyphens). CHR\$(14) in statement 202 prints "1982—Sales" in double-width mode to provide a conspicuous chart title. Since the double-width mode turns off automatically at the end of a print line, statements 204, 206 and 208 print "Hardware, Sundries, Dry Goods," and K\$ chart entries in normal-width mode. Statement 209's decrementing For...To loop prints vertical scale markers 8 through 1 and each marker's hyphen string (LD). LF + LF codes in the loop skip two print lines between vertical scale markers. Finally, statements 233 and 234 print the baseline 0 and the month markers, respectively.

Blue, green and red print runs are similar, except for height of the printed month sales columns. Blue print-run statement 300 redefines LD as a space plus a CA pattern. It also defines LC as a string of 10 LD codes. Statements 303 and 304 print the blue column identifier segment adjacent to the chart's sundries entry. STRING\$(13,10) in statement 305 advances the paper to print line 18, just above the two tallest blue columns. Statements 319-321 print all uneven upper portions of the 10 blue columns. At that point, statement 322's For...To loop starts printing LD(10 blue columns) down to just short of the baseline. Finally, statement 333 extends the blue column ends to the baseline.

The green print run (statements 400-433) uses variables LB, LD and LC as defined for the blue print run. These variables are redefined for the red print run to place all red columns between the blue and green columns.

Butterfly Art

Figure 4 shows how one program can produce different art effects when its print run colors are switched. Butterfly Art (Program Listing 4) is arranged to print red, blue, black and green on a normal brown background as shown in the left panel.

Two black print runs are used to provide double-strike and emphasized black densities on several print lines. First-run state-

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ments 101-135 print the panel's border, butterfly's antennae and pussy willow buds in double-strike black. Variable TB, defined in statement 100, is used alone in several statements and in a For...To loop to print border segments on print lines that do not have buds.

Second-run statements 208-217 print the butterfly's head, body and wing outlines in emphasized black.

Emphasized red and normal blue print runs fill in the butterfly's wing colors. A double-strike green print run prints random vegetation in the panel's lower area and the catkin supports throughout the panel.

Two brown print runs complete the panel. Emphasized brown-run statements 601-635 print all the pussy willow branches. Finally, normal brown-run statements 701-733 fill the background with patterns that leave white pussy willow catkins on the branches. The normal brown run also overprints the branches and their black buds to darken them. The overprint scheme reduces the number of pattern codes needed to fill the background.

Program Listing 4 also printed the Fig. 4 center panel, but with two color substitutions. A brown instead of red ribbon was used for the third print run, then a red instead of brown ribbon was used for the seventh (background) print run. Overprinting the branches with red during the final run gave them a reddish-brown shade compared to medium brown in the left panel.

The Fig. 4 right panel was printed similarly, but a brown instead of blue ribbon was used in the fourth print run, then a blue instead of brown ribbon was used in the seventh print run. The final run's blue overprint produced almost black pussy willow branches.

Castle Art

Figure 5 is an example of depth and detail that can be achieved with various color densities, mixed-color shades, and non-graphic characters. Castle Art (Program Listing 5) produces the art with seven color print runs: double-strike black, emphasized red, normal blue, normal green, normal brown, double-strike brown, and finally empha-

sized brown. Additionally, a double-strike plus emphasized brown density is obtained by printing all castle towers' right edges during run 6 and run 7.

First-run statement 100 defines string variable TB as left and right border segments with 23 spaces between them. TB prints the edge segment pair on individual lines (statements 102 and 106) and in For...To loops prints successive lines (statements 114 and 131). Statements 103 and 104 print an exclamation point and an uppercase I, respectively, to simulate a flagpole. Statement 105 prints four underline dashes, then statements 109 and 110 print hyphens to accentuate the castle's parapets. Other statements print castle windows, door sections and corresponding reflections in the foreground water.

The second run prints the castle's flag and tower roof, three tree shapes, and red reflections in the water. Line-feed strings in statements 208 and 217 advance the paper over print lines that do not have red patterns.

The third run prints the cloudy sky background, four tree shapes, and parts of the foreground water.

The fourth run prints the landscape (minus tree trunks and roadway) and parts of the foreground water. Overprinting during this run changes four trees to a bluish-green shade and three others to a deep maroon shade.

Three brown print runs color the castle, landscape, shoreline and reflections in various densities. Normal brown run 5 prints all castle-tower left edges, the left wall, roadway, beach and left-edge parts of the castle's reflections. This run also overprints landscape areas surrounding the trees to provide a greenish-brown shade. The overprint leaves one green tree and some irregular green strips on the near landscape.

Run 6 prints each tower's left-center area and right edge, the right wall, all tree trunks, and corresponding reflections in double-strike brown. Code EM in statement 622 turns on the emphasized mode for a darker printout of the cliff shoreline. Code EX in statement 625 turns off the emphasized mode to restore double-strike printing on remaining lines.

Run 7 prints each tower's right-center area and right edge and corresponding parts of tower reflections. Run 7 also prints several vertical bars on the cliff shoreline to simulate corners and indentations.

Snoopy Art

Program Listing 6 demonstrates the maximum width color art that can be printed on the MX-80. Snoopy Art printed the 80-block-by-40-line framed art with six color print runs. The actual printout measures 8 by 6 9/16 inches. The program uses temporarily defined string variables to minimize coding requirements for recurring pattern groups. It also uses non-graphic characters to add structural details to the Red Baron's triplane.

Normal black run 1 prints Snoopy's body lines, the radio's top and right sides, and un-

```

97 ' PROGRAM LISTING 2. TRAIN ART (1.06K)
98 ' NOTE: ADD STATEMENTS 1-9 OF PROGRAM LISTING 1.
99 ' BLACK EM COLOR PRINT RUN SEQUENCE
100 PC="BLACK EM":GOSUB8
101 LPRINTEM
102 LPRINTS4;C#
103 LPRINTS4;DE;DC;DC;DF;C1;DC;B4
104 LPRINTS4;A2;A#;A2;A1;A2;A#;A1;A2;A#;A2;A#;A2;A#;A2;A#;A2;A#;
A2;A#;A2;A2
199 ' BLUE COLOR PRINT RUN SEQUENCE
200 CLS:PC="BLUE":GOSUB4
201 LPRINTF5;D7;FB;F4
202 LPRINTF4;BF;DE;FB;F4
203 LPRINTF4;A1;A3;A3;A#;BE;A3;CB;S3;CA;S3;CA;S3;CA;A1;A#;AB;F4
204 LPRINTSTRINGS(3#,163)
299 ' BROWN EM COLOR PRINT RUN SEQUENCE
300 CLS:PC="BROWN EM":GOSUB4
301 LPRINTEM+LF
303 LPRINTSA;S1;D7;D7;D7;B5;D7;D7;D7;B5;D7;D7;D7;B5
304 LPRINTSTRINGS(3#,164)
399 ' RED EM COLOR PRINT RUN SEQUENCE
400 CLS:PC="RED EM":GOSUB4
401 LPRINTEM+LF
403 LPRINTSB;S3;DE;DB;B4
499 ' GREEN DS COLOR PRINT RUN SEQUENCE
500 CLS:PC="GREEN DS":GOSUB4
501 LPRINTDS+LF+LF
504 LPRINTSTRINGS(3#,216)
505 LPRINTC
599 ' BLACK DS PRINT RUN FOR CABOOSE REAR DECK AND TRAIN TRACK
600 CLS:PC="BLACK DS":GOSUB4
601 LPRINTDS+LF
603 LPRINTSB;S5;C#
604 LPRINTDX;EM;STRINGS(3#,45): ' ASCII 45 IS A HYPHEN
699 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
700 CLS:PC="DONE":GOSUB4
899 ' NOTE: ADD STATEMENTS 900-1100 OF PROGRAM LISTING 1.

```

Program Listing 2. Train Art

Program Listing 3. Chart Art

```

97 ' PROGRAM LISTING 3. CHART ART (1.75K)
98 ' NOTE: ADD STATEMENTS 1-9 OF PROGRAM LISTING 1.
99 ' BLACK DS COLOR PRINT RUN SEQUENCE
100 PC="BLACK DS":GOSUB8
101 LPRINTDS;CA;STRINGS(24,163);B5
102 FORZ=1TO7:LPRINTTB:NEXTZ
109 FORZ=1TO24:LPRINTCA;S2;CA;SB;S1;B5:NEXTZ
133 LPRINTCA;S2;AA;STRINGS(2#,172);A4;B5

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Program Listing 3 Continues

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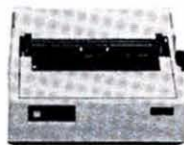


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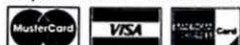
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275

derline dashes to accentuate the triplane's top wing. Run 1 also prints Snoopy's nose and the frame's inner and outer edges for later overprint with double-strike brown. Statement 100 defines TB as two frame edge segments with two spaces between them. TB is the first and last code used in statements that print lines with other normal black characters or patterns on them. Statement 185 prints left and right frame edge segment pairs with 72 spaces between them. For. . . To statements 104 and 113 loop through statement 185 to print lines that do not have other normal black characters or patterns.

Emphasized black run 2 prints all black parts not printed in the first run. These parts include Snoopy's eye pupil, goggle frame, earphone, microphone and cord, and the radio's front panel. Statement 200 defines lowercase o, left slash and right slash codes for use in statements 208-210. Code SO prints the Red Baron's head and the triplane's propeller hub. LS and RS codes print the plane's wing and landing gear struts.

Double-strike brown run 3 prints Snoopy's helmet and the art frame, except for the art credit slot. Run 3 also overprints Snoopy's nose, the frame's normal black edges, plus the horizon line and runway for later overprint with green.

Emphasized red run 4 overprints the frame's center line and directly prints all red shapes within the frame. Statement 400 re-defines TB as a space, two pattern halves which form a full block, and a space. The re-definition permits use of existing statement 185 in For. . . To loops of statements 410, 427 and 434. TB now prints red blocks down the centers of left and right frame sections.

Green run 5 starts out in the normal-density mode and ends in the double-strike mode. Statement 501's string of six line feeds advances the paper to print line 7. Statements 508-512 then print Snoopy's goggle lenses normal green. At that point, statement 513 turns on the emphasized mode and advances the paper to the first background mountain top. Subsequent statements print the mountains and the airfield, overprinting the brown horizon line and runway, and the radio's normal black right side.

Normal-blue run 6 completes the art printout. This run prints patterns that outline the clouds, Snoopy and his words, the antenna, and the radio waves. Farther down, blue patterns overprint the green mountains and Snoopy's shadow to shade them bluish-green. Finally, statement 639 turns on the emphasized mode and prints the art credit line in the frame's white credit slot.

Readers can get a reproducible 11-by-16-inch art layout chart, an enlarged pattern code chart (like Fig. 1), and some programming guides by mailing \$1 to the author. ■

Francis Kallnowski is retired, having spent 28 years in the U.S. Air Force and 20 years as a commercial electronic technical writer.

Program Listing 3 Continued

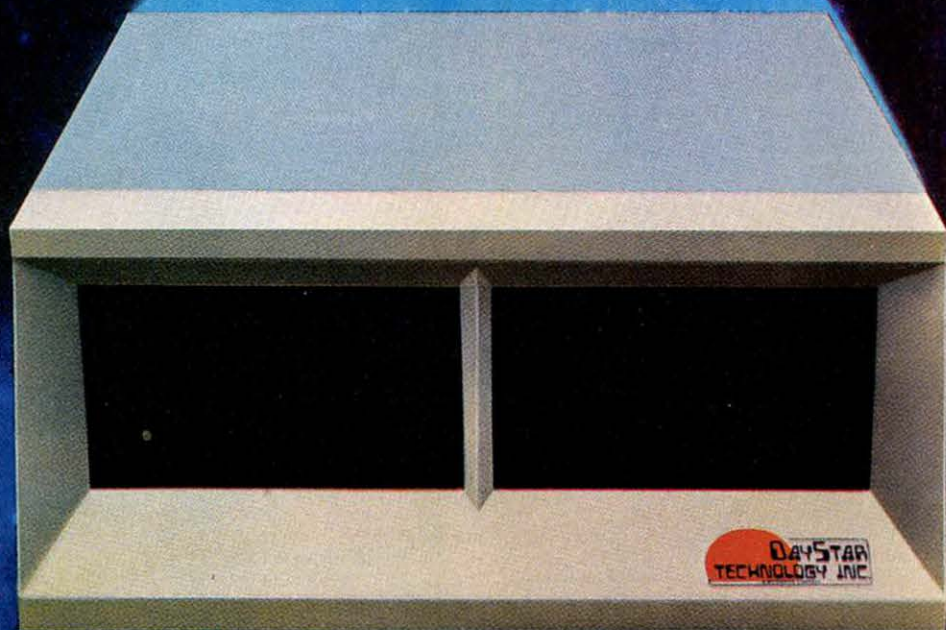
```
134 LPRINTTB
135 LPRINTCA;STRINGS(24,200);B5
199 ' BLACK EM COLOR PRINT RUN SEQUENCE
200 CLS:PC="BLACK EM":GOSUB40:LD=STRINGS(21,"-")
201 LPRINTEM
202 LPRINTCHR$(14);" 1982--SALES";LF
204 LPRINTS4;"HARDWARE  SUNDRIES";LF
206 LPRINTS4;"DRY GOODS";LF
208 LPRINT"  K$"
209 FORZK=8TOLSTEP-1:LPRINTS1;ZK;LD;LF+LF:NEXTZK
233 LPRINT"  Ø"
234 LPRINT"  M O J F M A M J J A S O"
299 ' BLUE DS COLOR PRINT RUN SEQUENCE
300 CLS:PC="BLUE DS":GOSUB40:LD=A0+CA:LC=LD+LD+LD+LD+LD+LD+LD
+LD+LD
301 LPRINTDS;LF
303 LPRINTSA;S4;B0
304 LPRINTSA;S4;B5
305 LPRINTSTRINGS(13,10)
319 LPRINTSA;S6;C8;S1;C0;S3;C8
320 LPRINTSA;S2;C0;S1;C8;LD;LD;LD;LD
321 LPRINTS6;C0;S1;C0;S2;LD;LD;LD;LD;LD
322 FORZ=1TOLL:LPRINTS3;IC:NEXTZ
333 LB=A0+A2:LPRINTS3;LB;LB;LB;LB;LB;LB;LB;LB
399 ' GREEN DS COLOR PRINT RUN SEQUENCE
400 CLS:PC="GREEN DS":GOSUB40: ' LB, LD, & LC SAME AS FOR BLUE
401 LPRINTDS;LF+LF+LF
405 LPRINTS3;B0
406 LPRINTS3;B5
407 LPRINTSTRINGS(5,10)
413 LPRINTSB;S3;C0
414 LPRINTSB;S1;C0;LD
415 LPRINTSA;LD;S3;C0;S4;LD;LD
416 LPRINTS4;LD;S1;C8;S1;C0;LD;LD;LD;S1;C8;LD;LD;LD
417 FORZ=1TOL6:LPRINTS4;LC:NEXTZ
433 LPRINTS4;LB;LB;LB;LB;LB;LB;LB;LB;LB;LB
499 ' RED EM COLOR PRINT RUN SEQUENCE
500 CLS:PC="RED EM":GOSUB40:LD=A0+B5:LC=S4+LD+LD+LD+LD+LD+LD+LD
LD+LD+LD
501 LPRINTEM;LF
503 LPRINTS3;B0
504 LPRINTS3;B5
505 LPRINTLF+LF+LF+LF
510 LPRINTSA;S5;B0;S1;B4;S1;B0
511 LPRINTSA;S3;B4;LD;LD;LD;LD;LD;S1;B0
512 LPRINTS9;B0;LD;LD;LD;LD;LD;LD;LD
513 LPRINTS5;B4;LD;LD;LD;LD;LD;LD;LD;LD;LD
514 FORZ=1TOL9:LPRINTLC:NEXTZ
533 LB=A0+A1:LPRINTS4;LB;LB;LB;LB;LB;LB;LB;LB;LB;LB
599 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
600 CLS:PC="DONE":GOSUB40
699 ' NOTE: ADD STATEMENTS 900-1100 OF PROGRAM LISTING 1.
```

Program Listing 4. Butterfly Art

```
97 ' PROGRAM LISTING 4. BUTTERFLY ART (5.45K)
98 ' NOTE: ADD STATEMENTS 1-90 OF PROGRAM LISTING 1.
99 ' BLACK DS COLOR PRINT RUN SEQUENCE
100 PC="BLACK DS":GOSUB00:TB=B5+SB+S3+CA
101 LPRINTDS;B7;STRINGS(23,163);CB
102 FORZ=1TOL4:LPRINTTB:NEXTZ
106 LPRINTB5;SA;S2;AA;SA;CA
107 LPRINTB5;SB;S1;C8;S1;CA
108 LPRINTTB
109 LPRINTB5;SB;S2;A5;CA
110 LPRINTTB
111 LPRINTB5;S1;B0;S9;B5;SA;S1;CA
112 LPRINTB5;S1;A1;S7;A2;A3;SA;S2;CA
113 LPRINTTB:LPRINTTB
115 LPRINTB5;SB;S2;A5;CA
116 LPRINTTB:LPRINTTB
118 LPRINTB5;S2;C8;SB;CA
119 LPRINTTB:LPRINTTB
121 LPRINTB5;S8;C0;SA;S4;CA
122 LPRINTB5;S8;A2;SA;S4;CA
123 LPRINTTB:LPRINTTB
125 LPRINTB5;SB;AA;S2;CA
126 LPRINTB5;S1;C8;SA;S4;B0;S6;CA
127 LPRINTB5;S5;C0;S3;B0;SA;S3;CA
128 LPRINTB5;S5;B2;S3;A1;SA;S3;CA
129 LPRINTB5;S5;A1;SA;S7;CA
130 LPRINTB5;S5;D0;S2;C0;S8;C0;S2;C0;S2;CA
131 LPRINTB5;S1;A5;S6;A2;S1;B4;S6;A2;S2;A2;S2;CA
132 LPRINTTB
133 LPRINTB5;S2;C0;S2;AA;SA;A5;S4;AA;S1;CA
134 LPRINTB5;S2;A2;SA;S1;AA;S8;CA
```

Program Listing 4 Continues

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```

135 LPRINTDS;STRINGS(23,208);DA
199 'BLACK EM COLOR PRINT RUN SEQUENCE
200 CLS:PC="BLACK EM":GOSUB40
201 LPRINTEM;STRINGS(6,10)
208 LPRINTSA;S5;C0;AC;BC
209 LPRINTSA;S4;C8;A1;A2;B4
210 LPRINTSA;S3;C0;A5;S2;C5
211 LPRINTSA;S3;CA;S3;D2;A4
212 LPRINTS8;D0;D0;D0;S1;AF;B2;C4;C0;A6;AC;AC;C9;B0
213 LPRINTS5;D8;B3;A3;S3;A3;A9;BA;DD;D9;S3;C8;A1
214 LPRINTS5;A1;A2;C4;S3;B8;A6;A2;B6;CD;A9;C4;D0;BA
215 LPRINTS8;A3;A6;C9;A1;S2;C9;S1;A1;S2;A2;A4
216 LPRINTSA;AD;D0;S2;DA
217 LPRINTSA;S2;A3;CB
299 'RED EM COLOR PRINT RUN SEQUENCE
300 CLS:PC="RED EM":GOSUB40
301 LPRINTEM;STRINGS(6,10)
308 LPRINTSA;S6;D0
309 LPRINTSA;S5;BE;DD
310 LPRINTSA;S4;DA;C9;CA;B0
311 LPRINTSA;S4;B5;BF;C1;AD
312 LPRINTSA;S4;AB;BA;B9;D0;D0;B4
313 LPRINTS6;CC;EC;C3;D3;B3;AC;D4;S2;A2;D5;S2;B7
314 LPRINTS7;AB;D2;D3;D1;C7;D9;CD;S2;A2;AB;AC;A5
315 LPRINTS9;A1;S1;B6;S1;A2;B4
316 LPRINTSA;A2;AD;D4;D8;A5
399 'BLUE COLOR PRINT RUN SEQUENCE
400 CLS:PC="BLUE":GOSUB40
401 LPRINTSTRINGS(11,10)
413 LPRINTSA;S7;CC;DC
414 LPRINTSA;S8;A1
415 LPRINTSA;S2;DC;B0
416 LPRINTSA;S2;A3;A3
499 'GREEN DS COLOR PRINT RUN SEQUENCE
500 CLS:PC="GREEN DS":GOSUB40
501 LPRINTDS;LF
503 LPRINTS7;AB
504 PRINTSA;S6;AB;B4
505 LPRINTSA;S1;AB;S9;C0;B0
506 LPRINTS1;AA;A1;SA;S8;A2;LF+LF
509 LPRINTS2;AA;A4
510 LPRINTS5;D0;SA;S4;D0

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511 LPRINTS4;A2;A1;SA;S4;A2
512 LPRINTSB;S2;DB
513 LPRINTS3;B0
514 LPRINTS3;A1
515 LPRINTS1;AB;LF+LF+LF
519 LPRINTS4;BC;SA;S7;C0;B0
520 LPRINTS4;A1;S1;CC;S2;A7;SA;S2;A2;LF
522 LPRINTS1;A2;A5;SA;S8;C0;B0
523 LPRINTSA;S6;D0;S4;A2
524 LPRINTS9;B0;S6;AA
525 LPRINTS1;B5;S7;A3;S1;D0
526 LPRINTS1;B5;S3;A5;S5;A2;S1;CA;A1;S8;CA
527 LPRINTS1;B5;SB;S1;CA
528 LPRINTS1;B5;SA;S3;CA;S6;B0;CA
529 LPRINTS1;B5;AA;A1;B4;CA;S8;B5;CA;S4;B4;S1;A3;CA
530 LPRINTS1;DF;S2;B5;S2;CA;S6;DF;CA;S1;B5;S5;DF
531 LPRINTS1;DF;S2;B5;CA;S1;DF;S4;B5;S1;DF;CA;S1;B5;C0;S1;B4;S2;
DF
532 LPRINTS1;DF;S2;C9;CA;B5;DF;B5;B5;S2;DD;CA;F2;S1;CF;DA;S1;BF;
S1;BF;DF
533 LPRINTS1;DF;B5;S1;DF;CA;B5;DF;B5;A1;B5;CA;DF;DE;CA;BF;CA;CA;
DF;S1;DA;DA;B5;DF
534 LPRINTS1;CA;B5;C8;F2;CA;DF;CB;CA;DF;S1;DF;CA;CA;B5;DE;CA;BF;
S1;B5;BF;B5;B5
535 LPRINTS1;A2;A1;A2;A1;A3;A2;A3;A2;A2;A3;S1;A3;A2;A2;A1;A3;A2;
A1;S1;A1;A1;A1;A1
599 'BROWN EM COLOR PRINT RUN SEQUENCE
600 CLS:PC="BROWN EM":GOSUB40
601 LPRINTEM;LF
603 LPRINTS7;B4
604 LPRINTS6;CA;S9;C0
605 LPRINTS6;B5;S4;C4;S5;D5
606 LPRINTS2;B4;S2;CA;S6;A9;C4;D0;D0;D0;S1;C9;S3;B5
607 LPRINTS2;CA;S2;CA;SA;S1;A3;AC;C5;S2;B5
608 LPRINTS3;B5;S1;B5;SA;S3;A2;B4;S1;CA
609 LPRINTS3;C9;C8;A1;SA;S4;CA;S1;CA
610 LPRINTS3;CA;CA;SA;S6;B5;CA
611 LPRINTS3;B7;A1;SA;S6;B5;BA
612 LPRINTS2;C8;A1;SA;S7;CA;A5
613 LPRINTS2;CA;SA;SB;CA
614 LPRINTS2;B6;SA;S9;B5
615 LPRINTS2;B5;SA;S9;C9
616 LPRINTS2;CA;SA;S9;CA
617 LPRINTS2;CA;SB;B5
618 LPRINTS3;B5;SA;S9;CA
619 LPRINTS3;D5;SA;S9;CA
620 LPRINTS3;CA;S2;B0;S2;C8;SA;S3;B5
621 LPRINTS4;B5;S1;C9;S2;BE;SA;S3;B5
622 LPRINTS1;A8;B0;S1;CB;S2;C5;S1;B5;SA;S2;CA
623 LPRINTS2;A2;C4;CA;S2;A2;D4;CA;SA;S2;B5
624 LPRINTS4;DF;S3;A2;CE;B0;S5;B5;S4;CA
625 LPRINTS4;CA;S5;C5;S5;CA;S4;B5
626 LPRINTS4;CA;S5;A2;B5;S2;B4;S2;C5;S2;CA
627 LPRINTS2;A2;C4;CA;S6;B5;S1;DA;A1;S2;AA;B0;C0;A5
628 LPRINTS3;CA;B7;S1;C8;S3;CA;A1;D8;A5;S4;B5;CA
629 LPRINTS3;DE;S2;BE;S3;CA;CA;A1;S5;C9;CA;S2;B4
630 LPRINTS3;DF;S1;CA;S4;CA;B5;S6;AA;DA;S2;B5
631 LPRINTS2;CA;B7;C0;A5;S4;DE;S8;DF;S1;C8;A1
632 LPRINTS2;CA;B5;B6;S5;DF;S8;DF;C0;A6
633 LPRINTS2;CA;BF;S2;C0;S2;B4;CA;B5;S2;B5;S2;B0;S1;DF;A5;S1;C0
634 LPRINTS1;B5;CA;B5;S2;B5;S1;B4;B5;S1;DF;S1;B5;B5;C0;S1;B5;C0;
DF;CA;C0;CA;CA
635 LPRINTS1;A1;A2;A1;A2;S1;A1;S1;A1;A1;S1;A3;S1;A1;A1;A2;S1;A1;
A2;A3;A2;A2;A2;A2
699 'BROWN NORMAL COLOR PRINT RUN SEQUENCE
700 CLS:PC="BROWN":GOSUB40
701 LPRINTS1;STRINGS(23,208)
702 LPRINTS1;F6;A1;FA;F6
703 LPRINTS1;F6;D4;F3;BF;F4;B7;CF;F6
704 LPRINTS1;BF;F9;S1;F4;D5;CA;F3;BF;F2
705 LPRINTS1;B5;CA;F8;D4;F1;BF;F7;B5;CA;DF
706 LPRINTS1;D5;DE;FA;F8;DD;BF;DF
707 LPRINTS1;FB;DF;DD;DF
708 LPRINTS1;B5;AB;FA;F2;BF;A3;C3;F5;CF
709 LPRINTS1;DF;D4;DB;F2;CF;F7;B7;S2;CB;F2;CF;F3
710 LPRINTS1;F4;A5;CA;F6;BF;S3;AA;F2;S1;F3
711 LPRINTS1;DF;DB;DF;DD;DE;F6;CA;B5;S4;DB;DF;DD;DF;BF;CB
712 LPRINTS1;F7;AF;AF;AD;DC;D0;CD;B0;S2;A3;A3;A2;CF;DF;A5;DA
713 LPRINTS1;F2;A1;DE;A7;S6;A2;C5;A2;A4;S4;DE;F3
714 LPRINTS1;A5;F3;DE;DD;B0;S6;C9;B2;D4;B0;S1;C0;F3;CF
715 LPRINTS1;D4;F6;DC;D8;B6;S3;A2;DF;DE;F2;DD;DB;F3
716 LPRINTS1;F9;D0;S4;F9
717 LPRINTS1;FA;DF;DC;B4;FA
718 LPRINTS1;F2;DD;BF;CF;F3;BF;FA;F2;BF;DF
719 LPRINTS1;F3;C0;DF;A5;F2;A1;FA;F2;B5;CA
720 LPRINTS1;F3;DE;DF;B0;F2;D8;FA;F2;DD;DF
721 LPRINTS1;B5;CB;F7;CF;FA;CF;F2
722 LPRINTS1;DD;DA;FA;F3;BF;F4;S1;CF;DF
723 LPRINTS1;FA;F5;S1;F4;DD;F2
724 LPRINTS1;F7;AB;CF;DF;CF;F4;D5;F7
725 LPRINTS1;CA;F3;A1;F2;DC;DC;DF;S1;DF;B5;CB;F7;DE;DF
726 LPRINTS1;CA;DD;F2;D8;F5;DD;DF;B5;DE;DF;D7;F6;B5
727 LPRINTS1;CA;F4;D7;F3;DB;FA;F2;B5
728 LPRINTS1;CA;B5;CB;F2;DB;F8;B5;F4;A7;DF;A2;B5

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Program Listing 4 Continued

729 LPRINTS1;CA;D5;DE;CB;B5;F8;CA;B5;F4;C0;DF;DC;B5
 730 LPRINTS2;CF;DF;CA;DF;D7;B5;DF;D7;F4;S1;B5;DF;CA;F3;D7;DF
 731 LPRINTS2;F2;CA;B5;DF;S1;F3;DE;CA;DF;S1;B5;DF;CA;BF;DF;CB;F2
 732 LPRINTS2;F2;B6;B5;CA;S1;CA;CA;F2;A2;B5;S2;DF;S1;A5;DF;C0;DF
 733 LPRINTS2;CA;DF;S1;B5;CA;S1;CA;DE;CA;B5;S1;A1;B5;S1;B5;B5;S1;
 DF;A5;A5;CA
 734 LPRINTS1;B5;CA;B7;S2;B5;S1;B4;B5;S1;DF;S1;B5;B5;CA;A1;B5;C0;
 DF;CA;C0;CA;CA
 735 LPRINTS1;A1;A2;A1;A2;S1;A1;S1;A1;A1;S1;A3;S1;A1;A1;A2;S1;A1;
 A2;A3;A2;A2;A2;A2
 799 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
 800 CLS:PC="DONE":GOSUB40
 899 ' NOTE: ADD STATEMENTS 900-1100 OF PROGRAM LISTING 1.

Program Listing 5. Castle Art

97 ' PROGRAM LISTING 5. CASTLE ART (6.89K)
 98 ' NOTE: ADD STATEMENTS 1-90 OF PROGRAM LISTING 1.
 99 ' BLACK DS COLOR PRINT RUN SEQUENCE
 100 PC="BLACK DS":GOSUB80;TB=B5+SB+S3+CA
 101 LPRINTS;B7;STRINGS(23,163);CB
 102 LPRINTTB
 103 LPRINTB5;SA;"!";SA;S2;CA
 104 LPRINTB5;SA;"I";SA;S2;CA
 105 LPRINTB5;S8;STRINGS(4,95);SA;S1;CA
 106 LPRINTTB
 107 LPRINTB5;S9;C8;CB;SA;S2;CA
 108 LPRINTB5;SA;S5;A2;A2;S6;CA
 109 LPRINTB5;S2;"---";SA;S4;"---";S1;CA
 110 LPRINTB5;S3;AA;"---";C8;C8;"-----";AA;S2;CA
 111 LPRINTB5;S3;C0;S1;AA;S1;A5;S4;AA;S1;A5;AA;S1;A5;AA;S1;C0;S2;
 CA
 112 LPRINTB5;S3;A2;S5;BF;BB;B5;S8;A2;S2;CA
 113 LPRINTB5;S9;AF;AE;A5;SA;S1;CA
 114 FORZ=1TO11:LPRINTTB:NEXTZ
 125 LPRINTB5;S3;C0;S5;D3;B1;A5;SA;S1;CA
 126 LPRINTB5;S3;A2;S1;C8;S1;B4;S4;C8;S1;B4;C8;S1;A4;C0;S1;AA;S2;
 CA
 127 LPRINTB5;S3;C8;S5;C0;C8;S9;C0;S2;CA
 128 LPRINTB5;SB;A2;S2;CA
 129 LPRINTB5;SA;S5;C0;C0;S6;CA
 130 LPRINTB5;S9;AA;AA;SA;S2;CA
 131 FORZ=1TO3:LPRINTTB:NEXTZ
 134 LPRINTB5;SA;"!";SA;S2;CA
 135 LPRINTS;STRINGS(23,208);DA
 199 ' RED EM COLOR PRINT RUN SEQUENCE
 200 CLS:PC="RED EM":GOSUB40
 201 LPRINTEM;LF
 203 LPRINTSA;S1;DC;DC;D0;B0
 204 LPRINTSA;S3;A3;AB;AC
 205 LPRINTSA;S7;B4
 206 LPRINTSA;S6;DA;DF;B0
 207 LPRINTSA;S5;AB;AF;AF;AD
 208 LPRINTSTRINGS(4,10)
 213 LPRINTS2;C0;D5;SA;S2;D0;B0
 214 LPRINTS2;DE;DF;B4;S9;C0;DE;F2;D4;S4;C0
 215 LPRINTS1;DA;F2;A1;S9;AA;F3;BF;S3;C8;DF
 216 LPRINTS1;AB;AF;A5;SA;S1;A2;A3;A3;S4;A2;CF
 217 LPRINTSTRINGS(12,10)
 230 LPRINTSA;S5;C0;D0;D0;D0
 231 LPRINTSA;S6;AF;DC
 232 LPRINTSA;S7;A5
 233 LPRINTSA;S4;D0;D0
 234 LPRINTSA;S1;D3;DB;AF;A5
 299 ' BLUE COLOR PRINT RUN SEQUENCE
 300 CLS:PC="BLUE":GOSUB40
 301 LPRINTS1;STRINGS(23,208)
 302 LPRINTS1;F2;BF;A1;S1;AB;F2;A7;A3;S1;C0;D8;DF;D4;S1;A3;AB;AF;
 A7;S1;A3;DF
 303 LPRINTS1;DF;A5;S5;A1;S4;AF;A3;AF;A1;S6;DA
 304 LPRINTS1;D5;S1;C8;D4;SA;S7;CA;DF
 305 LPRINTS1;DF;DD;F2;D5;B0;SA;S3;C0;DE;F2
 306 LPRINTS1;F2;A3;AB;F2;BD;SA;S2;CF;AF;A3;DF
 307 LPRINTS1;BF;A1;S6;B0;S3;D4;D0;S6;C0;S1;DA
 308 LPRINTS1;DD;B4;S4;AD;DF;B5;S3;DF;B7;A1;S4;A8;AB;AB;CB
 309 LPRINTS1;DF;B7;S6;A1;S3;BF;S9;DE
 310 LPRINTS1;DF;SB;S1;DF
 311 LPRINTS1;B5;SB;S1;DF
 312 LPRINTS1;DF;S5;DA;B0;SA;S1;D8;DC;B0;A1
 313 LPRINTS1;DF;B5;S3;C8;DF;DD;SA;DE;F3;B4
 314 LPRINTS1;DF;A1;S3;AA;F2;D5;S9;AB;F2;BF;A1
 315 LPRINTS7;CB;DF;A7;S9;C0;DC;D4
 316 LPRINTSA;S8;C8;F3;DD
 317 LPRINTSA;S8;A2;CF;F2;A7
 318 LPRINTSTRINGS(5,10)
 324 LPRINTS4;D0;D3;D3;D3;D1;D3;A3;D0;D0;B0
 325 LPRINTS1;D0;D0;DA;DF;AF;D3;D3;BE;AD;AC;AC;D2;D3;D3;DF;S1;D0;

Program Listing 5 Continues

<p>5 1/4" \$199*</p> <p>SINGLE SIDE SINGLE DENSITY W/HUB RING</p> <p style="text-align: right;">SOFT, 10 OR 16 SECTORS</p> <p>100% CERTIFIED 2 YEAR WARRANTY</p>	<p>8" \$199*</p> <p>SINGLE SIDE SINGLE DENSITY</p> <p style="text-align: right;">SOFT OR 32 SECTORS</p> <p>100% CERTIFIED 2 YEAR WARRANTY</p>
<p>5 1/4" \$219*</p> <p>SINGLE SIDE DOUBLE DENSITY W/HUB RING</p> <p style="text-align: right;">SOFT, 10 OR 16 SECTORS</p> <p>100% CERTIFIED 2 YEAR WARRANTY</p>	<p>8" \$249*</p> <p>SINGLE SIDE DOUBLE DENSITY</p> <p style="text-align: right;">SOFT OR 32 SECTORS</p> <p>100% CERTIFIED 2 YEAR WARRANTY</p>
<p>5 1/4" \$299*</p> <p>DOUBLE SIDE DOUBLE DENSITY W/HUB RING</p> <p style="text-align: right;">SOFT, 10 OR 16 SECTORS</p> <p>100% CERTIFIED 2 YEAR WARRANTY</p>	<p>8" \$309*</p> <p>DOUBLE SIDE DOUBLE DENSITY</p> <p style="text-align: right;">SOFT OR 32 SECTORS</p> <p>100% CERTIFIED 2 YEAR WARRANTY</p>

- Minimum order 100
- For smaller quantities add 10%
- Packed 10 boxes of 10 diskettes with sleeves and labels
- Quantity discounts - 1,000 deduct 3%, 5,000 deduct 5%, 10,000 deduct 7%
- Add \$5.00 per case 5 1/4", \$7.00 per case 8"

For shipping and handling Continental U.S.A., U.P.S. ground.

<p>Box of 10 diskettes: 5 1/4" 8"</p> <p>OPUS ss/sd \$20 ss/sd \$21 BASF ss/od \$23 ss/sd \$24 MAXWELL } TOO LOW TO QUOTE CALL DYSAN }</p> <p><small>SPECIFY SECTORING WHEN ORDERING. 5 1/4" QUAD DENSITY IN STOCK</small></p>	<p>DISK DRIVE HEAD CLEANING KITS</p> <p>Prevent head crashes and ensure error-free operation</p> <p>5 1/4" or 8" \$19.50</p>
<p>HARDHOLE DISK PROTECTORS</p> <p>Reinforcing rings of tough mylar protect disk hole edge from damage.</p> <p>Applicators \$3 \$4 Hardhole Rings (50) \$6 \$8</p>	<p>SFD C-10 CASSETTES . . 10/S7 (All cassettes include box and labels)</p> <p>Get 6 cassettes, C-10 Sonic, and Cassette/8 Library-Album, as illustrated, for only \$8</p>
<p>LIBRARY CASES</p> <p>8" Kas-sette/10 \$2.99 5 1/4" Mini Kas-sette/10 \$2.49</p>	<p>5 1/4" or 8" Vinyl Storage Pages 10/S5</p>

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D0;A3;D3;DF;D3;D0
326 LPRINTS1;AC;AC;A4;S3;A3;AB;AC;A4;A8;AC;A2;A3;A8;A4;AC;S1;AC;
AC;S2;AC
327 LPRINTS1;D3;D3;D5;B0;S1;C3;D3;CF;DD;B0;A3;S1;C3;C0;B0;D2;D3;
D9;D4;B0;A3;D3;D3
328 LPRINTS1;AC;AC;A4;S2;A3;A3;S1;AC;AC;S2;AC;AC;A4;A8;AC;AC;
AC;S2;AC
329 LPRINTS1;D3;D3;D1;D2;A3;A3;A3;A3;C3;D2;D0;D0;D0;D3;B0;B0;
STRINGS(6,211)
330 LPRINTS1;D3;D3;D3;A3;S1;A1;A2;A3;A1;S1;C0;D0;D0;D0;BB;S2;A2;
D3;A3;A3;A3;D3
331 LPRINTS1;DC;AC;AC;AC;AF;AF;AF;AC;A4;S3;AC;AC;AC;S2;AC;S1;A3;
A3;S1;AC
332 LPRINTS1;D3;D3;D3;A3;S1;D0;D0;D0;A3;A1;S2;D3;A3;A3;C3;D0;S3;
D0;D3;D3
333 LPRINTS1;D0;D0;D8;AC;AC;AC;S5;A8;A8;AC;AC;S4;AC;AC;S1;A8
334 LPRINTS1;DF;DC;AC;S2;D0;D0;D3;D3;D3;S4;D0;D0;D3;A3;A8;AC;A4;
S1;C0
335 LPRINTS7;A3;A3;A3;A3;S4;A3;A3;A3;A3
399 ' GREEN COLOR PRINT RUN SEQUENCE
400 CLS:PC="GREEN":GOSUB40
401 LPRINTSTRINGS(9,10)
411 LPRINTS1;DC;B0
412 LPRINTS1;DF;DD;B4;S3;DA;B0;S9;D0;B0;D8;DC;B0;DE
413 LPRINTS1;F2;D5;S1;C8;C8;DF;DD;STRINGS(5,208);DC;DC;DE;F7
414 LPRINTS1;F4;F5;B5;S1;FA;F2
415 LPRINTS1;DA;FB;A1;S1;F9;DE;F2
416 LPRINTS1;F2;CF;F5;A1;S1;A8;F4;B7;F7
417 LPRINTS1;F2;DE;DF;B7;F3;DD;D0;S2;AB;FA
418 LPRINTS1;FA;DD;B0;S1;A2;AF;CF;F3;D5;F3
419 LPRINTS1;FA;F2;DD;D4;B0;S1;A2;A3;AB;AF;AF;AF;AF
420 LPRINTS1;FA;F5;DD;D4;STRINGS(6,208)
421 LPRINTS1;F9;CF;FA;F3
422 LPRINTS1;F2;BF;A3;S1;A2;A3;S3;A2;A3;AB;AF;CF;F5;BF;F2
423 LPRINTS1;DF;AF;A1;S2;B0;S1;D0;D0;B0;S6;AB;AF;A3;S3;AB
424 LPRINTS4;A8;AC;AE;AF;STRINGS(5,172);D0;S6;D0;D0;B0
425 LPRINTS2;AC;AC;AC;AF;AF;STRINGS(5,172);A8;AC;AC;AC;A4;A8;
STRINGS(5,172)
426 LPRINTS1;D3;D3;D3;A1;D3;B3;D3;C3;D3;B3;A2;A3;A3;A3;C3;B3;D3;
D3;A3;A3;C1;D3;D3
427 LPRINTS1;AC;AC;A4;S1;STRINGS(6,172);A4;AC;AC;S1;A8;STRINGS(5
,172);A4;S1;AC
428 LPRINTS1;D3;D3;A3;S1;A3;AF;D3;A3;B3;S2;D2;D0;D3;D3;D1;A2;D3;
D3;S1;A1;A3;D3
429 LPRINTS1;AC;S1;A8;S3;AC;AC;AC;AC;S3;AC;AC;S1;A8;AC;AC;A8;A8;
AC;AC
430 LPRINTS1;A4;STRINGS(6,172);AC;AC;S3;AC;S4;A8;AC;AC;S2;A8
431 LPRINTS1;A3;A3;AB;AF;AF;A3;D3;D0;S2;A1;A1;D0;S3;A3;D3;D3;D3;
D3;A3;C3
432 LPRINTS1;STRINGS(6,172);S2;AC;AC;S5;A8;A8;A4;S3;A8;AC
433 LPRINTS1;B7;A3;S1;D0;D2;D3;D3;A3;S2;A8;D0;S2;A3;A3;D3;D3;D3;
D3;S2;A3
434 LPRINTS1;A4;SA;S2;A8;AC;AC;S3;AC;AC;AC;AE
435 LPRINTS1;STRINGS(6,163);S4;A3;A3;A3;A3;S4;STRINGS(5,163)
499 ' BROWN COLOR PRINT RUN SEQUENCE
500 CLS:PC="BROWN":GOSUB40
501 LPRINTLF+LF
504 LPRINTS9;B0
505 LPRINTS9;C5
506 LPRINTS9;CA
507 LPRINTS9;CA;S6;B0
508 LPRINTS3;B4;S5;CA;S6;B5;S3;B4
509 LPRINTS3;C9;S5;CA;S6;B5;S3;C9
510 LPRINTS3;CA;S2;DD;DD;DD;CA;SA;CA
511 LPRINTS1;C8;B0;CA;S2;D5;DF;DA;CA;SA;CA
512 LPRINTS2;DD;DE;S2;DF;A5;CF;CA;S8;D0;B0;A2;S2;DE
513 LPRINTS2;AA;AA;S2;B7;S1;A2;DA;D0;D0;D0;DC;DC;AE;CF;DF;A1;
S3;CB
514 LPRINTS9;AA;F4;BF;A1;S2;AB;D4;S2;C0;BE
515 LPRINTS9;D8;F4;D5;S3;C0;BF;A3;AA;B7
516 LPRINTS1;D4;D0;C0;S3;C0;F7;DD;B4;DC;B7;S4;B0
517 LPRINTS1;F2;DE;DD;B4;DC;FA;DF;DD;B0;S2;D8;DF
518 LPRINTS1;AF;AF;FA;F7;D5;F3
519 LPRINTS1;D2;AF;CF;F9;AF;AF;CF;F8
520 LPRINTS1;AC;DC;DC;D0;D3;D3;D3;AD;AC;AC;AC;AC;DF;D3;D3;F8
521 LPRINTS1;DF;AF;F5;AF;AF;F6;D3;D3;F2;AC;AC;AC;AC
522 LPRINTS1;F2;BF;A3;S1;A2;A3;S2;B0;A2;A3;A8;AF;CC;DC;DC;AF;AF;
D3;B3;F2
523 LPRINTS1;DF;AF;A1;D0;DE;CD;DC;AF;AF;CF;DC;DC;B0;S3;AB;AF;A3;
S1;C0;S1;AB
524 LPRINTS2;D0;D8;A7;S4;A2;S2;A3;AF;CF;DF;DC;D0;D0;DC;AF;AF;CF;
D5
525 LPRINTS1;AF;A3;A1;S4;C0;D2;S6;B3;AB;A7;D0;S3;A3
526 LPRINTS3;A8;S2;A4;AC;S5;B4;DC;S3;D8;B0;D0
527 LPRINTS3;AA;S2;B0;S2;A2;S4;BF;C7;A1;S1;A2;A3;C3
528 LPRINTS3;D8;S5;C0;SA;D3
529 LPRINTS3;A4;S5;C0;S6;A5;S3;A4
530 LPRINTS9;C2
531 LPRINTS9;C8
532 LPRINTS9;D0
533 LPRINTS9;A7
599 ' BROWN DS COLOR PRINT RUN SEQUENCE
600 CLS:PC="BROWN DS":GOSUB40

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601 LPRINTS;LF+LF
604 LPRINTSA;B0;S2;B0
605 LPRINTS9;AA;DF;S1;C0;A5
606 LPRINTSA;DF;S1;CA
607 LPRINTS;B7;S1;CA;S3;C0;B0;B0
608 LPRINTS3;C0;D4;S1;B4;S3;DF;S1;CA;S3;C8;B5;B5;S1;C0;D4;S1;B4
609 LPRINTS3;A2;DF;C8;A1;S3;DF;S1;CA;S3;CA;B5;B5;S1;A2;DF;C8;A1
610 LPRINTS4;D5;CA;S3;B5;B7;S1;CA;DD;DD;DD;F2;DD;DD;S1;D5;CA
611 LPRINTS4;BF;CA;S3;B5;DF;S1;CA;D5;DF;DA;D5;DF;DA;D5;S1;BF;CA
612 LPRINTS4;DD;CA;S3;B5;S2;CA;F5;AF;CF;S1;A1;BA
613 LPRINTS4;DF;A2;S3;A5;S2;AA;AF;A3;A3;A1
614 LPRINTS4;AB
615 LPRINTS1;A5;SA;S9;A1
616 LPRINTS3;B0;SA;S2;C8
617 LPRINTS3;A1;S1;C8
618 LPRINTSB;AA
619 LPRINTLF+LF
622 LPRINTEM;S3;C0;DC;DF;DD;DC;F2;CF;DD;DC;D4;D0;B0;S5;C0
623 LPRINTS2;D0;DE;AF;A1;A2;A3;S3;A3;A3;CF;F3;D4;D0;DC;DF;BF;DF;
D4
624 LPRINTS1;DF;AF;A7;SA;S2;A3;AF;AF;A3;S3;AB
625 LPRINTEX;S4;B0;C0;SA;C0;B0
626 LPRINTS4;DC;A8;SA;S5;B4
627 LPRINTS4;A7;C2;S4;A3;S1;C0;S8;B8
628 LPRINTS4;DF;C8;S4;D3;S1;A8;S3;A8;B4;S3;DC
629 LPRINTS4;A6;S1;A4;S3;B0;S1;A8;S3;AA;A5;S3;A6
630 LPRINTSA;D5;S1;AA;S3;A8;S1;A5
631 LPRINTSA;DC;S1;C8
632 LPRINTSA;D2;S1;CA
633 LPRINTSA;A7;S1;A2;A5
699 ' BROWN EM COLOR PRINT RUN SEQUENCE
700 CLS:PC="BROWN EM":GOSUB40
701 LPRINTEM;LF+LF
704 LPRINTSA;S1;B0;B0;B0
705 LPRINTSA;S1;F2;A5
706 LPRINTSA;S1;F2
707 LPRINTSA;S1;B7;DF;S4;C0;B0
708 LPRINTS5;D4;B4;S4;F2;S4;C8;B5;S3;D4;B4
709 LPRINTS5;DF;A1;S4;F2;S4;CA;B5;S3;DF;A1
710 LPRINTS5;DF;S5;B7;DF;S3;A1;A1;A1;S1;B5;S1;DF
711 LPRINTS5;DF;S5;F2;S7;B5;S1;DF
712 LPRINTS5;DF;S4;C0;C4;CA;S7;A5;S1;CF
713 LPRINTS5;B7;S5;A1;AA
714 LPRINTSTRINGS(6,10)
721 LPRINTSA;C0
722 LPRINTS5;B5;S2;B5;S1;CA;S2;B4;S6;C0
723 LPRINTS3;B4;S1;A1;S7;A5;S2;B4;S3;AA
724 LPRINTS3;A5;S7;D0
725 LPRINTS5;D0;S2;A1;S2;C2
726 LPRINTS5;AC;S4;C8;D5;D0;S9;AC
727 LPRINTS5;D3;S5;B0;D0;S9;AC
728 LPRINTS5;DC;S5;DF;AD;S4;C0;S4;DC
729 LPRINTS5;A5;A4;S4;AD;AC;S4;A2
730 LPRINTSA;S1;B5;AF;S4;AF;A5
731 LPRINTSA;S1;DE;DC
732 LPRINTSA;S1;D3;DF
733 LPRINTSA;S1;A7;A7;A5
799 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
800 CLS:PC="DONE":GOSUB40
899 ' NOTE: ADD STATEMENTS 900-1100 OF PROGRAM LISTING 1.

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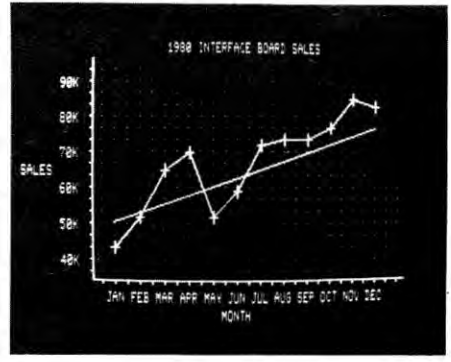
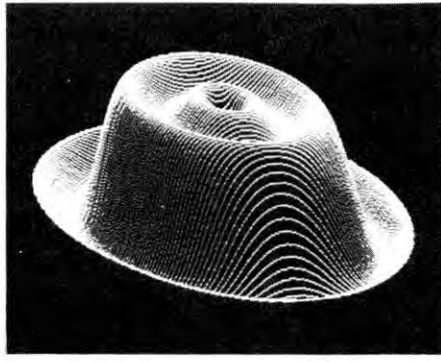
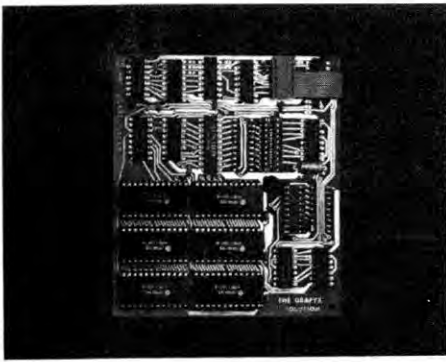
Program Listing 6. Snoopy Art

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97 ' PROGRAM LISTING 6. SNOOPY ART (8.3K)
98 ' NOTE: ADD STATEMENTS 1-90 OF PROGRAM LISTING 1.
99 ' BLACK COLOR PRINT RUN SEQUENCE
100 PC="BLACK":GOSUB80;TB=B5+S2+CA
101 LPRINTB7;STRINGS(78,163);CB
102 LPRINTB5;SG;S8;CA
103 LPRINTB5;S2;C8;STRINGS(72,172);B4;S2;CA
104 FORZ=1TO3:GOSUB185:NEXTZ
107 LPRINTTB;SE;S3;STRINGS(11,95);SB;TB
108 LPRINTTB;SE;S8;D0;SA;S3;TB
109 GOSUB185
110 LPRINTTB;SB;S3;D0;B0;SD;S7;TB
111 LPRINTTB;SB;S3;F2;SD;S7;TB
112 LPRINTTB;SB;S3;A3;A1;SD;S7;TB
113 FORZ=1TO9:GOSUB185:NEXTZ
122 LPRINTTB;SA;S5;A9;B0;SE;S5;TB
123 LPRINTTB;SA;S6;A2;A4;SE;S4;TB
124 LPRINTTB;SA;S4;C0;SE;S7;TB
125 LPRINTTB;SA;S2;C8;S2;D5;SE;S6;TB
126 LPRINTTB;SA;S3;B5;A0;AA;B0;SE;S5;TB
127 LPRINTTB;SA;S3;C9;S2;B5;SE;S5;TB
128 LPRINTTB;SA;S2;C0;DA;S2;C9;SE;S5;TB
129 LPRINTTB;S9;BF;S2;CA;S3;CA;SC;S9;C0;D8;DE;F4;B5;F4;C7;B4;S2;
TB
130 LPRINTTB;SA;S3;A3;AC;AC;A1;D0;C0;SC;S4;C0;D8;DE;F7;DC;DE;DF;

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Program Listing 6 Continues

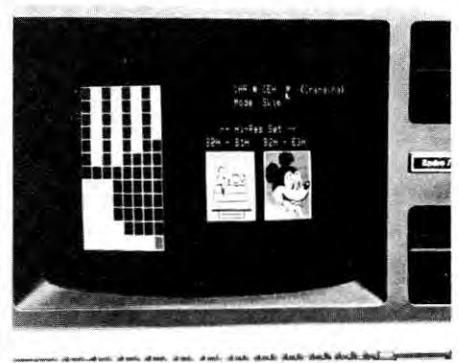
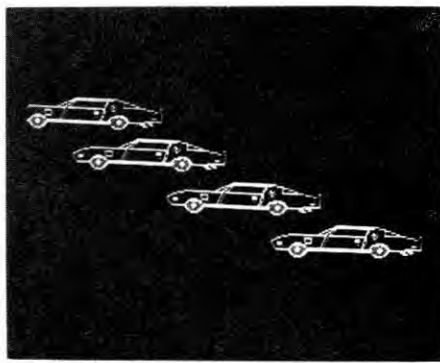
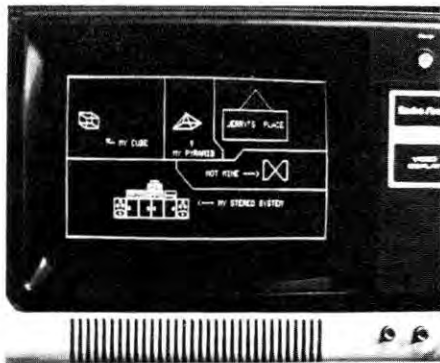


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Program Listing 6 Continued

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BF;D9;DF;B5;S2;TB
131 LPRINTTB;SA;S7;B5;SD;S8;CA;F2;B5;S2;TB
132 LPRINTTB;SA;S7;B5;D0;D0;D0;SD;S5;CA;F2;B5;S2;TB
133 LPRINTTB;SA;S7;A3;A1;A0;A2;B5;SD;S4;CA;DF;BF;A1;S2;TB
134 LPRINTTB;SF;S6;CA;A7;S4;TB
135 FORZ=1TO3:GOSUB185:NEXTZ
138 LPRINTB5;S2;A2;STRING$(72,163);A1;S2;CA
139 LPRINTB5;SG;S8;CA
140 LPRINTAD;STRING$(78,172);AE;GOTO200
185 LPRINTTB;SG;S2;TB:RETURN
199 ' BLACK EMPHASIZED COLOR PRINT RUN SEQUENCE
200 CLS:PC="BLACK EM":GOSUB40:LS=CHR$(92):RS=CHR$(47):UL=CHR$(95)
):SO=CHR$(111)
201 LPRINTEM;STRING$(5,10)
207 LPRINTSA;S1;C0;D0;B0
208 LPRINTSA;C8;A7;A3;AB;B4;SD;S3;LS;S2;LS;SO;RS;S2;RS
209 LPRINTSA;B7;S3;CB;SD;S4;LS;S2;SO;S2;RS
210 LPRINTSA;CD;S3;BE;SD;S5;CB;RS;A0;LS;B4
211 LPRINTSA;A2;D5;A0;DA;A1;S2;A4
212 LPRINTSA;S1;BA;AC;A5
213 LPRINTS9;C0;A6;SA;S6;UL
214 LPRINTS7;C0;A6;A9;B0;SA;S2;UL
215 LPRINTS7;B6;S2;C9;S8;"-";UL;"-"
216 LPRINTS7;AA;B0;C0;A5;SA;S2;C0;D0;S2;UL
217 LPRINTS8;A2;A1;SA;S3;B7;B7;A1
218 LPRINTSB;S3;B0;B5;A1
219 LPRINTSB;S3;CD;DD;A1
220 LPRINTSB;S4;B5
221 LPRINTSB;S4;C9
222 LPRINTSB;S4;A2;B4
223 LPRINTSB;S5;C5
224 LPRINTSB;S5;CA
225 LPRINTSB;S6;B5
226 LPRINTSB;S6;C9
227 LPRINTSB;S6;AA;B0
228 LPRINTSB;S7;C5
229 LPRINTSB;S7;AA;B0
230 LPRINTSB;S8;C9
231 LPRINTSB;S9;C5;SB;S7;DC;DC;AC;DC;BC;CC;DC;BC;AC;AC;AC;DC
232 LPRINTSC;A3;A3;AC;AC;D0;D0;B0;SA;S9;D0;DF;A1;A0;A2;B7;S2;CB;
B5;S3;DF
233 LPRINTSC;S6;A2;A3;A3;STRING$(6,172);C4;STRING$(6,208);B8;AC;
A6;A3;A0;DF;B0;C0;D5;S2;DA;D2;BA;S3;AC;CC;DF
234 LPRINTSE;S7;F2;DC;F2;DD;DE;F2;DC;DD;DE;DF
299 ' BROWN DOUBLE-STRIKE COLOR PRINT RUN SEQUENCE
300 CLS:PC="BROWN DS":GOSUB40
301 LPRINTDS;FG;FA
302 LPRINTFG;FA
303 LPRINTF4;STRING$(72,175);F4
304 FORZ=1TO5:LPRINTF4;SG;S2;F4:NEXTZ
309 LPRINTF4;S4;C0;DE;S5;BD;SF;F4
310 LPRINTF4;S3;C0;F2;B0;S3;C0;A1;SA;S1;D0;B0;SD;S7;F4
311 LPRINTF4;S2;C8;F3;DD;S3;A4;SA;S2;F2;SD;S7;F4
312 LPRINTF4;A0;C0;F5;C5;D0;B2;SA;S3;A3;A1;SD;S7;F4
313 LPRINTF4;A0;DA;F3;BF;D9;DF;BF;SF;S3;F4
314 LPRINTF4;A0;F2;BF;D9;D6;CF;DF;B5;SF;S3;F4
315 LPRINTF4;A0;F2;C9;F2;B6;DF;DD;SF;S3;F4
316 LPRINTF4;A0;CA;DF;D5;CF;BF;DA;F2;SF;S3;F4
317 LPRINTF4;S2;CF;DF;DD;DE;F3;B5;SF;S2;F4
318 LPRINTF4;S2;A2;F7;B0;SF;S1;F4
319 LPRINTF4;S3;A2;CF;F5;DD;D0;D0;B0;SE;S7;F4
320 LPRINTF4;S5;AB;CF;F3;BF;A3;A3;A1;SE;S7;F4
321 FORZ=1TO10:LPRINTF4;SG;S2;F4:NEXTZ
331 LPRINTF4;A8;STRING$(12,172);A4;S5;STRING$(6,172);A8;STRING$(
18,172);STRING$(7,220);BC;AC;SA;S6;A8;AC;A4;F4
332 LPRINTF4;SC;SB;D0;D0;DC;DC;FA;A4;SA;S9;F4
333 LPRINTF4;SC;S1;C0;D0;DC;DC;D2;STRING$(5,211);BB;STRING$(6,17
5);C7;D3;D9;DC;DF;SA;S9;F4
334 LPRINTF4;SB;S4;C0;D0;D8;DC;DE;FB;F4;SA;S9;F4
335 LPRINTF4;SA;S7;C0;D0;D0;D8;DC;FC;F7;DC;D0;SA;S1;F4
336 LPRINTF4;S9;C0;D0;D0;DC;DE;F7;DC;D0;S8;F4
337 LPRINTF4;S4;A8;AC;AE;STRING$(58,175);AC;S6;F4
338 LPRINTFE;F2;STRING$(21,175);F7
339 LPRINTFE;F2;SB;S1;F7
340 LPRINTSTRINGS(80,175)
399 ' RED EMPHASIZED COLOR PRINT RUN SEQUENCE
400 CLS:PC="RED EM":GOSUB40:TB=A0+CA+B5+A0
401 LPRINTEM
402 LPRINTA0;CA;BF;STRING$(74,175);CF;B5
403 FORZ=1TO4:GOSUB185:NEXTZ
407 LPRINTTB;SE;S3;STRING$(11,208);S8;TB
408 LPRINTTB;SE;S3;C0;D0;D0;D0;A0;B0;D0;D0;D0;B0;S8;TB
409 LPRINTTB;SE;S4;D0;D0;D0;BA;DF;D4;D0;D0;S9;TB
410 FORZ=1TO7:GOSUB185:NEXTZ
417 LPRINTTB;SA;S9;C8;C8;SE;S1;TB
418 LPRINTTB;SA;S9;CA;CA;SE;S1;TB
419 LPRINTTB;SA;S9;A2;A2;SE;S1;TB:GOSUB185
421 LPRINTTB;SA;S1;C0;DC;DE;A5;SE;S7;TB
422 LPRINTTB;S7;C0;D8;AE;CB;AF;A1;SE;S9;TB
423 LPRINTTB;S6;C0;DF;A1;C0;A5;SF;S1;TB
424 LPRINTTB;S6;DF;A5;A0;BE;SF;S2;TB
425 LPRINTTB;S6;A1;A0;DE;A5;SF;S2;TB
426 LPRINTTB;S8;A7;SF;S3;TB

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427 FORZ=1TO5:GOSUB185:NEXTZ
432 LPRINTTB;SE;S4;C8;DF;B4;A0;DE;DD;S2;F2;B5;S7;TB
433 LPRINTTB;SE;S4;AA;DF;A5;A0;CF;BF;SA;S2;TB
434 FORZ=1TO5:GOSUB185:NEXTZ
439 LPRINTA0;AA;STRING$(50,175);SB;S1;STRING$(5,175);A5
499 ' GREEN COLOR PRINT RUN SEQUENCE
500 CLS:PC="GREEN":GOSUB40
501 LPRINTSTRINGS(6,10)
508 LPRINTSA;S1;D8;DC;D4
509 LPRINTSA;C8;F3;B4
510 LPRINTSA;A2;F3;A1
511 LPRINTSA;S1;AA;DF;A5
512 LPRINTSA;S2;A3
513 LPRINTEM;STRING$(11,10)
525 LPRINTSA;A0;C0;D0
526 LPRINTSA;CA;F4;DC;D0;SF;D0;DC;D4;D8;B5
527 LPRINTSA;CA;F5;B7;DF;DC;B4;SB;S3;D0;D0;SC;D8;F5;B5
528 LPRINTSA;CA;F5;D5;A2;AF;B5;SA;S7;C0;D8;DC;D0;DC;F3;DD;D4;SB;
D0;DC;DF;DD;DC;D0;B4;F7;B5
529 LPRINTSA;CA;F6;D4;A0;C0;B0;S9;DC;D4;B0;A0;C0;DC;FA;F1;D0;D0;
D0;SA;S4;C0;D8;BE;A7;A1;S9;C0;DE;DF;B5
530 LPRINTSA;CA;FA;D4;S7;DE;F3;DD;B6;FA;F6;DD;DC;D0;D0;S4;C0;
D0;D8;BE;A7;A1;SA;S1;D8;F3;B5
531 LPRINTSA;CA;FA;F2;D4;S5;F2;AF;AF;F2;BA;FB;F7;SA;S3;CA;F4;B5
532 LPRINTSA;CA;FA;F3;S9;CA;F2;DC;DC;D3;D3;AF;AF;FA;F9;AF;SA;
S3;CA;F4;B5
533 LPRINTSA;CA;FA;F2;BF;S9;DA;F8;DD;DC;DC;STRING$(6,211);BB;STR
INGS(6,175);C7;D3;D9;DC;DF;SA;S3;CA;F4;B5
534 LPRINTSA;CA;FA;F2;S8;FC;F2;SA;S3;CA;F4;B5
535 LPRINTSA;CA;FA;F2;DD;STRING$(6,220);DE;FE;B5
536 LPRINTSA;CA;FG;B5
537 LPRINTSA;AA;STRING$(70,175);A5
599 ' BLUE COLOR PRINT RUN SEQUENCE
600 CLS:PC="BLUE":GOSUB40
601 LPRINTLF+LF
604 LPRINTSA;CA;CF;D4;B0;S5;C3;DF;D5;SA;C2;F2;DD;DC;D0;D0;A0;C0;
B0;S4;D0;D0;D8;DC;DF;B7;SA;S5;CB;DC;D0;B0;S3;D0;D0;DC;BE;A7;A2;A
F;B5
605 LPRINTS6;A3;AF;DF;D0;B0;D8;F3;B4;S8;D8;FA;F1;D4;D8;F7;D5;
SA;S3;C8;F5;DC;F4;A1;S3;B1
606 LPRINTS8;AB;F8;DC;B0;S5;D8;FB;F2;B0;SA;S1;C0;FA;F1;DD;B0;A0;
DE;B5
607 LPRINTS8;D8;F2;BF;AF;CF;F5;DD;DC;D0;D0;DC;FB;F4;DD;B0;S9;AE;
STRING$(8,175);F4;B1;A0;A2
608 LPRINTS4;C0;S2;DE;F2;B7;S3;CB;FC;F5;DD;B0;A0;D0;S3;B8;AE;STR
INGS(8,175);CF;F5;DD;D4
609 LPRINTSA;CA;DD;DE;DF;BF;A1;S5;A2;AB;CF;F2;AF;A7;A3;A3;AF;
FB;F9;DC;DE;DF;AF;AF;AF;A5;A0;AA;AF;AF;F8;B5
610 LPRINTSA;CA;DF;DF;BF;SA;S9;AF;CF;FC;F1;B7;DE;F2;CB;FA;B5
611 LPRINTSA;CA;DF;B7;S9;AA;A1;SA;S1;FD;F6;B5
612 LPRINTSA;CA;BF;SB;C0;DC;DE;FD;F6;B5
613 LPRINTSA;CA;A5;SA;C0;STRING$(9,220);DE;FA;F1;CF;FC;F6;B5
614 LPRINTSA;CA;SA;S1;DE;FA;F2;CA;DF;CA;C8;DC;DE;CA;DF;CA;CA;DF;
B5;DC;B6;B5;DC;DC;B5;DC;B6;F2;C8;DC;CB;C7;D6;CF;C8;DC;CB;C9;DC;C
B;C2;CF;B5;F9;B5
615 LPRINTSA;CA;SA;S1;FA;F3;C8;DC;CA;C8;DE;DF;DD;C9;DF;CA;DF;B5;
D4;CE;B5;DC;DF;B5;DF;B5;F2;C8;DC;CB;C2;D3;CA;C8;B8;DF;CA;DF;CA;C
A;DD;B1;DF;DC;DF;DC;DF;DC;F3;B5
616 LPRINTSA;CA;B5;SA;AA;F6;BF;AF;F4;DE;DF;DE;DC;DC;DE;DF;DE;DF;
DB;DF;DD;DF;DD;DC;DD;DC;DE;F2;DC;DC;DF;DE;DF;DE;DF;DE;D
D;DC;DF;DE;DF;DD;F9;B5
617 LPRINTSA;CA;DF;B0;SA;S3;C0;DE;DF;S2;A2;FC;F7;CB;F3;B5;F4;CB;
F2;B5
618 LPRINTSA;CA;DF;DD;SA;S3;DE;DF;S3;A2;FC;F6;DA;F2;B7;DF;B5;DF;
B7;F3;DA;DF;B5
619 LPRINTSA;CA;F2;DD;B0;S9;C0;DE;DF;B7;S3;A2;FC;F5;CD;F2;BF;DA;
DF;B5;F2;BA;F2;DD;CF;B5
620 LPRINTSA;CA;F4;D4;B0;S7;DE;DF;BF;S2;C8;CA;FC;F5;D7;F3;B9;F2;
B5;F2;BD;B5;F2;D7;B5
621 LPRINTSA;CA;F8;DD;B0;S3;AA;DF;A1;A0;C0;DF;B6;FC;F6;BE;F2;DD;
CB;DF;B5;F2;C9;F2;BF;DE;B5
622 LPRINTSA;CA;F6;BF;A7;D1;B4;B0;S6;DA;DF;DD;CB;FC;F6;CB;F2;D5;
DF;B5;DF;D5;F3;CB;DF;B5
623 LPRINTSA;CA;F5;BF;A0;DE;BF;DA;DD;S5;C8;F3;BA;FC;F7;DA;F3;B5;
F4;DA;F2;B5
624 LPRINTSA;CA;F4;BD;A0;DA;DF;C1;DF;A5;S6;AB;F2;B5;FD;F1;B5;F7;
B5
625 LPRINTSA;CA;F4;D7;DE;D7;A1;DA;B7;S8;A2;CF;DF;CA;FD;B5;F7;B5
626 LPRINTSA;CA;F6;BD;DF;A1;S9;A2;DF;B6;FD;B5;F7;B5
627 LPRINTSA;CA;F5;B7;F2;BF;SA;S1;CA;D5;CF;FC;F9;B5;F7;B5
628 LPRINTSA;CA;F5;D5;A2;AF;B5;SA;C0;F2;BA;FC;F9;B5;F7;B5
629 LPRINTSA;CA;F6;D4;A0;C0;B0;S9;DE;F2;D5;CF;FC;F1;BF;A7;A1;SA;
CA;DF;B5
630 LPRINTSA;CA;FA;D4;S7;DE;F4;B6;FB;FB;BF;A7;A1;SA;S3;CA;DF;B5
631 LPRINTSA;A2;STRING$(12,163);S6;STRING$(6,163);A2;STRING$(27,
163);SA;S6;A2;A3;A1
632 LPRINTSA;S5;C0;D0;D0
633 LPRINTSA;S1;D8;DC;F4;BF
634 LPRINTSA;A2;AF;F5;S8;A3;A3
635 LPRINTSA;S3;A2;A3;AF;AF;DD;DC;DC;DC;BC;AC;AC;A4
636 LPRINTLF+LF
639 LPRINTSE;S3;EM;"PRINTER ART BY: KAL"
699 ' END FLAG OR ADDITIONAL COLOR PRINT RUN
700 CLS:PC="DONE":GOSUB40
899 ' NOTE: ADD STATEMENTS 900-1100 OF PROGRAM LISTING 1.

```


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Warning! Opening your computer will void Radio Shack's warranty. But if you are careful, you can convert a 4K Color Computer 8K Color Basic to a 16K Extended Color Basic

computer for \$125 instead of \$200 plus installation. The 16K RAM chips can be ordered from several advertisers in this magazine, but you will have to order the Extended Basic ROM from Radio Shack for \$99 (RS# 26-3018).

Installation

Turn the computer upside

down. There are five screws to remove: two at the front; two at the back; and one under the black warranty label. Do not remove the bottom. Turn the computer upright and remove the top.

To gain more work room, unplug the keyboard and set it aside. With a small screwdriver pry off the top of the radio fre-

quency shield. With the shield off the heart of the computer is exposed. Many of these chips are sensitive to static electricity. Do not touch anything unless you have to, just to be on the safe side.

There are eight Motorola MCM6604 chips in the right corner closest to the keyboard. They are 4K by 1 bit RAM chips. These memory chips are static sensitive. To minimize the static problem, ground yourself. I twist a piece of #20 GA bare copper wire around my wrist, screw the other end to the ground prong of a U-ground plug and plug it into a wall outlet.

Using a miniature screwdriver remove the eight chips by prying between the chip and the socket. Set them on a piece of metal (not aluminum). When the 16K chips are in the computer, store the 4K chips in the tube the 16K chips came in.

Take the new RAM chips out of the tube and put them on another piece of metal. The leads on the new chips are probably too wide for the sockets. Pick up the chip by the epoxy ends (try not to touch the leads) and bend the leads on one side by pressing them on a piece of metal. I use

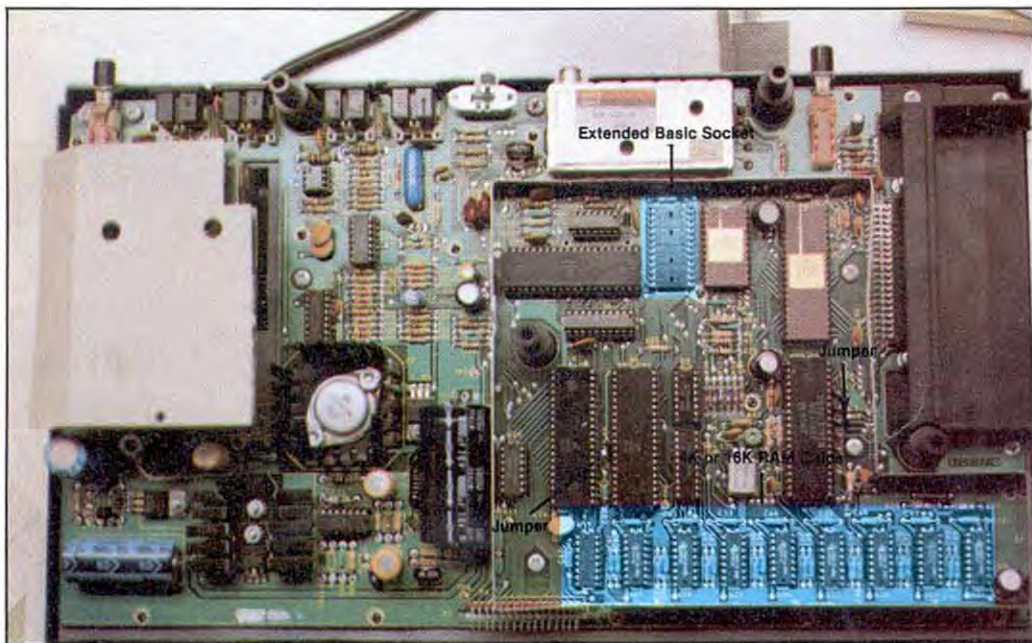


Photo 1. TRS-80 Color Computer

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my long nose pliers as that piece of metal. Insert the chip in a socket by lightly placing one side into the holes; then apply a little sideways pressure to insert the other side. Check to make sure all pins are in and then press the top of the chip to seat it fully in the socket. Follow this procedure for the other chips.

There are two jumpers to change. These jumpers join two of three pins, the center being the common. Remove the jumper shorting the common to the pin marked 4K and reinstall to short the common and the pin marked 16K. See Photo 1 for location of jumpers.

The 8K Extended Basic ROM chip goes in the 24-pin socket as indicated in the photo. The orientation is the same as the 24-pin chip beside it. Using the same techniques as before, insert the ROM into the socket. When pressing the chip into the socket be sure to apply even pressure on both ends to avoid breaking the epoxy package.

Put the radio frequency shield

back on, plug in the keyboard and put the cover on. Turn on the computer. You should get an Extended Color Basic copyright message on the screen. Type PRINT MEM. You should get 8487. Extended Basic assumes you want maximum density graphics and reserves a full 6K for the screen and 2K for its work area. Type PCLEAR1 and PRINT MEM. The memory available should be 13095.

One of the advantages of more memory is a machine language monitor can be loaded from tape. Use the monitor to examine the Basic ROM's and ROM paks. To defeat the ROM pak autostart, put a piece of tape over pin 8 (fourth from the far end on the upper side) and insert it in the socket. When you turn on the computer the Basic message should appear. Now you can load your monitor from tape.

There is no need to pay Tandy an extra 75-plus dollars to get Extended Color Basic and 16K of memory if you follow these instructions. ■

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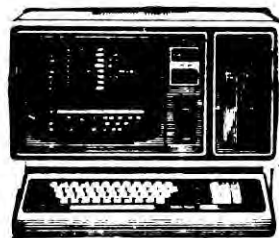
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FEATURES OF THE NEW POSTMAN MASS MAILING SYSTEM

The Postman system (version 2) is an almost COMPLETE rewrite, rethink, redesign of the original POSTMAN. The many features of the new POSTMAN system are quickly outlined below:

MULTI-DRIVE - True multi-drive operation is possible. POSTMAN will search all drives for address files and connect them together into one large file for the duration of that session. Once POSTMAN has found the data files on the disks, the operator "sees" just ONE CONTIGUOUS sorted list of addresses. The operator does not need to tell POSTMAN when to "switch" drives or manually "swap" sections of the data file in and out of the computer's memory. This is the foremost among the list of features because of its relative uniqueness among mail list handlers written for the TRS-80.

LARGE LIST SUPPORT - The multi-drive operation allows the user to access data files on ALL configured drives CONCURRENTLY (at the SAME time) for truly large mailing lists. Files need not be sectioned into smaller "byte size" chunks to fit into memory.

HARD DISK SUPPORT - (HARD DISK POSTMAN only) The FULL utilization of the space and speed of the new hard disk drives is possible with POSTMAN. For example, a 7.5 megabyte drive can be configured to hold almost 60,000 labels. Multiple hard drives can be accessed CONCURRENTLY allowing 200,000++ entry mailing lists.

FORM LETTER CAPABILITY - With the purchase of the separate POSTRITE program, the user is provided with an easy to use form letter generator which will merge a generalized letter produced from a word processing system (i.e. LAZY WRITER, etc.), with the name and address information from the POSTMAN MASS MAILER data base. POSTWRITER allows the user to insert any field from a POSTMAN label entry anywhere in the letter.

MENU OPERATION - As you would in a restaurant, choose your dinner from a list (or MENU). POSTMAN will allow you to direct its actions by selecting from various menus that it will display. A complete discussion of each menu is presented in the manual.

INSERT - New names can be quickly added to your list at any time. The new addresses are placed into the file in their proper sorted order eliminating the need for a separate sort operation after entering a stack of new names. POSTMAN will allow the operator to enter a "batch" of labels without returning to the control menu between each label insertion, thus speeding entry and reducing the aggravation of extra menu control keystrokes.

DELETE - Names can be removed at any time when they are no longer needed.

EDIT - Information in any name entry can be quickly changed at will with "word processor" ease. A "transparent" cursor simply is moved to the label displayed on the computer screen and corrections are just typed over the existing label. If you happen to change a field which is also used as a sort key, POSTMAN will automatically move the changed label to its correct position in the list to maintain the sorted arrangement of the labels.

OVERLAY - When identical changes are needed on many addresses, the OVERLAY feature can make them with one keystroke. The needed changes which are common to many labels are entered into the "overlay mask". When you wish to apply these common changes to any label, one command will do it.

SORT - Arrange your list in any alphabetic or numeric order. The ordering may use one or more fields to control the sort. A machine language heap sort assures fast execution. The sort need only be performed once, the sorted list will stay sorted through all subsequent insertions, deletions, and changes to existing labels. NO NEED to leave the POSTMAN program to use a separate program to sort your data. Your data is sorted quickly and after sort completion, POSTMAN is ready for your next command!

ADVANCED STREET ADDRESS SORT - For the user with many addresses on the same street, POSTMAN will sort your entries by the house NUMBER after grouping those on the same street together. Local city lists can be quickly sorted to aid post office dispatching.

PURGE - Unwanted duplicate addresses can be removed from your list automatically or under operator control.

SEARCH - Any address in your list can be quickly found with fast search and positioning commands. Three different types of searches are provided. A "fast" search which uses a hashing technique, a "selective sequential" search for labels with common fields, and "quick" positioning using the first or major sort field to get you into the general "ball park" of a label or sequence of labels.

LABEL PRINTING - One, a few or all addresses in your list can be printed on standard or non-standard label stock. Up to 6 labels across can be printed with a format YOU can easily control. TWO user definable "ATTN" lines are provided for any use. Labels can be printed from many of POSTMAN's menus, search, edit, or during label insertion.

EFFICIENCY - POSTMAN is written in the machine's native language to gain the full advantage of the microcomputer's speed. Extensive use of program segmentation reduces the amount of user RAM needed to hold the program, allowing a greater number labels to be kept in core, resulting in faster operation. Little used routines need only be brought into memory when they are needed and once through with their task, release their space back to POSTMAN.

REPORT LISTINGS - A special program to produce columnar listings of address data from your label data base is provided. You can easily specify the information to be printed.

DATA DISK MERGING - Labels can be quickly transferred from one disk to another with the POSTMERGE program callable from the main POSTMAN SYSTEM menu. Source and destination drives need not be separate drives, prompts to exchange diskettes if the same drive is used, are provided.

DATA DISK PREPARATION UTILITY - Provided with POSTMAN is the DPREP program which allows the user to prepare a floppy/hard disk for use with POSTMAN. This easy to use utility can be told to prepare any portion of the available space on a disk.

DATA INTEGRITY - All data transfers to the disk files are made using special write commands which instructs the operating system to check the validity of EACH write to the disk.

DATA GUARD - Is a special programming technique only offered by Soft Sector Marketing, Inc. If by chance your machine resets while writing information to the disk, you only lose the information that you were writing. Your files are always protected from the danger of losing all the work that you have put in that day. NO OTHER PROGRAM ON THE MARKET OFFERS THIS PROTECTION. If you reset with ANYBODY'S MAILING PACKAGE DURING WRITING you would destroy your ENTIRE data disk. We can't stop your machine from failing but we can protect your data.

Description of Label Record Fields:

Length	Name	Description	Length	Name	Description
10	Code	User defined printable field	15	City	City, township, village
15	Last Name	Last name of addressee	5	State	State, province, territory
15	First Name	First name of addressee	9	Zip	Zip code, zone, route
26	Company	Name of company	2	Data 1	User definable field
26	Address	Street address	5	Data 2	User definable field

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Bit graphics on the MX-80.

Graftrax 80

Thomas McNamee
Mantech Data Systems
5055 S. Chesterfield RD. #516
Arlington, VA 22206

About a year after I purchased my Model III, 48K (no-disk) system I started looking for a printer that would give lowercase letters with descenders and some graphics capability. Like thousands of others, I chose the Epson MX-80.

Graftrax 80 was once an option on the MX-80, but it is now standard. Purchasers have the option of buying the printer with it installed or included as a kit. Graftrax 80 adds a fine character set, including italics, and a number of printing options.

It's Easy!

The kit contains three ROMs and an instruction manual of 23 pages. The manual assumes you have read and understood the manual accompanying the MX-80, you have a fair knowledge of Basic, you can change a socketed IC, and you have a Phillips screwdriver.

The idea of modifying a brand new, working printer had little appeal to me, but installation turned out to be simple. Just remove the case as you did when you first got the printer, and change the ROM. To remove the original ROM from its socket the manual

suggests a flat-blade screwdriver. Be careful—prying too vigorously might damage the printed circuit tracks beneath the chip. Then install the three ROMs in the Graftrax package. The chips are labeled with their respective socket location, and pin 1 is well indexed on both the board and the chip. The manual includes an assembly drawing showing chip location and the location of a jumper which must be cut. Just before reassembly the Dip switches S1 and S2 must be reset according to the manual's chart. That's all there is to it! In a little over a half hour, I had my italics (see Fig. 1).

The self-test worked fine, so I checked out my second fear. Had the control codes changed? No, not much—in fact, many existing features were markedly improved. The bell (CHR\$(7)) now sounds for only 1/3 second, instead of for three seconds. When setting vertical line spacing with ESC A, ESC 2 is no longer required to put the command into effect. ESC 2 now resets the line spacing to the default of six lines per inch. CHR\$(15) still sets the printer in condensed character mode, but now this mode may be mixed on the same line as normal and expanded characters. The emphasized mode (ESC E) and the double-strike mode (ESC G) may now be turned on and off in the same line.

The forms controls have also been changed. The maximum form length has

been increased to 255 lines. To set tabs, both horizontal and vertical, you no longer need to add 128 to the tab positions, the tab command itself, or the command terminator. Tabbing commands must now end with CHR\$(0) or CHR\$(255). The maximum number of both horizontal and vertical tab stops is now 16. Horizontal tabs default to every eight print positions, and vertical tabs default to a single line feed.

Bit-Mapped Graphics

Bit-mapped graphics allow the user to control the top eight of the nine hammers in the print head. Three modes are available: 480 dots per line, 960 dots per line and 960 dots per line at the 480 speed. The third mode requires a machine-language driver, and adds the restriction that no hammer be fired twice in succession. In the 960 dots/line an incredible 760,320 dots can be addressed on a single sheet of paper.

