Micros: The New Supertoys

Educating Your Child
Six Simple Programs Told Out of School

A Kid Wrote This?
Young Programmers Show Their Stuff

Also Inside:
Inside Your II/16
Beyond Basic Programming
Poetry in Motion
Son of Pilot
The Model 16 Reviewed

*TRS-80 is a trademark of Radio Shack, a division of Tandy Corp.*
More and more hardware and communications services are allowing speeds up to 1200 baud. Soon, some may be going faster than that. Today's terminal software simply can't keep up. But now there is an alternative. Micro-Systems Software introduces MicroTerm, the high speed terminal.

Model III MicroTerm will communicate, without insertion of null characters, at 4800 baud. Guaranteed. No cop-outs, no question. MicroTerm is so fast that you can exit from the terminal to the main menu, adjust video width, open the buffer, turn on the printer, or any one of dozens of other functions, and return to the terminal model without missing a thing!

MicroTerm continues to input from the RS232, even while at the main menu. This is the only terminal capable of such an astounding feat. MicroTerm offers you most of the features that "Brand X" smart terminals have, plus it gives you: Ultra high baud rate operation (up to 9600 in certain cases). Input while at menu. Easy to use translation tables. Easy to use phone number listings. Maximum auto dial support — most major brands. Direct file transfer companion program included at no extra cost (compatible with DFT). DOS commands from menu without exiting program. Over 34K of capture buffer (in a 48K TRS-80). Can be set to automatically dial telephone and transmit buffer at preset time without any operator intervention.

And many, many more great features. MicroTerm is so fast you must see it to believe it. The various menus are displayed so fast, they seem to jump out at you. Status of various functions can be displayed and altered in split seconds.

For the computerist who wants the ultimate, state-of-the-art terminal software, there is no other choice. MicroTerm retails for $79.95, but registered DOSPLUS owners can purchase it for only $59.95. $20.00 off the retail price! MicroTerm comes complete with the terminal program, the direct file transfer program, some standard translation tables, and documentation.

Don't delay, order yours today! Specify when ordering: Model I or III and whether you want it on 40 or 80 track media. Requires TRS-80 Disk or parallel with one disk drive. We recommend 48K for serious communications work. MicroTerm will be available beginning June 30, 1982.
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178. Spelling Challenger
With these three word games, your kids can learn their spelling words while having a good time.
Larry Krengel

184. Math Fun
Your children will have so much fun playing with your micro that they won’t even notice they’re learning addition and subtraction.
David Haan

208. Michael’s Game
Youngsters don’t have to grow up afraid of micros. Start them off early with this game program that teaches letters and numbers.
Nancy Modney

212. Refrigerator Controller
Got an old refrigerator hanging around? This unit will let you control its lighting and temperature for all sorts of science projects.
Doug Biedenweg

237. Horse Race II
This revision of a previously published program makes it a more useful educational tool.
Danley Christensen

270. Twinkle, Twinkle, Little Star
With a little help from you and some imaginative graphics, the TRS-80 becomes a poet.
Bill Grout

In our January issue, we published a program by Bruce Tonkin called The Creator. It has since come to our attention that Software Technology for Computers (PO Box 428, Belmont, MA 02178) markets a program generator that is also called The Creator, and holds a trademark to that name. These programs are in no way related, and should not be confused with one another.

We regret any inconveniences we might have caused STC or our readers.
132. Byte Cycles
A joystick game a la the light cycle races in TRON.
Nathan Miller (Second Place, 10 and under)

134. Boxer
Test your pugilistic skill in this nifty game involving you against the computer.
Lloyd Kupchanko (Third Place, 14–18)

149. Foreign Flag Quiz
Test your knowledge of world draperies.
Jennifer Neidenbach (Third Place, 11–13)

152. CASS-80
Have your own cassette-based bulletin-board system.
Scott Steele (Third Place, 11–13)

160. Math Countdown
A computer class programming assignment turns into a valuable learning tool.
Adam Wells (Third Place, 10 and under)

244. The Art of Encoding and Decoding
Use your computer to translate your messages into an indecipherable mess; then with this program, you can translate them back again.
Karl Andreassen

252. LP VII Screen Printout
Reproduce the video display on paper.
Serge Calmettes

254. Fun for the Younger Set
Introduce your 5-year-old to the TRS-80 with these math and word programs.
Safi Bahcall

256. Convergem
Adjust the color and alignment of your color monitor with this Color Computer program.
James A. Sanford

260. APL Primer—Part III
This month’s installment contains a bonanza of functions. To name a few: logical operators, shaping, indexing, and reduction.
Margaret M. Grothman

280. Mod II Random Access
You can benefit from this author’s migraine headaches caused by Model II mishandling of disk data.
Terry Kepner

282. Drop Your Color Computer into Disk Drive
Discover life in the fast data lane by putting the pedal to the metal oxide.
Robert Nicholas and Philip Martel

296. Screen Format Program Generator
Save yourself the trouble of figuring screen locations, field prompts, and input fields and let your computer do the work for you.
Joel Belcher

310. Peek Pong
If you thought fast-paced games couldn’t be written in Basic, Peek Pong should surprise you.
Charles Gulick

314. Color Life
Watch communities of organisms develop with the Game of Life for the Color Computer.
Larry F. Perry

328. The Input Specifier
A subroutine allowing editing of input and saving your programs from crashing.
G. Schweizer

332. Color Computer Merge
Concatenate your programs on tape.
John Heusinkveld

334. Transmuter
Merge Transmuter with another program and you can relabel any and all program variables.
Jon Mark O’Connor

8. Remarks
The 16-bit fad.
Wayne Green

10. Proof Notes
Piracy becomes a political issue.

12. To Copy or Not to Copy
A reader offers a helping hand and raises a commotion.
The left bracket, [ ], replaces the up arrow used by Radio Shack to indicate exponen-
tiation on our printouts. When entering programs published in *80 Micro*, you
should make this change.

*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.

Article submissions from our readers
are welcomed and encouraged. Inquiries
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  - 368,640 bytes – 40-track DS/DD
  - 368,640 bytes – 80-track SS/DD
  - 737,280 bytes – 80-track DS/DD
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  - 1,182,720 bytes – 77-track DS/DD
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COMPLETE – The LNDoubler 5/8, switches your Model I or LNW-80 into the most versatile computer you can own. The LNDoubler's switch allows you to boot from 5- or 8-inch system disks, and it's accessible from outside the interface. The LNDoubler 5/8 comes with a double-density disk operating system (DOS+ 3.3.9), complete with BASIC and utility programs . . . ready to run your software NOW!

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"8" drive operation requires special cable, 8" double-density requires 3.55MHz CPU speed-up modification or LNW-80 4MHz computer.

TRS-80 is a trademark of Tandy Corporation.
Another worry about the Model 16?

Internal memory the computer owner can afford, the faster the system can do these number-crunching operations. But there is no use buying more internal memory (RAM) if the computer CPU can’t quickly address it.

A practical limit might have been 24 bits, since this would allow the computer to directly address 16 megabytes of storage. Even with the still dropping cost of RAM memories, it is going to be a while before we even approach that limitation. We are seeing some one-megabyte RAM desktop computers (which actually take only 20 bits to address), and, with the growth of 16-bit systems that can address a 32-bit bus, I’m sure we’ll soon be seeing systems with two megabytes of RAM... and so on. That still puts 16 MB a long, long way off. Maybe a couple of years.

A 32-bit oriented microprocessor chip is capable of substantially increasing the throughput of a computer as compared with the 16-bit-oriented units. It could be a factor of four times. Now, for the average small office where 99 percent of the time the computer is sitting around waiting for the operator, this may not be an important development... at least for the moment. But let’s remember one of the basics of computers, Green’s Axiom 107, that the more you use a computer, the more you find for it to do.

We’re just starting to be serious about asking that all of our desktop computer systems be able to work with virtually any number of other computers in a network... or to host other smaller computers. The coming proliferation of incredibly inexpensive home computers, any of which can be pressed into service as a satellite computer for a small business network or even a home network, has to be dealt with.

One thing we know for sure, there is a raft of Japanese technicians and engineers (many of them graduates of their ham radio exposure in high school) working enthusiastically to develop LCD flat screens for the low-end computers. These will be along the lines of the pocket LCD screens on the new television sets. The $100 ($79.95 at Lechmere’s) home computer, complete with 64×16 screen, is coming... soon.

Once we have that, we won’t even have to buy a $69.95 black and white TV set to use for a monitor! But with or without the LCD screen, you know as well as I that home computerists will be running wires around their homes so they can have a remote computer/terminal in the kitchen, by the phone, in the living room, in the bedroom... hell, perhaps in the bathroom for those used to taking in a book to read.

In the office, the el cheapo computer/terminals will be networked to the host system, allowing every worker in the business to access data, swap messages, keep notes, and so on... all without upsetting their word processing or data entry via more traditional computers or terminals.

Such networking calls for some power in the host system, particularly as the users get involved with ever more applications. I think that this demand will put on the pressure for the desktop computer industry to move on to the 32-bit processors... and quickly.

But what about the software, you exclaim? In this case, the news is cheering. From what I’ve been able to learn, the Intel 80826 chip will run all of that nice 8080 stuff from 1976, the Z80 stuff from 1977–82, the 8086 stuff from this year... and so on. It will also want to have a bunch of new, higher throughput oriented programs written to really take advantage of the new 32-bit power. But at least it won’t leave us high and dry as did the Radio Shack Model II and their CoCo.

Since Radio Shack seems to be committed to supporting the business market via a higher end system, I’m sure that somewhere in the bowels of one of the Tandy Towers, a dedicated team of engineers is working day and night to come up with a 32-bit computer with which to dazzle us... and the financial press. Surely they won’t wait for IBM to put on the pressure again.

Will we see this by Comdex time this fall? Probably not. But then, considering the pace of the industry, can they afford to wait until their traditional August new product showing time for something as key to their future as this?
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- Remdisk-1 (Disk I/O Techniques) $29.95

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80 Micro, February 1983 • 9
Piracy has become political issue

If manufacturers want to curb software piracy, they’re going to have to take a much bigger step. They are going to have to improve their responsiveness to their customers’ needs. They are going to have to provide ample proof that the loyalty and respect they demand of the consumer is reciprocated. Only then will the consumer feel any responsibility to protect the manufacturers’ proprietary interests.

Unfortunately, the better companies must share the anger fostered by others. But they are also in the best position to do something about it. Perhaps the time has come for them to take the lead in guiding and policing the software industry. Perhaps they need to develop a code of ethics and take steps to enforce it.

As long as there are people who want to make a quick buck from the labors of others, software piracy will be a problem. But that problem could be curbed considerably if the software industry made a concerted effort to regain the respect of the consumer. Otherwise, we can expect the insurgency to continue for some time to come.

* * * *

In our response to “To Copy or Not to Copy,” we asked readers to advise us on whether we should publish the name of the person offering the key to backing up Super Utility Plus. The response was an overwhelming “Yes.” Nevertheless, we have decided to withhold the name.

We agree with many of the comments made. Most readers would like to back up Super Utility Plus, and other software, only to guard their own interests. But we do not want to declare open season on the manufacturers of protected software. To do so, we feel, would only aggravate an already-volatile situation.

On the other hand, we understand our role as a primary source of information on the TRS-80 microcomputers.
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4. INTELLIGENT. The NEW AIDS-III is smart. It doesn't waste your time with questions about record sizes, field counts and other technical mumbo-jumbo. A new system can be created, or an old one modified, in a couple of minutes. Even if your name isn't Albert Einstein.

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In the November 1982 issue we published a letter from a reader who offered information on copying Super Utility Plus should Powersoft Inc. ever be unable to provide back-ups. We withheld the name of the author, and requested your reactions to both the letter and the whole subject of protected software. We also contacted eight manufacturers for their views, but only Apparat Inc. responded. Read on for some representative viewpoints. For 80 Micro’s views on the subject, see Proof Notes on p. 10.

What’s the Big Deal?

Why the agony on releasing the key to Super Utility?

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Truth in Advertising

Nobody wants to buy protected programs. You know it, I know it, and the vendors know it. That’s why, in spite of repeated requests, practically none of the people who sell protected programs will even mention this fact in their ads. But this matters so much to the buyer, and that’s who you should be looking out for—the tens of thousands of people who pay for all the software and, directly or indirectly, all the issues of your magazine.