Now for the hard part. If you want to address 760,320 dots, get out the graph paper. You will need to map out and translate to decimal form some 95,040 bytes of information which will comprise at least 792 lines of your program. This programming difficulty will not be around long, however. Interesting ways to get around this include light pens and optical scanners. A driver program is already available for the Apple, and this area of programming is wide open for the TRS-80. The Program Listing will print

This is a sample of GRAFTRAX italics!

This is a sample of GRAFTRAX italics!

This is a sample of GRAFTRAX italics!

This is a sample of GRAFTRAX italics!

This is a sample of GRAFTRAX italics!

Fig. 1. Graftrax Italics

The Key Box

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the CHR\$ codes of whatever is drawn on the video screen. More about that later.

How It Works

Figure 2 shows the addressing for the top eight hammers in the nine-hammer print head. The ninth hammer cannot be addressed, but since the line spacing can be controlled to a third of a dot, contiguous vertical printing is possible. The format for the bit-mapped function is:

```
480 dots/line: ESC "K" x1 x2 ....
960 dots/line: ESC "L" x1 x2 ....
960 dots at 480 speed: ESC "J" x1 x2 ....
```

(The ESC (Escape) code is sent to the printer with LPRINT CHR\$(27).) In Basic, the command is:

```
LPRINT CHR$(27) "K" CHR$(x1) CHR$(x2) ...
or LPRINT CHR$(27) "L" etc.
```

The values x1 and x2 combine to describe the number of graphics bytes that follow this command. The value of x1 may be anywhere from zero to 255. If the value of x2 is one, add 256 to the value of x1; if the value of x2 is zero or 255, add nothing to x1. I have found that CHR\$(0) does not work reliably on my Model III, so I use CHR\$(255).

As shown in Fig. 3, the first job is to map out on a grid eight blocks high the figure to be printed. The MSB (2⁷) is at the top. Each column, translated into a decimal character, counts as a character. This total character count must be included in the ESC K, L or J command. An error condition results if the character count advances the print head beyond the end of a line. In the 480-dot-per-line mode, a line may be no longer than 480 dots long, text, block graphics and bit-mapped graphics included. In 960 dots per line, the limit is 960. If a drawing is to be more than eight dots high, a separate ESC command sequence is required for each line.

For example, the character 1 would be stated this way:

```
LPRINT CHR$(27) "K" CHR$(3) CHR$(255)
```

The semicolon is not necessary, but it is included to show where the command ends and the graphics data begins. Change K to L and note the difference in type density. ESC J cannot be used here, as Basic is too slow. A solid graphics block eight dots high and 20 dots long can be printed this way:

```
LPRINT CHR$(27) "K" CHR$(20) CHR$(255); STRING$(20,255)
The STRING$ command simplifies the more repetitious areas of code.
```

Sketch and Translate

Program Listing 1 is designed to simplify the process of composing bit-mapped graphics. The first part allows you to design the graphics character on the CRT. After setting appropriate boundaries, the second part of the program scans and translates each lit pixel into one bit of data. An eight-bit-high column is assembled into a decimal number (0-255) and sent to the printer. At the end of the scan, the total character count is printed, and the scanned section of the video screen is printed in bit-mapped graphics. If the figure is greater than eight pixels high, the program scans the next

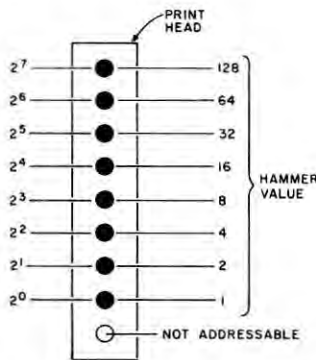


Fig. 2. Dot addressing

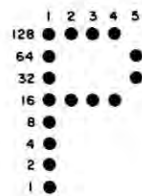


Fig. 3. Bit-mapped programming example (see Listing 3)

eight bits. Since the print head can only be addressed to eight dots high, several separate lines of graphics commands may have to be stacked on one another. The spacing between print lines is important—set it to 8/72 inch so the two lines will blend vertically.

Enter the program shown in Listing 1.

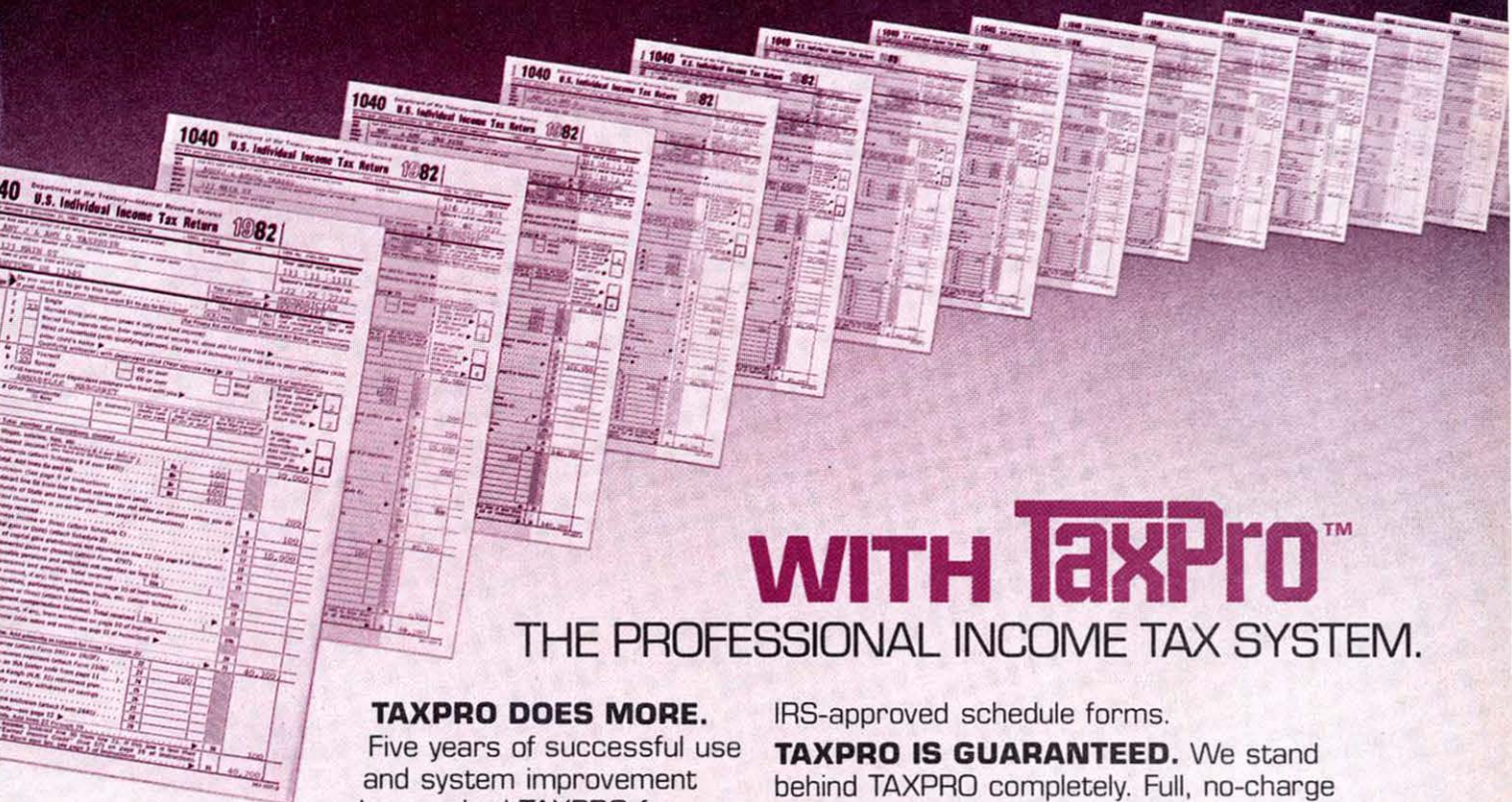
Line numbers are in increments of 10, so Auto line numbering may be used. When the program is up and running, the initial display will show a flashing cursor in the center of the screen. In the upper right corner of the CRT, the mode message will show Reset. Move the cursor horizontally, vertically, or diagonally with the arrow keys. In Reset mode the cursor will reset all pixels it crosses. Press Enter to toggle the mode between Set and Reset. In the Set mode the cursor leaves a trail of lit pixels as it moves. With a little practice, this method of sketch-

Program Listing 1

```
1 '#####
2 '#####
3 '##### Listing 1 #####
4 '##### Sketch & Translate for Epson GRAPTRAX #####
5 '#####
6
7 10 CLEAR 1000
8 20 DEFSTR A,Z:DEFINT B-Z
9 30 DIM G(126) '*** GRAPHICS CHARACTERS
10 40 CLS
11 50 PRINT#52,"Mode: RESET";
12 60 FOR Y=3 TO 47:SET(0,Y):SET(127,Y):NEXT
13 70 FOR Y=3 TO 47 STEP 8:SET(1,Y):SET(126,Y):NEXT
14 80 X=64:Y=28:M=-2
15 90 PRINT#0,"Press ENTER to change mode, CLEAR to learn figure.";
16
17 91 '
18 92 '***** SKETCH ROUTINE *****
19
20 100 IF POINT(X,Y) THEN RESET(X,Y) ELSE SET(X,Y) '*** FLASH CURSOR
21
22 110 B=PEEK(14400):IF B=0 THEN 100
23 120 X1=0:Y1=0
24 130 IF B=1 THEN M=NOT M
25 140 IF M=1 PRINT#52,"Mode: SET ";ELSE PRINT#52,"Mode: RESET";
26 150 IF B=2 THEN GOTO 280
27 160 IF M=1 THEN SET(X,Y) ELSE RESET(X,Y)
28 170 IF B=72 THEN X1=1:Y1=-1:GOTO250
29 180 IF B=40 THEN X1=-1:Y1=-1:GOTO250
30 190 IF B=48 THEN X1=-1:Y1=1:GOTO250
31 200 IF B=80 THEN X1=1:Y1=1:GOTO250
32 210 IF B=8 THEN Y1=-1:GOTO250
33 220 IF B=16 THEN Y1=1:GOTO250
34 230 IF B=32 THEN X1=-1:GOTO250
35 240 IF B=64 THEN X1=1:GOTO250
36 250 IF X1>X AND X1+X<127 THEN X=X+X1
37 260 IF Y1>Y AND Y1+Y<47 THEN Y=Y+Y1
38 270 GOTO 100
39 271
40 272 '***** SET BOUNDRIES *****
41
42 280 PRINT#0,CHR$(30);"Set boundary at UPPER LEFT corner of figure
43 - press ENTER.";
44 290 GOSUB 610
45 300 X2=X:Y2=Y
46 310 GOSUB 750
47 320 PRINT#0,"Set boundary at UPPER RIGHT corner of figure- press
48 ENTER.";
49 330 U=2:GOSUB 620:U=0
50 340 X3=X:Y3=Y
51 350 GOSUB 770
52 351
53 352 '***** PRINT CHARACTER CODES *****
54
55 360 PRINT#0,CHR$(30);
56 370 IF PEEK(14312) <>61 PRINT#0,"";PRINT TAB(19)***** READY PR
57 INTER *****;:GOTO370
58 380 PRINT#0,"Sending values out to printer.
59 ";
60 390 LPRINT CHR$(27) "2";
61 400 CC=1 '*** CC= CHARACTER COUNT
62 410 FOR X9=X2 TO X3
63 420 D=0 '*** D= DECIMAL TOTAL
64 430 T=7 '*** T= BIT COUNTER
65 440 FOR Y9=Y2 TO Y2+8
66 450 IF POINT(X9,Y9) D=D+2[T
67 460 T=T-1
68 470 NEXT
```

Listing 1 continues

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Listing 1 continued

```

480 G(CC)=D
490 PRINT@50,D;:LPRINT "Character";CC;"=";D:CC=CC+1
500 NEXT
501 '
502 '***** PRINT BIT MAPPED SKETCH (THIS LINE ONLY) *****

510 LPRINT:LPRINT "CHARACTER COUNT=";CC-1
520 LPRINT CHR$(27)*"<"
530 LPRINT CHR$(125);" ";CHR$(27)*"L" CHR$(CC) CHR$(255);
540 FOR T=1 TO CC:LPRINT CHR$(G(T));:NEXT
550 LPRINT
551 '
552 '***** INCREMENT BORDERS FOR NEXT LINE *****

560 PRINT@0,"Do you have another line? (Y/N)
";
570 A=INKEY$:IF A="N" 790 ELSE IF A">"Y" THEN 570
580 Y2=Y2+8;Y3=Y3+8
590 GOSUB 750:GOSUB 770
600 GOTO 370
601 '
602 '***** BORDER CURSOR MOVE SUBROUTINE *****

610 RESET(X,Y):X=2;Y=5
620 IF PEEK(14400)<>0 THEN 620
630 IF POINT(X,Y) THEN RESET(X,Y) ELSE SET(X,Y) *** FLASH CURSOR
640 IF POINT(X,Y) THEN RESET(X,Y) ELSE SET(X,Y) *** FLASH CURSOR

650 B=PEEK(14400):IF B=0 THEN 630
660 X1=0;Y1=0
670 IF B=8 THEN Y1=-1:GOTO720
680 IF B=16 THEN Y1=1:GOTO720
690 IF B=32 THEN X1=-1:GOTO720
700 IF B=64 THEN X1=1:GOTO720
710 IF B=1 RETURN
720 IF X1>X>0 AND X1<127 THEN X=X+X1
730 IF Y1>Y>0 AND Y1<47 THEN Y=Y+Y1
740 GOTO 630
741 '
742 '***** BORDER SUBROUTINES *****

750 FOR Y9=Y2 TO Y2+7:SET(X2-2,Y9):NEXT
760 RETURN
770 FOR Y9=Y3 TO Y3+7:SET(X3+2,Y9):NEXT
780 RETURN
781 '
782 '***** RESET BORDERS *****

790 FOR Y=3 TO 47:RESET(X2-2,Y):RESET(X3+2,Y):NEXT
800 X=2;Y=5:M=-2
810 GOTO 90

```

ing is quick and easy.

After the sketch is completed, define the borders of the scan area. Leave as little empty space as possible before and after the sketch. While still in the sketch mode, move the cursor away from the figure and press Clear. This enters the Learn mode. The cursor will appear in the upper left corner of the screen, and movement is again controlled by the arrow keys. The cursor is non-destructive. Move the cursor to the top left corner of the figure. The cursor position is the top of the first eight-bit column. No part of the sketch should be higher than the cursor, and no part should be farther left than the cursor column.

Press Enter when the cursor is correctly positioned. An eight-bit-long border will be drawn two columns to the left of where the

Sample run using ESC L

80

Sample run using ESC K

80

Figure 4

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7492	.42	74LS15	.30	74LS273	1.75	MLM311P1	.90	2102	6.49
7493	.42	74LS20	.26	74LS367	.69	MC14412	14.95		
7495	.55	74LS21	.30	74LS368	.69				
74121	.32	74LS27	.30	74LS373	1.49				
74123	.55	74LS30	.26	74LS374	1.45				
74125	.47	74LS32	.37	74LS393	1.95				
74132	.60	74LS42	.65						
74151	.55	74LS74	.39	74S00 SERIES					
74157	.60	74LS86	.41	Type	Price				
74161	.83	74LS93	.70	74S04	\$.55				
74164	.83	74LS123	.92	74S05	.50				
74165	.83	74LS124	1.35	74S22	.47				
74166	.90	74LS132	.72	74S32	.47				
74173	1.05	74LS138	.66	74S64	.47				
74175	.65	74LS139	.66	74S74	.58				
74176	.75	74LS153	.64	74S112	.71				
74194	.73	74LS155	.85	74S161	2.95				
74195	.64	74LS157	.67	74S174	1.15				
74366	.64	74LS161	.87	74S175	1.15				
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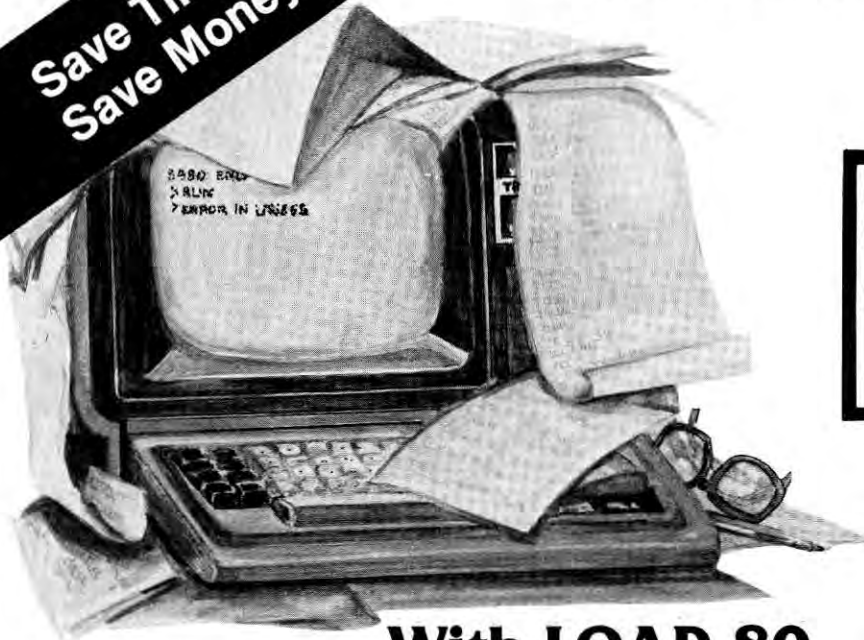
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scan will start. This will aid you in seeing if the sketch is larger than eight pixels, requiring a second scan. Now move the cursor over to the right border of the sketch and press Enter. Another border will appear two columns to the right.

If the printer is ready, the message "Sending values out to printer" will appear. In the upper right corner of the CRT, the decimal value of the area currently being scanned is displayed. The printout will take the form of Fig 4. The question "Do you have another line (Y/N)?" will appear. If your sketch extends below the borders, press Y. The borders will extend another eight pixels, and the scan/print sequence will repeat. Continue until the sketch has been fully translated. When you answer N, the program returns to the sketch mode to allow further changes to the existing figure.

Program Listing 2 shows how this information is incorporated into a program. Line 20 sets the vertical line spacing to eight dots, to blend the two print lines. The variable L is set to the length (character count) of the graphics data and used in the ESC L command in line 50. A separate ESC L is required for each print line, so the loop in line 40 is set to the number of lines to be printed. Lines 60-90 read the data statements and put them out to the printer. Line 120 resets the line spacing back to the original six lines per inch. Sample runs of the 80 logo are shown in 480-dots-per-line and the 960-dots-per-line format (see Fig. 4).

```

1 ***** -80- SAMPLE BIT MAPPED PROGRAM *****
10 RESTORE
20 LPRINT CHR$(27) "A" CHR$(8)  *** SET 8 DOT LINE SPACING
30 L=42                          *** L= LENGTH OF GRAPHICS DATA
40 FOR B=1 TO 2                  *** 2 LINES OF GRAPHICS
50 LPRINT CHR$(27) "L" CHR$(L) CHR$(255);
60 FOR T=1 TO L
70 READ A
80 LPRINT CHR$(A);
90 NEXT T
100 LPRINT                       *** CR/LF FOR SECOND LINE
110 NEXT B
120 LPRINT CHR$(27) "2"         *** RETURN TO NORMAL SPACING
121 !
122 ***** DATA FOR FIRST LINE *****

130 DATA 60,126,255,255,231,195,195,195,195,195,195,195
140 DATA 231,255,255,126,60,0,0,0,0,0,0,0,31,63,127,248,240
150 DATA 224,224,224,224,224,224,224,224,240,248,127,63,31
151 !
152 ***** DATA FOR SECOND LINE *****

160 DATA 56,124,254,254,206,134,134,134,134,134,134,134
170 DATA 206,254,254,124,56,0,0,0,0,0,0,0,240,248,252,62,30
180 DATA 14,14,14,14,14,14,14,14,30,62,252,248,240

```

Program Listing 2

This program can serve as a model for creating your own graphics. The 480-dots-per-line mode leaves figures quite elongated, while the 960-dots-per-line mode is much closer to the aspect ratio of the TRS-80 CRT. Remember, if you try to print a bit-mapped figure past the end of a line, the printer will beep eight times and then hang up. The printer will not respond again until cycle power.

It will be interesting to see what the hardware hobbyists come up with to better utilize bit-mapped graphics. ■

```

10 LPRINT CHR$(27) "K" CHR$(5) CHR$(255);
20 FOR T = 1 TO 5
30 READ A:LPRINT CHR$(A);
40 NEXT
50 DATA 254,144,144,144,96

```

Program Listing 3

Thomas McNamee amuses himself with his micros and by raising cats.

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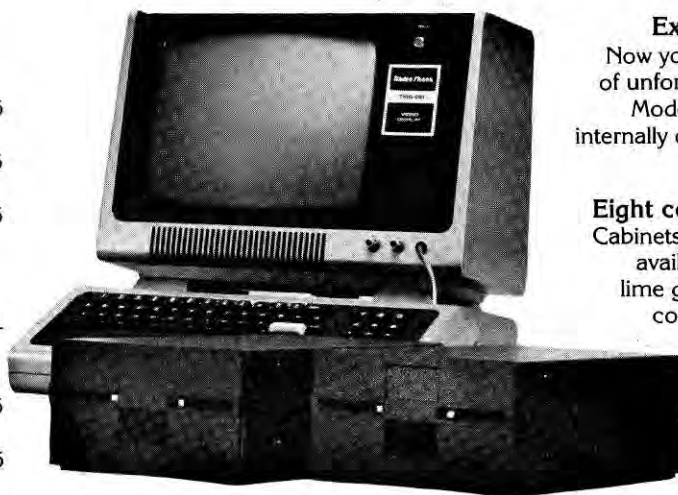
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One of the most intriguing software products yet announced for 68XX microprocessors is this compact Pascal compiler developed by Dynasoft of Windsor Junction, Nova Scotia. With it, you can explore the concepts of structured programming, for which Pascal, the most successful new language of the '70s, is so well known. This is an integer Pascal of limited capability; that is the price you pay in a 16K machine. Still, enough of the flavor of the complete language comes through to let you explore some of its novel control structures and data types.

The Dynasoft compiler has been modified for use with two Color Computer configurations: 16K of RAM plus the Power Pack's outboard 6K, and 32K of on-board RAM. The former is the subject of this review.

Setting Up

The Compiler comes on one side of a short cassette with three demonstration programs on the other side. You also receive a brief user's manual from Dynasoft and Computerware's Color Computer Supplement. Both booklets are not Pascal references, and they recommend that the user obtain one of the many complete works now available.

Although the Dynasoft manual contains

much information, it is very densely packed and less suitable as an introduction to the language than as a guide to the syntax of this particular dialect. In the same way, the Computerware manual covers the specifics of Color Computer memory usage and the location of some useful machine-language routines. The prospective Pascal user can get the full benefit of this package only by having a reasonably complete reference book on hand.

In the 16K version, Color Pascal uses the Power Pack's Monitor program to perform input/output (I/O) operations. The compiler, which loads with monitor's "L" command, consists of two programs: the Supervisor and the Editor. These play roles very much like those of the Monitor and Editor of the Computerware tool kit. Supervisor is the more general control program. You use Editor for creating and modifying the source code of a Pascal program. (For people totally unfamiliar with Pascal, it is a compiled language, the relatively English-like text which the programmer writes is the source code, while the compiler's output is called the P-code.)

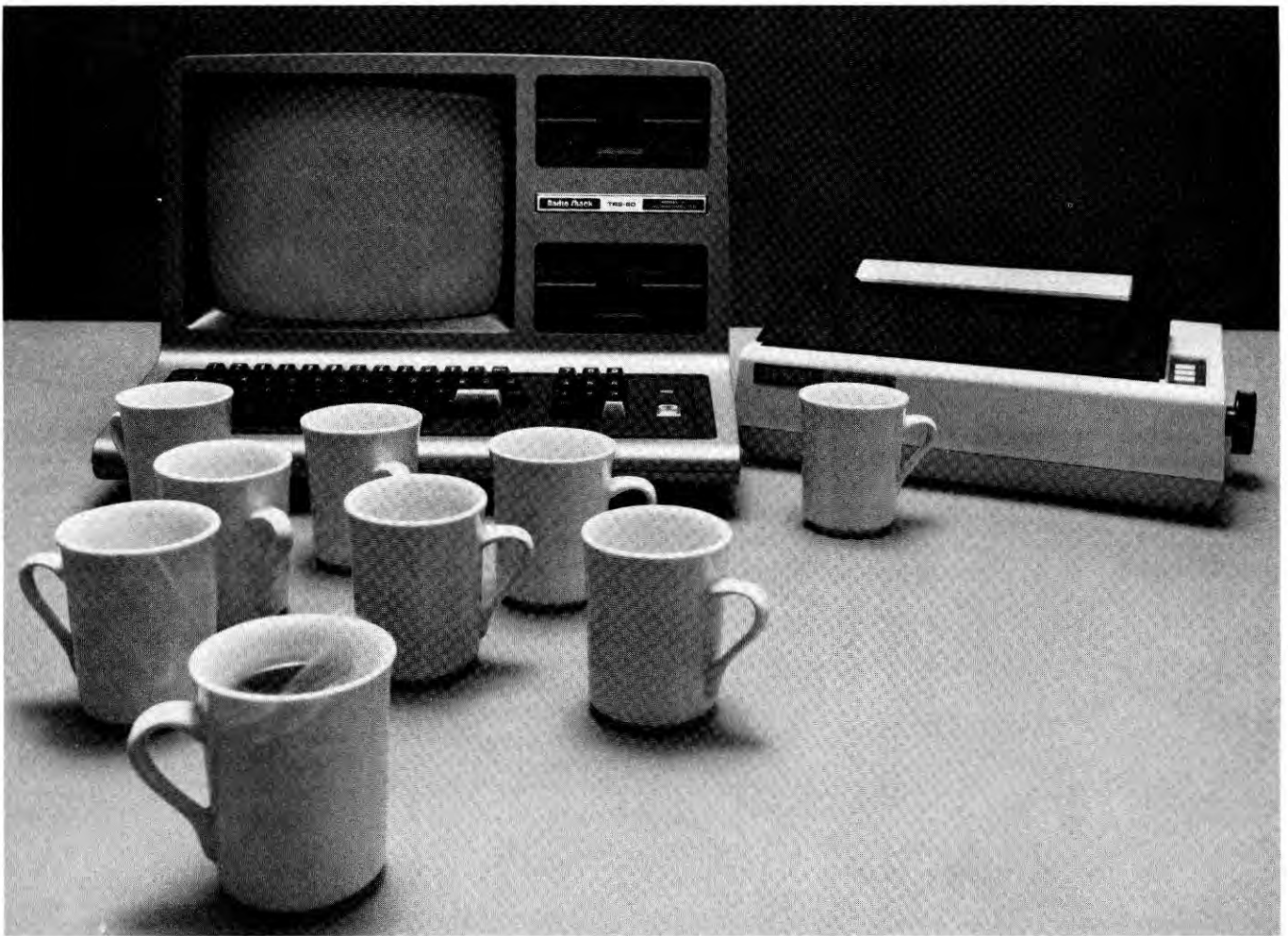
You have three new prompts to learn. Supervisor's, which comes up immediately after you load the compiler tape, is "Ready" plus a block cursor. Supervisor commands consist of a single letter, sometimes followed by decimal digits; entering the E (Edit) command gets you into Editor with an initial prompt of two dots (.). This is Editor's command mode. To enter source code, you must get into the insert mode, which you do by entering "I" followed by a decimal number for the number of lines. You can use an arbitrary number, like 9999, to reserve an arbitrary amount of workspace. The prompt for the insert mode is ">."

At this point, you enter your source-code statements, indenting with the space bar as appropriate for the various levels within the program. Leading blanks are preserved throughout the compilation process, unlike the compression that takes place when you enter a Basic program. Another major departure from Basic is the absence of line numbers; the Pascal Editor uses an internal line pointer to indicate which line of source code you are working on at any time. You can move this pointer throughout the workspace by Up, Down, Top and Bottom commands, and use it for editing, adding or deleting lines of code, and so on.

After you have entered the source code, press Break to get back to Editor's command mode. This seems reasonable, especially if you are used to the Power Pack Monitor's and Editor's operation. The Dynasoft manual refers to the use of control-C to do this job, while the Computerware manual does not describe the procedure at all.

Once you have completed your editing, Editor's Q command returns you to Supervisor. Now you can compile and run your program, but you will regret it if you do. Save your source code first! The compilation process destroys the source code in memory, and if any errors are found, you will need it back again. Only source-code statements can be edited. You save the source code with Supervisor's S command. Entering S gets you an immediate prompt of =, to which you respond with a file name of up to eight characters.

After you have saved your source code, you are ready to compile. A simple C command starts the process. The compiler displays a copyright notice, and replays the source code line by line but with a difference: the presence of what look like hex addresses at the left margin. These are offsets

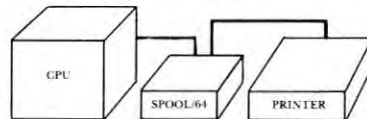


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“The process of making even the smallest change to a Pascal program involves recompiling.”

for each line of compiled code, referenced to program origin.

If errors are detected during compilation, the compiler prints a one or two-digit error code and upward-pointing caret. Depending on the nature of the error, however, the caret may actually point to the line following the one in which the error occurred. Experience in interpreting the cryptic messages (with the aid of the Dynasoft manual) is necessary. As a rule, compilation will continue to the end, and the compiler will display a message of the total number of errors. Unfortunately, some of the simplest syntax errors, such as omitting a semicolon at the end of a statement, will propagate and cause many error messages.

Since the display scrolls continuously during compilation, it is impossible to keep track of error messages in any but the shortest programs. The value of a printed listing immediately becomes clear. The program documentation, though, is of little help. The Computerware manual goes into some detail about machine-language file control blocks and device control blocks which the Monitor uses to interface to I/O routines in ROM. However, the discussion left me cold. I may understand it some day, but at this point the machine language seems to get in the way of the Pascal.

There is an easy way out. The Power Pack Monitor has an Echo command which duplicates everything printed on the video screen on a printer connected to the RS-232 port. You can use this command at various points in the process of entering, compiling and running a Pascal program to obtain a printout. You can invoke the Monitor by hitting Reset, and reenter the Pascal compiler by the Monitor command “J 0700.”

Here is a rundown on how to get printouts of various parts of the process:

- For the entire session, hit Reset immediately after loading the Pascal compiler. Respond to the Monitor prompt with “E,” which toggles the printer echo mode on. It will remain on until you next use Reset. As indicated, J 0700 returns you to the Pascal Supervisor and you can proceed to Editor for source-code entry, and so on.

- For a printout of the compilation alone, enter your source code and store it on tape. Go back into the Monitor, press “E,” and return to Supervisor. Load your source code with the Supervisor’s L command, and press “C” to compile. Your printout will start with the Monitor prompt after you press “E,” but you will at least have saved the time required to print each source code line as you composed it.

- For a printout of program results, store the compiled P-code on tape with the Supervisor’s S command (both source and P-code store and load in the same fashion). Then

go to Monitor, toggle the echo mode on, and return to Supervisor. Load the P-code instead of the source code. You can run your program immediately, and your printout will contain only a few commands before the results of your program.

The process of making even the smallest change to a Pascal program involves recompiling. If you have not worked with compiled languages before, it can be frustrating. Just stick with it, and keep a clear head as to where you are in the whole process. If

you remember to save your source code, you will be ahead of the game.

Formatting

One of the most enjoyable things about Basic is the relative ease with which you can format program outputs. Color Pascal is less convenient in this respect. For the new user, the manuals are useless.

Color Pascal employs a pair of output statements, WRITE and WRITELN. Each can have a list of arguments in parenthe-

```
PROGRAM PASTEST;
VAR D,D2,N: INTEGER;
    LF,SP: CHAR;
PROCEDURE CLEAR; EXTERN(43304);
BEGIN
  CLEAR;
  LF:= 13; SP:= 32;
  WRITE(LF,'GIVE ME AN INTEGER < 180',SP,SP);
  READ(D);
  FOR N:= 1 TO 2500 DO
    BEGIN
      D2:= D*D;
    END;
  WRITE(LF,LF,SP,SP,'YOUR NUMBER SQUARED IS ',D2:1);
END.
```

Program Listing 1. Pascal demonstration program

```
10 'BASTEST
20 CLS
30 PRINT: INPUT "GIVE ME AN INTEGER < 180";D
40 FOR N = 1 TO 2500
50 D2 = D*D
60 NEXT
70 PRINT:PRINT:PRINT" YOUR NUMBER SQUARED IS ";D2
80 END
```

Program Listing 2. Basic version of the demonstration program of Listing 1

Color Pascal Reserved Words

AND, ARRAY, BEGIN, CASE, CONST, DIV, DO, DOWNTO, ELSE, END, EXTERN, FOR, FORWARD, FUNCTION, IF, MOD, NOT, OF, OR, OTHERWISE, PROCEDURE, PROGRAM, READ, REPEAT, THEN, TO, TYPE, UNTIL, VAR, WHILE, WRITE, WRITELN

Color Pascal Data Types

BOOLEAN, CHAR, INTEGER

Color Pascal Standard Procedures & Functions

FIND, HALT, LINK, MARK, MOVL, MOVR, NEW, ODD, RELEASE, SETP, SHL, SHR, SYSCOM

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"Color Pascal assumes that every integer expression is six spaces wide."

ses, separated by commas, including both literal strings and variables; the difference is that only WRITELN generates a return and line feed. Thus using WRITELN in one of Pascal's several types of loops generates a new output line for every pass through the loop, just like a Print statement in Basic. Use WRITE in the same situation, however, and successive outputs will be printed on the same line, one after another. A new line only starts when you reach the end of your display's or printer's line length. To be more specific, suppose that you have defined "I" as an integer variable, and suppose that the statement WRITE('I = ',I); is to be executed for values of I between 0 and 10 (the single quotes define literal strings). The resulting output is:

```
I = 0I = 1I = 2...
```

A WRITELN in the same place gives:

```
I = 0
I = 1
.
.
.
I = 10
```

Color Pascal assumes that every integer expression is six spaces wide unless otherwise instructed. The way to change this is to follow each integer variable or expression in an output statement with a colon and a specification of the minimum field width to be used. Thus WRITELN('I = ',I:1); generates

```
I = 0
.
.
.
I = 10
```

Can you move the starting point away from the left margin? The only way I have found so far is to incorporate into the output statement's argument a character variable, defined in the program to have the value 32, which is the ASCII code for the space operation. Repeat this variable in the output list as many times as there are spaces required. If we want to move our list of I= statements three spaces to the right, we need this in the variable declaration portion of the program: VAR C:CHAR; and somewhere ahead of the output statement, we need C:=32; Finally, our WRITELN statement becomes WRITELN(C,C,C,'I = ',I:1);

Similarly, you can insert blank lines into an output list by using WRITELN without an argument, or by using WRITE with a character variable argument which you have assigned the value 13 (ASCII for line feed with carriage return). Finally, a character variable assigned the value 8 generates a backspace on the video display, although dumb

printers like my Line Printer VII do not recognize it. These are the only video control codes the Color Computer recognizes; however, you can use the same technique to include printer control codes. A variable assigned 31 generates double-width print on my Line Printer VII, for instance.

These procedures can help format your printed output, but you still need one elementary thing: a way of clearing the video display. The way to do it illustrates how you can tap into a predefined operation, whether in ROM or in protected RAM. The key is the use of what Pascal calls a procedure, analogous to a Basic subroutine. Procedures are called by name in a Pascal program, but must first be identified in one of two ways: as a collection of Pascal statements, or as the decimal address of a machine-language routine. For the latter method, you use the address as the argument of the keyword EXTERN.

The Color Assembler manual contains the addresses of many useful Basic subroutine entry points, including \$A928 (43304 decimal) for CLRSCN, the routine which clears the screen to blanks. All we need do is include in the declaration part of a program the definition "PROCEDURE CLEAR; EXTERN(43304);" Now, any time we need a blank screen in the program we just use the statement "CLEAR;." The procedure name Clear is arbitrary.

What about input? It turns out that Color Pascal's Read statement, READ(X), handles numbers in a straightforward manner. Just type in your number and hit Enter, as usual. Character variables are read into an array one character at a time. Both manuals illustrate this with a program which takes a word and prints all permutations of its letters. The same program is on the cassette.

Program Listing 1 includes most of the things I have mentioned. It is just a program to read an integer from the keyboard, compute its square 2,500 times, and print the result. However, it illustrates the syntax of Color Pascal, including the screen formatting tricks I have described. Program Listing 2 gives the Basic equivalent.

For those of you already familiar with Pascal, Table 1 presents a compilation of Color Pascal's reserved words and pre-declared identifiers for data types, procedures and functions. This may give you some feeling for the extent to which the dialect represents full-blown Pascal.

Color Pascal is nothing more than an introduction to the world of structured programming. The 16K version represents a real accomplishment on the part of its author(s), but requires an investment in time and effort if you are going to use it for complicated programs. ■



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Screenplay

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I always wanted to be a science fiction writer, but I hate typewriters. Scribbling notebooks full of futuristic prose is a slow, painful procedure. When I heard about word processors and saw a microcomputer cheap enough to buy, I imagined sci-fi novels pouring out of my brain onto a video display. Even if I couldn't afford a printer right away I would just store my prose on tape. The microcomputer would make me a science fiction writer, for sure.

So I bought a Level I 4K TRS-80.

Needless to say, you cannot do word processing with Level I Basic (maybe you can, but who would want to?). You know the pattern from here: get Level II and 16K; learn Level II; try to do serious programming without a printer; get a printer; tire of cassette; wish for floppy disks; settle for something cheaper; get a lowercase modification; get a better printer; subscribe to several computer magazines; wish for a word processing program that can work with my particular collection of peripherals.

I have always balked at spending a lot of money for software, and usually write programs myself. The result is that I've written very little science fiction but quite a few

word processing programs.

I wrote all my programs in Basic and they all worked, but they were long, slow and erratic. They manipulated strings. When I edited a line, or when text memory was almost full, the computer ignored keyboard input while it sorted out defunct text strings to free up memory space.

When I installed my lowercase modification I discovered the POKE instruction. I could use POKE to put lowercase characters on the screen, and I did not need the ULCBAS tape. Could I POKE text onto the screen? What if I wanted to insert or delete

text in a line? There are no Basic instructions, such as MID\$, or any other ways to shove the characters around in memory. But I could use the simple Z80 instruction LDIR if I could figure out how to implement USRs and keep track of many memory addresses.

I solved all the problems in this direct-memory-access approach, and in the process I learned more about Z80 Assembly language. The program—now called Screenplay—evolved from a monster listing that processed just 3K' of text. The compact 4800 program bytes now process 10,240 bytes of text.

Summary of Functions—[Edit] means accessed by edit cursor {All} means available to all cursors

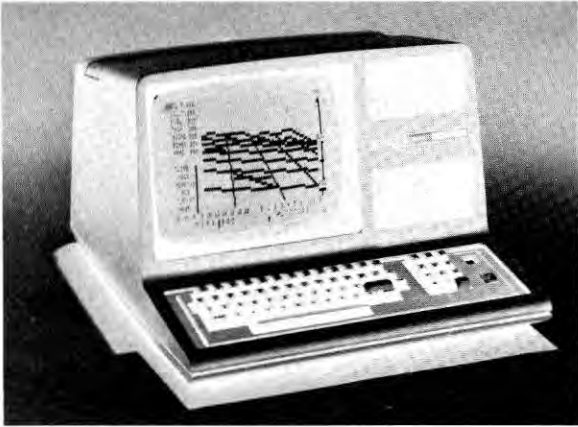
Key(s)	Function	Summary
0-9	Page Call	{Edit} call page of text to screen.
[SH] [LA]	Scroll	Use arrow keys to direct scrolling. For viewing only. No cursor on screen. Press [EN] to exit.
[RA]	four-way	
{All}		
[SH] [CL]	32-char.	Displays only every other character. Use horizontal scroll to view all bytes. Press [SH] [CL] [RA] for 64-char. per line.
[LA]	per line	
{All}		
[!]	Justify	? _ Prompt requires number of lines to be right-justified. 64-char. lines only.
{Edit}		
["]	I/O	1 = Save 2 = Load 3 = Print 4 = View ? _ Prompt requires number from 1 to 4.
{Edit}		
[#]	page/line display	e.g. # 1 / 4 # means line 4 of page 1 is top line on screen. Press [#] to remove.
{Edit}		
[\$]	Insert	Install Yen symbol at end of block to be inserted into. Recognizes Yen symbol farthest ahead of cursor. If no Yen is ahead of cursor, insertion is limited to one line. Insertion stops at right margin. Press [EN] to exit function.
{Edit}		
[%]	Draw	Use arrows to direct Set point. Use [SH] and arrows to direct Reset point. Press [SH] [EN] to erase, [EN] to store as text.
{Edit}		
[&]	Move	Two prompts: Move? _ and ?? _ . Requires two factors of total bytes to be moved. Cursor points to start of block. Arrows direct move. Press [EN] to exit.
{Edit}		
[']	Delete	Same as Insert function except any key deletes one character and [LA] deletes continuously. Press [EN] to exit.
{Edit}		
[()]	Open	160th line is pushed out of memory. Push any key to open line, [EN] to escape.
{Edit}		
[)]	Close	160th line is duplicated. Push any key to close current line, [EN] to escape.
{Edit}		
[*]	Loop	Screen pages 0-9 are flashed on screen until [EN] is pushed.
{Edit}		
[=]	Hex Edit	e.g. = < 32 20 28251 6E5B > where "=" is cursor, "32" is decimal ASCII, "20" is hexadecimal ASCII, 28251 and 6E5B are decimal and hex byte address. [UA] & [DA] increase and decrease ASCII value, [LA] & [RA] move "=" cursor. Exit is [EN].
{Edit}		

Table 1. Summary of Functions

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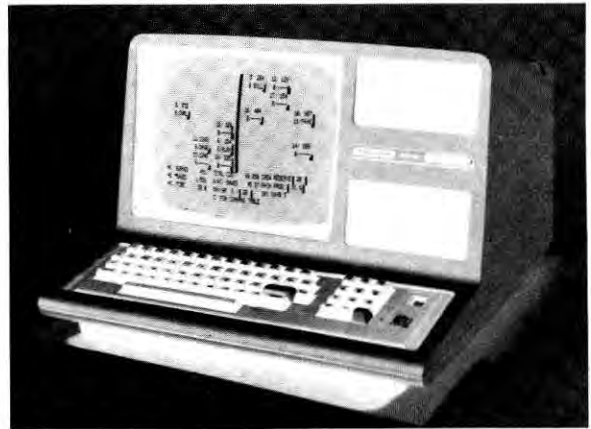
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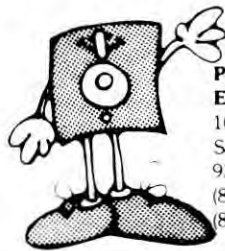
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From the January 1981 issue of the CSRA Computer
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There was some amusement at the November meeting when the Radio Shack representatives stated that the software in the ROM cartridges could not be copied. This month's 68 Micro Journal reported they had disassembled the programs on ROM by covering some of the connector pins with tape. They promise details next month. Never tell a hobbyist something can't be done! This magazine seems to be the only source so far of technical information on the TRS-80 color computer. Devoted to SS-50 6800 and 6809 machines up to now, 68 Micro Journal plans to include the TRS-80 6809 unit in future issues.

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Screenplay is not an Electric Pencil or Scripsit, nor is it the equivalent of a Basic word processor. It does not really manipulate text, except as a side effect. Screenplay is for having fun putting stuff in memory and then printing it. You can put any value from 0 to 255 into any memory byte from 22528 to 32767. You can then dump these values on paper in a manner similar to a screen dump. The only limitation is your hardware and your imagination. In other words, you can draw pictures, write a story, mix graphics and words, even write machine code, and edit anything you can write or load into the upper 10K of memory.

System Requirements

To use Screenplay you need a Model I Level II 16K TRS-80. It will probably run in a Model III with minor changes. You also need an Exatron Stringy-Floppy (ESF) for memory storage. You can use cassette but it will require a special machine-language routine and a place to put the routine. The ESF is ever so much quicker and surer. You should also have an Epson MX-80 printer, or the equivalent, to take full advantage of the graphics possibilities and multiple text densities. Lowercase is also a must. Finally, a 50 percent increase in the speed of your computer provides a very comfortable rate of keyboard input. (If you are a speed typist, better stick with one of those expensive word processing programs.)

Screenplay will not run on a disk system because it is not relocatable from its position in the keyboard memory. The disk operating system (DOS) usually resides in the same area.

POKE?

As I have suggested, the whole program is built around using the POKE statement. Sneaky programmers use this nasty sounding instruction for arcane purposes. PEEK is its partner in crime. Try POKEing the number 97 in video memory: POKE16000,97. If you have lowercase enabled in your computer, you will see a lowercase a at print position 640. Now try this: PRINT@650,CHR\$(97). If you have lowercase but do not have ULCBAS or some other driver routine engaged, you will see an uppercase A. Screenplay works by taking keyboard input via INKEY\$, changing the string character to an ASCII number by ASC(I\$), and POKEing the ASCII number into screen memory. At the same time, it also puts the number in a higher memory location that corresponds to the screen memory address by a calculated offset factor. The screen memory, in effect, becomes a copy of what is stored in higher memory.

If you have ever used PEEK or POKE in a loop, you know they are slow instructions. To put 1024 bytes on screen by PEEKing a higher memory location and POKEing its contents into video memory takes several seconds. POKE graphics are slow; USR instructions speed things up. Screenplay employs several USRs, but the one that gets used most is just 12 bytes long and features the LDIR instruction.

LDIR is a special Z80 instruction that uses three defining values to move a block of memory from one place to another. A Basic program can calculate these three values and POKE them into place, just before the program calls the USR. The USR then copies (moves) 1024 bytes (the block length) of memory from text memory (the source address) to video memory (the destination address). This takes less than one second—much much less. You can easily reverse the process by switching the source and destination addresses, thereby copying the entire screen into text memory. When the source text address is bumped up or down by 64 bytes, scrolling occurs as the screen is updated.

If you do not confine your POKEing to screen memory, disaster awaits below 15360 and above 16383. If it were not for the ESF's speed, I would still be in the early development stages of this program. I had to save the program on tape before every trial run because there was a good chance the POKES or the block moves would miss screen memory and obliterate some of Level II ROM's sacred RAM addresses.

While developing Screenplay I learned to write some Z80 Assembly language to provide insertion, deletion, right justification, and unlimited block movement of text. I had to interface these subroutines to the Basic part of the program.

The Coding

The last stage of developing Screenplay required writing extremely compact Basic code, so all the different features I wanted could fit into less than 5K of program space.

Control Key Functions—for multi-key commands
press the first key listed
then the remaining keys
simultaneously

Abbreviations: EN = Enter; CL = Clear; SH = Shift; UA = Up arrow; DA = Down arrow; LA = Left arrow; RA = Right arrow; [] = Any key.

[UA] = Cursor up
[DA] = Cursor down
[LA] = Cursor left
[RA] = Cursor right
[EN] = Carriage return
[CL] = no function alone
[SH] = no function alone
[UA] [LA] = Home cursor
[DA] [RA] = Anti-home cursor
[SH] [UA] = Access uppercase lock
[SH] [DA] [LA] = Access lowercase/typewriter mode
[SH] [LA] = Tab left
[SH] [RA] = Tab right
[SH] [EN] = Access edit cursor
[SH] [CL] = Hack
[CL] [UA] = Repeat up
[CL] [DA] = Repeat down
[CL] [LA] = Repeat left
[CL] [RA] = Repeat right
[SH] [UA] [DA] = Access graphics cursor
[SH] [LA] [RA] = Access four-way scroll
[SH] [CL] [DA] = Clear to bottom of screen
[SH] [LA] [CL] = Access 32-character/line display
[SH] [RA] [CL] = Return to 64-character/line display
[SH] [CL] [UA] [DA] = Clear all of text memory

Table 2. Control Key Functions

There are no comments in the listing because there is no room for them. I do not believe there is a single unnecessary line number.

Screenplay's memory map looks like this: 10240 bytes of text memory (22528-32767); 356 bytes of machine language and scratch space (22172-22527); about 500 bytes of variable, array, string, and stack space (21670-22171); and about 4500 bytes of

Basic program listing (17129-21670).

Screenplay can be both easy and difficult to use. A computer novice can get useful results from the program with a minimum of instruction. It is just like using a typewriter. But if you get into the heavy editing and the embedded printer commands that can produce fancy printouts, Screenplay becomes a challenge. Think of it as a word processing adventure game program. The treasures

INPUT/OUTPUT FUNCTIONS

Save —	Requires cursor positioned at the first byte to be saved. Requires Exatron Stringy Floppy Version 4.1. @SAVE? __ prompt requires file number. 0 is escape. LINES? __ prompt requires total number of 64-byte lines to be saved. Enter 0 to escape.
Load —	@LOAD? __ prompt requires file number. Enter 0 to escape.
Print —	Requires cursor positioned at the first byte to be printed. Printer parameters are displayed: LINES = 0 SPACES = 0 MARG = 0 LLEN = 0 GO = 0
Lines = 0 =>? __	Prompt requires total of 64-byte lines to be printed, even if you are printing more or less than 64 characters per line.
Spaces = 0 =>? __	Prompt requires line-spacing factor: 1 = single spacing; 2 = double spacing; 3 = triple spacing; etc.
Marg = 0 =>? __	Prompt requires number of spaces to provide left margin width. 8 is about right for 8-inch paper, 64-char. text lines and 80-char. printer lines.
Lien = 0 =>? __	Prompt requires length of text line to be printed. 64 is standard. The printer line length must be greater than this or printer wraparound will occur. Printer line length is set by escape by embedded commands, but is usually 80 by default.
Go = 0 =>? __	Prompt requires value greater than 0 to start printing.
Responding with a zero to any of these prompts returns you to the I/O menu.	

Table 3. I/O Functions

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134

are there to be found—you just have to hit the right keys and think deviously.

To hit the right keys most of the time, you will need some labels you can write on and press onto the fronts of certain important keys to remind you of their special functions. Screenplay is not a menu-driven program, except for the I/O (input/output) functions. All edit functions are activated the instant you touch the right key. If you hit the wrong key, you should never lose more than one line of text.

How to Use Screenplay

To use Screenplay, turn on your TRS-80, respond 22172 to the Memory Size? prompt, load the machine-language file, load the Basic listing, and type Run. Screenplay begins with the edit cursor blinking in the upper left corner. If you press any of the numbered keys (0-9) you will see the contents of text memory. The pattern will appear to be @ symbols and █ graphics blocks. These are ASCII values zero and 255, a result of the memory test the TRS-80 performs when you turn it on. To clear text memory (put blanks or ASCII code 32 characters in memory) press Shift Clear up arrow down arrow. It takes about a second for the blank screen to be copied ten times into text memory.

The edit cursor is a rectangular patch of dots (ASCII 127), if you have the right character generator chip. (You can change it in line 8000 of the Basic listing.) The edit cursor accesses the I/O menu, the Insert, Delete, and Move functions, and a few other features. See Table 1.

There are three other cursor characters: █ is the lowercase cursor, █ the uppercase cursor, and █ the graphics cursor. Several Edit functions, such as Hack and Repeat, are available to all cursors. To access the different cursors you press different combinations of control keys: the shift, clear, and arrow keys. If you want to write as though using a typewriter, press Shift down arrow to access the lowercase cursor. Table 2 is a summary of control key functions.

You can move the cursors anywhere on the screen with the arrow keys. The cursors do not destroy text as they move over it, and the character under the cursor reappears each time the cursor blinks off. When you fill the screen with text or reach the bottom line, the screen automatically scrolls up one line, giving you another line to write on. Any time you attempt to move the cursor below or above the screen limits, text will scroll up or down.

Screenplay has several special features not usually found in a word processing program.

Draw

You have to be in the edit mode to access this feature. In Table 2 you will see that you get the edit cursor by pressing Shift Enter. Pressing the percent key initiates the Draw function. A rapidly blinking Set point will appear where the edit cursor used to be. Using

the arrow keys you can draw a line in any direction. To draw a diagonal line, press two arrow keys at once. (Pressing down arrow

and right arrow will draw a diagonal downward and right.)

Erase points or lines by activating the Reset instruction; hold the shift key down while pressing the arrow key. There are two ways to exit the Draw function, depending on whether you want to retain what you have drawn in text memory. If you want to store the picture in text memory, press Enter. If you want to erase the picture and restore the screen to its original condition (you may have drawn over something important) then press Shift Enter. This exit method only erases the patterns you have drawn from the current drawing session. Previous pictures remain stored in text memory.

Loop

The Loop function is accessed from the edit cursor. It flashes all ten screen pages of text sequentially. You could, for instance, use it to animate a series of pictures you have drawn. I have played with expanding and contracting geometric patterns.

Hex Edit

Place the edit cursor over the byte of text you want to alter or investigate and press the equals key. Let's say you have an

A—15360, beginning of screen memory
F—1 or 0, Shift key flag
H—high byte decimal POKE value, sub 8400
I—0 to 255, keyboard input byte or ASCII value
J—32, ASCII space code, left-arrow PEEK value
K—64, screen line length, right-arrow PEEK value, etc.
L—low byte decimal POKE value, sub 8400
M—input value to sub 8400, text length or byte address
N—1 or 0, page/line display flag, 1 = on, 0 = off
O—1 to 4, op. mode, 1 L/case, 2 graphics, 3 edit, 4 U/case
P—1 to 10, text memory page number (0 to 9 keyboard)
Q—22273, used for POKEing data into USR's
R—not used
S—0 to 96, control key PEEK number
T—7168 to 16384, text address addend
V—15360 to 16383, screen cursor address
Z—16383, end of screen memory
B, C, D, E, G, U, W, X, Y, Z—general purpose variables
US—16526, low byte pointer to USR address
UX—dummy variable for calling USR's
I(Y)—printer command parameters
P\$(W)—printer command labels

Table 4. Basic Variables

Line 1000 sets all variables to integer type, clears enough string space to allow the Hex Edit and Printer output functions to operate, and defines various fixed values that are used often in the program. Sub 9100 picks up the initial value of T, the text address addend.
Lines 1200-1220 process most of the keyboard text input.
Lines 1230-1280 process the control key inputs. Line 1250 handles all control key combinations except those involving the shift key. Line 1270 handles all shift/control key inputs.
Lines 1290-1330 implement the Repeat function.
Lines 1340-1370 provide the tab increments and the home and anti-home cursor controls.
Line 1380 is the Hack function.
Lines 1400-1420 are the lowercase operating mode.
Line 1500 gives the uppercase cursor.
Lines 1600-1620 are the Graphics operating mode.
Lines 1800-1920 are the Printer output routine.
Lines 2000-2010 are the Scroll function.
Lines 2200-2210 are the ESF Save function.
Lines 2300-2310 are the I/O menu.
Lines 2400-2420 are the ESF Load function.
Line 2800 is the Close function.
Line 3000 is the Open function.
Line 3200 is the Right Justify function.
Lines 3600-3620 are the Insert function.
Lines 3700-3720 are the Delete function.
Lines 4200-4270 are the Move function.
Lines 4600-4640 are the Draw function.
Lines 5000-5100 are common exit points from edit functions that either call a page from text memory or copy the screen to text memory, then restore the current cursor.
Lines 5200-5290 are the Hex Edit function.
Line 5800 calls a page from text memory.
Line 6000 copies the screen to text memory.
Line 7000 is the Loop function.
Lines 8000-8050 are the Edit operating mode.
Line 8060 is the Clear function (clears to bottom of screen).
Line 8100 determines the Page number when a number key is pressed in the edit mode.
Lines 8200-8210 determine if the page/line display is on or off.
Line 8400 calculates decimal POKE values which control the machine language subroutines.
Line 8500 turns on the 32-character/line display mode.
Line 8550 resumes 64-character/line display mode.
Line 8700 calculates the page/line number for display.
Line 9000 clears all text memory.
Line 9100 calculates the text address addend.
Line 9200 sets the cursor to the left margin (used for technical purposes in several edit functions).
Line 9300 helps provide a "transparent" cursor by restoring the character it covers.
Lines 9500-9520 keep the cursor within screen memory and initiate automatic scrolling.
Lines 9600-9610 keep the scrolling within text memory.
Line 9800 PEEKs at control key addresses to see what keys are pressed.
Lines 9900-9910 provide blinking action for the cursor and wait for any key to be pressed.

Table 5. Comments

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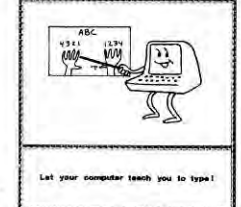
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up arrow in your text and do not remember whether it is ASCII 27 (printer escape code) or ASCII 91 (one of the special characters

available with the graphics cursor). The edit cursor will be replaced with an equals sign that blinks. Following the equals sign

will be something like this: < 27 1B 26650 681A >. The four numbers are: ASCII 27 decimal, ASCII 1B hexadecimal, text memory address 26650 decimal, and text memory address 681A hexadecimal.

By pressing up arrow or down arrow you can increase or decrease the ASCII numbers. By pressing left arrow or right arrow you can move the equals cursor to the left or right. Pressing Enter terminates Hex edit.

This function is vital when preparing your text for fancy printing because all printer control codes begin with an ASCII number below what you can normally enter from the keyboard without the use of CHR\$(N) statements. The Epson MX-80, for instance, responds to such ASCII codes as 0, 1, 2, 7, 11, 14, 20, and so on.

You could use the Hex Edit function to write machine-language code. Most short machine-language programs used in other applications reside in the upper end of keyboard memory, which also happens to be the text memory area of Screenplay. If you have a short, debugged machine-language program, you can use Screenplay to enter it directly into memory.

Hex Edit will not display the numbers if the cursor is located in the right half of the bottom screen line.

Justify

The edit cursor must be positioned somewhere in the first line to be right justified. The function automatically puts the cursor at the left margin when finished. An input prompt requests you to enter the number of lines you want to justify from the cursor position downward. I suggest you justify one paragraph or one page at a time, unless you like to watch the screen scroll.

If you enter a zero for the number of lines to justify, you will escape from the function without any action taking place. If you enter a number greater than the number of lines remaining in text memory, the program will halt with an OV Error, but this will not hurt

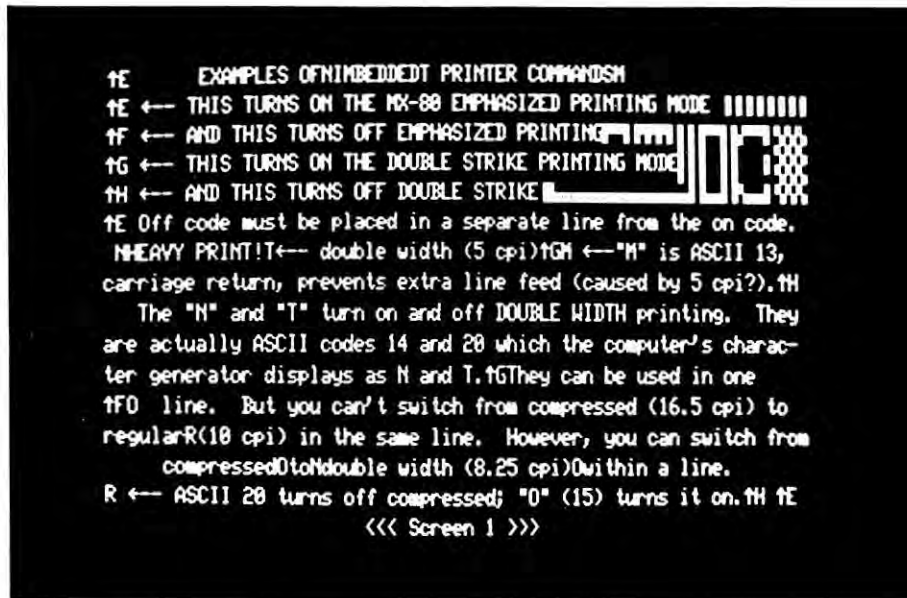


Photo 1. Imbedded Printer Commands

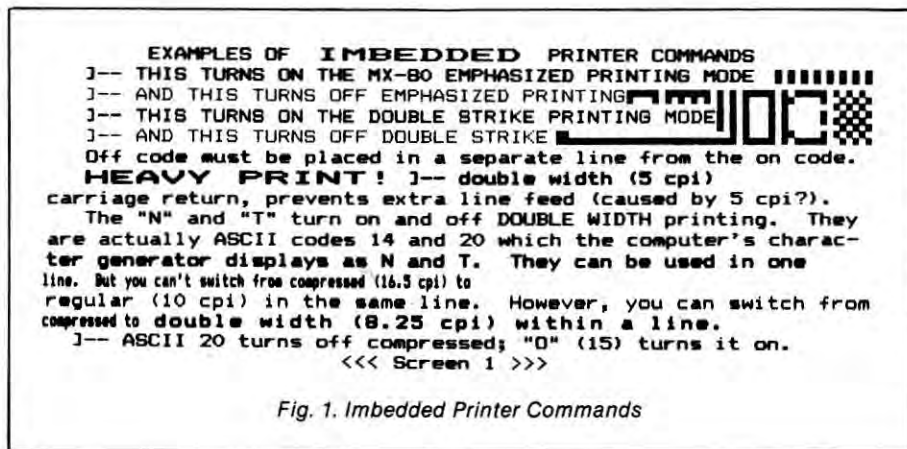


Fig. 1. Imbedded Printer Commands

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your text. Just type Run or GOTO2300 to resume operation. The Justify function inserts extra spaces between words from right to left. If there are more extra spaces than there are words to put them between, the line will be left as is. Indentation is preserved.

Page/Line

This function displays the current page number and the number of the top line on the screen. The display is updated whenever the text is updated by scrolling or page calls. This function is particularly useful when used with the Move function, where it allows you to keep track of where you are in text during a long-distance text movement. The page/line display appears in the upper left corner of the screen and looks like this: # 6 / 3.0625 #. Six is the page number and three is the line number. The decimal fraction indicates text has been scrolled left about four bytes (.0625 x 64 = 4). Some functions require the absence of the page/line display. For instance, it disappears when you use the Hack function. To make the page/line display disappear or reappear, press the pound sign while in the edit mode.

Open

To make a new line position available in the middle of text, use the Open function. Position the cursor where you need to insert a new line, press the left parenthesis, then press any key except Enter. Pressing Enter cancels the action. The left parenthesis replaces the cursor, moves to the left margin and blinks until you press a key. Then all of text memory from the cursor position onward will be pushed 64 bytes toward the end of memory. This causes the last line to be pushed out of text memory (it will be overwritten by the 159th line), so don't use Open if the 160th line is important. Note: This is one of the functions that turns off the page/line display.

Close

This function is the opposite of Open. It makes the line at the cursor position disappear forever. All subsequent text memory is pushed up 64 bytes, causing the 160th line to be duplicated at line 159. Close is accessed by the right parenthesis and is otherwise identical in operation to Open.

Move

You can move any amount of text to any place within the 10K of text memory using the Move function. The cursor must be put at the first byte to be moved. When you press the ampersand key the first of two prompts will appear somewhere on the screen. The second prompt will have two question marks. You must provide two decimal values which, when multiplied by the program, produce the total number of bytes of text you wish to move. For instance, if you want to move a paragraph of six lines you would enter 64 and 6 (or any other pair of numbers which factor 384). To move a 10-letter word, position the cursor at

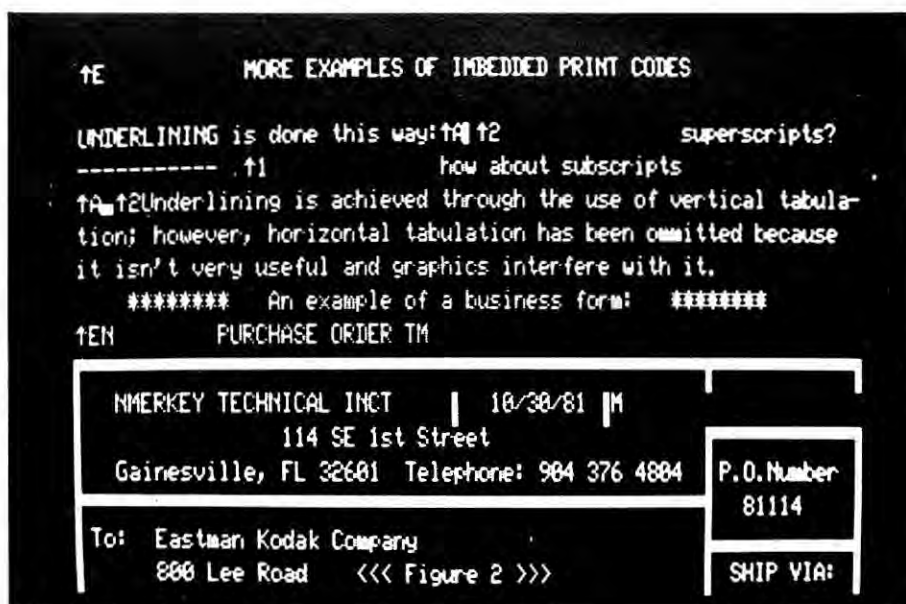


Photo 2. Imbedded Print Codes

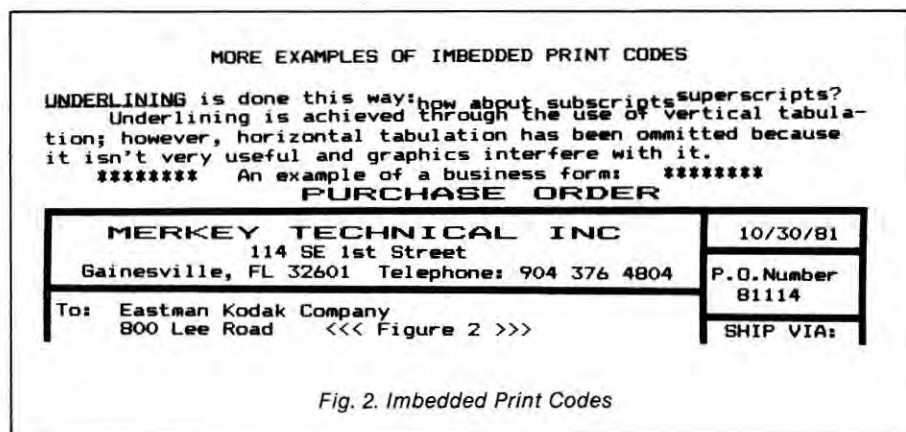


Fig. 2. Imbedded Print Codes

Program Listing 1. Basic Listing

```

1000 DEFINT A-Z; CLEAR 140: Q=22273: US=16526: P=1: GOSUB 9100: POKEUS, 0:
POKEUS+1, 87: O=3: A=15360: Z=16383: J=32: K=64: V=A: CLS
1200 ONOGOSUB 1400, 1600, 8000, 1500: GOSUB 9900
1210 I=ASC(I$): IF I < JORI=91 THEN 1230 ELSE ONOGOTO 1410, 1610, 8030
1220 POKEV, I: POKEV+T, I: V=V+1: IF V < Z THEN 1200 ELSE GOSUB 9500
1230 GOSUB 9800: GOSUB 9300: IFF=1 THEN 1270
1250 IFS=J THEN V=V-1 ELSE IFS=K THEN V=V+1 ELSE IFS=8 THEN V=V-K ELSE IFS=1
6 THEN V=V+K ELSE IFS=1 THEN V=INT(V/K)*K+K ELSE IFS=66 THEN 1320 ELSE IFS=4
0 THEN 1360 ELSE IFS=80 THEN 1370 ELSE IFS=18 THEN 1290 ELSE IFS=34 THEN 1300 E
LSE IFS=10 THEN 1310 ELSE IFS=0 THEN 1200
1260 GOSUB 9500: ONOGOSUB 1400, 1600, 8000, 1500: POKEV, I: GOTO 1230
1270 IFS=K THEN 1350 ELSE IFS=J THEN 1340 ELSE IFS=8 THEN 1340 ELSE IFS=48 THE
NO=1 ELSE IFS=24 THEN 1300 ELSE IFS=18 THEN 8060 ELSE IFS=2 THEN 1380 ELSE IFS=
1 THEN 1300 ELSE IFS=96 THEN 2000 ELSE IFS=34 THEN 8500 ELSE IFS=66 THEN 8550 E
LSE IFS=26 THEN 9000
1280 GOTO 1200
1290 G=K: GOTO 1330
1300 G=-1: GOTO 1330
1310 G=-K: GOTO 1330
1320 G=1
1330 I=PEEK(V+T): V=V+G: GOSUB 9500: POKEV, I: POKEV+T, I: GOTO 1230
1340 V=V-6: GOTO 1260
1350 V=V+6: GOTO 1260
1360 V=A: FOR W=1 TO K: NEXT W: GOTO 1200
1370 V=Z: FOR W=1 TO K: NEXT W: GOTO 1200
1380 N=0: GOSUB 5800: PRINT @V-A, CHR$(30);: GOTO 5100
1400 I=140: RETURN
1410 IF I > K AND I < 91 THEN I=I+J ELSE IF I > 96 THEN I=I-J
1420 GOTO 1220

```

Program Listing 1 Continues

the first character in the word, press the ampersand key, then enter 10 and 1 or 5 and 2. If you enter a zero you will escape the Move function without any action taking place. If you enter too-large numbers, the program will return the edit cursor with no action occurring. After you have set the block length the ampersand symbol will blink where the cursor used to be, identifying the start of the block to be moved. You can then use any arrow key to move the block of text up, down, or sideways. If you are on page 0 and moving upward, or if you are on page 9 and moving downward, the block will move through a stationary background of text. At all other times the background will scroll and the block will appear to stand still. If you are moving more than a page of text, and if the block begins at the top of the page, then you will not have any background text to observe as the move progresses. This is where the page/line displayed numbers come in handy. Of course, the logical thing to do is move less than 16 lines of text at a time and put a few graphics characters in text to mark your destination. As long as you move small blocks of text you should not have any trouble. When your block reaches the beginning or the end of text memory, the Move function automatically terminates. To terminate at will press Enter.

Insert

This function is much harder to describe

Program Listing 1 Continued

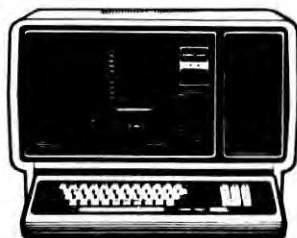
```

1500 I=143:RETURN
1600 I=179:RETURN
1610 IFI>KANDI<91THENI=I+KELSEIFI>96ANDI<123THENI=I+58ELSEIFI>47
ANDI<59THENI=I+133ELSEIFI>JANDI<39THENI=I+58ELSEIFI>38ANDI<44THE
NI=I+84
1620 GOTO1220
1800 P$(0)="LINES":P$(1)="SPACES":P$(2)="MARG":P$(3)="LLEN":P$(4
)="GO":M=V+T
1810 FORW=0TO4:CLS:FORY=0TO4:PRINTP$(Y);";":I(Y):NEXTY:PRINT@W*K
+LEN(P$(W))+8,"=";:INPUTI(W):IFI(W)<1THEN2300ELSENEXTW
1820 Y=(I(0)-1)*K:FORW=0TOYSTEPI(3):LPRINTSTRING$(I(2),J);:FORX=
0TOI(3)-1:I=PEEK(M+W*X):IFI<JTHEN1890
1830 LPRINTCHR$(I);:NEXTX:FORG=1TOI(1):LPRINTCHR$(13);:NEXTG,W
1850 INPUT"COPY";I$:IFI$="Y"THEN1820ELSE2300
1890 IFI=13THENX=I(3)-1:I=J:GOTO1830
1900 LPRINTCHR$(I);:IFI<>27THENI=J:GOTO1830
1910 E=M+W+X+1:IFPEEK(E)>68ORPEEK(E)<65THENLPRINTCHR$(PEEK(E));:
X=X+1:I=J:LPRINTCHR$(I);:GOTO1830
1920 LPRINTCHR$(PEEK(E));CHR$(PEEK(E+1));:X=X+2:I=J:LPRINTCHR$(I
);CHR$(I);:GOTO1830
2000 GOSUB9800:IFS=8THEN=T-KELSEIFS=16THEN=T+KELSEIFS=JTHEN=T
-1ELSEIFS=KTHEN=T+1ELSEIFS=0THEN2000ELSEIFS=1THEN1200
2010 GOSUB9600:GOSUB5800:GOTO2000
2200 M=V+T:INPUT"@SAVE";X:IFX<1THEN2300ELSEINPUT"LINES";Y:IFY<10
RY>160THEN2300ELSEY=Y*K
2210 @SAVEX,M,Y
2300 CLS:INPUT"1=SAVE 2=LOAD 3=PRINT 4=VIEW ";G:ONGOTO2200,2400
,1800,5000
2310 GOTO2300
2400 INPUT"@LOAD";X:IFX<1THEN2300
2410 @LOADX
2420 GOTO2300
2800 GOSUB9200:I=41:GOSUB9900:IFASC(I$)=13THEN1200ELSEM=32704-T-
V:GOSUB8400:POKEQ,L:POKEQ+1,H:M=V+T:GOSUB8400:POKEQ+3,L:POKEQ+4,
H:M=M+K:GOSUB8400:POKEQ+6,L:POKEQ+7,H:UX=USR(0):GOTO5000
3000 GOSUB9200:I=40:GOSUB9900:IFASC(I$)=13THEN1200ELSEPOKEQ+9,18
4:POKEQ+3,255:POKEQ+4,127:M=32704-T-V:GOSUB8400:POKEQ,L:POKEQ+1,
H:POKEQ+6,191:POKEQ+7,127:UX=USR(0):POKEQ+9,176:GOTO1380

```

Program Listing 1 Continues

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Program Listing 1 Continued

```

3200 GOSUB9200:INPUTB:IFB<1THEN500ELSEFORI=1TOB:POKEUS,129:UX=U
SR(V+T):V=V+K:GOSUB9500:NEXT:GOTO5000
3600 I=36:GOSUB9900:GOSUB9800:I=ASC(I$):IFS=1THEN1200
3610 U=V:GOSUB9200:C=V+63-U:IFC<1THEN500ELSEPOKEUS,12:POKEQ+21,
C:UX=USR(U+T):V=U:IFI>KANDI<91THENI=I+JELSEIFI>96THENI=I-J
3620 POKEV+T,I:GOSUB5800:V=V+1:GOTO3600
3700 I=47:GOSUB9900:IFASC(I$)<32THEN3720
3710 U=V:GOSUB9200:C=V+63-U:IFC<1THEN500ELSEPOKEUS,61:POKEQ+70,
C:UX=USR(U+T):V=U:GOSUB5800
3720 GOSUB9800:IFS=JTHEN3710ELSEIFS=1THEN1200ELSE3700
4200 X=0:Y=0:INPUT"MOVE";X,Y:U=X*Y:IFU<1THEN500ELSEM=U:GOSUB840
0:POKEQ-81,L:POKEQ-80,H:POKE22511,L:POKE22512,H:GOSUB5800:I=38
4210 GOSUB9900
4220 POKEV,I:GOSUB9800:IFS=1THEN1200ELSEIFS=16THENG=K:GOTO4260
4230 IFS=KTHENG=1:GOTO4260
4240 IFS=8THENG=KELSEIFS=JTHEN1ELSE4210
4250 IFV+T-G<22528THEN1200ELSEPOKEQ-94,G:POKEUS,156:POKEUS+1,86:
UX=USR(V+T):V=V-G:GOTO4270
4260 IFV+T+U>32767THEN1200ELSEPOKE22494,G:POKEUS,215:UX=USR(V+T+
U):V=V+G
4270 GOSUB9500:GOSUB5800:GOTO4220
4600 N=0:GOSUB5800:X=(V-(INT(V/K)*K))*2:Y=((INT(V/K)*K-A)/K)*3
4610 RESET(X,Y):GOSUB9800:SET(X,Y):IFF<1THEN4640ELSEIFS=0THEN461
0ELSEIFS=1THENRESET(X,Y):GOTO5100
4620 IFSANDKTHENX=X+1ELSEIFSANDJTHENX=X-1
4625 IFSANDLTHENY=Y+1ELSEIFSAND8THENY=Y-1
4630 IFX<0THENX=127ELSEIFX>127THENX=0
4635 IFY<0THENY=47ELSEIFY>47THENY=0
4640 SET(X,Y):GOSUB9800:RESET(X,Y):IFF<>1THEN4610ELSEIFS=1THEN50
00ELSE4620
5000 GOSUB5800:GOTO1200
5100 GOSUB6000:GOTO1200
5200 M=V+T:GOSUB8400:X=PEEK(V+T):B=INT(H/16):C=INT(L/16):Y=INT(X
/16):D=H-B*16:E=L-C*16:W=X-Y*16
5204 IPC>9THENC=C+7
5208 IFY>9THENY=Y+7
5210 IFB>9THENB=B+7
5220 IFD>9THEND=D+7
5224 IFE>9THENE=E+7
5228 IFW>9THENW=W+7
5230 IFV<Z-JPRINT@V-A+1,"<"X;CHR$(Y+48)+CHR$(W+48);M;CHR$(B+48)
+CHR$(D+48)+CHR$(C+48)+CHR$(E+48);">";
5240 GOSUB9800:IFS=8THENX=X+1ELSEIFS=16THENX=X-1ELSEIFS=JORS=KTH
EN5270ELSEIFS=1THEN5000ELSE5290
5250 IFX<0THENX=0ELSEIFX>255THENX=255
5260 POKEV,X:POKEV+T,X:GOTO5200
5270 IFS=JTHENV=V-1ELSEIFS=KTHENV=V+1
5280 GOSUB9500:GOSUB5800:GOTO5200
5290 GOSUB9900:GOTO5200
5800 POKEQ,0:POKEQ+1,4:POKEQ+3,0:POKEQ+4,60:M=A+T:GOSUB8400:POKE
Q+6,L:POKEQ+7,H:UX=USR(0):GOSUB8700:RETURN
6000 POKEQ,0:POKEQ+1,4:M=A+T:GOSUB8400:POKEQ+3,L:POKEQ+4,H:POKEQ
+6,0:POKEQ+7,60:UX=USR(0):RETURN
7000 POKEQ,0:POKEQ+1,40:POKEQ+3,0:POKEQ+4,128:POKEQ+6,0:POKEQ+7,
88:UX=USR(0):GOTO1200
8000 I=127:RETURN
8030 IFI=33THEN3200ELSEIFI=34THEN2300ELSEIFI=35THEN8200ELSEIFI=3
6THEN3600ELSEIFI=37THEN4600ELSEIFI=38THEN4200ELSEIFI=39THEN3700E
LSEIFI=40THEN3000ELSEIFI=41THEN2800ELSEIFI=42THEN7000ELSEIFI>47A
NDI<58THEN8100ELSEIFI=61THEN5200
8050 GOTO1200
8060 N=0:GOSUB5800:PRINT@V-A,CHR$(31);:GOTO5100
8100 P=I-47:GOSUB9100:GOTO5000
8200 IFN=0THENN=1:GOTO5000
8210 IFN=1THENN=0:GOTO5000
8400 W=INT(M/4096):X=M-W*4096:Y=INT(X/256):H=Y+16*W:L=X-Y*256:RE
TURN
8500 PRINTCHR$(23);:GOTO1200
8550 PRINTCHR$(28);:GOTO1200
8700 IFN<>1THENRETURNELSEX=(T-6144)/1024:PRINT@0,"#";INT(X)-1;"/
";(X-INT(X))*16+1;"#";:RETURN
9000 CLS:FORP=1TO10:GOSUB9100:GOSUB6000:NEXT:P=1:GOSUB9100:GOTO1
200
9100 T=P*1024+6144:RETURN
9200 GOSUB9300:PRINT@V-A,CHR$(29);:V=256*PEEK(16417)+PEEK(16416)
:RETURN
9300 POKEV,PEEK(V+T):RETURN
9500 IFV>ZTHENV=V-K:T=T+K:GOSUB9600:GOSUB5800
9510 IFV<ATHENV=V+K:T=T-K:GOSUB9600:GOSUB5800
9520 RETURN
9600 IFT>ZTHENT=Z+1ELSEIFT<7168THENT=7168
9610 RETURN
9800 S=PEEK(14400):F=PEEK(14464):RETURN
9900 POKEV,I:FORW=1TOJ:I$=INKEY$:IFI$<>" "THENRETURNELSENEXT
9910 GOSUB9300:FORW=1TOJ:I$=INKEY$:IFI$<>" "THENRETURNELSENEXT:GO
TO9900
  
```

Program Listing 1 Continues

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Program Listing 2. Assembly Listing

```

00100 ;MOVEUP USR
00110 ;CA = CURSOR ADDRESS (V+T) G = INCREMENT
00120 ;TA = TRANSFER STORAGE ADDRESS TL = TEXT LENGTH (U)
569C 00130 ORG 22172
5722 00140 EXJUMP EQU 5722H
569C CD7F0A 00150 CALL 2687 ;CA
569F 11C056 00160 LD DE,22208 ;TA
56A2 010000 00170 LD BC,0 ;G
56A5 C5 00180 PUSH BC
56A6 D5 00190 PUSH DE
56A7 E5 00200 PUSH HL
56A8 ED42 00210 SBC HL,BC ;CA-G
56AA E5 00220 PUSH HL
56AB EDB0 00230 LDIR ;STORE TRANSFER LINE
56AD D1 00240 POP DE ;CA-G
56AE E1 00250 POP HL ;CA
56AF 010000 00260 LD BC,0 ;TL FROM BASIC
56B2 C5 00270 PUSH BC
56B3 D5 00280 PUSH DE
56B4 EDB0 00290 LDIR ;MOVE TEXT BLOCK
56B6 D1 00300 POP DE ;CA-G
56B7 E1 00310 POP HL ;TL
56B8 19 00320 ADD HL,DE ;CA+TL-G
56B9 EB 00330 EX DE,HL
56BA E1 00340 POP HL ;TA
56BB C1 00350 POP BC ;G
56BC EDB0 00360 LDIR ;RETRIEVE TRANSFER LINE
56BE 1862 00370 JR EXJUMP
00380 ;USR FOR BLOCK MOVES, INSERT, DELETE
00390 ;BLOCK-MOVES
5700 00400 ORG 22272
5700 010000 00410 LD BC,0 ;BLOCK LENGTH
5703 110000 00420 LD DE,0 ;DESTINATION ADDRESS
5706 210000 00430 LD HL,0 ;SOURCE ADDRESS
5709 EDB0 00440 LDIR
570B C9 00450 RET
00460 ;INSERT
570C CD7F0A 00470 CALL 2687 ;CA
570F E5 00480 PUSH HL
5710 CD6D57 00490 CALL SEARCH ;LOOK FOR YEN CHARACTER
5713 200F 00500 JR NZ,YESYEN ;IF YEN SYMBOL IS PRESENT
00510 ;DO MULTI-LINE INSERT
5715 010000 00520 NOYEN LD BC,0 ;GET ONE-LINE BLOCK LENGTH (B=0)
5718 E1 00530 POP HL ;CA
5719 09 00540 ADD HL,BC ;FIND END-OF-LINE ADDRESS
571A E5 00550 PUSH HL
571B D1 00560 POP DE
571C 2B 00570 DEC HL ;MAKE HL SOURCE ADDRESS
571D EDB8 00580 LDDR ;SHIFT TEXT RIGHT
571F 23 00590 INC HL ;ADJUST HL TO CURSOR ADDRESS
5720 3620 00600 LD (HL),32 ;PUT BLANK AT CURSOR ADDRESS
5722 1856 00610 JR EXIT
5724 C1 00620 YESYEN POP BC ;CA
5725 E5 00630 PUSH HL
5726 D1 00640 POP DE
5727 B7 00650 OR A ;RESET FLAGS
5728 ED42 00660 SBC HL,BC ;FIND BLOCK LENGTH
572A 3005 00670 JR NC,SHOVE ;DO MOVE IF YEN > CURSOR
572C 284C 00680 JR Z,EXIT ;RETURN IF ZERO BLOCK LENGTH
572E C5 00690 PUSH BC ;SAVE CA FOR NOYEN
572F 18E4 00700 JR NOYEN ;DO ONE-LINE INSERT: YEN < CURSOR
5731 E5 00710 SHOVE PUSH HL ;COPY BLOCK LENGTH FROM
5732 C1 00720 POP BC ;HL TO BC
5733 D5 00730 PUSH DE ;COPY DESTINATION ADDRESS FROM
5734 E1 00740 POP HL ;DE TO HL
5735 2B 00750 DEC HL ;MAKE HL SOURCE ADDRESS
5736 EDB8 00760 LDDR ;MOVE MULTI-LINE BLOCK ONE BYTE
5738 23 00770 INC HL ;ADJUST HL TO CA
5739 3620 00780 LD (HL),32 ;PUT BLANK AT CA
573B 183D 00790 JR EXIT
00800 ;DELETE
573D CD7F0A 00810 CALL 2687 ;CA
5740 E5 00820 PUSH HL
5741 CD6D57 00830 CALL SEARCH ;LOOK FOR YEN CHARACTER
5744 200E 00840 JR NZ,GOTYEN ;DO MULTI-LINE DELETE IF YEN
00850 ;SYMBOL IS PRESENT
5746 010000 00860 NOTYEN LD BC,0 ;GET ONE-LINE BLOCK LENGTH
5749 D1 00870 POP DE ;CA
574A D5 00880 PUSH DE
574B E1 00890 POP HL
574C 23 00900 INC HL ;MAKE HL SOURCE ADDRESS
574D EDB0 00910 LDIR ;SHIFT TEXT LEFT
574F 2B 00920 DEC HL ;ADJUST HL TO CA
5750 3620 00930 LD (HL),32 ;PUT BLANK AT END OF LINE
5752 1826 00940 JR EXIT
5754 C1 00950 GOTYEN POP BC ;CA
5755 C5 00960 PUSH BC
5756 D1 00970 POP DE
5757 B7 00980 OR A ;RESET FLAGS
5758 ED42 00990 SBC HL,BC ;FIND BLOCK LENGTH
575A 3005 01000 JR NC,PULL ;DO MOVE IF YEN > CURSOR
575C 281C 01010 JR Z,EXIT ;RETURN IF BLOCK LENGTH = 0
575E C5 01020 PUSH BC ;SAVE CA FOR NOTYEN
575F 18E5 01030 JR NOTYEN ;DO ONE-LINE DELETE: YEN < CURSOR
5761 E5 01040 PULL PUSH HL ;PUT BLOCK LENGTH
5762 C1 01050 POP BC ;INTO BC REGISTER
5763 D5 01060 PUSH DE ;COPY DESTINATION ADDRESS
5764 E1 01070 POP HL ;INTO HL REGISTER
5765 23 01080 INC HL ;MAKE HL SOURCE ADDRESS

```

Program Listing 2 Continues

than it is to use. Its purpose is to insert text within a line or within a block of text.

First, determine how much text you need to insert. Remember that lines are 64 bytes long. If you want to insert another character in a line that already has 64 characters in it, the last character will be pushed off the right end of the line and you will never see it again, unless you tell the Insert function to operate on more than just one line.

Do this by first installing a yen symbol at the end of the block into which you wish to insert more text. The yen symbol (ASCII 126) is a special character available to the graphics cursor and is found by pressing the asterisk key or by using the Hex Edit function. Typically, you would place the yen symbol at the right end of a line where a paragraph has ended, provided there are enough extra blank spaces to absorb the new text. If there are not, you may want to Open a new line position. Do not forget to remove the yen symbol when you are finished inserting.

If there is more than one yen symbol in text, the Insert function uses the one highest in memory. If the cursor is positioned beyond the yen symbol, it is ignored and the insertion is confined to one line. Most of the time there will be enough extra spaces at the end of a line to allow you to add a letter or two or to add a small word inside a sentence. After a multi-line insertion, however, you are faced with a clean up job. Words get chopped off at the margins when text is moved by an amount that is not a multiple of 64. Also, the extra spaces that used to be at the right margin are moved to new positions within a line, and words that ended at the right margin are placed directly against the first word in the next line. You have to see it and use it to really understand what I am describing.

The Insert function uses the lowercase keyboard coding. The dollar sign becomes the cursor and you merely type in the characters to be inserted. The right side of the line, or the rest of the yen-defined block, moves to the right as each character is typed in. Press Enter to exit.

Delete

Delete operates almost identically to the Insert function and deletes rather than inserts text. You can also use the yen symbol. A slash replaces the cursor. Pressing any key except a control key deletes one byte. The right side of the line, or the rest of the yen-defined block, will move left to cover the deleted byte. Holding the left arrow key down causes continuous deletion. Pressing Enter terminates Delete.

Repeat, Hack and Clear

Use the clear key with the arrow keys to repeat a character in any of four directions. You must place the cursor on the character to be repeated. (Push Clear first.)

Press Shift then Clear to hack off the remainder of a line from the cursor position to the right. Press Shift Clear down arrow to clear text from the cursor position to the

bottom of the screen.

Scroll

This is a special form of scrolling. There is no cursor and you can scroll in four directions. Press Shift left arrow right arrow and then use the arrows to direct the motion. Press Enter to escape. This is for viewing only; you cannot alter text.

32-Mode

Press Shift left arrow Clear to change to 32-characters-per-line display mode. In this mode, only every other byte of memory is displayed and the cursor disappears on those bytes that are not displayed. You can still write to text memory and move the cursor through text; you just cannot see half your text. To see the other half, just scroll left or right. To return to 64-characters-per-line mode press Shift right arrow Clear. Note: You should press the arrow key before, or at the same time as, the clear key or you may Hack the line.

Input/Output

Although Screenplay is designed to use the Exatron Stringy Floppy for text storage, there is a way to use cassette. Remember that text memory runs from 22528 to 32767 and it is always there until you turn off the power. Cassette users should write a cassette memory save and load subroutine assembled to run in the protected area from 22172 to 23527.

Program Listing 2 Continued

```

5766 EDB0 01090 LDIR ;SHIFT TEXT LEFT
5768 2B 01100 DEC HL ;ADJUST HL TO CA
5769 3620 01110 LD (HL),32 ;PUT BLANK AT END OF BLOCK
576B 180D 01120 JR EXIT
576D 3E7E 01130 SEARCH LD A,126 ;126 = YEN SYMBOL
576F 010028 01140 LD BC,10240 ;SEARCH LENGTH
5772 21FF7F 01150 LD HL,32767 ;START SEARCH AT TOP OF MEMORY
5775 EDB9 01160 CPDR
5777 78 01170 LD A,B
5778 B1 01180 OR C ;SET UP FLAG TEST
5779 C9 01190 RET
577A 210057 01200 EXIT LD HL,22272 ;ADDRESS OF USR 1
577D 228E40 01210 LD (16526),HL ;16526=USR POINTER
5780 C9 01220 RET ;RETURN TO BASIC PROGRAM
01230 ;RIGHT-JUSTIFY
577A EQU 577AH
5781 CD7F0A 01250 CALL 2687 ;CA
5784 E5 01260 PUSH HL
5785 DDE1 01270 POP IX
5787 013F00 01280 LD BC,63 ;64 = LINE LENGTH
578A 110000 01290 LD DE,0 ;D=INDENT, E=EXTRA SPACES
578D 09 01300 ADD HL,BC ;GET END OF LINE ADDRESS
578E 01003F 01310 LD BC,3F00H ;C=0, B=63
5791 7E 01320 LOOP1 LD A,(HL) ;INSPECT ADDRESS
5792 FE20 01330 CP 32 ;IS IT BLANK?
5794 2004 01340 JR NZ,INDENT ;NO, THEN DO NEXT LOOP
5796 1C 01350 INC E ;ADD 1 TO COUNT OF EXTRA SPACES
5797 2B 01360 DEC HL ;NEXT ADDRESS
5798 10F7 01370 DJNZ LOOP1
579A AF 01380 INDEXT XOR A ;A=0
579B B3 01390 OR E ;E=0?
579C 28DC 01400 JR Z,LEAVE ;YES, FULL LINE, STOP
579E B0 01410 OR B ;B=0?
579F 28D9 01420 JR Z,LEAVE ;YES, BLANK LINE, STOP
57A1 DDE5 01430 PUSH IX
57A3 E1 01440 POP HL
57A4 7E 01450 LOOP2 LD A,(HL) ;INSPECT FOR INDENTATION
57A5 FE20 01460 CP 32
57A7 2004 01470 JR NZ,SPACES ;END INDENT SPACES
57A9 14 01480 INC D ;ADD TO INDENT COUNT
57AA 23 01490 INC HL ;NEXT ADDRESS
57AB 18F7 01500 JR LOOP2
57AD 3E40 01510 SPACES LD A,64
57AF 93 01520 SUB E ;64-E
57B0 92 01530 SUB D ;64-E-D=INSERT FIELD
57B1 47 01540 LD B,A

```

Program Listing 2 Continues



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```

57B2 7E      01550 LOOP3 LD      A,(HL) ;START OF INDENTED LINE
57B3 FE20    01560 CP          32
57B5 2001    01570 JR          NZ,SKIP1 ;NOT BLANK
57B7 0C      01580 INC         C          ;BLANK, +1
57B8 23      01590 SKIP1 INC        HL
57B9 10F7    01600 DJNZ       LOOP3     ;END OF INSERT FIELD
57BB B7      01610 OR          A          ;RESET CARRY FLAG
57BC 79      01620 LD          A,C
57BD 9B      01630 SBC        A,E        ;E>C?
57BE 38BA    01640 JR          C,LEAVE  ;YES, STOP
57C0 43      01650 LD          B,E
57C1 2B      01660 DEC        HL
57C2 E5      01670 PUSH       HL
57C3 1600    01680 LD          D,0       ;DE = EXTRAS
57C5 19      01690 ADD        HL,DE     ;LINE END ADDR
57C6 D1      01700 POP         DE
57C7 1A      01710 LOOP4 LD        A,(DE)
57C8 77      01720 LD          (HL),A   ;MOVE CHAR. TO LINE END
57C9 FE20    01730 CP          32
57CB 2006    01740 JR          NZ,SKIP2 ;END OF WORD?
57CD 2B      01750 DEC        HL        ;YES, GET NEXT ADDR
57CE 77      01760 LD          (HL),A ;INSERT EXTRA
57CF 1002    01770 DJNZ       SKIP2   ;END OF INSERT FIELD?
57D1 18A7    01780 JR          LEAVE   ;YES, JUSTIFIED
57D3 2B      01790 SKIP2 DEC        HL
57D4 1B      01800 DEC        DE
57D5 18F0    01810 JR          LOOP4
          01820 ;MOVE DOWN
57D1      01830 JUMPEX EQU    57D1H
57D7 CD7F0A  01840 CALL    2687 ;CA
57DA 11C056  01850 LD      DE,22208 ;TA
57DD 010000  01860 LD      BC,0 ;G
57E0 C5      01870 PUSH    BC
57E1 D5      01880 PUSH    DE
57E2 C5      01890 PUSH    BC
57E3 E5      01900 PUSH    HL
57E4 EDB0    01910 LDIR           ;STORE TRANSFER LINE
57E6 E1      01920 POP     HL
57E7 D1      01930 POP     DE
57E8 E5      01940 PUSH    HL
57E9 2B      01950 DEC     HL        ;CA+TL-1
57EA E5      01960 PUSH    HL
57EB 19      01970 ADD     HL,DE     ;CA+TL-1+G
57EC EB      01980 EX      DE,HL
57ED E1      01990 POP     HL
57EE 010000  02000 LD      BC,0 ;TL FROM BASIC
57F1 C5      02010 PUSH    BC
57F2 EDB0    02020 LDDR           ;MOVE TEXT BLOCK
57F4 D1      02030 POP     DE
57F5 E1      02040 POP     HL        ;CA+TL
57F6 ED52    02050 SBC     HL,DE     ;CA
57F8 EB      02060 EX      DE,HL
57F9 E1      02070 POP     HL        ;TA
57FA C1      02080 POP     BC        ;G
57FB EDB0    02090 LDIR           ;RETRIEVE TRANSFER LINE
57FD 18D2    02100 JR      JUMPEX
57FF 00      02110 NOP
0000      02120 END

```

```

1 'You may wish to incorporate the machine-language subroutines
2 'into a BASIC program listing as DATA values to be POKEd into
3 'place. Here is a BASIC program you can use to do that.
4
10 '*** PROGRAM TO PUT SCREENPLAY'S USRs INTO MEMORY ***
20 FORA=22172TO22207:READB:POKEA,B:NEXTA
30 DATA 205,127,10,17,192,86,1,0,0,197,213,229,237,66
40 DATA 229,237,176,209,225,1,0,0,197,213,237,176,209,225
50 DATA 25,235,225,193,237,176,24,98
60 FORA=22272TO22527:READB:POKEA,B:NEXTA
70 DATA 1,0,0,17,0,0,33,0,0,237,176,201,205,127
80 DATA 10,229,205,109,87,32,15,1,0,0,225,9,229,209
90 DATA 43,237,184,35,54,32,24,86,193,229,209,183,237,66
100 DATA 48,5,40,76,197,24,228,229,193,213,225,43,237,184
110 DATA 35,54,32,24,61,205,127,10,229,205,109,87,32,14
120 DATA 1,0,0,209,213,225,35,237,176,43,54,32,24,38
130 DATA 193,197,209,183,237,66,48,5,40,28,197,24,229,229
140 DATA 193,213,225,35,237,176,43,54,32,24,13,62,126,1
150 DATA 0,40,33,255,127,237,185,120,177,201,33,0,87,34
160 DATA 142,64,201,205,127,10,229,221,225,1,63,0,17,0
170 DATA 0,9,1,0,63,126,254,32,32,4,28,43,16,247
180 DATA 175,179,40,220,176,40,217,221,229,225,126,254,32,32
190 DATA 4,20,35,24,247,62,64,147,146,71,126,254,32,32
200 DATA 1,12,35,16,247,183,121,155,56,186,67,43,229,22
210 DATA 0,25,209,26,119,254,32,32,6,43,119,16,2,24
220 DATA 167,43,27,24,240,205,127,10,17,192,86,1,0,0
230 DATA 197,213,197,229,237,176,225,209,229,43,229,25,235,225
240 DATA 1,0,0,197,237,184,209,225,237,82,235,225,193,237
250 DATA 176,24,210,0
260 END

```

Program Listing 3. Decimal Data for USR

When you finish using Screenplay to write and edit your text, load your cassette routines into Screenplay's USR area and use them to dump text memory onto tape. If you then wish to return to using Screenplay, just reload Screenplay's machine-language subroutines and type Run. For the sake of simplicity you could write your cassette routines to save and load a fixed amount of text.

Alternatively, you could put the cassette I/O in the first or last page of text memory or reserve more memory in front of the USRs and put it there. The latter option requires deletion of some of the Basic program to maintain enough overhead for the interpreter to run the program.

Menu

There are only four items on the I/O menu: 1 Save, 2 Load, 3 Print, and 4 View. View means return to text display.

The only thing you need to load a text file is the file number. To save a text file just:

*“My Epson MX-80
is well suited to
work with Screenplay.”*

position the cursor at the first byte of text to be saved; call the I/O menu and select Save; and respond to the prompts with a file number and the number of lines of text you are saving. When the ESF is finished program control returns to the I/O menu.

Print

My Epson MX-80 is well suited to work with Screenplay. However, you are going to have to work to get your fancy hardcopy. Familiarize yourself with your printer's abilities and see how the printer output routine accesses those abilities.

You do not have to set the MX-80 to the TRS-80 mode of operation to get graphics. Screenplay adds 32 to the ASCII numbers to match the MX-80's graphics set.

You can imbed one, two and three-byte control codes in your text. The printer executes the codes and inserts blank spaces in place of the code numbers. The indentation space at the beginning of a paragraph is a good spot to put a string of control codes. You can even put them in the spaces between words.

Study Photos 1 and 2 and Figs. 1 and 2 for the video display and the resulting hardcopy. They should give you some clues as to how I produced them. They do not show the printer text parameters, which can interact with the imbedded codes. See Table 3 for an outline of the printer text parameters. Good luck! ■

Warren Merkey owns and operates Warren's Camera Services Inc. His hobby is science fiction writing.

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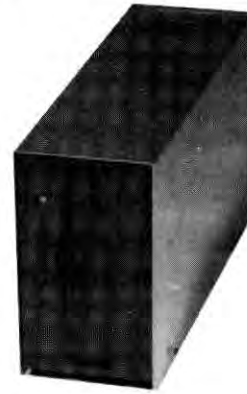
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Know Scripsit before you start modifying it.

Inside Scripsit—Part I

Craig A. Lindley
P.O. Box 704
Colorado Springs, CO 80901

Bynow, almost everyone owning a Model I, II or III has had the opportunity to use the Scripsit word processor program. Although feelings are mixed, most consider Scripsit an effective word processing tool. Because everyone has a different application for the program, numerous patch programs have appeared on the market to fix real or imagined

shortcomings. I too had some ideas about what I thought Scripsit should be able to do. When these didn't correspond exactly with any of the canned patch programs available, I had to write my own.

Before modifying any large program it is necessary to understand completely the portions of the program you will change. In some cases, you should understand the program completely so you can minimize and correct any side effects caused by your modifications.

In a well commented program

in a high level language like Basic, modifications can be relatively painless. All variables are visible, and comments can steer you to the point in the program where the modifications must be made. In an Assembly-language program, however, making the modifications is 10 times more difficult.

Understanding a large program like Scripsit from an un-commented disassembly takes time. You must start at the program's entry point and proceed until the structure of the complete program unveils itself. While this is a lot of work, the time is well spent. You learn by looking at other programmers' code—take note of interesting ideas and routines and then try them in your own programs.

This, the first article in a series, will tell you what I have discovered of the structure, workings and modification of Scripsit. With this information you can quickly modify Scripsit to fit your needs more exactly. Next month I will put the facts in this article to work with a patch program for Scripsit.

Figures 1-10 show the categories of information I will discuss. It is obvious that intermingling subroutines, tables and messages make a single block diagram of Scripsit's

structure impossible. First let's consider some important details used by the designers of Scripsit.

Register Usage

The designers of Scripsit employed the following conventions for register use.

- Both normal and alternate register sets are used throughout the program.

- Register DE is used as a pointer to the text in the text buffer almost exclusively. If it is used for another purpose (a block move, for example) its function and value are always returned promptly.

- Register HL is used as a general pointer for data, flags and messages.

- Register BC is used as a counter and temporary variable storage.

- Register IX is used to point to a table of line lengths. This table is used in formatting text data for display on both the video screen and the line printer. There is an entry in this table for each line of a document, blank or not (blank equals 0FFH). The value for each line in this table is the number of characters from the text buffer contained in the formatted line.

- Register IY usually has the value of 7C2FH. It is a pointer to a block of memory containing the current variables necessary for program operation (see Fig. 1). These variables are usually referenced by a displacement from IY.

(IY + x) Offset	Address	Function
1	7C30H	Last key input
2	7C31H	Repeat command count
6	7C35H	Character line position
7	7C36H	Current cursor character
8	7C37H	Indent paragraph length
0BH	7C3AH	Temporary storage for last key input
0EH	7C3DH	Line printer parameter flags
0FH	7C3EH	Last command executed storage
11H	7C40H	Repeat command flag
12H	7C41H	General parameter 1 storage
13H	7C42H	General parameter 2 storage
14H	7C43H	Current text buffer position
26H	7C55H	Memory size storage
2EH	7C54H	Auxiliary memory size storage
30H	7C5FH	Current page number storage
34H	7C63H	Output text flag
35H	7C64H	Video line width storage
36H	7C65H	Left margin storage
37H	.	Right margin storage
38H	.	PF storage
39H	.	Justify Y or N storage
3AH	.	Center Y or N storage
3BH	.	Flush right Y or N storage
3DH	7C6CH	Suppress widow line Y or N
3EH	.	Line spacing storage
3FH	.	Top margin storage
40H	.	Bottom margin storage
41H	.	Vertical center Y or N
42H	.	Page length storage
43H	.	Header flag storage
44H	.	Footer flag storage
49H	7C68H	Lines/page storage

Fig. 1. Memory address offsets from IY (7C2FH)

The Key Box

Model I or III
16K RAM
1 Disk Drive

Example: LD (IY + 15H),0DH

Table Structure

Considering the large number of commands available from Scripsit, the designers very wisely opted for a table-driven rather than a compare and jump structure (see Fig. 2). Because of this, numerous tables throughout Scripsit steer program operation smoothly and efficiently.

Because all the command tables are laid out the same, one routine (located at 58F0H) can process them all. This routine is always called with HL pointing at the appropriate command table. The general structure of these command tables is in Table 1. A command mnemonic is associated with every command address. The table processing routine at 58F0H searches the command mnemonics for a match. If it finds

one it calculates the appropriate address in the second portion of the table and jumps to it. If the command mnemonic is not found, an illegal command message is output in most cases.

This table processing routine is called from six different locations in Scripsit. An example of its use would be:

- When Break is hit while in the text entry mode, the table processing routine transfers control (jumps) to location 6446H where the break command is processed.

- If an examine command is given after the Break key is pressed (for example, ?N) this routine transfers control to location 692AH where the examine commands are processed.

- At this point, the routine

CMDTBL	DEFB	N	Total number of commands in table
	DEFB	A	Command number 1 mnemonic
	DEFB	B	Command number 2 mnemonic
	DEFB	Y	Command N-1 mnemonic
	DEFB	Z	Command N mnemonic
	DEFW	—	Command N address
	DEFW	—	Command N-1 address
	DEFW	—	Command number 2 address
	DEFW	—	Command number 1 address

Table 1

Command Number	Command	
1	CP A	...cmd = A?
	JP Z,AAAAH	...if yes then
2	CP B	...cmd = B?
	JP Z,BBBBH	...if yes then
N-1	CP Y	...cmd = Y?
	JP Z,YYYYH	...if yes then
N	CP Z	...cmd = Z?
	JP Z,ZZZZH	...if yes then
	JP ERROR	...if none then

The compare and jump method of command processing requires five bytes per command (assuming that the long jump instruction is used instead of the relative jump). The table structure, however, requires three bytes per command, plus 31 bytes required for the command processing routine. A little algebra shows the memory break-even point in using the two different approaches.

5N	Total for N commands compare and jump method
3N + 31	Total for N commands table approach
5N = 3N + 31	Equate memory usage to find N

If Scripsit had only 15 commands available, the compare and jump method would work just as well and be just as memory efficient as the table method. But because Scripsit has more than 15 commands, the designers of Scripsit saved a lot of memory with the table method.

Fig. 2. Alternative Compare and Jump structure

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again transfers control to 694AH where the name command is executed.

If this command table lookup scheme were not used, Scripsit would be a complicated mass of compare and jump statements.

Messages

Another good idea that the designers of Scripsit did not carry through was a table-driven message output routine. Using this routine, an output message could be displayed on the command line by calling the indexed message output routine at 6F7CH with a message index in the A register. The selected message would be displayed on the command line and control passed back to the calling routine. The advantage of this type of output routine is a register doesn't have to be tied up pointing at the message string to be output.

It seems odd to adopt this sophisticated approach only for the messages located in 7807H-7963H. All other messages output by Scripsit are processed by pointing HL at the message and calling the routine at 6BC8H to display it on the command line. The structures of all messages are the same, however: The length of the message (in bytes) is followed by the message itself (in ASCII).

Program I/O

With the exception of disk I/O, Scripsit provides its own I/O drivers (video, printer, keyboard and cassette). Scripsit doesn't use any I/O channels available through the DCB's (Device Control Blocks) or any calls to the resident ROM. This makes it much more machine independent and transportable than Basic, for example. (That is why Model I Scripsit can be modified to run on the Model III without many problems. See the next article in this series for details.)

In this manner, Scripsit also provides upper and lowercase video, upper and lowercase keyboard input (with correct shift key action), and a special keyboard control key not available through normal system I/O. I will discuss each of Scripsit's I/O channels later.

Key	Unshift	Shift	Control	Key	Unshift	Shift	Control
A	61	41	01	Y	79	59	19
B	62	42	02	Z	7A	5A	1A
C	63	43	03	up arrow	9B	8B	1B
D	64	44	04	down arrow	9C	8C	1C
E	65	45	05	break	1D	1D	1D
F	66	46	06	enter	1E	1E	1E
G	67	47	07	←	9D	8D	1F
H	68	48	08	→	9E	8E	9E
I	69	49	09	0	30	40	30
J	6A	4A	0A	1/!	31	21	31
K	6B	4B	0B	2/"	32	22	32
L	6C	4C	0C	3/#	33	23	33
M	6D	4D	0D	4/\$	34	24	34
N	6E	4E	0E	5/%	35	25	35
O	6F	4F	0F	6/&	36	26	36
P	70	50	10	7/'	37	27	37
Q	71	51	11	8/(38	28	38
R	72	52	12	9/)	39	29	39
S	73	53	13	space bar	20	20	20
T	74	54	14	!*	3A	2A	3A
U	75	55	15	-/=	3D	2D	2D
V	76	56	16	:/+	3B	2B	3B
W	77	57	17	,<	2C	3C	2C
X	78	58	18	.>	2E	3E	2E
Y	79	59	19	/?	2F	3F	2F
Z	7A	5A	1A				

The control key (@), the shift key and the clear key don't return key codes by themselves. They are all polled directly in memory and only influence the codes returned from the other keys.

Fig. 3. Scripsit keyboard driver key codes

Scripsit contains its own keyboard driver (a routine that scans the keyboard and returns unique key codes) instead of using the ROM input routines 2BH or 49H to accomplish keyboard polling. This allows keys to return codes that are not possible from the normal keyboard (@ is used as a control key, for example).

Ordinary system input routines also do not provide a rollover key function (a function allowing you to type faster than characters can be processed). Scripsit can stack up to 32 key codes and process them when time allows. For general information, the keyboard rollover buffer is located at 7E15H.

The keyboard driver routine, located at 6061H, is remarkably similar to the one at ROM location 3E3H. This routine scans the keys and returns a zero in A if no key was pressed, or a key code if one was pressed. Figure 3 shows all key codes available from this keyboard scan routine.

The next level of keyboard input routine, located at 6026H, saves and restores all registers and stacks the input character if the prior ones have not yet been processed. Scripsit's higher level input routines are in Table 2.

Cassette I/O

Scripsit's cassette I/O routines

are very similar to the ROM cassette routines except for some minor time constant changes. (These changes might account for the more reliable cassette I/O.) The important cassette

routines are in Table 3.

Printer and Video I/O

Output to both the line printer and the video display is handled through a single output routine,

6017H	Tests clear key, returns to @ if active Returns next scheduled rollover key Returns character in location 7C30H
5FD2H	Waits for a key press Blinks cursor while waiting at current cursor position (HL)
5FCCH	Main character input routine
5E72H	Line input routine used for break key processing Writes B periods along command line Allows backspacing Places carriage return code 1EH at end of input string and zeros remaining buffer Points HL at input string On return, B has character count, A has first character code
6BF8H	Input decimal number Converts ASCII decimal number to hex Result in A between 1-255

Table 2

6238H	Load tape file routine Sets bit 7 of each control byte
634FH	Save tape file routine
6314H	Verify tape file routine
6370H	Write 256-byte block of data to tape
6381H	Assemble byte from tape, like 235H in ROM
638CH	Read data bit from tape, like 241H in ROM
63AFH	Write data byte to tape, like 264H in ROM
63CBH	Write leader and sync, like 287H in ROM
63DAH	Read leader and sync, like 293H in ROM
63F0H	Define tape drive, like 221H in ROM
63F9H	Turn off cassette, like 1F8H in ROM
640DH	Blink an asterisk, like 22CH in ROM

Table 3

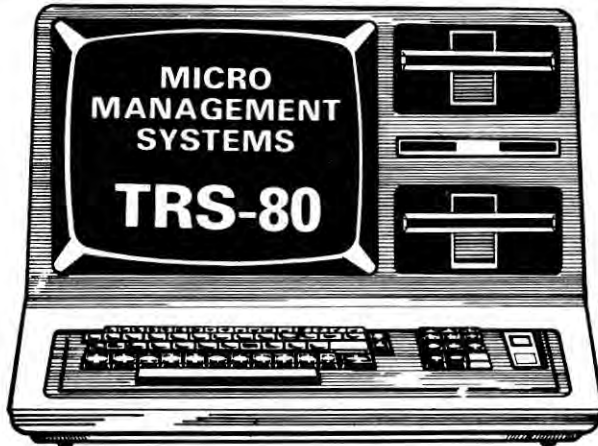
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located at 5F44H. The operation of this routine is controlled by a series of flags set up before the routine is called.

Bit 7 of 7C63H (or IY plus 34H) determines whether the output character in the A register is destined for the line printer (one) or the video display (zero). If the output is for the video display, control transfers to 5F8EH for video output. During this video output routine, the character in A is masked to produce the proper code for display and is stored at the current position of the cursor, HL.

If the character has bit 7 set (Scripsit's control character) the video lookup table at 7966H is scanned to find the printable replacement. If it is found in the table, the replacement character is stored at the current cursor position. If not found, a space is displayed instead.

If bit 7 of 7C63H indicates the character is for the printer, bit 1 of 7C3DH (or IY plus 0EH) is

tested to see if a serial printer has been specified during the print command execution. If a serial printer was specified, control transfers to 5F56H. If the default parallel printer is to be used, control transfers to 5F60H. In either case, if the printer tests ready, the character is output.

Disk I/O

All disk I/O is handled by appropriate calls to the operating system. When writing data to disk bit 7 of all control bytes is set low. On reading back from the disk, the bit is again set high. The address of the pertinent disk I/O routines are as follows:

5D23H	Load disk file routine
5D97H	Save disk file routine
5E13H-5E71H	Operating system calls and error recovery

It is interesting to note that the disk error recovery routine is the only place Scripsit uses the normal video driver DCB. The operating system disk error

Key(s)	Command	Location
shift or @ up arrow	Start entry	6E24H
shift or @ down arrow	End entry	6E5DH
@ Q	Block entry	586AH
	Open	59EEH
	Close	5A3EH
@ W	Window entry	6DADH
	Right	6DC7H
	Left	6DE5H
	Down	5463H
	Up	5411H
	Align window right	6DFEH
	Align window left	6E0EH
	Home cursor	6E56H
@ E	Exchange entry	58B5H
	Word	590EH
	Paragraph	5940H
	Block	5AD2H
@ R	Repeat entry	6F42H
@ S	Insert entry	5678H
	Character	56DDH
	Line	5696H
	Block	5A45H
@ D	Delete entry	5883H
	Character	5608H
	Word	6D6EH
	Line	6D2FH
	Blank(s)	6D96H
	Paragraph	6D55H
	Block	5AAFH
	Unmark	5ABBH
	To end of file	6D1DH
@ →	Tab entry	6B5FH
shift →	End of line entry	6E50H
shift ←	Beginning of line entry	6E50H
@ V	New page entry	6F37H
@ C	New paragraph entry	6EF3H
@ X or enter	New line entry	6F26H
@ F or →	Cursor right entry	5518H
@ ← or ← or @ A	Cursor left entry	54FBH
down	Cursor down entry	54B9H
up	Cursor up entry	552DH
Break	Break key entry	6446H

Fig. 4. Main command entry points

reporting routine at 4409H is called to report any disk-related problems. The internal operation of this error reporting routine dictates the use of the video DCB.

Main Command Entry Points

On Scripsit's normal text entry level, numerous commands can be input along with text. As I mentioned earlier, Scripsit uses a table structure located at 7993H-79DEH in its code to process commands.

Figure 4 shows entry points for all commands available on the text entry level. The commands labeled entry are where the table processing routine at 58F0H jumps to when it recognizes a command mnemonic or key. The items listed under the entry point are the addresses of the routines that actually perform the requested command. For example, if you give the delete command the delete processing routine at 5883H is executed. At that time the additional inputs determine what routines are used. If you input the line key the table processing routine is used again to transfer control to the delete line routine at 6D2FH.

If a text character is input instead of a command mnemonic, control transfers to a routine (at

5608H) which inserts the character into the text buffer at the current position of the cursor. Note that even the cursor positioning commands are entries in the command lookup table.

If you hit the Break key while on the text entry level, control transfers to the special command entry level via a jump to location 6446H. On this level 14 main commands can be issued, along with numerous sub-commands. These are all shown in Fig. 5. The lookup table for Break commands is located at 6AE4H-6BOCH.

The final command table, shown in Fig. 6, is located at 77BFH-77E0H. This is the lookup table for all possible format commands. These routines are jumped to whenever a format specification is identified in your document's text during printing. These format specifications are identified during parsing of the format lines in the subroutine located at 7566H. As with all of these command routines, if the format specification is not found in the lookup table an illegal command error message is output.

Two identical passes are made through the text buffer after the print command. The first pass outputs the Testing

Key	Command	Location
W	Set right margin entry	6597H
P	Set top margin entry	66D5H
	Formatted	7047H
	Unformatted	73AAH
I	Indent entry	66FBH
?	Examine entry	692AH
	Width	697BH
	Length	69AFH
	Memory	6995H
	Cursor line	6936H
	Name	694AH
	Indent	6988H
T	Tab entry	68CBH
	Set one	6B17H
	Set many	68EDH
	Clear one	6B17H
	Clear all	6915H
S	Save entry	6694H
	Tape	634FH
	Disk	5D97H
L	Load entry	6694H
	Tape	6238H
	Disk	5D23H
F	Find entry	67DAH
R	Replace entry	672EH
D	Delete entry	679FH
H	Hyphen entry	6468H
C	Copy mark entry	6F2AH
V	Verify tape entry	6314H
E	End entry	657DH

Fig. 5. Break command entry points

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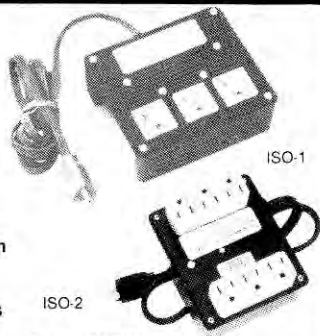
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Mnemonic	Command	Location
RM	Set right margin entry	7658H
TM	Set top margin entry	765FH
BM	Set bottom margin entry	7669H
J	Justify entry	76A5H
C	Center entry	76AAH
VC	Vertical center entry	76AFH
L	L commands entry	7744H
	LS	774FH
	LM	7758H
P	P commands entry	7761H
	PF	7789H
	PL	7792H
	PN	779EH
	Y or N	776FH
F	F commands entry	76DEH
H	H commands entry	76FAH

Fig. 6. Format command entry points

for Errors message and disables the final output to the line printer. Scripsit thinks it outputs the document twice, once for each pass. If the first pass through is successful (no errors are found), the line printer is enabled. The whole output routine repeats, this time slowed substantially by the printer's operation.

Miscellaneous Information

The information in Figs. 7, 8 and 9 explains Scripsit's memory usage. Figure 7 shows where all messages output to the video display are stored. As you can see, they are well distributed throughout the whole program.

Figure 8 shows all the unused memory areas I have found in Scripsit. Program modifications can be placed in these holes without interfering with normal program operation. This is especially true in the 389-byte hole located at 7AA5H. Two of the holes shown on this diagram need further explanation. The first, at 5202H, is the Radio Shack copyright message coded in ASCII. If, when modifying Scripsit, you make the entry point 523FH, you will have a total memory area of 63 bytes for your mods.

The second unused memory area is 31 bytes long, starting at address 584BH. I don't understand why this hole is there—it appears to be some kind of table but I cannot find a reference to it. Any ideas?

Besides the command lookup tables I discussed earlier, Scripsit includes parameter tables, RS-232 baud rate tables and character replacement tables, to name a few. Figure 9 shows the address of all tables, along with a description of what they contain. This list is extremely handy in interpreting data during disassembly.

Figure 10 is a list of important routines and where they reside in Scripsit. This is not meant to be an exhaustive list with detailed memory and register

Group	Message location
1	5202H-523EH
2	57F6H-584AH
3	5C69H-5D22H
4	6435H-6445H
5	69C2H-6AC8H
6	6FB8H-7046H
7	7465H-7484H
8	7807H-7963H (indexed)

Fig. 7. Scripsit's message storage areas

Group	Free Bytes	Location
1	61	5202H-523EH
2	2	5656H-5657H
3	31	584BH-5869H (see text)
4	8	7A66H-7A6DH
5	389	7AA5H-7C29H

Fig. 8. Scripsit's unused memory areas

usage, but an entry point list to guide you to the routines you might be interested in seeing in detail. I will consider detailed usage of some of these routines in my next article.

Coming Attractions

Next month I will show a more practical demonstration of the information in this article—a

patch adding over 15 new features and functions to Scripsit. I will even show how modified Model I Scripsit can be altered to run on the Model III. Until then, have fun playing with your Scripsit program! ■

Craig Lindley, an independent computer programmer, enjoys guitar playing and backpacking.

Number	Location	Description
1	584BH-5869H	Use unknown
2	6AC9H-6ACCH	Print parameter table
3	6ACDH-6AD0H	Load/Save parameter table
4	6AD1H-6AE3H	Examine command lookup table
5	6AE4H-6B0EH	Break command lookup table
6	6B0FH-6B16H	RS-232 baud rate table
7	7446H-7464H	Unformatted print special character lookup table
8	77BFH-77E0H	Format command lookup table
9	77E1H-7806H	Output message index table
10	7964H-7992H	Video special character lookup table
11	7993H-79DEH	Main command lookup table
12	79DFH-79EEH	Delete command lookup table
13	79EFH-7A0AH	Window command lookup table
14	7A0BH-7A14H	Exchange command lookup table
15	7A15H-7A28H	Default print format table

Fig. 9. Scripsit's tables

Number	Location	Description
1	532BH	Line length calculation for formatting video and printer output
2	53FEH	Check character at DE for text boundary mark
3	58F0H	Command lookup routine (see text)
4	59EEH	Insert named text block—block name in A, placed at cursor position
5	5A35H	Convert lowercase alphabet to upper Character in A for input/output
6	5BD2H	Locate named block, name in A
7	5DDCH	Move 256 bytes from disk buffer to text buffer
8	5F60H	Parallel printer status check
9	5F84H	Serial printer status check
10	5FB8H	Yes or No input subroutine Z equals one if yes
11	600CH	Test for clear key active Z equals zero if not active
12	6708H	Parameter check routine
13	6BC8H	Output message on command line
14	6BE9H	Clear command line
15	6C4CH	Convert ASCII decimal at HL to hex in HL
16	6E84H	Format all text buffer lines from current cursor position at DE to the end of the text
17	6F8BH	Recover from illegal command
18	708BH	Move print format defaults into place and initialize all counters
19	70C9H	Format complete page of text from the text buffer
20	7189H	Process next print line
21	71ABH	Justify next print line
22	71B4H	Flush left next print line
23	71DBH	Center next print line
24	71DDH	Flush right next print line
25	71E4H	Adjacent spaces in print line to justify
26	721AH	Move next print line from the text buffer to the print buffer
27	72D5H	Test to see if header/footer should be printed on current page
28	742CH	Check printer pause option
29	7558H	Calculate printed line length
30	7566H	Process text format lines
31	75C2H	Skip forward over spaces and commas
32	7697H	Find end of numeric text string

Fig. 10. Miscellaneous routines and tables

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Using the Color Computer like a drawing board.

Joystick Paintbrush

Gerald Sprouse
9977 C. Chirimolla
San Diego, CA 92131

One of the first programs I entered into my new Color Computer was "Drawing Board" (sample program 14 of the Extended Color Basic Manual). After using this program for several months I added several fea-

tures. The two versions of the program presented here use a joystick to draw, differing only in the method they dump the screen to the printer.

The First Program

Lines 10-100 of Program Listing 1 provide instructions for the user and set the graphics control (line 90). You may obtain greater resolution by using PMODE4,1. If you select this

mode, change the values of CC to zero and three. I don't use this option because it is not compatible with the printout option for this program.

Lines 110-250 interpret joystick movement. Using a joystick is a very convenient way to control the screen drawing. Line 240 checks the status of the joystick pushbutton. Press the button if you want to blank or erase the line.

Lines 260-280 transfer program control to the printer. Lines 290-340 draw the line on the screen and then return program control to line 120 for new instructions.

The routine in lines 350-530 is based on the fact that eight pixels are stored in one word of video RAM memory. The routine reads this word and then converts it to the corresponding printer code to produce a printout. Because my Line Printer VII has only seven dots vertically the conversion is not one to one. The printer does not print all the information stored in video RAM. However, the routine works well because in PMODE3,1 every two pixels are identical. If I select PMODE4,1 an occasional vertical line is not printed.

My printer requires 20 minutes to dump a complete screen. Figure 1 shows a typical output of this program. (Note: You must first input Radio Shack program 700-2013, which allows the

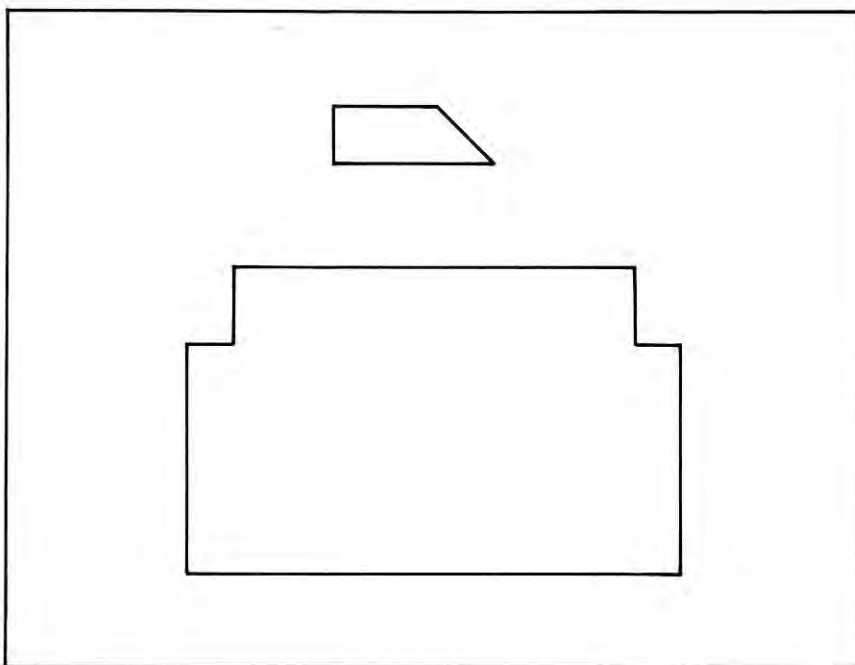


Figure 1

The Key Box

Extended Color Basic
Color Computer
16K RAM
Line printer required



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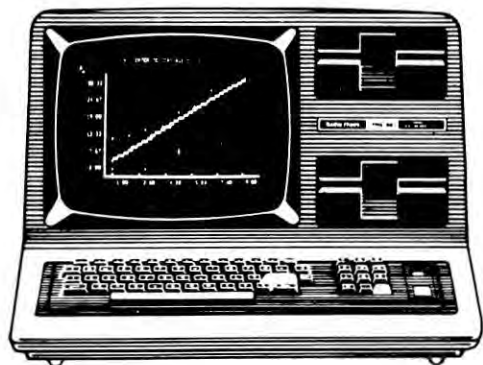
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eight-bit serial interface between the Color Computer and the Line Printer VII. The graphics mode requires the eight-bit serial interface.)

The Second Program

Program Listing 2 employs the Radio Shack Screen Print Routine (Catalog #26-3021).

Lines 10-100 provide instructions for the user and set the

graphics control (line 90). You must use PMODE2,1 with the screen print routine. Also, the values of CC are reversed from version one of the program.

Lines 110-140 draw a box at the edge of the screen. Lines 150-290 allow you to use the joystick to control screen drawing. Press the joystick button if you want to blank or erase the line.

Lines 300-350 draw the line

on the screen and then return control to line 160 for new instructions. Figure 2 shows a typical output of this program.

These programs, favorites with our family, have provided many hours of entertainment.

Because the screen print routine provides a quick dump (less than two minutes) we use the second version more often. ■

Gerald Sprouse is employed as an operations research analyst.

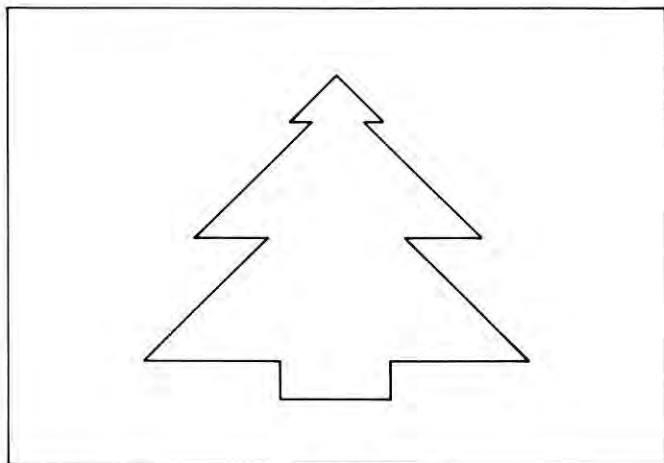


Figure 2

```

10 REM DRAWING BOARD  VERSION 1
20 REM INPUT
30 CLS
40 PRINT" USE JOYSTICK TO DRAW"
50 PRINT" PRESS BUTTON TO ERASE"
60 PRINT" PRESS <H> FOR HARD COPY"
70 PRINT" KEY ENTER TO BEGIN"
80 INPUT Z$
90 PMODE3,1:PCLS:SCREEN1,0:X=128:Y=96:X1=0:Y1=0
100 CC=4
110 REM JOYSTICK
120 A=JOYSTK(0)
130 B=JOYSTK(1)
140 IFA<44 OR A>16 THEN X1=0:Y1=0
150 IPB<44 OR B>16 THEN X1=0:Y1=0
160 IPB<15 THEN Y1=-1:X1=0:GOTO 180
170 IPB<45 THEN Y1=1:X1=0
180 IFA<15 THEN Y1=0:X1=-1:GOTO 200
190 IFA<45 THEN X1=1:Y1=0
200 IFA<15 AND B<15 THEN X1=-1:Y1=-1:GOTO 240
210 IFA<45 AND B>45 THEN X1=1:Y1=1:GOTO 240
220 IFA<15 AND B>45 THEN X1=-1:Y1=1:GOTO 240
230 IFA<45 AND B<15 THEN X1=1:Y1=-1:GOTO 240
240 P=PEEK(65280)
250 IF P=126 OR P=254 THEN CC=1 ELSE CC=4
260 REM KEYBOARD OPTION
270 AS=INKEY$
280 IF AS="H" THEN GOTO 350
290 REM GRAPHICS
300 X=X+X1:Y=Y+Y1:IF X<0 THEN X=0
310 IF X>255 THEN X=255
320 IF Y<0 THEN Y=0:IF Y>191 THEN Y=191
330 PSET (X,Y,CC)
340 GOTO 120
350 REM HARD COPY
360 PRINT#-2,CHR$(18)
370 FOR L=0 TO 31
380 FOR C=1 TO 192
390 A=07680-C*32+L
400 B=PEEK(A)
410 C1=INT(B/128):B=B-C1*128
420 C2=INT(B/64):B=B-C2*64
430 C3=INT(B/32):B=B-C3*32
440 C4=INT(B/16):B=B-C4*16
450 C5=INT(B/8):B=B-C5*8
460 C6=INT(B/4):B=B-C6*4
470 C7=INT(B/2)
480 D=128+C1+2*C2+4*C3+8*C4+16*C5+32*C6+64*C7
490 PRINT#-2,CHR$(D);
500 NEXTC
510 PRINT#-2,CHR$(26)
520 NEXTL
530 GOTO 120

```

Program Listing 1

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```

10 REM DRAWING BOARD  VERSION 2
20 REM INPUT
30 CLS
40 PRINT" USE JOYSTICK TO DRAW"
50 PRINT" PRESS BUTTON TO ERASE"
60 PRINT" PRESS <BREAK> FOLLOWED BY      <SHIFT ^> FOR HARD CO
PY"
70 PRINT" KEY ENTER TO BEGIN"
80 INPUT Z$
90 PMODE2,1:PCLS:SCREEN1,0
100 CC=1
110 REM DRAW BOX
120 FOR X=0TO255:PSET(X,0,CC):PSET(X,191,CC):NEXTX
130 FOR Y=0TO191:PSET(0,Y,CC):PSET(255,Y,CC):NEXTY
140 X=128:Y=96:X1=0:Y1=0
150 REM JOYSTICK
160 A=JOYSTK(0)
170 B=JOYSTK(1)
180 IFA<44 OR A>16 THEN X1=0:Y1=0
190 IPB<44 OR B>16 THEN X1=0:Y1=0
200 IPB<15 THEN Y1=-1:X1=0:GOTO 220
210 IPB<45 THEN Y1=1:X1=0
220 IFA<15 THEN Y1=0:X1=-1:GOTO 240
230 IFA<45 THEN X1=1:Y1=0
240 IFA<15 AND B<15 THEN X1=-1:Y1=-1:GOTO 280
250 IFA<45 AND B>45 THEN X1=1:Y1=1:GOTO 280
260 IFA<15 AND B>45 THEN X1=-1:Y1=1:GOTO 280
270 IFA<45 AND B<15 THEN X1=1:Y1=-1:GOTO 280
280 P=PEEK(65280)
290 IF P=126 OR P=254 THEN CC=4 ELSE CC=1
300 REM GRAPHICS
310 X=X+X1:Y=Y+Y1:IF X<0 THEN X=0
320 IF X>255 THEN X=255
330 IF Y<0 THEN Y=0:IF Y>191 THEN Y=191
340 PSET (X,Y,CC)
350 GOTO 160

```

Program Listing 2



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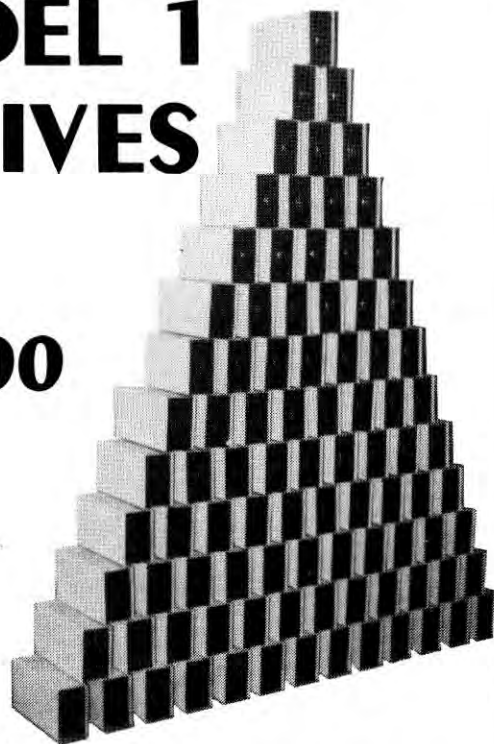
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Compiler Comparison

Ken Knecht
1340 West Third St. #130
Yuma, AZ 85364

Microsoft's Basic Compiler is almost totally compatible with Level II and Disk Basic (when running TRSDOS 2.3). You can run and debug your program using the interpreter and then compile it for additional speed. This means all the excellent debugging tools Basic offers are available, plus such utility programs as Boss make debugging even easier. Debugging compiled Basic is difficult and there is a long delay while the program compiles again each time you change the source code. (The source code is the Basic program you type into the computer.)

The Microsoft compiler loses this advantage if you use the Basic-80 syntax, a compiler option. Although this is an excellent Basic, and contains some of the options available when using Radio Shack's Compiler Basic, it is not compatible with the TRS-80's Interpreter Basic. In all my comments about the Microsoft compiler, I assume you are using regular interpreter Basic, not Basic-80.

The Radio Shack compiler can only run the programs after compilation. It has some debugging features (such as tracing line numbers, checking variable values, and stepping through a program line by line), but this is not as convenient as using the interpreter. Documentation of how to access these features is poor. Checking variable values is awkward. The biggest disadvantage is that you must compile the corrected program again. If the source and object code can fit into memory at the same time, compilation is faster than when compiling from source code stored on disk.

The Radio Shack compiler generates shorter object code programs than does Microsoft's. Both compilers require a runtime module to be used with the program's object file. Thus the object code is not pure machine code and cannot be used on just any Z80 computer.

The Radio Shack compiler loads and saves source code very, very, very slowly!

Both compilers offer sequential and random access files. Only Radio Shack's Compiler Basic permits adding new data to a sequential file after closing the file.

One significant advantage of Radio Shack's Compiler Basic is that you can use variable length random access records. The Microsoft compiler must use the 256-byte fixed length random access records TRSDOS 2.3 allows.

Radio Shack's Compiler Basic offers several types of sequential and random access files; each formats data differently. One method uses formatting similar to Print Using. You can do this with the Microsoft compiler as well, but the method is not well documented in the TRSDOS manual.

```
90;>#>##.##"
100 PRINT USING #1;90,NO%,PRICE
```

In this example line 90 contains the record format; the >s denote justify right. Line 100 then uses line 90 as the format to store items in the record.

With the Microsoft compiler you would use:

```
90 A$ = "##.##.##"
100 PRINT #1, USING A$; NO%, PRICE
```

With the Radio Shack compiler, random access files are a bit easier to use. Radio Shack's compiler does not use the Field

statement or the RSET and LSET statements. With the Microsoft compiler you would use:

```
10 FIELD 1, 11 AS A$, 2 AS B$
20 NAMES$ = "JAMES SMITH"
30 NUM% = 1245
40 LSET A$ = NAMES; LSET B$ = MKI$(NUM%)
```

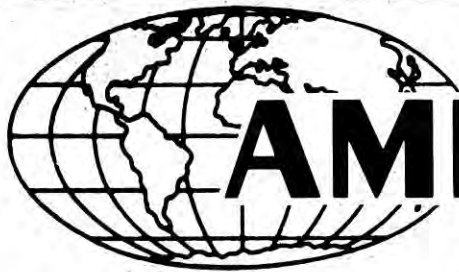
With the Radio Shack compiler you would use:

```
10 ;">#####>###"
20 NAMES$ = "JAMES SMITH"
30 NUM% = 1245
40 PRINT USING #1; 10, NAMES$, NUM%
```

Note that numbers can usually be stored in less space in a Microsoft random access file. But remember, Radio Shack's Compiler Basic permits variable length random access records.

Radio Shack's Compiler Basic offers many other ways for storing data in disk files. You choose the method depending on the type of data you are working with. Radio Shack's Compiler Basic offers easier file handling.

The Radio Shack compiler also offers optional use of an indexed file. This permits you to tie a key to each record. You can then use the key word or number to access that record in the future. Using the indexed file makes access very quick and easy, but the addition of the key file means more space is required on the disk. It is best to use this for files in which you must access individual records frequently and change the contents of the records often. It is also easier for inexperienced operators to use if the key is unambiguous (such as a social security number or driver's license number). Note you can do the same thing using random access files, but you have to create your



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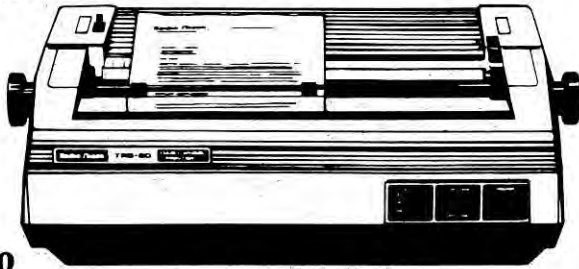
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own software to use a key. Also, Radio Shack Basic's fixed length records make this a bit awkward and slows the access time of the main record.

Another very useful feature in Radio Shack's Compiler Basic is the Call instruction. Microsoft's compiler has this available in Basic-80, but not interpreter Basic. The Call statement allows you to organize the program in modules. You can carry data directly to the module and get data back from the module very easily. For example, you could use a routine like that shown in the Program Listing.

This is an extremely useful feature. Note the variables in the Call and in the SUB (module) do not have to have the same names; only the variable types must agree. Also, to speed up debugging, you can write a short program to test each module before you incorporate it into the main program—short programs compile much faster than long programs.

You can create a library of modules in source code and easily incorporate them in your programs as required. You can also store the modules as object code to save compiling time and space on the disk. You can append either source or object code with the Radio Shack compiler.

Neither system permits using variables or expressions in a DIM statement. Only constants are allowed.

The Radio Shack compiler permits long

variable names. The first six characters are significant. Radio Shack's compiler does not use single precision variables. Variables are either integer (NUM%) or double precision (NUM# or NUM). (Double precision variables are called REAL in Radio Shack's Compiler Basic.) You cannot have two variables of the same name; you cannot use N% and N or N# or N\$ in the same program.

You must use the End statement at the end of a Radio Shack Compiler Basic program; elsewhere you must use Stop.

The Radio Shack compiler includes all the string functions found in Microsoft Basic. However, a few have different names. Thus SEG\$ is used instead of MID\$. Also, SEG\$ cannot be used to the left of the equal sign. A few other names changed are EXT for DEFUSR, HVL for &H, and most of the graphics commands. Arithmetic functions (SIN, LOG, and so on) return double precision values. This is useful for number crunching.

All the usual Basic statements are present in Radio Shack's Compiler Basic, with a few additions. A potentially useful statement is ON BREAK GOTO..., except that if you use it in the main program it is not recognized in any of the modules; if you use it in a module it is only recognized in that module. The statement is useful and usable, but with a lot of work.

Editing is a sore point in the Radio Shack compiler. Once you are used to the character editing features in Microsoft Basic you will find the editing very primitive in the Radio Shack compiler. You can change a character or group of characters in a line, but it is very awkward. There is a way to get all of the Microsoft Basic editing features; you must load the source code with another program, BEdit, to do so. This editor is just like that provided with the Radio Shack Editor/Assembler. In fact, I suspect it is the same editor. As long programs load with annoying slowness, you probably will not use this editor much.

Radio Shack's compiler compiles in one step. You do not have to worry about the linking loader and subroutine library. Thus compilation is much easier, but takes about the same length of time for long programs. Short programs compile much faster when you use the Radio Shack compiler.

The Radio Shack compiler runs on either the Model I or Model III. Both versions are supplied when you purchase the program. As this is written, the Microsoft compiler runs only on the Model I, though I suspect there will be a Model III version by

the time you read this.

Both compilers come with a fat loose-leaf manual. If you are fluent in Microsoft Basic and TRSDOS Disk Basic the Microsoft manual is better. The Radio Shack compiler manual leaves some points rather obscure. I had most of my problems using the debugging features. The manual should explain in more detail passing variables when using Call, such as the effect of declaring a group of variables as integer or string in the main program on the subprograms, and vice-versa.

Programs created by the Microsoft compiler run much faster when you use integer variables, and about the same speed when you use single and double precision variables, with infrequent integer use.

If you use the Basic-80 syntax with the Microsoft compiler you gain most of the special features Radio Shack's Compiler Basic offers, but lose the use of the interpreter. Debugging is much harder than when using the Radio Shack compiler.

In the Radio Shack compiler, if you have source code in memory and compile it all goes well if there is room in memory for the object code. If you run out of memory the system freezes up (after telling you it is out of memory). Your only recourse is to reboot! If you did not save your source code before you tried to compile it, that source code is gone forever. Be warned! The documentation does not mention this.

Both are good Basic compilers. If you are fluent in Microsoft Level II Basic and TRSDOS Disk Basic then you will find the Microsoft compiler easier to learn to use. Many books have been written about Microsoft Basic which makes it easier to learn. However, Radio Shack's Compiler Basic is not much different, especially if you disregard the differences in file handling.

One very nice feature of the Microsoft compiler is that most Basic programs you already have will probably compile with few or no changes. The Radio Shack compiler accepts regular Basic programs saved in ASCII (A option), but you will still have more changing to do to get the program to run than you would using the Microsoft compiler. This can be difficult using Radio Shack's poor editor.

The Radio Shack compiler is \$50 cheaper than Microsoft's.

I prefer the Radio Shack compiler for the kinds of programs (business, data base) I write. If I were doing games or using a lot of graphics I would prefer Microsoft, because of the ability to use the interpreter for debugging. ■

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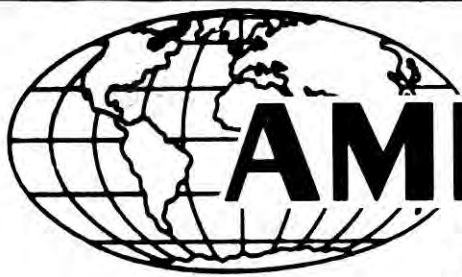
```

10 MONTH$ = "JULY"
20 DAY = 10
30 YEAR = 1980
40 CALL "DATE"; MONTH$, DAY, YEAR, DATES
50 PRINT DATES
60 END

10 SUB "DATE"; M$, D, Y, DA$
20 DA$ = STR$(D) + LEFT$(M$,3) + " " + RIGHT$(STR$(Y),2)
30 SUBEND

```

Program Listing



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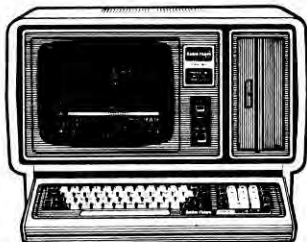
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AW...WHAT THE HECK

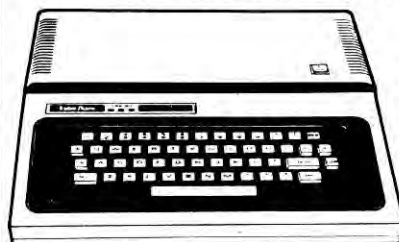
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COLOR COMPUTER



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✓ 220

918-825-4844

Extended Color Basic from Level II programs.

Conversion

Frank H. Osborne
515 Kaplan Street
Roselle, NJ 07203

I often rewrite Level II Basic programs for use on my 16K Color Computer with Extended Color Basic. Since Level II con-

tains some commands not in my computer, it can be a frustrating experience.

An exception to this was Bob Boothe's recent article "Advanced Graphics Techniques" (80 *Microcomputing*, May 1981) in which he created 11 designs

for his printer. Extended Color Basic has splendid graphics capabilities so I rewrote his programs for my computer to present on the screen. The designs all run without resorting to machine language programming or to POKEing commands into RAM as he did.

Extended Color Basic has two "screens." You program into the

The Key Box

Extended Color Basic
Color Computer
16K RAM

```
10 REM DESIGN NO. 1
15 CLS
20 PCLS
25 PMODE 4,1
30 PI=3.1416
35 INPUT "NUMBER OF POINTS";N
40 SCREEN 1,1
45 DIM A(N),B(N)
50 FOR T=0TO2*PI-.001STEP2*PI/N
55 Z=Z+1
60 A(Z)=COS(T)*95+128:B(Z)=SIN(T)*95+96
65 NEXT T
70 FOR S=1 TO N-1:FOR D=S+1 TO N
75 X1=A(S):Y1=B(S)
80 X2=A(D):Y2=B(D)
85 LINE (X1,Y1)-(X2,Y2),PSET
90 NEXT D,S
95 GOTO95
```

Program Listing 1

```
10 REM DESIGN NO. 2
15 CLS
20 PCLS
25 PMODE 4,1
30 PI=3.1416
35 INPUT "NUMBER OF POINTS";N
40 SCREEN 1,1
45 FOR Q=0TO196STEP9
50 X1=0:Y1=0:X2=Q:Y2=196
55 LINE (X1,Y1)-(X2,Y2),PSET
60 X1=Q+58:Y1=0:X2=255:Y2=Q
65 LINE (X1,Y1)-(X2,Y2),PSET
70 NEXT Q
75 DIM A(N),B(N)
80 FOR T=0TO2*PI-.001 STEP 2*PI/N
85 Z=Z+1
90 A(Z)=COS(T)*75+128:B(Z)=SIN(T)*75+
95 NEXT T
100 FOR S=1TO N-1:FOR D=S+1TO N
105 X1=A(S):Y1=B(S)
110 X2=A(D):Y2=B(D)
115 LINE (X1,Y1)-(X2,Y2),PSET
120 NEXT D,S
125 GOTO125
```

Program Listing 2

Two Screens in One Computer

The 16K Color Computer with

```
10 REM DESIGN NO. 3
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 PI=3.1416
40 FOR T=0TO PI/2 STEP PI/180
45 X1=COS(T)*50:Y1=SIN(T)*50
50 X2=COS(T)*196:Y2=SIN(T)*196
55 LINE (X1,Y1)-(X2,Y2),PSET
60 X1=255-X1:Y1=196-Y1
65 X2=255-X2:Y2=196-Y2
70 LINE (X1,Y1)-(X2,Y2),PSET
75 NEXT T
80 GOTO80
```

Program Listing 3

```
10 REM DESIGN NO. 4
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 X1=128:Y1=96
40 FOR Q=1TO30
45 X2=X1+5*Q+2:Y2=Y1
50 LINE (X1,Y1)-(X2,Y2),PSET
55 X1=X2:Y1=Y2+5*Q+3
60 LINE -(X1,Y1),PSET
65 X2=X1-5*Q-5:Y2=Y1
70 LINE -(X2,Y2),PSET
75 X1=X2:Y1=Y2-5*Q-6
80 LINE -(X1,Y1),PSET
85 NEXT Q
90 GOTO90
```

Program Listing 4

```
10 REM DESIGN NO. 5
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 PI=3.1416
40 DIM A(102),B(102),C(102),D(102)
45 X=1
50 FOR T=0TO2*PI STEP PI/50
55 X1=COS(T)*150+250:Y1=SIN(T)*150+202
60 A=T+3*PI/4
65 X2=COS(A)*150+250:Y2=SIN(A)*150+202
70 A(X)=INT(X1)/2:B(X)=INT(Y1)/2
75 C(X)=INT(X2)/2:D(X)=INT(Y2)/2
80 X=X+1
85 NEXT T
90 FOR X=1TO102
95 LINE (A(X),B(X))-(C(X),D(X)),PSET
100 NEXT X
105 GOTO105
```

Program Listing 5



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✓ 221

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computer from the keyboard in the usual way on the text screen where the colorful but low resolution set/reset graphics are also displayed.

The high resolution *graphics* screen, a different entity, consists of up to 8 pages of memory at 1.5K each. Each of the programs presented here uses only the first page of graphics memory.

The Screen command changes from the print screen to the graphics screen. After clearing the graphics screen

using the PCLS command, the program computes the end-points of each line segment. To plot the line between points (X1,Y1) and (X2,Y2), I use the Line command followed by PSET to place the line in the foreground color (otherwise it is plotted in the background color and is invisible).

You can choose the foreground and background colors by using the Color statement (not used here). They depend on the graphics mode you use. There are five modes (PMODE 0-4).

PMODE 0 and PMODE 1 use the largest blocks and give the lowest resolution, while PMODE 4 uses the smallest blocks and gives straight lines and perfect circles (when you use the Circle command). For example, the choice of colors available in PMODE 4 is more limited than in PMODE 3, but PMODE 3 has less resolution. My use of the Line statement eliminates the need for POKEing in a subroutine characteristic of Bob Boothe's original programs.

I adjusted the output of Bob Boothe's programs to fit a rect-

angular tv screen with different horizontal and vertical parameters. The center of the graphics screen is at X equals 128 and Y equals 96. Using Bob's printer centering constants causes error notations where the plot is beyond the range of X (0-255) and/or Y (0-191). Compare my adapted programs with his original ones to see where these changes are incorporated. ■

Frank Osborne is a biology professor at Kean College of New Jersey.

```

10 REM DESIGN NO. 6
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 PI=3.1416
40 DIM A(200),B(200),C(200),D(200)
45 X=1
50 FOR T=0TO10*PI STEP PI/20
55 X1=COS(T)*5*T+250:Y1=SIN(T)*5*T+202
60 A=T+2*PI/3
65 X2=COS(A)*5*A+250:Y2=SIN(A)*5*A+202
70 A(X)=INT(X1)/2:B(X)=INT(Y1)/2
75 C(X)=INT(X2)/2:D(X)=INT(Y2)/2
80 X=X+1
85 NEXT T
90 FOR X=1TO120
95 LINE (A(X),B(X))-(C(X),D(X)),PSET
100 NEXT X
105 GOTO105

```

Program Listing 6

```

10 REM DESIGN NO. 9
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 PI=3.1416
40 DIM A(120),B(120),C(120),D(120)
45 X=1
50 FOR T=0TO2*PI STEP PI/60
55 R=COS(4*T)*180
60 X1=COS(T)*R+250:Y1=SIN(T)*R+202
65 A(X)=INT(X1)/2:B(X)=INT(Y1)/2
70 A=T+PI/4
75 R2=COS(4*A)*180
80 X2=COS(A)*R2+250:Y2=SIN(A)*R2+202
85 C(X)=INT(X2)/2:D(X)=INT(Y2)/2
90 X=X+1
95 NEXT T
100 FOR X=1TO120
105 LINE(A(X),B(X))-(C(X),D(X)),PSET
110 NEXT X
115 GOTO115

```

Program Listing 9

```

10 REM DESIGN NO. 7
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 PI=3.1416
40 DIM A(120),B(120),C(120),D(120)
45 X=1
50 FOR T=0TO2*PI STEP PI/60
55 R=COS(2*T)*180
60 X1=COS(T)*R+250:Y1=SIN(T)*R+202
65 A(X)=INT(X1)/2:B(X)=INT(Y1)/2
70 A=T+PI/3
75 R2=COS(2*A)*180
80 X2=COS(A)*R2+250:Y2=SIN(A)*R2+202
85 C(X)=INT(X2)/2:D(X)=INT(Y2)/2
90 X=X+1
95 NEXT T
100 FOR X=1TO120
105 LINE(A(X),B(X))-(C(X),D(X)),PSET
110 NEXT X
115 GOTO115

```

Program Listing 7

```

10 REM DESIGN NO. 10
15 CLS
20 PCLS
25 PMODE 4,1
30 PI=3.1416
35 SCREEN 1,1
40 FOR T=0TO2*PI STEP PI/30
45 R=T*15
50 X1=COS(T)*R+128:Y1=SIN(T)*R+96
55 A=T+2*PI/3
60 X2=COS(A)*R+128:Y2=SIN(A)*R+96
65 LINE(X1,Y1)-(X2,Y2),PSET
70 B=T+4*PI/3
75 X1=COS(B)*R+128:Y1=SIN(B)*R+96
80 LINE -(X1,Y1),PSET
85 X2=COS(T)*R+128:Y2=SIN(T)*R+96
90 LINE -(X2,Y2),PSET
95 NEXT T
100 GOTO100

```

Program Listing 10

```

10 REM DESIGN NO. 8
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 PI=3.1416
40 DIM A(120),B(120),C(120),D(120)
45 X=1
50 FOR T=0TO2*PI STEP PI/60
55 R=COS(2*T)*180
60 X1=COS(T)*R+250:Y1=SIN(T)*R+202
65 A(X)=INT(X1)/2:B(X)=INT(Y1)/2
70 A=T+PI/2
75 R2=COS(2*A)*180
80 X2=COS(A)*R2+250:Y2=SIN(A)*R2+202
85 C(X)=INT(X2)/2:D(X)=INT(Y2)/2
90 X=X+1
95 NEXT T
100 FOR X=1TO120
105 LINE(A(X),B(X))-(C(X),D(X)),PSET
110 NEXT X
115 GOTO115

```

Program Listing 8

```

10 REM DESIGN NO. 11
15 CLS
20 PCLS
25 PMODE 4,1
30 SCREEN 1,1
35 PI=3.1416
40 R=1
45 FOR T=0TO2.90 STEP PI/30
50 R=R*1.17557
55 X1=COS(T)*R+128:Y1=SIN(T)*R+96
60 A=T+2*PI/3
65 X2=COS(A)*R+128:Y2=SIN(A)*R+96
70 LINE(X1,Y1)-(X2,Y2),PSET
75 B=T+4*PI/3
80 X1=COS(B)*R+128:Y1=SIN(B)*R+96
85 LINE -(X1,Y1),PSET
90 X2=COS(T)*R+128:Y2=SIN(T)*R+96
95 LINE -(X2,Y2),PSET
100 NEXT T
105 GOTO105

```

Program Listing 11

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Adding vital subroutines.

Homebrew Data Base Management—Part II

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As we left it last time, our data base contained only the simplest and very minimum of routines that would enable you to use it, at least in a test mode. By now you have had a chance to try it and come up with some modifications or additions of your own. You may even have found some problems in its operation. If nothing else, you have realized how simple a programming task can be when you break it into

discrete subroutines. I hope you saved a copy of the original program so we can add the remaining program functions.

We will now add more routines to complete the basic program. Table 1 lists the subroutines still open. Since the ability to print the file as it appears in the storage array will prove helpful in testing some of the other routines, we will insert this addition first.

File P

A raw file print enables you to list your file exactly as it appears in the data array. Along with the data, on a deleted record it will also print the D indicator from the DA array zero position. This will appear on the print immediately following the record number. As the comma is the only formatting device, the print listing may be disjointed, especially if the character count per record or number of comma tabs are greater than the line length of your printer.

The file-print subroutine shown in Program Listing 1 consists of two nested loops. The outer (I) loop cycles through the data array, record by record, as the inner (J) loop cycles across each record to print the individual fields. On completion of the print, the program returns to the menu for another selection.

The message "Start raw file print" from line 2000 will appear on the screen to indicate that the file print is starting. Next, the subroutine will print the title (line 2010) and the I loop will start with record zero. We have not used the zero position yet, so your printer will print a blank line or two until it encounters the first data in record two. Line 2030 will print the record number, and the inner loop (lines 2040-2060) will print the contents of each record, field by field. The LPRINT in line 2070 completes the print line to satisfy the trailing comma from print line

2050. This ensures that a new record always starts at the beginning of a line. You can now try a file print.

Look

It may sometimes be advantageous to scan the file on the screen to examine a group of records or a specific record without listing the entire file on your printer. The Look option provides such an ability. It first asks for the record number where you wish to start viewing. After printing that record a "Next?" prompt will appear.

At this point, three options are acceptable: You can enter an N (next) and the next higher record will appear; you can enter B (back) and the next lower record in the file will appear; if you enter a minus 1 you cancel the Look operation and return to the menu.

Enter Program Listing 2. Line 10000 provides the screen prompt for a selection of a record number (SN). When you enter a numeric response specifying a record, the loop in lines 10010-10030 will print each of the selected record fields in turn. Again, only the comma is used for formatting. The PRINT in line 10040 satisfies the trailing comma after the last field is printed so the next record will start at the beginning of a line.

File P—Print the raw file without modification
Purge—Remove deleted records from file
Select—Select specified records for printout
Look—Look through the file line by line
Restore—Restore full file after using Select
Save-D—Save file to disk
Load-D—Load file from disk

Table 1

```
10 'DBII/L01
2000 PRINT"START RAW FILE PRINT"
2010 LPRINT TIS: LPRINT
2020 FOR I = 0 TO RC
2030 LPRINT I,
2040 FOR J = 0 TO FC
2050 LPRINT DA(I,J),
2060 NEXT J
2070 LPRINT
2080 NEXT I
2090 RETURN
```

Program Listing 1. Work File Subroutine

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Line 10050 requests the next selection and three If statements examine the response to see what to do next. Entry of N increments SN and sends the program back through the loop to print the next record, while entry of B decrements SN and prints the previous record. Entry of minus 1 tells the program that you are finished looking and returns the program to the menu.

Line 10090 provides a safety device to protect against an improper selection input. If this line were not included and you were, by accident, to enter some character other than the three that are expected, the program would drop through all three If statements and "crash" into other parts of the program. This statement catches those fall throughs and sends them back to the NEXT? prompt for the entry of a proper selection. This type of a trap following an input option is highly recommended and can avoid a lot of frustration. A number of places in this program do not have this protection. You can try your hand providing coverage against improper input in these areas.

Purge

When you delete a record in the file of this program, it really is not removed from the file. Instead, it is flagged with a D in the data array zero record field and the print routine will bypass it. Although this is a simple procedure it can cause problems if you delete or edit much. In this case, the file can grow to excessive size as it gains large numbers of "deleted" records. When this occurs, you must purge the file of these records to shrink it back to size.

The Purge function reads through the file looking for deleted records. When it finds one it will move the last record in file to that location overwriting the deleted record. The Purge function checks the record moved into position to make certain it is not a deleted record itself. If it is, the program discards it, selects the record just ahead of it in file and uses that one unless it is also marked as deleted. This procedure repeats until a good record is found then moves to overwrite the earlier deleted record. The program continues to check through the entire file until it has removed all deleted records.

Switching and deleting records destroys the chaining sequence. You must now resort the entire file. Rather than build in another sort routine, the program returns to the sort in the Add subroutine and sequences the records as if they were new records being entered for the first time. Since this will take time, depending on the size of the file, use Purge only after you have accomplished all editing and deleting within a work session and then only if the file size is too large.

The Purge subroutine appears in Program Listing 3. The purged record counter (PC) and the saved record counter (SD) are both cleared to zeros. The actual record purging occurs in the For...Next loop extending from line 6030 to 6120. As the loop

```

10 'DBII/L02
10000 INPUT "ENTER STARTING RECORD NUMBER.";SN
10010 FOR I = 1 TO FC
10020 PRINT DA(SN,I),
10030 NEXT I
10040 PRINT
10050 INPUT "NEXT?";NN$
10060 IF NN$ = "N" THEN SN = SN + 1: GOTO 10010
10070 IF NN$ = "B" THEN SN = SN - 1: GOTO 10010
10080 IF NN$ = "-1" THEN RETURN
10090 GOTO 10050

```

Program Listing 2. Look Subroutine

cycles through each record, the zero field position is checked for a D. If no D is found in a given record, the program jumps to line 6110 where the saved record counter (SD) is incremented by one and the following Next I carries the program back to look at the next record. If, on the other hand, a D is found, the last record in the file is checked in line 6045 to see if it is also a deleted record. If it is, the record counter (RC) decrements by one, thus shortening the file by one record and dropping that last record right out of file. Line 6046 then sends the program to check what is now the last record in file for a D. This cycle repeats until it finds a record to save that can be inserted in place of the initial deleted record.

Lines 6050-6093 then move the record to overwrite the purged record. Actually the program does not move the record at all as the Varptr function with the PEEK and POKE changes the file pointers to give the effect of record movement. I used this method, rather than moving the record to avoid cluttering the TRS-80 string storage space and having the computer go into "mumble mode" while it clears and rearranges this area. If you have not used the Varptr function for this type of operation, I suggest that you study it. It can save running time especially if you do extensive string manipulations.

The loop will continue to cycle until it examines all the records and purges the deleted records from the file. Each time a record is removed, the record counter (RC) decrements by one count and when a record is saved, the saved counter (SD) increases by one count.

To empty the chaining array of any residual garbage prior to the sort, it is cleared to zeros in lines 6130-6170. The record counter (RC) is set to a one and the saved record count remaining after the purge is transferred to the new record counter (NC). These counts will be the loop controls when the program jumps to the Add routine to be re-sorted. The sort operates as it would with the addition of new records under the Add function. On completion of the sort, the program returns to the menu. The purge is complete.

Select

On occasion, you may want to print a listing limited to a selected group of records in file. For example, you have built an address file and you want to list only those people

living in Harrisburg. The Select function does this. In addition, this subroutine allows you, through an AND or OR function, to be even more specific. You can select people who live in Harrisburg AND on Main Street. Only the records containing both of the noted words will print. You can also select a list of people residing in Harrisburg OR Pittsburgh. The subroutine is quite flexible for its apparent simplicity.

For this function, the zero position on the chain array (KY(X,0)) for each record will store our selections. To make this option function, in addition to the subroutine itself that will start at line 7000, we will make additions at two other program locations.

Program Listing 4 shows the necessary statements. In the housekeeping area, add lines 130 to 150 which form a loop to set all

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the KY(X,0) positions to a 1. In the print routine add line 3115 to bypass (not print) any record in which the zero record position of the KY array is a zero. Without the Select function, therefore, you can print all records as a result of all KY array zero position fields containing a one. To avoid losing these ones when using the New function, revise line 13040 as shown.

The Select routine starts at line 7000. The first thing it does is change all those ones we just talked about to zeros. Now, without some type of selection, you cannot print any records. Line 7010 asks for the field number and requests the data list to be searched for. As an example, suppose you have your addresses in field number three. You would enter 3 to the field request and "Harrisburg" to the list request. Field 3 will then be searched for Harrisburg and for each find the KY(X,0) position, for that

record, will be changed to a one.

On completion of the search, a prompt will appear (line 7120). You can END the select function and return to menu, or make a search with an AND function or, make a search with an OR function. If you select either of the latter, the program will return to the "which field?" option to prepare for another pass through the file. The OR function will change the zeros to ones on a find as did the original pass. The AND, however, will change any "no finds" to a zero; thus the only "ones" remaining are the finds under both passes. On return to the menu, you can now print the selected records.

Restore

The Restore function is necessary after the Select routine to return all the selected keys to ones so that you can access the entire file again. Program Listing 5 contains a

```
10 'DBII/L03
6000 PRINT "STARTING PURGE ROUTINE"
6010 PC = 0
6020 SD = 0
6030 FOR I = 2 TO RC
6040 IF DA(I,0) <> "D" THEN GOTO 6110 ELSE PC = PC + 1
6045 IF DA(RC,0) = "D" THEN RC = RC - 1 ELSE GOTO 6050
6046 GOTO 6045
6050 FOR J = 1 TO FC
6060 FOR K = 0 TO 2
6070 A2 = PEEK(VARPTR(DA(RC,J))+K)
6080 POKE(VARPTR(DA(I,J))+K),A2
6090 NEXT K
6093 NEXT J
6095 DA(I,0) = ""
6100 RC = RC - 1
6110 SD = SD + 1
6120 NEXT I
6130 FOR I = 0 TO RC
6140 FOR J = 0 TO FC
6150 KY(I,J) = 0
6160 NEXT J
6170 NEXT I
6180 RC = 1
6190 NC = SD - PC
6200 GOTO 1090
```

Program Listing 3. Purge Subroutine

```
10 'DBII/L04
130 FOR I = 1 TO 50
140 KY(I,0) = 1
150 NEXT I
3115 IF KY(GO,0) = 0 THEN GOTO 3220
7000 FOR I = 1 TO RC
7001 KY(I,0) = 0
7002 NEXT I
7010 INPUT "ENTER FIELD TO BE SEARCHED.";SF
7020 INPUT "ENTER LIST TO BE FOUND.";C$
7030 CC = LEN(C$)
7040 FOR I = 2 TO RC
7050 FOR J = 1 TO LEN(DA(I,SF))-CC+1
7060 IF C$ <> MID$(DA(I,SF),J,CC) THEN GOTO 7090
7070 IF OC <> 2 THEN KY(I,0) = 1
7080 GOTO 7110
7090 NEXT J
7100 IF OC = 2 THEN KY(I,0) = 0
7110 NEXT I
7120 INPUT "<1> END <2> AND <3> OR";OC
7130 IF OC = 1 THEN RETURN ELSE GOTO 7010
13040 IF J <> 0 THEN KY(I,J) = 0 ELSE KY(I,J) = 1
```

Program Listing 4. Select Subroutine

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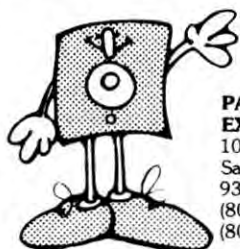
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loop to cycle through all the records and insert the necessary ones in the KY array zero field position. Once this is done, the file is ready for another Select, Print and so on.

Save-D

The disk save routine is fairly standard for a sequential file and is similar to the tape save. Line 11000 (Program Listing 6) prints the name under which the file is currently saved, assuming it had been read in as a disk file. The following line asks for the name under which you wish to save your current data file to disk. The same file specification will call the file for later use. Line 11010 opens the file for output defining the file specification from the name just entered.

The first record saved consists of the title, record count and the field count. Note the comma enclosed in quotes following the TI\$. Make certain that it is entered as shown to avoid file structure problems. The same use of a comma in quotes occurs again in line 10040. These commas keep the string fields separated as individual fields for proper read on input. A loop starting at line 11030 cycles the program through each record and its chain array and prints them to disk. Line 10035 ensures a record in the DA(X,0) position; again to keep the stored

records in step with the arrays that will read them out of file and back into memory. When all the records have been read out to disk, the file will be closed and the program will return to the menu.

Load-D

The disk file input routine shown in Program Listing 7 follows the same pattern as the save routine. Line 12000 requests the file specification and the file is opened for input. The first record read in consists of the file title, the record count and the field count. A loop then reads in the chaining information and the data. When all records are in, the file is closed and a return to the menu is made.

Testing

We have now installed all the major sub-routines. You can set up a small file of some type and thoroughly test all subroutines and the program as a whole. This will provide the necessary proof that they all work as they should, and will familiarize you with the overall program operation.

You will find that the program can be useful at this stage of its construction, but it still lacks many features that will make it easier and more comfortable to work with. It would be nice to have field headings, better field formatting for printing and some statements on the screen to show what is happening during some of the longer processing cycles and other enhancements. Next time we will add some of the features that I have already worked out to improve operation.