Why does the consumer always come last? You should require that any ad for protected software include that fact, right next to the price. And your software reviews should always address this question. When the buyer is at last given an honest choice between protected program A, and its unprotected competitor B, we will see the protection mania disappear, to everyone’s benefit.

Here is an open question to Acorn, Med Systems, SubLogic, Adventure International, Powersoft, and all the other vendors who silently sell protected programs: You cannot pretend that your customers don’t care about back-up software. I met one such person and explained the cost and quality of the software he was using. He promptly bought a copy of a software program he had already owned. Why? Yes, the program is not as good, but it is the only program available. The software company also sells the software and has no competition.

To copy or not to copy

Apparat’s Answer

Apparat, like other software developers, is very concerned about piracy. In the case of the NEWDOS80 operating system, Apparat has found many illegal copies on the market. In the past, Apparat has taken some steps against software pirates, and will take much more severe steps in the months to come.

Apparat has never made software that could not be copied by the consumer, and probably never will. Our feeling is that the customer paid for the right to reproduce the software for his own personal use at the time of purchase. By limiting the number of copies, or preventing copying entirely, you may very well be limiting your customer base. Also, nothing can be locked that cannot be unlocked. And locked software can provoke many typically honest people into becoming backyard pirates.

Apparat sees only two ways to prevent, or hinder, the software piracy business. The first is the standard: registration numbers and no service if you cannot provide us with a verifiable number. The second is the hardware lock for software, similar to that used by Simutek in their Copystart word processor. The hardware lock can be duplicated also, but not easily, and most software pirates neither have the brains nor the inclination to unlock the secrets hidden in hardware.

Jason Robert C. Matthews
Manager, Software R&D
Apparat, Inc.
4401 So. Tamarac Parkway
Denver, CO 80237

Routine Copies

For several years I have been quietly cracking the protection codes on games. As I have gained more experience, it has become quite routine for me to unlock the protected disks as soon as I get them, make a copy, and place the original on a shelf far from harm. Software piracy is disagreeable, but the thought of having a locked disk is equally distasteful. I would be afraid to use it, for fear that I would destroy it and never be able to use it again.

In the November 1982 issue of 80 Micro, on page 443, the ad for Sales Data Inc. states that they will sell the
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software to allow unlimited back-ups of Scripsit and VisiCalc on the Model III. Since Scripsit for the Model III comes on a protected disk, you are clearly willing to allow mention and sales of protection-unlocking programs in your magazine. I, for one, am grateful for both of those policies.

Paul Jaeger 61 Jane St. New York, NY 10014

Excess Aggravation

I have only purchased one protected software package. I agree with the letter writer about the aggravation, so I have promised myself never to buy another product that has this type of protection.

I fully support Logical Systems with LDOS and ABC Sales with Lazy Writer. These products are sold with serial numbers and full support for future upgrades. By providing technical support only to registered owners, they keep down the pirates and allow honest buyers unlimited back-up copies. The people making the most fuss over this are the same ones that only want to sell software for the money, with no regard for the customer after the sale.

If companies sold software at reasonable prices, there would also be less pirating. Why does the same package cost more for the Model II and III than it does for the Model I? Is this honest pricing policy?

If the author of the letter can save even one other person from getting into trouble with no back-up, he should tell others. If the goal of 80 Micro is to provide information to help its readers (why else do we buy it?), then it also should not hold back information to please its advertisers.

Jeffrey Sherman 20 Riviera Drive Somerville, NJ 08876

Reject Those Ads

As a responsible, consumer-oriented publishing company, you and your fellow magazine publishers can solve the protected software problem by refusing to accept ads from companies with protected software, unless you receive with such an unlock routine and permission to publish same in the event of the demise of the company or its inability to furnish service to owners of the software.

Spencer Trimble 229 Lipona Road South Tallahassee, FL 32304

Preserving the Free Market

Super Utility Plus is without a doubt one of the finest utility programs ever written for the TRS-80; however, it suffers from a serious flaw. In an attempt to protect the program from unauthorized duplication, it is distributed on a protected disk. This may provide protection from pirates, but it seriously limits the usefulness of the program to the people who have paid for it.

In this format a disk failure can force a user to pay a fee, not to mention lost work time, to obtain a new copy of the program. Every time the disk makes a revolution, magnetic coating wears off the disk. No matter how careful the user, or reliable the system, any disk will eventually wear out. We should not be forced into being dependent on any manufacturer for back-ups of programs that have been legally obtained. We find it disturbing that the program brags about its ability to duplicate protected disks while the author has ensured his own work would remain uncopied.

TRS-80 users are notorious for the use of oddball hardware configurations and patchwork systems. Users who have modified their systems usually work out patches to programs to accommodate their hardware. With a protected disk, this becomes an impossible task. The educational value of getting inside a top-notch utility like SU+ cannot be overestimated.

We don't believe back-up protected disks serve the best interest of users or publishers and are against their use. This does not mean we are against authors receiving just compensation for their work. A minority of users and crooked publishers are causing the legitimate publishers to use protected media. If the majority of users will refuse to deal with pirates, and that includes users who swap back-ups of copyrighted programs, publishers won't feel they need to use protection schemes. As a user and publisher we would rather see the free market continue.

The alternatives are government involvement or hardware protection schemes. If either of these becomes necessary, you can expect software costs to skyrocket, as well as creativity to be stifled. With unprotected software a program can reach the market with an investment of a few thousand dollars. If users force publishers to use hardware protection schemes, programs that don't have mass-market appeal will never see the light of day. All computer users have a vested interest in seeing the free market continue.

Jean Marie Witt President WittSoft 1302 41st St. Orlando, FL 32805

WittSoft has recently introduced Super Duper, a program that can create copies of Super Utility Plus.—Eds.

The Price Problem

To copy in order to resell or otherwise pass on is, of course, a violation of the law. Having been so victimized, I can understand the author's point of view.

However, when we purchase a program that may be used at several stations in the building, it's a nuisance to be forced to make a several-hundred-yard round trip to pick up a disk from another room, use it for five minutes, and then return it. My vote is to release the name and address, hoping—however vainly—that resale will not occur. Maybe software manufacturers should look to their retail prices. We can afford a $40 program, but to spend $120 to have it available at three separate stations is an expense I can't justify. No one photocopies a $6 book, but a $60 one might not be so immune.

The Rev. George T. Cook 50 Anchor Ave. P.O. Box 98 Oceanside, NY 11572

Piracy Policy

We agree with the statement that software should not be copy-protect ed. Staten Island Labs has some software like this, and it is very aggravat-
NEWCLOCK-80

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Wouldn't it be nice if your computer could always boot up with the right time and date and then stay accurate. Newclock-80 will enhance your Model I or III system with powerful clock/calendar/timer functions.

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Installation is very simple, no tools, no disassembly, no soldering. Just plug it in, that's all. There is no power supply or messy cable. Newclock-80 plugs into the rear of the keyboard or side of the Exp. Int. Model III Newclock fits the 50 pin card edge (underneath).

The Software: Newclock-80 is as easy to use as it is to install. "SET", a Basic program, is used only once to set the time and date and select 12 or 24 hour format. "TIMESTR", also in Basic, patches your computer's "TIME$" function to read Newclock-80. It also adds "TIMES" to keyboard-only systems, a short routine is simply "poked" into low memory.

Newclock-80 uses 12 ports (176 to 188): 6 for the time, 6 for the date. The data is conveniently stored in decimal form, no conversion is needed. You can read or modify any digit using simple Basic "INP" and "OUT" statements.

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ing not to have back-ups. We prefer the policies of certain software companies, such as Logical Systems Inc. and Prosoft, that support only registered owners of their programs.

Our policy toward copy-protected software is to attempt to break the lock and pirate it, not because we want the programs, but because we are against the policy of copy protection.

Philip Herbst
Senior Partner
Staten Island Labs
140 Castleton Avenue
Staten Island, NY 10301

Low Life

I am strongly opposed to pirated software! Those computerists who pirate software are the lowest form of animal life on the planet. However, I feel that any company selling software on protected disks is only one step above the pirate.

For the most part, purchasers of original software have little knowledge of how a computer works. These people pay good money to software suppliers for programs that will in some way save time, reduce mistakes, or increase productivity. Waiting for a company to send a replacement disk is at best an inconvenience and may spell disaster for a person or company that has come to rely on the program.

The pirate, on the other hand, is as cunning as a fox and patient as a saint. He views a protected program as a challenge. The better the protection scheme, the sweeter the taste of victory when it is broken—and there is no protection scheme available that cannot be broken! When the program is rendered defenseless, the pirate will move on to another challenge. For this reason, it is not in the best interest for software suppliers to protect their software and it is not in the best interest of users to purchase protected software.

James S. Schaefer
33 Jackson Road
Berlin, NJ 08009

Pathos in Advertising

First let me say that I feel the recent letter on copying locked software should have been printed as you did, without the author's name. The issue is whether as users we have rights to the software we purchase as opposed to the rights of the authors of the software.

As both an end user and a programmer, I have a tremendous amount of compassion for both sides of the question. My personal solution to the problem is to enclose a picture of my little boy with every program sold. I will also enclose a note begging people not to make illicit copies of the program or I will not be able to feed my little boy.

At prices that are competitive, I have to sell many programs to recover development time. I also need a good product that I can stand behind and support. You are important to me as a customer, so I won't lock your software. Your success in using my product directly relates to my success.

One last comment is directed to the morally concerned at 80 Micro. You had to be kidding when you said some of the editorial staff who are of "conservative inclinations felt that to publish (the letter) would be to condone and promote an illegal (and perhaps immoral) act." A fascinating viewpoint when your magazine carries advertising for companies that promote programs that unlock other software. Your moral considerations are inconsistent and hypocritical to say the least. I applaud the side of the editorial staff that won and published the letter.

Gary A. Shade
3847 Galesburg Court
Arlington Hts., IL 60004

Positive Piracy

I have some pirated programs, but I also purchase software regularly, often after using a pirated copy. I probably would not have purchased some of the programs if I hadn't had an opportunity to try the pirated copies. In those cases, pirating was a form of advertising. In other cases, I have to say, "I'm glad I didn't pay money for this!"

I doubt that authors will stop writing software because of piracy; a good author will keep writing and keep selling because his next program will be better than his last. While piracy undoubtedly takes its toll in uncollected royalties, the prolific author can even benefit from having his programs widely circulated as more people are introduced to his work.

Protecting a disk or tape ought to be an author's prerogative. However, as a purchaser, I should be told in advertising whether a program can be backed up, as this is sometimes a factor in making the decision to buy a particular program. There is software I haven't purchased simply because I knew it was protected and I wanted to be able to back it up. In this case, protecting a disk kept an author from getting his royalty.

Tom Kilbridge
4117 Lyle
Waco, TX 76710
The Too New PC-2

I look forward every month to receiving each new issue of 80 Micro. I am hoping for more PC-2 coverage. I realize PC-2 is new, just like the Color Computer was last year, so maybe I need to be patient. I hope this information arrives sooner, not later.

Doyle R. Painter, Jr.  
311 Fury's Ferry Road  
Martinez, GA 30907

Unfortunately, we have received only a couple of articles about the exciting new Pocket Computer. Author Tim Daniel will reveal many of the secrets of the PC-2 in a future issue. Anybody out there care to help?—Eds.

Find the Line

On Break GOTO—now, there’s a good idea (80 Micro, November 1982, p. 390). Everybody who has used a TRS-80 has wanted this function. However, there may be a better way. The method used by SFC Donais intercepts the break vector at 16396, directs control to the sergeant’s patch, which rectifies the stack and returns control to the Basic command processor with HL pointing to the first line of the program.

Basic then takes over, and, with a couple of tests, directs program flow to an appropriate Break-handling line of Basic. Wouldn’t it be better to return control to Basic at the appropriate line? All we need to do this is the address of the beginning of that line.

As it happens, there is a ROM call that finds the beginning of a specified line, at 1B2CH. This is a fairly straightforward call. The DE register is loaded with the number of the line being sought, the call is made, and, on return, BC contains the address of the first byte in the line. If the line doesn’t exist, control passes to the Basic error handling routine. The procedure would be:

- Call 1B8FH to rectify the stack.
- Load DE with the line number sought.
- Call the line finder at 1B2CH.
- Decrement BC to point zero before the line.
- Transfer this address to HL.
- Jump to the command processor at 1D1EH.

Program Listing 1 is the assembler code for the routine, which takes 15 bytes. Listing 2 is a rewrite of the sergeant’s Basic program, altered to use the new routine. By POKEing a dif-
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GREEN SCREEN WARNING

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.
- Some "cheap" brand 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.
- Some "cheap" brand is in fact just the opposite. One of the Green Screen's major benefits is to increase the contrast between the text and the background.
- "Eye-strain" Most are using adhesive strips to cover the screen to the monitor. This method makes it awkward to remove for necessary periodical cleaning. All (except ours) are flat. Light pulls with 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). We have done our homework and we think we manufacture the best Green Screen. Here is why:
- Fits right into the picture tube like a skin because it is the only DURABLE SCREEN MODIFIED exactly to the picture tube curvature. It is cut precisely to cover the exposure area of the picture tube. The fit is such that the static electricity is sufficient to keep it in place with adhesive strips included in your package or reusable tape for a more secure fastening.
- The filter material that we use is just right. Not too dark nor too light. The result is a really eye pleasing display. We are so sure that you will never have your green screen off that we offer an unconditional money-back guarantee. 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, who are selling mainly by mail should insist their street addresses/streets upon a phone number (for questions and orders or accept CODs) not every one likes to send checks to a P.O. box (possibly the convenience of charging their purchase to major credit cards). How come are we the only green screen people doing it? Order your ALPH A GREEN SCREEN today.

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different line number into START +4 (LSB) and START +5 (MSB), the routine can be made to seek any line number existing in the Basic program.

By setting the variable Break to a value dependent on the portion of the program being executed, and directing the Break-handling routine to a line containing an ON BREAK GOTO NNN, NNN, NNN statement, a press of the break key can be made to have different responses depending on where the program was when the key was pressed.

J. Stewart Schneider
2813 Louisa St.
P.O. Box 365
Caylettsburg, KY 41129

Adapting to the Future

Sure, computers can help our educational system, which is in terrible shape, but Wayne Green is a dreamer. The idea behind a proper liberal arts course is not to teach students to appreciate trees, although there is nothing wrong with that. The idea is to help these students develop thought processes and problem-solving abilities. This way, when Mr. Green's technical students find that their field has turned over so fast that the techniques they learned only two years ago in his industrial park are already outdated, they will have the ability to adapt to changes in technology that were unforeseen.

James Magliano
462 West 6 Ave.
Roselle, NJ 07203

Bugs in the Board

In your August 1982 issue of 80 Micro, Dennis Kitsz published a PC card layout for the Radio Shack Color Computer. As an avid user of the 6809-based machine interested in generating my own specialized PROM boards, I had a prototype board made. Lo and behold, it didn't work. After many hours of debugging, the corrections for the published layout are as follows:

- The edge connector is not to the proper scale (0.100") and could short out one's Color Computer if any further reductions are made, or if the total edge connector size is not correct.
- The traces as published are too fine for easy photocopying. My board had several micro-cracks in the traces which had to be found with an ohm meter.

The 74LS138 (p. 348) is in backwards.

- A hole should have been provided for the cartridge interrupt self-start function (edge connector pins 7-8).

And now for the most serious bugs (see Fig. 1):
1. The trace to the edge connector pin 37 should be cut (see Fig. 2).
2. Cut the trace from the edge connector pin 20. Pin 20 is mistakenly connected to pin 19 in the drawing; this shorts A0 to A1 thereby the CoCo will not work.
3. Add a jumper from the plate-through hole below where the trace was cut in 2 above to (2k ROM C, 4k ROM D) pin 7.
4. The plate-through hole under (2k ROM A, 4k ROM C) does not connect to the IC socket pin 15. A short piece of wire soldered in the hole will make this connection.
5. With the component side up, on the edge connector, on the right side, solder a small jumper from the next to the last terminal to the hole above it and to the right.

With the above corrections made, I have successfully made the prototype board work with both 2716s and 2732s, fully populated. The lesson I learned was not to believe all that is published. We are designing our own Color Computer board with plans to hold four 2716s, four 2732s, two 2764s or one 27128.

G.W.J.K., Jr.
The Irishman's Software
P.O. Box 119
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Kitsz Comments

I'm sorry G.W.J.K., Jr. met with so much difficulty. I did double-check the published material against my own; see the Updates in this month's "Applications" for an offer to readers.

As for G.W.J.K.'s comments: My film negatives are to the proper scale of 0.1 inch, derived from 2x originals. The size error, as well as the ink dots, scratches, and blurring, was introduced during the production of the magazine, something beyond my control. The traces, however, photocopy just fine on my machine; such detail was required for the board to fit in Radio Shack's plastic case. I did reverse the 74LS138 in redrawing the parts overlay from my pencil copy.

G.W.J.K.'s five board corrections will work. I would like to offer an apology and an explanation to readers who may have been frustrated by my errors. The electronic design, two wire-wrap versions, four sets of original PC artwork and three prototypes were done and updated. The final prototype was made for me by the company who intended to sell the ROM board. I was told they had the board working; however, I failed to ask if they had made final corrections, and I further neglected to examine the prototype when I received it. My last set of artwork, which still contained errors, was sent in for publication. That company went out of business last month.

I, too, have learned a lesson from this experience. Although this is the first PC layout with flaws that has appeared in print, it is the last PC layout I will produce for publication. Future articles will contain only the schematics; however, PC boards will still be available for each project, and I will give a source for them.

Dennis Kitsz
Green Mountain Micro
Roxbury, VT 05669

Secret Slip

I enjoyed James T. Demberger's "I Have a Secret" program (80 Micro, October 1982, p. 296). My complaint with the article is that Mr. Demberger implies that an exclusive OR (XOR) logic function could not be constructed within Level II Basic without the use of machine code. This is absolutely false! Level II Basic contains three logical operators: NOT, AND, and OR. With combinations of these three operators, any logic function can be simulated.

The XOR logic function can be simulated by taking two inputs and ANDing them with each other's inverse, then ORing the result. To test the XOR function, type and run Program Listing 3 or 4. Listing 3 displays the XOR truth table and Listing 4 is a short crypto cipher/decipher algorithm.

William T. Faulkner
5350 N. Lover Lane Road
Milwaukee, WI 53225

Printer Problem

I would like to share with 80 Micro readers a problem I've encountered with the Model III and the Okidata Microline 83A printer. In Basic, a line feed is often done by using the LPRINT statement; however, this will not work with the Okidata 83A because of an apparent error in its ROM. A technician at Okidata indicated that the company was aware of the problem and that a new ROM would be issued sometime in the future.

When using LDOS 5.1.2, NEWSOS 1.3, Level II, a line feed can be issued by using LPRINT or LPRINT's, but neither statement will work when using DOSPLUS 3.4 or MULTIDOS 1.1 with the Okidata 83A.

While most of our software was easily adapted to conform to the statement that the printer would accept under LDOS, Newscript 7.0 refused to eject the page or to issue line feeds between paragraphs. The people at ProSoft stated that they had not been aware of this difficulty; because the program had performed well with a Microline 80, it was assumed that it would work with the 83A. While ProSoft was willing to find a fix for the problem, I was unwilling to wait and found that Newscript will run under LDOS or DOSPLUS if the following statement is appended to line 7340 of the Script module:

:LF$ = CHR$(10)

Although not an official fix from ProSoft, this has enabled us to use the word processor without difficulties.

Any prospective buyer of the Microline 83A, which I still consider an excellent printer, should be aware of the line feed idiosyncracy and its possible incompatibility with two of the major operating systems.

Ernest Stefanik
Fax Plus Computing
373 Wilson St.
Derry, PA 15627
Convert to CP/M and Save.

Unprecedented Sale for Model III Owners. Call for Details.

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.

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 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.

CP/M Acquires Unprecedented Support.

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 280 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.

Plan Ahead.

The Omikon "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 Omikon "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 — Omikon offers you more than ever before.

COUGAR ... Omikon'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, Omikon has formed Cougar, our official users group. Through Cougar, Omikon 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.

Omikon Puts It All Together.

Omikon has sold more CP/M conversions than all of our competitors combined. Omikon was the first in the market with a CP/M conversion. Omikon has continued to lead the market for one simple reason — our total commitment to our customers. Only Omikon offers a "Works" type introductory package. Only Omikon 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 Omikon, you buy from a company with a proven record of dedication and success.

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TRS-80™ Radio Shack/Tandy Corporation
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CBASICII, CP/M™ Digital Research
What Model II?

I recently subscribed to your magazine and found it very entertaining. A better name for your publication, however, might be 80 Micro for the Model I & III. What I would like to see in your magazine, as you may have guessed, is more on the Model II.

Wayne C. Bucklaew
700 Etheridge Road
Chesapeake, VA 23320

Starting in March 1983, we will publish Model II versions of many of the Model I/III programs that appear in each issue. The conversions are being made by our technical staff and a cadre of 80 Micro authors who specialize in Model II software. In addition, we remain vigilant in our efforts to obtain high-quality articles on the Model II.—Eds.

Controversial Definition

As a senior Telecommunications Analyst, I could not believe Jay Chidsey’s definition of baud (80 Micro, October 1982, p. 96). It does not mean “bits of audio data.” Emile Baudot’s name is the source of the term; he created a five-level code for data transmission many years ago, after Samuel Morse created the Morse code.

The correct definition of baud is: “The number of signal level changes per second regardless of the information content of those signals.” A modem (MODulator/DEModulator) clocks at a certain speed; that is, the timing inside the modem changes signal levels at a preset speed. The clock must time at the speed of the data being transmitted or faster. The faster the clock, the faster data can be transmitted. This does not mean that baud and BPS (bits per second) are the same. A modem can clock at 4800 or 9600 baud, but data will be transmitted at 1200 or 2400 BPS. The only time baud and BPS are interchangeable is at the speed of 1200 BPS or less. That is because the modems at those speeds usually clock at the same rate as the data. The correct way to refer to data transmission speed is by the term BPS, not baud.

I discovered a second error in Mr. Chidsey’s reference to processor speed. The speed of a computer is never rated in terms of baud. Computers, either micros, minis, or large mainframes such as IBM’s 303X series, are measured by the time it takes to execute a single machine code instruction. The term for this is IPS, Instructions Per Second. A mainframe like IBM’s 3033 Model N is rated at a speed of about 3.6 MIPS. This means that the computer can execute 3.6 million instructions per second. Another method of comparing processors is by rating it against a benchmark machine, in this case the IBM 370/158 Model 3.

Chuck Bolvin
1234 Valley Lake Drive, Apt. 542
Schaumburg, IL 60195

Chidsey’s Response

First an explanation, which is not intended to serve as an excuse. The idea of the “Bit Smitten” column was to assign a person who had writing experience and some familiarity with a TRS-80 the task of recalling questions he had in the early part of the experience of working with the computer, and then to research answers and, with the back-up of technical people on the 80 Micro staff, write columns based on this research and on simple tips for newcomers to the micro field. “Bit Smitten” is a researched column, not one written by a computer expert. That is, however, no excuse for passing on false or inadequate information.

Mr. Bolvin’s description of the derivation of the word baud is persuasive, but I must protest to him that all three of the other authorities checked ascribe the term to “bits of audio data.” Reference to a standard work, Computer Dictionary and Handbook by Charles Sippl, Howard W. Sams & Co., Indianapolis, Kansas City and New York, confirms Mr. Bolvin’s point without question.

Further checking, with Mr. Bolvin’s assistance, reveals that Emile Baudot created a five-level (or five-bit) code for use in automatic telegraph transmission (teletype). By making use of shift option, two sets of 32 characters were possible: a total of 64. The Baudot code was, however, little used in America. Donald Murray created a five-bit shifted code, which is used here. American microcomputers use the eight-bit ASCII code, and are now in the process of moving to 16-bit code.

Baud and BPS are used loosely and incorrectly as synonymous by some manufacturers and advertisers of peripherals, such as modems. The rule of thumb appears to be that information on big machines, directed toward technicians, uses BPS in describing data transfer rates, and information on micros, directed toward businessmen and hobbyists, uses baud rate.