Drop me a line with some of your ideas and how you implemented them. Possibly we can build them into the master program. ■

```
10 'DBII/L05
14000 FOR I = 1 TO RC
14010 KY(I,0) = 1
14020 NEXT I
14030 RETURN
```

Program Listing 5. Restore Subroutine

```
10 'DBII/L06
11000 PRINT "CURRENT FILE IS ";CF$
11005 INPUT "SAVE FILE NAMED - ";CF$
11010 OPEN "O",1,CF$
11020 PRINT#1, TI$," ", RC; FC
11030 FOR I = 0 TO RC
11035 IF DA(I,0) = "" THEN DA(I,0) = "0"
11040 PRINT#1, KY(I,0); KY(I,1); KY(I,2); KY(I,3); KY(I,4); KY(I,5);
DA(I,0); " "; DA(I,1); " "; DA(I,2); " "; DA(I,3); " "; DA(I,4);
" "; DA(I,5)
11050 NEXT I
11060 CLOSE 1
11070 RETURN
```

Program Listing 6. Disk Save Subroutine

```
10 'DBII/L07
12000 INPUT "ENTER FILE NAME TO BE LOADED.";CF$
12010 OPEN "I",1,CF$
12020 INPUT#1, TI$, RC, FC
12030 FOR I = 0 TO RC
12040 INPUT#1, KY(I,0), KY(I,1), KY(I,2), KY(I,3), KY(I,4), KY(I,5),
DA(I,0), DA(I,1), DA(I,2), DA(I,3), DA(I,4), DA(I,5)
12050 NEXT I
12060 CLOSE 1
12070 RETURN
```

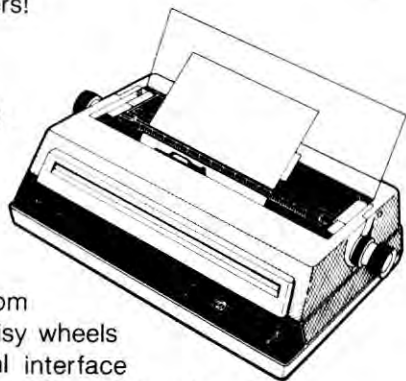
Program Listing 7. Disk Load Subroutine

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ARROW OF DEATH, PART 1

By Brian Howarth from Acorn

Proper English only! This British import is Acorn Software's first adventure and it meets their reputation for high quality. The vocabulary you use in this adventure must conform to proper English standards—not the barbaric tongue spoken here in the colonies! You and Sorcerer Zarda must restore the kingdom from the engulfing sense of bitterness and ill feeling that forced the ruler to flee the palace.

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By Jyym Pearson from Med Systems**

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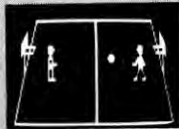
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COSMIC FIGHTER

By Hogue & Konyu from Big Five
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By Leo Christopherson from Acorn
Teach your "animated android" how to wield a laser sword! Leo Christopherson, author of "Android NIM," "Dancing Demon," "Voyage to Valkyrie" and other animations, has developed a new type of animation and high quality sound in this work.

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PINBALL

By John Allen from Acorn
Get your flipper fingers ready for action in this real-time, machine language game. Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80. Choose from five playing speeds to match your skill. Can you beat your friends' scores? Will you avoid the infamous "Bermuda Square?" Get PINBALL today and find out.

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*No joystick option.

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From Personal Software
Your greatest adventure awaits you in the Great Underground Empire of Zork! You'll face perils and puzzles as you try to escape from Zork I with the Twenty Treasures and your life. You'll experience challenges in their most realistic sense—you can communicate in complete sentences with the largest vocabulary and range of command options anywhere. Challenges change as you make your moves. Beware mysterious objects and beware the Thief! "Save the game" feature.

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By Hogue & Konyu from Big-Five
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METEOR MISSION 2

By Hogue & Konyu from Big Five
Six astronauts are stranded on a desolate planet. You must undock from your command module and maneuver your rescue shuttle through the asteroid field to save them.

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EVEREST EXPLORER



By W. Godwin & D. Knowlton from Acorn
Challenge the world's highest mountain without ever leaving home. In this simulation you must buy the manpower and supplies you will need to support your quest. Now the adventure begins as you conquer the elements and terrain, establishing ever higher encampments. Will you reach Everest's 29,028 foot summit? It can be done, but it takes planning, willpower, and luck.

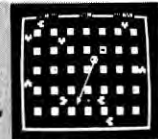
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By Laurence, Sothen & Gavenda from Acorn
Play football against a friend or your computer. With graphic display of the field, ball and scoreboard. Choose from 11 offensive plays against your opponents 7 defenses—77 possible, play options! Five levels of difficulty; save the game feature.

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ATTACK FORCE!



By Hogue & Konyu from Big Five
Unlike the usual space "shoot-em-ups," Attack Force lets you control both speed and direction as you maneuver all over the screen in search of the alien Ramships and Flagships.

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GAMMON CHALLENGER

By Daly & Throop from Acorn
There's a whole other computer backgammon game like this one! Choose one of three levels of play, but don't get too ambitious—Gammon Challenger will put your skill to the test at all levels. For serious players, the "doubling cube" option can be used for added excitement.

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INVADERS FROM SPACE



By Carl Miller from Acorn
A fast machine language approach to this classic (and addictive) space game. The aliens drop bombs and move from side to side trying to overrun your bases. You choose the speed, enemy bomb frequency and accuracy, your number of shots on screen and bases. Unlike most such games, you can move your base and simultaneously fire at the invaders. Full sound effects add even more excitement to the incredible action of INVADERS FROM SPACE. Fun for all ages and skill levels.

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QUAD

By Charles Asper from Acorn
Ready for 3-dimensional Tic-Tac-Toe? Then you'll love Quad, Acorn's challenging version. Play against the computer or a friend, against the computer, there are 4 levels of difficulty. Or rotate the cube 6 ways to help you and confuse your opponent. 76 different winning 4-in-a-row combinations.

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SPACE WAR

By Device Oriented Games from Acorn
Two-player, real-time action game that lets each player control a spaceship with rotate, thrust, fire and hyperspace. 5 game options (including gravity); 3 playing speeds. Lots of action as you maneuver your craft in an interstellar dogfight, or run for the cover of hyperspace!

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LDOS 5.1

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LDOS 5.1 is the state of the art in operating systems for the TRS-80. It supports more features and different kinds of hardware than any of its competitors and possesses a user friendliness not found elsewhere.

LDOS features device independence including creating special phantom devices for use in routing and linking to and from files and other devices. For example, you can link the RS-232 to the line printer, and every time you execute an LPRINT statement, the output goes to the serial port. What do you do if you wish to use a serial printer *and* a parallel printer? LDOS allows any device to be opened as though it were a file. Try this example: SET *CL RS232R(BAUD = 300, PARITY = ON, EVEN, WORD = 7, STOP = 1) (or whatever your particular printer requires). Then go into LBasic and run the program:

```
10 OPEN"O",1,"CL":REM OPEN THE DEVICE
20 PRINT#1,"HELLO I'M YOUR SERIAL PRINTER"
30 LPRINT"HELLO I'M YOUR PARALLEL PRINTER"
40 CLOSE
50 END
```

The power available to the Basic program can be used to write a bulletin board program by connecting a modem to the RS-232 instead of a printer. By first linking *UD to filespec and then linking *DO to *UD, you can set up a user defined device to send all video to a disk file. By filtering the *UD device to remove certain characters, those characters will never be sent to the disk file.

Does your printer do funny things when it receives certain control codes? If so you may install a filter between the *PR device to

move or translate those codes. A filter is a program or routine that changes, adds to, or subtracts data that is passed through it. The folks at Logical Systems have provided a special filter disk at extra cost containing many routines for device filtering. In what is an unusual practice in personal computing, they also provided the source codes for the filters. This makes the filters doubly useful because the moderately skilled user can modify them.

One of the filters provided, SLASH0/FLT, makes daisy-wheel and other printers which do not slash their zeros do a backspace and print a slash mark over each zero sent to the printer. Since my printer supports a "no escapement on next character" command, I was able (with the source code) to modify the filter to accept these codes and save two carriage movements whenever my printer was called upon to slash a zero. This speeded my printing noticeably and saves wear and tear on my printer.

Also on the filter disk is a complete EBCDIC translation filter and a Dvorak keyboard filter as well as many other useful filters. A MINIDOS filter is provided with LDOS 5.1 which allows you to kill files, check free space, send characters to the printer, turn the clock on or off, enter debugger, display a disk directory, or repeat the last DOS command. All this is possible from within your application, provided the application has not disabled the interrupts. All properly written filters may be loaded into memory and then SYSGENed to be loaded automatically and quickly at each reboot. This is also true of the device drivers within LDOS.

Device independence is not the only powerful feature offered by LDOS. It is very easy to use. A TRSDOS user can step right into LDOS with minimal effort. Although some of LDOS' advanced features require study to understand, a full comprehension is not required for successful operation of the system. The command syntax is almost identical to TRSDOS, though every command has been greatly expanded. The DIR command,

for example, can display a sorted directory of all /CMD files in the system on all drives with the command: DIR /CMD. Files are maintained in the directory with the last date the file was modified and a modification flag to indicate whether the file has been backed up since that time.

The command DIR :2(MOD,A,P) sends a directory of all files in drive two that have been modified since the last time they were backed up, with their size and date, to the printer. The command DIR (DATE = "01/15/82-02/15/82") returns all files bearing either of those two dates or any date between them. Eliminating the first date displays all files whose date is less than the date specified and placing a hyphen after the date displays all files whose dates are later than the date specified. These same parameters may be used with the Backup and Purge commands, greatly simplifying file management on a system running LDOS.

This logical manner of assigning parameter names makes LDOS easy to learn and use.

Another example is the Free command: If it is given with a drivespec, a free-space map of the requested disk is displayed. If it is given without a drivespec it performs just as it does in TRSDOS. LDOS also accepts commands entered in either upper or lowercase or a mixture of both.

The Percom Doubler II

Another example of user-friendliness is the Percom Doubler installed in the expansion interface. The default immediately becomes double density for the format operation, and the track count for the drive is used as a default also. The system instantly recognizes a double or single-density disk without operator intervention. This is known as automatic density recognition.

The user of LDOS simply specifies the kind of format he wants or simply presses enter to use the defaults (which are user definable) and the system takes care of the

Voyager I

From Avalon Hill
You're on board a spaceship infested with killer robots in this graphic science fiction game. You must clear the 4-level 144-location ship of robots and arm it to self-destruct. Can you do it and escape before you, too, are blown up? High-speed graphics are represented in 3-D perspective representing your eye's view; with instant switching to floor plan maps. Extended BASIC required.
16K Tape, \$19.95



Ghost Gobbler

From Spectral Associates
In this new and exciting version of the popular arcade game, use your joysticks to move your Ghost Gobbler through the maze, eating dots and power pills to score points. 8 bonus shapes, super sound, and 16 skill levels. Extended BASIC not required; joysticks.
16K Tape, \$21.95



Creatavader

By Fred Scerbo from Illustrated Memory Banks
Create your own antagonist, and fire away! Pick your pet target, or use ours: tv sets, killer tomatoes or smiley faces. Use the joystick to fire your cannon and clear the screen. Look out for the secret target defender! Extended BASIC and one joystick required.
16K Tape, \$18.95



Madness and the Minotaur

From Spectral Associates
Classic adventure game with 200 rooms, assorted friendly and dangerous creatures, 8 magic spells and —of course—treasures. The computer obeys two-word commands such as "get lamp" to move you through your journey. You must enter the castle of King Minos, descend into the labyrinth and collect all the treasures you can.
16K Tape, \$19.95

Color Computer Blockade

By Terry Kepner from Interpro
Compete against a friend or the computer in this real-time, full color arcade game with sound effects. Use your joysticks to draw a barrier around your opponent while avoiding the trap being set for you. Requires joysticks.
Level I 4K/16K or Level II with Extended BASIC
Tape, \$14.95

Gator Zone

By Scerbo and Jammalo from Illustrated Memory Banks
Revenge on the Preppies at last!! The Preppy Craze has gotten completely out of control. You must journey to the planet "Preptune" to stop the 'gators from invading earth in assorted garment forms. Use your shirt shields and lasers to protect you as you aim the crosshairs and press the fire button on your joystick. Get the gators before they get your shirts! 3 levels of difficulty. Extended BASIC required; joysticks.
16K Tape, \$18.95



Moon Lander

By Greg Zumwalt from American Small Business Computers
Pilot your spacecraft over the moon's landscape and try to land it amid the mountains and craters. While carefully controlling your fuel consumption, use your joysticks to maneuver your craft and control your velocity against the forces of gravity. Be careful to avoid the asteroids drifting through space.
16K Tape, \$14.95



S.E.C.S.

(Screen Edit Control System)

By Steve Bjork from DataSoft, Inc.
One program provides you with high resolution graphics, enabling you to draw lines in any direction and in any color. Invert the screen, set color, set programmable character, set line and set screen. The screen-based editor includes auto key repeat, insert, delete, joining/relocating lines, audible error warning. The Character Generator has set of 64 definable characters which can be placed on screen in variety of colors and positions for everything from Japanese to scientific notation. Characters can be saved and re-used.
4K required for editor; 16K for other features.
Tape, \$29.95



The Super "Color" Terminal

From Nelson Software Systems
Time Share, Smart Terminal, High-speed Data Transfer and Videotex. Turns your Color Computer into a Super-smart terminal with all the features of VIDEO-TEX plus much more. Communicate with Dow Jones, Comuserve and computers like TRS-80 Models I, II, III, APPLE, etc. via modem or RS-232 direct. Save the data to tape, or print it! Cuts on-line costs to a minimum.
ROM Pak, \$49.95
Disk, \$69.95

TRS-80 Color Basic

By Bob Albrecht from John Wiley & Sons
Step-by-step guide to the unique color, sound and graphic capabilities of your new Color Computer. No previous experience is required. Teach yourself BASIC—there's a whole chapter on typical programming problems and solutions.
Softcover, \$9.95

TRS-80 Programs and Applications for the Color Computer

By Alfred Baker from Reston
Handy guide to your Color Computer: how to play games, balance your checkbook, use your computer as a teacher, etc. With chapters on color and sound, art and music. Helpful for beginning or experienced computer user.
Softcover, \$14.95



Color Computer Scarfman

From The Cornsoft Group
Use the keyboard or joysticks to move your Color Scarfman through the maze to gobble up little yellow dots while avoiding 5 red monsters. If Scarfman can eat a yellow plus (+), a monster turns blue and can be eaten. Each time you clear the screen, the level and point value increase. Extended BASIC not required.
4K Tape, \$19.95

Scepter of Kzirgla

From Rainbow Connection Software
Real-time graphics adventure game with arcade sound for the color computer. 13 floors of dungeon with monsters, treasure chests, hidden trap doors... even a flying magic carpet! All in your quest to find the Scepter of Kzirgla. Whatever you do, don't get caught in the poisonous gas cloud! Extended BASIC required.
16K Tape, \$16.95, 16K Disk, \$21.95



Master Control

From Soft Sector Marketing
This is a BASIC language program designed to decrease typing time and error while providing direct control of motor, trace, audio and run. With Automatic Line Numbering and a custom key you can re-use or change at any time; plus 50 preprogrammed command keys. Can be used on a 32K system.
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- Plus a real-time clock, sockets for custom ROM, and a heavy-duty power supply for your keyboard unit

Discover the real power and potential of your Model I, with the bargain-priced Lobo LX-80!

LX-80 with LDOS operating system (required)	\$510.00
LX-80 without LDOS (for current LDOS users)	\$460.00
Dual RS-232C serial port option	\$100.00

LDOS: the ultimate TRSDOS-compatible operating system

One of the few software products ever to receive a perfect box score from *Infoworld* magazine. The reviewer said: "LDOS 5.1 is awesome! ... It performs nearly perfectly ... a straightforward and simple system to use ... the best manual for software I've ever seen or reviewed, bar none ... This DOS takes the TRS-80 from the hobby category and endows it with features that many a so-called business system does not have. ... LDOS offers unparalleled versatility and function."

LDOS includes a powerful extended disk BASIC, smart terminal emulator, and many other useful utilities that make it worth far more than its low price. It runs on any Model I or Model III with at least one disk drive.

LDOS operating system (specify Model I or Model III) \$129.00



Add-on 8" floppies for Model II

Why pay Radio Shack prices to expand your Model II's disk capacity? The Lobo 8202C2 adds two 8" double-density floppy drives, for a total of 1.1 megabytes of additional storage. Installation and operation are identical, and you get the added benefit of Lobo's 1-year parts and labor warranty. **8202C2 dual-drive 8" floppy system for Model II \$1269.00**

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Completely compatible with all Model I hardware and software, but with an extra 5 tracks for data storage. Requires a Model I with either the Radio Shack expansion interface or the Lobo LX-80 (see left).

4401C Add-on 5 1/4" drive for Model I \$305.00

High-capacity minifloppy for LX-80

An economical way to get a big storage boost for your LX-80-equipped Model I. The double-sided, 96 track/inch drive stores 720 kB, and eliminates most tedious disk swapping.

Model 4801C high-capacity 5 1/4" drive for LX-80 \$465.00



Winchester disk systems for Model I and Model III

The ultimate mass storage devices! Enormous capacity and impressive speed give your system a dramatic performance boost. Add the impressive file-handling capabilities of LDOS (included), and you can outperform systems costing far more. **IMPORTANT:** Many Winchester disks now being sold have no provision for file backup. Lobo systems include a built-in high-density floppy drive that can store the entire contents of the hard disk on just 6 or 7 floppies. This backup drive is also usable for additional on-line storage of programs and data.

8" floppy systems for Model I and Model III

These rugged dual-drive systems attach to any Model I with LX-80 expansion interface, or any Model III, and add the mass storage you need for the big jobs. Double density recording stores 535kB on one side of the disk. Using the LDOS operating system (required) you get full compatibility with standard TRSDOS plus greatly increased capabilities.

8202C3 two single-sided drives (1.1 MB total) for Model III \$1625.00

8202CX same as above, for Model I with LX-80 (sold separately) \$1249.00

5202C3 two double-sided drives (2.2 MB total) for Model III \$2025.00

5202CX same as above, for Model I with LX-80 (sold separately) \$1749.00

5 1/4" Winchester System

Compact and exceptionally reliable, with 4.8 megabytes of high-speed Winchester storage plus a 720 kilobyte floppy drive. The value leader in mass storage.

950T for Model III or Model I with LX-80 (sold separately) \$3633.00

8" Winchester System

Over 9 million bytes of storage accessible in milliseconds: 8.2 MB on an 8" Winchester drive and another 1.1 MB on the backup floppy drive. Unsurpassed for maintaining very large data bases.

1850T for Model III or Model I with LX-80 (sold separately) \$4459.00

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The Lobo Warranty

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rest—no more fooling around with a complicated and unnecessary PDrive configuration. LDOS knows what kind of disk it is trying to read and reads or writes to it automatically. The combination of LDOS and the Percom Doubler II is unbeatable for double density.

The Copy command under LDOS is greatly expanded. It copies any file from one disk to another, but also copies a file to a device. The command Copy FILESPEC/BAS:3 TO *CL copies the contents of the file out the RS-232 automatically. This command was of great use to me when I transferred a number of files to an Apple computer. The LRL parameter allows changing the logical record length of the destination file to whatever you wish. The Clone parameter duplicates the attributes, visibility and passwords of the destination file to those of the source file. The Echo parameter echos characters to the screen if the copy is from a file to a device, or from a device to a device. Also included is an X parameter which allows copies to be made without a System disk in drive zero. The command Copy *KI*PR copies what is typed at the keyboard directly to the printer until break is pressed. If the Echo parameter is specified, the characters are also sent to the screen.

Unlike NEWDOS80, the Copy command is not intended for multiple file transfers or disk backup. A Backup command is provided for this purpose and honors most of the parameters used by the other commands. Unlike other systems, Backup cannot reproduce to a disk that has not been formatted, but I like this as it has saved me from accidentally ruining a valuable disk on more than one occasion. Backups may be done by file, date, range of dates, or whether or not they exist on the destination disk, by way of the DATE =, new and old parameters. The use of any of these parameters forces a backup by file. If the Query parameter is specified, the operator is prompted for each file before it is backed-up. Although backup by file can be slow on a double-density disk, it can be speeded greatly with the system(SYSRES = n) feature described below. Backup automatically requires that the source disk's password be entered before the backup is allowed if that password is other than "Password." The manual gives a master password that can be used to access any file if you don't know the password.

The Device Command

An entire book could be written about LDOS' Device command. Because of the device independence of the system, it is often necessary to know the ways the devices are routed and the entry address of the drivers for these devices. Another purpose of this command is to show the system options in use and the system modules resident in memory. Also shown is the density and number of cylinders on disk in each drive when the command is issued or the last disk read if the drive is empty. Only with LDOS and VTOS, and only on a single-sided

disk, are the terms track and cylinder interchangeable. If you have a two-sided, 80-track drive, you actually have a 160-track drive of 80 cylinders, and each cylinder has two tracks—one on the front surface of the disk and one on the back. On a hard disk, it is possible to have several tracks on each cylinder because the drive may have several platters.

LDOS comes with a complete job-control language and 26 well-written pages of documentation. Some of the macros in the job-control language are: Include, Input, Keyin, If, Else, Set, Reset, Assign and End. This is a complete chaining language in itself; though not as powerful as Basic, it is much more powerful than the simple chaining facilities offered on other systems. If you wish to write a menu-driven set of applications software for your non-computer-oriented employees to use, the LDOS JCL is more than adequate for your needs.

Included in LDOS is a printer spooler that operates with complete invisibility. To activate the spooler type: SPOOL *PR FILESPEC/SPL (MEM=5,DISK=50). This spools the printer from 5K of memory and, when this is filled, can use up to 50K of disk space before hanging up the system to wait on the printer. If desired, DISK=0 can be specified to avoid the use of disk space, but at least 1K of memory must be specified. This is one of the best spoolers I've seen including those offered as stand-alone programs. The spooler works from within Scripsit and any other program that does not disable the interrupts.

The List command is another enhanced command. By entering List Scripsit/CMD(H) a listing of the file Scripsit in hex format is provided. Each byte in the file is shown in hex and ASCII, one beneath the other on the screen with ASCII to the right of hex on the printer. Entering List Source/ASM(T), lists the EDTASM source file named Source/ASM, resets bit seven of the line numbers so they may be read, and expands all tab characters to the next column, making for a very neat listing. All this can be done from the LDOS Ready prompt.

The command List File/BAS(LINE=1500) lists the ASCII Basic program file beginning with line number 1500 and ignoring all numbers before line 1500. The command List File/TXT(NUM), automatically adds line numbers to the listed file beginning with one and incrementing by ones after each carriage return. There is no Print command in LDOS. This is done by entering List Filespec(P).

The KI/DVR device driver enables features such as keystroke type-ahead and the JKL screen-print function. Type-ahead is the feature I like most; it allows the operator to key in his input before the computer is ready for it. When the computer is ready, the information is relayed to it without delay. It takes getting used to, and the typist must not make any errors or the next input prompt will not get what it expects. The type-ahead buffer may be emptied at any time by typing clear-@ simultaneously allowing recovery from errors. The JKL func-

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tion, though still called by that name, is activated by pressing shift-down arrow-* at the same time on both the Model I and III. This prevents the J, K or L key from echoing to the screen and messing up the printout—a thoughtful and needed change.

The System command provides a means of customizing LDOS to suit your particular needs. Using this command, you may disable break and blink a line graphic block in the upper right of the screen indicating whether the computer or the software is hung up. This cursor sometimes shows interrupt activity even when Trace appears dead.

You can also configure your drives and the defaults used by the Format program. For example, System(DRIVE=2,STEP=1,DELAY=N,CYL=40) tells LDOS that drive two can step at 12ms, requires a power-on delay of only half a second, and has 40 cylinders. With these parameters noted for each drive, the system knows what your hardware is at all times.

The Format utility uses these settings as defaults. System(TIME=N,DATE=N) causes the computer not to request the date or time when it is turned on or rebooted. (The date is not asked at reboot if it is already in memory, but is requested when the computer is turned on; the time is not normally requested, but may be if desired.)

The parameters Fast and Slow tell the system whether you have a clock-speed-up board in your computer and activates it if you do. I have been running the Archbold

board at 3.54 MHz with LDOS for about six months and the results are magnificent. With the System command you can also set up a blinking cursor of your own defined character by typing: SYSTEM(BLINK=x). X equals the CHR\$ value of the character you want. Blink by itself defaults to character 143, a solid graphics block.

The SYSRES feature allows loading certain system modules normally called from the disk as overlays into high memory. You would do this to perform a single-drive copy by file, or merely to provide for faster program loading and saving. File management in Basic is speeded this way also. Simply type: System(SYSRES=1) or use whatever system module number you wish to make resident. All /SYS modules may be made resident except SYS6 and SYS7.

The most powerful feature in LDOS is the System(SYSGEN) command. This command causes all your system configuration, drivers, filters, routing, linking and so on, as well as Spooler, Verify and Clock, to be written to a file called CONFIG/SYS on drive 0. Each time the system is booted, it looks for this file and if it is present, loads the user's configuration. In this way you can store a standard configuration on disk and have it ready each time you turn on the system. All system changes are made first in memory and do not become permanent until you execute a System(SYSGEN). This lets you experiment with different configurations without making a special System disk.

Utilities

LCOMM is an advanced communications package for use with the RS-232. Because it is so flexible (you can even use it to communicate directly with your printer, though not very well), it is difficult to learn. The first-time user will be mystified when he types LCOMM only to have the system tell him "Comm Line Driver Not Specified!" You must type LCOMM *CL, or whatever device you are communicating with. This terminal program uses all resident filters and drivers within LDOS and therefore is more flexible than any other terminal package I have seen. Most have their own drivers and those in the operating system must be disabled to prevent conflict. LCOMM has been maligned on local bulletin boards since its introduction, but I suspect that the people doing so have been unwilling to learn to use it properly. You cannot learn LCOMM without effort, so sit down with the documentation for at least half an hour and save yourself a lot of on-line frustration.

The patch utility is provided to allow making changes to the system or to other files as well. The syntax is: Patch File:0 Fixfile:2. If after applying a patch in memory address format, you decide that it's not what you want, type: Patch File:0 Fixfile(Yank) to remove the patch from the file. The Patch file may be created with the Build library command (a simple ASCII file builder), or written using Scripsit or Pencil.

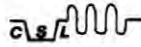
The Repair utility brings disks created on certain other systems up to LDOS standards. It updates TRSDOS's data address

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✓ 192

mark used in the directory to an F8H instead of the FAH, making single-density disks directly usable on the Model III with LDOS. In fact, if your Model I is double density, you can switch disks back and forth between models without even knowing what density the disk is! It also performs additional corrections on the disks to ensure reliable operation.

DOSPLUS sets bit 7 on byte 3 of the Boot sector, the directory pointer byte. Repair resets this bit making DOSPLUS single and double-density disks directly usable by LDOS (as data disks of course).

The CMDFILE utility is somewhat like the Apparat LMOFFSET program except its prompts are more understandable and it can be exited without rebooting. More options are available also. If you know the overlay number (found by looking in SYS1) of the command you want in SYS6 or SYS7, you can extract the code and make it into a command file. Doing this to more than a couple of the overlays defeats the disk space-saving purpose of an ISAM file, which is what SYS6 and SYS7 are.

CONV is a utility provided to convert Model III TRSDOS disks to LDOS on either a Model III or a double-density Model I. The HITAPE utility enables the use of high-speed cassette I/O on a Model III.

The Basic provided with LDOS is named LBasic. It is a complete language rather than a patch to Radio Shack's Basic as was the case in the past. It offers several enhancements over standard Radio Shack Basic and is completely upward compatible with it. LBasic programs can be declared Execute only, meaning any program interruption clears memory, protecting the code from alteration without the proper password. Variable length files are supported with the same syntax as in Model III Disk Basic, as is the ability to declare whether an error is to occur if the file already exists or does not exist.

Not present in LBasic, as it is in Model III Basic, is the bug that causes a physical record write for every logical record. With a file of LRL=1 on a Model III, disk I/O takes place at about 12 baud. LBasic handles this properly and quickly. The ability to add to a sequential file is also provided by way of the Open"E" statement. Line editing commands are provided as are abbreviations of Auto, Delete, List and Edit to their first letter.

Any LDOS system command that does not alter the high-memory pointers can be used from LBasic via CMD"command." This includes Directory, Free, Format, Backup, and so on. LBasic programs may be single stepped by holding down the shift-@ keys while pressing the space bar for each statement to be executed. A cross-reference utility is provided that is invoked via CMD"X", and line renumbering may be had by typing CMD"N". CMD"***" sends the screen contents to the printer and CMD"P" returns the printer status to a variable. The command Restorennnn may be used within a program to restore the data pointers so subsequent Read statements begin with

the data statements in the specified line number. The Run command has been expanded to allow the computer to run another Basic program preserving the variables used in the present program intact. A line number to begin execution of the new program may be specified. The command Set EOFn allows the length of a random file to be shortened. Simply read the last record wanted in the file and execute SET EOF1. The file is shortened to include all records up to and including the last one read.

Also available is a CMD"O" single-dimension string array sort. It is fast, but not nearly as flexible as that in NEWDOS. If there are any shortcomings in LDOS, it would have to be the limited CMD"O" sort and that they have given their Basic the name of LBasic. In order to rename it you must patch two of the three overlay files or some of the CMD functions won't properly return to LBasic. This is not hard, but it is an annoyance.

The Documentation

DOS documentation has been a slowly developing field. The LDOS documentation is the clearest, best written I have ever seen. Each DOS command or utility has its own section in the manual. A large block shows the syntax and parameters of the command and several examples show the use of each form of the command and the proper use of each parameter. Almost all of the advanced features can be easily understood by reading the examples in the manual. If you still can't understand the command, help is only a phone call away from the LDOS support team.

A complete technical section is also provided. It fully describes the more common system entry points, storage areas and vectors, along with lucid instructions on how to call them. For the beginning Assembly-language programmer this might be the most valuable part of the manual.

The Newsletter

Also provided is a quarterly newsletter mailed to all registered LDOS owners. The last one I received was larger than the entire DOSPLUS manual. Patches were included for RSCobol, RSBasic and Microsoft's Basic compiler. System module patches are included in this newsletter as well as many user-contributed utility routines. The quarterly subscription, worth at least \$25 per year, is included at no charge if you send in your warranty registration card. Also included is membership in the Micronet LDOS SIG if you are a Micronet subscriber.

Scriptsit and LDOS


Using Scriptsit under LDOS with the LSCRIPT/FIX patch is a pleasure. The patch allows any ASCII character to be entered from the keyboard, including the tilde, left and right braces, and underline character. Also provided is a Scriptsit* text recover entry. In case of an accidental reboot, you can recover your text with just as much

ease as Basic* works under TRSDOS. To accommodate this, the control key has been redefined to shift-down arrow and a couple of the other keys have been redefined. This poses no problem and I learned them all in less than a day.

By using special filters and Scriptsit, it is possible to print languages that require double keystrokes to type a single letter, provided you have the correct printer support. Since the filters are applied externally to Scriptsit, the character counter in Scriptsit isn't affected and justification can be used. There is also a Scrip/FIX for those who do not need the advanced features or do not wish to redefine their Scriptsit keyboards. VisiCalc has had a couple of new commands added to it and has also been made Model I and III transportable.

As mentioned earlier, also available for the LDOS user is a filters disk from Logical Systems. The disk contains filters to perform hex-to-decimal calculation, printer page pausing, page titling and slashed zeroes. Filters to translate, trap and remove bytes are also provided. At \$70 the filters disk is a good buy, particularly since the source code is provided.

LDOS is the best value today in an operating system for the TRS-80. LDOS 5.1 comes with so many utility programs, drivers, and filters that it requires two disks to hold it all on a single-density, 35-track Model I. If you need additional computing power, LDOS 5.1 is the best choice you can make! ■



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RECOVER

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My program, Recover, is only 18 bytes long. With it keyed in a glitch is no more than a minor interruption. Your glitch procedure will change from pulling out your hair to shift, up arrow, enter up arrow, shift down arrow.

How It Works

Memory location 7F62H begins the text-save area. When Scripsit is initialized, it zeroes this and sets all pointers to this address. Like Basic, when New is entered, an end-of-file pointer is set at the very start of the text. The data appears to be erased, when actually it is whole except for that first byte.

Also, 7F62H resides at memory locations 5277H-5278H in Scripsit, and sets all pointers to the start of that address. At lo-

cation 5286H, the program picks up the zero plugged into location 7F62H.

Recover finds the previous end-of-file mark (00H) and plugs that location into 5277H-5278H. It then replaces the zero at location 5286H with a space character (20H). Once this is done, a jump is made to 5200H, which is the entry point for Disk Scripsit.

Again Scripsit initializes, but this time with the modified routines. It points to the end of the text, usually about 120 bytes beyond the end of your actual text. After a reset the area occupied by Scripsit is unaffected.

Pressing shift, up arrow will put you at the beginning of the text area. But because all necessary pointers are not set, video formatting is off. This is corrected when a carriage return is processed at the start of the text. Once all pointers are corrected, the screen display reformats to reflect these corrections. Now delete the carriage return (for cosmetic purposes only), and you are ready to return to editing your text.

After Recover is run and Scripsit is restarted I usually find a blank screen with my cursor 120 bytes beyond the end of my actual text. Other times I get a Line Too Long error message and the screen fills with charac-

ters. This is not part of your file and can be deleted once you recover your text.

Other times the screen will fill with scrunched together text or maybe just a blank screen. Do not fret; hit the enter key and no matter how lost things may seem, you find all your data intact.

The excess data or spaces at the end of your text can be deleted by pointing your cursor beyond the text and pressing control, D, control, down arrow, Y.

Saving Recover to Disk

Key in Recover using EDTASM and save it to disk using Tape Disk, LMOFFSET or another loading module. If you require pointing addresses, as with Tape Disk, use addresses 7AA5H 7AB6H 7AA5H. Refer to your user's manual for the functions of your loader program. ■

David Gobel enjoys hiking, bicycling, reading and machine-language programming.

It happens. While working with Scripsit you get so involved with what you are writing that you don't remember to save anything until it is too late. In the blink of an eye your text turns into—DOS Ready.

```
00100 ;SCRIPSIT TEXT RECOVERY PROGRAM
00110 ;BY—DAVID R. GOBEN DEC. 1981
00120
00130     ORG 7BBEH
00140
00150 START LD  HL,7F62H
00160 LOOP  RST 10H
00170     OR  A
00180     JR  NZ,LOOP
00190     LD  (5277H),HL
00200     LD  A,20H
00210     LD  (5286H),A
00220     JP  5200H
00230
00240     END START
```

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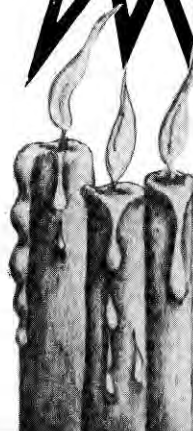


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Computerized Girl Scout cookie drive.

Technological Destiny—Part IV

Gary Dillio
1109 Madison Avenue
Prospect Park, PA 19076

Last month we began the systems development (SD) process for our girl scout cookie drive. The SD process encom-

passes all the necessary steps for developing an effective computer based application for specific user needs. Phase 1 of this process is system analysis.

System analysis begins with problem identification and goal assessment. Then the project's scope and limitations are established and system feasibility is explored. A system concept emerges and develops into a rough system plan ending phase 1.

The System Design Phase

Elements of system design include system and program flowcharts and programming. A *system flowchart* is a symbolic representation of the overall system. It traces data flow from the initiator through processing to the product user.

Flowcharting

Figure 1 shows the system flowchart for our example COMS system. The system consists of

four programs. Each program begins with an oblong user block. This means program initiation and frequency, as well as data input will be user controlled.

The program block indicates the program's objective. Program 1 projects a realistic cookie order. Program 2, used only once, initializes the GCF (Girls' Cookie File) and the CRF (Cookie Reorder File). Constant items such as girls' names, cookie names and troop numbers entered here create the files needed in Programs 3 and 4. There is no visible output to Program 2.

The second program prepares the system files for future use. Arrows pointing from the program to the file denote file updates. Arrows pointing to the programs from the file denote program retrieval of file data.

Program 3 has two purposes: to report generation which requires retrieval of file data, and to update files. Program 3's output is any combination of GCF update, CRF update or GCF, CRF and financial data reports. Program 3 is the heart of our COMS system. Programs 1 and 2 are run only once and program 4 will be run at the end of the cookie drive to determine which scouts will receive special awards and to create a compos-

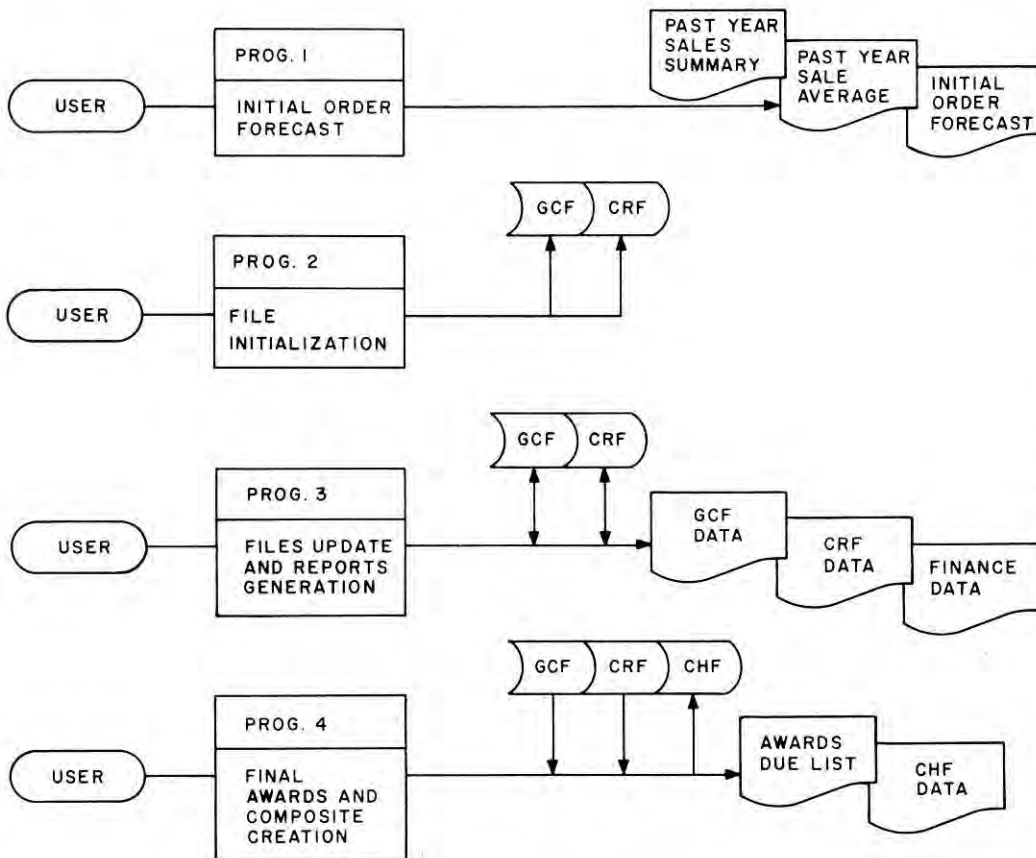


Fig. 1. COMS system flowchart

The Key Box

Basic Level II
Model I
32K RAM
NEWDOS
1 Disk Drive

System: COMS.
Function: Initial order suggested quantity and cost.
Trigger: COMS program initiation.

Input: User-supplied via keyboard.

Data Elements:

1. Number of girl scouts participating last year/this year.
2. Number of boxes sold last year by cookie type.
3. Cookie price last year/this year.
4. Percentage of total sales to be ordered initially.

Output: Printed report(s):

1. Summary of last year's sales.
2. Average of last year's sales.
3. Initial order forecast.

Data Elements:

1. Totals: Boxes/cases/value sold last year.
2. Average per child last year.
3. Total cases (broken down by cookie type) and total cost for initial order.

Frequency: Processed one time.

Processing:

1. Prompt user for information: Each cookie type, amount sold, boxes per case, cost per box.
2. Display information including total boxes, total cases and total value.
3. Prompt user for total children selling cookies and display averages per child.
4. Prompt user for total children this year, percent or initial order and price per case.
5. Display recommended order quantities.
6. End.

Fig. 2. Functional Statement

ite CHF (Cookie History File) for future drives. The only program to run with any frequency is Program 3. A good systems analyst would choose his best programmer to write Program 3.

Program Design

Next, a broad *functional statement* is prepared for each program in the system. Figure 2 shows a functional statement for Program 1. It defines the system, the program's functions and the *trigger*.

A program trigger is the event initiating the program. An inventory program may be triggered by a stock change. A bill paid or cash received may trigger a bookkeeping program. Our program is triggered by the beginning of COMS processing.

The Processing section is a general verbal program flowchart. The program steps are listed, but no mention of input or output format is made. Instructions for calculating averages are also absent. The functional description aids the analyst in later testing; it is not meant as a programming tool.

Customer Interface

Any video display, printed report, or program-generated me-

COOKIE MANAGEMENT SYSTEM
INITIAL COOKIE ORDER PROGRAM

Fig. 3. Program 1 Screen 1

YOU WILL BE ASKED TO TYPE THE COOKIE NAME AND THE TOTAL NUMBER OF BOXES SOLD LAST YEAR.

WHEN YOU ARE FINISHED ENTERING DATA, ANSWER COOKIE NAME WITH AN 'END'

COOKIE NAME? TAG-A-LONG
BOXES SOLD? 567
COOKIE NAME? MINTS
BOXES SOLD? 725
COOKIE NAME? GRANOLA
BOXES SOLD? 334
COOKIE NAME? DO-SI-DO
BOXES SOLD? 841
COOKIE NAME? END

Fig. 4. Program 1 Screen 2

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dia is *customer interface*. This is important when the user and his employees have never used computers. Novice computer users do not think like programmers and analysts. They are easily spooked by oblique messages. A good programmer, or analyst, designs his system to be "user-proof."

I once received a call from a

user who had panicked at, "Alphanumeric Move Truncation." He was justifiably worried that the error had wiped out several hundred transactions he had keyed in. His only error was in trying to input a 27-character name in a 25-character field. A good programmer would have dealt with that problem within the program, or at least, worded the er-

HOW MANY BOXES IN EACH CASE? 12
 WHAT IS THE PRICE OF 1 BOX? 1.50

Fig. 5. Program 1 Screen 3

NAME	QUANTITY
TAG-A-LONG	567
MINTS	725
GRANOLA	334
DO-SI-DO	841

TOTAL BOXES	2467
TOTAL CASES	205.583
TOTAL VALUE	\$3700.5

Do You Want This Information Printed (Y/N)?

Fig. 6. Program 1 Screen 4

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ror message more clearly. Never program for a programmer. Customer interface messages should be simple enough for a child to understand. No program is a success if its customer interface is badly planned. Figures 3-10 represent the video presentations for Program 1.

The video presentations are called *screens*. The eight screens in Figs. 3-10 correspond to the procedural steps of the functional statement. The analyst and user design the screens together to diminish later confusion.

Keep in mind, no program-

ming has started at this point. The programmer in most of us is probably screaming to get started and, on a system of this simplicity, several of these steps seem unnecessary. But this simplistic system illustrates the system development process. The rush to program is probably the primary cause of

How Many Children Sold These Cookies? 10

Fig. 7. Program 1 Screen 5

AVERAGE SALES PER CHILD	
TAG-A-LONGS	56.7
MINTS	72.5
GRANOLA	33.4
DO-SI-DO	84.1
TOTAL PER CHILD	246.7
Press Enter To Continue?	

Fig. 8. Program 1 Screen 6

HOW MANY CHILDREN ARE SELLING COOKIES THIS YEAR? 25
 WHAT PERCENTAGE OF AVERAGE SALES WOULD YOU LIKE TO ORDER INITIALLY (ENTER 60% AS .6)? .5
 WHAT IS THE CURRENT COST PER CASE? 22.00

Fig. 9. Program 1 Screen 7

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system failure. Poor planning creates a poor system.

The Programmer

The programmer begins by reading all the system documentation produced thus far. After digesting the functional statement and the customer interface screen formats, he is ready to begin flowcharting. What! Another flowchart? The first flowchart was a system flowchart. The programmer creates a more detailed *program flowchart*. In this particular application a program flowchart

may be unnecessary, but in a complex program, flowcharts eliminate programming mistakes before they happen.

A program flowchart is a step-by-step procedure for organizing program logic. The two main symbols are the rectangle and the diamond. Rectangles (also called process symbols) denote program action. Add A To B, Print Total and Delete Record are three actions that might appear in a process rectangle.

The diamond denotes a decision. Two or more paths always project from a diamond. Depending upon the decision, one or another program path is followed. These paths are often called *program legs*.

The Program Flowchart

The flowchart in Fig. 11 examines the date and value of a variable "X." The first process is to read a record from a file. Then we make our first decision. If we are at the end of the file we end the program; if not, we go on to check the date. If the date does

INITIAL ORDER—IN CASES

COOKIE	CASES
TAG-A-LONG	59.06
MINTS	75.52
GRANOLA	34.79
DO-SI-DO	87.6
TOTAL CASES	256.97
TOTAL COST	5653.34 DOLLARS

Do You Want To Print This Information?
(Yes)

Fig. 10. Program 1 Screen 8

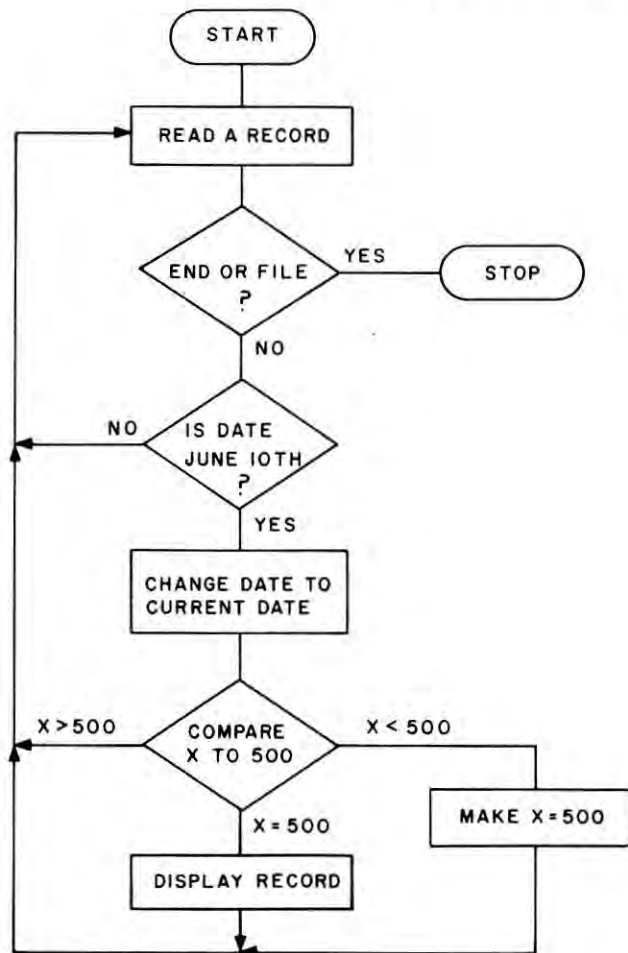


Fig. 11. Program Flowchart

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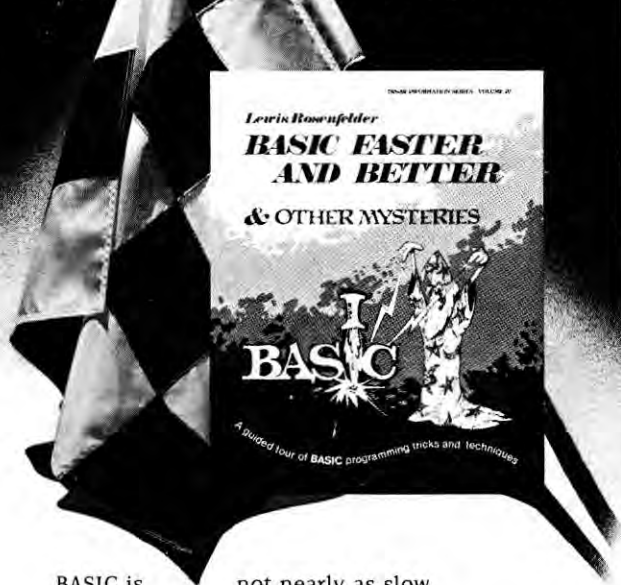
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not equal June 10th, we loop back to read another record. If the date is June 10th, we proceed to the process block containing the "change date to current date" instruction.

The next decision branches our program to one of three legs depending on the value of X. All decisions are handled by If statements in this program. The flowchart in Fig. 11 contains no *disconnects* until the end of file. Figure 12 is not a valid flowchart as it has a disconnect present. What happens if X is less than 500? A flowchart must cover all possibilities.

In addition to offering a pictorial representation of the program logic, a flowchart aids in debugging the finished program. A *desk-check* of the flowchart often reveals not-so-obvious logic flaws. A desk check simulates how the program will act upon the data using sample transactions processed against the flowchart.

Figure 13 shows the most common flowcharting symbols. The triangle has two meanings, depending on its point direction. When pointing up, it depicts a sort; down, a merge. The manual process symbol represents a

phase where human work is required. The init/term symbol usually appears at the beginning of a program, as Start, Begin, or Initialize, or at the end of a program, as Stop, End, or Terminate. The small circle, called a connector, references a connection to another page or portion of a flowchart where line connection would be cumbersome or impossible. The other five symbols represent forms of input or output.

Next month's article will cover the flowchart and program necessary to satisfy the requirements of COMS system initialization and the testing methodology to assure bug-free execution. ■

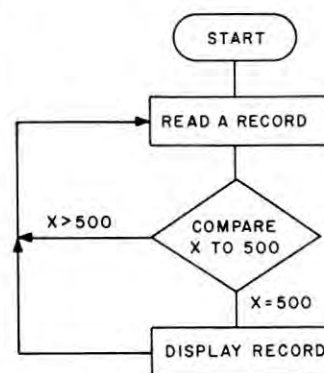


Fig. 12. Invalid Flowchart

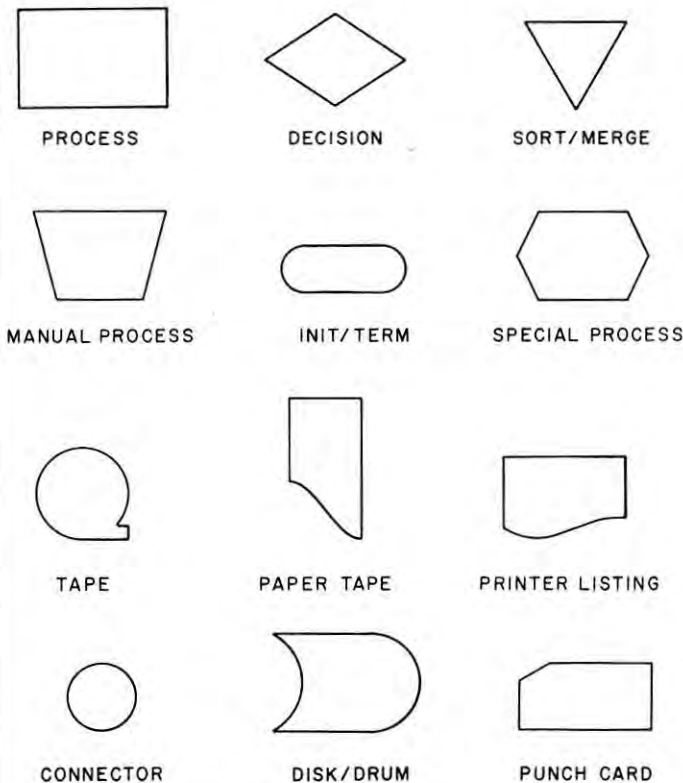


Fig. 13. Flowchart Symbols

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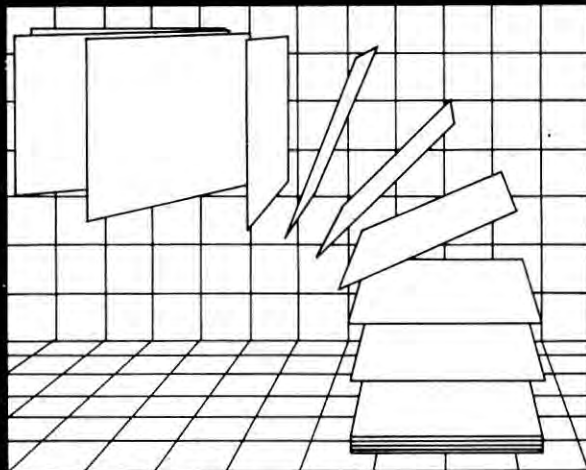
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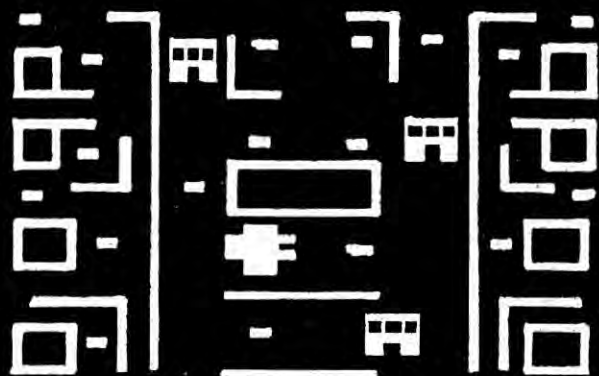
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No need to worry about data degradation.

Bit Smitten—Part II

Jay Chidsey
205 E. Adams St.
Green Springs, OH 44836

This series was formerly titled "For the Novice." This time Jay Chidsey talks about heat build-up, whether leaving the TRS-80 on a long time will hurt it and turn on/turn off shock and peripheral shock.

I became concerned about potential heat build-up problems in my TRS-80 after reading an article in another microcomputer magazine recently. The article's author warned of dire data degradation problems resulting from heat build-up, and prescribed mechanical solutions (some involving disassembly of the computer casing and installation of a fan), which made my non-handyperson blood run cold. I decided to check the problem, and possible solutions, out and report to you.

The news is good. The Model II does have a fan, because of the larger video screen, and the Models I and III do not because they do not need one. If the room is properly ventilated, with normal airflow (whatever that is in the dead of winter), heat build-up and data degradation should be no problem. A manager of a Radio Shack Computer Center says that he has never run into this problem on any TRS-80 in his career.

How about heat build-up over time... overnight or over several days? Does the addition of 16 or 32 more kilobytes of memory (upgrading to 32K or 48K) or the addition of a printer or a disk system increase heat build-up? Again, there is no significant problem. Eight of 12 additional RAM (Random Access Memory) chips produce some heat, and so does the operation of peripheral driver chips, but

this small increase is anticipated in the system's design. I have had a program I was working on a little at a time in my Model I 16K for nearly a week with no degradation problems, and one of my correspondents reports having had a program "in process" for over two weeks without problems. Tandy researchers left a machine (Model unspecified) on for a full year to test for program or hardware problems, and report no damage. Once the computer has been on for an hour, says a customer service representative from Fort Worth, it is about as hot as it is ever going to get (and that's not very hot).

Your TRS-80 is designed to operate properly in the temperature range of 32-158 degrees Fahrenheit (0-70 Celsius). Expansion Interface owners, however, may experience some heat problems with the Interface at high room temperatures because two power supply transformers are housed within it. This may cause occasional trouble, most likely in the power supply section, not in the logic circuits. In humid areas corrosion around the screws holding the power supply parts in place may become a problem.

Power Surges

If not heat build-up, there *is* a problem which you should be concerned about in long on status for the computer. That is power surges; spikes and micro-outages. If a thunderstorm is coming on, CSAVE your current program. It is a good idea to do so in any case every time you have spent an hour or so working on a program. An unexpected power outage from outside or even from a heavy surge inside your home—a refrigerator plus air conditioner or electric heater coming on at the same time, for example—can break you back to Memory Size in microseconds.

For this purpose you can safely rerecord

over the same tape repeatedly, first one side and then the other (so that you always have your first and second most recent versions of the program as a backup). It is very convenient to use a Tandy no-leader tape for repeated recording. Just CSAVE and then CLOAD? to make sure you have the program recorded properly.

Model III owners have a secondary problem with long on operation: the video screen. When I had my Model I, I could just turn the video monitor unit off, and leave the CPU/keyboard unit on. (CPU is computerese for Central Processing Unit.) There is no such handy option for Model III owners; the keyboard and the video unit are incorporated into the same enclosure and electrical system. You cannot turn the video off and leave the CPU/keyboard on. I do not want to burn the same spot(s) on my screen overnight or for a day or more. There is a simple, though ham-handed solution. Turn brightness down to null. I prefer the more elegant solution of entering a housekeeping function at line 10000 (higher if your program runs long).

```
10000 CLS: X = RND(128) - 1: Y = RND(48) - 1:
SET(X,Y):FOR I = 1 TO 1000: NEXT: GOTO 10000
```

Important: Do not put a cover on your computer while it is on. All bets are off on normal airflow and on no problem with heat build-up if you block the ventilation holes while the computer is operating.

Your TRS-80 is designed to be set on a hard, flat surface. Putting it on a soft surface such as a blanket or a shag rug can block the intake slots on the bottom, which are needed for air intake and proper ventilation.

Power Consumption

You may be curious about how much power your computer consumes, since we

are discussing the potential problems involved in leaving it on over several days. The answer is not much. Your documentation (the user's guide) for your computer and each peripheral unit (cassette, disk system, printer and so on) will list specifications, and these will describe wattage and amperage draw. For example, the TRS-80 Model III draws 105-130 (one respondent gives the figure 117) VAC (Volts Alternating Current) and .83 RMS (Root Mean Square Amperage, engineering shorthand for true current demand). Multiply volts by amperes on each unit to get wattage draw; that is, 117 times .83 equals 97.11 watts. The Model III burns about as much electricity in full operation as a 100 watt light bulb. That is the top current draw, but in fact Models I, II or III draw closer to 50 watts most of the time, say the folks at Fort Worth. You can hold your hand over the ventilation slots and feel a small flow of warm air, but not much. It does not cost much to leave on.

You can check exactly how much it costs by determining wattage draw (volts times amperes), dividing by 1,000 to get kilowatt draw, and multiplying by the cost per KWH (kilowatt hour) your electric company charges. You will never find that out from the company. Mine has a cost of 5.64 cents per KWH, times a fuel adjustment of 1.6793 of that total, plus a flat \$4 charge for being alive, plus a new federal surcharge of .0071 per KWH. Divide the KWH shown on any bill into the charge on that bill for the true cost per KWH. Better yet,

type in the program shown in the listing, get your voltage and amperage figures from the manual and your KWH and charge from a recent electric bill and find out the easy way. This program will calculate watts used and costs per hour (usually under one cent), per day, per week and per month. You can use it to calculate draw and costs for any peripherals, too. Table 1 shows a sample program run to determine the cost of operating my Model III; if your results are much different, check your input and that you have typed the program correctly.

Line Surge

Your printer may be another matter. If it has a fairly heavy electric draw on standby, turn it off first. You should be most cautious about turning your printer off while the computer is left on. The TRS-80 manual says you should never turn peripherals off or on while the computer is operating lest you destroy your program and get broken back to the Memory Size question. I hashed this problem over with a Radio Shack Computer Center manager recently, and the bottom line seems to be that the potential problem is line surge. Older printers, which ate a lot of electrical current, often created a surge on turn off and turn on which could zap a program, but newer, mostly electronic printers are unlikely to do so. I have turned my own MX-80 F/T printer on and off a hundred times with a program in the Model III and never detected a hint of data degradation, let

alone a zap of the whole program.

A Final Concern

A General Electric engineer, high up in GE's lamp bulb operation, once told me that the shock of turning on a light bulb took as much off its burn life as 24 hours of continuous operation. I have checked this potential problem of on/off shock versus burn time with several people at Tandy. Because of the tiny amperage involved in microchip operation, the shock of turn on and off is miniscule, and so also is the damage done to the chip by long operation. It is apples and oranges to compare a tungsten filament with a microchip. The surge when you turn on your computer is absorbed by a combination of the power transformer, the diodes, filter capacitors and voltage regulators. In the Model I very little gets through to the chips, and in the Model III, with its switching power supply, the protection is better yet. The shock to a video screen (your monitor) is more significant than that to the semiconductor devices in the computer, but the wattage is so low that this is not a major problem either.

If you have had any problems or bad experiences in data degradation or crashes or in any of the other potential problems discussed above, send me your sad tale at the address above. This is an information column for apprentice programmers, and the more problems we hear about, the better we can do. ■

```

ENTER VOLTAGE OF UNIT? 117
ENTER AMPERAGE (RMS) OF UNIT? .83
UNIT CONSUMES, IN WATTS:
  97.11 PER HOUR    16314.5 PER WEEK
 2330.64 PER DAY   69919.2 PER MONTH
ENTER KILOWATT HOURS FROM ELECTRIC BILL? 304
ENTER AMOUNT OF ELECTRIC BILL, $? 26.26
COST PER HOUR     $8.38852E-03
COST PER DAY      $2.01324
COST PER WEEK     $1.40927
COST PER MONTH    $6.03973

```

Table 1

```

10 CLS: D=24: K=168: M=720
20 PRINT CHR$(23) @200, "ELECTRICITY USAGE AND
30 PRINT @260, "OPERATION COST CALCULATOR
40 PRINT @464, "BY JAY CHIDSEY
50 PRINT @772, "PRESS >ENTER< TO CONTINUE";: INPUT Y
60 CLS: INPUT "ENTER VOLTAGE OF UNIT"; V
70 INPUT "ENTER AMPERAGE (RMS) OF UNIT"; A
80 PRINT: W = V * A
90 PRINT, " UNIT CONSUMES, IN WATTS:
100 PRINT CHR$(204) W "PER HOUR", " " W * K "PER WEEK
110 PRINT CHR$(202) W * D "PER DAY", " " W * M "PER MONTH
120 PRINT: INPUT "ENTER KILOWATT HOURS FROM ELECTRIC BILL"; KH
130 INPUT "ENTER AMOUNT OF ELECTRIC BILL, $"; EB
140 PRINT: W = W/1000: C = EB/KH
: REM CALCULATES COST PER KILOWATT HOUR
150 PRINT, "COST PER HOUR $" W * C
160 PRINT, "COST PER DAY $" W * C * D
170 PRINT, "COST PER WEEK $" W * C * K
180 PRINT, "COST PER MONTH $" W * C * M

```

Program Listing

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is easily customized for any application.

If, like me, you use blank paper, remove the REM state-

ments in lines 740-780 and insert your own data. I center my logo, but you may prefer to experiment before setting the final tabs in these lines.

LPRINT statements are all tabbed to eight since my printer does not have an adjustable tractor.

The Program

To run the program, simply answer each question as it appears on the screen. Several error trapping routines are built into the program.

The program accepts only 15 items. If you are going to order half the items in a catalog, redimension the variables in lines 100, 350, and 910.

You will first be asked the company's name, their street address, city, state and zip code. You can use commas and semicolons. The input for everything except Price Ea. and Number Ea. is an INKEY\$ routine.

The screen will clear and the data will appear with the question "Is this correct? (Y/N)." The error trap allows you to correct faulty data.

The program will query you for

Program Listing 1

```

10 REM - ORDER FORM - BY A.J. WRIGHT
20 REM - FOR SMALL BUSINESSES AND PERSONAL USE
30 REM - WILL LIST EACH ITEM , NUMBER ORDERED, PRICE EACH
40 REM - AND TOTAL. IT WILL THEN TOTAL THE ITEMS PRICE
50 REM - LET YOU ADD POSTAGE OR SHIPPING CHARGES AND TOTAL
60 REM - THE ENTIRE BILL FOR YOU. YOU THEN MAY PRINT IT OUT
70 REM - EITHER ON YOUR OWN INVOICES OR IT WILL CUSTOMIZE
80 REM - YOUR OWN INVOICE FOR YOU.
90
100 CLEAR 1000 : DEFINT B-Z : L=15 : DIM A$(L),PE$(L),N1(L),T$(L)
110 REM - INITILIZE ORDERING DATA
120 CLS: PRINT@20,"O R D E R   F O R M" : PRINT
130 PRINT"TO BE ORDERED FROM -" : PRINT
140 PRINT"COMPANY NAME   : "; REM - COMPANY YOU ARE ORDERING FROM
150 GOSUB 1140 : C$=R$: PRINT
160 PRINT"STREET ADDRESS : "; REM - THEIR STREET ADDRESS
170 GOSUB1140 : S$=R$: PRINT
180 PRINT"CITY,STATE,ZIP : "; REM - THEIR CITY, STATE, ZIP (NO COMMAS)
190 GOSUB1140 : Z$=R$: PRINT
200 CLS : FOR J=1TO3 : PRINTJ;"COMPANY NAME   : ";CS:J=J+1
210 PRINTJ;"STREET ADDRESS : ";S$:J=J+1
220 PRINTJ;"CITY,STATE,ZIP : ";Z$
230 PRINT:INPUT "IS THIS CORRECT (Y/N)";YS: REM - ERROR TRAP
240 IF LEFT$(YS,1)="Y" GOTO 290
250 IF LEFT$(YS,1)="N" THEN INPUT "WHICH NUMBER NEEDS CORRECTING ?";CC
260 IF CC=1 THEN C$="" : PRINT "COMPANY NAME   : ";GOSUB1140:C$=R$:GOTO200
270 IF CC=2 THEN S$="" : PRINT "STREET ADDRESS : ";GOSUB1140:S$=R$:GOTO200
280 IF CC=3 THEN Z$="" : PRINT "CITY, STATE, ZIP: ";GOSUB1140:Z$=R$:GOTO200
290 CLS : PRINT"ITEMS FROM WHAT SOURCE ?(CATALOG, AD ETC.)"
300 GOSUB 1140 : D$=R$: PRINT
310 PRINT "DATE";
320 GOSUB1140 : B$=R$: PRINT
330 PRINT "INVOICE NO#";
340 GOSUB1140 : I$=R$
350 FOR L=1TO15
360 CLS :PRINT"ITEM : "; REM - INPUT ITEM ORDERED DATA AND PRICE
370 GOSUB1140 : A$(L)=R$: PRINT
380 IF A$(L)=CHR$(13)GOTO430: REM - IF THROUGH GOTO POSTAGE ROUTINE
390 INPUT"PRICE EA. ";PE$(L)
400 INPUT"NUMBER EA. ";N1(L)
410 T$(L)=PE$(L)*N1(L) : GOSUB490
420 NEXT L
430 CLS : INPUT"POSTAGE OR SHIPPING CHARGE : ";U$: REM - POSTAGE OR SHIPPING CH
ARGE
440 P#=P#+U$
450 REM - ENTER METHOD OF PAYMENT SUCH AS; "ENCLOSED (CHECK #-)" OR
"TO BE CHARGED TO MASTERCARD # 231-121221-33211".
460 PRINT "METHOD OF PAYMENT (ENCLOSED / TO BE CHARGED)"
470 GOSUB1140 : P$=R$: PRINT
480 GOTO670
490 T1$=P#
500 P#=T1$+T$(L)
510 CLS : FOR J=1TO3 :PRINTJ;"ITEM           :";A$(L) :J=J+1
520 PRINTJ;"PRICE EA   :";PE$(L):J=J+1
530 PRINTJ;"NUMBER EA  :";N1(L)
540 PRINT"TOTAL";P#
550 REM - ERROR TRAP FOR ITEMS, NUMBER EA, AND PRICE
560 PRINT:INPUT "IS THIS ENTRY CORRECT (Y/N)";CR$
570 IF LEFT$(CR$,1)="Y" THEN RETURN
580 IF LEFT$(CR$,1)="N" THEN INPUT"WHICH NUMBER NEEDS CORRECTING ?";CC
590 IF CC=1 THEN A$(L)="" : PRINT "ITEM : ";GOSUB1140:A$(L)=R$:GOTO510
600 IF CC=2 OR CC=3 THEN T#=# : P#=P#-T$(L)
610 IF CC=2 THEN PE$(L)=0:INPUT"PRICE EA : ";PE$(L)
620 IF CC=3 THEN N1(L)=0: INPUT "NUMBER EA : ";N1(L)
630 IF CC<1ORCC>3THEN490

```

Program continues

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✓ 58

the source of the items you are ordering, such as "ad in 80 Micro" or "your catalog #301." Limit yourself to 28 characters.

Line 310 asks you for the date and line 330 asks for an invoice number. I use an invoice number to have a reference when writing the company about an order. Delete this if you desire.

Lines 350-660 are where you input the items you are ordering, their price and the number you want. You are given a running cost total as each item is entered. The Item question should be limited to 24 characters or less.

Another error trapping routine keeps me from getting carried away. I set a total amount for each order and quit even if it means deleting the last items.

To end ordering, answer the Item question with the enter key. Line 380 moves you along to the Postage question to use for either postage or shipping charges. If the items are prepaid

Program continued

```

640 T#(L)=PE#(L)*N1(L)
650 GOTO490
660 RETURN
670 INPUT"READY TO PRINT (Y/N)";ZZ$: REM - EXIT IF NO HARDCOPY WANTED
680 IF LEFT$(ZZ$,1)="N" THEN 690 ELSE 740
690 INPUT"CANCEL ORDER (Y/N)";X$: REM - CANCEL ORDER IF YOU
    CHANGE YOUR MIND OR FIND MAJOR ERROR
700 IF LEFT$(X$,1)="Y" THEN 1120
710 IF LEFT$(X$,1)="N" THEN 670
720 *LPRINT ROUTINE FOR ORDER FORM DATA - DELETE LINES 520-590
    IF USING PREPRINTED INVOICES.
730 REM - USE TABS TO CENTER YOUR LOGO IN THE CENTER OF THE PAGE.
740 *LPRINTTAB(PRINT) - YOUR COMPANY OR PERSONA NAME
750 *LPRINTTAB(?) - ATTN: YOUR NAME IF COMPANY NAME USED OTHERWISE DELETE THIS L
    INE
760 *LPRINTTAB(?) - YOUR ADDRESS INSERTED HERE
770 *LPRINTTAB(?) - YOUR CITY, STATE AND ZIP CODE HERE
780 *LPRINTTAB(?) - YOUR AREA CODE AND PHONE NUMBER GO HERE
790 LPRINTSTRING$(2,138)
800 *LPRINTTAB(8)*TO: *;C$: REM - FROM WHOM ORDERED
810 *LPRINTTAB(13) S$: REM - THEIR ADDRESS
820 *LPRINTTAB(13) Z$: REM - THEIR CITY STATE AND ZIP
830 LPRINTSTRING$(2,138); REM - ADJUST FOR PRE-PRINTED FORMS.
840 LPRINT STRING$(80,"-"); REM - DELETE FOR PRE-PRINTED FORMS.
850 *LPRINTTAB(8)"INVOICE NUMBER ";I$;TAB(35)"DATE "; *;B$
860 LPRINTSTRING$(80,"-"); REM - DELETE FOR PRE-PRINTED FORMS.
870 LPRINTCHR$(138)
880 *LPRINTTAB(8) " PLEASE SHIP THE FOLLOWING ITEMS FROM ";D$:
    REM - ALLOWS 24 SPACES FOR SOURCE OF ITEMS.
890 *LPRINTTAB(8)"TO THE ABOVE ADDRESS.":GOTO 900
900 LPRINTCHR$(138)
910 FOR L=1TO15
920 IF A$(L)-CHR$(13) THEN 970
930 REM - LPRINTS OUT THE ORDERING INFORMATION BY ITEM AND COST
940 *LPRINTTAB(10)L;";";A$(L); * ";TAB(40)USING*##";N1(L);
950 LPRINT" EA. @ ";:LPRINTUSING"$###.##";PE#(L),T#(L)
960 NEXT L
970 LPRINTCHR$(138)
980 IF U#=0THEN GOTO1010
990 *LPRINTTAB(8) "POSTAGE ";:LPRINTUSING"$###.##";U#
1000 REM - ADDS IN POSTAGE TO TOTAL AND GIVES METHOD OF PAYMENT
1010 *LPRINTTAB(8) "PAYMENT OF ";:LPRINTUSING"$###.##";P#;:LPRINT" IS ";P$
1020 LPRINTCHR$(138)
1030 *LPRINTTAB(8)"THANK YOU FOR YOUR TIME AND SERVICE.":GOTO 1040: REM - OPTIONA
    L
1040 LPRINTSTRING$(2,138)
1050 *LPRINTTAB(8)"YOURS TRULY": REM - OPTIONAL
1060 LPRINTSTRING$(3,138)
1070 *LPRINTTAB(?) - YOUR NAME OR NAME OF PURCHASING AGENT
1080 LPRINTSTRING$(3,138)

```

Program continues

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	4K	16K	32K	4K	16K	32K
System Size	N/A	8K	24K	N/A	2K	18K
TAPE Text space	2.5K	15K	31K	N/A	N/A	N/A
ROMPAK Text space	N/A	6.5K	22.5K	N/A	0.5K	16.5K
Right Justify	YES	NO	NO	NO	NO	NO
Video Window	YES	NO	NO	NO	NO	NO
Edit any ASCII File	YES	NO	NO	NO	NO	NO

The figures speak for themselves and with professional features like PROGRAMMABLE function string commands to perform up to 28 commands automatically, PROGRAMMABLE text file chaining, PROGRAMMABLE column insert & delete, and right hand JUSTIFICATION with punctuation precedence, the choice is clear but there's still more!

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The Disk version of the Super "Color" Writer works with the TRS-80C Disk System and has all the features listed above plus many more! Use with up to four Disk Drives. Includes an extended HELP table you can access at any time. Call a directory, print FREE space, Kill disk files and SAVE and LOAD text files you've created all from the Super "Color" Writer. Print, merge or append any Super "Color" Terminal file, ASCII file, BASIC program or Editor/Assembler source listing stored on the Disk or tape. The Super "Color" Writer Disk version has additional formatting and print features for more control over your printer and PROGRAMMABLE chaining of disk files for "hands off" operation. Print an entire BOOK without ever touching a thing!

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Super "Color" Terminal Disk

The Disk version offers all the features listed above plus Host ability in full duplex • Lower case masking • 10 Keystroke Multiplier (MACRO) buffers on disk to perform repetitive log-on tasks and send short messages (up to 255 bytes) • Programmable prompts for send next line • Selectable character trapping • Set printer line length • Pagination • Linefeed with CR option • Printer Baud: 110, 300, 600, 1200 & 2400 • Documentation.

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answer the question with enter.

Next you are asked for method of payment. Answer with "enclosed (check #123)" or "to be charged to MC ACC#213-12232-483-1." Again limit yourself to 40 characters or less.

Now the program asks if you are ready to print your order. If you answer no, it asks if you want to cancel the order. Answering no returns you to the print question again. Make sure your printer is on and the paper set when you answer Y, because your order immediately prints.

When your order form is completed, the program asks if you want another copy of the order. You can print as many as you like. If you answer no, the program asks if you have another order to make. Answering no exits the program. Answering yes restarts you at the beginning.

Special instructions can be entered at Remarks Or Reply after completing the order. If you use a lot of special instructions, or have a special shipping address, these lines are easily added to the program.

For preprinted order forms, adjust the tabs and linefeeds to your form and delete any unnecessary information. ■

Albert J. Wright is director of a small software and hardware development company which is a division of Personal Computer Service, Las Cruces, NM.

Program continued

```
1090 LPRINTAB(6)"REMARKS OR REPLY IF ANY:": REM - OPTIONAL
1100 CLS:INPUT"ANOTHER COPY ?(Y/N)":Y$
1110 IFLEFT$(Y$,1)="Y"GOTO 740
1120 INPUT "ANOTHER INVOICE ?(Y/N)":Z1$
1130 IF LEFT$(Z1$,1)="Y"THEN 100 ELSE CLS:END
1140 REM - INPUT ROUTINE
1150 R$="":PRINT " ";CHR$(95);
1160 IPT$=CHR$(8) AND LEN(R$)>1THENR$=LEFT$(R$,LEN(R$)-2)ELSEIPT$=CHR$(8) AND LEN
(R$)<2THENR$=LEFT$(R$,LEN(R$)-1):PRINTCHR$(8);" ";CHR$(95);
1170 T$=INKEY$: IPT$="" THEN 1170 ELSE IF T$=CHR$(13) THEN 1190 ELSE IF T$=CHR$(
8)THENPRINT CHR$(8);CHR$(95);
1180 PRINTCHR$(8);T$;CHR$(95);:R$=R$+T$:GOTO1160
1190 IPT$=CHR$(13) AND R$=""THEN R$=CHR$(13)
1200 PRINTCHR$(8);: RETURN
```

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You need OMNITERM if you need to communicate efficiently with many different computers, or if you want to customize your TRS-80 for use with one particular computer. You need OMNITERM to SOLVE your communications problems once and for all.

What do I get?

The OMNITERM package includes the OMNITERM terminal program, four conversion utilities, a text editor, and setting files for use with popular computers such as CompuServe, the Source, and Dow Jones — just as samples of what you can

The ULTIMATE TRS-80 Terminal Package

do for the computer you want to work with. The package includes six programs, seven data files, and real documentation: a 76-page manual that has been called "the best in the industry." And OMNITERM comes with real user support. We can be reached via CompuServe, Source, phone, or mail to promptly answer your questions about using OMNITERM.

What do I need to use OMNITERM?

A Model I or Model III TRS-80, at least 32K of memory, one disk, and the RS-232 interface, or Microconnection modem. OMNITERM works with all ROMs and DOSes, and will work with your special keyboard drivers.

What will it do?

OMNITERM allows you to translate any character going to any device: printer, screen, disk, keyboard, or communications line, giving you complete control and allowing you to redefine the character sets of all devices. It will let you transfer data, and run your printer while connected for a record of everything that happens. OMNITERM can reformat your screen so that 80, 32, or 40 column lines are easy to read and look neat on your TRS-80 screen. It even lets you get on remote computers with just one keystroke! The program lets you send special characters, echo characters, count UART errors, configure your UART, send True Breaks and use lower case. It accepts VIDEOTEX codes, giving you full cursor control. It will even let you review text that has scrolled off the screen! Best of all, OMNITERM will save a special file with all your changes so you

can quickly use OMNITERM for any one of many different computers by loading the proper file. It's easy to use since it's menu driven, and gives you a full status display so you can examine and change everything.

"OMNITERM has my vote as the top TRS-80 terminal program available today" Kilobaud Microcomputing, June 1981, pages 16-19.

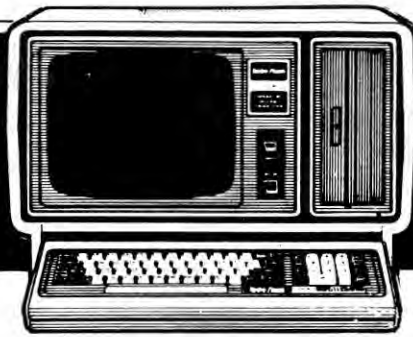
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In this game, it's a sin to make a triangle.

The Game of SIM

Stephen Radin
751 Bard Avenue
Staten Island, NY 10310

Sim is a pencil and paper game similar to Tic Tac Toe or Battleship. It has been enjoyed by many who were exposed to it through mathematics periodicals and booklets, but has gone almost unnoticed by the general public. Sim was intro-

duced by Gustavus J. Simmons in the *Journal of Recreational Mathematics*, April 1969. It was further enhanced by John H. Nairn and A.B. Sperry in the same periodical four years later (Vol. 6, Number 4, in the fall of 1973).

Sim was originally designed to be played on paper with colored pencils. This TRS-80 version uses two different graphic characters for the pencils and a screen for paper.

The game is played by two opponents who in turn connect vertices of a hexagon with straight lines. The first to create a triangle whose vertices are three of the original points loses. The object of the game is to avoid falling into this trap. No game can end in a draw. Whether or not the player who moves first or last has the upper hand is left unanswered. Simmons wrote in a later article that the second player has the upper

hand if playing properly. In my version the computer randomly decides the order of play.

I have tried two strategies which seem to work. First, try to play parallels; fill in lines which are parallel to each other whenever possible. I use my second strategy when the first becomes difficult. I select vertices which have been occupied the least by my own play. If you come up with a good strategy I would like to hear about it.

This version of Sim takes advantage of the TRS-80's fast graphics and processor speed, allowing you to play against another person or against the computer. The program keeps track of the allowable moves and lets you study the computer's attempts as it tries various possibilities. ■

Professor Radin is Computer Education Coordinator to Community School District 22 in New York City and Assistant Professor of Math and Science at St. John's University.