I was clearly wrong in using baud to refer to IPS as a measure of speed of execution for a single machine-code instruction within a computer. I stand abashed and instructed.

Jay Chidsey
205 East Adams St.
Green Springs, OH 44836

Subscription Solution

I am shocked by the flippant answer given by your editors to Mr. Hoover (80 Micro, December 1982, p. 20). Your subscribers deserve better. If it had been me, I would have complained to the postal service about mail fraud.

L.J. Kuten
201 South Central
P.O. Box 16185
St. Louis, MO 63105

It was not our intent to be flippant. We responded to Mr. Hoover’s problem as quickly as possible, and resolved it three months prior to the publication of his letter. Our first priority is to serve our readers, and such matters therefore receive immediate attention. We published Mr. Hoover’s letter because we were impressed by (and grateful for) the humor with which he handled a very unusual situation, and we wanted to share that humor.—Eds.

Earning Our Keep

It’s articles like the one Dennis Kitz wrote in the October 1982 issue (80 Micro, “Applications,” p. 368) that keep me a faithful subscriber. The most-used keys on my machine, 1 and space bar, had long since stopped responding to my cleaning efforts, and were working so poorly that it seemed a trip to the Radio Shack Repair Center was inevitable. Since my Model I has been heavily modified, taking it back is not something I undertake lightly, but I couldn’t figure out what the problem was.

Then along came the October issue and there was the answer! Sure enough, there were tiny cracks in the solder connecting the key contacts to the board, just as Dennis said. In a matter of
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NEWSCRIPT'S 277 page manual contains an introductory tutorial with explanations of the beginner's most common needs, a "How to Section" to help when you're stuck, a fully alphabetized description of the commands with literally hundreds of examples, a topical index with over 1,300 entries, and a handy quick-reference card (naturally).

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*Some features work only if your printer has the mechanical capability.
minutes my four year old keyboard was working like new.

I probably would never have thought of looking at the Radio Shack technician would have either; it's tough to catch. As a result, that article saved me somewhere between the minimum $15 labor charge and $75 for a new keyboard. When you also figure the time it saved me (taking the machine apart and at least one round trip of 1½ hours to the nearest Center and back), you can see how that one article easily paid for at least a whole year's worth of magazine.

Jim Unwin
18022 Valley Vista
Mulino, OR 97042

Leaning on the Lamp Post

Program Listing 5 is a modification on "Drunkard's Walk" (80 Micro, October 1982, p. 97). It provides an interesting holding pattern for those moments before inspiration strikes.

Information, at least in English, is hard to come by over here in Germany and you fill the bill for TRS-80 owners. I'm also pleased at the response time on your reader service card and of several of your advertisers.

Richard W. Stubbs
HHC, V Corps (G3)
APO NY 09079

Tandy Bonus

Despite all the warnings given in your fine magazine, I recently managed to destroy my TRSDOS system disk. Last Saturday I headed for my local Tandy store, where I have received superb service since buying my Model III 15 months ago. I duly purchased a replacement disk and received the expected lecture on how not to do what I had done.

On arriving home I booted the disk and found that not only did the directory show the usual LPC/CMD, HERZ50/BLD, etc., but full working copies of several disk dump programs and Big Five's Defense Command. I have read that Tandy is soon to start merchandising non-Tandy software, but did not think that this was the intended modus operandi!

Bryan W. Carter
219 White Oak Ridge Road
Short Hills, NJ 07078

TRSDOS Patches

The following are three patches that I came up with, but I have not seen any of them published. These patch bypass the logo and copyright displays on TRSDOS when the system is reset. The last patch was written by John Ratzlaff and appeared in the September issue. These must be typed in exactly as they appear and are used on version 1.3 of TRSDOS.

```
0  *** IDLER
1  *** ADAPTED FROM: 'DRUNKARDS WALK' (80 MICRO/OCT 82, PG 97)
2  *** BY: DICK STUBBS (HHC, V CORPS =G3 APO NY 09079)/6 OCT 82
3  *** FOR: SRS-80 MOD III (48K) (TRSDOS 1.3)
10 X = RND (127) : Y = RND (47)
20 CLS : SET (X, Y)
30 Z = RND (2)
40 X = X + (RND (2) - 2)
50 Y = Y + (RND (2) - 2)
60 IF X > 1270 OR X < 0, 10
70 IF Y > 470 OR Y < 0, 10
80 IFPOINTER (X, Y) = 0 ELSE SET (X, Y)
90 RANDOM
100 Z = INKEY$: IF Z$ = "", 30 ELSE CLS
110 PRINT@527, "< B >ASIC or < T >RSDOS?": I$ = INKEY$: IF I$ = "1"
120 IFI$ = "1" CLS : END
130 CLS : END
```

Program Listing 5

The first patch changes the present LD mnemonic to JP for a jump to the memory location specified by the second and third patches. The fourth patch bypasses the time and date input for the system. If you want to change the system back to the original specifications, redo the patches but switch the values for FIND and CHG of each patch.

Hermes S. Mendez
Forest Lake Academy
P.O. Box 157
Maitland, FL 32751

Inside Information

Those of you who are interested in contacting Craig Lindley concerning his "Inside Scripsit" articles (80 Micro, September, October, and December 1982), can call him in the evenings at 303-685-1786. Craig has received over 75 letters already. Unfortunately, he cannot respond to each one individually, but he'll be glad to discuss the articles with anyone who calls.—Eds.
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Stringy Floppy is a trademark of Exatron Corporation
Engineering Software

Can someone give me the name and address of a software distributor that is interested in programs for engineering applications?

John A. Henson, II
2011 Dawn Heights Drive
Lakeland, FL 33801

Looking for Software

I am looking for software for my Model III 48K that will let me use the cassette port from a communications receiver to input CW and translate to ASCII and display/print. This will be used for monitoring only since I don't have a ham license.

Also, I need to find someone locally who has The Last One program-generator package, and who would be willing to answer some questions I have about the operation and the efficacy of a $600 program generator.

Alfred Kohlberg, Jr.
Communications Service Company
5706 84th Avenue
New Carrollton, MD 20784
(301) 577-2023

DDC Problems

I have a System 80 with the expansion interface that has an RS-232 port and S100 capability (this is the Australian version of the American marketed PMC 80). Recently I bought the Aerocomp DDC to give me double-density capability, and found that it was not compatible with the System 80 interface.

I would appreciate information from anyone who has managed to get the DDC working in a System 80 expansion interface, the similar PMC 80 system, or in the Video Genie 80.

R.A. Ivory
P.O. Box 3230
Christchurch, New Zealand

Typing Blind

I recently purchased a Modem I with cassette software, and an extra cable to hook up the modem through the cassette port of my TRS-80 Model I. I did this so I would not have to purchase an expansion interface or an RS-232 to communicate with my school's IBM 370. There is, however, one problem. If I type in a program line, I can't see it until I list it afterwards. Also, there is no carriage return.

Has any other reader had this problem? How can I correct it? Note that the system at school is running in the half-duplex mode. Could it be a problem with the IBM 370 sending machine?

Christopher Inguaña
23-06 21st St. Apt. 6J
Astoria, NY 11105

Converted Program Wanted

I would appreciate a listing from anyone who has successfully converted the Cassbox program by Charles E. Gillen (November 1982) to work with a Model III, and an Epson MX-80 with Graftrax-Plus. I can't get the printer to print double-wide characters on the front panel.

If anyone has figured out how to use the Epson control codes while using the cassette Scriptisp, or if anyone knows of a good patch program, I'd like to hear from you. I want to be able to change codes while using Scriptisp.

Larry E. Ierley
923 Thistle Road
Elizabethtown, PA 17022

Parts and Ribbons

In response to Bryan Headley's question (Aid, November 1982), parts and ribbons for the Base 2 Model 800 printer (printer mechanism only) can be obtained from the OEM, Two-Day Corporation, 203 East Main Street, Riverton, WY 82501 (307) 856-1111. Ribbons are $9.95 each plus shipping.

Computer Peripheral Repair, 1483 East Warner Avenue, Santa Ana, CA 92705, has made exclusive arrangements with Base 2 Corp. to support all repair work with factory-trained personnel, and to stock all major replacement parts. Minimum charge is $50 plus parts.

Neither company accepts credit cards, though the Two-Day Corp. will ship C.O.D.

Roger Parish
1712 Anna Rose Drive
Belleville, IL 62221

Police Need Help

I am interested in finding a program that will aid me in the scientific reconstruction of automobile accidents. I have a Model II with two disk drives. Can someone help?

Sgt. Michael J. Capman
Crown Enterprises
823 Parchment Avenue
Parchment, MI 49004

Programs for the Handicapped Needed

We at the Cheshire Home for the physically handicapped are building a program library for disabled computer users. We are looking for new programs to add to this library. We already have several Apple, PET, and TRS-80 programs. Does anyone have any programs of this nature for the ZX series of computers?

The program scope is unlimited, but please remember that many handicapped operators have restricted vision, so the display needs to be extremely clear.

Robin Nixon
Seven Springs Cheshire Home
Pembury Road,
Tunbridge Wells, Kent
England TN2 4NB

Instruction Booklet Wanted

I am desperate! I need a copy of the instruction booklet for the Voxbox (Catalog #26-1181). I bought this from a Radio Shack store about a year ago, and have been trying ever since to get the booklet. Can anyone help me?

John Marcinisen
230 Cedar Road
East Northport, NY 11731

Route Problems

I recently purchased a Model III with
the intention to use both the parallel and serial outputs directly to the matrix and daisy-wheel printers. To my dismay, I found that the serial driver cannot be used since the Route command does not function properly on the current DOS system.

Does anyone have a solution? I don’t want to give up my Model III.

Stanford L. Hart
22110 Napa St.
Canoga Park, CA 91304

Coding Wand

Can anyone provide hardware and software information for using a low-cost bar-coding wand with the TRS-80 Model III? I intend to use this system for inventory control and batch number record keeping.

Jerry Ellis
Laboratory Service Company
P.O. Box 7526
Clearwater, FL 33758

Needs Help

I am trying to interface a TRS-80 Model III with two additional video monitors for use in a press operation at a motorsports facility. Any help in obtaining either a circuit or an interface box to perform this function is appreciated.

Michael F. Hollander
Racing Information Systems
7317 Haskell Avenue, Suite 214
Van Nuys, CA 91406

Thus, we will continue to accept advertisements that offer programs to back up protected software.

Furthermore, we feel strongly that whether a program is protected has become an important buying consideration for many consumers. Thus, we are encouraging our writers to include this information in their reviews. We will also solicit such information for our buyer’s guides.

We hope that such steps will eventually become unnecessary. We would like to see a healthy and trusting relationship develop between microcomputer users and manufacturers. The computer users have made their feelings known in no uncertain terms. It is now up to the manufacturers to respond.

—E. M.

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**“Practical” Corrections**

The gremlins are at it again! My article “Practical Regression Analysis” (November 1982) contains three errors that might cause confusion.
- The probability subroutine found on page 102 is incorrect. The proper version is:

```plaintext
2790 ' PROB
2800 DX = D1:DY = D2:DZ = D2:FF = F:IF F<
1 THEN DY = D1:DX = D2:DZ = D1:FF = 1/F
2820 DD = (FF(1/3)*(1 - DY) + DX - 1)/SQR
(FF(2/3)*DY + DX)
2830 IF DZ=<4 THEN DD = DD*(.08*DD4/DZ(3 + 1))
2840 FP = .5/(1 + DD*(.19685 + DD*(.11519 +
DD*(.000344 + DD*.00953)))/4
2850 IF F>1 THEN FP = 1 - FP
2860 RETURN
```

- At the end of page 103, there is a “Listing continues” note. Actually, this is the end of the listing; there are no missing lines.
- The legends on page 106 are switched for Figs. 7 and 8.

**Delmer D. Hinrichs**
2116 S.E. 377th Avenue
Washtouga, WA 98671
(206) 835-2983

**Poker Correction**

Thanks to Karl Weeks, I have found a couple of errors in my “Casino Draw Poker” game (November 1982). The game doesn’t recognize either the royal flush or the four-of-a-kind. Since I have never gotten either, I didn’t realize the problem existed until Mr. Weeks informed me of it. To correct the problem, change line 8120 to:

```
8120 IF (FF = 1) AND (CS(5,1) = 13) AND
(CS(4,1) = 12) AND (CS(3,1) = 11) AND
(CS(2,1) = 10) AND (CS(1,1) = 1) THEN WV =
9: GOTO90000
```

You must also change the WT = 7 in lines 8140 and 8150 to WV = 7.

**Ron Balewski**
412 East Ridge St.
Nanticoke, PA 18634
(717) 735-3736

**Model III Grafrax**

There are several bugs in the listings of Thomas McNamee’s “Grafrax 80” article (September 1982).
- In line 370 a test is made for printer ready by PEEKing at location 14312 to see if it is “61.” This will not work on my Model III. The number should be 63.
- The count for the number of codes, and the codes themselves, are sent out to the printer using the CHR$(X) function. Unfortunately, Basic will not send out codes of 0, 10, and 12. I recently realized that the printer was connected as a port, and that I could use the OUT &HF8, X (or in decimal, OUT 248, X) command. This results in the following changes in lines 530-540:

```
530 LPRINT CHR$(125); " ;CHR$(27);"L"
531 OUT &HF8, CC
533 IF PEEK (14312)<63 THEN GOTO 533
535 LPRINT CHR$(255); 537 FOR T=1 TO CC: OUT &HF8, G(T)
538 IF PEEK (14312)< 63 THEN GOTO 538
540 NEXT
```

The program comes close to the correct aspect ratio for the 960 density, but is far off for the 480 density, which I use. This can be improved by modifying the program to light two horizontally adjacent pixels, and then testing X two steps at a time.

**Donald Wade**
35-41 72nd St.
Jackson Heights, NY 11372
(212) 672-6399

**Case Dismissed**

I have had many phone calls and letters concerning the September Debug on how to connect the plotter in my “Digital Doodles” article (January 1982) to the computer. The following information will help answer these questions:
- On the left side of the schematic, the inputs to the three inverters labeled 0, 1, and 2 go to the address lines 0, 1, and 2. The gates labeled 04 are 74LS04s, and those labeled 02 are 74LS02s. All the plotter software is written to use output port #2 (second 74LS373 from the top). The other three ports are not needed. The reason for the other three ports is that this is the schematic for the I/O ports I use to make sure that it will work. The 74LS373s are no longer stocked by Radio Shack, but they are still sold by many advertisers in 80 Micro.

- If you have access to the address and data lines, I don’t see why the hardware should not work on a Model III. Most of the software is in Basic so there should be no problem, though the one routine in machine machine may have to be changed.

*Alan Sehmer*
150A Lorretta Drive NW
Corrals. NM 87048
(505) 897-0955

**Lucky 13 Fix**

I encountered an error in Carl Bevington’s article “Tee for Six” (August 1982). To play the game Lucky 13 correctly, change the 211 in line 800 to 212. Without this change a move from B to K is allowed, but the correct legal move from B to L is read as incorrect.

*Hal Smith*
1334 Keith Drive
Colorado Springs, CO 80916

**Tax Estimator**

I have received several letters concerning my “Income Tax Estimator” article (October 1982). I would like to clear up some of the questions raised by readers.
- The data used in the sample was randomly chosen for illustrative purposes, and did not represent real numbers for any particular individual. (I am not naive to allow 100,000 readers to peruse the numbers in my own return.) Given correct data, the program does produce correct results.
- The program was originally written in 1980, and submitted to 80 Micro in 1981. Minor revisions to update to 1981 tax rules were made in 1982. Given the lead time for magazine publishing it is impossible to ensure that any tax program will still be correct by the time it is published.
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The program was written so that it acts as a summary program. It serves to keep track of each item, and provides a running computation of the entered data. Providing that the user makes intelligent decisions as to what to list and deduct with the new regulations in mind, the program will still provide the correct results.

Concerning the absence of the self-employment schedule SE: This particular version was developed for the case where neither husband nor wife are subject to SE tax, because Social Security payments are fully covered by their income from wages. Since this is not the general case, the following lines should be added to the program:

1561 IF C1<400 THEN GOTO 1570
1562 PRINT "WITH SCHEDULE C INCOME OF $": C1
1563 PRINT "YOU MAY BE SUBJECT TO SCHEDULE SE, CALCULATE"
1564 PRINT "ANY SELF-EMPLOYMENT TAX AND ENTER IT NOW."
1565 INPUT S1
1566 D=S1: KS=""SELF-EMPLOYMENT"

Golf Fix
Helpful callers have identified a few errors in the coding of my "Callaway Golf Scoring Program" (May 1982). The changes are as follows:

1220 L=0:L1=0:P1=0:IF SH<>1

On page 320 of our Anniversary 1983 issue, we published an article by Charles Knight entitled "Directory Information Please" without the Program Listings. They are printed below. We apologize for the oversight. —Eds.

Program Listing 1

<table>
<thead>
<tr>
<th>Line</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>REM &quot;***************************************************************************&quot;</td>
</tr>
<tr>
<td>02</td>
<td>REM *** &quot;MAGIDEX Disk directory Management ***</td>
</tr>
<tr>
<td>03</td>
<td>REM *** program by Charles P. Knight ***</td>
</tr>
<tr>
<td>04</td>
<td>REM *** &quot;COPYRIGHT (C) 1982 - ALL RIGHTS RESERVED ***</td>
</tr>
<tr>
<td>05</td>
<td>100 REM *** &quot;Version 1.2&quot;</td>
</tr>
<tr>
<td>06</td>
<td>120 REM &quot;***************************************************************************&quot;</td>
</tr>
<tr>
<td>07</td>
<td>140 CLEAR2000</td>
</tr>
<tr>
<td>08</td>
<td>160 ONERRORGOTO260</td>
</tr>
<tr>
<td>09</td>
<td>180 OPEN 1,&quot;1,&quot;TRANSFER/DAT&quot;</td>
</tr>
<tr>
<td>10</td>
<td>200 INPUT1,VR,DS,DS1,IN,KTS</td>
</tr>
<tr>
<td>11</td>
<td>220 CLOSE</td>
</tr>
<tr>
<td>12</td>
<td>240 GOTO280</td>
</tr>
<tr>
<td>13</td>
<td>260 IF ERR=186 THENRESUME28 ELSE PRINT &quot;UNRECOVERABLE ERROR&quot;;CHD&quot;E&quot;:</td>
</tr>
<tr>
<td>14</td>
<td>PRINT &quot;PROGRAM ABORTED&quot;;STOP</td>
</tr>
<tr>
<td>15</td>
<td>280 ONERRORGOTO0</td>
</tr>
<tr>
<td>16</td>
<td>300 G1=&quot;&quot;</td>
</tr>
<tr>
<td>17</td>
<td>320 CLS;PRINT09,&quot;&quot;Disk Directory Management Program Master Menu&quot;;</td>
</tr>
<tr>
<td>18</td>
<td>340 PRINT067,&quot;&quot;Requires L.D.O.S. operating system and at least 2 drives&quot;;</td>
</tr>
<tr>
<td>19</td>
<td>360;IFD2&lt;1 THENNC=&quot;No data in system at present - select option n 1&quot;ELENCNS=&quot;Disk containing directory data should be in drive 1:&quot; +RIGHTS(D2S,1)</td>
</tr>
<tr>
<td>20</td>
<td>380 PRINT128+32-(LEN(NCS)/2),NCS;</td>
</tr>
<tr>
<td>21</td>
<td>400 PRINT192,STRINGS(64,143);</td>
</tr>
<tr>
<td>22</td>
<td>420 PRINT128,STRINGS(64,143);</td>
</tr>
<tr>
<td>23</td>
<td>440 PRINT&quot;[1] Enter more disks&quot;</td>
</tr>
<tr>
<td>24</td>
<td>460 PRINT&quot;[2] Sort Directory data file&quot;</td>
</tr>
<tr>
<td>25</td>
<td>500 PRINT&quot;[3] Print results&quot;</td>
</tr>
<tr>
<td>26</td>
<td>520 PRINT&quot;[4] End program&quot;</td>
</tr>
<tr>
<td>27</td>
<td>540 PRINT0320,CHR$(191);PRINT0433,STRINGS2,2191);PRINT0447,STRINGS2,2191);PRINT0457,STRINGS3,2191);</td>
</tr>
<tr>
<td>28</td>
<td>PRINT0439,CHR$(191);</td>
</tr>
<tr>
<td>29</td>
<td>560 PRINTSTRINGS(64,143);</td>
</tr>
<tr>
<td>30</td>
<td>580 PRINTTAB33,&quot;&quot;Copyright (C) 1981 by&quot;</td>
</tr>
<tr>
<td>31</td>
<td>600 PRINTTAB33,&quot;&quot;Charles P. Knight&quot;</td>
</tr>
<tr>
<td>32</td>
<td>620 QQ=330</td>
</tr>
<tr>
<td>33</td>
<td>640 PRINT0903,&quot;&quot;Do not press &lt;ENTER&gt; after entering menu selection n:&quot;;IFD2S&lt;1 THENPRINT0704,&quot;&quot;Number disks in file 1:&quot;;IN1=&quot;&quot;;ELSEPRINT +INITB404,&quot;&quot;File not initialized!&quot;</td>
</tr>
<tr>
<td>34</td>
<td>660 IFKTS1=&quot;&quot;THENPRINT0973,&quot;&quot;Library of: &quot;:;KTS1;</td>
</tr>
<tr>
<td>35</td>
<td>680 PRINT0976,&quot;&quot;Enter selection please;&quot;</td>
</tr>
<tr>
<td>36</td>
<td>700 CK=5</td>
</tr>
<tr>
<td>37</td>
<td>720 IFCK=0 THENRESUME28 ELSE IFKTS1=&quot;&quot;THENPRINT0975,IKS;:IFKTS1=&quot;&quot;1&quot;ORIKS=&quot;&quot;4&quot;THENPRINT0978=VAL (IKS);GOTO840</td>
</tr>
<tr>
<td>38</td>
<td>740 IFCK=0 THENRESUME28 ELSE IFKTS1=&quot;&quot;THENPRINT0975,IKS;:IFKTS1=&quot;&quot;1&quot;ORIKS=&quot;&quot;4&quot;THENPRINT0978=VAL (IKS);GOTO840</td>
</tr>
</tbody>
</table>

Listing 1 continues on p. 392
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<table>
<thead>
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<th>PARALLEL</th>
<th>SERIAL</th>
<th>PRICE</th>
</tr>
</thead>
<tbody>
<tr>
<td>82A</td>
<td>120</td>
<td>STD.</td>
<td>STD.</td>
<td>$494.00</td>
</tr>
<tr>
<td>83A</td>
<td>120</td>
<td>STD.</td>
<td>STD.</td>
<td>$765.00</td>
</tr>
<tr>
<td>84</td>
<td>200</td>
<td>$1169.00</td>
<td>$1295.00</td>
<td>--</td>
</tr>
<tr>
<td>2350</td>
<td>350</td>
<td>$2405.00</td>
<td>$2765.00</td>
<td>--</td>
</tr>
</tbody>
</table>

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Fig. 6a. Memory board part placement and external connections. See Fig. 6b for U27 placement. Drill a 5/16-inch hole at the + location to allow passage of a keyboard housing post through the board. The large donut in the lower right corner denotes a board attachment site if the 32K mod will not be housed in the keyboard cabinet. Note that pin 1 orientation of ICs U9-U16 is opposite to that of the other ICs.

Fig. 11. Noise-suppression component placement. Install these after soldering ribbon cable to the other side of the PC board. Intall C23-C26 close to PC board, keeping leads very short.

Above are circuit-board corrections to Philip Van Praag's "Hardware Hacker—Part II" (80 Micro, Nov., 1982, page 112).
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Hey, what’s this? Mmmm. Looks like some kind of box. Let’s take a closer look. Hey, it’s a soapbox. It looks very familiar. Friendly even. I wonder what’ll happen if I stand on it. Whooooo....

All I want is to be left alone. Just leave me in front of a computer with an idea and an editor, assembler, interpreter, or a compiler, and I’m happy. The fact that a usable piece of software results from my efforts is merely a bonus that makes programming more attractive. I really enjoy it for its own sake.