Program Listing

```

1000 REM ***           S   I   M           VERSION 2.8           ***
1010 REM *** BY STEPHEN RADIN 751 BARD AVENUE STATEN ISLAND ***
1020 REM *** N.Y. 10310 (212) 720-6496 AUGUST 2,1981 ***
1030 POKE 16553,255
1040 CLS:GOSUB 1070
1050 FOR X=1TO3000:NEXT
1060 GOTO 1220
1070 DATA "PT ", 181
1080 DATA 15446,160,15447,184,15448,174,15449,191,15450,140,15451,140,15
452,140,15453,140,15454,140,15455,140,15456,140,15457,140,15458,140,15459,1
40,15460,140
1090 DATA 15461,191,15462,157,15463,180,15464,144,15508,184,15509,142,15
510,131,15528,131,15529,141,15530,180,15572,160,15573,176,15574,176,15575,1
76,15576,176
1100 DATA 15577,176,15578,144,15587,176,15588,176,15589,144,15596,160,15
597,176,15598,144,15633,160,15634,184,15635,190,15636,143,15637,131,15641,1
30,15642,175
1110 DATA 15643,189,15644,144,15651,191,15652,149,15653,139,15654,180,15
659,184,15660,135,15661,191,15662,149,15697,191,15698,143,15715,191,15716,1
49,15718,130
1120 DATA 15719,181,15722,186,15723,129,15725,191,15726,149,15755,176,15
756,156,15757,135,15761,191,15762,180,15779,191,15780,149,15783,130,15784,1
81,15785,186
1130 DATA 15786,129,15789,191,15790,149,15794,139,15795,172,15796,176,15
818,190,15819,189,15825,130,15826,143,15827,140,15828,140,15829,140,15830,1
40,15831,140
1140 DATA 15832,140,15833,140,15834,172,15835,180,15843,191,15844,149,15
848,130,15849,129,15853,191,15854,149,15860,190,15861,189,15882,139,15883,1
83,15884,144
1150 DATA 15899,139,15900,189,15901,144,15904,179,15907,191,15908,149,15
917,191,15918,149,15923,160,15924,187,15925,135,15948,131,15949,141,15953,1
60,15954,180
1160 DATA 15955,144,15963,160,15964,191,15965,149,15968,191,15971,191,15
972,149,15981,191,15982,149,15986,142,15987,131,16018,130,16019,175,16020,1
80,16021,176
1170 DATA 16026,184,16027,159,16028,129,16032,191,16035,191,16036,149,16
045,191,16046,149,16084,130,16085,143,16086,140,16087,140,16088,140,16089,1
42,16090,135

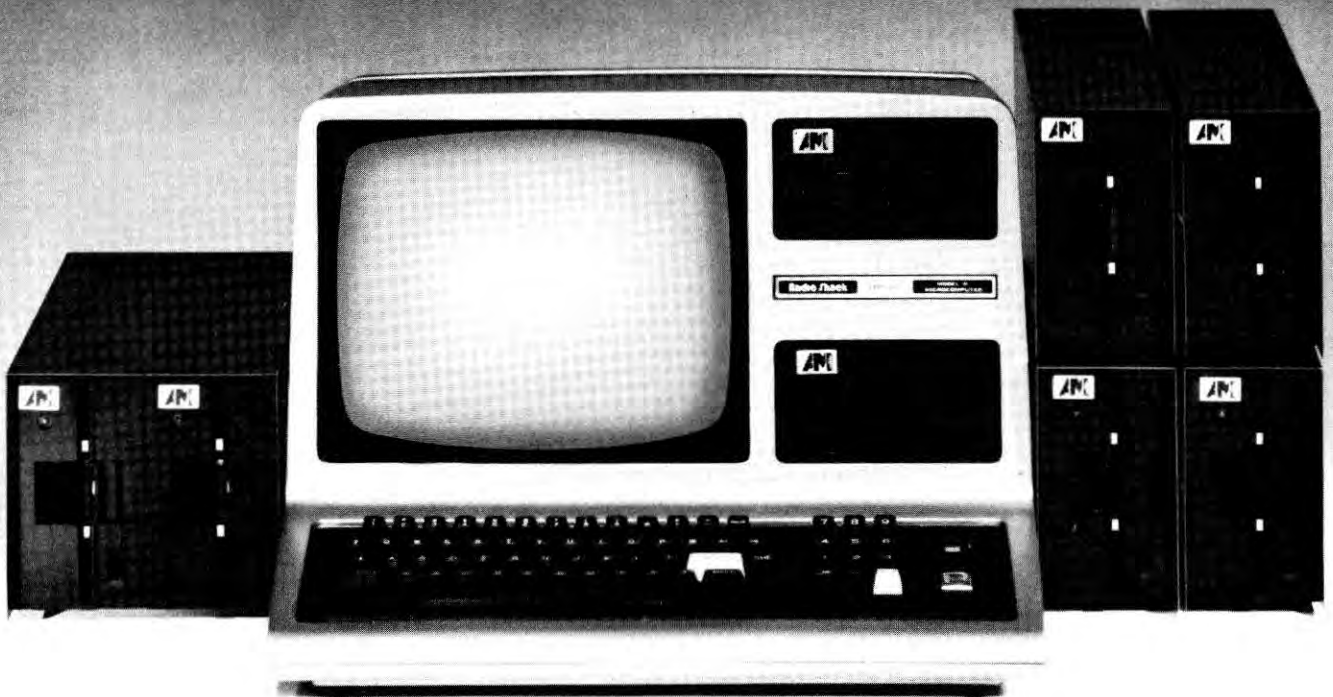
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Program continues

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385

Program continued

```

1180 DATA 16096,143,16099,143,16100,133,16109,143,16110,133,16148,139,16
149,172,16150,176,16168,160,16169,184,16170,142,16171,129,16214,130,16215,1
39,16216,174
1190 DATA 16217,191,16218,140,16219,140,16220,140,16221,140,16222,140,16
223,140,16224,140,16225,140,16226,140,16227,140,16228,140,16229,174,16230,1
91,16231,142
1200 DATA 16232,131,15360,32,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0
1210 READD3$,XX:FORXY=1 TO XX:READXW,XZ:POKE XW,XZ:NEXT XY: RETURN
1220 CLS
1230 C(1)=150:C(2)=175:C(3)=521:C(4)=574:C(5)=918:C(6)=943
1240 QA=192:QB=1
1250 FORX=1TO6STEP2:PRINT@C(X)-1,CHR$(64+X);***;:NEXT
1260 FOR X=2TO6STEP2:PRINT@C(X),***;CHR$(64+X);:NEXT
1270 FORZZ=1TO18
1280 F$=CHR$(RND(6)+64):G$=CHR$(RND(6)+64)
1290 IF F$=G$THEN GOTO 1280
1300 E$=CHR$(RND(6)+120)
1310 GOSUB 2390
1320 NEXT
1330 FOR ZZ=1TO2000:NEXT
1340 CLS:PRINTCHR$(23):PRINT THE GAME OF S I M "
1350 PRINT"TRANSCRIBED FOR THE TRS-80 (TM)"
1360 PRINT BY"
1370 PRINT"STEPHEN RADIN(C) JUNE 27,1981"
1380 PRINT"VERSION 2.8"
1390 FORZZ=1TO2000:NEXT
1400 CLEAR 1000:CLS:DIM T$(20),T(7,7,5)
1410 FORB=1TO2:FORA=1TO6:T(A,A,B)=7:NEXT:NEXT
1420 G1=35:G2=64:'THESE ARE THE CHARACTERS WHICH WILL DISPLAY**
1430 PRINT:PRINT:PRINT
1440 PRINT THIS IS THE GAME OF SIM. IT WAS DEVELOPED AND FIRST"
1450 PRINT DESCRIBED BY G.J.SIMMONS. IT WAS POPULARIZED IN AN "
1460 PRINT ARTICLE BY JOHN H. NAIRN AND A.B.SPERRY IN THE "
1470 PRINT RECREATIONAL MATHEMATICS JOURNAL DATED FALL 1973 "
1480 PRINT VOLUME 6 NUMBER 4. A MORE THOROUGH HISTORY AND "
1490 PRINT DOCUMENTATION IS AVAILABLE THROUGH THAT SOURCE."
1500 PRINT:PRINT:PRINT
1510 PRINT PRESS ANY KEY TO SEE THE INSTRUCTIONS"
1520 A$=INKEY$:IF A$="" THEN GOTO 1520
1530 CLS
1540 PRINT"THE GAME IS PLAYED BY TWO PLAYERS EACH CONNECTING TWO"
1550 PRINT"VERTICES OF A HEXAGON WITH A LINE SEGMENT. EACH PLAYER IN "
1560 PRINT"TURN WILL BE ASKED TO SELECT A STARTING AND ENDING POINT"
1570 PRINT"FOR HIS OR HER SEGMENT. EACH PLAYER MUST SELECT THE "
1580 PRINT"CORRECT LABEL FOR EACH. IF A PLAYER SELECTS A LETTER"
1590 PRINT"PAIR WHICH HAS ALREADY BEEN USED THE MACHINE WILL ASK "
1600 PRINT"FOR A NEW SELECTION. THERE IS NO WAY TO 'PASS' A "
1610 PRINT"TURN. THE FIRST PLAYER TO CREATE A TRIANGLE WHOSE "
1620 PRINT"VERTICES ARE THREE OF THE ORIGINAL SIX POINTS IS THE "
1630 PRINT"LOSER. THEORETICALLY THE PERSON WHO MOVES SECOND HAS AN "
1640 PRINT"ADVANTAGE SO I WILL RANDOMLY SELECT THE ORDER OF PLAY."
1650 PRINT
1660 PRINT PRESS ANY KEY TO CONTINUE":
1670 A$=INKEY$:IF A$="" THEN 1670
1680 CLS
1690 PRINT"IF YOU WANT THE COMPUTER TO PLAY ONE OF THE POSITIONS"
1700 PRINT"JUST TYPE <ENTER> FOR THE NAME OF A COMPETITOR. BE ADVISED"
1710 PRINT"HOWEVER THAT THE MACHINE PLAYS A POOR GAME AGAINST ITSELF."
1720 PRINT"IT KNOWS ALL OF IT'S OWN TRICKS AND LOSES QUICKLY."
1730 PRINT:PRINT
1740 PRINT"GOOD LUCK !!!!!!!!"
1750 PRINT:PRINT
1760 PRINT"PRESS ANY KEY NOW TO BEGIN THE GAME"
1770 A$=INKEY$:IF A$="" THEN 1770
1780 CLS
1790 PRINT"THE CHARACTERS I WILL USE TO DRAW THE LINES WITH ARE ";CHR$(39);
CHR$(G1);CHR$(39);" AND ";CHR$(39);CHR$(G2);CHR$(39)
1800 PRINT"YOU MAY CHANGE THEM NOW IF YOU WANT BY TYPING IN NEW ONES"
1810 PRINT"IF YOU WANT ONE UNCHANGED JUST TYPE <ENTER> WHEN REQUESTED"
1820 A$="" :PRINT"WHAT WOULD YOU LIKE TO REPLACE ";CHR$(39);CHR$(G1);CHR$(39)
); " WITH"
1830 INPUTA$:IF A$<>" THEN G1=ASC(LEFT$(A$,1))
1840 A$="" :PRINT"WHAT WOULD YOU LIKE TO REPLACE ";CHR$(39);CHR$(G2);CHR$(39)
); " WITH"
1850 INPUTA$:IF A$<>" THEN G2=ASC(LEFT$(A$,1))
1860 CLS
1870 CLS:QA=192:QB=1
1880 REM *** SETUP *****
1890 PRINT"I NEED THE NAMES OF THE TWO COMPETITORS NOW"
1900 INPUT"FIRST COMPETITOR'S NAME PLEASE";C1$
1910 IF C1$="" THENC1$="COMPUTER"
1920 INPUT"SECOND COMPETITOR'S NAME PLEASE ";C2$
1930 IF C2$="" THENC2$="COMPUTER"
1940 C1$=C1$+" ";C2$=C2$+" "
1950 X5=LEN(C2$)+1
1960 IFLEN(C1$)>LEN(C2$)THENX5=LEN(C1$)+1
1970 IF X5<10 THEN X5=10
1980 IF X5>15 THEN X5=15
1990 C1$=LEFT$(C1$,X5)+" ";C2$=LEFT$(C2$,X5)+" "
2000 Q=RND(2):IF Q=1THEN PRINT C1$;" WON THE TOSS AND GOES FIRST":E$=CHR$(G
1):I$=C1$
2010 IF Q=2 THEN PRINT C2$;" WON THE TOSS AND GOES FIRST ":E$=CHR$(G2):I$=C
2$
2020 FORX=1TO1000:NEXT:CLS
2030 C(1)=150:C(2)=175:C(3)=521:C(4)=574:C(5)=918:C(6)=943
2040 FORX=1TO6STEP2:PRINT@C(X)-1,CHR$(64+X);***;:NEXT
2050 FOR X=2TO6STEP2:PRINT@C(X),***;CHR$(64+X);:NEXT
2060 REM ***** INPUT ROUTINE *****
2070 'PRINT@27,"= S I M =";
2080 IF LEFT$(I$,8)="COMPUTER" THEN GOTO 2080
2090 PRINT@1,I$;" ";E$;E$;" PLEASE SELECT A STARTING POINT NOW
";
2100 F$=INKEY$:IF F$="" THEN 2100
2110 IF ASC(F$)<65 OR ASC(F$)>70 THEN GOTO 2100
2120 PRINT@1,I$;" ";E$;E$;" NOW SELECT A FINISHING POINT FOR YOUR LINE";
2130 G$=INKEY$:IF G$="" THEN 2130
2140 IF F$=G$THENGOTO 2090
2150 IF ASC(G$)<65 OR ASC(G$)>70 THEN GOTO 2130
2160 IF F$>G$ THEN H$=F$:F$=G$:G$=H$
2170 CR=CR+1:T$(CR)=F$+E$+G$
2180 IF CR=1 THEN GOTO 2230
2190 REM ***** TEST TO SEE IF ALREADY TAKEN *****
2200 IF LEFT$(I$,8)="COMPUTER" THEN GOTO 2230
2210 FORX=1TOCR-1:IFLEFT$(T$(CR),1)=LEFT$(T$(X),1)ANDRIGHT$(T$(CR),1)=RIGHT

```

Program continues

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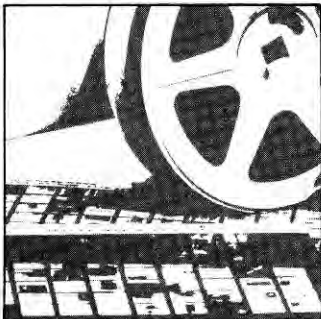
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Program continued

```

$(T$(X),1) THEN CR=CR-1:PRINT@1,"SORRY ";IS;" BUT THAT IS ALREADY TAKEN
";:FORZZ=1TO1000:NEXT:GOTO 2090
2220 NEXT
2230 GOSUB 2390
2240 REM *** TEST IF GAME LOST *****
2250 M$=LEFT$(T$(CR),2)
2260 N$=RIGHT$(T$(CR),2)
2270 FORA9=1TOCR+1
2280 IF MID$(T$(A9),2,1)=ESANDLEFT$(T$(A9),2)=M$THENOS=RIGHT$(T$(A9),1):GOS
UB2320
2290 IF MID$(T$(A9),2,1)=ESANDRIGHT$(T$(A9),1)=LEFT$(M$,1)THENOS=LEFT$(T$(A
9),1):GOSUB2320
2300 NEXT
2310 GOTO 2590
2320 FORA6=1TOCR+1
2330 IF MID$(T$(A6),2,1)=ESANDLEFT$(T$(A6),1)=OSANDRIGHT$(T$(A6),1)=RIGHT$(
N$,1)THENGOTO2640
2340 IF MID$(T$(A6),2,1)=ESANDLEFT$(T$(A6),1)=RIGHT$(N$,1)ANDRIGHT$(T$(A6),
1)=OSTHENGOTO2640
2350 NEXT
2360 RETURN
2370 GOTO 2600
2380 REM *** DRAW IN THE LINE *****
2390 P1=ASC(F$)-64:P2=ASC(G$)-64
2400 IF S2=1THEN GOTO 2430
2410 PRINT@QA,QB;F$;E$;G$;
2420 IF QA>950 THEN QA=134
2430 QA=QA+64:QB=QB+1
2440 T(P1,P2,Q)=7
2450 T(P2,P1,Q)=7
2460 P1=C(P1):P2=C(P2)
2470 IF P2<P1 THEN P3=P1:P1=P2:P2=P3
2480 V=INT((P2-P1)/64)
2490 H=P2-64*V-P1
2500 IF V=5 OR V=11 THEN V=V+1:H=H-64
2510 IF V=0 THEN Q5=H:C=0:GOTO2530
2520 Q5=H/V:C=0:GOTO 2540
2530 FORX=P1TOP1+(H-2)/2STEP.5:C=C+1:GOTO2550
2540 FORX=P1TOP1+(V-2)/2STEP.5:C=C+1
2550 IF V=0 THEN Y1=P1+C:GOTO2570
2560 Y1=P1+C*(64+Q5)
2570 PRINT@Y1,E$;
2580 NEXT:RETURN
2590 REM *** CHANGE PLAYER *****
2600 IF E$=CHRS(G1) THEN Q=2:E$=CHRS(G2):I$=C2$;GOTO 2620
2610 E$=CHRS(G1):I$=C1$:Q=1
2620 GOTO 2060
2630 REM *** LOST ROUTINE *****
2640 PRINT@0,I$;" L O S T ";
2650 S2=1
2660 FORX3=1TO5
2670 FORY=1TOCR
2680 IF LEFT$(T$(Y),1)=LEFT$(M$,1)ANDRIGHT$(T$(Y),1)=RIGHT$(N$,1)THENGOSUB2
760
2690 IF LEFT$(T$(Y),1)=LEFT$(M$,1)ANDRIGHT$(T$(Y),1)=OSTHENGOSUB2760
2700 IF LEFT$(T$(Y),1)=RIGHT$(N$,1)ANDRIGHT$(T$(Y),1)=OSTHENGOSUB2760
2710 IF LEFT$(T$(Y),1)=RIGHT$(N$,1)ANDRIGHT$(T$(Y),1)=LEFT$(M$,1)THENGOSUB2
760
2720 IF LEFT$(T$(Y),1)=OSANDRIGHT$(T$(Y),1)=LEFT$(M$,1)THENGOSUB2760
2730 IF LEFT$(T$(Y),1)=OSANDRIGHT$(T$(Y),1)=RIGHT$(N$,1)THENGOSUB2760
2740 NEXT:NEXT
2750 FOR X=1TO1000:NEXT:GOTO 2800
2760 F$=LEFT$(T$(Y),1):G$=RIGHT$(T$(Y),1)
2770 E$=CHRS(38-X3)
2780 GOSUB 2390
2790 RETURN
2800 FORX=1TO2000:NEXT
2810 PRINT@0,"";
2820 INPUT"WOULD YOU LIKE TO START AGAIN WITH A NEW GAME";A$
2830 IF LEFT$(A$,1)="Y" THEN RUN 1340
2840 END
2850 REM *** MACHINE WILL CHOSE A SEGMENT NOW *****
2860 PRINT@1,"COMPUTER WILL ATTEMPT -
";
2870 FORX8=0TO5
2880 FOR Y6=1TO6:FORY7=1TO6
2890 X6=Y6:X7=Y7
2900 IF X6>X7 THEN Y5=X6:X6=X7:X7=Y5
2910 PRINT@26,"PLY",X8;"TRIAL POINTS ";CHR$(X6+64);" ";CHR$(X7+64)
2920 IF X8=5 AND X6=6 AND X7=6 THEN GOTO 3160
2930 P1=X6:P2=X7
2940 REM *** ALREADY CHOSEN ? *****
2950 IF T(P1,P2,1)>SORT(P1,P2,2)>5 THEN GOTO 2980
2960 IF X6=X7THENGOTO 2980
2970 IF T(X6,X7,Q)<=X8 THEN GOTO 3000
2980 NEXT:NEXT:NEXT
2990 REM *** IS THIS A LOSING CHOICE ? *****
3000 FORZY=1TO6:IF(T(P1,ZY,Q)>5ANDT(P2,ZY,Q)>5)OR(T(ZY,P1,Q)>5ANDT(ZY,P2,Q)
>5)OR(T(P1,ZY,Q)>5ANDT(ZY,P2,Q)>5)OR(T(ZY,P1,Q)>5ANDT(P2,ZY,Q)>5)THENT(P1,P
2,Q)=7:T(P2,P1,Q)=7:GOTO2870
3010 NEXT
3020 FORX=1TO6
3030 IF (T(P1,X,Q)>5ANDT(P2,X,Q)>5)OR(T(X,P1,Q)>5ANDT(X,P2,Q)>5)OR(T(P1,X,Q)
)>5ANDT(X,P2,Q)>5)OR(T(P2,X,Q)>5ANDT(X,P1,Q)>5)THENGOTO2980
3040 IF P1=X OR P2=X THEN GOTO 3050
3050 NEXT
3060 GOTO 3070
3070 P1=X6:P2=X7:PRINT@1,"COMPUTER HAS CHOSEN - ";
3080 FORX=1TO6
3090 T(X,P1,Q)=T(X,P1,Q)+1:T(X,P2,Q)=T(X,P2,Q)+1
3100 T(P1,X,Q)=T(P1,X,Q)+1:T(P2,X,Q)=T(P2,X,Q)+1
3110 NEXT
3120 F$=CHRS(P1+64):G$=CHRS(P2+64)
3130 M$=F-E$:N$=E+G$
3140 GOTO 2160
3150 FORA=1TOCR+1:PRINTF$,G$,T$(A):NEXT
3160 PRINT@1,"I RESIGN. I HAVE NO ACCEPTABLE MOVE LEFT
";
3170 FORZZ=1TO2000:NEXT
3180 GOTO 2800
3190 FORX=1TOCR
3200 IF T$(X)=CHRS(P1+64)+E$+CHRS(P2+64)ORT$(X)=CHRS(P2+64)+E$+CHRS(P1+64)
THENGOTO2980
3210 NEXT
3220 GOTO 3040

```


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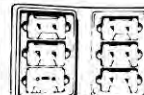
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Most Color Computer owners probably know that when they power up under Extended Color Basic, only 8487 bytes of memory are available for use. Extended Color Basic reserves 6K for graphics screens and 1653 bytes for its own use (pointers and the like). You can maximize available memory by reserving zero pages of memory for high resolution graphics.

By examining the memory, I discovered PCLEAR moves the lower end of the program space

up and down. While the upper end remains at 16383, PCLEAR 4 puts the lower end of program space at 7680. PCLEAR 8 would put it at 13824. The lowest address I could reserve for programs was 3072, using PCLEAR 1. The memory between 1536 and 3071 was reserved for graphics, and there was no way to "un-reserve" it.

I needed to find where Basic stores the address of the lower end of program space. I was stuck: None of the memory maps provided by Radio Shack in *Getting Started With Color Basic* and *Going Ahead With Extended Color Basic* show where this is. Before I could write to

Radio Shack *80 Micro* published an excellent article on the Color Computer in June 1981 ("The Color Computer—An Inside Look"). Included in this article was an extensive memory map. I found what I wanted in bytes 25 and 26!

I PEEKed these locations, multiplied the contents of the first by 256 and added it to the contents of the second. The result was 3073. Apparently, the program space began one byte ahead of where I had expected it to (3072). (I was in PMODE 0.) I wanted it to point to 1537, the normal start of program space in Color Basic with no memory reserved for high resolution graphics.

I had to break 1537 into two numbers (h and l) to be POKEd into bytes 25 and 26. My answer was h equals 6, l equals one. Triumphantly, I typed: POKE 25,6:POKE 26,1. Nothing visible happened. After a moment of thought, I decided this was good. I typed Print Mem next. The computer responded with 13095, its normal response in PMODE 0. It seemed I had failed.

Suddenly inspired, I typed New then Print Mem. This time the computer responded with 14631, indicating I had successfully reserved an extra 1536 bytes of memory.

When I finished congratulating myself, I entered, ran,

saved and reloaded a few programs. Everything worked fine, except of course, the high resolution graphics commands (they made mincemeat out of the program). Normal graphics commands, such as Set and Reset, worked perfectly.

If you are baffled by this, it is not as complicated as it sounds. All you need to know is POKE 25,6: POKE 26, 1 : NEW clears the memory and reserves zero pages of memory for high resolution graphics. All memory is free for programs not requiring high resolution graphics.

This also opens up interesting possibilities. Instead of having the high resolution graphics use low memory, as they normally do, you can make them use high memory. The expanded *Getting Started With Color Basic* tells how to do this. This new edition is a gold mine of useful information.

Radio Shack's guides, while excellent texts for beginners, lack the technical information we need to get the most from our Color Computers. So we have to explore on our own. If you discover something interesting, share it with the rest of us by writing an article about it. ■

John Heusinkveld studies computer sciences.

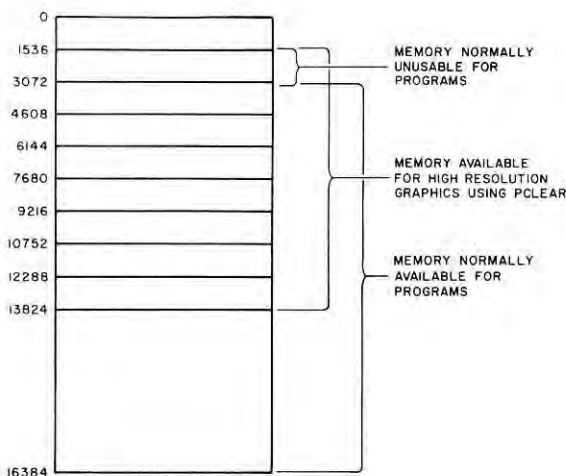


Fig. 1. Simplified memory map of 16K system

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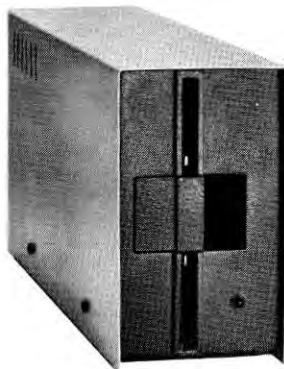


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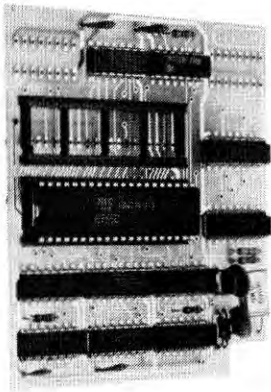
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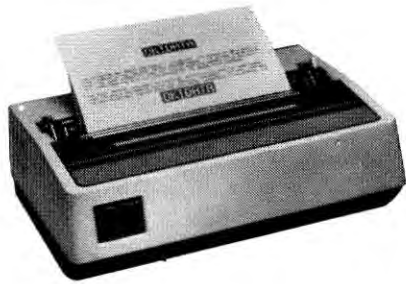
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Temporarily hide your screen's contents.

Screen Veil

Mike Keller
13423 Desert Hills NE
Albuquerque, NM 87111

Veil is a machine-language utility that lets you temporarily cloak the screen contents.

Suppose a visitor drops by while you're running your accounts receivable program with the screen displaying information about a customer's 60-day delinquent account. If you've initialized Veil, all you do is press the shift and Break keys together. This causes the screen to go blank, except for the message "Security hold. Do not reset or turn off computer." Now you can give your attention to the visitor without compromising the delinquent account's right to privacy. Veil requires NEWDOS80 (Version 1 or 2) but is adaptable for use with other disk operating systems. Veil is driven by the TRS-80's interrupt signals, and once initialized, functions under any program that runs with interrupts enabled, such as Basic, DOS, Debug, Scripsit, and so on.

While the computer is in this security hold, the keyboard is locked up, and except for the correct combination of keys, it will not respond to any input (including NEWDOS80's 123, DFG and JKL). To restore the previous screen contents and let your program take up where it left off press shift and Break. Veil is also handy for someone who must unexpectedly leave the computer for a few minutes.

Getting It Started

To use Veil, enter the source code of Program Listing 1, under EDTASM/CMD. Change the origin address if necessary to avoid conflicts with other frequently used

machine-language routines. Write the source code to disk so you can make changes later, then assemble the object code to disk with the name VEIL/CMD. Go into DOS Ready and set high memory or system option AP to B9FFH to protect the area where VEIL/CMD resides. Then, initialize the utility by entering its name. The message "screen veil active" will appear.

Now you may go about your work as usual, except the shift and Break keys will now put the computer in a security hold as described earlier. That's all there is to it. Use the Auto function or a chain file to initialize Veil automatically at power-on/reset, but make sure the high memory is properly set.

Limitations

The program operates only if interrupts are enabled. This means you won't be able to invoke the security hold if you have executed a CMD" T" in Basic.

Since interrupts are disabled while in a security hold, the TRS-80's real-time clock stops, and starts running again only after you resume normal execution of your program.

Because the Break key is treated by some programs as a special input, invoking the security hold may cause a break in your program when it resumes. To avoid this under Basic, disable the Break key before running your program—a precaution that should be taken with any program dealing in sensitive data. Do not disable Break when using EDTASM, since Break is the only key that terminates certain EDTASM functions.

Once Veil is initialized, you can invoke the security hold as often as necessary, but

do not issue the Veil command a second time without a reset. NEWDOS80 doesn't like having the same routine inserted into its interrupt chain twice, and will reboot or cause your system to hang up. If you can't remember whether or not Veil has been initialized, press shift/Break.

Customizing

Veil was written on a Model I, but I believe NEWDOS80 calls (as well as other hard addresses referenced in the routine) are compatible with the Model III's.

Special key combinations can be substituted for shift/Break to enter a security hold, provided you know something of how the keyboard is laid out in memory. Those who are paranoid about security might want to use one combination to activate, and a different one to deactivate. If you do this, omit the first delay loop in the source code.

Be careful using other key combinations. If your program is scanning for a single keystroke (as with INKEY\$) when you invoke a security hold, one of the keys you press may be accepted by the program as a prompt response.

I used shift/Break to avoid this and it works while running Basic programs, as long as the Break key is disabled.

Screen Watchers Foiled

As computers become more widespread in business offices, the need to protect sensitive company information increases. With Veil, your corporate data needn't be advertised to those who gather around the terminal. Now, if we could just find some invisible ink for the printer... ■

The Key Box

Model I and III
32K RAM
NEWDOS80 1.0 or 2.0
Editor/Assembler
1 Disk Drive

Program Listing

```
00001 ;VEIL/SRC      M. KELLER  ALBUQUERQUE,NM (505) 294-4966
00021 ;THIS UTILITY ALLOWS THE OPERATOR TO CONCEAL THE CURRENT
00041 ;SCREEN CONTENTS AND TEMPORARILY PAUSE PROGRAM EXECUTION.
00061 ;      NOTE: REQUIRES NEWDOS/80 VERSION 1 OR 2
00081 ;
00101 ;----- LABEL ASSIGNMENTS -----
BA00  00121      ORG      0BA00H ;ORG ADDRESS CAN BE CHANGED
4410  00141      INSERT   EQU    4410H ;SEE NEWDOS/80'S DOS ROUTINES
4467  00161      DSPMSG  EQU    4467H ;SEE NEWDOS/80'S DOS ROUTINES
402D  00181      DOSRDY  EQU    402DH ;USED TO RETURN TO "DOS READY"
0060  00201      DELAY   EQU    0060H ;ROM CALL USED FOR DELAY
3C00  00221      VIDEO   EQU    3C00H ;ADDRESS OF SCREEN POSN. 0
```

Program continues

Program continued

```

3880      00241 SHFROW EQU      3880H ;SHIFT KEYS LIVE AT THIS ROW
3840      00261 BRKROW EQU      3840H ;BREAK KEY LIVES AT THIS ROW
00281 ;
00301 ;===== INITIALIZATION =====
00321 ;THIS ADDS OUR ROUTINE (BELOW) TO THE INTERRUPT CHAIN.
BA00 110FBA 00341 BEGIN LD DE,VEIL ;POINT TO ROUTINE, AND
BA03 CD1044 00361 CALL INSERT ; ADD TO INTERRUPT CHAIN
BA06 2166BA 00381 LD HL,MESSG1 ;POINT TO MESSAGE 1 AND
BA09 CD6744 00401 CALL DSPMSG ; CONFIRM "VEIL ACTIVE"
BA0C C32D40 00421 JP DOSRDY ;RETURN TO "DOS READY"
00441 ;===== END OF INITIALIZATION =====
00461 ;
00481 ;===== INTERRUPT ROUTINE =====
00501 ;ANYTIME AFTER INITIALIZATION, PRESSING SHIFT/BREAK KEYS
00521 ;TOGETHER WILL CLEAR THE SCREEN AND ENTER AN APPARENT
00541 ;LOCKUP. WHEN SHIFT/BREAK IS AGAIN PRESSED, THE SCREEN
00561 ;CONTENTS ARE RESTORED AND THE USER'S PROGRAM RESUMES.
00581 ;(NEXT 4 BYTES CONFORM TO REQUIREMENTS OF NEWDOS/80)
00601 VEIL DEFS 2 ;RESERVE 2 BYTES FOR DOS
BA11 01 00621 DEFB 1 ;INVOKE AT EACH INTERRUPT
BA12 01 00641 DEFB 1 ;INITIAL INTERRUPT COUNT
00661 ;BEGIN BY CHECKING IF SHIFT AND BREAK KEYS PRESSED.
BA13 3A8038 00681 LD A,(SHFROW) ;GET SHIFT ROW'S CONTENTS
BA16 B7 00701 OR A ;IS A SHIFT KEY PRESSED?
BA17 C8 00721 RET Z ;NO. RETURN
BA18 3A4038 00741 LD A,(BRKROW) ;YES. GET BREAK'S ROW
BA1B FE04 00761 CP 4 ;IS BREAK PRESSED TOO ?
BA1D C0 00781 RET NZ ;NO. RETURN
00801 ;SHIFT & BREAK KEYS ARE PRESSED, SO ENTER SECURITY HOLD.
00821 ;START HOLD BY SAVING CURRENT SCREEN IN TEMPLATE BUFFER.
BA1E 21003C 00841 LD HL,VIDEO ;SOURCE = SCREEN POSN. 0
BA21 11ABBA 00861 LD DE,TEMPLT ;DEST = TEMPLATE'S ADDR.
BA24 010004 00881 LD BC,1024 ;COUNT = 1024 CHARACTERS
BA27 EDB0 00901 LDIR ;COPY SCREEN TO TEMPLATE
00921 ;CLEAR THE SCREEN AND SHOW "SECURITY HOLD" MESSAGE.
BA29 21003C 00941 LD HL,VIDEO ;SOURCE = SCREEN POSN. 0
BA2C 11013C 00961 LD DE,VIDEO+1 ;DEST = FOLLOWING BYTE
BA2F 3620 00981 LD (HL),' ' ;CLEAR FIRST SCREEN POSN.
BA31 01FF03 01001 LD BC,1023 ;1023 MORE BYTES TO CLEAR
BA34 EDB0 01021 LDIR ;CLR REMAINDER OF SCREEN
BA36 2179BA 01041 LD HL,MESSG2 ;SOURCE = MESSAGE ADDRESS
BA39 11003E 01061 LD DE,15872 ;DEST = SCREEN POSN. 512
BA3C 013200 01081 LD BC,50 ;COUNT = MESSAGE LENGTH
BA3F EDB0 01101 LDIR ;COPY MESSAGE TO SCREEN
BA41 010040 01121 LD BC,04000H ;GIVE OPERATOR SOME TIME
BA44 CD6000 01141 CALL DELAY ; TO RELEASE THE KEYS
01161 ;NOW ENTER LOCKUP UNTIL SHIFT/BREAK PRESSED AGAIN.
BA47 3A8038 01181 HOLD LD A,(SHFROW) ;GET SHIFT ROW'S CONTENTS
BA4A B7 01201 OR A ;IS A SHIFT KEY PRESSED?
BA4B 28FA 01221 JR Z,HOLD ;NO. STAY IN HOLD
BA4D 3A4038 01241 LD A,(BRKROW) ;YES. GET BREAK'S ROW
BA50 FE04 01261 CP 4 ;IS BREAK PRESSED TOO ?
BA52 20F3 01281 JR NZ,HOLD ;NO. STAY IN HOLD
01301 ;SHIFT & BREAK KEYS PRESSED, SO RESTORE USER'S PROGRAM.
BA54 21ABBA 01321 LD HL,TEMPLT ;SOURCE = TEMPLATE'S ADDR
BA57 11003C 01341 LD DE,VIDEO ;DEST = SCREEN POSN. 0
BA5A 010004 01361 LD BC,1024 ;COUNT = 1024 CHARACTERS
BA5D EDB0 01381 LDIR ;RESTORE SCREEN CONTENTS
BA5F 010040 01401 LD BC,4000H ;GIVE OPERATOR SOME TIME
BA62 CD6000 01421 CALL DELAY ; TO RELEASE THE KEYS,
BA65 C9 01441 RET ; THEN RETURN
01461 ;===== END OF INTERRUPT ROUTINE =====
01481 ;
01501 ;===== MESSAGE AND TEMPLATE BUFFERS =====
BA66 53 01521 MESSG1 DEFM 'SCREEN VEIL ACTIVE'
BA78 0D 01541 DEFB 0DH ;<-- MESSAGE TERMINATOR BYTE
BA79 53 01561 MESSG2 DEFM 'SECURITY HOLD. DO NOT RESET OR TURN'
BA9D 20 01581 DEFM 'OFF COMPUTER!'
0400 01601 TEMPLT DEFS 1024 ;RESERVE 1024 BYTES FOR TEMPLATE
BEAB 00 01621 DEFB 0 ;MARKER FOR ASSEMBLY END ADDRESS
01641 ;=====
BA00 01661 END BEGIN
00000 TOTAL ERRORS

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Juicing Pin 18

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The Epson MX-80 printer is easily interfaced to the TRS-80 Model I using the relatively inexpensive (\$59) Radio Shack Buffered Printer Interface Cable (cat. 26-1411). The cable is designed for +5VDC supplied externally from pin 18 of the printer connector. As the Epson MX-80 does not supply +5VDC to pin 18; a modification is necessary.

There are two approaches to the problem. The first is an interim method to get you through the printer's 90-day warranty. Epson will not honor their warranty if the second method, involving the printer's +5VDC supply, is used. Both methods are easy to implement.

Although there is only a little soldering involved, I don't suggest either method unless you are experienced. Be sure all AC power is off and all cords unplugged.

Method One

The buffered cable is a flat ribbon cable with a rectangular black box near one end. The box

has a small printed circuit board between matching plastic top and bottom pieces.

First disassemble the black box. The plastic pieces are keyed and held together by a small molded plastic pin and hole in each corner. Carefully pull the pieces apart. Second, solder two insulated wires, each about ten inches long, to the appropriate points on the printed circuit board. Use a light gauge wire, such as AWG No. 22.

There is a tubular electrolytic capacitor adjacent to the connector edge. Connect one wire to the exposed portion of each lead of the capacitor. To do this, strip about 1/16th-inch of insulation from one end of each wire. If stranded wire is used, tin the exposed ends with a tiny drop of solder. Form the ends into a tiny hook to catch the capacitor leads. Another very tiny drop of solder secures each wire to its respective lead.

One end of the capacitor has a small indent around the circumference; this is the positive side. The wire connected to this end connects to the positive pole of a +5VDC supply. The capacitor body is marked in various ways including an arrow, containing minus signs,

pointing away from the indent toward the opposite end. Damage results if the polarity is reversed so *do not guess!* Clearly mark the unconnected end of each wire for plus and minus, corresponding to the observed polarity of the capacitor.

Reassemble the case routing the two new wires out of the case. Make sure they do not interfere with the edge connector. Carefully push the plastic pieces together. If necessary, use a tiny dab of rubber cement in one or two of the corner holes. Do not use plastic cement or you will not be able to disassemble the case again without breaking the plastic.

For a simple +5VDC power supply use three 1.5V size D flashlight batteries connected in series using battery holders. Double check your wires making sure they are connected to the right poles.

Method Two

If the interim modification was made, first, disassemble the plastic case and cut off the two added wires with a small pair of diagonal cutters. Another way is to desolder the wires. Put the case back together and put it aside.

Remove the top cover of the printer and arrange the printer so you face into the left side of it. What is normally the left side of the printer (the side opposite the black knob) will be adjacent and parallel to the edge of your work table. The external connector will be on your left and the cover will be standing on its edge next to the far side.

In the near left corner of the printer is a small printed circuit board piggyback on the main printed circuit board. The left edge of this board is over the inside portion of the 36 pin external connector. A cable plugs into the top of the piggyback board. The wires from this plug are routed around the right edge of this board through a small rectangular cutout. Remember this for reassembly. Near the center of the main board, adjacent to the far edge of the piggyback board, is a small black 26 pin female connector marked

The Key Box

Model I
Epson MX-80 Printer
Buffered Printer Interface Cable

CN-3. A connection will be made to this connector later.

Carefully remove the piggyback board by unplugging the cable plugged into the top of it. Slowly and gently pull it straight up. Remove the two Phillips screws in two of the piggyback board corners. A multi-pin connector, underneath and on the far side of the piggyback board, still holds the circuit boards together. Gently pull straight up; put the board aside.

Remove about 1/16th-inch of insulation from each end of a four inch length of AWG No. 22 wire. If the wire is stranded, tin each end with a tiny drop of solder.

One end of the wire connects to pin 18 of the external connector. Pin 18 is at the far end of the connector in the top row (the numbers are molded into the connector on the outside edge). Bend a hook into one end of the wire. With a drop of solder, secure the hooked end of the wire to the exposed part of pin 18 on the inside of the external con-

ductor. Confirm that no solder bridges have been inadvertently created with adjacent pins. Plug the other end of the wire into hole 16 on connector CN-3. Pin 16 is the source of +5VDC. Make sure the wire goes deep enough to be tightly grasped by the metal contact. Connector CN-3 is used for the optional serial interface. So do not damage the connector by using force or too large a wire. Route the wire against the circuit board.

Replace the piggyback board with extreme care. Check the inside of the printer for wire scraps and replace the top cover. Plug the short length of ribbon cable into the CPU. Connect the long length of ribbon cable to the printer and to the black box. Plug everything in and your Epson MX-80 will respond to LPRINT and LLIST commands. ■

Barry Gorodetzer, an electrical engineer, is project manager for a consulting engineering firm.

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LOG Documentation PAGE 2 08 02 81 16 04 00 P

CONTENTS

Cursor positioning commands	pages 3-4
Page positioning commands	pages 5-7
Write commands	pages 8-11
Lineprinter commands	page 12
Special commands	pages 13, 14
Search command	pages 15-20
New page creation	page 21
Entry options	pages 22-26
Exit	page 27
Technical information	pages 28-33
Suggestions for use	pages 34-37

continue to next page

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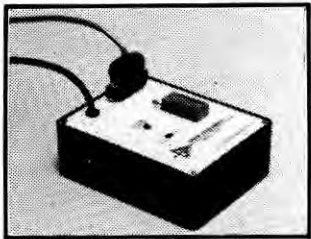
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✓243

Modifying NEWDOS's screen print function.

JKL Minus Blanks

Richard M. Straw
790 Liberty Street
Ashland, OR 97520

The NEWDOS+ JKL procedure prints whatever is on the screen when the keys J, K, and L are pressed simultaneously. I use it often. But it has, as originally written, one very annoying feature. Even if there are only two lines displayed on your screen, the print-

er will traverse and feed paper for the remaining 14 blank lines.

My Solution

This program stops printing by using a carriage return when a line is empty. I assembled this short program with automatic status invoked by the command AUTO JKL (the name under which it is stored). Whenever I power up with this system, the modification runs as if it were part of the original program.

It might have been possible to insert this modification somewhere into the operating system itself using Superzap, but that would add 34 bytes to an already tight set of programs. It resides in the topmost section of memory.

The program has three basic entry points. It first protects the program by modifying the top-of-memory pointer set on power-up. These two bytes reside at 4049H and 404AH. The second entry is into the NEWDOS JKL routine itself, 43B1H to 43E2H. I jump into the routine at 43BEH, store a couple of counters and call the Scan subroutine.

The Scan segment loads in high memory. In my 48K system, the top location is FFFF and the origin is FFDBH. On a 32K system, the proper ORG location is BFDBH. The value in line 250 of the source program is the only one you need to change to adapt to the smaller memory. Scan looks at the line in the screen memory (which begins at 3C00H) character by character, using the C register as a counter.

If this location has a printable

character, its byte location is stored in the B register. If there is only a space, this does not happen. When the end of the line is reached, the PRNT segment transfers data to the line printer one character at a time. Printing continues only for the number of bytes stored in the B counter, without going beyond the last non-space character. All graphics codes are converted to periods to avoid confusing the printer. If your printer displays graphics leave this out. The carriage return is inserted at the end of each line.

The main routine keeps track of the lines as the original JKL routine by checking for a one in bit 6 of the H register. This indicates the HL pair has been incremented to a location beyond the video memory. When all 16 lines are scanned and printed, the routine exits through the end of the original JKL system and restores registers. Since the BC registers are used in the revised routine, these are also restored.

The End statement returns the system to DOS using its transfer vector at 402DH.

For line printers unable to produce graphics characters, insert more code at line 390 to convert various graphics items to characters resembling those on the video display. ■

The Key Box

Basic Level II
Model I
32K or 48K RAM
NEWDOS+
One or more disk drives
Printer

Dr. Straw is a former Professor of Biology and is now manager of Academic Services in the computer center at Southern Oregon State College.

```

00005 ;MODIFICATION TO NEWDOS+ JKL ROUTINE - NO PRINTING PAST
00006 ;LAST NON-SPACE CHARACTER IN ANY LINE
00007 ;FIRST, SET TOP OF MEMORY LOCATION TO ACCEPT PROGRAM
4049 00010 ORG 4049H ;POINT TO TOP OF MEM
4049 DAPP 00020 DEW SCAN-1 ;SET TO PROTECT
00025 ;INSERT NEW TEXT INTO EXISTING JKL ROUTINE
43BE 00030 ORG 43BEH ;ENTER JKL ROUTINE
43BE C5 00120 PUSH BC ;VIDEO ORIGIN
43BF 21003C 00130 LD HL,3C00H ;PRINT LINE ORIGIN
43C2 54 00140 LINE LD D,H
43C3 5D 00150 LD E,L
43C4 010101 00160 LD BC,0101H ;COUNTERS
43C7 CDD8FF 00170 CALL SCAN
43CA 23 00180 INC HL ;CHECK FOR END OF
43CB C574 00190 BIT 6,H ; VIDEO
43CD 28F3 00200 JR Z,LINE ;IF NOT, ANOTHER LINE
43CF C1 00210 POP BC ;RESTORE REGISTERS
43D0 C3DA43 00220 JP 43DAH ;RET THROUGH JKL
00230 ;SUBROUTINE CALLED TO SCAN EACH LINE FOR LAST CHARACTER
00240 ;INSERT LOCATION IN B, THEN PRINT B CHARACTERS ONLY.
FFDB 00250 ORG 0FFDBH ;34 BYTES FOR SUBRTN
FFDB 7E 00260 SCAN LD A,(HL) ;CHARACTER ON SCREEN
FFDC FE20 00270 CP 20H ;SPACE?
FFDE 2801 00280 JR Z,NXT ;JUMP IF A SPACE
FFE0 41 00290 LD B,C ;BYTE COUNT IF NOT
FFE1 79 00300 NXT LD A,C
FFE2 FE40 00310 CP 40H ;CHECK END OF LINE
FFE4 2804 00320 JR Z,PRNT
FFE6 0C 00330 INC C ;INCREMENT IF NOT
FFE7 23 00340 INC HL
FFE8 18F1 00350 JR SCAN ;CONTINUE SCAN
FFFA 1A 00360 PRNT LD A,(DE) ;CHAR TO PRINT
FFFB FE80 00370 CP 80H ;GRAPHICS?
FFFD 3802 00380 JR C,PR2
FFFE 3E2E 00390 LD A,2EH ;PERIOD IF YES
FFF1 CD9C03 00400 PR2 CALL 039CH ;LPRINT ROUTINE
FFF4 13 00410 INC DE
FFF5 10F3 00420 DJNZ PRNT ;RETURN FOR NEXT
FFF7 3E0D 00430 LD A,0DH ;CARRIAGE RETURN
FFF9 CD9C03 00440 CALL 039CH ; OUTPUT
FFFC C9 00450 RET ;RET FROM SCAN & PRINT
402D 00460 END 402DH ;RET TO DOS AFTER LOAD
00000 TOTAL ERRORS

```

Program Listing 1

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Richard C. McGarvey
221 Hirschfield Drive
Williamsville, NY 14221

An absolute must for every Assembly-language programmer, beginner or professional, is a good program monitor. A monitor combining both unique commands and ease of use is an exceptional programming aid.

A common shortcoming in most monitors is that they do not execute code *interactively*, one instruction at a time. With this type of monitor it is necessary to set a breakpoint in the object program and then run the object program without monitor control until the breakpoint is hit. If a bug is hit during the run before the breakpoint, a crash usually results and the programmer is left to search the code for the problem. That is the object of setting breakpoints—to isolate bugs—but the programmer must still search the isolated section of code to find the problem. (I refer to this science of debugging as crashology.)

This method is used by most common debug routines. Although these routines allow single-stepping of instructions, they actually send control to the object program while the instruction is being executed. The result of a bug in the instruction is often a crashed program leading to the reloading of the monitor and the object program.

Then came Macro-Mon, a monitor with almost every feature any programmer could want. Using commands similar to most monitors, it also adds commands allowing single instruction, interpretive operation, and complete, dynamic register display to video and printer. It is both disk and tape compatible, and while executing one instruction, it displays the disassembly of the

next instruction to be executed. It also provides a disassembly of object code to disk (under certain conditions) or printer. The disassembly can be printed as the program is interpreted providing a running printout of the registers along with the disassembled instructions.

Macro-Monitor "The Shadow"

Written by Jake Commander, Macro-Mon is an effort to supply a monitor with all of the standard machine-language monitor features plus many important and unique extras. The effort was successful.

I received the 16K Model I version and although I have a 48K disk system, the monitor operated immediately. The first thing I did was relocate Macro-Mon (it is completely relocatable) to upper memory preventing any conflict with my disk operating system. It also provides a good starting point for operation. If, once in memory, Macro-Mon conflicts with the object program it can be easily relocated with a simple command. My next step was to use Macro-Mon to save itself to disk. This is possible because Macro-Mon contains both disk and tape routines built in. There are no worries about upgrading from a tape version to a disk version.

Compatibility

Thinking there might be incompatibility with my DOS, I was worried when I read Macro-Mon came on a DOSPLUS disk (a minimum version). Upon receiving Macro-Mon, I tested it with TRSDOS and NEW-DOS80 versions 1.0 and 2.0 and found no problems at all. In my estimate Macro-Mon will work with all of the popular disk operating systems.

Documentation

Macro-Mon comes in one of the most professional-looking packages I have seen. The loose-leaf note book is designed to bend along the horizontal axis making the manual stand, easel fashion, for easy reference. There is plenty of room in the binder to allow for back-up storage, working tapes or disks, and pages of personal programming notes.

You can judge this book by its cover! The concise and easy-to-read manual is divided into sections allowing for easy learning. The manual also includes a sample session which traces Level II Basic and works with either tape or disk.

I should point out that the documentation is not written with the intention of tutoring the beginner in Assembly language. It gives only the information needed to use Macro-Mon and does not provide any explanation of the terms used. Likewise, the manual does not explain Assembly-language instructions. A beginner will need a source of basic information on Assembly language to effectively use Macro-Mon. This point is not a drawback and should not frighten even a rank amateur. The last thing a beginner needs is a long-winded, obscure manual that attempts to do more than explain the proper operation of the monitor.

Features

One of Macro-Mon's outstanding features is its video display. If it is difficult to follow the video display, a monitor is virtually useless. With Macro-Mon, the video display has single-keystroke selection, for hex or ASCII representation, in each of two separate modes. The first mode is the register display mode which displays all registers and updates them as the monitor is used to debug or trace a program. Following each register are 16 bytes of memory pointed to by the contents of that register. Below the register display is the disassembly of the next instruction to be executed pointed to by the PC register.

The bottom four lines show 64 bytes of memory which can be selected by the user. These lines can be scrolled forward or back by the use of the arrow keys. The scrolling does not affect the upper part of the display.

Finally, in the upper right of the screen is the @ symbol followed by two hex addresses (the start and end address of Macro-Mon). This monitor location feature is helpful in avoiding monitor/object program clash and it updates automatically when the monitor is relocated. Figures 1 and 2 show the same register-display mode

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JPC Products
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Kit: \$90
Assembled: \$120

by Carl A. Kollar

I guess I don't have to tell any TRS-80 owners how frustrating the cassette system that comes with the computer can be. Even with the factory mod that's available, the annoyance of loading and checking programs becomes just barely tolerable.

If you're like me, after you've just plunked down a chunk of money for a Level II 16K machine, "you ain't got nuttin left" for even one disk drive at 500 bucks apiece. So you suffer.

A reasonable alternative is the Exatron Stringy Floppy (ESF). This will cost you about 250 bucks and totally eliminates your loading and saving problems, automatically and fast. I've had one of these for about six months and love it!

But, if the price is still too steep, have I got a device for you!

The Device

The February 1980 issue of *Microcomputing* had an ad that intrigued the hell out of me. It was a high-speed cassette system by JPC Products acclaimed as a "poor man's floppy." It made all sorts of seemingly ridiculous claims such as "loads five times faster," "stores 50,000 bytes on a 10-minute cassette," "less than one bad load in a million bytes with the volume control anywhere between one and eight."

All this for a measly [90] bucks? How could this be? A call to Albuquerque answered a few questions: Yes, it had its own power supply, and, it stored programs five times faster because it utilized higher density data. The computer outputs the information at a higher rate out of the rear keyboard connector.

The ad had even claimed anyone could build it even if you have never soldered before. JPC would make it work, if you couldn't—for free. I was sold. I placed my order, and it arrived about two months later (parts shortage).

I work in electronics, so I found the unit exceptionally easy to build. It took about an hour. The manual is superb. (That's better than great.) It was clear, concise and exact with no

FOR TRS-80*

[Reprint of June 1980 Review, *80 Microcomputing*]

ambiguities. Important parts placements are stressed (polarity markings on electrolytics, bands on diodes, etc.).

JPC was right! With these instructions, you couldn't go wrong. The board quality is excellent. It is double-sided and parts locations are clearly marked on the component side of the board. There are no jumper wires to install. JPC utilizes PC traces and plated-through holes for connections to traces on the other side of the board.

Also, there are absolutely no adjustments or settings to bother with.

The documentation is a sheaf of 8½ × 11 papers stapled together. It is written in the nicest format I've seen in a while. Each command and/or subject is covered on its own sheet in large type. All explanations are in easy to read English—not computerese.

Commands and Features

SAVE"filename": Saves your BASIC program on cassette.

LOAD: Reads the next BASIC program from the cassette.

LOAD"filename": Searches for and loads the specified file from cassette.

LOAD? and LOAD?"filename": Reads file from cassette, and compares contents to memory.

LOADN: Prints a list of all the programs on a cassette, until interrupted by the "break" key.

LOADN"filename": Same as above except the tape will stop at the end of the program named.

KILL: Removes the file manager program from memory so that the extra memory can be used by large programs.

RSET: Allows the operator to rewind and position the tape on tape recorders that have these functions tied to the motor control jack.

RUN"filename": TC-8 searches for a specified program and runs it immediately.

PUT"filename": Same as SAVE "filename", except it is for use with system tapes.

GET: Same as LOAD, except it is for use with system tapes.

GET"filename": Same as LOAD "filename", except it is for use with system tapes.

GET? and GET?"filename": Same as LOAD? and LOAD?"filename", except it is for use with system tapes.

GETN and GETN"filename": Same as

LOADN and LOADN"filename", except it is for use with system tapes.

OPEN: Required before cassette input or output of a data file can be attempted.

CLOSE: Required to end a cassette data file.

PRINT#: Allows numerical or string data to be output to a cassette file.

INPUT#: Allows numerical or string data to be input from a cassette file.

I haven't counted them, so I don't know about the "one load in a million bytes" claim, but my son, Anthony (age 11), loaded about 30 of his programs from his Radio Shack format tape to a new TC-8 format tape. He's run them all and found no bad loads.

Unlike the standard tape system, you can position your tape anywhere before the program you want and not have to look for a blank spot between programs. The TC-8 patiently waits for the program you want and then starts loading without getting confused by the portion of the previous program you just fed it.

Try that on your regular cassette system; you'll wear out the reset button. ■

ORDER NOW

To order your TC-8 kit, send your check or money order for \$90.00 plus \$3.50 postage and handling to JPC PRODUCTS CO., 12021 Paisano Ct., Albuquerque, NM 87112 (New Mexico residents add 4% sales tax). Credit card orders accepted by phone or mail. Personal checks will delay shipment. We will otherwise immediately ship you the TC-8 kit, the cabinet, the ribbon cable, the power adapter, an instruction manual, and a cassette containing the software.

For Mod I Level II only.



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in both hex and ASCII.

The second display mode is called the video display mode, shown in Fig. 3 in hex. This display is a complete 256 bytes of user-defined memory. The video display can be in hex or ASCII and scrolls at the rate of one page (256 bytes) at a time using the arrow keys. This mode makes it easy to use the modify command, allowing you to alter memory contents. By entering the memory modify command, you can manipulate a graphics bracket, using the arrow keys, until the exact byte is selected. Memory can be modified in blocks or a byte at a time. The memory modify command works in the register display mode also.

As with most monitors, Macro-Mon has the breakpoint feature. Two versions of Macro-Mon are provided: MAC11 uses single-byte breakpoints while MAC13 uses

3-byte breakpoints. The use of breakpoints by Macro-Mon is essentially the same as with most monitors. Even though it has the breakpoint option, it is supplied only for use when specific routines (such as timed routines) are run.

This monitor's most outstanding feature is its ability to interpretively trace the execution of another program. This can be done a single step at a time, allowing you to check individual registers for proper values after each instruction. In addition, the next instruction is disassembled and displayed so that the program flow is easier to follow. This interpretive execution can be done at a rate of 1,200 instructions per second or at any user-set rate below that.

During the entire interpretive operation, the monitor never loses control, so changes can be made if a bug is encountered

and the program continued. This saves hours over the process of bug elimination by Crashology.

The Macro-Mon interpretive system even makes it possible to execute Basic ROM. Those tricky ROM routines can finally be watched in detail so you can incorporate them or their programming techniques into your own creations.

Object code can be executed in the following ways: first, by using a jump to the object program. This allows the program to operate normally and at full speed. Returning to Macro-Mon is accomplished by installing a breakpoint prior to the jump command. That's right! The crashology method is the only way to check routines that demand specific time requirements such as disk or cassette I/O.

Instructions can be executed singly. No breakpoints are necessary and Macro-Mon maintains full control. The program is interpreted and all registers are updated showing the effect of each instruction. With the exception of timed routines, this is an excellent method of debugging.

The Call execution allows a call to be executed in full, but the return is to Macro-Mon instead of the object program. The only problem here is that if a bug occurs in the called routine, the program may crash before the monitor regains control. This means you must reload and start over.

The ease and uniformity of command entry is an important feature of Macro-Mon. Most commands are single-key entry, although some can be used in combinations allowing for greater control. Parameters are used for many, and the format for entering commands is uniform throughout the monitor.

Following register changes on the video is a distinct advantage, but Macro-Mon also allows for that same register tracing feature to be routed to the line printer as well. Macro-Mon allows you to print out the registers as the program is being traced. The printout provides a disassembly of the instructions and the register conditions at each instruction—an invaluable tool.

Macro-Mon makes finding a string of hex code in the object program easy with the Find command. Up to 16 hex bytes can be entered and are then located in the object program by the monitor. This saves searching the pages of hex data by eye, and it is faster.

Additional Features

Additional outstanding features of Macro-Mon are: a built-in disassembler (which recognizes some 96 undocumented instruction codes listed in the rear of the manual); object code relocation; a memory-block copy feature; a line-printer dump of specified memory block; memory and register modification; a checksum memory command (useful but not infallible); a punch table for memory block I/O; read to file or port command which reads a file from disk or tape or reads a byte from a port (bytes are displayed as they are read in); dynamic up-

```

AF = 80 44 -Z---P--      AF' = FF FF SZ1H1PNC      @E000-FD0B
BC = 20 44 => CC 7B 1D 2B E5 CD 94 09 E1 2B 07 D7 DA C2 1E C3
DE = 44 80 => 80 20 00 00 42 00 00 63 00 00 1E 00 1E 00 02 00
HL = 43 1F => 0D FF FF FF FF FF FF FF FF FF FF FF FF FF FF
BC' = 0A 0A => 41 C9 7B B7 CA 55 09 21 5E 09 E5 CD 55 09 79 C8
DE' = 01 08 => 20 53 49 5A 45 00 52 2F 53 20 4C 32 20 42 41 53
HL' = 37 EC => 80 1D 80 C9 3F 3F 3F 3F FF FF FF FF 3F 3F 3F 3F
IX = FF FF => FF F3 AF C3 74 06 C3 00 40 C3 00 40 E1 E9 C3 9F
IY = 43 80 => 11 02 00 00 23 0A 02 05 00 00 11 02 00 00 23 0A
SP = 41 FA => 2D 40 49 4F 4E 20 E5 2A A3 8D 7E E6 7F FE 0D CC
PC = 40 2D => C3 00 44 3E 43 EF C3 EC 4A 00 00 00 00 00 00 01
      40 2D      C3 00 44      JP      4400H
      FD8E => 53 45 45 20 4B 4F 57 20 45 41 53 59 20 20 20 20
      FD9E => 4D 41 43 52 4F 2D 4D 4F 4E 20 4D 41 4B 45 53 20
      FDAE => 41 4C 54 45 52 49 4E 47 20 4D 45 4D 4F 52 59 21
      FDBE => 00 00 FF FF FF FF FF FF FF FF FF FF FF FF FF FF
  
```

Figure 1

```

AF = 80 44 -Z---P--      AF' = FF FF SZ1H1PNC      @E000-FD0B
BC = 20 44 => . x . + . . . . . ( . . . . .
DE = 44 80 => . . . . B . . c . . . . .
HL = 43 1F => . . . . . . . . . . . . . . .
BC' = 0A 0A => A . x . . U . ! ^ . . . U . Y .
DE' = 01 08 => S I Z E . R / S L 2 . B A S
HL' = 37 EC => . . . . ? ? ? / . . . . ? ? ? ?
IX = FF FF => . . . . t . . @ . . @ . . . .
IY = 43 80 => . . . . # . . . . . . . # . .
SP = 41 FA => - @ I O N . * . . . ~ . . . .
PC = 40 2D => . . D > C . . . . J . . . . .
      40 2D      C3 00 44      JP      4400H
      FD8E => S E E . H O W . E A S Y
      FD9E => M A C R O - M O N . M A K E S
      FDAE => A L T E R I N G . M E M O R Y !
      FDBE => . . . . . . . . . . . . . . .
  
```

Figure 2

```

0400 => 0E 01 79 A3 20 05 14 CB 01 1B F7 3A 80 38 47 7A
0410 => C6 40 FE 60 30 13 CB 0B 30 31 C6 20 57 3A 40 3B
0420 => E6 10 2B 28 7A D6 60 18 22 D6 70 30 10 C6 40 FE
0430 => 3C 38 02 EE 10 CB 0B 30 12 EE 10 1B 0E 07 CB 0B
0440 => 30 01 3C 21 50 00 4F 06 00 09 7E 57 01 AC 0D CD
0450 => 60 00 7A FE 01 C0 EF C9 DD 6E 03 DD 66 04 38 3A
0460 => DD 7E 05 B7 2B 01 77 79 FE 20 DA 06 05 FE 80 30
0470 => 35 FE 40 38 0B D6 40 FE 20 38 02 D6 20 CD 41 05
0480 => 7C E6 03 F6 3C 67 56 DD 7E 05 B7 2B 05 DD 72 05
0490 => 36 5F DD 75 03 DD 74 04 79 C9 DD 7E 05 B7 C0 7E
04A0 => C9 7D E6 C0 6F C9 FE C0 38 D3 D6 C0 2B D2 47 3E
04B0 => 20 CD 41 05 10 F9 1B CB 7E DD 77 05 C9 AF 1B F9
04C0 => 21 00 3C 3A 3D 40 E6 F7 32 3D 40 D3 FF C9 2B 3A
04D0 => 3D 40 E6 0B 2B 01 2B 36 20 C9 3A 3D 40 E6 0B C4
04E0 => E2 04 7D E6 3F 2B C0 11 40 00 19 C9 23 7D E6 3F
04F0 => C0 11 C0 FF 19 C9 3A 3D 40 F6 0B 32 3D 40 D3 FF
  
```

Figure 3

date of video allowing you to watch the operation of interrupt handling routines or memory mapped I/O; write to file or port (opposite of read listed above); memory-block exchange; a zap memory block command to fill a memory block with a particular byte; binary arithmetic and logic (including addition, subtraction, multiplication, division, logical and logical inclusive OR); enable, disable or continue interrupts; and finally, a printer option for the monitor's driver or an outside driver.

Model III Version

The Model III version is essentially the same as the Model I version; the commands and functions are identical. Although the Model III version is supplied only on disk, it does have tape routines. Also, both baud rates are available for cassette I/O.

If you have a Model III and have found monitors are a bit scarce, Macro-Mon is for you. Macro-Mon's Model III version is not a rehash of the Model I monitor. The commands and functions may be the same, but the programming is Model III all the way.

Advice

This section is for Model I disk users. Due to the additional expense of producing the monitor on disk complete with an operating system, the disk version is more expensive. Since there is no difference in the program or the manual—only in the media—I would advise that you buy the tape version and save \$5.

Shortcomings

Although I have extolled the excellence of Macro-Mon I should point out a couple of shortcomings. I prefer a disassembler that prints the ASCII codes for all values encountered during the disassembly. This is a personal preference and comes from the fact that my first disassembler had that function and I've gotten used to it. Macro-Mon does print out ASCII equivalents in some cases, but not for every hex code.

Another minor problem involves the disassembly. While Macro-Mon's symbolic output can be directed to disk, certain qualifications must be met first. The DOS used is what makes the difference and I don't believe that most DOS systems have the capability to reroute the output. Also, Macro-Mon does not have a facility for the symbolic dump of object code to tape.

While I found these points to be a bit of a problem, I don't think most users will notice them.

For the programmer just starting out, or for the programmer looking for a better monitor, you can't beat the features of Macro-Mon. Two minor conveniences are sacrificed, but in return you get much more valuable features that can't be found elsewhere.

If you have any specific questions feel free to write me or to contact me by EMAIL on Compuserve at 70145,171. I will be happy to share my Macro-Mon experiences with you. ■

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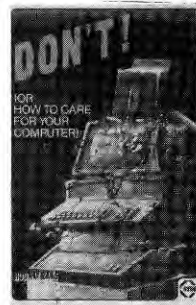
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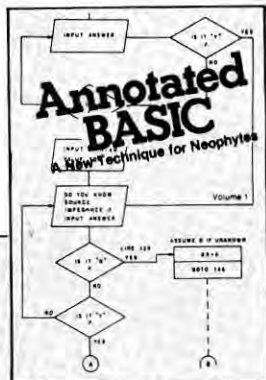
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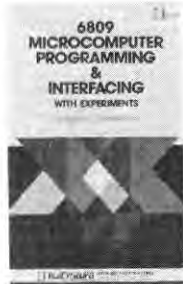
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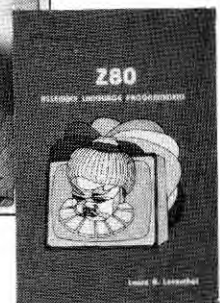
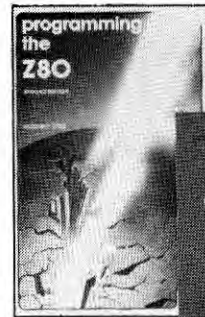
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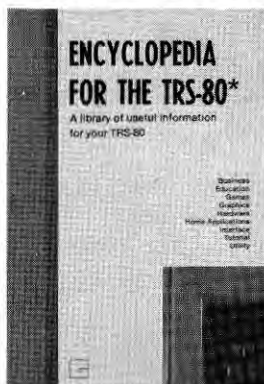
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DOS woes erode Tandy's lead

by G. Michael Vose

80 Micro Technical Editor

To be or not to be is the question that seems to characterize the new TRS-80 Model 16 Operating System and applications software as Tandy Corporation watches its early lead in the 16-bit computer race evaporate in a shower of machines using CP/M and MSDOS. Five months after its announcement, the Model 16 still has no software and, depending on whom you talk to, no operating system.

In the meantime, a dozen new 16-bit computers have debuted. (For stories on three of them, see Pulse Train.) Their designs recognize quality hardware is nothing without software. Therefore, most of the new machines use an operating system that immediately makes available the use of an existing software base. Or, as in the case of Apple computer, the makers are holding back the new machines until the software is ready. Radio Shack, however, is still playing the proprietary, "trust me," software game.

In fact, there are four different Radio Shack operating systems for the Model 16—TRSDOS versions 2.0a, 2.0b, II-4.1, and TRSDOS 16. The Model 16 is actually two computers in one—a Z80 based, 64K Model II plus a MC68000 based, 128K, multi-user Model 16. Three of the existing operating systems are Z80 based. TRSDOS 2.0a is the standard Model II operating system; TRSDOS 2.0b is modified to allow operation of the Model 16's new trimline, eight-inch disk drives; TRSDOS II-4.1 is the hard disk operating system; and TRSDOS 16 is the single-user, MC68000 16-bit operating system. The Z80-based systems were written by Tandy's System Software Group while TRSDOS 16 was written by Ryan-McFarland, a 21-year old software house currently based in Los Angeles.

The evolution of each of these versions

of TRSDOS would appear to be logical. Understanding their relationships may not.

TRSDOS 2.0b is the operating system that most current buyers of the machine would be interested in. Since there is no 16-bit software yet available, a buyer today would have to content himself with running the machine as a Model II. Version 2.0b is therefore required in order to run the Model 16's trimline drives. These drives are designed for double-sided operation, allowing two drive units to provide four separate, addressable 627K drives. Unfortunately, TRSDOS 2.0b does not support the trimline's double-sided configuration, limiting the system to only two drives, effectively eliminating any three or four drive applications.

TRSDOS II-4.1 supports the full double-sided operation of the trimline drives. It also supports the operation of Radio Shack's 8-megabyte hard-disk drive. There are reports from within Radio Shack and from independent software developers, however, that TRSDOS II-4.1's operation of the floppies is as much as 2½ times slower than TRSDOS 2.0b. This can negate the new drives' advantages over the older Model II drives—the old drives could be set to step no faster than 6 milliseconds while the new drives can step at 3 ms.

TRSDOS 16 does not support floppy hard-disk operation. TRSDOS II-4.1 is a requisite to run TRSDOS 16 and it handles all the input-output for 16-bit operations. In fact, TRSDOS II-4.1 "...thinks that TRSDOS 16 is an applications program," according to Bob Snapp, president and chief programmer of Snappware Inc. A programmer at Ryan-McFarland characterized TRSDOS 16 as "...just a system to get things started."

TRSDOS 16 comes with an assembler, written by Ryan-McFarland, for the machine-code programmer. The assembler

does not use the standard Motorola instruction set mnemonics, however, which may limit its acceptance by applications programmers.

There will be a variety of operating systems available for the machine by this time next year. Steve Williams, a former Tandy programmer now working on CP/M68000 for Digital Research, thinks that Charles River Data System's UNOS is the leading candidate. UNOS is a Unix-like operating system developed by CRDS for their own MC68000 based systems. Phase 1 Systems Inc. is working feverishly on Oasis-16 and expects to have it ready next spring. Digital Research, in conjunction with Hitachi, is working on CP/M-68000, which will undoubtedly be adapted for the Model 16. Microsoft Inc. has versions of its Bell Labs licensed Unix clone, called Xenix, available for all popular 16-bit processors and has stated publicly there will be a Xenix available for the Model 16 sometime in the near future, possibly three to six months.

The companies who have made a big splash in the Model III operating systems market, Logical Systems Inc. (LDOS) and Micro Systems Software Inc. (DOSPLUS), have only tentative plans to enter the race to produce a 16-bit operating system.

Radio Shack will have MC68000 recompiled versions of its RM-COBOL accounting software ready for sale by the fourth quarter of 1982. The development of other applications software for the Model 16 will probably await the development or procurement of a multi-user operating system. A Tandy spokesman admitted recently that a Model 16 Scripsit project, for example, has not yet been started.

As of the middle of June, Radio Shack had shipped no more than 2,000 Model 16s and the majority of these units are still in dealers' hands. Tandy's new machine was fast out of the blocks but appears to have taken a slow first step. ■

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Computer crime target of new insurance by Lloyd's-style firm

by John P. Mello Jr.

80 Micro News Editor

Protecting businesses from computer crime losses is the aim of a new line of insurance offered by a Lloyd's of London-style company based in a Chicago suburb.

For a firm victimized by unauthorized access to its computer, the new line of insurance offered by Shand, Morahan & Company Inc. covers up to \$10 million in liability claims plus court costs resulting from those claims.

In addition to covering third party liability for a business, its subsidiaries and its present and former directors, officers, and employees, the insurance covers personal injury claims.

"No computer is completely secure from access by unauthorized parties," Eileen M. Gerharz, underwriter for the policy, said in a statement. "This 'computer access' exposure can result in substantial direct financial loss to the insured. It can also result in liability claims brought by third parties for damages due to the release of confidential information, invasion of privacy, lost or altered records, or business interruption."

The policy also covers damages caused by unauthorized access:

- Costs related to restoring the system to its condition prior to unauthorized access;
- Expenses incurred to continue business while the system is being restored; and
- Pecuniary losses, like those resulting from all a business's accounts receivable records being destroyed.

Other features of the policy include:

- Protection from losses caused by accident and pranksters breaking into a system for "kicks;"
- Worldwide coverage provided claims are brought in the United States or Canada; and
- No EDP security audit, in most cases, to obtain coverage.

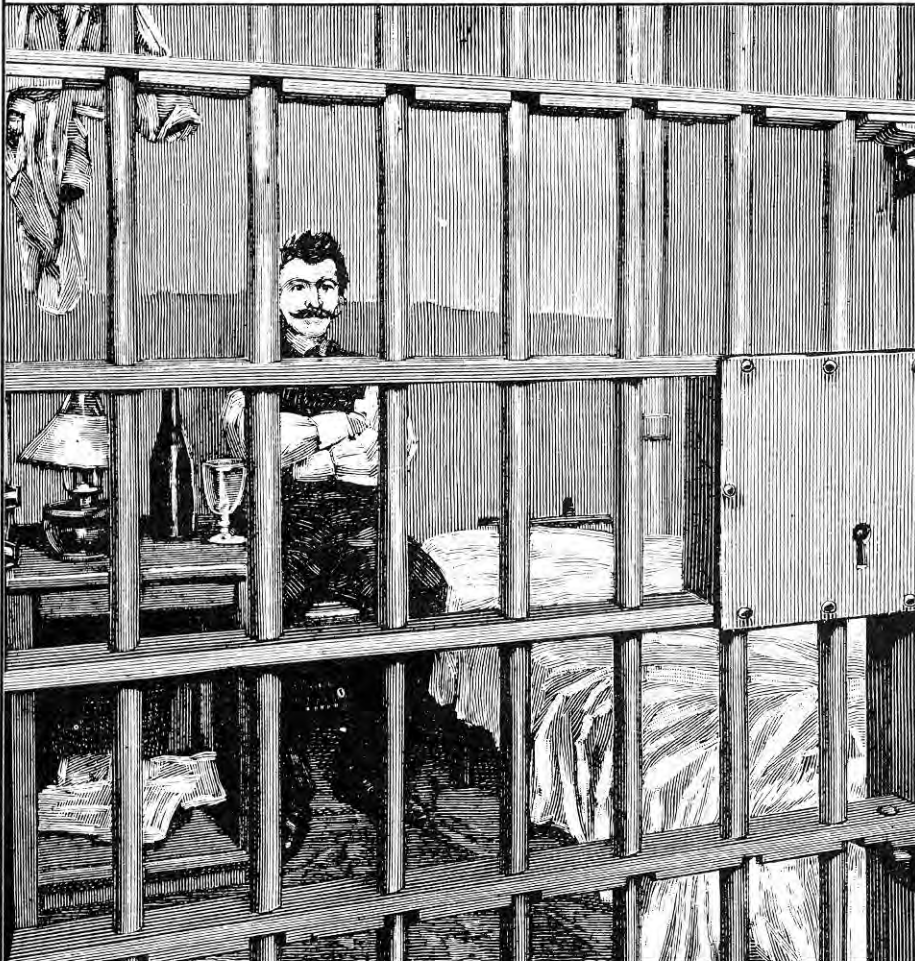
"The potential damages which may result from unauthorized access to a business computer system may be catastrophic," Gerharz noted. "Computers of major corporations have been disrupted, taken over or shut down by high school students who apparently wanted only the thrill of breaking into a system considered secure."

Shand-Morahan, the largest underwriter of professional insurance in the United States, has a history of being in the vanguard of the industry, according to spokesperson Kate Bell: "It's part of our tradition to perceive a need for new kinds of insurance coverage and go ahead and develop a new kind of policy that fills the gap we perceive in the insurance marketplace.

"This was one of the main reasons for going into the computer field. We've witnessed tremendous growth there and felt it was a growing exposure area."

Shand-Morahan, like Lloyd's, is an underwriting manager representing several insurance companies. "The companies essentially hand us the pen and we handle the program from start to finish," Bell said. "We design the policy forms, decide what's going to be written, arrange reinsurance backing (spreading the risk among the companies), issue the policies, handle all the accounting and supervise the claims. But because we are not technically an insurance company, we do not assume the risk. We operate on a man-

continued



INSURANCE^{continued}

agement contract basis with the different companies."

The Evanston, IL, firm deals in what the insurance trade calls "surplus lines."

"It is a facet of the industry that is not as closely regulated as more common kinds of insurance like auto and life," Bell explained. "The surplus lines are traditionally where the new and unusual lines of insurance are pioneered and first offered."

She added: "The surplus line area is where many new products find their beginnings. After experience and statistics are developed for a particular line, it may well move into what is known as the admitted marketplace with standard carriers. Then the surplus companies have to come up with another new product to take its place."

Asked how the premiums on the policy would be determined, Bell replied: "With a risk of this magnitude and this nature, each policy is going to be custom written. It's like asking me to give you the rates for Betty Grable's legs. We're going to be looking at each case individually."

"Initially the coverage will be written on a flat basis," Gerharz said in a telephone interview. "It will just be a flat annual charge." She explained: "We're going to be looking at banks, manufacturers, EDP service firms, stock brokers. Each of these classes of businesses have different exposures, different systems, different security. It would not be proper to charge the same amount for each of these risks considering they have different exposures and different chances of loss on this policy."

Enterprises wanting unauthorized access insurance fill out a 12-page application. It includes questions on an applicant's overall business operations and the configuration of their computer system.

"We're trying to get a good feel about management's attitude toward computer security," Gerharz said. "What kind of budget do they have for EDP? For computer security? Do they have in-house training programs? What are their policies toward terminated employees? We also ask questions about software security and physical security. Do the windows have non-removable hinge pins? Does the company use guards and man-traps?"

She added: "After we have all that information, we have to come up with a pricing and build into it loss control and risk management. If an insured has a particular security feature we think they should have, we will load our pricing to

reflect that. If they put one into place, we would be willing to give them some type of credit up to the premium."

"In putting together the application," she continued, "we had quite a bit of discussion with security consultants. They pointed out to us several areas of vulnerability in an EDP system and certain protections required to limit the potential for unauthorized access to the system. So we are aware of certain security features available to our insureds that we think will limit the potential for loss under our policy." The underwriter went on to say: "We have been writing a program for EDP since the mid-70s. Through that we have underwriters with a very good knowledge of EDP operations. We have also put a lot of resources into this new program training new employees."

Don Brayer, Shand-Morahan's vice president for marketing, added: "When

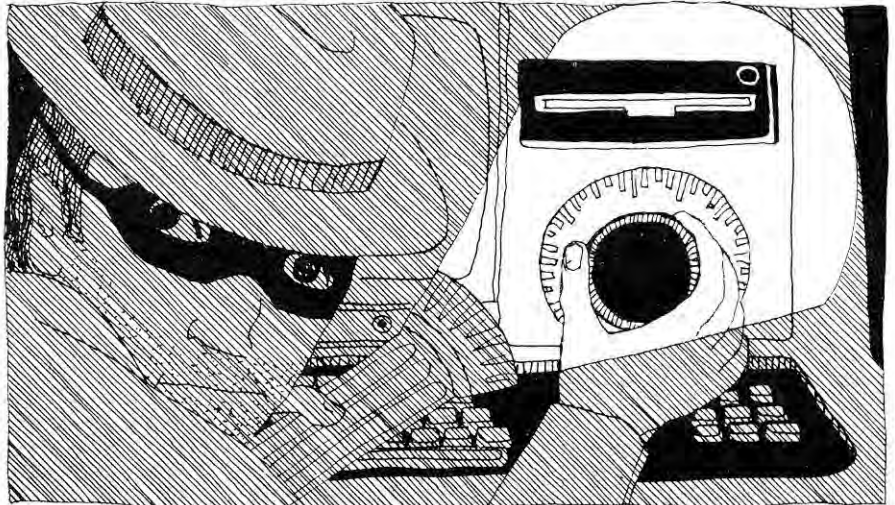
system and causing damage to data files, which is happening almost on a daily basis. Lloyd's would not respond to that type of situation."

Gerharz added Lloyd's policy covers only direct loss to the insured, while Shand-Morahan's covers direct loss and liability.

According to information from Lloyd's, its policy is not a fixed word policy but can be tailor-made to meet the needs of each client and incorporates a risk management review before the policy is agreed and issued.

It is intended to cover losses due to fraudulent input of electronic data or computer instructions to an insured's computer by:

- Unauthorized access to a terminal;
- Fraudulent preparation of tapes;
- Fraudulent preparation of computer programs; or
- Obtaining access to a bank's com-



you get off the ground with a new coverage, you're sort of feeling your way around. We've tried to put the program together as best we can, trying to meet the needs of the computer industry and satisfy ourselves from an underwriting standpoint."

According to spokesperson Bell, Shand-Morahan's policy is the only one of its kind in the United States and possibly the world. "Lloyd's is offering limited computer crime coverage, but the policy is very different from what we're offering," she observed. "A major difference between our unauthorized access policy and Lloyd's," Gerharz said, "is theirs applies only to financial institutions. They also require there be manifest intent to financially gain or cause damage. Under our policy, we can insure a commercial risk with this exposure. "We can cover, for example, a university for students getting into the

communication lines.

It also covers the activities of independent consultants, engineers, programmers and ex-employees having knowledge of a bank's system, and fraudulent use of electronic communications systems where messages are altered or a fictitious authority or ID is used.

Lloyd's said it developed its electronic and computer crime policy when it identified a weakness in the basic insurance bought by banks, leading to a potentially serious exposure in the area of electronic operations. In the early 1970s, it explained, many banks converted to electronic systems. Those systems were comparatively secure because of the general ignorance of them, effectively protecting them from computer fraud. However, the advent of personal computers and the ability to tap into systems illegally greatly increased that risk. ■

by G. Michael Vose

80 Micro Technical Editor

Six hundred thousand instructions per second. Separate supervisor and user modes. 68,000 transistors. A streamlined 56-mnemonic instruction set with 14 address modes. 17 separate 32-bit registers. A data transfer rate of 1.98 megabytes per second. A 24-bit address bus and a 16-bit data bus.

These are some of the features outlined for Motorola Inc. at a seminar held in Lexington, MA, on its new MC68000 microprocessor. The MC68000, the CPU being used in Tandy's new TRS-80 Model 16 microcomputer, is the hottest new microprocessor in the industry. It is being used in computers being manufactured by Tandy, Corvus, Apple, Fortune 32:16, Charles River Data Systems and many others. Motorola hopes to sustain this momen-

Seminar is exciting peek into the future

tum by offering a series of one day seminars (see 80 Micro calendar) demonstrating the capabilities of this new chip and its family of co-processors, peripheral adapters and enhanced version CPUs.

The MC68000 is a 16-bit microprocessor with 32-bit registers and a 32-bit program counter. It is considered a 16-bit processor because it uses a 16-bit data bus. A late 1983 version of the device, called the MC68020, will use a 32-bit data bus which, combined with a 32-bit address bus, will make it a 32-bit microprocessor.

Motorola also plans to make an 8-bit data bus version of the CPU, called the MC68008, for use with conventional 8-bit board designs and peripherals. The MC68008 will be 60 percent as efficient as the MC68000, offering enhanced processing power to 8-bit systems. In addition, code written to run on the MC68008 will run on all MC68000 series CPUs.

Although the MC68000 can address 16 megabytes of memory, it is not practical to design a system with this much on-board memory. Typical designs will offer 128K, 256K, 512K or 1 megabyte of memory. Motorola has anticipated the need to support tape or disk storage systems disguised as additional memory; the MC68010 CPU will support virtual memory configurations up to 4 gigabytes.

The MC68000 comes in five different clock speed versions—4MHz, 6MHz, 8MHz, 10MHz and 12.5MHz. The one-quarter-inch-square silicon wafer containing the CPU's circuitry is housed in a 64-pin DIP (Dual In-Line Package) approximately 3 inches long.

The MC68000 uses a 24-bit address bus allowing the direct addressing of up to 16 megabytes of memory. The MC68000 can be interfaced to 8-bit peripherals using a clock speed 1/10th that of the CPU clock using the Extal (E) pin and a variety of Peripheral Interface Adapters.

With 17 internal registers, the MC68000 can support very sophisticated assembly level programming as well as high level

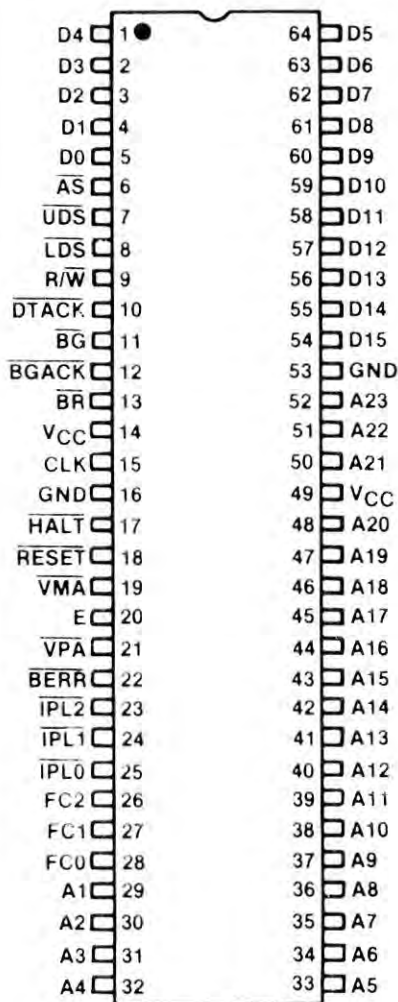
languages. Programs can be position independent, modular and reentrant. There are two levels of program privilege available, a supervisor mode and a user mode. The supervisor mode will allow the development of operating systems that allow a security system to be built-in, making software protection a realistic possibility in MC68000 based computers.

Programmers are already excited about the variety of microcoded interrupt vectors available in the MC68000. Motorola's new CPU will automatically trap bus errors, attempts to address a non-existent memory location, the use of illegal instructions, divide by zero errors, privilege violations and two user programmable vectors. The latter can be used to add to the instruction set! The MC68000 also offers seven levels of interrupts and a trace function that allows single step execution of code.

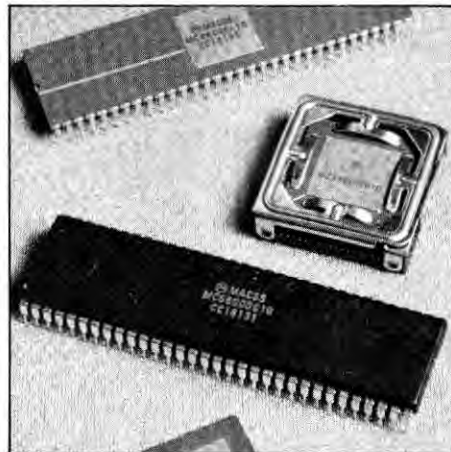
Motorola benchmark comparisons show the MC68000 to be approximately 30 percent faster for 64-bit binary add, negate and string translation operations than either the Zilog Z8001 or the Intel 8086-2 microprocessors. These benchmarks were made with the MC68000 running at 10MHz while the Zilog and Intel chips ran at 6MHz and 8MHz, respectively.

Motorola offers a variety of peripheral support chips for data communications and serial input/output. A memory management unit is available and co-processors are being planned to provide enhanced ALU logic.

The Motorola training seminars on the MC68000 are designed for systems engineers and designers. They cost \$20 and Motorola gives an MC68000 Educational Computer board as a door prize. The eight-hour session is an exciting peek into the near technological future of the microcomputer. ■



Pin-out diagram for MC68000 microprocessor.



MC 68000 chips

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139

The program aimed at doing for mathematical problem-solving what Visicalc did for financial analysis won't be available to TRS-80 owners until the end of the year at the earliest, according to Tracy R. Licklidge, vice president of operations for Software Arts Inc.

In an exclusive interview with *80 Micro*, Licklidge, whose Cambridge, MA, firm developed Visicalc, said IBM Personal Computer and Apple versions of the software, TK!Solver, priced at \$299, would be available later this fall, but versions for the TRS-80 and other micros won't be available for at least three months. Licklidge, interviewed last spring at a Software Arts press reception held in the observatory of the John Hancock Tower in Boston, explained that although TK!Solver was up and running on a 48K Model III, that size RAM left little room for building mathematical models with the software.

Major factors holding up the TRS-80 version, he said, were documenting, marketing and shrinking the program, not getting it to run on the hardware.

Although Software Arts would be working on getting TK!Solver running on the Model II and Model 16, the company's initial efforts were aimed at getting the software to operate on the Model III.

Asked why the firm was initially concentrating on IBM's PC and Apple II, Licklidge said because both computers have extended memory, something TK!Solver needs to show off all its capabilities.

He noted there would be no "elaborate" protections against pirating the software, but there will be "a short reminder to the user that you're supposed to pay for the program."