But then, along come the prophets of doom. Many times, when I read a book or an article about programming, I get preached at. Not that anyone gets on a soapbox and pontificates, but I come away with the idea that the author wouldn’t approve of the way I do things. You see, I don’t care a fig for how my programming ideas get in the computer as long as they work. In short, I’m an unstructured programmer, and I want to stay that way.

Maybe I feel I should be left alone with my sinful ways because I program mainly in machine code, which seems to afford me a special status. But then I fancy a change of style and write something in Basic. Then a little Pascal for dessert. I love it! Make that stupid computer jump through hoops!

But then what do I see as I leaf through a Rodnay Zaks book on Pascal? A kind of pseudo-subliminal preaching. I can understand the author of a reference on Pascal taking a stand on structured programming, but this one seems to want to herd all potential programmers into the same stable. He says that perhaps 10 percent of the programming population has a natural flair for programming and has little problem in producing a working piece of software. The other 90 percent? Well, they can come out with a finished result, but only with an effort that will be the inverse ratio of the amount of structured techniques they use.

Of course, in my programming vanity, I place myself in the upper echelons of the first 10 percent and smugly face my monitor to continue entering byte after awful unstructured byte of code. But Rodnay isn’t going to let me get away with that. He trips me up with a typically structured piece of structured logic. He informs me that nearly all programmers consider themselves to be in that same 10 percent. Thanks, buddy.

Now my ego and conscience suffer as I continue to enter my nasty unstructured code. Am I really a talented programmer with a future, or just an egotistical computer hacker with delusions of grandeur? It seems the only way to be saved is to subscribe to the Church of the Pascalites and bow daily to the deity of disciplined programming. Well, no thanks.

Nobody tries that with composers or painters or sculptors, and nobody’s going to do it with me. I love the actual medium that I work with far too much to change my style now. Other artists are allowed so-called artistic license, and I demand the same. I don’t know a single artist who enjoys his work who wouldn’t go bananas if told to change his style. These people develop their talents by emulating the works of other artists they admire until they finally develop their own style. And so it is with me.

I learned programming back in the 1960s under the tutelage of a book by D.D. McCracken. Good old McCracken introduced me to programming through a fictitious computer called TYDAC (for typical digital automatic computer). He assured the reader that the techniques learned would be of benefit to any programmer of almost any digital computer.

These were the wild west days of computing before sires had been invented. Things were tough then. Memory (old-fashioned core-memory) was a scarce commodity and was most definitely finite. This was constraint number 1. Also, in those bad old days, computers were huge expensive monsters that cost a fortune. Consequently, time on those computers was also expensive. Results had to be produced quickly—someone else was always waiting in the wings to run his own important program. So, constraint number 2 was time.

By the time he’d finished, McCracken had me wrestling with space and time to end up with working routines that had attained a mystical quality—elegance. This word isn’t used any more in regard to programming, especially in the books on structured programming. Now the quality to be reached for is discipline. I had enough of that at school and I relish the freedom I achieve by assembling any byte, anywhere and anyhow I like.

The best of it is that many machine-language programmers I know share my views. Structured high-level code is OK for beginners or for people who want to learn programming without making too great an effort. But leave me and my buddies alone, we’ll happily (even enthusiastically) sit down and write your next structured interpreter in any style we see fit—and that just may be unstructured code.

My legs are getting a little tired. What on earth am I doing standing on this box? I guess it’s time to step down and stretch my legs. Good grief, did I just say all that stuff about structured programming? Sounds like awfully good sense to me. I have a feeling I might get on the box again next month.
You've learned to program your Model I or Model III efficiently in Basic. You've also started learning to program simple Assembly-language programs. You are ready for the next step.

The major topic of this column will be the techniques of combining machine language and Basic. It will cover everything from the simplest steps of language interfacing to techniques of altering Basic verbs, using the "low memory" pointers, and even creating a Basic metalanguage for special applications. Although I'll present short machine-language routines, my purpose is to show you techniques you can use for your own creations.

I make some assumptions about you. First, I assume you are working with a Model I or Model III. Although a few columns might be limited to disk-based systems, most will be equally applicable to either disk or tape Basic.

Second, I assume you have an editor/assembler program and that you can write and understand at least simple Assembly-language programs. Third, I assume you understand hexadecimal notation and can convert values from hexadecimal to decimal.

And, finally, I assume you are curious about how and why your computer works, and that you would like to make it work more efficiently.

Since the possible configurations of TRS-80 systems are many, I'll try to give values and addresses for 16K, 32K, and 48K RAMs for tape and disk systems of the Model I and Model III. At times up to 12 different values may exist for the same pointer or address. Be sure you pick the one that applies to your system.

Fixed Location Routines

The first techniques presented involve separate machine-language routines that are written to load to specific, fixed locations in memory. These techniques are most useful for long or complex routines or for routines that seem to defy all efforts at relocatable programming. Program Listing 1 does not fit these qualifications, but it is the demonstration program for this month.

Listing 1 is a short routine that "melts" all the characters on the screen; it is useful as a showy, if slow, screen clear. Its origin is at 7FE6H, which is compatible with 16K, 32K, or 48K systems. Before reading further, assemble it and save the program to either tape or disk.

Fixed location programs are easy to use, but loading them separately from your Basic program can be tedious. The only difficulty you might find is in setting the appropriate memory size pointers correctly and letting Basic know where the program is. You must set the memory size to protect the program from being overwritten by the other machinations of Basic. Because this process is different for tape and disk users, the processes for each are explained separately.

For Tape Users

Before loading and using a fixed memory routine with a Level II tape system, you must make two calculations. First, convert the lowest address of the routine to decimal to answer the "Memory Size?" prompt. Your answer tells Basic the first byte of memory it cannot use. In Listing 1, the lowest address you need to protect is 7FE6H, which equals 32742 in decimal, so you would set the memory size value at 32742.

Load the assembled machine-language program from tape and then return to the memory size prompt. How do you do that? Load the program by setting your tape recorder to the assembled program, then type SYSTEM and enter. Answer the "?" prompt with the name of the program, and the tape recorder will transfer the routine to the computer. When the routine is loaded, another "?" appears. Respond with /0 and enter, and you will return to the memory size prompt. Now enter 32741; the routine will be safely loaded and protected in memory, waiting for you to call it.

Then you face a second problem. To call the program from Basic, first tell the computer where it is. The starting
address (not necessarily the lowest address) of the routine must be stored in a pointer at memory positions 16526 and 16527, and your program must POKE the appropriate values there. First take the last two hex digits from the beginning address of the routine (E6H), convert that value to decimal (230), and POKE the result into 16526. Then take the first two hex digits (7FH), convert them (127), and POKE that value into 16527. For Listing 1 the line of Basic would read:

POKE 16526,230: POKE 16527,127

Finally, to use the routine, you must include a USR command in your Basic program. Since no values are to be passed to or from this routine, all you need is a statement such as Q = USR(0). Instead of Q, you can use any valid, unused numeric variable name. Instead of 0, you can place any integer inside of parentheses.

For Disk Users

Using a fixed-location routine at the top of memory involves a special consideration for disk users. Not only does the memory size have to be set so Basic leaves the routine alone, but also a special HIMEM pointer must be set to guarantee that DOS commands will not mess up the routine. The problem comes about because TRSOS, as well as some DOSes, uses the top 256 bytes of memory as a buffer for transferring programs from disk to memory.

The address of the high memory pointer is 4049H and 404AH for the Model I, 4411H and 4412H for the Model III. The easiest way to set the pointer is with a DOS that includes a HIMEM command. For example, the Model III TRSOS command for the screen melt program is CLEAR (MEM = 7FE5). Without a special command, you have to do some thrashing around.

From DOS Ready, load the routine from disk. Then go to Debug, display the pointer, enter the Modify mode and set the pointer to the appropriate value. Be careful, though. Because of the way the Z80 stores and retrieves data from memory, DOS expects the value to be in "normal" reversed order, with the second half of the value first.

For Listing 1, set either 4049H or 4411H to E6H and either 404AH or 4412H to 7FH. Then exit from Debug back to DOS Ready and disable Debug from interrupting other commands.

Setting high memory has one large advantage—you can ignore the memory size question entirely because Disk Basic sets the top of its allowed memory from the high memory value when you enter Basic. You can hit enter at the memory size prompt without having to convert the program address to decimal.

Avoid having to set the high memory address separately by using a special trick. Add two lines to the original Assembly source code so the program will protect itself as it's loaded. In Listing 1, add the following two lines between lines 340 and 350:

342 ORG 4049H
344 DEFW 7FE6H

With a Model III, the ORG value would be changed to 4411H.

Your second step, letting Basic know where the program starts, is easier in Disk Basic than in Level II. The DEFUSR command recognizes hexadecimal as well as decimal numbers, so instead of POKEing values into memory, include the command DEFUSR0 = &H7FE6. You can change the zero to any single digit because Disk Basic lets you point to ten separate USR routines simultaneously. If you omit the digit, Basic assumes you meant 0 and acts accordingly.

To use the routine, the Disk Basic command is Q = USR(0). Again, you can use any of ten digits in place of the first 0, but be sure you use the same digit you used in the DEFUSR command. And again, if the digit is omitted, Basic assumes you meant 0.

For Everyone Again

Follow the above instructions and then enter and run either Program Listing 2 or Program Listing 3. Listing 2 is for those with tape systems; Listing 3 is for disk users. If all goes well, you will know you have learned to handle this first interfacing technique.

Generally, this fixed-location, separate-load technique is not used with routines as short and simple as my example. Also, the routine is put as high as possible in memory to conserve space. If you have 32K of RAM, assemble this program to 0BFE6H; with 48K RAM, the address would be 0FFE6H. Of course, you must adjust the memory size and USR pointers accordingly.

How do you calculate those addresses for your own memory size? Let the assembler do it for you. In our example, change lines 180 and 340 like this:

180 ORG 0000H
340 STOP RET

Assemble the program with the /NO option (no output), and note the address of the STOP label in the symbol table (0019H). Then change line 180 to read:

180 ORG 7FFFH-19H

Make the 7FFFH value equal to the highest address and the 19H value equal to the former address of STOP. Assemble the program to disk or tape, but be sure to write down the new ORG address to use later in setting the necessary pointers.

Next month I'll explain techniques for saving and loading fixed location programs as part of your Basic program. Also, for tape users, I'll present a simple technique that almost gives you the same power and flexibility that disk users have to control multiple user routines without constantly POKEing values into 16526 and 16527.

If you have comments, questions, or suggestions for future columns, please contact me through 80 Micro or CompuServe. My EMAIL address is 72165,735.
Welcome to the first installment of a column dedicated to the Model 16 and to those Model II computers that have been upgraded with the Model 16 enhancement boards.

In the months ahead we will investigate all aspects of life with the Model 16 and II/16. When new software becomes available, we will discuss it here. We also plan to clarify concepts presented in the owner’s manual and the Assembler-16 manual. If you have questions about your system, let us know and we’ll answer as many as possible in print.

First Impressions

One of the first things a new owner will try after uncrating the machine is to make a back-up of the TRS-DOS 16* System disk. To our surprise, it cannot be done on a single-disk-drive computer! The back-up command requires at least two disk drives. With some experimentation we found this to be true also of the Model II/16 upgraded computers. Obviously this machine is designed for use by people who have large storage needs and who would normally have either two or more floppy-disk drives or a hard disk connected to it. So for those readers who plan to buy a Model 16 but are not contemplating getting a hard disk, we advise purchasing a two-disk system right away.

We tried to get around this one-drive problem by using the format command under TRS-DOS 2.0* and then backing up under TRS-DOS 16*. It was to no avail—under no circumstances can a back-up be made with only one disk drive.

Model 16 users who have owned a Model II will have to get in the habit of placing disks in the drives with the label facing toward the screen rather than away from it.

The disk operating system for the Model 16 was written by the Ryan-McFarland Corporation, the same

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First thoughts on the Model 16

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Assembly-Language Corner

The only language now available on the Model 16 is Assembly language. In this section of our column, we will explain some fundamentals of programming the MC68000 microprocessor. We plan to make comparisons to Z80 programming, since the Models I, II, and III use this chip, as does the Model 16.

What does a Model 16 Assembly-language listing look like? A sample program is in the Listing. Like any computer language, the code looks like Greek the first time you lay eyes on it. However, it is no more difficult than programming in any other Assembly language.

The frame of many programs can be developed using subroutines built into the disk operating system. These routines are referred to as supervisor calls. All peripheral addressing can be handled by supervisor routines, disk I/O, getting input from the keyboard, displaying text and information on the screen, and sending data to a printer. In the months to come, we will examine many of the commonly used supervisor calls and show various ways to put them to work within an Assembly-language program.

The Program Listing instructs the computer to clear the screen, position the cursor at the first line on the top of the screen and 36 spaces to the left, display the message “80 MICRO” centered horizontally, and finally return to the disk operating system Ready mode.

Those of you who purchase books on programming the MC68000 chip will have to do some translating. Unfortunately, the Shack Assembler-16 mnemonics and notations are not always in keeping with Motorola’s syntax. This forces programmers to translate instructions in other books. The Assembler-16 manual claims the reason for this is an effort to standardize mnemonics.

The conventions and symbols referring to an address pointed to by a register (that is, indirectly addressing a register) are the first differences you might note. Some of the op-codes themselves appear different. The instruction to move data from one register to another or one memory location to another is shown as MOV in the Assembler-16 manual, yet Motorola uses MOVE.

The editor that allows development of source codes is in the same format as editors for most other microprocessors. Four columns represent label, op-code, operand, and comments.

The actual character count from left to right establishing each column is somewhat flexible. As long as there are at least two spaces between each element, then the editor assumes it to be classified under the next heading to its right. For example, if two spaces were placed between an op-code and its operand, the editor would know that the last instruction is an operand, even though it might not line up underneath the operand column.

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by Dan Keen and Dave Discher
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people that wrote the Model I, II, and III Cobol development packages sold in Shack stores. Accompanying the purchase of this computer is an editor/assembler disk and manual for writing Assembly-language programs for the MC68000 microprocessor. It, too, is by Ryan-McFarland. While both the assembler and the Model 16 owner's manuals contain a great deal of information, they do make a lot of assumptions. One of the goals of this column is to fill in the gaps.

Reader Forum

Users need an outlet for praises and complaints, as well as to give others answers to specific questions.

Since this is the first column to appear in this series, we haven't had the opportunity to get any feedback from readers. So we visited several Shack stores that were selling the Model 16 and asked the salesmen what the most frequent customer questions are.

One consistently asked question concerns the software available for this new machine. All software that will run on the Model II will also run on the 16 and II/16. But that software only uses the Z80 microprocessor. The MC68000, which gives the computer its powerful advantage over other micros, lies dormant. Updated versions of many programs that use the 16-bit central processing unit are being prepared for release.

You can expect programs for this machine to take advantage of its multi-user capability. This is where the Model 16 really shines. One of the main purposes for its design is to allow several people to access the machine at the same time. Naturally, you can use this machine to store a simple Profile file, but there is no point to it. Such a thing can be done on a Model II at a far lower cost.

The manager of a Radio Shack Computer Center told us that Shack plans to release a multi-user disk operating system soon. Such a system will cut up the RAM memory to enable up to three different programs to run simultaneously. Thus the system will not only be multi-user but also multitasking. One operator can print information from an accounts receivable program while another user at a remote location works on the payroll. Obviously, this microcomputer is not intended to be a personal home computer.

Some criticism has been raised concerning the release of hardware before any software is available. We applaud Shack for putting the Model 16 on the market as soon as the computer itself was ready. This allows large software houses as well as Mom-and-Pop outfits to get a jump ahead of the manufacturer and begin developing programs. More software is available for the consumer to choose from at an earlier date than if he were forced to wait for the manufacturer to develop it. We need not be dependent upon Radio Shack for programs to fit our business needs.

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- Our system is configured specifically for large mailing lists (or small) on floppy disk drives. Some other major systems run on floppy but are really intended for use on hard disk drives. Such a system assumes that you have vast amounts of on line disk storage capacity—the continuity of the data is limited to what you can have on line at one time. To get the real benefit of such a system, one usually has to purchase expanded track/density floppy disk drives and even then the problem occurs when all the drives are filled with data. We have really solved this problem by allowing all your data disks to be maintained in continuous order—even though, due to the limitations of your drives, the list may be too large to be on line at one time. Thus our system accommodates extremely large lists using your existing drives and yet avoids the "segmented" data problems of the hard disk approach.

- While it is fashionable to advertise all-machine-code systems, our system is primarily written in BASIC with embedded machine code for the speed sensitive areas. What this means is that our system is easy to modify, yet extremely fast. This is very important since many users like to have custom modifications made (either by them or us) so as to fit some unique requirement. Our manual has a section devoted exclusively to such modifications. Remember all-machine-code systems are extremely difficult to modify.

- Continuity of the ordered data (even data spanning many disks) is not limited to a "session", but is permanent.

- Optional "hacking up" of your data as you go is an integral part of the system and is not restricted to the end of a session. This is true even for deletions.

- The length of our data fields are more than adequate to accommodate even your longest data address.

- Adjusts to a 32K memory although full use is made of a 48K memory. Can be used with any DOS including TRSDOS.

- The program disk does not have to stay on line, thus freeing more space for data storage.

- Load and scroll through entire entries or selected fields. Edit as you scroll or go directly (takes about 2 sec.) to a specific entry and edit or delete.

- Our automatic repeat feature allows often used names/address to be entered with a single key stroke.

- Each disk entry optionally "remembers" how many mailings have been made for that particular entry...can be tied in with purge/sector.

- Continuing expert support just a phone call away. You will be able to discuss your problems/modifications with the authors.

- Money back guarantee if not fully satisfied.

ADDITIONAL FEATURES:

- Simple to use, even for the novice . menu oriented.

- Permits 2260 names on line with 40 track double density drives and almost 5000 names with 80 track drives. The older 35 single density drives permit 1025 on line entries...made possible with our unique data compression techniques.

- Super fast sort by alph. or zip order (8 sec. for 1000 entries). Both orders can exist simultaneously on disk.

- High speed recovery of entries from disk...speed of sort is meaningless if retrieval from disk is slow. Ours pulls in over 11 per sec!

- Master list printout of your list in several formats (not just a rehash of labels). Extremely useful.

- Zip order is sub-alphabetized.

- Less than 5 digit zip codes have leading 0's appended.

- Supports 9 digit zips, Canadian zip, and foreign abbrev.

- Optional second address line.

- Optional reversal of names about commas. This permits disk storage in last-name-first order to facilitate meaningful order-printout, but will be in "natural" order.

- Permits telephone, account, and/or serial numbers, etc.

- Prints on envelopes or labels 1, 2, 3, or 4 across.

- Can print individual labels at time of creation or editing.

- Test label/envelope printing allows you to make vertical and horizontal adjustments with ease.

- Transfers old files to our system.

- Selective printout by specific zip or zip ranges.

- Plenty of user defined fields with provisions for simultaneously purging and/or selecting the printout...even allows for inequalities. Powerful and easy to use.

- Editing is simple and fast...direct access or 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!

- All labels optionally support an "Attn" line with provisions for multiple entries. This permits mail to be sent to several people at given addresses...conserves disk space.

- All 0's are replaced by easier to read 0's in addresses.

- Continuous display of number of labels/envelopes printed.

- Extensive use of error traps...even recovers from a power failure during a printout.

- Extensive assortment of extra cost options for customized master list printout (in addition to the standard one mentioned above), transfer of entries between disks, summary reports, and "publisher"'s type multiple list label printouts.

- Hardware requirements 32K, printer, and 1 or 2 drives.

FORM LETTER (Use with Mail List System) $39.95

Create letters and store on disk with provisions for later retrieval and additions. Then print your letters using your mailing list.

- Same select and purge features as mailing list system.

- Select either continuous fanfold or "cut sheet" paper.

- Selectable tabbing, test printing, and paging.

- Allows regular or legal size pages.

- Greetings are selectable by codes on mailing list. Options include Mr., Mrs., Miss, Last Name, global, or user defined.

SUPER CALENDAR (Supplied on tape only) $19.95

Prints out calendars of individual months of years ranging from 1583 to any time in the future. Standard banker's holidays are noted. Additionally prints out large "graphics" type wall calendars with memorials under each day. Use as a planning calendar with optional disk storage. Requires 16k and a printer.

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Achieves pin point accuracy with a built in calendar. This sophisticated program produces an exceptionally professional looking printout that includes yearly summaries as well as "totals-to-date"...Several options for calculating interest includ- ing one that pushes the payment date ahead to the next business day if the regular pay date falls on a weekend or holiday.

FOOTBALL SCOUT (disk only) $89.95

Charge local schools up to $1000 per season for these sophisticated reports. Analyze the tendencies of opposing teams. Equivalent to that used by the pros.

P R E C I S I O N P R O T O T Y P E S

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The lesson developer generates the pages for the lesson. The Author and PRTEREF modules allow editing and provide branching information and error-checking of lesson flow. Author is the screen-oriented text editor that produces the text, question, glossary, and control pages comprising a lesson. I recommend the software manual be on your lap during the branching and labeling phases of lesson production. Otherwise, it is not much needed.

Operations are smooth and slick. Mixed text and graphics and special character symbols can be easily positioned and moved around the screen. When you are finished, what you see is what you get. Arrow keys position the cursor for text and graphics entry; shift, arrow inserts and deletes a character or line; shift, @ initiates the graphics mode; double shift, @ initiates the special character mode for choosing from over 100 special characters.

Within the graphics mode, hitting the zero, period, or the enter key toggles you to the drawing, no-drawing, and erase modes. The special characters mode has a disadvantage: At least four key depressions are required to display one character. If you have a good eye, though, you can create an eye-catching display with most of the line graphics and special characters of the Model III (some limitations here for Model I users). A buffer to store various repetitive drawings would have been a timesaver.

Seven types of labels can be embedded within the text and control pages to make use of question groupings, answers, date, student's name, and a random-number generator. The number of tries to give a correct answer, as well as the points for each answer, can be selected, and the messages for responding to correct and incorrect answers can be selected in generating question pages.

A good flowchart of a lesson should be made before dealing with the branching option in this module. Control pages allow conditional and unconditional branching (with possibilities such as greater-than or equal-to question groupings or address labeling). This is probably the most difficult area to design in producing a lesson.

Basic and machine-language programs can be accessed from the Teach module if a small number of lines of code can be inserted within the external program. After the external program is run, the student automatically returns to the Teach module with scoring information. It does take about 20 seconds for even the smallest external Basic program to run and return to Author I. It would have been convenient to be able to pass variables from the external program into the Author I package. Then the system would be able to do things like generate its own math questions.

PRTEREF is a module to print, verify, and error-check a given lesson. Three error codes and eight reference codes aid you (the lesson developer) in troubleshooting your lesson.

My misgivings are not with this very able software package, but with the limitations of the Model I and III computers I tested it with. Color and a touch screen would enhance the package greatly. Early in 1983 an authoring software package will be available for the Color Computer that will be screen-oriented, in color, and will make use of the built-in tone generator circuitry.

Author I is sold in two ways. A complete package with all the modules sells for $150. An abridged version, with just the Teach and Student modules, sells for $65 and is designed to run packaged software. One such package is a series of 150 programs sold in four modules called CARD (computer-aided reading development). Sentence, paragraph, reading for details, and comprehension are the topics these modules address.

Author I is an impressive package that can be used by even those with no Basic experience to produce interactive, good-looking lessons.

---

The Basic Answer
Logical Systems Inc.
11520 Port Washington Road
Mequon, WI 53092
Model I and III
$69

by G. Michael Vose
80 Micro staff

The Basic Answer, or TBA, is a text-processing utility that works like an advanced computer system compiler. It allows you to create Basic program source code using a word processor or text editor and then use that textual code to produce an executable Basic program. It is designed to work only with the LDOS operating system. What makes TBA unique is that it allows you to use a descriptive, English-like syntax and it encourages the use of that ol' black magic "structured programming."

Now structured programming is a concept that frightens some computer scientists and is the holy grail for others. The disciples of structured programming scoff at the undisciplined masses who program in interpreted Basic, that most unstructured of all languages that allows you to GOTO and GOSUB a line number. The traditionalists cringe at the idea that you can send execution to a place without a name.

The wild and unruly masses of programming mavens addicted to interpreted Basic's easygoing, meandering style—a style that lets you tack on a new idea when it comes to mind—recoil in horror at the mention of structured programming ideas like "procedures," "labels," and "compile."