Software Arts Chairman of the Board Dan Bricklin, who developed Visicalc with Bob Frankston, told *80 Micro* software protections would vary from machine to machine. Infinite copies may be made of some parts of the program and other parts may be protected, he said. He added users will receive with their initial purchase additional disks with backups of any protected parts of the program.

The reception announcing TK!Solver



Tracy Licklidge

Will TK!Solver impact on micros like Visicalc?

was attended by some 70 reporters and highlighted by a slide show and a demonstration, using a four-foot tv screen as a monitor, of what TK!Solver could do.

"What Visicalc did for business analysis and forecasting, the TK!Solver program will do for mathematical problem solving in a variety of technical and educational fields," Bricklin said.

Most engineers and scientists use programmable calculators or custom computer programs to solve common problems they encounter in their work. Now they can use TK!Solver to grapple with those problems.

"The advantage," Bricklin said, "is TK!Solver requires no expertise in programming and is far easier to learn, use and modify than programs written in computer languages such as Basic and Fortran. Someone who has never used the program before can be solving difficult problems in a matter of minutes, yet the program has the depth and power to solve complicated problems that until now required complex specially-written programs."

The software allows the computer to store knowledge as mathematical relationships and empirical data, so there is no need to reformulate equations to accommodate the special needs of a computer programming language. TK!Solver has a wide variety of built-in functions—from sine and cosine to net present value and internal rate of return—and can provide answers at the push of a button displayed as numbers, tables or graphs.

TK!Solver also converts units of measurement so in a problem dealing with lengths, a user could get answers in inches or meters, feet or kilometers.

And it supports the DIF file format developed by Software Arts, allowing data to be exchanged with other programs including Visicalc.

According to Seth Steinberg, senior software engineer at Software Arts, TK!Solver uses artificial intelligence to understand a set of rules and apply them interactively. "When you combine that," he said, "with the TK!Solver program's ability to deal with lists of values, generate plots and tables, and deal with empirical data, you have a tool that lets a profes-

sional get results as if he had his own personal programmer working for him."

To make things even easier, Software Arts will be producing applications packages, ranging in price from \$50 to \$100, for use with TK!Solver. The packages contain predefined models to solve common mathematical problems in a profession. According to Software Arts, the packages will be easy to use, and be easily modified to suit special circumstances—unlike Basic, Fortran or programmable calculator programs.

Initial packages will be in mechanical engineering, financial analysis, high school science, and architectural design and construction.

In mechanical engineering, the application package can solve common problems such as tensile and torsion stress analysis, piping layout and design, sizing of hydraulic and pneumatic actuators, beam deflection, and cost efficiency.

John Sofia, a practicing mechanical en-

continued



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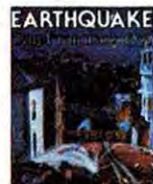
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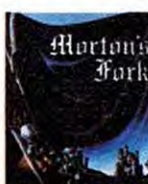
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Skill Level: Moderate.



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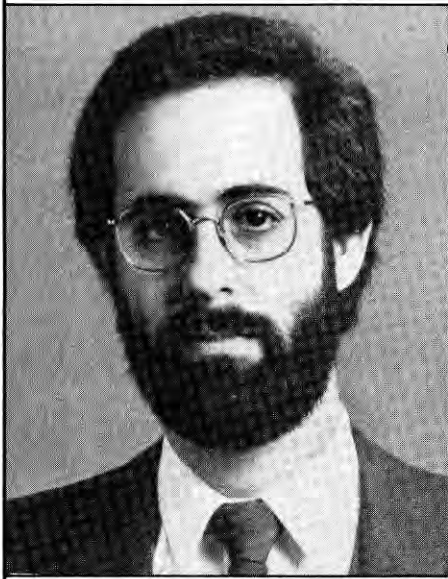
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TK!SOLVER_{continued}

Dan Bricklin

gineer and consultant to Software Arts, noted: "Much of an engineer's work deals with numbers, equations, calculations and variables. These calculations are time-consuming and a major bottleneck in the creative process of engineering. TK!Solver breaks this bottleneck by quickly and reliably solving problems and freeing the engineer to interactively explore design alternatives."

In investment management and analysis, applications models include product costing and pricing, lease versus purchase analysis, and balance sheet analysis. TK!Solver eliminates the need for referring to basic tables of values by calculating investment yields in bonds, stocks, annuities, options or real estate.

"Financial analysts will use TK!Solver to calculate accurate results for complex problems where they would otherwise rely on estimates or use expensive time-sharing computer services," explained Katherine Joseph, an investment analyst who produced the package for finance. "In particular, TK!Solver solves variations of a problem for different unknown values without rearrangement of individual formulas or the model structure by the user."

Education consultant to Software Arts and head of the Weston, MA, high school science department George Blakeslee called TK!Solver the "student's slateboard of the 80s." He explained the program can be used to teach any high school science concept involving mathematical description. Application models in the education package include population growth, radioactive decay, projectile motion, and chemical equilibrium.

A house built on **Visicalc**

If microcomputer software has any gurus, Dan Bricklin and Bob Frankston must be two of them. The staggering success of the duo's cerebral offspring, Visicalc, has given it sort of a mystical reputation among computer analysts.

As the story goes, Bricklin got the idea for an electronic spreadsheet one day in 1978 while watching one of his professors at the Harvard Business School labor over mock budgets on a blackboard. Each time one number was changed, the prof would have to recalculate several others.

A microcomputer could do all that work instantly, thought Bricklin, an MIT graduate, and he convinced long-time friend Frankston, another grad of that Cambridge, MA, school, that they should write the software to do it.

The result was Visicalc—for visible calculator. One of Bricklin's professors scoffed at the idea. And when Frankston tried to sell the program to a couple of experts at the National Computer Conference in 1979, they walked away. But industry analyst Ben Rosen in his "Electronics Letter" saw potential in the software. "Visicalc," he wrote, "could someday be the software tail that wags the personal-computer dog."

And so it came to pass. As the first program that proved personal computers could be useful for businesspeople, Visicalc is credited with sparking a growth explosion for software and hardware producers. And because the program wasn't adapted for another machine for nearly a year, it is credited with pushing Apple into first place in the micro market.

Visicalc has shown exponential growth since its inception and now has sold more than 250,000 copies. Bricklin and Frankston's firm, Software Arts, has more than \$4 million in annual sales. The firm has grown from 2 to 50 employees in three years and later this year will move its completely automated office into a 30,000-square-foot building it's bought in Wellesley, MA. ■

Software Arts apparently sees TK!Solver having as much impact on the sale of microcomputers as Visicalc. When Chief Operating Officer Julian E. Lange took the podium, a TK!Solver-generated graph used by Blakeslee remained on the four-foot tv screen. The graph showed two population curves—a low one based on cur-

rent conditions and one with a dramatic rise due to a major increase in life-expectancy. Lange pointed to the lower curve and quipped, "This illustrates the growth of microcomputer sales before TK!Solver." Then referring to the higher curve he added, "And this represents sales after TK!Solver." ■



Photo by John Meila

A member of the computer press corps puts TK!Solver through its paces on a Model III.

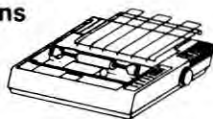
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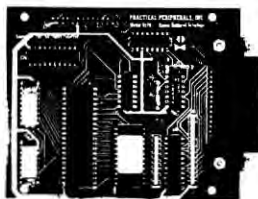
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V-games go to college

Games aid Hi-Ed funding at West Virginia

At the University of West Virginia, higher education has found a new way to fight its perpetual budget crunch: electronic games.

West Virginia, with an enrollment of 20,000, has raked in \$150,000 from the 75 game machines located in its student union and quad-towered dormitory building.

"The multitude of services provided at the student union don't generate any revenue," explained Robert Taylor, games area supervisor at the university. "They have to be supported somehow. This type of operation helps to support those areas."

He said the decision to expand the number of game machines on campus was made three years ago: "It required a change of administration to do it. For many years these machines were related to pinball, pool rooms, and dark dingy beer joints. The administration at the time didn't feel that was the proper image for the student union to have."

But the new administration saw the handwriting on the CRT. "As the arcades began to spring up around the country," Taylor observed, "it wasn't difficult to see the games were going to be tremendously popular." The university hired a consulting firm specializing in campus arcades. Taylor said: "We were dealing with an excellent vendor—Associated Amusements from Redford, MI. They gave us some pretty fair projections of what to expect."

"Our facility turned out to be more

popular than any other in the country," Taylor continued. "I'm not sure why. A lot of it had to do with having a very good vendor who understood what a college campus needed. And we did go to the trouble of creating a special room for the arcade instead of filling up some room we had empty."

"West Virginia saw that this would be a moneymaker for it and wanted to make it attractive for the players to come in," recalled David Himelhoch, marketing manager for Associated Amusements. "It was remodeling its union, so it was a very high-tech-looking game room. It wasn't your basic brick-walled room with 40 or 50 games in it."

"We did it up like a commercial arcade," Taylor observed. They covered the floor with a rubber mat to fight the bane of electronics: static electricity. They installed track lighting. They carpeted the walls and rigged up a new sound system. And they built an aluminum ceiling to reflect the colored lights from the games.

West Virginia also departed from the smoke-filled seedy arcade image worrying past administrators. Taylor noted: "We took a poll of the students. The overwhelming vote was no smoking and no food and drinks in the arcade."

"West Virginia," Himelhoch explained, "was very cooperative in letting us arrange the games inside the room. That's another part of running the business. You've got to have those attractive games

right there in the front so people who walk by are going to see them and walk in."

Himelhoch's firm has been specializing in college arcades for 10 years. "The college age group is a market segment," he said. "A lot of the programs we run are very successful with that market. If we ran them for 14 year olds or 35 year olds, they wouldn't work as well. Working with college students for the last 10 years, we seem to have a pretty good feel for what 18 to 24 year olds like to see in a game."

"For instance," he continued, "there's a game called Alpine Ski. We thought we'd be bold and put it in the University of Alabama. Here we are down South where they see snow once every 15 years and we're putting a skiing game down there. The first two weeks there it was the number one grossing machine."

He said: "A lot of articles have appeared lately about the virtues of the video industry and how people can make hundreds and hundreds of dollars per game per week. That's true. Some games do earn quite a bit of money, but it's not every game. Pac Man is a popular game, but if you looked at the 100,000 Pac Man machines in the country, they don't average \$200 a week."

One promotion Associated Amusements uses to attract players is varying the number of game tokens they can buy for a dollar. Ordinarily, a player receives four for a dollar. "At different times we'll give you five tokens, up to eight tokens for

continued

Two TRS-80s to go: hold the anchovies

The Color Computer and Model III are workhorses at Goodtime Pizza, a family-oriented sub shop and game room located in Canton, OH.

In a display window of the pizza shop, Doug McCallum, field supervisor for Associated Amusements (see West Virginia story), uses a program he calls "Art Gallery" to make a CC an electronic billboard advertising Goodtime. With the CC are three monitors slaved to video games in the arcade room.

Four more slaves are located in the dining area along with four monitors tied to a Model III. Instead of shouting when orders are ready, McCallum observed, the monitors act as an order-ready system. "All you have to do is keep your eye on the screen," he said, "and when your pizza order is ready, your number will appear."

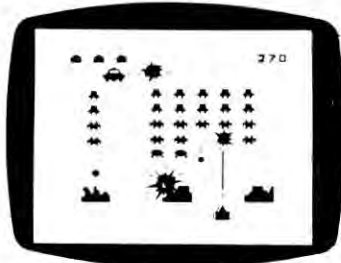
He explained he made two mods to the III to integrate it into the system.

"I had to create a video interface," he said. "The video on the Model III is not composite. There's the video signal and the horizontal and vertical sync signal. I combined those with a module I put together so I could feed a line of monitors off a 75 ohm cable.

"The other modification was I added a remote keypad so the computer console wouldn't have to sit on the counter. Due to the nature of the keyboard circuits, I couldn't directly tap in there, so I used some sensitive read relays and paralleled that across the switch matrix lines. Then I ran a cable with a generic keypad on it up to the counter area." ■

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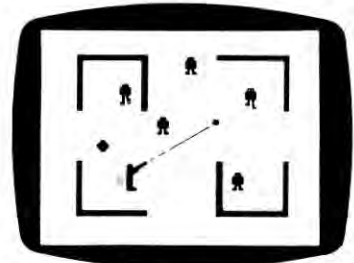
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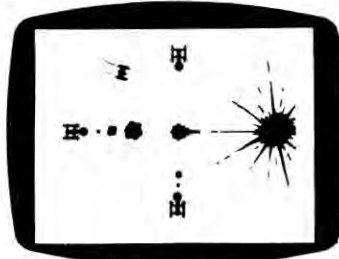
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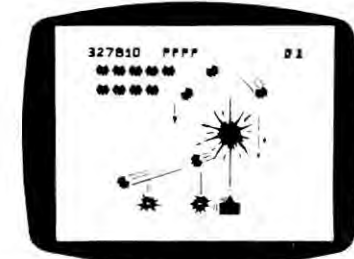
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WEST VIRGINIA_{continued}

a dollar, depending on the time of day, day of the week, what activities are happening around the union," Himelhoch noted.

Another promotion capitalized on West Virginia's traditional homecoming called Mountainlair Week. Special tokens were minted with University of West Virginia embossed on them and distributed to alumni. Himelhoch explained: "We made

sure people who got the tokens knew they weren't souvenirs. It was something to get them downstairs into the game room and have them play the games. If people play one game, they're going to play more."

He said West Virginia's collections from its games were very successful, but since most schools don't publicize earnings from their arcades, it's impossible to rank UWV's success. However, the game-playing trade there is pretty brisk.

Himelhoch recalled: "One game would shut down for no apparent reason. Our technician was really baffled. He couldn't figure out what was wrong with it electronically. Then he looked in the cash box. You couldn't get any more coins in it."

Reactions to the Mountaineer's game room has been "quite positive," according to Taylor. "We not only have students interested, but a number of staff and faculty who drop by almost daily to play their favorite game." ■

New England v-text pact inked

by Kerry Leichtman

80 Micro Staff

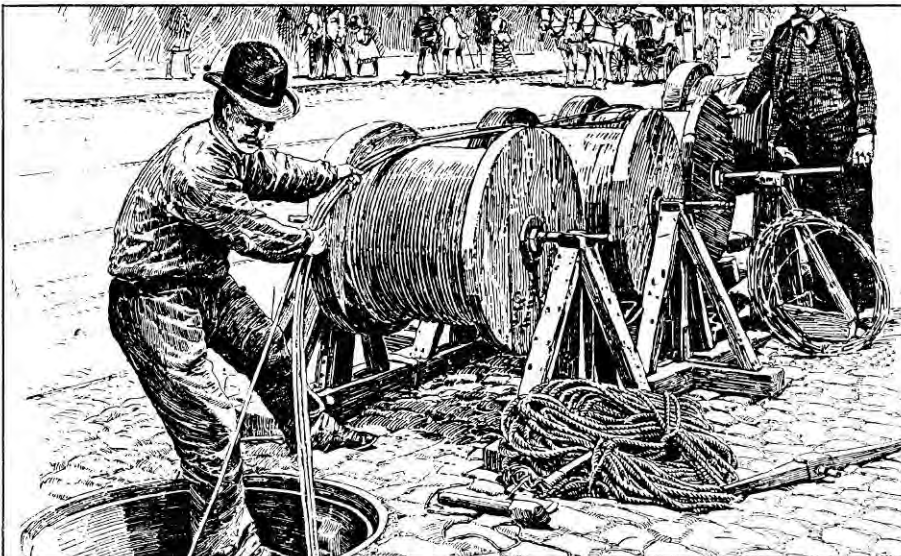
Like big toes testing lukewarm water, Viewtron is gearing up for a mid-1983 real market test before attempting a big splash in Boston. Knight-Ridder Newspapers Inc. and Affiliated Publications Inc.—owner of the *Boston Globe*—signed an agreement in April 1982 that, in effect, gives Affiliated the first major franchise opportunity to establish the two-way electronic information system in a large metropolitan area.

The success of a Florida subscription test by Knight-Ridder has much to do with whether or not Affiliated will bring the service to Boston. "Should the tests in Florida prove positive," Jack Coan, assistant vice president at Affiliated told *80 Micro* during a telephone interview, "then we would proceed in the Boston market in a joint venture with Knight-Ridder."

Both Knight-Ridder and Affiliated are not strangers to electronic and print media. Knight-Ridder, originator of Viewtron, publishes 33 daily newspapers, owns four television stations, and holds interests in cable tv. Affiliated, in addition to owning the *Globe*, owns a broadcasting company operating 12 radio stations, and 45 percent of McCaw Communications, which is involved in cable tv.

While optimistic about the subscription test's outcome, Affiliated is not running into the project with their eyes closed. The agreement signed between the two organizations allows Affiliated access to the information Knight-Ridder will compile in Florida. "Right now our commitment is to learn about it and to train with them," Coan said. "If things go as we anticipate down in Florida, then we'll go online sometime in 1985."

The Viewtron system will supply its subscribers with access to news, weather, sports, business news, in-home banking, shopping, travel and dining reservations,



games and message displays. Subscribers will be supplied with an alphanumeric keyboard that will be wired to their tv. Access to Viewtron's many services will be done using the keyboard.

"News will be presented differently than it is in newspapers," Coan explained. "The news service will be interactive; you can call it up when you want it. You don't have to sit and wait for a particular item to scroll by, as with many cable news services. With Viewtron you call up what you want when you want it."

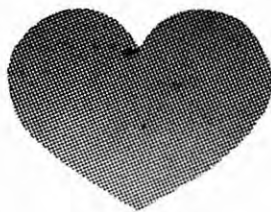
Knight-Ridder teamed up with AT&T in 1980 to test the system in Coral Gables, FL. The south Florida introduction scheduled for mid-1983 expects 5,000 paying subscribers. Advertisers are also being sought and will pay for the viewer access. Unless someone else jumps in quick, Viewtron will be the first system of its kind to be tested under real money-on-the-line conditions (see Tandy Star-text story in Pulse Train).

Also involved are AT&T, Southern Bell, and Viewdata Corporation of America. Ma Bell is responsible for the home terminals, Southern Bell the communications network, and Viewdata the content of the data base. Viewdata is a subsidiary of Knight-Ridder.

If the Florida test proves successful, Boston will be the first major American city to have a home subscriber to a computer data base commercial network. In a statement in *Editor & Publisher* John P. Giuggio, speaking for Affiliated Publications, said the Viewtron's coming to the Hub has "exciting possibilities for the people of metropolitan Boston. It is only fitting that this center of high technology should be among the first to reap the benefits of the new electronic age."

Plans are already in the works should Viewtron's Boston appearance prove successful. Service would spread to the rest of Massachusetts, and then to residents of Maine, New Hampshire and Vermont. ■

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When it comes to computer argot, there doesn't seem to be any middle ground, according to Don Ethan Miller, author of *The Book of Jargon*.

The pop reference work—published in January by Macmillan and expected to be out in paperback this fall—contains 24 chapters aimed at helping laypersons penetrate the argot jungle. One of the chapters is on computers.

"What is fascinating is that in this field of endeavor, more than any other, there are so few people with a moderate amount of knowledge," Miller writes. "Most people have a modicum of understanding about medicine, say, or law; plenty of people who are not tennis pros know the difference between a cannonball serve and a

lob or volley. But in relation to computers, there seems to be no middle ground: You're either in or out, informed or ignorant. Coincidentally, it is exactly this binary mode that is the essence of how a computer stores and processes information: in a multitude of 0-1, yes-no, true-false, bits of data represented by tiny electrical circuits being either on or off."

"Computer seems to be the hardest for the layperson to understand," the journalist and martial arts expert told *80 Micro* in a phone interview. "People have a very hard time because there are no references in their normal vocabulary or way of thinking."

"It also seemed to be the hardest for the three computer people I used as resources to translate into English," he added. "I

had a hell of a time. There were very serious problems explaining the stuff in other than computer language."

Miller said he based his choice of the some 175 words in the computer chapter on commonality and frequency of usage, and the likelihood an average person would come across the word. He added, "We didn't attempt to have a dictionary as much as a Berlitz guide for the layperson to get some idea of how computer terminology works and interfaces, if you will, with their normal way of thinking."

He also maintained the book has consumer protection aims: "It's to give the average person a fighting chance when dealing with professionals and experts in any of a number of fields. It's so if you go to the

Jargon book helps common man crack microdom's argot maze



Don Ethan Miller

doctor or the auto mechanic and they throw some terminology at you, you don't immediately fold up and say, Go ahead; do whatever you have to. It's been my experience that knowing language is power."

When you speak the language, Miller claimed, "You have a chance to participate and not be ripped off, to make some choices for yourself rather than leaving it up to the professionals. For example, by using some terminology to define a problem to a mechanic, you indicate to him you're knowledgeable. You've defined the problem to some degree, therefore he's limited in the kind of work he's going to do or pretend to do."

Asked if he found computer jargon dryer than others, Miller opined: "I don't think it's dry. It can be colorful and humorous here and there. I think people think of it as dry because it doesn't refer to anything in everyday life. But if you're in the field, it certainly isn't."

"Most interesting to me," he went on to say, "is if you get some picture of the language, it gives you some picture of the thought processes that are common in the profession. Programmers think in terms of very logical operations. Most people don't proceed on that kind of purely logical basis."

Asked if he had done his book on one of the commonest computer-layperson interfaces, a word processor, Miller replied: "No and I sure as hell wish I had. If I do a volume II, I will definitely do it on a word processor." ■

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PULSE TRAIN

So Long 4K Color Computer

Stiff competition at the low end of the microcomputer marketplace forced the Tandy Corporation to drop the 4K Color Computer and replace it with a 16K version, according to *Electronic News*.

To move its inventory of 4K machines, Radio Shack slashed Color Computer prices last spring by \$100—from \$399 to \$299.

The trade newspaper quoted Tandy Vice President for Computer Marketing Ron Stegall as stating, "After this sale is over, we plan to phase it [the 4K model] out."

Two of Tandy's old rivals, Texas Instruments and Commodore, market low-end micros under \$300. And a new competitor, Timex, is selling the Sinclair 1000

for under \$100. Commodore and TI have also sealed pacts with several mass merchandising stores to gain wide distribution of their computers.

According to EN, Stegall said competition wasn't the primary reason for discontinuing the 4K model. What influenced the decision most, he told the newspaper, was price reductions in making units, notably the decrease in memory chip prices.

He said the new 16K unit would put the Color Computer on better footing with its competitors. On a RAM per dollar basis, he noted, the CC has been undercut by its market foes.

The 16K's \$399 price tag still makes it higher priced than its competitors, but Stegall maintained the machine was still competitive: "We wouldn't bring it in at that price if we didn't think it was (competitive)."

Tandy's competitors, when questioned by EN about the Fort Worth firm's move, attributed it to competitive pressure.

"Radio Shack found themselves dramatically overpriced," said TI Assistant Vice President of Marketing for Consumer Products William Turner. "Radio Shack's color machine with 4K RAM is similar in capability to the Commodore and Sinclair machines. The competition from Sinclair and Commodore forced them to reduce the price."

Turner told EN he did not view the CC as direct competition to TI's 99/4A, which he called an educational and financial applications machine rather than one for games and computer literacy.

Turner contended even at \$299, Tandy's color offering is more expensive than Sinclair and Commodore but the Texas firm's strong distribution system can maintain that premium price.

Another Tandy competitor, Atari, refused to comment to EN about the CC price cut. The Warner Communications subsidiary is reportedly upgrading its

continued

Computer Slang

—From *The Book of Jargon* by Don Ethan Miller.

Computer "jocks" employ not only an extensive technical vocabulary, but also an array of pithy argot to describe the common hassles and major disasters of computer operation. Here are some examples.

bomb: Also barf. When a piece of computer equipment (especially software) ceases to function, or begins to function erratically.

bug: A wrinkle, a hitch, a fault, a boner, a loose nut, a problem, an erratum; that is, anything that stands between a program and absolute perfection.

crash: A program bombs, but an entire computer system crashes. Why all the fighter-pilot jargon, no one knows.

cybercrud: Attributed to Theodore Nelson, a good word to describe the less professional aspects of the computer boom; the electronic equivalent of "hype" or "bull." Because computers were for so long mysterious and awesome machines, a mystique grew up around them—much of which is, of course, false. Computers *can't* evaluate sketches for matchbook art schools, never go on monomaniacal rampages, and rarely speed up your tax return.

FIFO: First in, first out; a simple—but not always efficient—way to deal with a list of tasks, meaning that the list is treated as a line of people as a bank teller's window. Also called first come, first served.

GIGO: Garbage in, garbage out; regardless of the sophistication of a system, this acronym reminds us that its weakest link is the data and assumptions that a system operates upon. Whether the system is the Internal Revenue Service, or a microcomputer accounts-payable system, what comes out is absolutely dependent on what goes in.

glitch: A source of malfunction. The glitch is a rather vague crit-

ter that may prove to be anything from a loose wire to a statewide power failure. Its essence is that it is unexpected.

kluge: Also kludge. Probably from the German kluge, meaning clever. A kluged solution to a problem is an improvised patch-up (usually of software) that always seems to last longer than it has any right to, or than anyone would have expected. When a kluge fails, however, everyone says, "Well, what did you expect?"

LIFO: Last in, first out; Another method by which computers deal with a list of tasks, but not a method humans like to be a part of.

moby: A very large and seemingly malevolent group of devices (or kluges), which threaten to come apart violently at any moment.

mung: Acronym for munched until no good. Programs can mung up files if, due to some undiscovered bug, they run amok.

number crunching: Tasks that require not insight but seemingly endless repetitive calculations. Computers are absolutely vital to such scientific endeavors as the space program, more for their routine (rather than exotic) applications. Digital machines can perform thousands of numerical operations per second, thus resolving tedious problems in planetary mechanics, fuel use, materials stress, and the like.

nybble: Half a byte.

scrub: To clean a file of data that isn't needed, such as data that is out of date or redundant. This is distinct from garbage collection, as files are usually scrubbed only once, while their garbage is collected periodically.

wetware: Not a swimsuit, but the organic hardware that conceives of and writes the abstract software which drives the mineral hardware. In other words, wetware is the human brain—or, by extension, any organic intelligence. ■

PULSE TRAIN *continued*

400 and calling the new model the 600, which will have a raised keyboard instead of the 400's membrane one.

Meanwhile, Texas Instruments implemented a number of incentives this month to make its 99/4A more attractive. It is offering free Texnet service with the purchase of an RS-232 interface card, telephone modem and terminal emulator module. Texnet, which carries a \$100 price tag, allows 99/4A access to The Source data base.

A free speech synthesizer is also being offered by TI with the purchase of two software albums or six solid-state software modules. The retail price of the synthesizer is \$149.

Tandy offering "Next Step in News"

Radio Shack has teamed up with the *Fort Worth Star-Telegram* to bring Star-text, an electronic newspaper, to Tarrant County subscribers of its Tandy Videotex Service (80 *Micro*, March 1982).

According to a statement from Radio Shack, the *Star-Telegram* is also working with Dow Jones and Sammons Communications to make Star-text available on Sammons cable tv.

Tandy said Star-text allows the *Star-Telegram* to provide two great benefits to the information consumer: immediacy and choice. As a news organization, it added, Star-text will allow the *Fort Worth* paper to compete head-to-head with broadcast media for immediate news. The daily will be able to disseminate breaking news minutes after it leaves the editor's hands.

News, entertainment, and shopping information will be offered Star-text subscribers through "advanced entry" access to the system for \$5 a month. Users request the sections of the paper they want. The sections are sent to their terminal and stored. Their terminal is automatically disconnected from the system, but users may browse through the information sent to them anytime they want.

Another method, called on-line access, is offered to subscribers for an additional \$2.50. That method gives a user unlimited access to Star-text.

The news will be generated by *Star-Telegram* staff members in Texas and Washington, DC, and compiled from the wires of Knight-Ridder, the Associated Press, the *New York Times* and others. It

will include local, state, national, and international stories; sports news and scores; weather and business news.

The news will be updated continuously 16 hours a day, seven days a week.

Entertainment information includes listings and reviews of movies, restaurants, concerts and theaters, and listings of ticket agencies.

Shopping information includes consumer advice, classified- and display-type advertising.

Star-text is being marketed through Radio Shack's 37 area stores and the *Star-Telegram*.

CC figs too low

John C. Dvorak in his Inside Track column in *Infoworld* said he asked Tandy Chief Executive John Roach how many Color Computers had been sold by Radio Shack. All Roach would say, according to Dvorak, is he hasn't seen any published figures that come close to the actual number. They're all too low.

Dvorak said he's been told by sources inside Radio Shack that 50,000 Model 16s had been sold by May of this year.

Work alike sue alike

Franklin Computer Corp.—makers of a "work-alike" Apple micro called the Ace 100—and Apple Computer Inc. have sued each other in federal district court in Philadelphia.

Apple claims Franklin violated Apple patents and copyrights, and engaged in unfair competition and misappropriation. The Cupertino, CA, firm is seeking an injunction against Franklin and any profits it made from its alleged wrongdoing.

Franklin denies Apple's charges. The Pennsauken, NJ, firm contends Apple is claiming copyright and patent rights that are invalid and unenforceable. In a counter claim, Franklin charged Apple with violating the Sherman Antitrust Act by attempting to monopolize the personal computer market. It is seeking \$150 million in compensatory damages, an unspecified amount in punitive damages, and attorneys fees.

Barry Borden, chairman and chief executive officer of Franklin, told the computer trade paper *Electronic News* the lawsuits would not interfere with his firm's production plans, which call for Franklin to produce 2,000 Ace 100s a month by September.

Earlier this year, Personal Micro Computers Inc. of Mt. View, CA, makers of a work-alike TRS-80 Model I, was sued by the Tandy Corporation in U. S. District Court in San Francisco. That case is still pending.

Bay State town bans video games

If Marshfield, MA, voters have their way, there will be no video games in their town by the end of this month.

At a town meeting held in June, voters adopted an ordinance giving video game and pinball operators three months to get their machines out of town. Anyone breaking the new law will be hit with a \$200 fine for each offense.

Home video games are excluded from the ordinance.

Although many communities in the nation are attempting to regulate the games, Marshfield is one of the first to entirely ban the amusements.

The community, located south of Boston, had its pro-regulation element, but it was outgunned at the town meeting by supporters of a total ban.

Tom Jackson, author of the bylaw and chairman of the town's vandalism committee, told the *Boston Globe* Marshfield parents object to the time and money their children are spending on the machines.

"I'm a former narcotics officer, and I've seen what these machines do to kids and the amount of money that is wasted on them," he said, adding the machines contributed to a "honky tonk" atmosphere in the town.

Bust goes the video games

The bottom will fall out of the video games market early next year, according to the man who is credited with putting Mattel's Intellivision on the map.

Jeff Rochlis, former president of Mattel Electronics, is quoted in the *Boston Globe* as telling a group attending a Yankee Group seminar that "games will make it through Christmas, but the industry will go bust early next year."

He predicted a glut of video game software based on the latest Hollywood movie or arcade game. While the industry will not shrivel up and die, he said, retailers should look for ways to move customers into personal computers.

The *Globe* reported home video games are being developed based on Walt Disney's *Tron* (80 *Micro*, August 1982), *The Empire Strikes Back*, and *Jaws*. And Atari, with 70 percent of the home video market, has formed a joint venture with the movie company that gave the world *Star Wars* to develop "a new level of video game."

continued

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The M-1200FM hard disk subsystem is the largest Winchester hard disk subsystem available today for micro computers. It features 120 Mbytes of formatted storage, ERROR CORRECTION controller and alternate sector mapping. The SASI-Net* multiplexer is also included to allow multiple computers to share the M-1200FM storage, forming a "Mainframe" like network.

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PULSE TRAIN^{continued}

Games author can play again

The author of *How to Win at Pac-Man* and *How to Beat the Top Video Games* has bested one of his toughest opponents: the Atlantic City gambling establishment.

The New Jersey Supreme Court has ruled Ken Uston (*80 Micro*, June 1982), a legendary blackjack counter, cannot be barred from gaming tables by the city's casinos.

The 5-0 opinion was handed down on an appeal by Resorts International and the Atlantic City Casino Assn. of a lower court decision allowing Uston to play blackjack in New Jersey.

However, the high court continued for 90 days an order restraining Uston, the former president of the Pacific Stock Exchange, from playing blackjack. The move will give the state's Casino Control Commission time to act on the issue of counters.

Uston's card counting ability helped him earn enough money to retire at age 37.

Sony unveils new micro

Sony Corporation of America entered the personal microcomputer market with the distribution this month of its Z80A-based SMC-70.

Although the basic SMC-70 has an 8-bit microprocessor, Sony curbed criticism of its new machine by offering an optional 16-bit adapter unit upgrading the micro to a system based on Intel's 8086 chip.

Priced at \$1,475, Sony said its micro is aimed at the business market.

The basic SMC-70 contains 64K of RAM expandable to 192K; the 8086 version 128K of RAM expandable to 256K.

In ROM, the Sony micro has 32K, which includes memory for Sony Basic, the system's monitor and an automatic start-up diagnostic. The diagnostic automatically runs a failsafe test of the system when it's turned on.

Thirty-eight K is dedicated for video memory—6K for characters and 32K for graphics. There are four graphics modes: 160 x 100 dots (16 colors), 320 x 200 (16 colors), 640 x 200 (4 colors), and 640 x 400 (2 colors). Digital Research Inc.'s CP/M operating system has been enhanced by Sony to handle its micro's color graphics capabilities.

Three memory storage options are offered for the micro: 3.5-inch floppy disk drive with a capacity of 280K; 6 megabyte hard disk; and 256K cache memory device, which looks like a standard disk drive but operates faster.

The basic SMC-70 has 13 input-output interfaces. Among them are a Centronics-type parallel port, RS-232C, RGB video and black-white composite video, light pen, numeric keypad, and cassette interface.

Sony will include with the micro Visicalc, a family of word processors, a data base manager, a six-module accounting system package and several vertical market packages.

NEC aims new 16-bit micro at business

Nippon Electric Company Information Systems Inc. has introduced a new 16-bit personal computer for the business market.

The Advanced Personal Computer has a CP/M-86 operating system and is based on a NEC-manufactured 16-bit 8086-compatible microprocessor.

Two versions of the APC are offered by NEC.

The monochrome model, priced at \$3,298, has a green-black monitor with resolution of 8 x 19 dots. It has 128K of RAM and a dual-sided 8-inch disk drive capable of storing 1 megabyte.

The color model, priced at \$4,998, includes two disk drives and an eight-color monitor. Otherwise it is the same as its monotone brother.

Symbols for the screen display can be chosen from one set of 200 predefined characters or defined on a dot-by-dot basis and stored on disk.

The Japanese firm's micro comes with a standard office typewriter keyboard, which includes 22 dual-mode user-definable function keys.

Standard input-output features of the machine include a parallel printer controller and serial communications controller, supporting asynchronous and synchronous communications at 19,200 baud per second.

Software for the APC includes Microsoft's MSDOS; Ryan-McFarland's RM/COBOL compiler; System Plus's Accounting Plus packages; the Benchmark Word Processor; Metasoft's Telecommunicator and Mailing List Manager; Chang Laboratories' Microplan; Ashton-Tate's dBase II Database Manager; and a family of asynchronous and synchronous communications packages from IE Systems.

"Our ability to introduce such a com-

petitively priced product" said Richard M. Underwood, President of NEC Information Systems, "is due to the fact that NEC itself directly manufactures most of the components used in the new computer. This degree of direct control also means we can offer users a level of reliability unsurpassed by current market offerings."

Big DEC in personal micro fray

Digital Equipment Corporation is gearing up to lock horns with Apple, Tandy, and IBM for a share of the personal computer business market.

The Maynard, MA, firm expects to manufacture 100,000 systems this year and start distributing them by the end of November. However, a knowledgeable observer of the computer industry noted DEC's software and documentation group would have to "burn the midnight oil" to meet that deadline.

Digital's personal computer lineup looks like this:

- The Rainbow 100, priced at \$3,495, including CP/M 80-86. It has two microprocessors—the Z80 and Intel 8088—and 64K RAM, expandable to 256K. Options include graphics capabilities, color CRT, and 5¼-inch Winchester disk drive.

- The DECmate II, priced at \$3,745, including CP/M option card. It runs on the CDS310 or WPS-8 operating systems. It has 96K of RAM and its software is compatible with Digital's word processor, DECmate. Options include a 5¼-inch Winchester and CX and DX communications software.

- The Professional Series, consisting of two models: the 325, priced at \$3,995, and the 350, priced at \$4,995. Both machines run on the P/OS operating system, a derivative of the system used on DEC's larger PDP-11 computer. Options for both machines include extended graphics, floating point adapter, and Ethernet and DECnet support. Options for the 350 include a 5¼-inch, 5 megabyte, internal Winchester and a color monitor.

Digital expects to have 75 software products, including operating systems, ready for its new micros by the end of 1982 or the beginning of 1983.

Dale Kutnick of the Yankee Group, a Cambridge, MA, consulting group, reportedly said of DEC's move into the micro field: "I think in the Fortune 2000 accounts, Digital's Professional series will wipe Apple out. You can expect a lot of fire sale prices, particularly in the Xerox camp." ■

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Have you ever seen a fast action game combined with the intense strategy of chess, backgammon or Othello? Ricochet...the first abstract strategy game designed **exclusively** for the computer owner...is both. And loads of fun!

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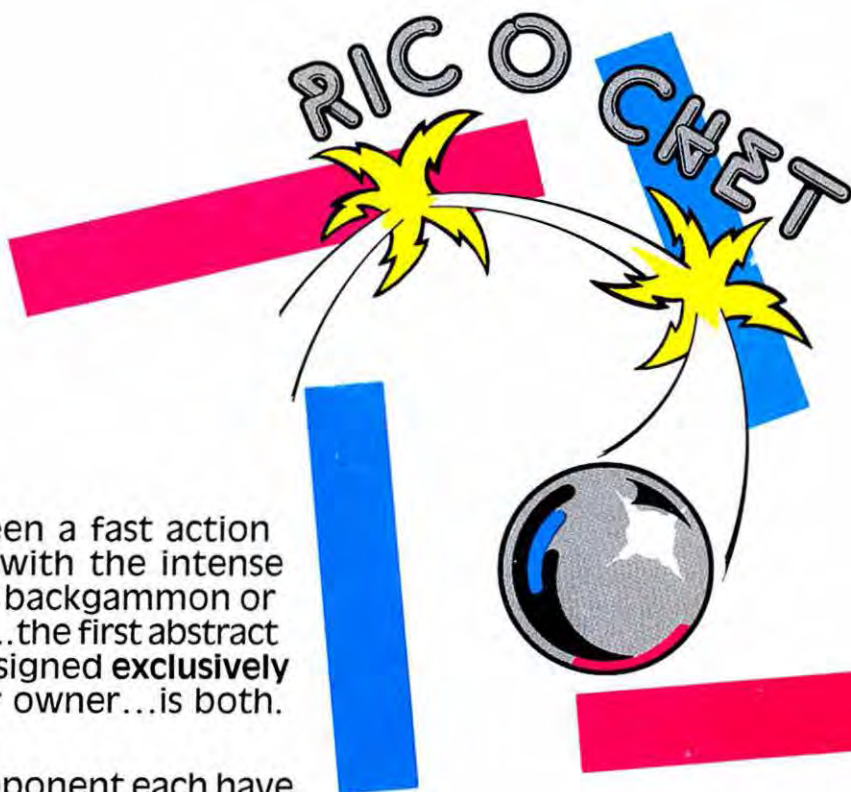
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Your computer rates you after each match, so you can compare your mastery of the game with that of other players. In the long run, you're trying to rack up points for your personal Ricochet Rating.

Get Ricochet now at your local dealer for your Atari, Apple or TRS-80. Suggested retail price: \$19.95.



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Includes power cables and disk drive data cable, Switching power supply (DON'T USE A LINEAR SUPPLY INSIDE YOUR MODEL III - Heat and Regulation Problems!) and disk drive mounting brackets. Installation kit will work with either the Computex drive controller boards or the Micro Design MDX-3 controller. Be sure and specify which controller you are using!



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Alan R. Miller, *Interface Age*, May 1982:

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A.A. Wicks, *Computronics*, June 1982:

"The manual for Grammatik is better than average. The general text and explanations are thorough, detailed, and concise." "When the program was 'test run' on some old articles of mine still on disk, I was embarrassed by some of the over-worked, wordy, or trite phrases that I had used. Nevertheless, I had to agree with what Grammatik was saying, and vow to avoid these pitfalls in the future." "This is one of the most interesting and useful programs that I have had the pleasure to review. All functions operated as stated with no problems, or even a hint of a problem. And no guessing was required about exactly what some of the directions implied. Anyone involved with word processing in any way, whether writing manuals, letters, brochures, newscopy, reports, etc. is encouraged to get this excellent program."

Stephen Kimmel, *Creative Computing*, June 1982:

"I don't get excited about many programs. I am excited about Grammatik." "It is difficult to imagine the program being any easier to use." "I had decided that the program would be useful to a professional writer if only because it checks for double words." "I have a higher enthusiasm threshold than that. Grammatik can also be expanded to include phrases of parti-

cular significance to you. It can become your personal editor and English coach. I love to start sentences with 'and'. That's not a particularly good idea. So I added the phrase 'And' with the note to be careful not to overuse it. Now I get a reminder every time I do it. There are other words that I use too often. My copy of Grammatik checks for them, too, and gently tells me to watch out." "I like Grammatik a great deal. It is a worthy and useful addition to your word processing software."

Bob Loudon, *InfoWorld*, December 7, 1981:

"Grammatik is the next step beyond spelling checking for serious word processors. Grammatik analyzes writing style at the word and sentence level while, at the same time, it checks for subtle spelling and typographical errors that go beyond the capabilities of conventional spelling-checking programs. If you use a word processor and a spelling checker, then you should investigate the unique capabilities of this program." "Although skeptical at first, I proceeded to run several of my published articles through Grammatik. None were free of errors." "Grammatik is a surprisingly fast and easy tool for analyzing writing style and punctuation."

Dona Z. Meilach, *Interface Age*, May 1982:

"The programs together (Aspen Software's spelling checker Proofreader and Grammatik) offer a dynamic tool for comprehensive editing beyond spelling corrections. It can begin where your college English teacher left off and help you analyze your documents in a way you may never have thought possible."

Eric Balkan, *The Computer Consultant*, Vol 2 No 9:

"As a reviewer, I'm impressed the most with the imagination that went into this product. With all the me-too software on the market, it's good to see something original come out. It's also good to see that the program author allowed the user as much freedom as he did — you can use your own imagination to extend the uses of the program."

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CP/M and IBM-PC DOS: Grammatik - \$150.00, Proofreader - \$129.00, Both - \$250.00 TRS-80 Model II: Grammatik - \$99.00, Proofreader - \$99.00, Both - \$179.00 TRS-80 Model I/III: Grammatik - \$59.00, Proofreader - \$89.00, Both - \$139.00 Manuals only \$8.00 each. \$15.00 both.

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FEEDBACK LOOP

by Terry Kepner

"Will the IRS accept computer printout financial records?"

Send any questions or problems dealing with any area of TRS-80 microcomputers to Feedback Loop, 80 Micro, 80 Pine St., Peterborough, NH 03458.

I recently purchased a TRS-80 Model II for business financial records. My only concern is whether or not the IRS will accept computer printout financial records. Any suggestions?

M.F.
St. Paul, MN

Large corporations have been using computerized financial records for decades and the IRS accepts their printouts without complaints. What you must do is keep an accurate paper record of all your business transactions. Keep all receipts and checks to back up your claims on income and expenditure. As long as you can prove your computer accounting is accurate, they will accept your printouts as adequate for their purposes.

I want to start a small newspaper for my computer club using Scripsit with justified text. But the computer does not space the letters properly in each line, sometimes leaving large spaces between words. What can I do?

T.B.
Hartford, CT

You are a victim of non-proportional word spacing. To get justified margins Scripsit uses a very simple algorithm: It randomly adds spaces between the words until the rightmost word lines up properly with the right margin. When there are many small words in a line, the spaces are not too noticeable. If, on the other hand, you have only a few very long words, adding spaces becomes a problem.

Proportional spacing eliminates this problem by assigning each letter only the amount of room it actually needs, thus 20 t's take up half as much space on a line as 20 w's. If the program needs to add spaces to move the words over to the right margin, it spreads the spaces out evenly

across the entire line by adding a dot increment (1/32") between each letter until the margin is reached. This is how newspapers and magazines do it. The disadvantage is with single-word lines. The word ends up looking ridiculous with each letter separated from the next by a long blank.

There are two solutions, one costs some money and the other is time consuming. Use the window command of Scripsit to set up your newsletter on the video in the width you expect to use on the printer. Invoke the hyphenation command to present the words that should be hyphenated to fill in some of the blanks at the end of each line. In essence you are right-justifying by hand. I have done this before and it is very time consuming. This won't eliminate the using of spaces to fill out the line length for right-justification, but it will make it less noticeable.

The other solution is to buy a patch to Scripsit (of which there are several advertised in this magazine) that lets you use true proportional spacing on dot-matrix printers such as the Epson MX-80, Centronics 737 and Radio Shack Line Printer IV. If you have a club member who has access to a Radio Shack Daisy Wheel II printer, I suggest you get Newsprint 7.0 (\$149) from Prosoft (213-764-3131) which uses the proportional spacing mode to deliver letter-perfect type.

A new product, Maxprint by Peggytronics, could be a less expensive way to go—under \$30. It offers, among other features, proportional spacing. As far as I know it only works with MX-80s. I haven't had the opportunity to try it, but it might be worth checking out.

I heard that Radio Shack has introduced a new device called a digitizer. What is it?

E.L.
Reno, NV

A digitizer converts an analog measurement of a physical quantity into decimal notation. The remote control box to a rotating tv antenna is an analog device. By turning the knob on the box you control the antenna's direction. When the control

box sends a voltage of .5 volts, the antenna points north, 1 volt points the antenna east, 1.5 volts south, and 2 volts for west.

Now let's say you want your computer to report your antenna's position. Your computer doesn't understand west or east, but it does understand numbers. A program can tell the computer that a value of 126 means the antenna is pointing south, and zero means it's pointing north. A digitizer, or analog-to-digital converter, converts the voltage reported by the antenna to a number the computer can understand.

Most digitizers are used to input charts and pictures to the computer. This is done by connecting the arms in the digitizer to servo motors that use a varying voltage to report the positions of the arms. These voltages are then converted to digital numbers so the computer can store and use them.

I caught the computer bug and now spend most of my free time in front of my TRS-80. I'm sure there are others who are in the same position. I'd like to know how to join a TRS-80 club. Any ideas?

T.G.
Boise, ID

Drop by your local computer store and ask the manager if he knows of any computer clubs in the area. If there's a club around, he should know. If that doesn't work, the November 1981 issue of *80 Micro* published as comprehensive a list as possible. Radio Shack's newsletter also keeps an updated list as do other computer magazines.

I'm ready to toss my TRS-80 and printer right out the window! I write programs that call for printed output. I use the statement LPRINT to add line spaces to the output, but when I run the program the printer ignores the LPRINT and doesn't skip to the next line. What am I doing wrong?

F.G.
Warren, MI

You're not doing anything wrong. You didn't say which printer you're using, but I

FEEDBACK LOOP

suspect your printer is the problem. Many printers, including some of Radio Shack's, will not accept a lone LPRINT. The only way to get these printers to skip a line is to print a space like this: LPRINT" ". Many of the disk operating systems on the market automatically do this for you.

Regarding the Key Box, when it says Basic Level II Model I 16K RAM, does that mean the program won't run in a 16K Level II Model III 32K or 48K cassette machine?

D.P.
Victoria, B.C. Canada

Starting with August 1982, the Key Box lists all TRS-80 systems which are compatible with the article, the minimum RAM needed, the language used, and peripherals needed. If two figures are given for the RAM, the first is for cassettes and the second for disks. Cassette Basic describes a non-disk Basic on the Models I and III.

The 80 Micro staff does not have time to load every program into every machine to test for compatibility, so some Key Boxes are based on a thorough reading of the listing. If a program doesn't work on your system and the Key Box says it will, give 80 Micro a call.

Key Boxes before August 1982, however, describe the minimum system required.

I'm having a frustrating problem with my TRS-80 48K, single-drive Model I. I have a Radio Shack Expansion Interface and a printer. While I am in NEWDOS80 2.0 Disk Basic I get @ signs scattered about my program. The small Basic programs are untouched, but 10K or larger programs have the @ throughout them. Sometimes the program lines merge together into a line of garbage. What's up?

R.S.
Loveland, CO

Your problem, from your description, is with the memory in the Expansion Interface. You don't say what happens in normal Level II Basic but I suspect the results would be pretty much the same. The problem could be static, which is easy to check out. Take off your clothes and power up the system. If the problem still occurs, it's not static.

The problem might be power fluctuations from the electric company. (The Expansion Interface is more sensitive to this than the keyboard.) This is harder to find, but one clue would be that the problem is intermittent and most serious around times of high power usage (dinner time es-

pecially). Since you don't mention that the problem is intermittent I doubt that's it.

Try a memory diagnostic. Most available memory tests will tell you which memory chip failed. Armed with this knowledge, and the Expansion Interface Technical Manual, you can replace the chip yourself. (Warning: Opening up any piece of Tandy equipment voids the warranty of that equipment.) If you'd rather not do that, take your computer to an authorized dealer and have them check out the memory and replace any defective chips.

I use a Model II with a Line Printer III. I print fanfold production tickets and four and five-part forms. As the perforation (the one that points out) travels past the print head it lifts the ribbon out of position, making it impossible to leave the printer unattended. I've tried several remedies to no avail, including lessening the print head tension. The only solution that works is to bend back the offending perforations before they go by the print head. I would like to know if there is something else I can do, or am I stuck with a bad printer design?

P.D.
Nashville, TN

After discussing your problem with the local Radio Shack computer technician I've narrowed your problem down to two possibilities: since the owner's manual states that the Line Printer III is capable of printing on five-part forms, the most likely problem is that the print head has become misadjusted and needs to be readjusted back to its proper operating position; or the forms you're using are too thick (in paper and carbons) for the clearance required by the printhead mechanism. For example, five sheets of 15#-stock paper are almost as thick as four sheets of 20#-stock paper. The heavier the paper feels, the thicker it is, and the fewer sheets of it that can be run through the printer simultaneously.

Your problem might even be a combination of these. Check and see if you can get your forms printed on slightly lighter paper, and have a technician take a look at the adjustment of the print head.

Did Radio Shack make a bad lot of Checkers 80? I have bought and returned three copies due to inability to load. I've even traveled to another city in hopes of purchasing a good version. It also did not load. Do you know why?

M.M.
Huntsville, AL

When dealing with cassette tapes, the most frequent problem lies with the tape recorder, not the tape itself. The play/record head of the average tape recorder is held in place by a small screw. The constant pushing of the play and stop buttons subjects the head assembly to a good deal of vibration. After several months of use, the screw moves slightly away from its optimum position and tapes that used to load, won't. Tapes made recently will load perfectly, of course. The easiest way to check for this problem is to borrow a friend's tape recorder and try loading the problem tapes. If that doesn't work take your recorder to the repair shop for alignment or buy a new one.

Another point to consider when loading tapes is the sensitivity of the computer to the volume level. I have had tapes that would only load when the volume level was exactly at four. The tiniest movement away from that point would render the tape unloadable.

I am a new owner of a TRS-80 Color Computer, 16K with Extended Color Basic, and would like some specific recommendations on machine-language manuals. Which are best?

R.M.
Poland, OH

So far there are only two machine-language manuals on the 6809 CPU that I know of: *The MC6809 Cookbook*, by Carl D. Warren, sold by Tab Books (Tab No. 1209, ISBN: 0-8306-1209-2, \$6.95); and *6809 Microcomputer Programming & Interfacing, with Experiments*, by Andrew Staugaard, Jr., sold by Howard W. Sams & Co., Inc. (ISBN: 0-672-21798-8, \$13.95) and also available through Wayne Green Books.

Of the two books, the second is better written and specifically mentions the 6809E CPU, which is the actual 6809 version used in the TRS-80 CC. It also better explains how to program in Assembly language without needless digressions.

I am an amateur meteorologist with a new TRS-80 Model III. I have called and looked all over trying to find a weather forecast program. Would you please help me find one. I need it on cassette.

L.R.
Charlotte, MI

I checked through my magazine index and could not find any reference to weather forecasting programs, so you won't find

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- Fully compatible with all Model III Software

PHONE MODEM ✓78

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FEEDBACK LOOP

any help from the magazines (unless something has appeared recently).

The only weather forecasting program I know of is for a disk-based Model I or III. It is sold by Instant Software and called Climate Comp (#0316RD—\$24.95). The package is actually two programs: Weather Forecaster, for short-range, three-day upcoming local weather forecasting; and Weather Plot, which provides you with accurate weather data for most of the major cities of the US.

The package used to be sold as a cassette-based system, but the data files for Weather Plot were a source of constant loading problems (they also required two tapes in addition to the one containing the programs). Weather Forecaster does not use these data files and can easily be used on a cassette system. If you have a friend with a disk system, you might consider buying this package and having your friend CSAVE the program to tape for your use.

If anyone knows of a weather forecasting program for L.R., please let me know so I can relay the message.

Your magazine, from time to time, has programs which use both Assembly language and Basic. Please explain the proper method of recording these programs. Which comes first and why? Sounds like the chicken and the egg. Is the Editor/Assembler program needed to load these programs?

D.M.
Huntsville, AL

I'll tackle your last question first. Radio Shack's EDTASM is needed only if the machine-language program is listed in the magazine as mnemonics and not the actual machine code. If the machine code is given, you can use the Basic command POKE to put the machine language into memory.

The technique of storing machine language in your Basic program as data in data statements to be read and POKEd into memory is one easy method of combining machine language and Basic programs into one simple-to-load program. All you have to do is make sure to reserve space for the machine code via the memory size prompt.

If you want to load the two programs separately, then the purpose of the programs will dictate the order in which they are loaded. In most cases it doesn't matter which you load first, just as long as the machine-language program is not overwritten by the Basic program, and vice versa.

If you want to combine the two pro-

grams there are several different methods available, one of which I've already mentioned. Several other techniques are discussed in *Basic Faster and Better*, the IJG book on how to improve your Basic programming skills (\$29.95).

If you have two programs on tape (one Basic and one machine language) that you want to combine into one program, Instant Software has a utility program that lets you combine programs into one load module. It's called Utility II (#0076R—\$9.95). The package actually contains two programs, CFETCH and CWRITE. CFETCH lets you merge Basic programs or subroutines into one long program. The only constraints are that your computer have adequate memory for the entire program and the programs have consecutive line numbers. CWRITE combines subroutines at different places in memory into a single-loading program, with the subroutines still loading into their separate places in memory. It works with Basic and one or more machine-language programs, and gives you a general checksum of its loading progress.

I have a TRS-80, Model I, Level II, with one disk drive and a friend with a Model III with two disk drives.

We would like to exchange programs. With Basic programs this is not a problem using tapes. However, Assembly language seems to be impossible. Is there any way to exchange disks? Can the Model III be set to operate in single density temporarily?

E.S.
Los Angeles, CA

I'm sorry, but there isn't any easy, inexpensive solution to your problem. The Model III can operate in single-density, but that requires a DOS other than TRSDOS, which means learning how to use a new DOS, and converting your old programs from TRSDOS to the new DOS. The advantage is that other DOSes are more versatile than TRSDOS. If you do buy another DOS for the Model I, your computer will suddenly become more reliable than it was with TRSDOS. MULTIDOS, DOSPLUS, NEWDOS80 and LDOS let you save programs in single-density on the Model III, but none of them are compatible with Model III TRSDOS, although all of them can read and write to Model I versions of their DOS.

The other choice is to buy an editor/assembler package and save your machine-language programs to tape. This is the cheapest route to take.

The final choice is to buy an RS-232 board for your Model I, a cable to connect

your computers, and terminal programs to drive the RS-232s. This way you can quickly ship programs, Basic or machine language, from one computer to the other. If you don't want to transport the computers from house to house, you'll have to purchase a modem for each computer and communicate by phone. The advantage to this method is that you open up the world of data communications. You can communicate with almost any other computer that has an RS-232, as well as the hundreds of computer bulletin boards across the country, and the megabyte computers of The Source, MicroNet and CompuServe (although they charge you for using their resources).

On my TRS-80 Model I, I use Electric Pencil as a text editor and ST80D for RS-232 communications with the outside world. Sending unformatted Electric Pencil text blocks to another system is not practical. Do you know of a way to save formatted Pencil files to disk (as they would appear on a printer)? Do you know of another good full-screen text editor that will do this if Pencil won't? Which full-screen editors will load and save Basic programs? I would like a nice, easy way to list my programs with lines starting at the colons. Pencil won't load my Basic programs.

G.B.
Hopkins, MN

First of all, you don't mention which Pencil version you are using, the old one or the new, updated one available from IJG Computer Services. Which one you have makes a big difference.

I'll answer you out of order. Both versions can load, edit and save Basic programs, but the programs must first have been saved from Basic in ASCII format (use the command Save "filename",A). The only problem with saving programs in ASCII format is that very long program lines, when expanded from the normal compressed format, become longer than 242 characters and will no longer load back into Basic without giving a Direct Statement In File error.

The solution is to save the program in ASCII format, immediately reload it, and look for the last line that successfully loaded. The line after this one is the one that is too long. Reload the compressed format program, go to that line, break it into two lines, and resave it. Then save it in ASCII format and reload it again, looking for another DS error. Repeat this until it saves and loads in ASCII format without problems.

Another solution is to save the file in

ASCII format, load it into Pencil and use Pencil to find any lines longer than 244 characters (including the line numbers). This is faster than the other method, but it's more difficult to use.

Next, all of the word processors I know of, except ForthWrite, are capable of loading Basic programs, as long as the program has been saved in ASCII format first.

Finally, your first question. No, Pencil does not have a way of saving text files on disk the way they would appear on paper. However, if you have the new version, IJG is working on a supplementary module that will let you send Pencil text files out the RS-232 in both formatted and unformatted forms. Also, if you have the new version, you can write your own RS-232 driver that takes over Pencil's printer-driver and redirects the output to the RS-232 instead of letting it go to the printer. If you're up on machine language, you could use the same approach to redirect the printer device control blocks to the disk control blocks.

The only practical solution available to you at this point is to purchase a DOS different from TRSDOS. DOSPLUS, VTOS, LDOS, and MULTIDOS all let you either link the disk drives to the printer (so everything sent to the printer by Electric Pencil is also sent to the disk drives), or to route the printer output to the disk drives (so that it goes to the disk drives instead of the printer).

As to whether or not there are any word processors that can save text files to the disk the way the file would appear as if it were printed, I don't know of any that can do that. ■

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Mayday

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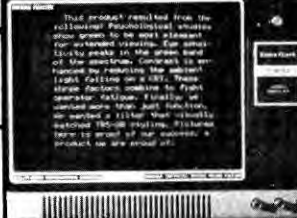
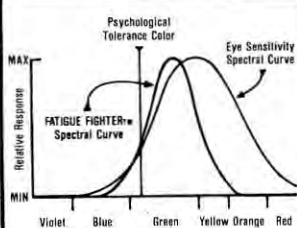
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by Richard Ramella

MIDWAY

I looked up "fun house" in five dictionaries and they all agree: A fun house is an amusement park building with devices that amuse or startle.

Fun House is a monthly column, and this is the first one. I'm going to admit only three kinds of

people into Fun House: Kids, adults who have friends who are kids, and people who haven't lost the sense of playfulness that kids have as standard equipment.

Fun House is more about fun than houses. Each month I invite you to enter and open a new door. Behind each door is a different area where the activities center on a theme of the month.

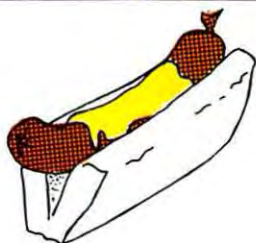
The programs will usually be 100 or fewer single-statement

lines. The programs will be numbered by tens starting at 100 and follow a spacing style that makes the material easy to read.

Most of the programs are written for a Model I with Level II. Color Computer programs will be included in later columns.

Fun House is not meant to teach programming, though the simple methods can be good material for the beginner. So much for the big welcome. It would be heartless to insist you enter the Fun House without sampling the activities of the carnival midway. So why don't you take a walk. I'll wait at the entrance of the Fun House until you're ready to enter.

HOT DOG



```

100 REM * HOT DOG *
110 CLS
120 CLEAR 500
130 Q=0
140 E=488
150 F=553
160 A$=STRING$(40,CHR$(191))
170 B$=STRING$(64,CHR$(128))
180 PRINT @ 64,A$
190 PRINT A$
200 PRINT A$
210 PRINT @ 140," H O T D O G ";
220 X=79
230 PRINT @ E,X+1;"SLICES TO GO...";
240 PRINT @ F,"";
250 INPUT "CUT UP TO 12 SLICES";Z
260 IF Z>12 PRINT "TOO MANY. ";: GOTO 230
270 IF Z>X+1 PRINT "NOT THAT MANY LEFT": GOTO 230
280 IF Z<<INT(Z) OR Z<1 PRINT "HUH-UH...": GOTO 230
290 Q=Q+1
300 FOR A=X TO X-Z+1 STEP -1
310 FOR Y=12 TO 47
320 SET(X,Y)
330 RESET(X,Y-9)
340 NEXT Y
350 X=X-1
360 NEXT A
370 IF X<1 GOTO 460
380 PRINT @ E,B$
390 PRINT @ F,B$;
400 IF Q/2=INT(Q/2) GOTO 230
410 Z=RND(12)
420 IF X<13 Z=X
430 IF X>13 AND X<25 Z=X-13
440 PRINT "HANNAH CUTS"Z;"SLICES"
450 GOTO 290
460 IF X=-1 PRINT "YOU TOOK THE LAST SLICE! YOU LOSE": END
470 IF X=0 PRINT "ONLY ONE SLICE LEFT."
480 IF Q/2=INT(Q/2) PRINT "HANNAH WINS" ELSE PRINT "YOU WIN!"
490 END

```

Hot Dog

Hungry? How about a hot dog prepared by Hannah, the boss of the food concession? You can get a free hot dog if you accept it in 80 slices and put up with a game that Hannah likes to play.

As the program starts, the hot dog is drawn at the top of the screen. You're invited to cut from one to 12 slices each turn; then Hannah cuts some slices. You lose if there's only one slice left and it's your turn. When it's your turn you'll see the prompt, CUT UP TO 12 SLICES?

Hannah has a strategy, but she can be beaten. You don't think we'd run a crooked game on our midway, do you?

Motor Mouth

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What does this amazing side-show attraction do? It's difficult to explain, and if I did explain it would spoil the effect.

I'll say only that Motor Mouth will put you into a complete tizzy with a series of questions. The last question you answer aloud without entering it into the computer. Then Motor Mouth

FUN HOUSE

guesses your answer. Motor Mouth is right most of the time. Wait until next month and I'll explain why.



MOTOR MOUTH



```

100 REM * MOTOR MOUTH *
110 CLS: CLEAR500
120 DATA COME ON,FASTER,QUICK NOW,SPEED IT UP
130 DATA DON'T YOU KNOW?,DON'T SLOW DOWN,SO?
140 DATA WHAT IS IT?,NEED HELP?,SAY IT NOW!
150 A$=CHR$(82)+CHR$(69)+CHR$(68)
160 D$=CHR$(67)+CHR$(79)+CHR$(76)+CHR$(79)+CHR$(82)
170 FOR A=0 TO 9
180 READ B$(A)
190 NEXT A
200 PRINT "AN EXPERIMENT. ANSWER EVERY QUESTION"
210 INPUT "I ASK AS SOON AS YOU CAN. SAY YES";C$
220 IF C$<>"YES" AND C$<>"NO" GOTO 210
230 IF C$<>"NO" THEN PRINT "THANK YOU JUST EVER SO MUCH!"
240 IF C$="NO" THEN PRINT "ANYONE ELSE?": GOTO 200
250 CLS
260 PRINT "REMEMBER, IT'S ALL FOR SCIENCE..."
270 PRINT "TYPE IN ANSWER THOUGH IT
WON'T SHOW."
280 INPUT "PRESS ENTER WHEN READY TO START";X
290 CLS
300 E=2
310 PRINT "WHAT'S";E;"PLUS";E;"?"
320 E$=E$+INKEY$
330 G=VAL(E$)
340 IF G=E+E THEN CLS: PRINT "RIGHT": GOTO 420
350 H=RND(100)
360 IF H<4 THEN PRINT B$(RND(10)-1)
370 N=N+1
380 IF N=100 THEN N=0:GOTO 400
390 GOTO 320
400 CLS
410 PRINT "CLOSE ENOUGH"
420 FOR T=1 TO 200
430 NEXT T
440 E$=""
450 E=E+E
460 CLS
470 J=J+1
480 IF J=9 GOTO 500
490 GOTO 310
500 CLS
510 PRINT "SAY THE NAME OF A ";D$
520 PRINT "AS FAST AS YOU CAN. SAY IT OUT LOUD."
530 FOR T=1 TO 1500
540 NEXT T
550 CLS
560 PRINT "THE ";D$;" YOU SAID WAS ";A$
570 PRINT
580 INPUT "AM I RIGHT (YES/NO)";C$
590 IF C$<>"YES" AND C$<>"NO" GOTO 580
600 IF C$="YES" THEN PRINT "I THOUGHT SO"
610 IF C$="NO" PRINT "WELL, I'M ONLY A COMPUTER..."
620 END

```

Pachinko

You're in for a rare treat. Pachinko games used to be the rage, and our arcade has one of those nice, old-fashioned Pachinko games.

A Pachinko game is a glass-enclosed board that hangs on a wall. In our version, 10 balls in turn are dropped into the playing field. As they drop they hit bumpers and bounce in different directions. At the bottom is a series of holes with point values marked. The one marked with a question mark is worth most—a surprise amount.

This is how you play: At the start of the game the board and bumpers are drawn. At top middle is the first ball. Position the ball by pressing L for left or R for right; press D for drop and the ball falls. A running score is given, and when the game is over you're invited to play again.

PACHINKO



```

100 REM * PACHINKO *
110 CLS
120 PRINT @ 352,"PACHINKO!"
130 U=0
140 Y=0
150 FOR X=0 TO 60
160 SET(X,Y)
170 NEXT X
180 X=0
190 FOR Y=0 TO 40
200 SET(X,Y)
210 SET(X+60,Y)
220 NEXT Y
230 Y=40
240 FOR X=0 TO 60 STEP 6
250 SET(X,Y)
260 NEXT X

```

Program continues

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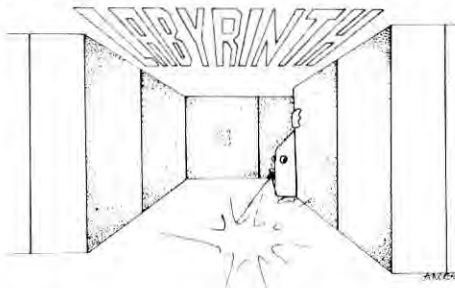
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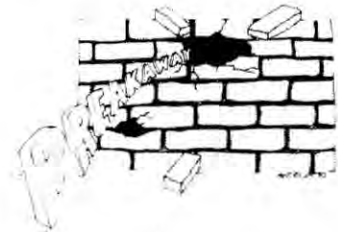
It does have some limitations. It takes at least 8K of RAM to run the compiler and it does only support a subset of BASIC—about 20 commands including FOR, NEXT, END, GOSUB, GOTO, IF, THEN, RETURN, END, PRINT, STOP, USR (X), PEEK, POKE, *, /, +, -, >, <, =, VARIABLE NAMES A-Z, SUBSCRIPTED VARIABLES, and INTEGER NUMBERS FORM 0-64K.

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Fun House

Now let's go into the Fun House. On this first visit you get the standard tour. Next month we'll begin opening secret doors.

This Fun House is a building about 80 by 40 feet. I won't be exact because you travel through in complete darkness. You will know how many feet you've traveled, and you will know your location only by what you hear, smell or touch in that location.

You travel through the gloom by pressing N for north, W for

west, S for south and E for east. There's more to discover, but you have to enter to find out what it is.

You can zip through the Fun House in two minutes. Or it may take longer.

If you're still in there next month, I'll come in the back door and lead you out. I'm willing to do that because I don't want you to miss the next trip into the Fun House. We're going to try some games that work because of a graphics command called Point(X,Y). ■

Program continued

```
270 FOR Y=4 TO 37 STEP 3
280 FOR X=1 TO 58 STEP 2
290 D=RND(3)
300 IF D=3 SET(X,Y): SET(X+1,Y)
310 NEXT X
320 NEXT Y
330 PRINT @ 896," 0 1 0 2 ? 10 2 0 1 0";
340 FOR L=1 TO 11
350 X=30
360 Y=2
370 A$=INKEY$
380 SET(X,Y)
390 IF A$="L" RESET(X,Y): X=X-1
400 IF A$="R" RESET(X,Y): X=X+1
410 IF X<1 X=1
420 IF X>59 X=59
430 IF A$="D" RESET(X,Y): GOTO 450
440 GOTO 370
450 Y=Y+1
460 SET(X,Y)
470 IF POINT(X,Y+1)=-1 RESET(X,Y): GOSUB 690
480 IF X=1 AND POINT(X-1,Y)=-1 RESET(X,Y): GOSUB 810
490 IF X=59 AND POINT(X+1,Y)=-1 RESET(X,Y): GOSUB 880
500 FOR T=1 TO 10
510 NEXT T
520 RESET(X,Y)
530 IF Y=40 GOTO 560
540 GOTO 450
550 NEXT L
560 PRINT @ 288,"TURN:";L;
570 PRINT @ 352,"POINTS:";
580 IF X<6 OR X>54 THEN Z=0
590 IF X>12 AND X<18 OR X>42 AND X<48 THEN Z=0
600 IF X>6 AND X<12 OR X>48 AND X<54 THEN Z=1
610 IF X>18 AND X<24 OR X>36 AND X<42 THEN Z=2
620 IF X>30 AND X<36 THEN Z=10
630 IF X>24 AND X<30 THEN Z=RND(20)+10
640 PRINT Z;
650 U=U+Z
660 PRINT @ 416,"TOTAL";U;
670 IF L=11 PRINT @ 960,"END OF GAME. ";: GOTO 950
680 NEXT L
690 Y=Y-1
700 IF X/2<>INT(X/2) GOTO 730
710 FOR X=X TO X-RND(3) STEP -1
720 GOTO 740
730 FOR X=X TO X+RND(3)
740 SET(X,Y)
750 FOR T=1 TO 20
760 NEXT T
770 IF POINT(X-1,Y)=-1 OR POINT(X+1,Y)=-1 RETURN
780 RESET(X,Y)
790 NEXT X
800 RETURN
810 FOR X=X TO X+RND(5)
```

Program continues

Program continued

```
820 SET(X,Y)
830 FOR T=1 TO 20
840 NEXT T
850 RESET(X,Y)
860 NEXT X
870 RETURN
880 FOR X=X TO X-RND(5) STEP -1
890 SET(X,Y)
900 FOR T=1 TO 20
910 NEXT T
920 RESET(X,Y)
930 NEXT X
940 RETURN
950 PRINT "TO PLAY AGAIN PRESS ENTER";
960 INPUT X
970 CLS
980 GOTO 110
990 END
```

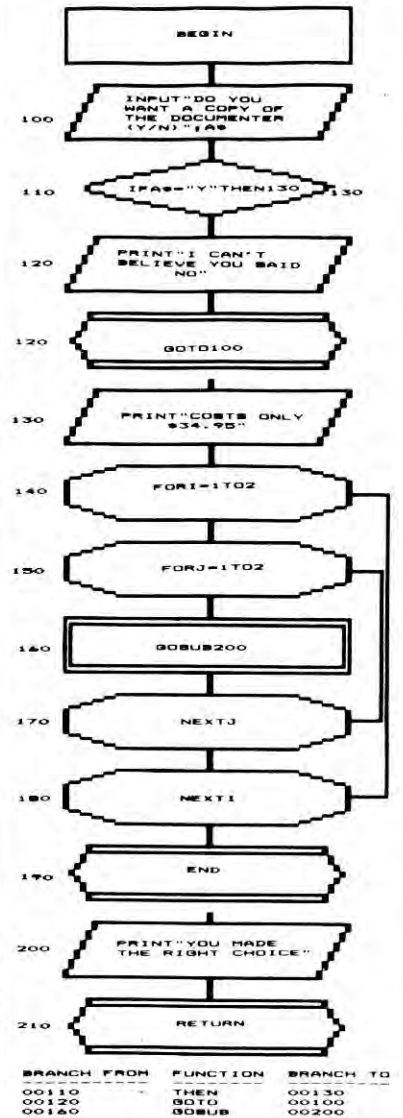
FUN HOUSE

```
100 REM * FUN HOUSE *
110 DATA GIGGLING,SPIDER WEBS,AROMA OF PERFUME
120 DATA SOMEONE CRYING ABOUT BEING LOST,SILKEN CURTAIN
130 DATA MANIACAL LAUGHTER,SMELL OF POPCORN,HOLLOW KNOCK
140 DATA A COLD HAND ON YOUR NECK,WHISTLING IN THE DARK
150 CLS
160 CLEAR 500
170 DEFSTR A,B,E,F-H,N,W,S
180 N="NORTH"
190 W="WEST"
200 S="SOUTH"
210 E="EAST"
220 G="WALL"
230 Z=RND(3)
240 H=CHR$(RND(26)+64)+CHR$(RND(9)+48)+CHR$(RND(26)+64)
250 PRINT "WELCOME TO THE FUN HOUSE..."
260 FOR D=1 TO 10
270 READ A(D)
280 NEXT D
290 FOR D=1 TO 10
300 C=RND(10)
310 IF A(C)=" " GOTO 300
320 B(D)=A(C)
330 A(C)=" "
340 NEXT D
350 PRINT "YOU'RE JUST INSIDE THE ENTRANCE"
360 Q=0
370 GOSUB 1090
380 IF F=N THEN X=40: GOTO 420
390 IF F=W OR F=E PRINT "LOCKED SECRET PANEL"
400 IF F=S PRINT "DOOR LOCKED"
410 GOTO 350
420 Q=1
430 GOSUB 1090
440 IF F=W THEN X=20: GOTO 470
450 IF F=S THEN X=40: GOTO 350
460 IF F=N OR F=E PRINT G: GOTO 420
470 Q=2
480 GOSUB 1090
490 IF F=E THEN X=20: GOTO 420
500 IF F=S THEN X=40: GOTO 520
510 PRINT G: GOTO 470
520 PRINT "YOU'RE IN A DIMLY-LIT ROOM. THERE ARE"
530 PRINT "THREE DOORS NUMBERED 1, 2 AND 3."
540 INPUT "WHICH DO YOU TAKE";L
550 IF L<1 OR L>3 CLS: GOTO 530
560 IF L=Z PRINT "GOOD CHOICE": F=W: X=10: GOTO 580
570 PRINT "SORRY, YOU GO BACK A WAY": Q=0: F=E: X=10: GOTO 350
580 Q=3
590 GOSUB 1090
600 IF F=N THEN X=50: GOTO 630
610 IF F=E PRINT "YOU CAN'T GO BACK": GOTO 580
```

Program continues

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Program continued

```

620 IF F=W OR F=S PRINT G: GOTO 580
630 Q=4
640 GOSUB 1090
650 IF F=N THEN X=15: GOTO 690
660 IF F=E THEN X=20: GOTO 780
670 IF F=S THEN X=50: GOTO 580
680 IF F=W PRINT G: GOTO 630
690 Q=5
700 GOSUB 1090
710 IF F=S THEN X=15: GOTO 630
720 IF F=W THEN X=10: GOTO 740
730 IF F=N OR F=E PRINT G: GOTO 690
740 Q=6
750 GOSUB 1090
760 IF F=E THEN X=10: GOTO 690
770 IF F=N OR F=W OR F=S PRINT G: GOTO 740
780 PRINT "YOUR SECRET EXIT CODE IS ";H
790 PRINT "DON'T FORGET IT."
800 Q=7
810 GOSUB 1090
820 IF F=N THEN X=25: GOTO 850
830 IF F=W THEN X=20: GOTO 630
840 IF F=S OR F=E PRINT G: GOTO 800
850 Q=8
860 GOSUB 1090
870 IF F=S THEN X=25: GOTO 780
880 IF F=W THEN X=10: GOTO 900
890 IF F=N OR F=E PRINT G: GOTO 850
900 Q=9
910 GOSUB 1090
920 IF F=S THEN X=15: GOTO 960
930 IF F=W THEN X=30: GOTO 1000
940 IF F=E THEN X=10: GOTO 850
950 IF F=N PRINT G: GOTO 900
960 Q=10
970 GOSUB 1090
980 IF F=N THEN X=15: GOTO 900
990 IF F=W OR F=S OR F=E PRINT G: GOTO 960
1000 PRINT "YOU ARE JUST INSIDE THE EXIT."
1010 Q=0
1020 INPUT "ENTER SECRET EXIT CODE";J$
1030 IF J$=H PRINT "RIGHT. YOU'RE OUTSIDE.": END
1040 IF J$<>H PRINT "GO BACK AND GET CODE": F="": X=0
1050 GOSUB 1090
1060 IF F=W GOTO 1040
1070 IF F=N OR F=S PRINT G: GOTO 1050
1080 IF F=E THEN X=30: GOTO 900
1090 PRINT "YOU TAKE";X;"STEPS ";F
1100 PRINT "IMPRESSION: ";B(Q)
1110 PRINT "DIRECTION? (N-W-S-E)
1120 X=0
1130 F=INKEY$
1140 IF F="N" F=N
1150 IF F="W" F=W
1160 IF F="S" F=S
1170 IF F="E" F=E
1180 IF F=N OR F=W OR F=S OR F=E CLS: RETURN
1190 GOTO 1130
1200 END
    
```

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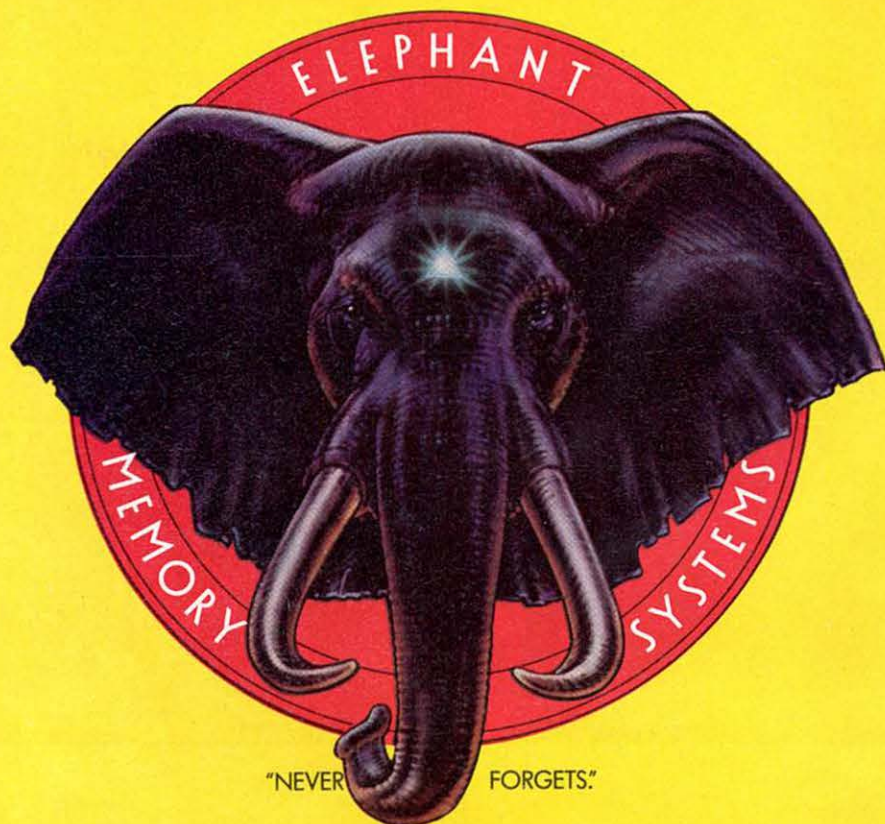
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100 CPU Shop, The	363	447 Hoffman Associates	243	* NRI Schools	87	432 Star-Kits	382
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556 CRT Products Co.	386	153 Holmes Engineering	111	547 Nanos Systems Corp.	123	180 Sturdivant & Dunn Inc.	128
466 Checkmate	93	573 Home Information Systems	402	128 Nelson Software Systems Inc.	264, 273	71 Sublogic Communication Corp.	205
102 Cloud Magazine Inc.	257	421 Hon F & I Computers	29	326 Nelson Classics Software	267	* Subscription	299, 361
103 Cloud Magazine Inc.	29	175 Howe Software	269	232 Nocona Electronics	84	* Subscription Problems	263
121 Cognitek	79	JGG	13, 141, 236, 250	50 Omikron	29	559 Summerville Enterprises	389
* Color Software Services	347	404 J.S.	114	195 Omnitek	253, 289	285 Sun Research Inc.	169
61 Communications Systems Lab	254, 347	560 Ico-Rally Corp.	386	206 Options-80	257	456 Sunlock Corp.	247
252 CompuAdd Corp.	391	274 Illustrated Memory Banks	203	275 Orange Micro	17	* Synergistic Solar Inc.	246
455 CompuKit	301	424 Individual Systems, Inc.	49	151 Orion Instruments	283	174 Syracuse R & D Center	295
276 Compulink Corp.	12	591 Inmac	402	242 PMC Software	223	408 T & D Software	278
235 Compuserve	35	* Instant Software	379, 380	368 P80NUT Software, Inc.	335	447 TSASA Inc.	236
500 Computer Advantages	89	351 Institute for Scientific Analysis	391	207 Pacific Exchanges	206, 246, 295, 329	550 TYC Software	384
120 Computer Applications Unlimited	349	182 Interface, Inc.	196	122 Pan American Electronics	305	570 TYC Software	398
479 Computer/Business Services	287, 391	430 Intergraphics, Inc.	114	333 Peggytronics	157	189 TAB Sales	253
139 Computer Case Company	305	413 Island Computer Services	262	* Percom Data Company	3	70 Taranto & Associates Inc.	165
133 Computer Discount of America	74	202 JES Graphics	206	1 Percom Data Company	32, 33	529 TCorp.	232
420 Computer Peripheral Resources	280	273 J.F. Consulting	118	2 Percom Data Company	32, 33	440 Tech Data Corp.	391
18 Computer Plus	25	42 JPC Products Co.	293	3 Percom Data Company	32, 33	59 Texas Computer Systems	219
109 Computer Shack	63, 65	* Jesse Jones Box Corp.	287	552 Pericom	385	450 Texas Digital	194
453 Computer Shack	67, 69	254 Jimsco Inc.	213	272 Peripherals Unlimited	265	144 Thomas V. Lenz	115
39 Computer Shopper	401	515 John Wiley & Sons	159	124 Perry Oil & Gas Inc.	275	527 Tiny-C	155
325 Computer Software Design Inc.	313	150 Johnson Associates	49	558 Personal Micro Computers Inc.	384	566 TOPS Programming Enterprises	392
115 Computer Sports Systems	256	485 Kalgio Electronics Co.	30	* Phase I Systems Inc.	91	81 Total Access	53
369 Computerware	267	331 KSoft	289	160 Pioneer Software	261	522 Two/Sixteen Magazine	217
588 Computerware	400	358 KWIK Software	75	592 Platinum Software	402	441 Universal Software	78
589 Computerware	400	581 KWIK Software	398	377 Plug Bug, The	156	* University Microfilms Int'l	287
27 CompuText	322, 323	582 KWIK Software	384	73 Plus Computer Technology	122	567 Utility Co., The	396
484 CompuWare	117	444 L.J. Kuttien, Attorney	357	25 Pocket Computer Newsletter	361	* V R Data Corp.	393, 394, 395
68 Contract Services Assoc.	193	30 LNW Research	CIV	61 Powersoft	45, 353	169 Van Horn Office Supply	121
105 Coosol Inc.	272	31 LNW Research	7	471 Powersoft	393	459 Volks Microcomputer Systems, Inc.	76
308 Cornsoft Group	121	32 LNW Research	61	569 Practical Applications of CA	396	431 W.C. Maxey	357
45 Cornucopia Software	373	33 LNW Research	144	11 Practical Peripherals	CIII	553 W.C. Maxey	385
58 Cosmopolitan Electronics Corp.	271	462 LSI Systems	113	63 Precision Prototypes	73	587 Wm C. Brown Co. Publishers	400
187 Cottage Software	175	572 Lance Micklus Inc.	398	288 Process Control Tech	263	* Wayne Green Books	291, 341
190 Creative Computer	351	551 Langley-St. Clair Instrumentation Systems Inc.	385	521 Professional Aids	155	* Wayne Green Inc.	157
557 Creative Micro Systems Inc.	385	453 Lardo Systems Inc.	245	80 Program Store/Realsoft	248, 249, 251	179 Western Operations	78
307 Custom Data	334	191 Lawyers Microcomputer, The	167	245 Programmer's Institute	148	586 Westico	400
565 Custom Data	390	472 Leading Edge	338	418 Programs for the 80's	197	212 William A. Fink	102
410 D.B. Software	214	155 LEDS Publishing Co., Inc.	228	143 Progressive Electronics	81	192 Wilson Software Division	254
517 DCS Software	101	* Level IV Products Inc.	375	91 Prosoft	37	158 XYZT Computer Dimensions Inc.	388
452 Data Mail	399	131 Libra Laboratories Inc.	85	48 Quality Computer Services	369	156 York 10 Computerware	281
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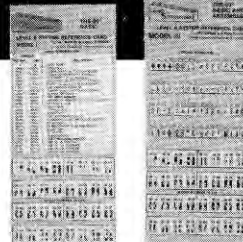
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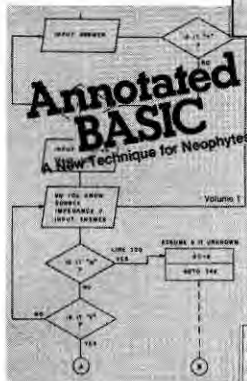
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Copernica Mathematica

by Bruce Douglass

"A differential equation contains an unknown function and one or more of its derivatives."

Let's continue our study of calculus with a discussion of differential equations.

A differential equation contains an unknown function and one or more of its derivatives. It may be a function of only one variable (ordinary differential equation) or of two or more variables (partial differential equation). Two other main categories are initial value problems and boundary value problems.

In an initial value problem you know the value of the function and its derivatives at the initial point, but not thereafter. Your job is to find the value of the unknown function at some later time. In a boundary value problem you know the values of the function at some different discrete points, but do not know the values of the function and its derivatives all at the same point. For reasons we will discuss in a bit, this type of problem is significantly more difficult.

Analytically, the solution of a differential equation is an equation which identifies the unknown function. Numerically, however, the solution usually is a single value for the unknown function, given the differential equation and the initial conditions.

There are two main approaches to the numerical solution of differential equations. One contains methods of direct

Taylor series approximation, Euler's method, and the well-known Runge-Kutta algorithm. The other approach, predictor-corrector methods, is generally preferred for real applications.

Taylor Series Methods

A Taylor series is an infinite series of terms that approximate a given function. It has a particular form:

$$f(x+h) = f(x) + h \cdot f'(x) + (h^2/2) f''(x) + (h^3/3) f'''(x) + \dots$$

By definition, if the function is analytic at x , then the Taylor series will equal the value of the function at that point.

The main problem with using Taylor series for the numerical solution of differential equations is that you must be able to calculate the derivatives ($f'(x)$, $f''(x)$, and so on) of the unknown function. Also, you cannot evaluate the entire series, since there is an infinite number of terms. Thus, you must stop using terms at some point, and this adds truncation error into the calculation. If an infinite series converges, it is easy to show that the terms get smaller and smaller. Sooner or later, we have to stop adding terms.

The standard form for a first-order differential equation is $x' = f(x,t)$ where $f(x,t)$ is the known problem equation. Generally, in the solution of differential equations,

we don't really know what the derivatives of the function are. Consider the problem:

$$x' = 1 + x^2 + t^2$$

and initial value of $x(0)$ equals zero. We can get the higher derivatives of $f(x)$ with the chain rule:

$$\begin{aligned} x'' &= 2 \cdot x \cdot x' + 2 \cdot t \\ x''' &= 2 \cdot x' \cdot x' + 2 \cdot x \cdot 2 + 2 \cdot t \end{aligned}$$

In this case, we can find the solution of $x(a)$ at some later point (usually t is used to indicate time). The idea is quite simple. We know the value of $x(t)$ at some point ($x(0)$ in this case). Therefore, using a Taylor series, we can approximate the function at some nearby point $x(t+h)$. Now we can again use a Taylor series to determine the value of the function further away from the initial value, continuing until we reach the value of t at which we wanted to know the value of $x(t)$.

Step size refers to how far away we are evaluating the value of the function. It is generally a good idea to use a step size that is a power of two, such as 2^{-7} (1/128), since these numbers can be exactly represented in binary format. (This helps minimize round-off error.)

Short programs to solve the above problem appear in Listings 1-3. These programs illustrate a very simple solution, but there are some difficulties with it.

First, you must be able to find the derivatives of the equation. For some equations it is impossible to write the derivatives in terms of simple functions. Thus, this method is limited to functions where derivatives may be easily found analytically.

In addition, you must write a new program for each problem, or at least insert several lines of function derivatives.

One solution to this is to use difference formulae for computing the derivatives. This is very risky—numerical differentiation is subject to round-off error. This type of numerical error is especially severe when you must subtract two numbers that

```
10 REM taylor series solution to the problem
20 REM x(t) = 1 + xQ + tR
30 INPUT"ENTER THE STARTING VALUE OF T";T1:
  INPUT"ENTER INITIAL VALUE OF X(T)";X:
  INPUT"ENTER ENDING VALUE OF T";K:
  INPUT"STEP SIZE";H:T=T1
40 FOR I = T1 TO K STEP H
50   X1 = 1 + X@2 + T@3
60   X2 = 2*X*X1 + 3*T@2
70   X3 = 2*X*X2 + 2*X1@2 + 6*T
80   X = X + H*(X1 + H*(X2/2 + H*X3/6))
90   T = T + H
100 NEXT I
110 PRINT "ANSWER IS ";X
120 END
```

Program Listing 1. Taylor Series (Basic)

are close to each other in value. The difference equation for the derivative of a function is:

$$f'(x) = (f(x+h) - f(x))/h$$

Since h is normally small and $f(x+h)$ will be very close in value to $f(x)$ a huge error results. There must be better methods.

Euler's Method

The Euler (pronounced oiler) method for solving differential equations is one of the fastest methods around. This Taylor series-based method uses only the first term of the Taylor series—it requires only an approximation of the first derivative. Therefore, it requires only two equations for its solution. These equations are used repeatedly, and this repetition is called iteration; the method is therefore called an iterative process.

Iterative processes are used for all sorts of numerical computations. They provide a means to make an educated guess of the answer and, using a series of steps or iterations, to reduce the error of the guess. Iterative methods for solving differential equations provide a means for estimating points along the unknown function curve, and they use these estimates to make even more estimates.

A main problem associated with iterative schemes applied to differential equations is that three types of errors crop up. The first, round-off error, is not usually too severe in these cases. The second, truncation error, arises with Taylor series-based schemes. Since we do not evaluate the entire Taylor series but only a certain number of its terms (one in the case of Euler's method, and four in the case of a fourth order Runge-Kutta method), those terms we omitted mean that we did not get exactly the right value; since we truncated the series, we created some error. Generally with the Runge-Kutta method, this error isn't too bad either.

The last type is accumulated truncation error. Since each iteration has some truncation error associated with it, the more iterations you perform, the less accurate you are; that is, the local truncation error accumulates in your answer. In fact, if your answer is far away from your starting place, it may be totally meaningless.

The geometric interpretation of Euler's method for solving differential equations can be seen in Fig. 1. The curved line is the actual function for which we are trying to solve. At a given point, the tangent line (the slope of which is given by the derivative at the point) is a reasonable approximation to the curve at that point. So if we

want to estimate a point on the curve not too far away, we might use a point on the tangent line as an approximation. Once at that new point (x_1), we want to look further down the curve, so we recompute the tangent line and use that as an approximation to get the next point (x_2), and so on,

until we have reached the point at which we wanted the value of the function.

The equations used for this iteration are:

$$x'(t) = f(x(t), t) \text{ (the differential equation)}$$

$$x(t+h) = x(t) + h \cdot x'(t)$$

(the truncated Taylor series approximation)

```

C      fortran program to calculate the numerical
C      solution to the problem
      READ(5,2)T, X, H, E
C      read in start(t), initial value for x (X),
C      ending, and step size (E)
      DO 1 I = T, E, H
        X1 = 1.0 + X**2 + T**3
        X2 = 2.0*X*X1 + 3.0*T**2
        X3 = 2.0*X*X2 + 2.0*X1**2 + 6.0*T
        X = X + H*(X1 + H*(X2/2 + H*X3/3))
1      T = T + H
      WRITE(5,3)T, X
2      FORMAT(F6.3)
3      FORMAT(' STEP= ',E2.6,' RESULT=' ,E6.6)

```

Program Listing 2. Taylor Series (Fortran)

```

PROGRAM DIFFEQ_TAY;
VAR
  X, X1, X2, X3, T, E : REAL;
BEGIN
  WRITELN('DIFFERENTIAL EQUATION SOLVER USING');
  WRITELN('THE TAYLOR SERIES METHODS');
  WRITE('ENTER INITIAL POINT, INITIAL VALUE,');
  WRITELN('STEP SIZE, AND ENDING POINT');
  READ(T,X,H,E);
  REPEAT
    X1 := 1 + X@2 + T@3;
    X2 := 2*X*X1 + 3*T@2;
    X3 := 2*X*X2 + 2*X1@2 + 6*T;
    X := H*(X1+H*(X2/2+H*X3/6));
    T := T + H
  UNTIL (T>E);
  WRITELN('AND THE SOLUTION IS');
  WRITE('T=',T,' X(T)=' ,X);
END.

```

Program Listing 3. Taylor Series (Pascal)

```

10 REM Euler's method for solving differential eqs
20 REM written by Bruce Powel Douglass
30 DEF FN F(X,T) = X@2 + T@3 + 2 'differential eq
40 INPUT"ENTER INITIAL POINT, & INITIAL VALUE";T0,X0
50 INPUT"ENTER STEP SIZE AND ENDING POINT";H,TE
60 X=X0
70 FOR T=T0 TO TE STEP H
80   X = H*(FN F(X,T)) + X
90   PRINT "POINT T=";T,"VALUE X(T)=";X
100 NEXT T
110 END

```

Program Listing 4. Euler's method (Basic)

The Basic program in Listing 4 shows the method. We begin with the differential equation (defined in line 40) at the initial point of t equals zero, and the initial value of $x(0)$ equals zero. This kind of problem is called an initial value problem.

If a given differential equation has one solution, it generally has an infinite number of solutions. To find a particular solution we need to know the value of the function and the derivative at some initial point in time. We decide on the step size (how big we step away from each calculated value of $x(t)$), and enter it, as well as the point at which we want the value of the function (the ending point). The program then calculates its estimate of the curve's value and uses this value (along with the value of the derivative calculated from line 40) to calculate the next value, until we reach the last value.

This method is fairly fast, but is not used much due to accumulated round-off error. A much more widely used technique is the Runge-Kutta method.

The Runge-Kutta Method

Carl Runge and Wilhelm Kutta developed a method for solving differential equations based on the Taylor series method, but without requiring the analytical derivatives for the initial value-type problems. This method is based on the bivariate Taylor series—the Taylor series for functions of two variables. The Runge-Kutta method treats the derivative as a function of two variables, the function itself and the function's variable. For example, a differential equation such as $f' = 1 + ft^2 + t^2$ has f' as a function of two variables, f and t .

The Runge-Kutta method requires the user to provide the function as a routine that can be called often, but approximates the derivatives. The number of terms used is the order of the method. Orders of two on up are sometimes used, but the fourth-order method is most often used.

The error associated with the fourth-

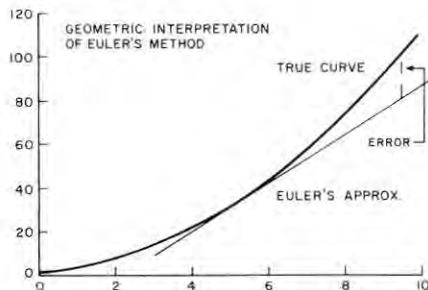


Figure 1

order Runge-Kutta algorithm is related to the size of the step used; it is approximately h^5 , where h is the size of the steps taken.

The algorithm is:

$$x(t+h) = x(t) + (F1 + 2 \cdot F2 + 2 \cdot F3 + F4)/6 \text{ where: } F1 = H \cdot F(T,X)$$

```

10 REM ***** Runge-Kutta method for solving *****
20 REM ***** differential equations *****
30 REM ***** BY Bruce Powel Douglass *****
40 DEF FN DY(X,Y)=X-2*X*Y 'function to be solved for
50 DEF FN Z(X) = .5-EXP(-X[2]/2 'actual analytic solution
60 DEF INT I=N:DEF DBL F,X,Y,H:U$="###.#####"
70 CLS:PRINT TAB(16);"DIFFERENTIAL EQUATION SOLVER":PRINT
  TAB(14);"VIA 4TH ORDER RUNGE-KUTTE METHOD":PRINT
  TAB(18);"BY BRUCE POWEL DOUGLASS"
80 PRINT:H=.1:INPUT"ENTER STEP SIZE";H:C=.005:INPUT"ENTER
  STEP-SIZE CONVERGENCE CRITERION";C:XE=2:INPUT"ENTER
  STARTING POINT, INTIAL VALUE, ENDING POINT";X,Y,XE
90 REM ***** 4TH ORDER RUNGE-KUTTA STARTER *****
100 REM
110 FOR K=1 TO 10000 : Y1 = Y : H2 = H/2
120 F1 = H*FN DY(X,Y)
130 F2 = H*FN DY(X+H2,Y+F1/2)
140 F3 = H*FN DY(X+H2,Y+F2/2)
150 F4 = H*FN DY(X+H,Y+F3)
160 Y = Y + (F1+F2*2+F3*2+F4)/6
170 X = X + H
180 GOSUB 230
190 IF ABS(Y1-Y)<C THEN H=H*4 ELSE IF ABS(Y1-Y)>C THEN H=H/4

200 IF X>=XE THEN GOTO 220
210 NEXT K
220 PRINT:PRINT"RESULTS ARE:":GOSUB230:END
230 PRINT"X=";:PRINT USING U$;X,:PRINT,"Y=";:PRINT USING U$;Y;
240 PRINT,"STEP=";:PRINT USING U$;H;:PRINT" LOOP=";K
250 PRINT TAB(16);"REAL ANSWER IS";:PRINT USING U$;FN Z(X)
260 RETURN
270 END
  
```

Program Listing 5. Runge-Kutta method (Basic)

```

C first the driver routine
  READ (5,1)T,X,H,STEPS)
C read in the initial value of the function (X),
  the value for T, X, H and the number of steps
C T=starting place, H=step size, STEPS=# of steps
C F is a defined function to be numerical integrated
  CALL RUNGE(F,T,X,H,STEPS)
  WRITE(5,2)T,X
1  FORMAT(5X, 2E20.13)
2  FORMAT('point =',T,' result='X)
  END
  SUBROUTINE RUNGE(F,T,X,H,STEPS)
    H2 = H/2.0
    DO 1 K=1, STEPS
      F1 = H*F(T, X)
      F2 = H*F(T+H2, X+F1/2.0)
      F3 = H*F(T+H2, X+F2/2.0)
      F4 = H*F(T+H, X+F3)
      T = T + H
10  X = X+(F1+2.0*F2+2.0*F3+F4)/6.0
      RETURN
  C F is the defined function (example function shown)
  FUNCTION F(T,X)
    F=SQRT(T+X*X)+SIN(T)*SIN(T)
  RETURN
  
```

Program Listing 6. Runge-Kutta method (Fortran)

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F2 = H*F(T+H/2, X+F1/2)
F3 = H*F(T+H/2, X+F2/2)
F4 = H*F(T+H, X+F3)

The method is used in Program Listings 5-7.

In the Euler method, only a single point and a slope are used to generate an approximation for the next point to be calculated. This approach does not take into consideration the behavior of the curve around the point, but merely the derivative of the curve at the point.

The Runge-Kutta method, however, uses a weighted average of four predicted points and uses this to generate the next point. Because we are using more information to generate the next point with the Runge-Kutta method than with the Euler method, we incorporate much less error.

To be more precise, the steps used to calculate the next point are:

- Estimate the value of the function at $t + h/2$ (one half of the step size used plus the current value of t).
- Calculate the slope there and re-estimate the value of the point at $t + h/2$ using the calculated slope.
- Make another estimate, but this time at $t + h$, and calculate the slope at this estimated value.
- Now, take a weighted average of all these estimations and add this to the current value of the function to get the next value of the function.

The error incorporated into the predictions of the next point with this method is much less than with the Euler method. The error associated with the Euler method is of the order h^2 , and the error associated with the Runge-Kutta method is of the order h^5 , where h is the step size used. So for even a small h , there can be quite an increase in accuracy.

What should be the step size? I suggest you use a power of two as your step size, but this is not always necessary nor desirable. The round-off error in adding and multiplying by the step size can be minimized since a power of two can be represented exactly in the computer, whereas a power of 10 (such as .01) cannot. A better number to use would be 1/128, which equals 0.0078125.

Should the step size change or be constant? Generally, application programs use a self-adjusting step size. There is a trade-off between computation time and computed accuracy. If you want high accuracy, you must wait a long time for the answer. If you want the answer today, you will want less computation. Compound this problem with the fact that the behavior of a general function may be vastly different in some portions than in others, and you have a sticky mess indeed.

In terms of the trade-off of computation time and accuracy, less calculation is necessary when the slope of the function is relatively constant, and more when the function's derivative is rapidly changing. To accommodate this, researchers have developed methods for changing step size to keep accuracy approximately constant.

If the function is well-behaved in a certain area, increase the step size—we are wasting time. On the other hand, if the function is not well-behaved, then decrease the step size—we are losing accuracy. (A good reference is in the *Society for Industrial Applied Mathematics (SIAM) Journal of Numerical Analysis*, Volume 10, Number 5, October 1973, "Algorithms for Changing The Step Size," by Fred T. Krogh.)

In-depth treatment of the topic is well beyond the scope of this article, but we will use it in the applications Runge-Kutta program (see Listing 5). We use the simple halving-doubling of step size in this and the other programs, although there are some stability problems associated with it. It is conceptually simple and easy to code.

Predictor-Corrector Methods

The methods we have looked at so far are called single-step methods, because if $x(t)$ is known for some t , then $x(t+h)$ is calculated without knowing the solution at points earlier than t .

The other main class of methods is called multi-step methods, because several values of the function ($x(t-h)$, $x(t-2h)$, $x(t-3h)$, and so on) are used to compute the new value of $x(t)$. These tend to be much more efficient than the single-step methods, but they have the drawback of not being self-starting. This means you need to know several points before you can use these methods. Single-step methods are self-starting.

In application programs, the usual approach is to use a single-step method to get started, and then switch to a multi-step method once you have generated enough points. In the programs presented below, the single-step method used is a fourth-order Runge-Kutta method.

One common multi-step method is the Adams-Moulton method. It is governed by the equations:

```
PROGRAM DIFFEQ;
VAR
  X, T, F, F1, F2, F3, F4, H : REAL;
  LOOP : INTEGER;
PROCEDURE RUNGE(VAR X, T, H : REAL);
  VAR
    F, F1, F2, F3, F4, H2 : REAL;
    LOOP : INTEGER;
  BEGIN
    H2 := H/2;
    FOR LOOP := 1 TO STEPS DO
      BEGIN
        F1 := H*F(T,X);
        F2 := H*F(T+H/2, X+F1/2);
        F3 := H*F(T+H/2, X+F2/2);
        F4 := H*F(T+H, X+F3);
        T := T + H;
        X := X+(F1+2*F2+2*F3+F4)/6;
      END
    END; { END_RUNGE }
    (**)
FUNCTION F(T,X:REAL) : REAL;
  BEGIN
    F := 2 + X*T@2/5 { USER-DEFINED FUNCTION HERE }
  END; { END_F(T,X) }
  (**)
BEGIN { MAIN PROGRAM }
  Writeln('FOURTH ORDER RUNGE-KUTTA ALGORITHM');
  Writeln('ENTER INITIAL POINT AND VALUE');
  READ (T, X);
  Writeln('ENTER STEP SIZE AND END-POINT');
  READ (H, E);
  RUNGE(T, X, H, E);
  Writeln('THE SOLUTION IS ');
  Writeln('T=', T, ' F=', F);
END.
```

Program Listing 7. Runge-Kutta method (Pascal)

Copernica Mathematica

$$x'(t) = F(x(t)) \text{ (the differential equation)—eq. 1}$$

$$x(t+h) = x(t) + h/24(55F(x(t)) - 59F(x(t-h)) - \text{eq. 2}$$

$$+ 37F(x(t-2h)) - 9F(x(t-3h)))$$

In practice, the above scheme is never used alone, but in conjunction with another equation. Formula 2 above is called the predictor, and the additional formula is called the corrector. A corrector often used with the Adams-Moulton method is shown below:

$$x(t+h) = x(t) + h/24(9F(x^*) + 19F(x(t)) - \text{eq. 3}$$

$$- 5F(x(t-h)) + F(x(t-2h)))$$

where * means predicted by eq. 2 above. Thus, you can think of eq. 2 as predicting a value for $x(t+h)$ called x^* , used by the corrector (eq. 3) to get a more accurate estimate of the true answer.

The method shown above is a fourth-order method, since four values are required in each iteration. The increased efficiency occurs because once we have calculated the value of $x(t)$, we do not have to calculate it again for the new iteration; instead we can store it, such as in an array. We then rotate the array each iteration, so that last iteration's $x(t)$ becomes this iteration's $x(t-h)$. Thus, we don't have to recalculate the points each time, and only need to calculate one new value each iteration. In the fourth-order Runge-Kutta method, we must calculate four values each time. For real applications, in which the function may take a fairly long time to be calculated, this can be a considerable savings.

There are many predictor-corrector methods around. My personal favorite was developed by Hamming of IBM. Some methods are unstable, which means errors propagate with increasing magnitude in each step. Milne's method falls into the unstable category but if you don't have too far to go, Milne's method will get you there quickly. Hamming's method is stable. In fact, if the differential equation is a polynomial of order six or less, the answer is exact, within machine accuracy.

The algorithm is shown below. The Hamming method uses more terms than most other predictor-corrector methods, so I will use the following notation. $P(j)$ is the value of the predictor at $t = j$, $M(j)$ is the value of the predictor modifier at $t = j$, $C(j)$ is the value of the corrector at $t = j$. The function is $F(j)$. The subscripts will be shown as plus or minus a number ($F(j+1)$ means the value of the function at the next ($j+1$) interval).

Predict: $P(j+1) = F(j-3) + 4h(2F(j)) - F(j-1) + 2F(j-2)/3$
 Modify: $M(j+1) = P(j+1) + 112(C(j) - P(j))/121$

Program Listing 8. Hamming's method (Basic)

```

10 REM ***** HAMMING'S METHOD FOR SOLVING *****
20 REM ***** DIFFERENTIAL EQUATIONS *****
30 REM ***** BY BRUCE POWEL DOUGLASS *****
40 CLEAR 800:DEFDBL C,P,M,X,Y,H,D,F
50 H=VAL("0.0100000000000000000000000000000000"):C=VAL(".0050000000000000000000000000000000")
60 DEF FNDY(X,Y)=X-2*X*Y: 'DIFF EQ TO BE SOLVED
70 DEF FNZ(X) = .5-EXP(-X[2]/2 'ACTUAL SOLUTION
80 DEFINT J-L:U$="###.#####"
90 CLS:PRINT TAB(16);"DIFFERENTIAL EQUATION SOLVER":PRINT
TAB(10);"VIA HAMMING'S PREDICTOR-CORRECTOR METHOD":
PRINT TAB(18);"BY BRUCE POWEL DOUGLASS"
100 PRINT:INPUT"ENTER STEP SIZE";H:INPUT"ENTER STEP-SIZE
CONVERGENCE CRITERION";C:XE=2:INPUT"
ENTER STARTING POINT, INTIAL VALUE, ENDING POINT";X,Y,XE
110 INPUT"1. TABLE OUTPUT, OR 2. REAL-TIME PLOT";PL
120 INPUT"1. NO HARD COPY AT END, OR 2. HARD COPY";HC
130 IF PL=2 THEN GOSUB 530
140 GOTO 260 'BYPASS RUNGE-KUTTA SUBROUTINE
150 REM ***** 4TH ORDER RUNGE-KUTTA STARTER *****
160 H2=H/2 : X(0)=X : Y(0)=Y2
170 FOR K=1 TO 3
180 F1 = H*FNDY(X,Y2)
190 F2 = H*FNDY(X+H2,Y2+F1/2)
200 F3 = H*FNDY(X+H2,Y2+F2/2)
210 F4 = H*FNDY(X+H,Y2+F3)
220 X = X + H : X(K) = X
230 Y2 = Y2 + (F1+F2*2+F3*2+F4)/6 : Y(K)=Y2
240 NEXT K
250 RETURN
260 REM ***** NOW THE DRIVER *****
270 Y2=Y:GOSUB 160
280 D(1)=FNDY(X(1),Y(1)):D(2)=FNDY(X(2),Y(2))
290 D(3)=FNDY(X(3),Y(3))
300 IF I<4 THEN P1=C1
310 P2 = Y(0) + 4*H/3*(2*D(3)-D(2)+2*D(1))
320 M2 = P2 - 112/121*(P1 - C1) : MP = FNDY(X(3)+H,M2)
330 C2 = (9*Y(3)-Y(1)+3*H*(MP+2*D(3)-D(2)))/8
340 IF I<3 THEN P2=C2
350 Y(4) = C2 + 9/121*(P2-C2)
360 X = X(3)+H : Y = Y(4) : Y1=Y(3) : X(4)=X
370 GOSUB 490
380 C1 = C2 : P1 = P2:I=I+1
390 IF INT(I/10)<>I/10 THEN 440
400 REM ***** NOW ADJUST STEP SIZE *****
410 IF ABS(P2-C2)<C THEN H=H*2
420 IF ABS(P2-C2)>C THEN H=H/2
430 Y2=Y(4) : X=X(4) : GOTO 270 'IF ADJUST STEP SIZE,
RECALCULATE 1ST 4 POINTS
440 IF X>XE THEN 470
450 FOR J=1 TO 4:Y(J-1)=Y(J):X(J-1)=X(J):D(J-1)=D(J):NEXT J
460 GOTO 290
470 IF HC=2 THEN GOSUB 650
480 PL=1:PRINT@896,"RESULTS ARE: ";GOSUB490:END
490 IF PL=2 THEN 600 ELSE PRINT"X=";X;:PRINT"
Y=";:PRINTUSINGU$;Y;
500 PRINT" STEP =" ;H;:PRINT" LOOP = ";I
510 PRINT TAB(16);"REAL ANSWER =" ;:PRINTUSINGU$;FNZ(X)
520 RETURN
530 *** SET UP REAL-TIME PLOT **
540 CLS:INPUT"ENTER LOWER & UPPER LIMITS FOR Y";YL,YU
550 CLS:FOR I=10 TO 127:SET(I,40):NEXT I
560 FOR I=0 TO 40:SET(10,I):NEXT I
570 PRINT@0,YU;:PRINT@832,YL;:PRINT@898,X;:PRINT@956,XE;
580 YC=(YU-YL)/40 : XC=(XE-X)/117
590 RETURN
600 *** PLOT IT **
610 XP=X/XC+10 : YP=40-Y/YC
620 IF XP>127 OR XP<0 OR YP>47 OR YP<0 THEN 640
630 SET(XP,YP)
640 RETURN
650 ' ** READ VIDEO SCREEN & OUTPUT **
660 M$=" "+STRING$(33,"*") : N$=" " 'N$=2 SPACES

```

Listing 8 Continues

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Listing 8 Continued

```

670 FOR K=1 TO 16 '# OF VIDEO LINES
680   L$(1)=" " : L$(2)=" " : L$(3)=" " : FOR L=0 TO 63
690     J=PEEK((K-1)*64+15360+L) ' CURRENT SCREEN BYTE
700     IF (J AND 128)=0 THEN
       L$(1)=L$(1)+N$:L$(2)=L$(2)+CHR$(J)+" " : L$(3)=L$(3)+ N$
       :GOTO 740 'NON-GRAPHICS ??
710     L$(1)=L$(1)+MID$(M$, (J AND 1)+1,1)+MID$(M$, (J AND
       2)+1,1)
720     L$(2)=L$(2)+MID$(M$, (J AND 4)+1,1)+MID$(M$, (J AND
       8)+1,1)
730     L$(3)=L$(3)+MID$(M$, (J AND 16)+1,1)+MID$(M$, (J AND
       32)+1,1)
740     NEXT L
750 LPRINT L$(1) : LPRINT L$(2) : LPRINT L$(3)
760 NEXT K : LPRINT "RESULTS: X=" ; X, "Y=" ; Y
770 RETURN

```

Correct: $C(j+1) = (9F(j) - F(j-2) + 3h(M'(j+1) + 2F'(j)) - F'(j-1))$
 Final: $F(j+1) = C(j+1) - 9(C(j+1) - P(j+1)) / 121$

This method requires four values to find a fifth, and so a Runge-Kutta method is used within the program (see Listing 8) to generate these. Further, a self-adjusting step size is used in the program. As an additional treat, the program will either put out the values of the function into a table (for the printer or the screen) or do a real-time plot of the values on the screen or line printer. Any printer will work with this program, since byte resolution is used on the printer.

For interested readers, a more advanced version of this program, along with several other programs, including linear programming, matrix functions (addition, division, inverse, transpose, all eigenvalues and vectors of a non-symmetric matrix), non-linear equation solvers, simultaneous equations solvers, and autocorrelation are contained in my new Numerical Analysis Package for Microcomputers (NAPM) for the TRS-80 Model I and III. It is available for the price of \$89.95 (disk version) or \$79.95 (tape version). If you're interested write me at (specify disk format Model I or III):

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The Hamming's method program plots the result on the screen or produces a table of results. You may output the results to the printer at the end. If you choose the real-time plot, the program will do a graphics plot of the function after asking for the range of the Y values. When it comes time to plot the result on the printer, it will scan the screen and plot an asterisk for each graphics block set. This

means your printer must be able to handle 127 characters across the page. For most printers, this capability is provided in the 16 cpi (characters per inch) or compressed font. The program assumes that you are in the correct font when it begins to plot, meaning that you must either set the appropriate DIP switches on your printer, or you must output the appropriate codes to the printer to put it into that font. For the Itoh 8510 or NEC 8023 printers, the appropriate codes are 27 and 81. To output these codes, just enter the command line `LPRINT CHR$(27);CHR$(81)`.

If you want to keep a constant step size, add the line 385 `GOTO 440`.

Some Practical Applications

We know that velocity and acceleration are related. If we assume constant acceleration due to gravity (980.621 cm/sec² or 32.1725 ft/sec²), and we let a rock fall from a high altitude, how fast will it be travelling after one second? Two seconds?

This is a simple problem to solve analytically, but it will serve our purposes as a simple numerical problem. We first need to write the differential equation:

$$x' = f(x,t) = g \quad x(0) = 0$$

where g is the constant gravitational acceleration, and we start with the initial condition that the rock initially ($t = 0$) is at rest ($x'(0) = 0$).

This problem is a simple matter to plug into any of our programs. You would find the appropriate line number in the program for the user-defined function and type in `DEF FN DY(X,Y) = 32.1725` (English units). The answer: You would be travelling at 32 feet per second after one second and 64 feet per second after two seconds.

Consider a slightly less trivial problem.

A resting body with starting mass of 200 grams is subjected to a force of 2000 dynes, and during the period of acceleration, loses mass at the rate of 1 gram per second. Further, air resistance equal to twice its velocity is trying to slow it down. What is the velocity after two minutes?

The differential equation is

$$x' = f(x,t) = (2000 - 2x)/(200 - t), x(0) = 0$$

This is entered into the program as `DEF FN DY(X,Y) = (2000 - 2*Y)/(200 - X)`.

The solution of the problem at two minutes is about 840 cm/sec, and plotted with the Hammings program, it looks like Fig. 2.

For a more interesting example of a graph, Fig. 3 shows the plot of the solution to the differential equation $y'(x) = \sin(xy) + \exp(-y/2)$. To enter it into the Hamming program, merely type the line `60 DEF FN DY(X,Y) = SIN(X*Y) + EXP(-Y/2)`.

Some other time, we will look at the methods of solving systems of differential equations and higher-order differential equations, and simulate a few mathematical models, such as the well-known predator-prey ecological model. ■

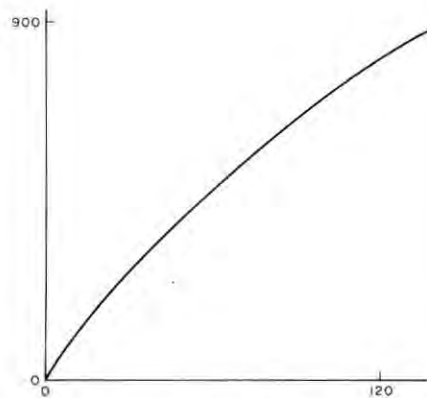


Figure 2

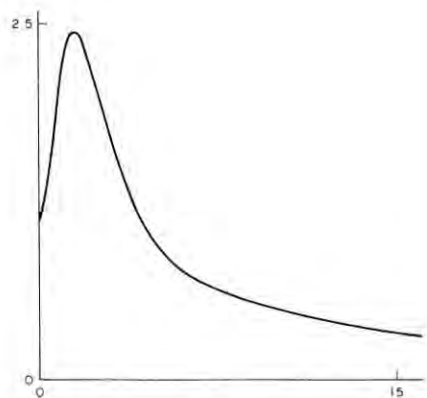
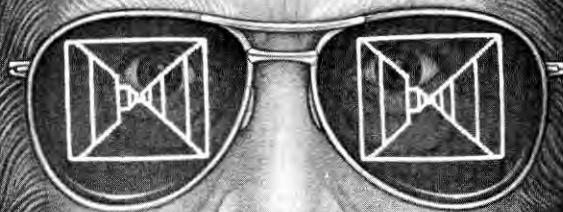


Figure 3

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Notes from BENEATH the KEYBOARD

by Paul Wiener

Last month we began discussing the programming logic used in such computer strategy games as reversi and chess. The method is known as the competitive tree search. Part I left practicality behind to examine theory. In this final part, we'll make our tree search more like the real thing. While continuing to keep our search limited to three ply, we'll drop the assumption that our opponent is not attempting to foil our strategy and win the game himself. If you haven't read Part I in the August issue, I suggest you do so to avoid confusion.

Let's consider a simple evaluation procedure. We will simply add all our material in a given terminal position, and likewise for the opponent's. For our material count, we can use standard chess values—a pawn equals one, a bishop equals three, a rook equals five, and so on. When we know the value of our own material, and the value of the opponent's, we will divide the former by the latter. The higher the

ratio, the more material we have in relation to the opponent, and the better (we hope) our position.

An interesting compromise has already been made here. We have chosen to use division as a basis of material comparison, rather than subtraction. This might be a good idea because a one pawn (a point) advantage early in the game, when both sides still have most of their pieces, is not as important as being a pawn ahead near the end when nearly all the other material has been traded off.

Division reflects the increase of unit value as the material on the board diminishes. Subtraction does not. But division uses more CPU time than subtraction. So division might not be the best idea after all. Normally, competitive tree-search development involves a lot of experimentation and fine tuning to resolve such uncertainties.

Our evaluation routine might as well also convert all ratios to a percentage

score. Ninety percent would indicate that in a given position, our side has 90 percent of the material. A 10 percent evaluation would show the preponderance of material belongs to the opponent.

Our evaluation also has to know that checkmating the opponent is a consummately desirable situation, and being checkmated is totally unacceptable, regardless of the material balance. So our evaluation will assign a value of 100 percent to any node in which we checkmate the opponent, and zero to any in which we get mated.

Once we've designed our evaluation procedure, we need to modify our tree search as well. In the cave, we were able to cut our search short as soon as we found the egress. But in a chess game, there's no guarantee that we'll find a mate in three ply. In fact, if the game is just starting, we almost certainly won't. So we'll have to generate and evaluate every terminal. Actually, alpha-beta pruning can

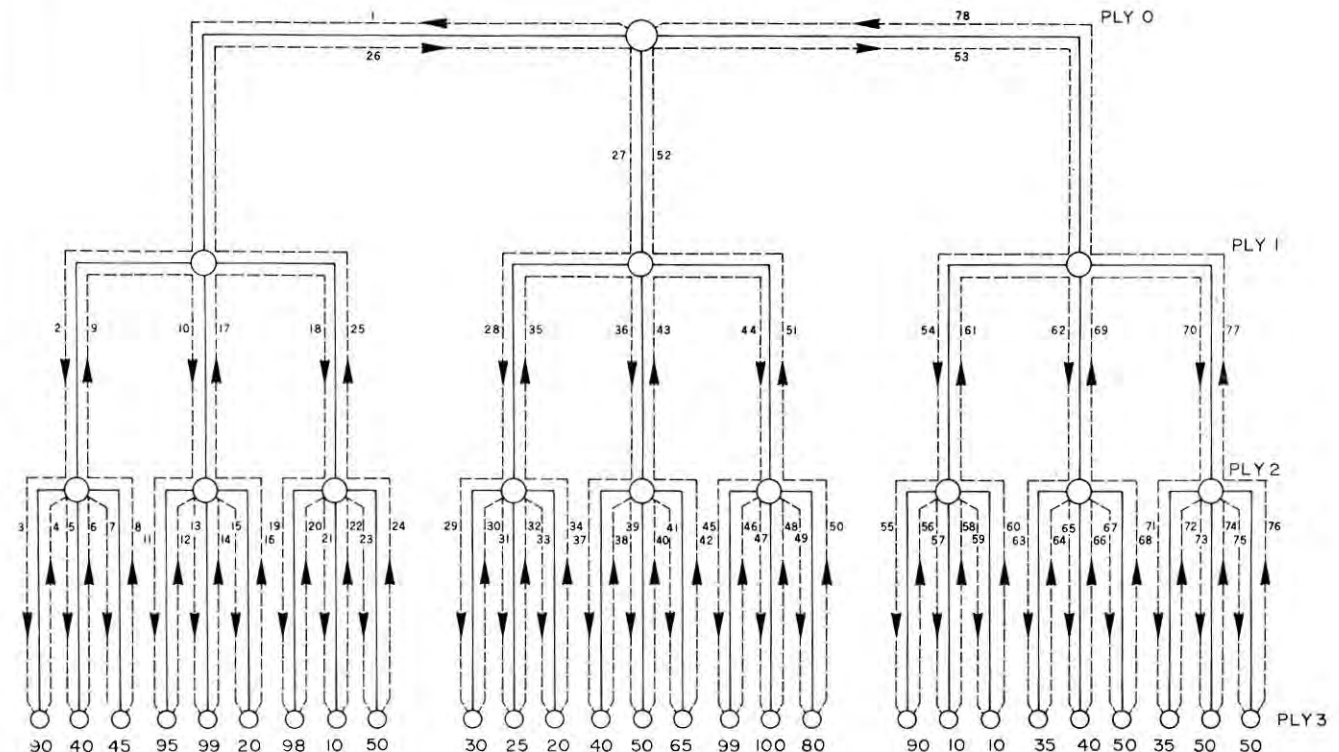


Figure 6



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Notes from BENEATH the KEYBOARD

help us restrict the breadth of our search, as we'll soon see.

We'll continue to use a tree with only three branches per node. In chess there would usually be many more, but the diagrams would be unwieldy. Figure 6 shows the path through our tree which generates all terminal nodes. Further, it assumes they've all been looked at by our evaluation routine, and an evaluation is printed for each.

Let's assume that we've reverted to a breadth-first search, and that the data shown in Fig. 6, including all the evaluation scores, is stored in memory. How can we (or the computer) select the best move on the basis of the data in the tree?

If the computer has white, the three nodes on the second line of Fig. 6 are the three choices immediately available to white. The third line in the figure has nine nodes. These represent black's answers to white's choices. The first triad represents black's responses to white's first possible choice, the second group contains responses to white's second choice, and the third group holds black's responses to white's last legal option.

The fourth line shows white's replies to black's responses. Again, the nodes are grouped to show which are successors to which parent nodes. Let's examine line four systematically. The first three moves

on the line represent all of white's options in a position which arises in a certain line of play. They evaluate to 90, 40 and 45. The highest evaluation, 90 percent, belongs to the first of the three. Therefore, should we actually find ourselves in the position represented by the node at ply three, number one, we know that by selecting our best move, we'd secure a 90 percent material advantage.

Let's incorporate this knowledge into the tree by assigning the node at level two, number one, the value of 90 (Fig. 7). If we pick out the highest value for each of the move groups at level four and pass that value up to the parent node at level three, we will have a map like the one shown in Fig. 8. This tells us the best move in any position that might arise at ply two. But we don't know which position will arise. And more importantly, we still don't know what to do at ply one, where our immediate choice has to be made.

Time for the next step. Each group of three nodes at level two represents black's responses to a parent node at level one. The first triad on level two represents all black's possible responses to white's first move at level one. The map (Fig. 8) shows us that black's third possibility allows white to attain as much as 98 percent if he makes the correct reply at level three.

Black's second possibility is even worse for him, granting white the opportunity to achieve a 99. The first move in the group, though not great for black, is the best of the bunch, limiting white to, at best, a 90 on the next ply. So if black finds himself in the position represented at level one, number one, his best bet would be to choose the leftmost path leading to the level two, number one.

We have just demonstrated that if black chooses correctly at ply one, number one, the best evaluation white can achieve is 90 percent. Write 90 next to node one, level one. If we analyze the two remaining nodes at level one in the same way we did the first, we'll finish with a map like the one in Fig. 9.

Inspecting Fig. 9, we see that only one of white's three options at the starting position offers a better than even chance—namely the first, or leftmost choice. This option yields 90 percent with best play by each side. Now our question has been answered; we know where to move. We should also copy the 90 from the leftmost node of level one to level zero. This indicates that the evaluation of the current position is 90 percent, because correct play by both sides leads to a 90 percent position at the terminal ply (Fig. 10 shows the final result of this search).

Let's review the process used to arrive

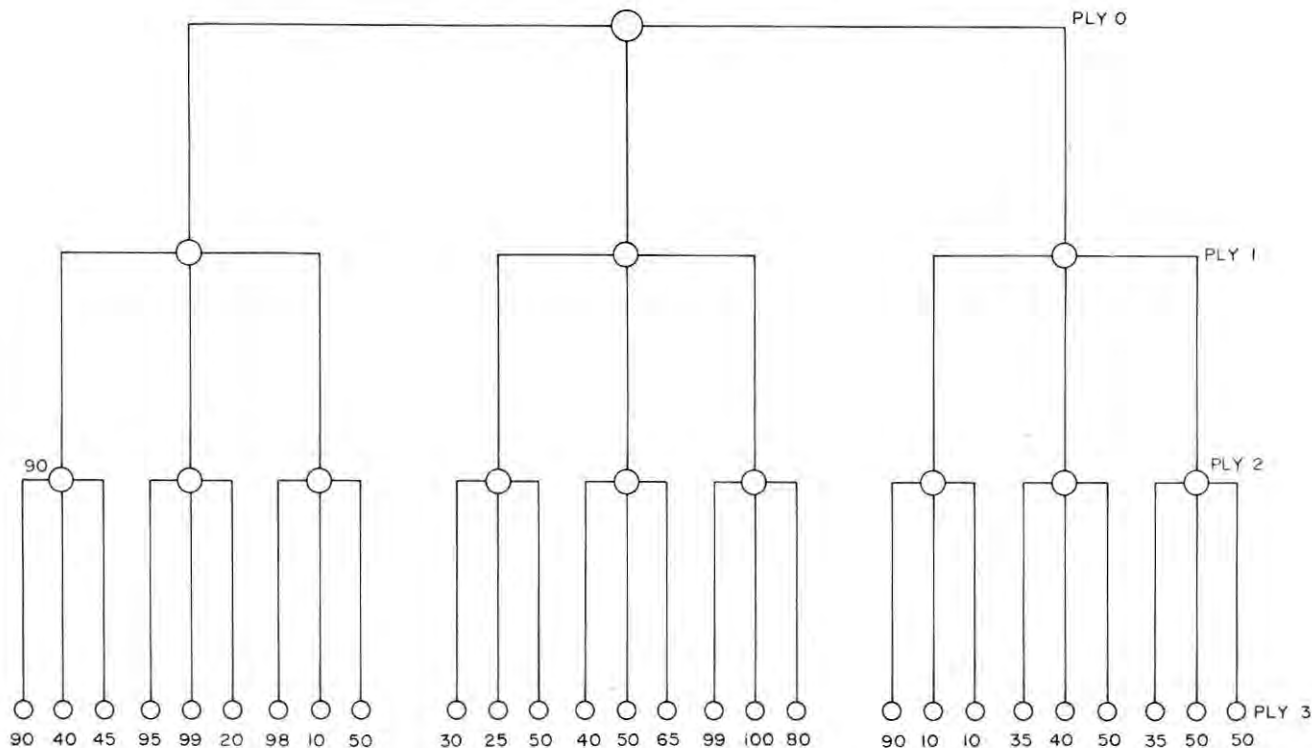


Figure 7

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at this conclusion. First we looked at all the terminal evaluations. Remember, these evaluations are of positions in which it was white's (the computer's) move. Since white tries to maximize the evaluation, we passed the highest value in each group up to the parent node and used it as the evaluation factor for that parent. This gave us an evaluation factor for each node at level two.

We repeated the procedure to derive evaluations for the three nodes at level one from the level-two values. There was one fundamental change, however. At level two it was the opponent's (black's) move. Since black wants to minimize white's chances, he picks the move with the lowest evaluation rather than the highest. So we passed the lowest value up from two to one. Going from one to zero, it was white's move again, and we passed the highest evaluation up to the parent node. This alternate choosing of highest and lowest values, at odd and even plies, is the mini/maxi principle.

We agreed that the computer is to do a depth-first, not a breadth-first search. How does it perform all this analysis without having the tree laid out in memory? It starts by putting a temporary evaluation of zero in all the nodes on even-numbered levels and 100 in all the nodes on odd-numbered levels. Then it follows

the search pattern shown in Fig. 6.

The program goes down the leftmost path until it evaluates its first terminal node at level three, number one, giving it an evaluation of 90. Then it backs up to the parent node to generate its next successor. When it backs up, it compares the evaluation of the terminal node with the evaluation of the parent node (level two, number one). The terminal node's 90 is greater than the parent node's zero. So it makes 90 the parent node's new temporary evaluation.

Each time one of the parent node's successors is evaluated, that value is compared with the current value of the parent node and the parent node evaluation is set equal to the higher of the two values. When the program eventually backs up to a level one node, it compares its evaluation value with the value carried up from its successor at level two. But this time, because of the mini/maxi principle, it saves the lower of the two values as the new temporary evaluation at level one.

Following this procedure, we will eventually arrive at the evaluation of the starting position and know which move is best. As in the other depth-first procedures examined, we need enough memory on the stack to hold one position for each ply. We also need to store some information about each position, such as how many

successors have been already generated from it (the Xs on the map) and its temporary evaluation factor.

The same method would work for a much deeper search. Charlie Heath's Reversi program will look 16 ply ahead to find a win in a complex Othello position. As stated earlier, deepening the search does not make prohibitive demands on memory. But the time used still increases geometrically with the ply. Obviously, some way of speeding things up is necessary.

Pruning

Time may be saved by pruning the search tree. If we don't explore all the branches, less time is used. But the danger exists of overlooking a vital continuation. If a way could be found to prune without the risk of missing an important line of play, we'd have the best of two worlds. Impossible, you say? Not at all, if you use the proper *modus operandi*.

Alpha-beta pruning does the trick. In order to understand it, we need to examine the concept of refutation. For the purposes of this discussion, a move is refuted if it can be proven inferior to one of its alternatives.

Look at Fig. 10 again and consider the reasoning implicit in the computer's path through the tree. It begins at the starting position and goes down the leftmost path

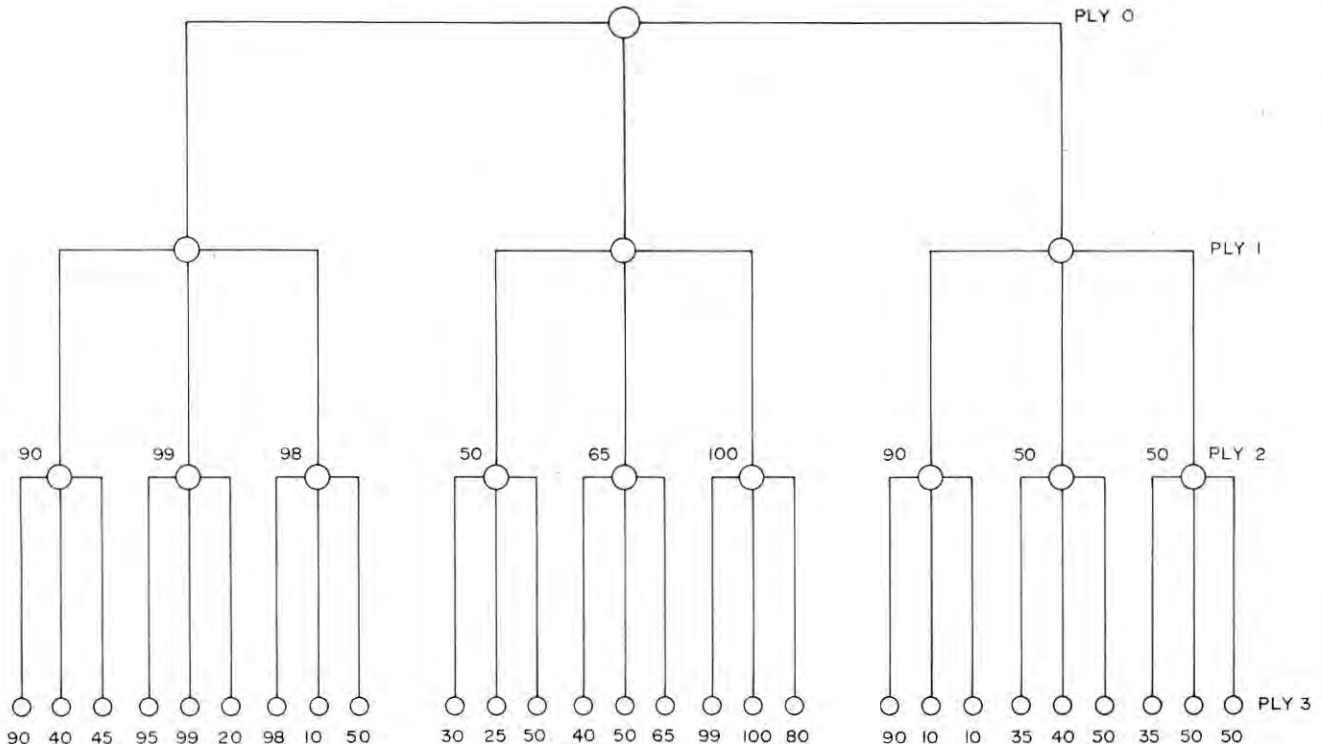


Figure 8

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Notes from BENEATH the KEYBOARD

until it reaches its first terminal node, which it evaluates as 90. Then it backs up to black's last move and generates its next successor, which it evaluates as 40. It repeats the process once more and evaluates its final possible response to the position at level two, number one as 45. Since 90 was the highest value it could attain from the position at level two, number one, it assigns that node a value of 90.

In effect the computer has said to itself, "Suppose I move here and he moves there and then I make this move. Hmm, the position I end up with is worth 90 percent. What if I do something different on my last move. . . nope, then I only make 40 or 45. So if I can get into the position represented by the node at level two, number one, then I am assured of a 90."

The next thing the program does is to try a different move for black at ply two. As the figure indicates, the first white response evaluated yields a score of 95. Our simple-minded program also evaluated the other two white responses as being worth 99 and 20. But this is a waste of time. As soon as ply three, number four was evaluated as 99, the black move at ply two, number two was refuted and could have been dropped.

The computer has already determined that if black makes the first move at ply two, he cuts his losses to 90. If black tries

a different move and finds white has a response which gets him 95, there is no point in evaluating white's further responses. No matter how good or bad white's alternatives are, we know he can get at least a 95, and won't pick a move that gets him less. Black prefers the move that limits white to 90 and does not need to evaluate other white responses to the refuted moves.

Not bothering to analyze refuted moves is called alpha-beta pruning. This technique can typically eliminate the need to generate and evaluate 80 percent of the tree. Figure 11 shows the alpha-beta path a program would take through our sample tree. Notes that won't have to be generated and evaluated have been crossed out.

Figure 11 reveals another interesting point. Notice that the search rejects the black move at ply two, number three as soon as it finds the white reply at ply three, number 19. The evaluation for ply three, number 19 was 90. The program can consider this refuted by the previous 90 at ply one, number one.

We have seen that a move is refuted if it's proven inferior to another previously explored move. But why should it be considered refuted if it's equal to the previous best? Because once we show that the opponent can do at least as well against our current candidate as he can

against a previously evaluated one, we don't need to spend any more time on the current investigation.

In our sample search, the 90 at ply three, number 19 tells us that white can do at least as well against the black move at two, number three as against the one at two, number one. So to save time, we drop the exploration of two, number three.

Instead of generating 40 nodes, only 20 are required. And instead of having to perform 27 lengthy terminal node evaluations, we got by with 11. The gain is impressive, but we haven't quite realized the 80 percent improvement I said was possible.

There are several factors affecting the efficiency of alpha-beta pruning. The one holding us back here is the relatively narrow depth and breadth of search in our example. In most game situations, there are far more than three options per move. This gives the alpha-beta technique more limbs to trim.

Most competitive searches go deeper than three ply. As the depth of a tree increases, node count increases geometrically. A single node trimmed near the top can drastically reduce the generation of nodes farther down the tree, especially time-critical terminal nodes.

Evaluating Order

Another very important factor in alpha-

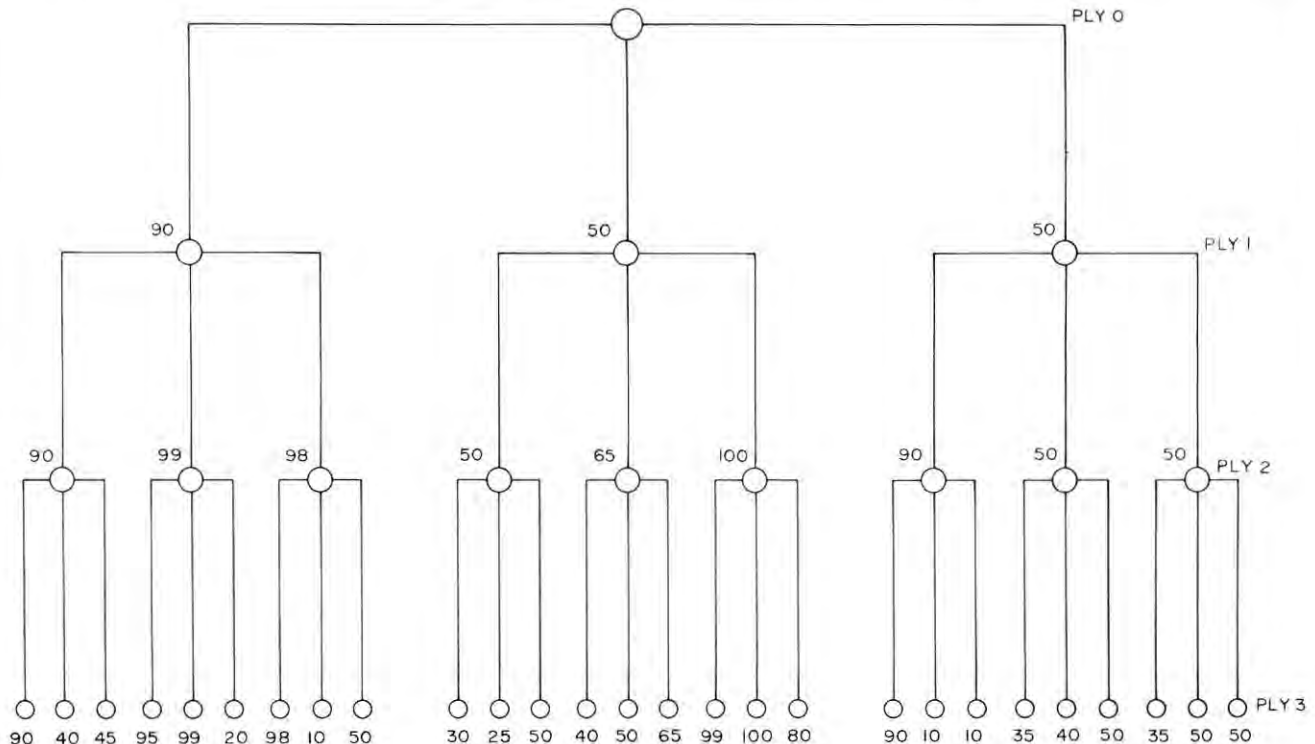
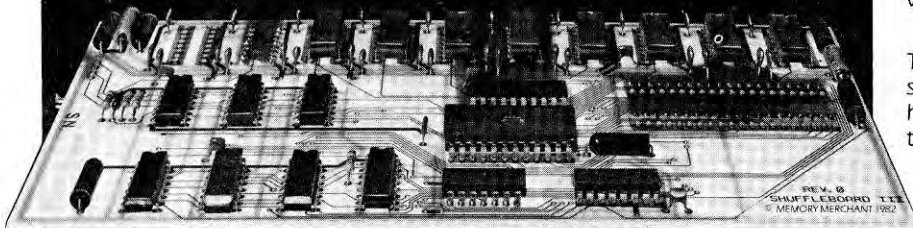


Figure 9

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Notes from BENEATH the KEYBOARD

beta effectiveness is the order in which the moves available in a given game position are evaluated. Alpha-beta efficiency depends on our being able to refute a move early in its investigation. Refuting a move consists of showing it to be inferior to a previously investigated move. Therefore, alpha-beta techniques require the best moves to be evaluated first. This may seem to be a catch 22. You don't know how good a move is until it's been evaluated, but you don't know which move to evaluate first, until you know how good they all are.

One way around this dilemma is to have two evaluation procedures. One is the terminal-node evaluator. It can be a fairly complex one using up lots of microseconds, but returns a fairly reliable evaluation. The second is the quick and dirty one, which does nothing more than take an educated guess at the best move, without any look-ahead whatsoever.

For chess, our terminal-node evaluator could be a time-costly algorithm that takes into account material, mobility and other positional factors, using complex pattern-recognition logic.

The alpha-beta evaluator, on the other hand, might look at all the legal moves available in a given position and assign them each a value based on material captured by the move—the bigger the cap-

ture, the higher the value. It sorts the move list, putting the highest-valued moves at the top of the list so they will be explored first. This is called a presort. The process can be done with very little time overhead, especially near the top of the tree where there are fewer nodes.

This crude alpha-beta criterion will not result in a very well ordered move list. But statistically, even a marginal improvement in order increases the number of limbs pruned enough to justify the time investment. In fact, alpha-beta efficiency rises so quickly with improved ordering that many programmers use what's known as an iterative search.

Suppose we plan to examine a given position to a depth of six ply. That's pretty deep, so we want the move list to be as well ordered as possible. One approach would be to do a depth of one search. We could presort the moves according to the evaluations returned by that search, then start at the top again and do a depth-of-two search. Since this new search has gone a ply deeper, it returns a somewhat more reliable evaluation, which we use as the basis of a new presort. Then we do a three-ply search, and so on until we've reached the desired six plies.

Each search improves our ordering and increases the speed of the following search. It may seem surprising that doing six searches would result in less

time consumption than one search, but such is the nature of alpha-beta pruning. Still, an iterative search shouldn't be the only factor used to order moves. To understand why, another look at alpha-beta logic is in order.

Alpha-beta pruning dictates that we stop investigating a move as soon as a refutation is found—not necessarily the best refutation, just the first. So what we learn about the move is that it is bad compared to some previously evaluated move. But we don't know *how* bad. And we don't know how it compares to the moves also rejected by the alpha-beta process. So the alpha-beta search is guaranteed to return the best move our evaluation algorithm is capable of discerning. But we can't trust its judgement about what move is second best, third best, and so on.

In an iterative search, we want to use the results of each iteration to order the move list for the next. But if every search uses alpha-beta pruning, we can trust only the one move it says to place at the top of the list. The ordering of the runners-up won't be very reliable. Therefore, we need some secondary presort criterion for ordering the remainder of our move list. The so-called "Killer Heuristic" provides one.

If a move in a given variation turns out to be advantageous, the odds are raised that it will be better in parallel variations.

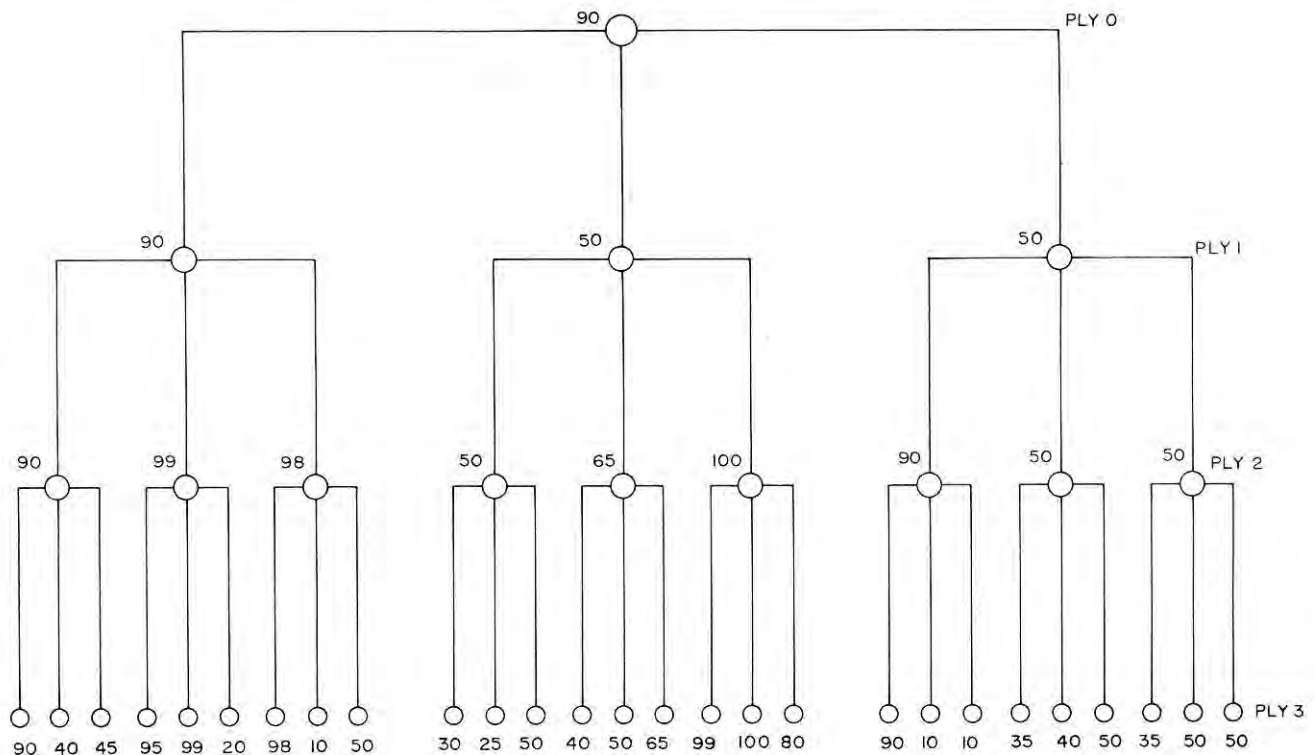


Figure 10

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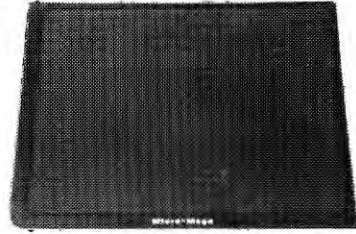
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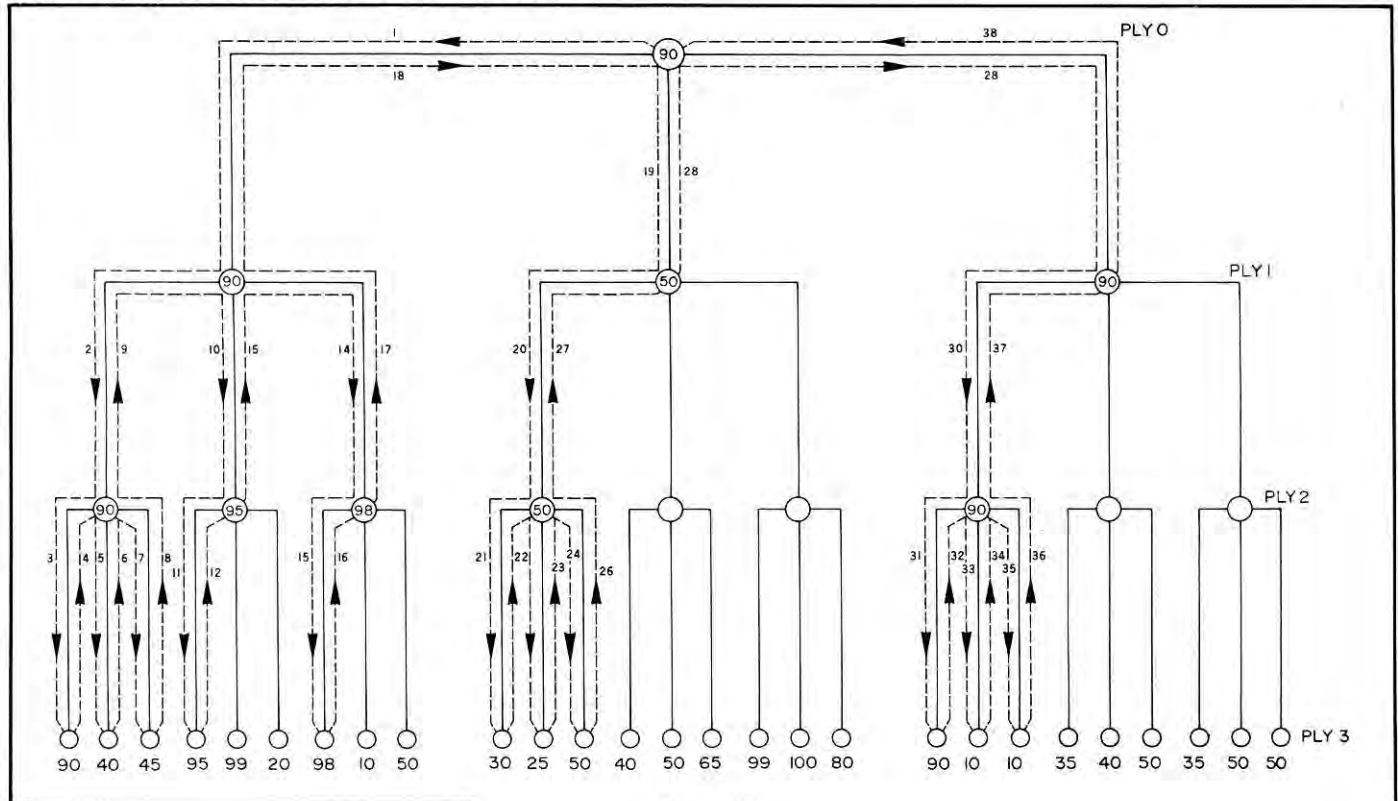
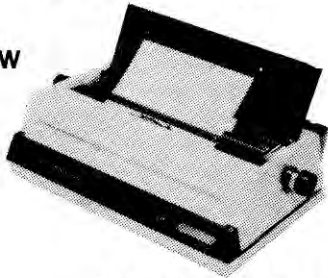


Figure 11

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So when a good move is discovered in a line of play, the Killer Heuristic pushes that move towards the top of the list at the same ply in parallel lines.

Windowing is another technique to augment the alpha-beta method of discarding non-productive segments of the search. It is analogous to the method a human uses in the same situation. Suppose it's your move in a chess game and you think you're winning. You try to visualize the long-range results of one of your possibilities. You look at the move in question a little, not too deeply, and notice that your advantage seems to be diminishing. Since you like your initial position, you tentatively conclude that you can do better with some other move.

You abort the exploration of the first move and try some others. If the other moves don't turn out well either, you can always come back to the first move in the hopes that a deeper search will reveal a hidden resource for you.

A computer implements such a strategy by using a value window. Suppose the computer is starting a six-ply search. It goes down the tree until it reaches the first terminal node, which it evaluates at 65 percent. If the presort was accurate, the computer picked the best moves for both sides on this trip down the tree. The computer thinks the odds at the starting position will evaluate at 65 percent. The

computer can speed up the rest of the search by using that information to play the odds.

The computer now uses 65 as the default alpha-beta evaluation for all even-numbered plies in the search. Suppose white's second move on the list is being evaluated. The computer believes the second (and all subsequent moves) aren't as good as the first. If the first black reply that white examines gives white a great advantage, say 85 percent, the alpha-beta cut-off window prevents the computer from spending lots of time on an exhaustive analysis of that continuation.

The computer effectively says to itself, "The second move on my list shouldn't let me do better than the first. Since the reply I'm looking at for black seems to be letting me build up an impressive advantage, it probably isn't black's best reply. So I'll just set aside the exploration of this part of the tree and see if some other move for black doesn't lead to a quick refutation of move two on my list. Hmm, if I'm wrong, I'll have to come back and analyze this variation in detail. So I'll save just enough information about this part of the tree so I can resume my search where I left off, if necessary."

That about wraps up the concepts as listed at the beginning of Part I. Next time your computer beats you at reversi, at least you'll know how it did it. ■

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Lest you think this column should be in an April issue, I assure you this is no put on. In fact, I shall put my money where my mouth is. On September 1 I will open an account, in the name of Money DOS, for \$50,000. The account will trade the system for one year. At the end, *any profits will be donated to charity*. Duplicate confirmations of all trades and statements will be furnished to *80 Micro* by the major investment firm with whom the trading will take place. If any of you think it will fail Mr. Keynes will bet another \$50,000 that it will prosper; Wayne Green can hold the \$100,000 stake.

Some Fundamentals

Every business day, millions of dollars change hands as a result of someone selling something he hasn't got to a buyer who has no use for it! If that doesn't puzzle you, I shall further explain that, in many cases, what is bought and sold doesn't even exist. A friend of mine made over \$1 million in six months buying something that he wouldn't recognize if he saw it. In fact, old Herman never saw a

soybean in his life. I speak, of course, of trading in commodity futures. The value of contracts traded daily far exceeds the value of all the stocks traded on the New York Stock Exchange.

Futures trading began in the 1860s to aid producers, handlers, processors, and users of agricultural commodities in protecting the prices of commodities they would buy or sell in the future. This price protection, called hedging, continues to be the primary function of the futures markets. This function is valuable to the general public, since it leads to better

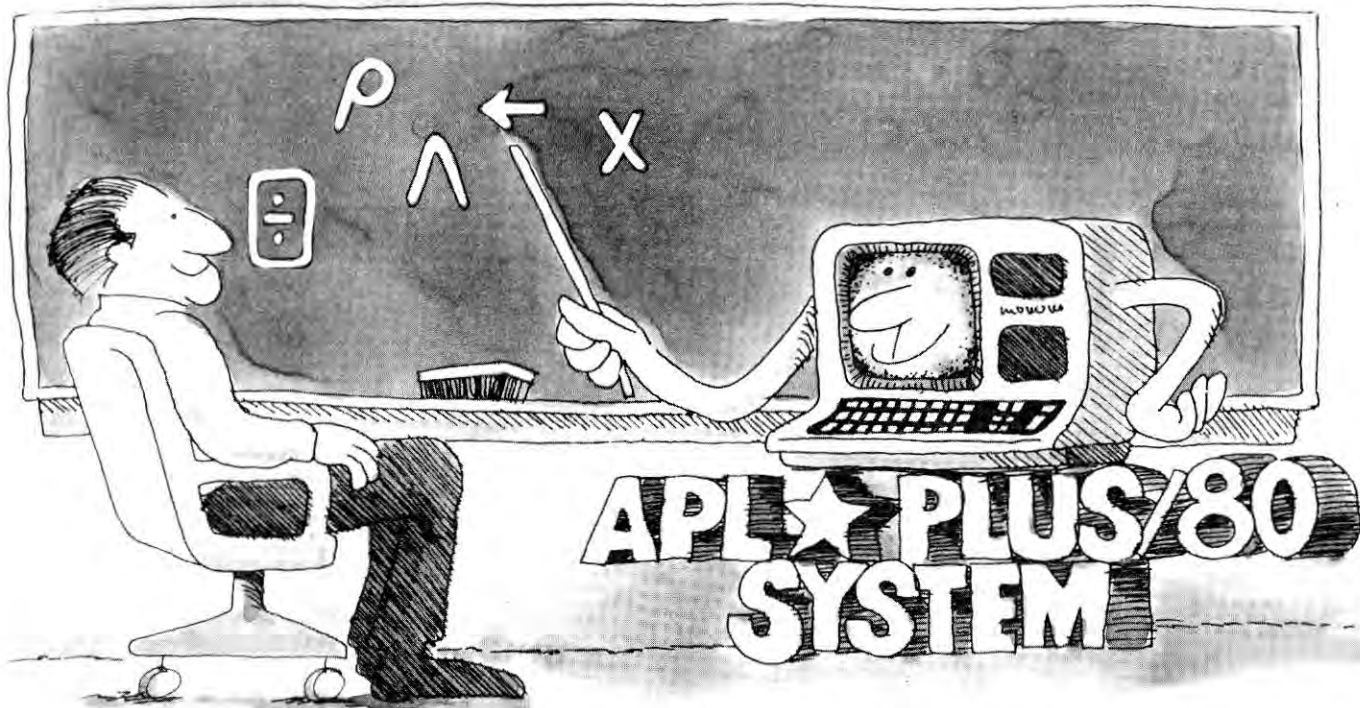
price stability (usually). This is a simple example of how it works:

A baker calls a miller and wants a firm price on 200,000 pounds of flour delivered in December. The miller calculates that he must have 5,000 bushels of wheat to make that much flour. The miller has two options:

- He can give the baker a price, hoping that he will be able to purchase the wheat in December and make a reasonable profit.
- If the miller does not wish to risk an adverse price move in wheat, he can buy



Fig. 1. The System in action



How much do you know about APL?

Q. APL uses "funny symbols."

TRUE FALSE

A. TRUE.

Some of the symbols in APL *are* unfamiliar. But many of them are so familiar that you've been using them since grade school. Symbols such as + - * / < > and =. Others, like ; and /, have new uses in APL, but you're familiar with them as symbols. These symbols *and* the "funny" symbols (for example, ρ \ and ε) make APL very concise and, therefore, very productive. One APL symbol often does as much as an entire statement in BASIC.

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Q. APL is hard to learn and to use.

TRUE FALSE

A. FALSE.

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Program Listing 1

```

10 REM ***** WRITTEN BY J.M. KEYNES *****
      $$$$$$$$ FOR 80 MICROCOMPUTING $$$$$$$$
      ##### MONEYDOS #####

20 CLS: PRINT@320,"A COMMODITY TIMING SYSTEM BASED ON MOVING AVE
RAGES"
30 PRINT:PRINT"ONLY DAILY CLOSING PRICES SHALL BE ENTERED
40 PRINT"THE GRAINS MUST BE CONVERTED TO DECIMAL.
50 PRINT"EG. 268 3/4 WILL BE ENTERED AS 268.75
60 GOSUB 1060
70 CLEAR: POKE16553,255
80 CLS: PRINT"I HAVE DATA FOR THE FOLLOWING COMMODITIES. OTHERS
CAN EASILY":PRINT"BE ADDED TO THE DATA STATEMENTS AT END OF PRO
GRAM.":PRINT:PRINT
90 READ N$,M$,H$: IF N$="END" THEN RESTORE: GOSUB 1060 : GOTO 10
0 ELSE PRINTN$,:GOTO90
100 CLS: PRINT@320,"IF YOU ARE NOT WILLING TO MAINTAIN COMPLETE
DISCIPLINE":PRINT"I WILL NOT WORK FOR YOU. DO AS I SAY AND YOU'L
L GROW TO LOVE":PRINT"ME. MASTERMIND YOUR OWN TRADES AND YOU WI
LL GO BUSTED!":GOSUB1060
110 CLS: CLEAR10000: Q$="#####.###"
120 DIMA$(100),PO(100),B$(100): Z=0: C$="EOF"
130 INPUT"FROM DISK=1 TRS-80=2 CREATE LIST PRESS 'ENTER'":S: IF
S=1THEN 210 ELSE IFS=2THEN 170
140 CLS:INPUT"MONTH";DD$:INPUT"COMMODITY NAME (GOLD, CORN, SUGAR
, ETC.)":D$: GOSUB 1070: GOSUB 1090
150 INPUT"HOW MANY ENTRIES?":N
160 PRINT"BE SURE TO TAB OVER (RIGHT ARROW) AFTER DATE ENTRY":M=
N:FORI=1TON:GOTO290
170 REM DELETE 140 IF NO DISK
180 CMD"T"
190 INPUT#-1,DD$,D$,R$,I8,I9: CLS: PRINT@325,"LOADING ";DD$+" "+
D$+" ";R$:
200 I=I+1: INPUT#-1,B$(I): PRINTB$(I): IPB$(I)="EOF" THEN GOSUB
1070: GOSUB 1090: GOTO 300 ELSE A$(I)=B$(I): E=E+1: N=N+1: M=N:
GOTO200
210 N=0: INPUT"WHICH FILE DO YOU WANT?":J$
220 OPEN "I",1,J$+="/DAT"
230 INPUT#1,DD$,D$,R$,I8,I9
240 CLS:PRINT@322,DD$+" "+D$+" ";R$:
250 IFOF(1)THEN GOSUB 1070 :GOSUB 1090: GOTO270
260 N=N+1: E=E+1: INPUT#1,A$(N): GOTO250
270 CLOSE: M=N: GOSUB 1090: GOTO300
280 REM REMEMBER TO HIT TAB (RIGHT ARROW) AFTER ENTERING DATE
ENTER DATE USING 4 NUMBERS SEPERATED BY A PERIOD.
EG. 03.08

290 PRINT" ";: INPUTA$(I): E=E+1: NEXT
300 CLS: PRINT@333,"STANDBY...I'M WORKING
310 FORI=1TOM
320 IJ=IJ+1
330 PP=VAL(RIGHT$(A$(I),7)): PL=PL+PP: PO(I)=PL/IJ
340 IF BB>PP THEN BC=BC+1: BB=PP ELSE BC=0: BB=PP
350 IF BD<PP THEN BE=BE+1: BD=PP ELSE BE=0: BD=PP
360 NEXTI
370 IF BC>9 THEN K$="DOWN":GOSUB950
380 IF BE>9 THEN K$="UP":GOSUB950
390 CLS
400 GOSUB800
410 X=N: FORI=NTOL STEP-1
420 PRINTA$(I)," ";
430 PRINTUSINGQ$;PO(I);: PRINT" DATA # ";X
440 X=X-1
450 Y=Y+1: IFY=14THENINPUT"SKIP PAGES=1":GY: IFGY=1THEN 470 ELSE
Y=0: CLS: GOSUB800
460 NEXTI
470 IJ=0: PL=0
480 GY=0: P0=0: Y=0: PRINT" LIST AGAIN=0 SAVE TO DISK=99 MOVI
NG AVERAGES=55"
490 INPUT"TO PRINTER=88 TRS80=77 EDIT DATA=66 ADD ITEMS (HOW
MANY)":UU
500 IFUU=0 THEN XY=0: CLS: GOTO 300
510 IF UU=99 THEN GOSUB 700: GOTO 600 ELSE IF UU=88 THEN 540

```

Program Listing 1 Continues

5,000 bushels on the futures market for delivery in December. Now he knows exactly what the raw material will cost at a future date and can give the baker a price at which he knows he can make a fair profit. This option will, in the long run, save the baker money because the miller can make a better price if he knows he is without risk. If there were no speculators in the markets, the miller would have to find a farmer who would agree to sell him the wheat in December. A farmer may not be there, but there is always a speculator who will take the risk from the miller and assume it himself, hoping that he has correctly anticipated price movement.

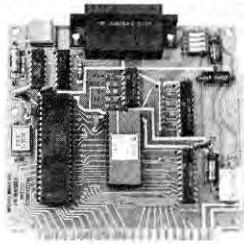
Even though billions of dollars change hands yearly, commodity trading is essentially a zero sum game; that is, for every winner, there is an equal and opposite loser. Your TRS-80's random number generator would have a 50-50 chance of profiting (10 A = RND(2): IF A = 1 THEN PRINT"BUY" ELSE PRINT "SELL"), and yet, every statistic I have ever seen indicates that at least 90 percent of the traders lose. Based on my many years in the markets, I think the 90 percent figure may be a bit low.

Some say the markets are rigged by insiders. Nonsense. That is the paranoid talk of losers. (Just because you're paranoid doesn't mean someone is *not* out to get you). The truth was simply stated by the Okefenokee philosopher, Pogo Possum, when he said, "We have met the enemy and they are us!" The behavior patterns of the losers clearly show them as they really are: *Compulsive gamblers* who approach the futures market as a surrogate casino wherein they cater to their crapshooting propensities, while disguised as investors. Those 90 percent have little chance from day one because they violate these sound principles: *Trade with the trend, limit losses, never add to a losing position, and use risk capital only.* Violate these and you have about as much chance of success as a cellophane dog chasing an asbestos cat through hell!

The System

In a zero sum game wherein 90 percent of the players lose, it logically follows that the privileged 10 percent must make a fortune. (I can assure you we do.) Everyone who has traded, and lost, has fantasized about what it would be like to find the key to joining that select group who make fortunes. In Program Listing 1 you'll find the key that may make you very rich. It's a system based solely on moving averages. To determine the three day moving average of securities or commodities one adds the

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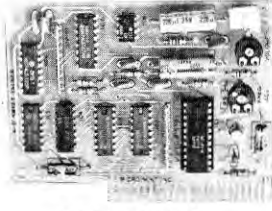


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MONEY DOS

Program Listing 1 Continued

```

520 IF UU=77 THEN GOSUB 700: GOTO 550 ELSE IF UU=55 THEN 810 EL
SE IF UU=66 THEN 670
530 XY=0: CLS:PRINT"REMEMBER TO ENTER DATE THEN TAB (RT ARROW) T
HEN PRICE.":N=E+UU: M=N: FORI=E+1TON: GOTO 290
540 LPRINTDD$+D$: FORI=H TO N: LPRINT A$(I): NEXT: GOTO580
550 CMD"T": REM DELETE IF NO DISK
560 CLS: PRINT@320,"READY TO RECORD ? PRESS 'ENTER' IF NOT ENTER
A 9": INPUTRR: IPRR=9 THEN 470
570 XY=0: PRINT#-1,DD$,D$,R$,I8,I9: FORI=H TO N: PRINTA$(I): PRI
NT#-1,A$(I): NEXTI: PRINT#-1,C$:
580 PRINT: PRINT: INPUT"RE-INITIATE=1 MENU=2";OP: IFOP=1THEN 70
ELSE 470
590 REM 430-480 ARE FOR DISK USERS . TAPE ONLY USERS
MAY DELETE.

600 INPUT"IF YOU WISH TO CORRECT NAME, DO IT NOW ELSE HIT ENTER.
";K$: IF K$="" THEN K$=D$ ELSE D$=K$
610 INPUT"MONTH CHANGE OR CORRECTION ENTER CHANGE ELSE HIT ENTER
";D0$: IF D0$<>" THEN DD$=D0$
620 XY=0: PRINT: PRINT"WHICH DRIVE 0,1,2, OR 3.": INPUTSS$
630 OPEN "O",1,K$+" /DAT"+": "+SS$
640 CLS: PRINT"SAVING TO DISK"
650 PRINT#1,DD$,"",D$,"",R$,"",I8,I9
660 FORI=H TO N: PRINT#1,A$(I): NEXT: CLOSE: CLS: PRINTD$;" H
AS BEEN SAVED TO DISK": GOTO580
670 CLS: INPUT"WHAT DATA # DO YOU WISH TO CHANGE";DN
680 PRINT"TYPE IN THE CORRECT DATE AND PRICE (TAB AFTER DATE)":
INPUT " ";F$
690 A$(DN)=F$: PRINT@333,"STANDBY....I'M WORKING": GOTO300
700 CLS
710 IF W2(1)>W2(2) THEN I8=1 ELSE I8=0
720 IF W2(2)>W2(3) THEN I9=1 ELSE I9=0
    
```

Program Listing 1 Continues

last three closing prices together and divides by three. The system calculates three moving averages and makes a decision based on the following rules: (I will use three-, seven-, and 19-day averages for the illustration).

- When the three is higher than the seven and the seven is higher than the 19, an up trend is under way. The system has bought (is long).

- If the three falls below the seven it maintains the buy position but no further buying is permitted.

- If the three falls below the seven and the seven is below the 19, a reversal in trend has taken place and the system sells (goes short) and stays that way until the trend reverses on the up side.

One need only enter the closing price for a maximum of 23 consecutive days (most commodities are less) to build the initial data base. Then, every day, enter the closing price. The program will tell you when to buy or sell. It will even estimate the risk involved in a given trade. When it flashes "A major up/down trend is under-way" you are likely in for a very profitable ride. No judgment is required since it is based on arithmetical averages. The more

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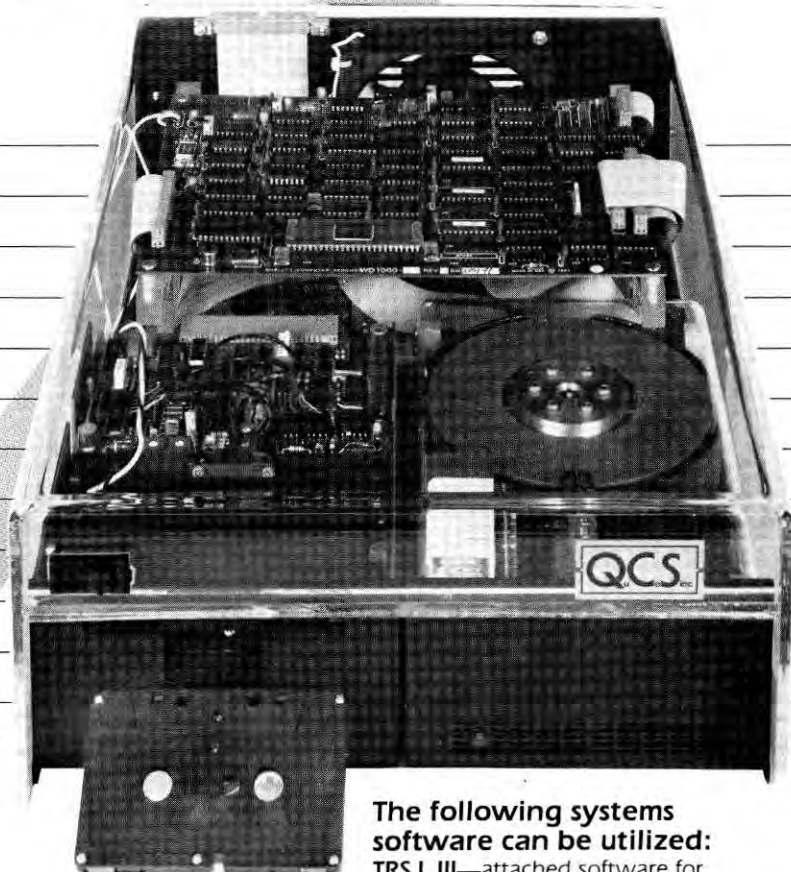
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Program Listing 1 Continued

```
1180 IF D$="SP500" OR D$="VL500" THEN E1=4: E2=10: E3=22: RETURN
N
1190 IF D$="BELLYS" THEN E1=3: E2=8: E3=19: RETURN
1200 E1=4: E2=9: E3=18: RETURN
1210 CLS: FORI=1TO40:PRINT,"ERROR":NEXT
1220 PRINT"YOU CHOSE A FILE THAT IS NOT ON LINE": GOTOL10
1230 REM
```

THE DATA STATEMENTS CONTAIN NAME,\$ VALUE OF A 1 DOLLAR MOVE AND MINIMUM MARGIN REQUIRED

```
1240 DATA CORN,50,700,CATTLE,400,900,BELLYS,760,1200,HOGS,450,800,
WHEAT,50,750,BEANS,50,1500,BEAN OIL,600,600,BEAN MEAL,100,1000,
PLYWOOD,76,700
1250 DATA GOLD,100,1500,SILVER,50,2000,COPPER,500,700,LUMBER,130,
1200,ORANGE JUICE,150,1000
1260 DATA GNMA,1000,2000,T-BILLS,2500,2000,VL500,500,7500,SP500,
500,7500,POTATOES,500,500,FEEDER CATTLE,440,900,COFFEE,375,5000,
OATS,500,400,SUGAR,1120,1700
1270 DATA COTTON,500,1000,D-MARK,1250,1500,SWISS FRANC,1250,2000,
YEN,1250,1500,POUND,1250,1500
1280 DATA COCOA,1000,1500,PLATINUM,50,600,HEATING OIL,420,2000
1290 REM THE FOLLOWING ARE FROM THE MID-AMERICA EXCHANGE AND
APPLY TO THE SMALL SIZE CONTRACTS
```

```
1300 DATA MINI HOGS,275,450,MINI CATTLE,300,540,MINI GOLD,33.333,
900,MINI SILVER,10,600,MINI WHEAT,100,200,MINI CORN,100,100,MINI
I BEANS,100,360
1310 DATA END,A,A
```

```
470 S=S+.01
480 IF S<10 THEN O=1 ELSE O=0
490 Z$(I)=STR$(S): Z$(I)=LEFT$(Z$(I),6)
500 IF LEN(Z$(I))<6 THEN Z$(I)=Z$(I)+"0"
510 IF O=1 THEN Z$(I)="0"+MID$(Z$(I),2,4)
520 W=VAL(RIGHT$(Z$(I),2)): IF W>31 THEN S=INT(S+1)+.01: GOTO 49
0
530 RETURN
```

The remarkable thing about this system is that it is simple (especially for those with computers), and very profitable. If you wonder what \$10,000 compounded at 50 percent for ten years would be worth,

try this (while in Basic):

Print 100000*(1.5110).

And yet, few of you will realize the potential because you don't have the *discipline*. By relieving you of the need for exercising

subjective judgment, the program takes all the fun out of it. Furthermore, you're impatient and will expect to get rich quick, and, likely you will quit if the first trade is a loss. The system is not a jackrabbit. Rather it is a slow, plodding, turtle that grinds it out inexorably over a period of time.

The Economic Recovery Act of 1981 made commodity trading far more interesting. All commodity futures transactions are taxed as 60 percent long term and 40 percent short term capital gains. This means that the maximum tax is 32 percent! It sure beats paying 50 percent, or the old 70 percent rate, on short term gains. Who said they were closing the loopholes of the rich (heh, heh)?

Caveat Emptor

Before you get carried away and run down to some commodity broker seeking your easy fortune, I must warn you that many brokers claim to have some fool-proof system with which you can make a million. Before you invest, make one simple request. Ask him to show you verifiable evidence of performance using *real money* for at least five years. There are many very competent commodity brokers, but there are legions of great salesmen who never made a penny on anything other than commissions. Make sure the firm you trade with is a clearing member of the major exchanges like The Chicago Board of Trade, The Chicago Mercantile Exchange, The COMEX and so on.

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Michael Tannenbaum, CPA
80 Microcomputing, August 1981

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A. A. Wicks - Program Previews
Computronics, September 1981

In a comparative review of proofreading programs (with smaller dictionaries), MICROPROOF was found to be considerably faster than all the others, when tested against a 400 word sample document.

Phillip Lemmons
BYTE Magazine, November 1981

"(MICROPROOF) operates with good speed and efficiency. A 1500 word document took 26 seconds to load, process, and proof when the program was run on a TRS-80 Model II under CP/M."

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Info-World, January 1982

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her, she'll send a free booklet that provides an in-depth look at futures trading. In truth, the system is all you will ever need. Program Listing 1 is the main program. I wrote Program Listing 2 to make it easier for you to create data bases for up to six commodities at one time. Follow it exactly for six months. Keep accurate books of every trade. Begin with \$20,000 of *Monopoly* money and see for yourself how well it works. Follow at least eight commodities. Enter the closing prices each day. If action is indicated, your new position will be the price at which it opens the following day.

I use this system with two refinements. My computer is "on line" and can alert me two minutes before the close of each commodity (commodities close at intervals from 1:45 p.m. to 4 p.m. EST). Some of the time it is obvious that a signal will be generated, in which case I take my new position at the close rather than at the opening the following day. This refinement produces a small advantage over the basic system, but is beyond the scope of traders unless you are "on line."

"Begin with \$20,000 of Monopoly money and see how well it works."

Oh yes, one other thing. I've borrowed an idea from my wife. Her Chicken Paprikash is fit for the gods. When she shares the recipe with a friend, she deliberately leaves out one ingredient. Her friend's dish is very good, but not quite as good as my wife's. I've done the same. The system explained herein is indeed very good, but, according to a computer model that compared this one with my modified version, this version produces an average yearly profit of only (?) 38.9 percent.

Speaking of systems. . . The number of contracts traded daily in 90 day T-Bill futures is enormous. On a given day they will trade 25,000 to 50,000 contracts which represent \$25-50 billion worth of T-Bills. The market is dominated by financial institutions. In January 1981 I first noticed some interesting behavior patterns. Each trading day hundreds of bank executives may enter orders. While they are separated geographically and have no contact with each other, it appears that they act in concert, almost as one. I devised a day trading system (I am in and out in the

```

10 REM WRITTEN BY J.M. KEYNES FOR 80 MICROCOMPUTING
20 CLS:PRINT"INITIAL DATA BASE PROGRAM TO BE USED WITH MAIN MOVING
30 PRINT"AVERAGE PROGRAM. THIS ONLY CREATES AND SAVES DATA BASE S.
40 PRINT"TO BE OF ANY USE, YOU MUST HAVE THE MAIN PROGRAM.
50 CLEAR4000: Q$="###.##"
60 DIM A$(25),B$(25),C$(25),D$(25),E$(25),F$(25),G$(25),Z$(25)
70 PRINT:INPUT"BEGINNING DATE SEPERATE DAY & MONTH BY A PERIOD
D";S: S=S+.001: S=S-.01: R=INT(S)
80 PRINT: INPUT"NUMBER OF DAYS PRICES TO BE ENTERED";N
90 DD$="NEW":I8=1:I9=1:R$="NEW DATA BASE"
100 INPUT "HOW MANY COMMODITIES";L: CLS
105 PRINT"ENTER COMMODITY NAME EXACTLY AS IT APPEARS IN THE DATA
":PRINT"STATEMENT IN THE MAIN PROGRAM"
110 FOR I=1TOL: PRINT "COMMODITY #";I;:INPUTT$(I): NEXT
120 Z$(1)=STR$(S):Z$(1)=LEFT$(Z$(1),6)
130 FOR I=1TON
140 CLS: PRINT"ENTER DATES SEQUENTIALLY BEGINNING WITH OLDEST DATE.":PRINT
150 GOSUB 460: PRINT@322,"DATE #";I;: PRINT@334,Z$(I)
160 PRINT@345,(N+1)-I;" ENTRIES REMAIN.
170 REM MANUAL DATE ADVANCE (FOR SAT. SUN. & HOLIDAYS)
180 Y$=INKEY$: PRINT@448,"TO ADVANCE DATE TOUCH 'A' OTHERWISE
HIT SPACE ": IF Y$="" THEN 180 ELSE IF Y$="A" THEN 140
190 PRINTT$(1);: INPUT " PRICE";A$(I)
200 IF L>1 THEN PRINTT$(2);: INPUT " PRICE ";B$(I)
210 IF L>2 THEN PRINTT$(3);: INPUT " PRICE ";C$(I)
220 IF L>3 THEN PRINTT$(4);: INPUT " PRICE ";D$(I)
230 IF L>4 THEN PRINTT$(5);: INPUT " PRICE ";E$(I)
240 IF L>5 THEN PRINT T$(6);: INPUT " PRICE";F$(I)
250 NEXT: CLS
260 INPUT"SAVE TO DISK =1, TO CASSETTE=2";SS
270 X=X+1: U$=T$(X)
280 IF U$="" THEN CLS: PRINT"I'M FINISHED": END
290 IF SS=1 THEN OPEN"O",1,U$+"/DAT"
300 PRINT"SAVING ";U$
310 IF SS=1 THEN PRINT#1,DD$,"",T$(X),"",R$,"",I8,I9
320 IF SS=2 THEN PRINT#-1,DD$,T$(X),R$,I8,I9
330 FORI=1TON
340 A$(I)=Z$(I)+ " "+A$(I): REM 8 SPACES...IMPORTANT
350 IF SS=1 THEN PRINT#1,A$(I)
360 IF SS=2 THEN PRINT#-1,A$(I)
370 IF X=1 THEN A$(I)=B$(I)
380 IF X=2 THEN A$(I)=C$(I)
390 IF X=3 THEN A$(I)=D$(I)
400 IF X=4 THEN A$(I)=E$(I)
410 IF X=5 THEN A$(I)=F$(I)
420 NEXT
430 IF SS=1 THEN CLOSE: GOTO 270
440 PRINT#-1,X$: GOTO 270
450 REM

AUTOMATIC DATE ADVANCE

460 IF S>12.31 THEN S=1

```

Program Listing 2

same day) designed to take advantage of this aberration. I have been following the system for only 18 months, but the results look promising. It is not a big money-maker in one day. In fact, after the first 300 trades it profited 146 times and lost 154 times. Average profit, including commissions, equalled \$365. Average loss equalled \$310. In 18 months it showed profits of \$53,290 and losses of \$47,740 for a net of only \$5,550 which is not bad considering the margin on one contract is \$2,500. If, by the end of this year, it has continued to grind out lunch money in a consistent

manner, I may tell you about it. My broker loves it because he makes more on the commissions than I do in profit. But then, I suppose my brokers have to live too. But so well?

Next month: A method of trading the stock market without paying any commissions—something your broker may not have told you.

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80 Medical Opinion

by Philip R. Mills, M.D.

"My primary criticism of the program is a lack of meticulous debugging."

After receiving numerous phone calls from other physicians, it is clear that many medical clinics are anxious to automate their patient billing procedures. A surprising number of physicians purchased the Model I two or more years ago for this purpose. So far I have heard from no physician who is using the Model I for patient billing. Several clinics are using the Model I for word processing and finding it very satisfactory.

Some callers are planning to upgrade their computers. Interestingly, no caller was considering the Model III. Most felt it had no significant advantage over the Model I. No callers were considering an Apple computer. Most were trying to decide among the Model 16 (or Model II), IBM or Xerox. I favor the Model 16 for the following reasons:

of years. For my money, I prefer a less expensive computer with more capability, even if service is slightly less convenient and the name less prestigious.

The interest physicians are showing for automated billing is being reflected by the growing number of software houses marketing different medical billing packages. I am aware of 12 different medical billing packages. In time I will try to review most of these programs.

**Medical Office Management I
Charles Mann & Associates
Models I & III
\$795.95**

One of the earliest offerings for the Models I and III was from Charles Mann and Associates. For more than two years,

tem may fit the needs of many small one-physician clinics. It may also be useable by a two or three-physician clinic if the physicians have similar scheduling and practice habits. It will not separate accounts by physician, however. The package contains several unique features, but it is not yet sufficiently developed to be a true turnkey system.

The documentation suffers from incompleteness. It contains only 21 pages of instruction, seven pages of sample printouts (one printout is repeated), no index, and not even a table of contents! Installation instructions are particularly sketchy and no information is given on the proper format to enter numeric information; no mention is made that dollar signs and commas must not be entered.

It provides no information on the maximum accepted length for responses to video prompts. Some confusing video prompts such as "Billing Code?" are not even mentioned. A paragraph of the documentation appears to have been inadvertently omitted. There is no cue-card.

However, a new manual will be released before this column is published and undoubtedly many of these problems will have been corrected. Furthermore, a hot line is available. I had no difficulty resolving problems and questions quickly. Also, the program is designed to be supported by a local software house, and this may account for some omissions.

With the 5¼-inch drive limitation many disks are required. This includes three system (program) disks, an appointment disk for each physician, two disks for new patients, several disks for established patients (630 patients per disk on the Model III, or 350 patients per disk for the Model I), and at least one monthly and one daily transaction data disk. You will use nine or more disks during the course of a day.

After backing up the system disks and formatting sufficient blank disks, perform the usual first tasks: entering the clinic's name, address, phone number, and so on. A feature that is certain to be appreciated by the user is the ability to configure the software easily to the hardware. It takes almost no time to specify how many drives are in the system. This can easily

"The package contains unique features, but it is not yet sufficiently developed to be a true turnkey system."

First, the Xerox computer is very slow. It uses single-density 8-inch drives, which hold only half the data double-density drives hold. It does have a nice keyboard. Most reviewers have given the computer a poor overall grade. In our area there is no service for this computer.

Second, the IBM is a better computer than the Xerox machine, but it is not innovative. While service is spotty at present, there is no reason to doubt that it will be good with time. It has two major drawbacks for use by medical clinics. First, its 5¼-inch disk drives are simply insufficient for patient billing. Second, its price is too high. With almost daily improvements in microcomputer hardware, it seems foolish to pay a high price for a machine certain to be obsolete in a couple

this software house has been creating software for physicians on the Apple computer. The primary author of the physician programs is Bruce Moxon. Although the company still favors Apple computers with hard disks, and their most sophisticated physician programs are available only for the Apple, one year ago they converted their simplest medical office management software for use with the Models I and III.

Their version requires a minimum of 48K, a 130-column printer, and at least two 5¼-inch disk drives. I recommend four double-density, double-sided disk drives, if hard disks are not being considered. The company recommends LDOS if hard disks are used.

The Medical Office Management sys-

be modified if repairs are being made to one or more drives, or if you acquire additional drives. All video prompts for disk swapping will reflect the number of disk drives specified. A further capability is provided with the choice of which drives to use for which disks during disk-swapping routines. With a few modifications it should be possible to accommodate many non-standard setups including a mixture of 80-track or 8-inch disk drives.

After performing these basic house-keeping tasks, you build the procedure file. For efficiency during month-end billing, the first 25 procedures entered should be the procedures most commonly used by the clinic. This important fact, however, was not mentioned in the installation instructions. It was mentioned later in the manual under month-end billing instructions. They probably assumed that the person entering the procedures would have read the entire manual and remembered that tiny piece of instruction when entering the data.

Another point not mentioned in the manual, but explained by phone to me, was that the procedure number does *not* represent the order of the procedure sequence kept by the computer. The procedures are kept in disk and memory in the order of their entry. This slows down searches. Since only 175 procedures are allowed for the Model III and 100 for the Model I, speed is not a great problem. Unfortunately, it is not possible to enter either an uncommon procedure or non-standard charge during the billing process unless it has previously been entered as a coded procedure. For those in

general practice, this should pose no significant handicap; but for surgical specialties such as orthopedics, this will be a problem.

Procedures can be entered in any order. There is no auto-incrementing of procedure numbers. There is no video prompt for the number of the last procedure entered.

Printout of the procedures is in order of entry. There are no provisions for listing procedures in either alphabetic or office-code sequence. A thoughtful feature is the option to print out a procedure list with space for a check mark beside each procedure. This can be used as a convenient charge slip.

Once the procedures are entered, the insurance carriers are entered. It accepts 25 insurance companies. (If more insurance companies are necessary, or more procedures must be used, CMA will provide information on modification.)

Data entry throughout the program is hindered by the failure to provide visual cues for maximum data length.

The program provides rudimentary patient scheduling. It prints out a very nice schedule each day, but the appointment program is time consuming to set up each month; to operate daily, it requires a separate disk for each physician, and it fails to provide any significant advantage over a manual appointment book. If it was written in machine language, had several needed enhancements (such as the increased flexibility in schedule times or differentiation between multiple physicians on one disk) it might be practical. In its present condition, however, I predict that few secretaries will be happy with it.

After initialization chores are completed, the program is ready to run. Since the original program was written on an Apple computer, it often fails to take advantage of the unique features of either the Model I or III. There are a few hidden residuals from the program's Apple ancestry which emerge occasionally. These include an occasional instruction to hit return to continue instead of the correct hit enter to continue.

Upon boot-up, the program asks for the date. There is no implementation of the date already entered on the Model III—again revealing its "foreign" origin.

Although the documentation states that the program resides on a protected disk, this is not true. Complete back-ups are possible. Written in Basic, the company does use passwords for the programs, but this protection is so minimal and easily defeated that even a beginner can break it. This type of protection might better be forgotten. Interestingly, I had to remove the passwords from my copy or the program would not run.

The authors have made no attempt to protect patient records. No passwords are required to update patient accounts.

Patient registration uses a novel approach. When a new patient makes an appointment, a temporary number (between 9,000 and 9,999) is assigned automatically by the computer and minimal information is entered. This becomes particularly helpful in a consultative type of practice with many new patients daily. If the patient does not meet the appointment, he will never receive an established patient number (between 1 and 9,000). However, if the patient does meet his appointment,



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✓437

80 Medical Opinion

the temporary patient number is transferred to an established patient number, and the information previously entered is also transferred to the permanent file. At this time a complete patient information file is entered. An important feature included in the program is the ability to enter both a home phone and a work phone.

The heart of any medical management system is its daily billing. This system, like any floppy-disk system, uses only a balance-forward method. Transactions are lost with month-end processing.

Posting daily transactions is a simple process. If necessary a Get Help/Information utility is always available. Only established patient accounts are accepted. Temporary patient account numbers must first be transferred to the permanent file or they will be rejected. After the patient account number is entered and the account found, an office procedure code is entered so charges can be registered. Next, the time the procedure took is entered. This information is used to monitor the clinic's efficiency. Although it is an interesting idea, if the practice routinely does multiple procedures on each patient visit, it will be very difficult to monitor the actual time each separate procedure takes. After the length of time taken is entered, payments are recorded.

Once in the transaction mode, a transaction *must* be entered; there is no other method for smoothly returning to the billing menu. Disk swapping is required to record the transaction. Here the company has made a very real attempt to trap incorrect disk-swapping errors at all strategic points. The method used is not foolproof, nor as good as the method used in Radio Shack's Medical Office System, but it is adequate. As with any program requiring disk swapping, careful labeling is mandatory. Charles Mann and Associates sell color-coded, large-print labels—a helpful service.

Account adjustments or payments are entered in the same manner as the daily transactions.

The program prints a daily transaction log that gives a detailed summary of each transaction in the order of transaction entry, and practice summary that gives information on the number of patients scheduled, the number of patients seen or who paid on their account, the number of appointment periods scheduled, the number of appointment periods used, and the banking activity. It also lists an operation summary, that gives fee productivity per time interval, for determining the practice's efficiency.

Month-end billing is time consuming

and requires two operations and constant operator intervention. A very clear statement is produced on plain paper. Each statement is then cut apart by hand. Only 20 statements should be printed at a time. Insurance companies can be billed twice each month, but this is more complicated and I would not recommend it. For insurance billing, a standard AMA insurance form is used.

When the statements have been completely printed, a complete and current patient list can be produced which will give current account status. A list of all insurance carriers and their outstanding balance can also be produced at this time. This is the only time during the month that current-account balances can be obtained on the patients; this is the single greatest drawback on most micro billing programs.

Idiosyncrasies

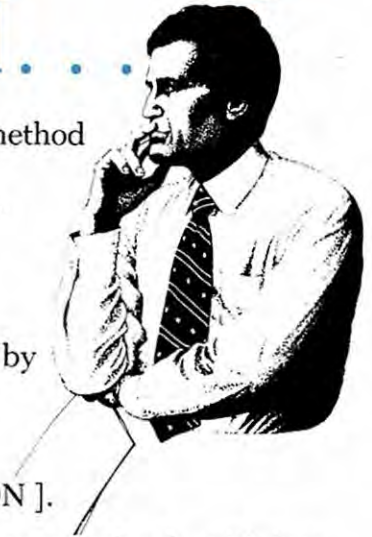
The program will not accept dates before 1979. When in the editing mode, hyphens and colons were accepted as if enter had been pushed for some entries. There was no error trapping for office codes which were entered as large numbers. Instead, they were printed out in exponential format! The break key was not disabled. Printouts commonly failed to utilize the Print Using feature, so dollar amounts were not printed out in standard dollar format unless entered as such. The printouts failed to provide a form feed when the printing was completed. If the printer was inadvertently turned off, no "printer not ready" warning was given.

My primary criticism of the program is a lack of meticulous debugging. The bugs are minor and will be fixed with time, but they are irritating. Error trapping is moderately complete, but it is still possible for an error to suddenly pop the user into Basic. The limits of the program's math ability are listed nowhere in the manual, and I was not able to obtain this information from CMA. Since single-precision routines are used throughout, the accuracy in calculation should be fine to \$9,999.99. I did find rounding errors above this for certain numbers.

The company itself is delightful to work with. I would hope that they convert some of their better medical packages for use on the Model II or Model 16. If interest is great enough, they have assured me that they will. They currently offer a dental package for the Model II.

Please feel free to contact me about software you have found to be excellent (or inadequate). Your input will determine the direction this column will take and the software we choose to review. Until next month... ■

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(circle one)
- 4) be limited in the number of accounts I could put on file only by the physical storage capacity of the computer.
- 5) have a period activity volume of up to [\$1M \$10M \$100M].
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- 6) have a year-to-date volume of up to [\$10M \$100M \$1BILLION].
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- 7) let me custom design up to [33 66 99] reports, and not force me to make-do with just the preprogrammed reports.
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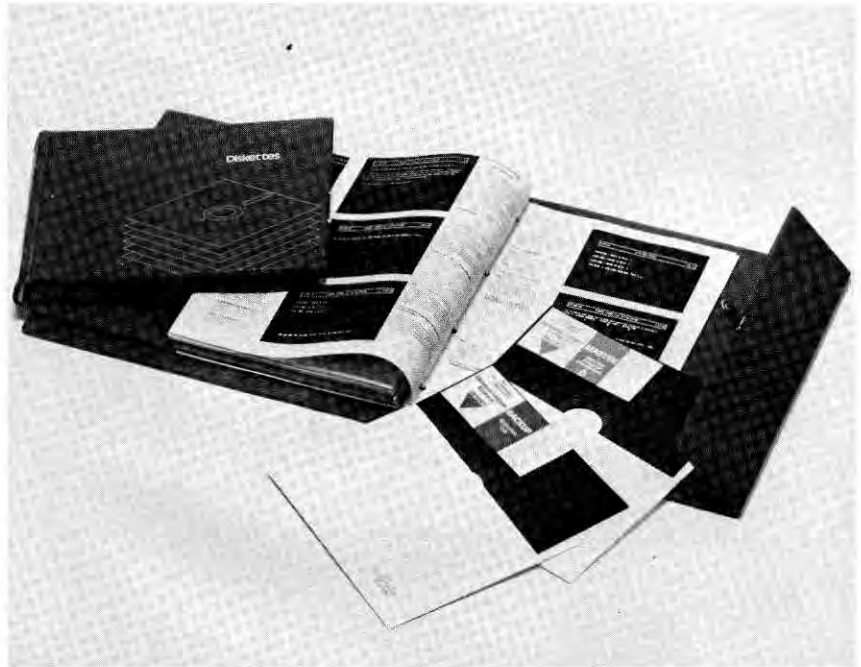
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- screen layouts are clean, attractive and informative.
- accompanies all transactions with an audit trail.
- Transaction File has assigned-by-you reference #s.
- Transaction Listings can be listed sequentially or under variety of criteria selected by you.

*TRS-80 is a trademark of Tandy Corp.

- 64 combinations of inquiry options to Transaction File.
- can print reports at any one of nine levels of detail that you select.
- ignores invalid data, making unwanted or accidental entry impossible.
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- will not let you duplicate account numbers.
- maintains details of activities period by period so that comparisons are easily obtained.
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98

RELOAD 80

by Art Huston

Counting Load 80 byte by byte

Compiling the Load 80 directory is one of the last steps in getting *80 Micro* to press. A scant few days before the magazine goes to the printer the editors decide exactly which articles will be in the issue. This leaves little time to decide on what will go onto the Load 80 tape.

In May the mad rush caught up with us. We estimated we could fit 12 programs onto

the cassette, and printed the Load 80 directory accordingly. A week later we had to cut FORE, PERSPECT, and TESTFILE—the extreme length of another program had thrown off our calculations.

Some good has come of this. Load 80 programs are now read off a disk and their bytes counted before the directory is printed. This takes extra time, but makes the

directory accurate.

The June/July Load 80 included all the programs listed in the directory. The August Load 80 went even better—we added SLALOM (page 112) and RAMMER (page 296). This brought that blockbuster month to a total of 25 games!

Basic and Machine-language Hybrids

Many programs in *80 Micro* and Load 80 are hybrids of Basic and machine language. This is frequently done in games that require a very fast sound routine ("Space Chase," April 1982, p. 292) or vertical scroller ("Rammer," August 1982, p. 296). Execution is simply not fast enough in Basic.

The usual method of setting up a machine-language subroutine is to POKE it into memory. A few programs POKE the routine into a string or a remark statement (see "Through the Asteroids," August 1982). Most POKE the routine into high memory, where it can be protected by setting the memory size.

Telling Basic Where to Go

Those programs that POKE routines into high memory may not work on systems with an amount of memory different from that specified by the program's author. The machine language needs to be POKED into a different region of RAM. Last month's RELOAD 80 column detailed how to relocate these routines. All that remains is to tell the Basic interpreter where the code is located.

Cassette-based Basic sets aside memory locations 16526 and 16527 to point towards the beginning of a machine-language subroutine. These memory locations store a two-byte integer—the first byte is the least significant byte (LSB) and the second is the most significant byte (MSB). The

Program Listing

```
10 CLS:DEFINT X
20 PRINT"1. Hex to Dec    2. Dec to Hex    3. Dec to LSB, MSB
    4. LSB, MSB to Dec  5. Add Bytes to Dec#"
30 INPUT"CHOICE";A$:CH=VAL(A$):IFCH<1ORCH>5THEN30ELSEONCHGOSUB40
,60,80,90,110:GOTO20
39 REM ** Hex to Dec **
40 INPUT"HEX#";HX$:IFLEN(HX$)>4ORLEN(HX$)<1THEN40ELSEDE=0:FORX=L
EN(HX$)-1TO0STEP-1:X2=ASC(HX$):X1=X2:IFX1<58THENX1=X1-48ELSEIFX1
>64THENX1=X1-55
50 IFX1>15ORX1<0THENX=0:NEXT:GOTO40ELSEDE=DE+X1*16[X:HX$=RIGHT$(
HX$,X):NEXT:GOSUB150:RETURN
59 REM ** Dec to Hex **
60 GOSUB130:HX$="":FORX=3TO0STEP-1:X1=INT(DE/16[X]:DE=DE-X1*16[X
:IFX1>9THENX2=X1+55ELSEX2=X1+48
70 HX$=HX$+CHR$(X2):NEXT:PRINTHX$:RETURN
79 REM ** Dec to LSB,MSB **
80 GOSUB130:X2=INT(DE/256):X1=DE-256*X2:PRINT"LSB ="X1"MSB ="X2:
RETURN
89 REM ** LSB,MSB to Dec **
90 INPUT"LSB";X1:IFX1<0ORX1>255THEN90
100 INPUT"MSB";X2:IFX2<0ORX2>255THEN100ELSEDE=X1+256*X2:GOSUB150
:RETURN
109 REM ** Add Bytes to Dec# **
110 GOSUB130:INPUT"Add # bytes (nnk for Kbytes)";A$:X=VAL(A$):A$
=RIGHT$(A$,1):IFA$="K"ORA$="k"THENX=X*1024
120 IFDE+X>65535ORDE+X<0THENPRINT"Result out of range":GOTO110EL
SEDE=DE+X:GOSUB150:RETURN
128 REM *** Subroutines ***
129 REM ** Input Dec # **
130 INPUT"DEC #";DE$:DE=VAL(DE$):IFDE<0ANDDE>-32769THENDE=DE+655
36
140 IFDE<0ORDE>65536THEN130ELSERETURN
149 REM ** Print Dec # **
150 PRINTDE;:IFDE>32767THENDE=FIX(DE-65536):PRINT("DE")"ELSEPR
INT
160 RETURN
```



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two-byte integer at these two locations can be expressed as PEEK(16526) + 256 * PEEK(16527).

Here is a short program for POKEing any address into 16526 and 16527:

```
10 INPUT "Mem Addr";MA
20 MSB = INT(MA/256)
30 LSB = MA - MSB * 256
40 POKE 16526,LSB
50 POKE 16527,MSB
```

This routine will work for values of MA between zero and 65535.

Disk Basic on both the Model I and III allows up to 10 machine-language subroutines at a time, each pointed to by a DEFUSR statement. The first routine is pointed to by DEFUSR0 = 'nnnn', the second by DEFUSR1 = 'nnnn' and so on up to DEFUSR9 = 'nnnn.' Most programs have only one such subroutine.

The 'nnnn' is the memory address of the routine. You can express it as either a decimal or hexadecimal number—just precede hexadecimal values by &H. The following statements define a routine at 32000, 767 bytes below the top of memory in a 16K machine:

```
DEFUSR0 = 32000
DEFUSR0 = &H7D00
```

Express memory addresses above 32767 in decimal as the address minus 65536. For example, DEFUSR0 = -20 defines a machine-language subroutine at 65516 (FF6CH).

The Actual Conversion

The Program Listing will help you relocate machine-language subroutines. The pro-

gram is error-trapped to keep all input and output below the top of a 48K machine. You may enter decimal numbers above 32767 as either negative or positive numbers; they will be printed in both forms.

Option 1 converts a hexadecimal number to decimal. Any letters in the number must be uppercase. To change the number 7FFFH, simply enter 7FFF. The result is 32767.

Option 2 converts a decimal number to hexadecimal.

Option 3 converts a decimal number to its LSB and MSB. You could use this option to determine what numbers to POKE in under Level II.

Option 4 converts an LSB and MSB to a decimal number. You might find this handy for going from Level II to Disk Basic.

Option 5 adds any number of bytes to a specified memory address. The program first asks for the decimal number, then for the number of bytes to add. To add a number of K, simply type K at the end of the second number. If you wish to subtract, make the second number negative.

In next month's column we'll actually modify a program to run on a different machine. ■

Editor's Note: This month Load 80 goes back to the old price and one tape/disk, but we still managed to fit 22 programs. SQUARE1-4 are game programs from the August 1982 Copernica Mathematica column. We had unexpected room and thought you'd enjoy them.

Program	Title	Page	Comments
1	MOBYDICK	139	None
2	COLORART	168	None
3	TRAINART	168	None
4	CHARTART	168	None
5	BTFlyART	168	None
6	CSTLEART	168	None
7	SNPYART	168	None
8	SCRNPLAY	204	None
9	ORDRFORM	270	None
10	SIM	276	None
11	VEIL/SRC	286	needs EDTASM
12	HOTDOG	330	None
13	MTRMOUTH	330	None
14	PACHINKO	330	None
15	FUNHOUSE	330	None
16	HAMMING	342	None
17	MDOS1	364	None
18	MDOS2	364	None
19	SQUARE1 (Aug)	358	None
20	SQUARE2 (Aug)	358	None
21	SQUARE3 (Aug)	358	None
22	SQUARE4 (Aug)	358	None

September Load 80 Directory

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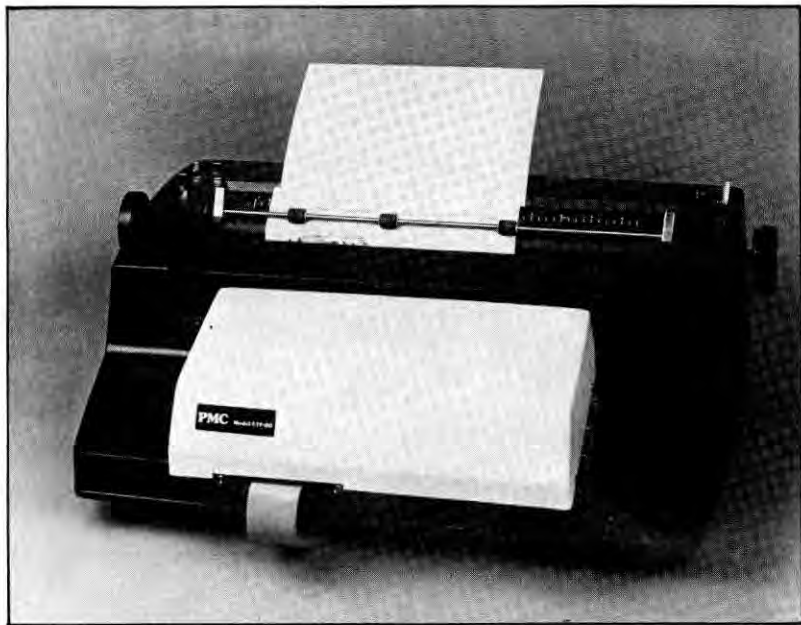
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Priced at \$595, it is available from Personal Micro Computers Inc., 475 Ellis St., Mt. View, CA 94043, (415) 962-0220.

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KWIK Cassette Mini-System

KWIKIT is a miniature version of the KWICOS and KOS3 cassette operating system for the TRS-80. It improves cassette storage of Basic programs. A software-only enhancement to Level II, this product

adds disk-like commands and an improved higher-speed tape storage format, but takes only 880 bytes from user memory. It saves and loads Basic programs at 1000 baud for the Model I and 2200 baud for the Model III.

The KWIKIT system features a graphic display to indicate correct volume setting,

protection against garbage loading from tape, immunity from keyboard lock-up during loads, a catalog command, display of program length, keyboard control of the cassette motor and a key debounce option.

Priced at \$9.50 (\$11.50 with debounce and List speed control option), it is available from KWIK Software, Dept. M, Bolivar, MO 65613, (417) 326-7154.

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The package includes a lab aid program which makes the computer into an intelligent calculator, preprogrammed with 20 of the most common formulas used in lab experiments. A simple data graphing routine allows a student to create graphs of his lab results. All these programs do not require programming knowledge.

The programs are illustrated with numerous graphics and students are quizzed throughout to reinforce information learned. The series comes complete with a teacher/student manual which contains student objectives, worksheets, answer keys, and general student user instructions.

Priced at \$78.50 for a Model III disk system and \$68.50 for a Model I or III 16K cassette system, the series is available from TYC Software, 40 Stuyvesant Manor, Geneseo, NY 14454, (716) 243-3005.

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Reader Service ✓551

CP/M Inventory Package

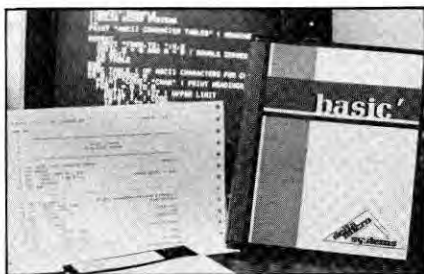
Pericomp Corporation's CP/M inventory package is designed for use by any small business with an inventory to maintain. It features unlimited, multiple-volume master files and entry/edit, stock status, and stock movement capabilities. A complete reporting function includes a do-it-yourself wild-card feature.

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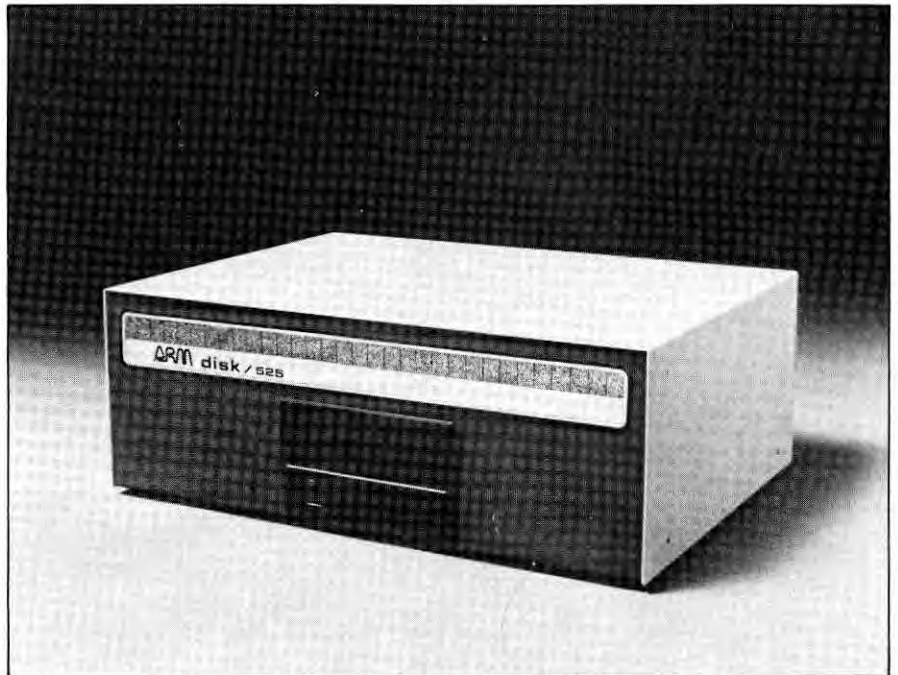
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Trissword

Trissword allows from one to four players to compete against the computer in a simulation of a popular word search game. The program features a 5 by 5 playing grid, selectable skill level for the computer, an on-screen three-minute timer, and easy player interface to the scoring program. The computer finds 4, 5 and 6-letter words.



basic'



ARMdisk/525

Trissword is for use with the Models I and III and requires a 48K system with disk. Priced at \$19.95, it is available from W.C. Maxey, 3003 Deer Creek Lake Shore Drive, Deerfield Beach, FL 33441.

Reader Service ✓553

basic' Programming Environment

basic' is a powerful, completely structured extension of the Basic language. Blocks of code are indicated by a unique indentation convention, eliminating the need for extraneous statements (such as Begin and End) and statement numbers.

A basic' program is written via editor—a full function text file editor—and is then translated into a normal Basic program producing a listing that cross references the basic' to its Basic translation. The Basic translation is then debugged using the Basic interpreter already available on your microcomputer.

basic' comes with full documentation on a program disk in a handy binder format. It is available for the Models I and III for \$129 and requires at least one disk drive. For more information contact Delta Micro Systems, P.O. Box 15952, New Orleans, LA 70175, (800) 535-1814.

Reader Service ✓ 554

ARMdisk/525

Model II and III owners can now expand their storage capacities and cut their data accessing times by as much as 80 percent with Automated Resource Management's ARMdisk/525 Winchester disk subsystem.

Offering as much as 30 megabytes of formatted hard disk storage, the ARMdisk/525 uses intelligent controller technology to help ensure data integrity. An error correction code is controller-supported and stored on disk to make data loss nearly impossible.

The ARMdisk/525 is supported by TRSDOS compatible operating systems. These include HSDS for Model II and LDOS for the Model III.

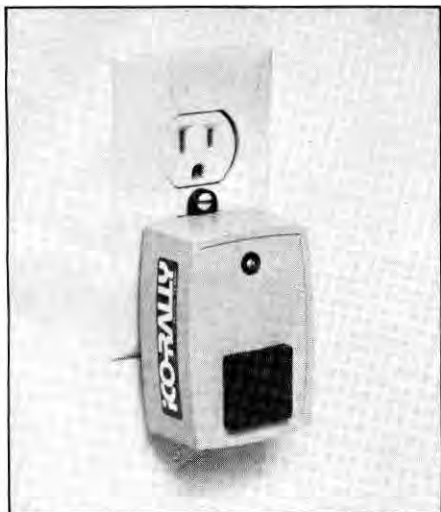
The ARMdisk/525 includes a Winchester disk controller, rotating memory system drive, and all necessary cables. It is priced from \$3395 for the 7½-megabyte system and \$3995 for the 15-megabyte system to \$6695 for an expanded 30-megabyte system. For further information, contact Automated Resource Management, 3613 West MacArthur Blvd., Santa Ana, CA 92704, (714) 850-9792.

Reader Service ✓561

Musician's Friend

Selection Aid for Musicians (SAM) is an easy-to-use Basic program for the Models

NEW PRODUCTS



Ico-Rally's Surge Protector

I and III which aids a musical group in song selection on stage. The program categorizes your own song list and you may call more than 20 specific sub-lists with only two keystrokes, or use a wild-card key to generalize the search. Song titles are displayed in double-width letters for easy reading, and list size is limited only by available memory.

Supplied on cassette, it is compatible with Model I and III tape or disk systems, and comes with a complete manual. Priced at \$14.95, it is available from Creative Micro Systems Inc., Box 604, Cushing, OK 74023.

Reader Service ✓557

Surge Protector

The Ico-Rally Surge Protector provides a buffer between fragile electronic equipment and destructive, disrupting voltage spikes and power surges. This single outlet stabilizing unit has a 25 nanosecond response time and can dissipate 950,000W at 100 microseconds at its rated 15 amp and 120 volts AC.

Priced at \$35.95, it is available from Ico-Rally Corp., 2575 East Bayshore Road, Palo Alto, CA 94303, (415) 856-9900.

Reader Service ✓560

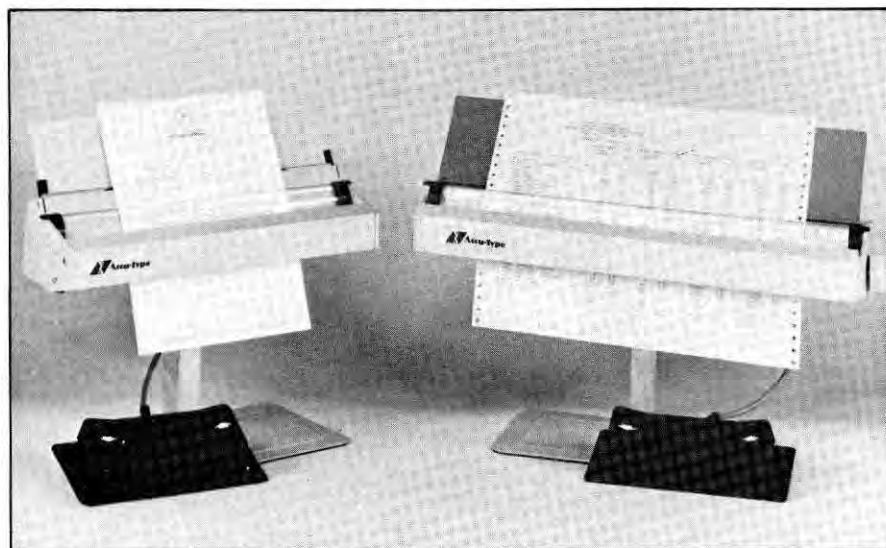
Electronic Copyholder

The Accu-Type I (\$149.95) and Accu-Type II (\$169.95) electronic copyholders are equipped with a fluorescent light and a magnifying bar with a guideline making copy easier to read. An electronic foot pedal moves the copy up and down automatically leaving both hands on the keyboard for improved speed and accuracy.

These products are on a free-standing pedestal base for easy placement and are adjustable for any typing height. Both models are quiet and will not disturb others in the same work area.

For more information contact Amatix Inc., 1263 Westwood Blvd., Suite 202, Los Angeles, CA 90024, (213) 473-7393.

Reader Service ✓564



Accu-Type I and III

Basic Conversions Handbook

Now you can convert a Basic program for the TRS-80, Apple II or PET computers into the form of Basic used by any other one of those machines. *The Basic Conversions Handbook* is a complete guide to converting Apple II and PET programs into the TRS-80, TRS-80 and PET into Apple II and TRS-80 and Apple II programs into PET. Equivalent commands are listed for TRS-80 Basic (Model I, Level II), Applesoft Basic and PET Basic. Also described are variations in graphics capabilities, PEEK, POKE and CALL statements, cursor and control characters, memory locations, subroutines and sample programs.

Priced at \$7.95, the book is available from Hayden Book Company Inc., 50 Essex St., Rochelle Park, NJ 07662, (800) 631-0856.

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Screen Kleen Removes Dust

Screen Kleen, a scientifically developed cloth, removes dust from the screen of a CRT terminal. It can be used on screen overlays where many destat chemicals cannot. This product easily removes paper dust from printers. It can also be used to clean dust from walls, ceilings, desk tops, and any other equipment in the computer room or office.

Priced at \$2.95 for two cloths in a storage bag, they are available from CRT Products Company, P.O. Box 07135, Detroit, MI 48207, (313) 259-0762.

Reader Service ✓556

Software for Chemical Dealers

Permit, a software package for agricultural chemical dealers, is designed to file and accumulate information concerning customers who hold restricted use pesticide permits. This program lets you file the following information: customer name, address, phone number, permit number and expiration date.

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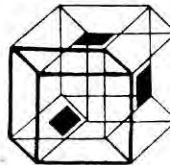
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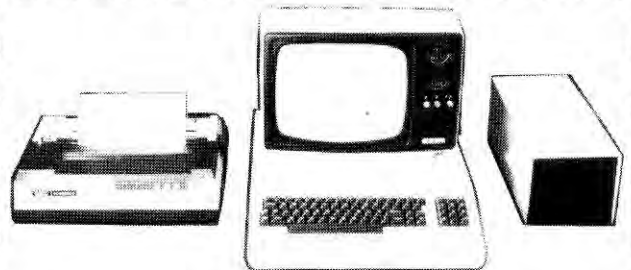
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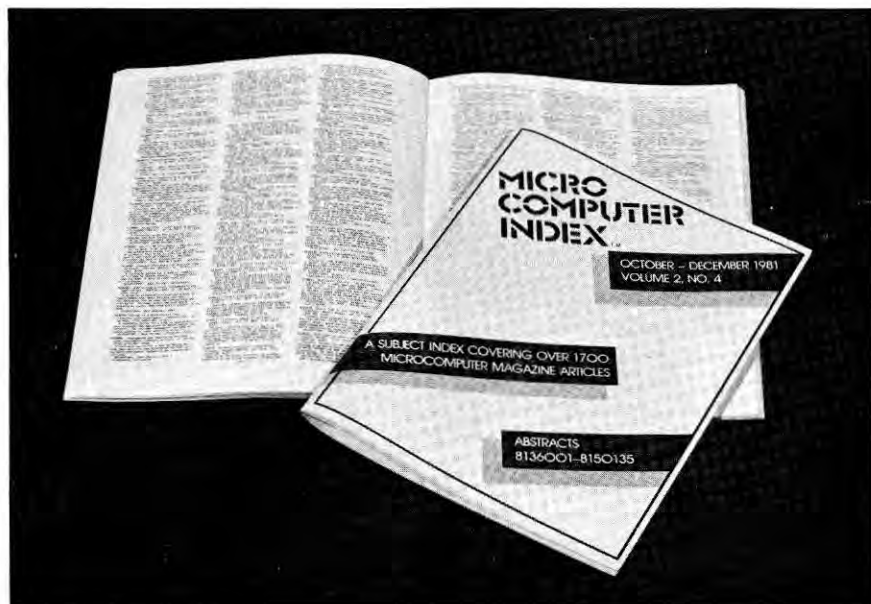
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For additional information contact Microcomputer Index, 2464 El Camino Real, Suite 247, Santa Clara, CA 95051,

mit expiration date; all permits that expire in any certain month; and individually addressed letters to all customers whose permits expire in any certain month.

Permit is available for the Models I, II, III or 16 from Summerville Enterprises, Agri-Computer Services, 104 Broad St., S.E., Aliceville, AL 35442, (205) 373-6383. Each program is customized to the customer's operation.

Reader Service 559

custom line and symbol shapes to be used in plotting.

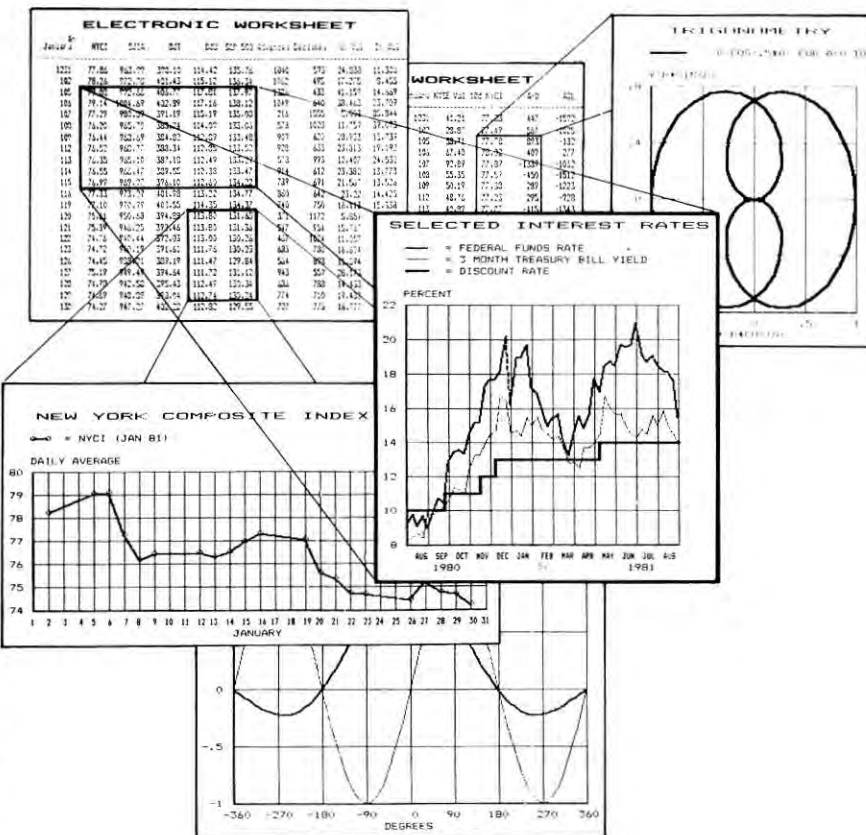
VisiGraph is available for the Models I

Printer Graphics Program

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A pre-formatted form is added to the VisiCalc worksheet for entering the graph features. A minimum set of graph feature entries require only the name of the worksheet and the location of which rows and columns of data are to be plotted. VisiGraph uses the worksheet and graph features stored on disk by VisiCalc to plot the graph on the printer. It also provides an interactive screen-graphic capability to compose and store a wide variety of



VisiGraph

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Church Donations Programs

Custom Data's Model III Church Donations program greatly simplifies the book-keeping necessary for recording and reporting offerings of the church congregation. The Model III version requires a minimum of two disk drives and 48K RAM. It can service a congregation of up to 1200 with 10 user selectable categories of donations. The price for the package is \$125.

Also available are two compliments to the Model II Church Donations program. One is a Church Directory which uses a select code to give up to five divisions of member identification. This directory gives an alphabetical, telephone book type printout and is available for \$35. The second is an attendance record that can keep track of 160 functions for up to 3000 people. The record can give total attendance and percentage of the congregation as well as an individual attendance record. This is also priced at \$35.

For more information contact Custom Data, P.O. Box 1066, Alamogordo, NM 88310, (505) 434-1096.
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TRS-80 Entertainment Programs

The SoftSide Sampler of TRS-80 Entertainment Programs is a compilation of the 29 most interesting and entertaining programs published in *SoftSide Magazine*. The 199-page book offers a variety of short, simple programs and longer, more complex adventures.

Test your nautical skills with such programs as *Around the Horn* and *Battleship* or your driving abilities with *Barrier* and *Drag Race*. Test your courage with *Cycle Jump*, rescue a princess in *Goblins*, fight *Darth Vader* in *Kronen*, or discover far away treasure with *Magical Journey*. The programs feature special graphics and sound effects.

Priced at \$8.95, the Sampler is available from Hayden Book Company Inc., 50 Essex St., Rochelle Park, NJ 07662, (800) 631-0856.

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Microprocessor Interfacing Course

Interfacing Course

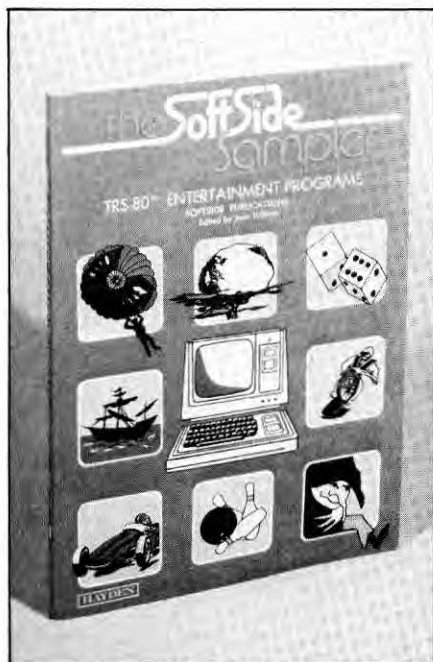
The EE-3402 Microprocessor Interfacing Course is designed for people who have a working knowledge of microprocessor fundamentals and want to gain additional knowledge about microprocessor interfacing techniques and more advanced microprocessors.

The 750-page text concentrates on teaching advanced microprocessor interfacing techniques. It also provides in-depth coverage of the 6800 family of microprocessors and introduces the student to the powerful 6809 and 68000 microprocessors. Review examinations, at the end of each unit, help students check their progress through the course material.

Ten experiments provide students with interactive hands-on experience in microprocessor interfacing. Highlights of the experiments include burning an Eprom and programming the 6809 microprocessor. All the components necessary to perform the course experiments are included.

The Heathkit/Zenith EE-3402 Microprocessor Interfacing Course is priced at \$99.95. The ET-3400A Microprocessor Trainer, which is required to perform the experiments in this course, is priced at \$229.95 in kit form. An assembled version of the Microprocessor Trainer (model ETW-3400A) is available for \$329.95. For more information contact Heath Company, Benton Harbor, MI 49022, (616) 982-3210.

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Model III Fortran

Radio Shack now offers Model III Fortran (26-2200) for the TRS-80 Model III computer, available for \$99.95 at Radio Shack Computer Centers, stores and participating dealers.

The Model III Fortran package includes three systems: an editor, a compiler and a linker plus a subroutine library on a 5¼-inch disk. A complete manual is also included.

The editor permits the writing and editing of Fortran source files on disk. The compiler reads the Fortran source code from the disk, translates it into relocatable object code and saves it on disk. The linker takes this relocatable object program, links it with all the subroutines it calls, and saves it on disk. This complete, independent object program can then load and execute directly from the Model III operating system, TRSDOS.

The accompanying manual includes complete user instructions for operating Model III Fortran, and a discussion of Fortran language statements and functions. It also includes a section on error messages and a quick reference.

Model III Fortran requires a 48K two-disk TRS-80 Model III for operation. A similar package (26-2201) for a 32K two-disk TRS-80 Model I is also available for \$99.95.

Reader Service ✓578



Model III Fortran

Pocket Computer Book

Radio Shack now offers a book that teaches problem solving techniques for the TRS-80 Pocket Computer. *Problem Solving on the TRS-80 Pocket Computer* by Don Inman and Jim Conlan is available for \$9.95 at Radio Shack stores, Computer Centers and participating dealers.

This book is a self-paced text for individuals with a working knowledge of TRS-80 Pocket Basic. It provides practical exercises, illustrations and diagrams that present and explain solutions to a variety of problems—solutions with numerous educational and practical applications.

It also addresses the advanced functions available with the TRS-80 Pocket Computer, including trigonometric, logic and print functions; random numbers; storing, sorting, searching and more.

Reader Service ✓579

Basic so you don't have to learn two separate procedures.

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Priced at \$29.95, it is available from TOPS Programming Enterprises, 7427 S.W. Garden Home Road, Suite 105, Portland, OR 97223.

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The program sells for \$65 and is available on disk for the Models I and III with 48K RAM and LDOS 5.x.x. At least one

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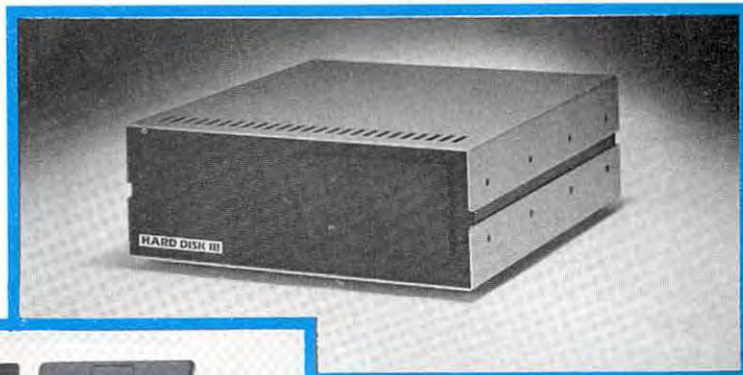
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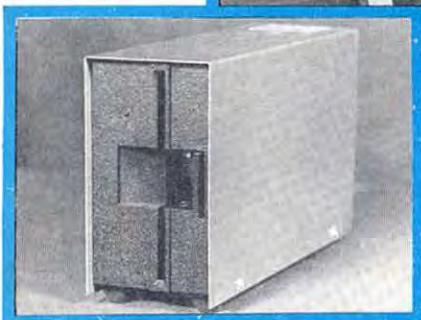
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Reader Service ✓567

Color Forth

Color Forth for the Color Computer is a highly interactive language like Basic, with the structure of Pascal and execution speed close to that of Assembly language.

Color Forth consists of the standard Forth Interest Group (FIG) implementation of the language plus most of Forth-79, and a screen editor with split screen display. Mass storage is via cassette interface. Color Forth also contains a decompiler and other aids for learning the inner workings of this language. It auto-configures to 4K, 16K or 32K models and contains 10K of ROM. The 112-page manual describes the many hardware-specific features of the implementation, including a glossary of the system-specific words, a full standard FIG glossary and complete source listing.

Color Forth, written by Talbot Microsystems, comes to you in ROMPACK for \$109.95. For more information contact The Micro Works, P.O. Box 1110, Del Mar, CA 92014, (714) 942-2400.

Reader Service ✓568

Softpedal

Softpedal is a software program and transducer pickup system that converts an existing bicycle, or exercise bike into a computer-aided training and exercise machine. The Softpedal programs display a simulated race course on any color television or video monitor, and allows the user to pace himself, race the clock, or another competitor.

Softpedal is a program tape which consists of two interactive user programs. The first program, Bike Race, displays several real-time parameters. After entering the rider's name, a gun is fired to signal the start of the race. Average speed and current speed (in mph), elapsed time, and distance are shown on the screen to give instant feedback on your progress around the course.

The second program is called Dashboard. At the start you input the number of lap legs desired, the average speed to maintain for each leg, and the length of

each leg. A percentage completed bargraph and speed in mph bargraph are displayed at the top of the screen. Your bicycle dashboard shows the average speed per leg, the distance covered up to that point, and your average speed.

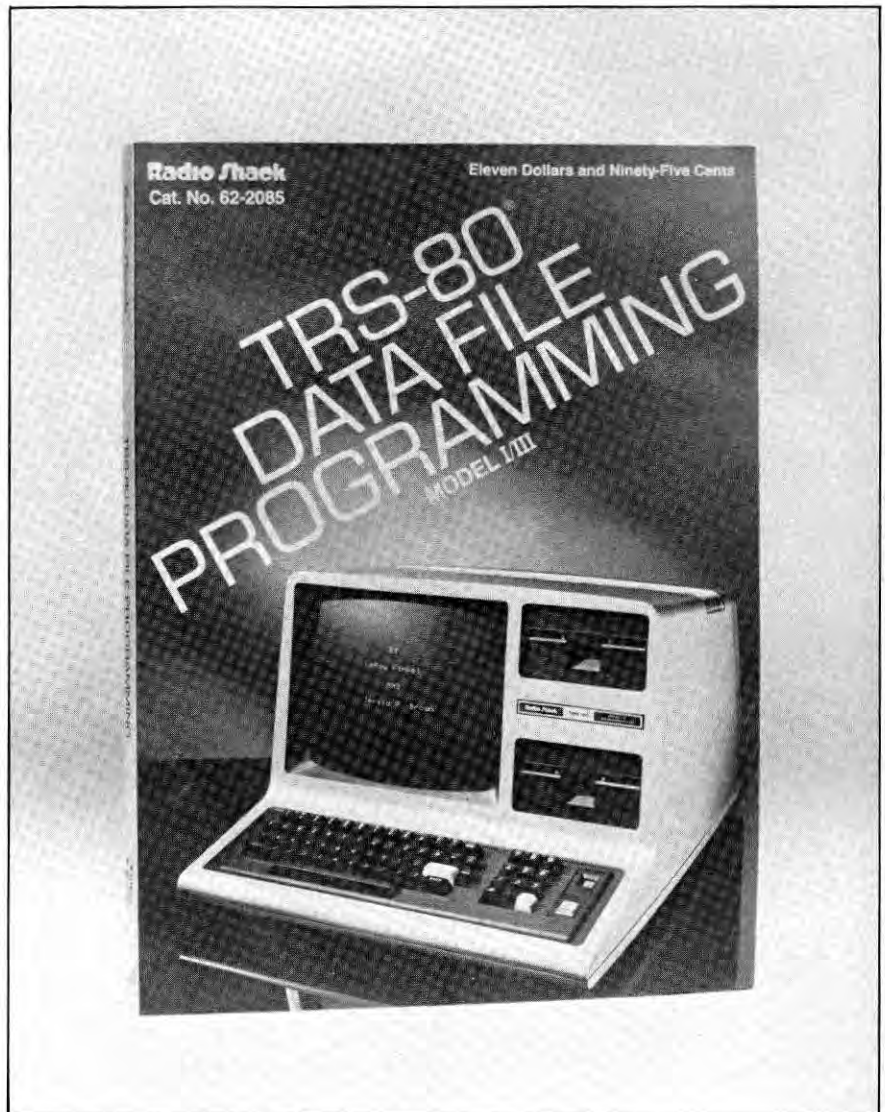
Softpedal is available for the Color Computer. Available options include a stand with an integral wind load mechanism, which simulates actual road conditions at any speed. The price for the package is \$145 including stand. For more information contact Practical Applications of California, P.O. Box 255768, Sacramento, CA 95825, 1-(800)-835-2246.

Reader Service ✓569

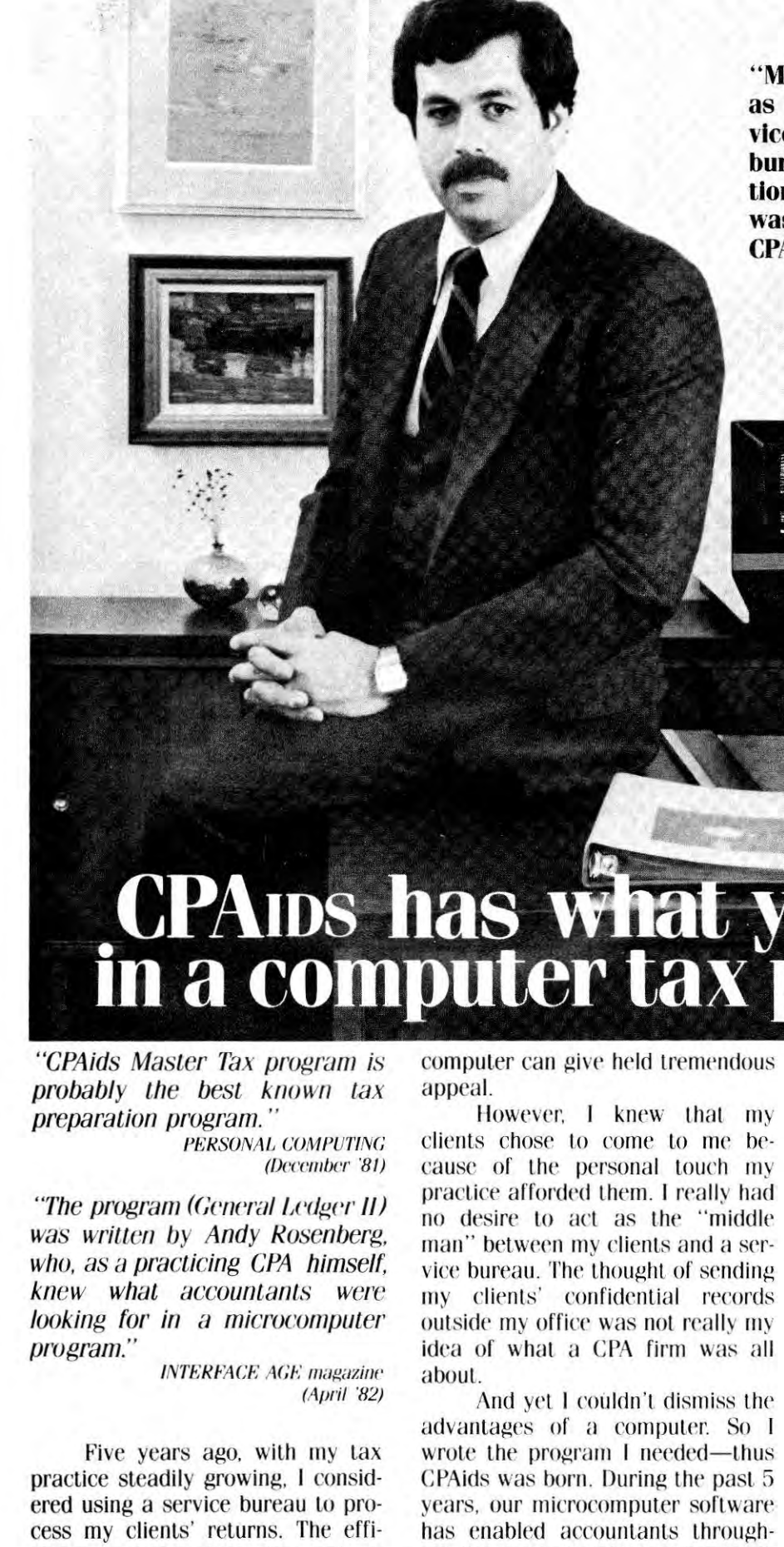
Data File Book

Radio Shack now offers TRS-80 Model I and III microcomputer users a comprehensive, self-instructional book on data file programming. *TRS-80 Data File Programming Model III* by LeRoy Finkel and Jerald R. Brown is available for \$11.95 at Radio Shack stores, Computer Centers and participating dealers.

This book is a non-technical, self-paced text on how to program and maintain data files. Sample programs and self tests lead readers (with a working knowledge of TRS-80 Basic) through each step in data file programming. The text offers practical advice on how to use disk files to keep track of billings, customer inventory and



TRS-80 Data File Programming



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*INTERFACE AGE magazine
(April '82)*

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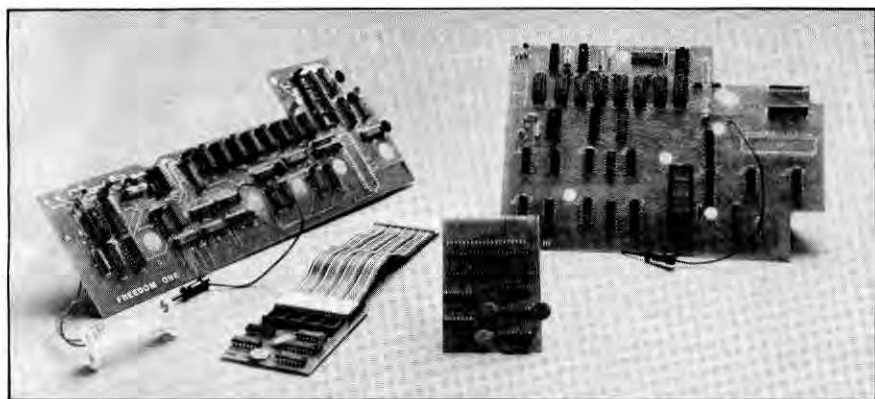
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NEW PRODUCTS



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The Freedom Option (\$275) and Freedom Plus (\$490) boards allow the TRS-80 Models I and III, the PMC 80 and 81, and the LNW80 to run CP/M applications software as well as TRSDOS software. The Freedom Option is the basic CP/M conversion board while the Freedom Plus provides CP/M conversion and adds 16K of RAM to the TRS-80.

The Freedom boards include Freedom Technology's CP/M compatible operating system, T8/OS. T8/OS is written in Z80 code. T8/OS can be configured to run any combination of 5¼ and 8-inch drives, single or double density, single or double sided.

The majority of CP/M applications software is compatible with the Freedom boards as well as the higher level language compilers that are available for CP/M, such as Cobol, Fortran, and Pascal.

For complete details contact Freedom Technology International, 119 North 18th St., Philadelphia, PA 19103, (215) 569-2381. Reader Service✓584

expenses; how to catalog material and maintain mailing lists; and how to process numerical and statistical information.

Reader Service✓580

Classroom Record Keeping System

Classfile, a record keeping system for the classroom teacher, is now available on disk for the Model III. This expanded disk version retains all the standard features of the original Classfile program and includes many new features.

Classfile works with classes of up to 45 students and can handle 25 grades per student. It allows the teacher to weight grades in averaging, enter new grades, change old grades, add extra credit, drop grades from averages for particular students, add students, delete students, alphabetize students, and start a new term without retyping students' names.

Classfile comes with a manual and a sample of all printed reports. It is available for the Model III with 48K and two disk drives for \$49.95. For more information contact TYC Software, 40 Stuyvesant Manor, Geneseo, NY 14454, (716) 243-3005.

Reader Service✓570

TRS-80 Galaxy of Games

The TRS-80 Galaxy of Games are four different games: Hangman, One Arm Bandit, Skunk and Jacks.

Hangman is a word game classic. The screen reveals a scaffold with parts of the human body listed next to it. Across from the scaffold is a blank word box that contains a certain number of dashes. The winner must guess the word in the box or die trying.

One Arm Bandit is a slot machine game. The player is given \$200 to begin betting on the wheel. Minimum bets are \$1 and the highest allowed is \$100.

Skunk is a dice game for one to six players. Each player must accumulate the highest number of points without rolling "skunk" (no points). The first player to reach the maximum score, which can be set at any amount, wins.

Jacks is a computer version of the popular card game for one to five players. The player must try to score the least amount of points by trading high cards for low cards in the deck.

TRS-80 Galaxy of Games is available on cassette for 16K Models I and III for \$14.95. For more information contact Hayden Book Company Inc., 50 Essex St., Rochelle Park, NJ 07662, (800) 631-0856.

Reader Service✓576

ST80-III Terminal Program

The new 2.50 version of the ST80-III terminal program for the Models I and III replaces the earlier 2.30 version and incorporates many new features such as a screen print command similar to the JKL feature started by the NEWDOS operating system, a built-in auto-dialer, improved high-speed operation, and a new, comprehensive, easy-to-understand instruction manual. The new version of ST80-III also clears up some of the major bugs that developed during the life of the previous version.

The price of ST80-III version 2.50 is \$150. Current users can upgrade to the new version for \$50. The upgrade price includes a new instruction manual. For more information contact Lance Micklus Inc., 217 South Union St., Burlington, VT 05401, (802) 864-5899.

Reader Service✓572

Model III Cassette Operating System

KOS3, a Model III version of the KWICOS Cassette Operating System from KWIK Software, adds disk-like commands and an improved 2200-baud tape storage format to supplement the standard CSAVE/CLOAD/System routines. KOS3 is easy to use: all operations are executed by simple commands from the Level II immediate mode. No add-ons, equipment modifications, or special programming skills are needed.

This product adds simple abbreviated commands to activate/deactivate the break key, set the standard high/low cassette baud, reroute or initialize I/O routing, set the date or time, and toggle the clock display on or off.

Priced at \$24, it is available from KWIK Software, Dept. K, Bolivar, MO 65613, (417) 326-7154.

Reader Service✓581

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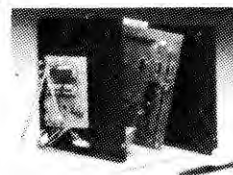
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NEW PRODUCTS

rectly enter only those items which are applicable. A detailed and numbered input sheet helps organize data and reduces input time. When data entry is complete the program does all calculations and prints a summary of the entire return including taxable income, total credits, regular tax, income averaging tax, minimum taxes and payment due or refund.

The Supertax II system (\$27.50) makes all the calculations made by the Supertax I program and prints the tax return for you. It prints pages one and two, Schedules A, B and G and Form 3468 on tractor feed forms. The Supertax II system is a two-disk package which includes the Supertax I and II programs.

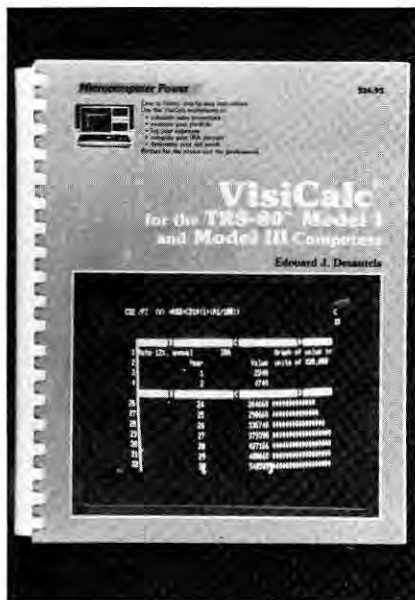
The Supertax III system (\$32.50) is also a two-disk package which includes Supertax I and II and also a program to calculate and print IRS Form 1040 Schedule C. The package also features a stand-alone depreciation program which calculates depreciation under the old depreciation rules (prior to 1981) and the new required ACRS rules.

The programs run on the Models I, II, III and 16. For more information contact Rockware Data Corp., P.O. Box 1493, Plano, TX 75074, (214) 596-0588.

Reader Service 583

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A new set of guidebooks from Wm. C. Brown Co. will help you get the most from the VisiCalc program. These guidebooks



VisiCalc Guidebook

provide clear, machine-specific examples to help the programmer learn faster and work with more accuracy. Written in workbook format, author Edouard J. Desautels shares his expertise and VisiCalc programming knowledge and presents it in easy to understand, step-by-step directions, leading the programmer toward total VisiCalc programming confidence.

VisiCalc for the TRS-80 Model II and 16 Computers and *VisiCalc for the TRS-80 Model I and III Computers* sell for \$16.95 each. To further enhance the guidebooks, Desautels has prepared disks containing several electronic worksheets. These disks are available for the Models II and III for \$39.95 each. However, if you purchase a VisiCalc book and disk together the price is \$49.95 for both. For more information contact Wm. C. Brown Co. Publishers, 2460 Kerper Blvd., Dubuque, IA 52001.

Reader Service 587

Cobol Utility Program

The Model III Host program accepts variable length Cobol source files from your Model II and creates Model III Cobol source files in Cedit format. To upload your Model II files to the Model III use the terminal program which accompanies Model II TRSDOS. Host puts the Cobol source files in ASCII format required by the Model III Cobol editor. Host runs at 9600 baud for rapid data transmission.

Priced at \$34.95, it is available from Absecon Software Associates, 550 Fourth St., Absecon, NJ 08201, (609) 646-9322.

Reader Service 585

MicroGANTT Now Available For CP/M

The MicroGANTT projects planning system is now available for Model II computers running CP/M. It uses critical path method (CPM) techniques to determine task dependencies and project completion dates. The user creates a project by defining tasks and task dependencies and by assigning costs. The program immediately displays a Gantt chart which gives a graphic representation of the project. Tasks can be displayed on a time scale of days, weeks, months, quarters or years. The time scale of the charts can be varied at any time to present more or less detail.

Priced at \$395 for system and documentation, MicroGANTT is available from

Westico, 25 Van Zant St., Norwalk, CT 06855, (203) 853-6880.

Reader Service 586

The Address Factory

The Address Factory, a mailing list program for the Color Computer, is perfect for club newsletters, church mailings, business customer lists, and personal party lists. It records name, address, city-state, zip, and a special code of 27 characters for each person on your mailing list. You can add or delete names or change any information easily from your keyboard. The program prints mailing labels or a listing of all or any selected subset of your names. It sorts the names by zip code or special code.

This product, accompanied by an instruction manual, is available on cassette (\$17.95) or disk (\$22.95) and requires 32K of memory. A printer is required for printing reports. For more information contact Computerware, Box 668, 4403 Manchester Ave., Encinitas, CA 92024, (714) 436-3512.

Reader Service 588

Starship Chameleon

You are the Starship Chameleon, a special intergalactic vessel with the assignment of protecting the planet below from the aerial attack of enemy invaders. You have the unique capability to change color at the push of a button in order to destroy the on-coming super bombs and anti-matter bombs that have been launched by the enemy Gabolatoks above. But watch out for the semi-intelligent aerial bombs! They home in on your every move, seeking to destroy you!

This fast moving, skill and strategy game can be played at nine skill levels. It is available on cassette (\$24.95) or disk (\$29.95) and requires 16K of memory. For more information contact Computerware, Box 668, 4403 Manchester Ave., Encinitas, CA 92024, (714) 436-3512.

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Regilean Bloodworm

Regilean Bloodworm is an arcade-style game for the Models I and III. You are a space worm who must eat the Zansbards (rotating space creatures) that appear on

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the screen. You do this by running them down and absorbing their energy. As you eat more of them your tail grows longer. The trick is you may never hit anything other than the Zansbards. This includes the walls of the arena and your own tail. There are 37 levels of play from molasses slow to lightning fast.

For more information contact A-Priori Software, 1005 W. Main, Vermillion SD 57069.

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Metallic-Clad Binder Envelopes

A new floppy-disk storage envelope protects valuable records from erasure or alteration due to magnetic fields. It also protects your disks from dust and other physical damage.

The anti-magnetic envelopes hold either two eight-inch disks or several smaller 5¼-inch disks or magnetic cards.

Featuring a clear vinyl top pocket for indexing, the envelopes fit standard three-ring binders for convenient filing and storage.

Priced at \$9.95 each, they are available from Inmac, Department 67, 2465 Augustine Drive, Santa Clara, CA 95051, (408) 727-1970.

Reader Service 591

Bible Available on Disks

THE WORD processor data base for two-disk 48K Model III computers contains the entire King James version of the Bible on disks. Designed for students of theology, pastors, and the personal computer market in general, THE WORD processor consists of eight disks replete with an easy-to-use instruction manual

Because the Bible text is accompanied by a special word processing program, your computer can scan the text looking for any combination of words or phrases, and inform you where and how often the

word or phrase occurs. You can scroll through the text at any speed you choose and branch to specific verses of interest. Any verses or references of special interest can be printed on request.

THE WORD processor is priced at \$159.95 (plus \$2.50 for postage and handling) and is available from Bible Research Systems, 8804 Wildridge Drive, Austin, TX 78759, (512) 346-2181.

Reader Service ✓571

Personal File Manager

The Personal File Manager is a disk-based filing system designed for everyday use such as storing addresses, phone lists, personal notes and reminders all in a single file. The file structure is format-free allowing any desired information to be stored on up to 400 related or unrelated subjects. This menu-driven Basic program includes its own edit subcommands to update the file.

This product requires a Color Computer with 32K RAM and one or more disk drives and Extended Color Basic. It is available on 5¼-inch disks for \$17.95 from Home Information Systems, 4006 Ellicott St., Alexandria, VA 22304.

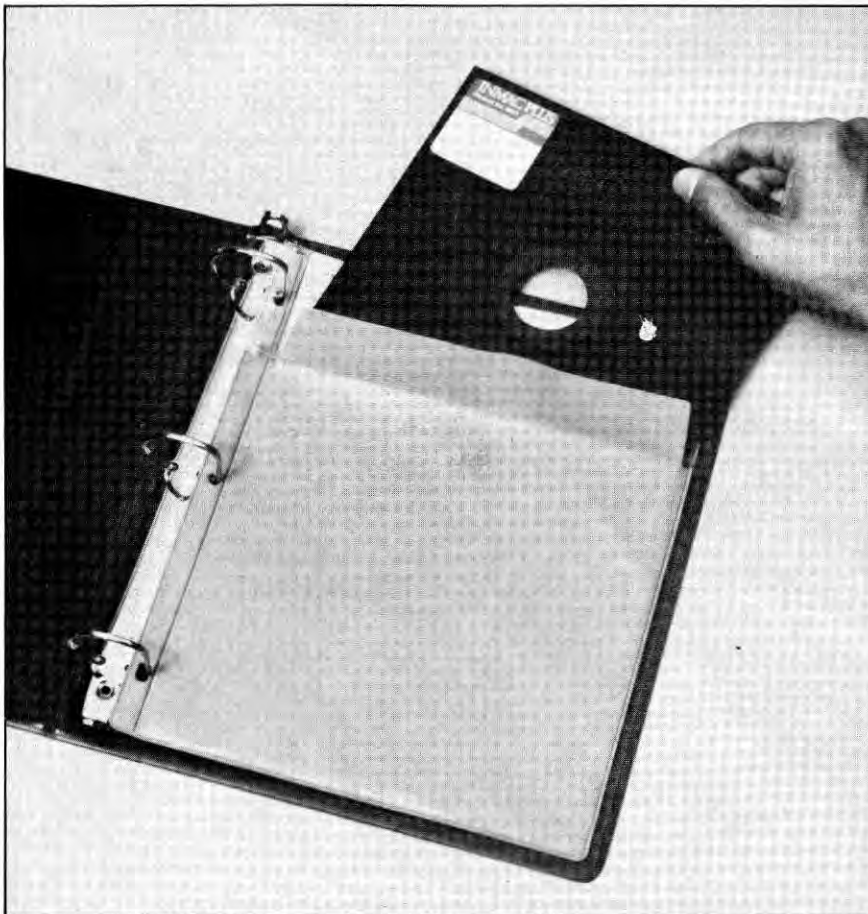
Reader Service ✓573

Color Computer Worksaver

The Platinum Worksaver is a programming aid that can reduce programming time by 50 percent. The Worksaver, designed for the 16K Extended Color Computer, occupies less than 2K of memory. It provides full screen editing of Basic programs with automatic line numbering, changes, deletes and inserts, using a completely moveable cursor. The Worksaver supports full screen editing of numeric and string arrays. There are single key entries of more than 90 Basic words. This product features program chaining and dynamic debugging, letting the programmer change, delete, join lines, or even load new programs without disturbing existing data. It also converts the right side of the keyboard into a numeric keypad, allowing fast entry of numbers.

Priced at \$30, the Platinum Worksaver is available from Platinum Software, P.O. Box 833, Plattsburgh, NY 12901, (518) 643-6796.

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Anti-magnetic Binder Envelope

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