In a debate between the two camps, the structuralists would argue that making each function in your program a subroutine, identified and called by a label, makes for more understandable source code—code that is much easier to read when you come back to it a year later. They would claim that isolating individual routines forces the programmer to give more thought to the overall structure of his program. The traditionalists would argue that Basic's major attraction is that it is interpreted, providing instant gratification to programmers who can write a line of code and test it immediately to see if it works. Besides, a traditionalist argues, you can write structured Basic code if you just do a little planning and flowcharting ahead of time. As for labels, what are remark statements for?

While this debate rages on, TBA steps in with a typically American solution to this problem—a compromise. TBA lets you write your source code in structured fashion, labels and all, and gives you a simple tool to create ordinary Basic code to execute at everyone's favorite time, not bedtime or mealtime, but run-time.

How It's Done
Here's how TBA works. First, you
FEATURES:
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ABCDEF - ABCD abce 123456 - ABCD abcd 123456
ABCDabcd 123456 - ABCD abcd 123456
ABCDEFghijklmnop - ABCDEFghijklmnop (these are some of the fonts supplied)

ADDITIONAL FONTS AVAILABLE

ABC 1234 - ABCD 1234
ABCDabcd 12345 - ABCD abcd 12345
abc - ABCD abcd - ABCD abcd

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273
create source code using a word processor, text editor, or even your Basic program editor. Obviously, a word processor or flexible text editor will make writing, adding or deleting characters, and changing your source code easier. You then save your source code text file in ASCII. Next, you use TBA to compile your source file into an object file—this object file will not be machine code, but familiar Basic code. Once your object file is created, you can load and run it as any Basic program.

Since you must compile your source file before you attempt to run your program, there is an extra step involved in programming the TBA way.

This can be annoying if you make errors in your source code since you'll find the errors only when you run your object code file. When you make errors, you must reload your source file, correct the errors, recompile the object file and run the program a second time to ascertain whether the errors have been corrected. This procedure gets tiresome very quickly and guarantees that you'll become a careful programmer in a short time.

**Let's Have a Look**

Listings 1 and 2 are examples of TBA source and object programs. I've used the program featured in December 1982's *80 Micro* ("TR-80 Tongues," p. 216) as my example. The first thing you'll notice about TBA source code is that there are no line numbers used. The other major difference between the source and the object code is the variables. TBA source code allows you to use up to 14 characters for variable names, and all 14 characters are significant. Furthermore, there are two kinds of variables—local variables whose values are retained only within the routine in which they appear, and global variables whose values are maintained throughout the program.

The next major difference in TBA source code is that all GOTOs and GOSUBs are followed by labels, not line numbers. Each routine in the program is defined by a label. When you want to perform a routine, you call that routine, or procedure, to use the structuralist's term, by using its label after a GOTO or GOSUB. Therefore, your source code will specify "GOTO @Format.Screen" to call a procedure for setting up a screen display. The compiled object file will then read, less descriptively, "GOTO100" (the @ sign is used by TBA to signal that what follows is a label).

There are some other slight differences in TBA source code. All variable types must be declared each time the variable's name appears in the code—the four variable types are integer, single precision, double precision, and string. The Basic keyword REM lets you place remarks in the source code that will be carried over to the compiled object program; if you use the abbreviation for Remark (the apostrophe, '), the remark will be deleted from the object program.

Otherwise, you write TBA source code much as you would regular Basic code, using labels and no line numbers. This results in source code that looks like Pascal. Logical Systems Inc. just might legitimize Basic in the eyes of upper echelon computerists with this refined achievement.

The real power of TBA may go beyond this refinement of the Basic language, however. The writers of TBA built into the system the ability to process the source code in a variety of ways. This processing is accomplished using directives. Directives allow the writing of master source code that accommodates all possible program configurations. At processing time, the directive appropriate for a specific application is chosen to produce an object program that serves that application. An example will illustrate this concept.

**TRS-80s run with a variety of peripherals—a distinction becoming more common, for example, is floppy disk versus hard disk.** With TBA, it is possible to write your master source code with a directive to allow discrimination between hard- and floppy-disk operation. When processing, or compiling, the source program, you can
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Role-playing games are a serious business. They require thought and strategy, skill and luck. Your computer role-playing games should help you, not slow you down. In this age, there is no excuse for endless disk I/O delays and constant referral to manuals. That's why Med Systems does role-playing right. Our Warrior or RAS games are entirely implemented in machine memory, with machine language speed and dungeon-master complexity. Why settle for anything less?

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*The Warrior of RAS trilogy requires 48K on the TRS-80 Model I or Model III.
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</tr>
</thead>
<tbody>
<tr>
<td>Volume I</td>
<td>DUNZHIN</td>
<td>$39.95</td>
</tr>
<tr>
<td>Volume II</td>
<td>KAIV</td>
<td>$39.95</td>
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then choose to compile a floppy- or hard-disk version of the object program. TBA calls this conditional processing. Conditional processing provides greater flexibility and ease in programming applications that require many different conditions.

### Evaluation

TBA is a very sophisticated programming tool, yet it is easy to use and learn. The documentation is similar in style to the LDOS manual. The manual is complete, professional, and full of examples of TBA features. Logical Systems does not write products that unsophisticated TRS-80 users are likely to buy, so their documentation style tends to be complicated because there is no fluff—each sentence is packed with important information.

TBA's error messages are descriptive and well thought out. As you might expect from a professional programming tool such as this one, TBA provides a cross-referenced label and variable table when processing a source file. Table 1 is the table for the sample program in Listings 1 and 2.

The generation of software products exemplified by TBA promises to push microcomputers into sophisticated new environments. Companies like Logical Systems Inc. deserve support and congratulations.

<table>
<thead>
<tr>
<th>Procedure Label</th>
<th>Defn #</th>
<th>Line #</th>
<th>Referenced at Line #’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>@BEGINNING</td>
<td>2</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>@GET.CVAL</td>
<td>11</td>
<td>12</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Variable Label</th>
<th>Defn #</th>
<th>XLate</th>
<th>Referenced at Line #’s</th>
</tr>
</thead>
<tbody>
<tr>
<td>CELSIUS_TEMP%</td>
<td>4</td>
<td>C%</td>
<td>6, 7, 13</td>
</tr>
<tr>
<td>COUNT%</td>
<td>2</td>
<td>C%</td>
<td>8, 8</td>
</tr>
<tr>
<td>FAHRENHEIT_TEMP%</td>
<td>4</td>
<td>F%</td>
<td>6, 7</td>
</tr>
</tbody>
</table>

Table 1. TBA Label and Variable Table

---

**Graphics Enhanced Basic**

Autel Electronics  
P.O. Box 11187  
Albuquerque, NM 87192  
Model I or II, disk only  
48K RAM  
$69.95

by Bruce Powel Douglass

A number of printers are now available with dot-addressable graphics: the Epson with Graftrax option, the C. Itoh 8510, and the NEC 8023A. A few programs are also available to dump screen graphics and make figures on these printers, but they are slow or inadequate for a number of applications. Graphics Enhanced Basic (GEB) solves this problem. It is a plotter language for making high-resolution figures on the Epson, C. Itoh 8510, and NEC 8023A printers.

Unlike most programs that use the high-resolution features of these printers, GEB actually interfaces with your Basic. Figures 1–3 were all done on my C. Itoh 8510 using GEB. The programs (see Listings 1–3) are all quite simple. GEB works with TRSDOS, NEWDOS80, LDOS, and MULTIDOS. It does not work with DOSPLUS.

One problem associated with making pictures on the printer is the huge amount of memory they require. GEB avoids the issue by spooling out to disk, so not all of the picture needs to be in memory at once. GEB resides in about 6K of high memory. It uses an adjustable buffer below it.

GEB allows different densities on the various printers. The Epson can run in

---

**Figure 1**

---

**Figure 2**

---

**Figure 3**

---

52 • 80 Micro, February 1983
A Computer That Writes Programs For You.

What will they think of next...

Your computer is fantastically fast...once it knows what to do. You probably realize that a computer is really the combination of hardware and software, working together smoothly, to give you what you want. Either one alone is useless. Software is really the key...the “mind” of a computer system. Every project or task you want to do requires a new specific software application to make it behave exactly the way you desire.

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 Compuations, 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 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.

You can order right now by phone or mail. If you have Visa/Mastercard, call toll-free from:

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60 and 120 dots/inch density, and the C. Itoh and NEC printers allow densities of 80, 96, 136, and 160 dots/inch. For comparison, the Tandy six-pen plotter has a resolution of 200 dots/inch. The amount of memory necessary to hold all the graphics information is:

\[
\text{Size} = \text{length} \times \text{width} \times (\text{inches}^2) \times \text{density} \times 9
\]

where Size is in bytes. This means that a page width of 8 inches, 15 inches long, with 60 dots/inch density would require a full 64K for storage. GEB performs smooth spooling of this output to disk, so you need not even be aware of the large size (except that your disk drives will be on).

A list of the graphics commands is in Table 1. These commands form a plotting language powerful enough for virtually any application. You can draw lines, move the imaginary pen around on the plotted page, scale graphics, and move the origin about. You can rotate any number of radians (the Tandy six-pen plotter only allows you to specify four rotations) or create plots within plots with the Clip command.

One of GEB's more powerful features is its ability to print text. Not only

**Program Listing 1**

```
10 REM set memory size to 47000; draws figure 1
20 ESC(27,62):REM UNIDIRECTIONAL PRINTING
30 ESC(27,63):REM BOLD PRINT SELECT
40 CLEAR 500
50 PI=3.141592654:PH=PI/4
60 BUFFER(6)
70 LIMIT(4,4)
80 OPENFILE("PLOT/GEB:1",1)
90 SETMARGIN(0,1)
100 AREA(0,8,0,8)
110 FRAME
120 ORIGIN(4,4)
130 HEIGHT(.3)
140 FOR I=0 TO 7
150 A$="ANGLE ="+STR$(PH*I*180/PI)+" DEGREES"
160 TEXT(0,0,A$)
170 ROTATE(PH)
180 NEXT I
190 PLOT
200 CLOSE FILE
210 NPAGE
220 END
```
do you have a full alphabet with numbers, you also have a predefined Greek character set, and the ability to define your own characters. The text is displayed with the TEXT(x,y,AS) command. AS is then printed out with the first character at (x,y). You can print text at size (set by the Height command) and rotation (set by the Rotate command). The height versus width of the characters is determined by the ratio of the limits of the x and y directions in your plot.

The ESC command allows you to output special escape sequences to your printer to do things like change font, force bidirectional printing, or use bold printing.

Clip lets you specify a rectangular space within the graphics page for temporary clipping. This means that you can plot figures and draw lines within this clipping area, but parts of these lines and figures that fall outside of the clipping rectangle will not be drawn. You can use Frame to draw boxes around the clipping rectangle. This gives you a number of distinct plots within a single graphics page, a powerful feature indeed!

GEB's manual, although short, contains enough information to use the program effectively. Several sample programs are provided for demonstration.

Program Listing 2

```
10 REM Program to generate spiral; figure 2
20 ESC(27,33)
30 REM SET MEMORY SIZE TO 47000
40 BUFFER(6)
50 LIMIT(4,4)
60 OPENFILE("PLOT/GERB:1",1)
70 SETMARGIN(0,1)
80 AREA(-1,1,-2,2)
90 PLOT=3.14159:TH=PI/180:RA=1:DR=RA/360:CLS
100 SCALE(1,2)
110 MOVE(SIN(0),COS(0))
120 FOR I=0 TO PI*20 STEP TH
130 PRINTI2,1
140 DRAW(SIN(I)*RA,COS(I)*RA)
150 RA=RA-DR
160 NEXT I
170 PLOT
180 CLOSEFILE
190 NPAGE
200 END
```
I am quite impressed with GEB and highly recommend it to anyone who has one of these printers. In fact, for most plotting needs, I recommend buying a printer that works with GEB. It is easy to take advantage of this powerful plotting language to do virtually anything that a digital plotter can do (and for less than half the cost). The only exceptions that come to mind are situations in which you need higher resolution than 160 dots per inch, plots larger than 8 by 15 inches, or multicolored plots.

---

**This book could almost be a do-it-yourself manual for computer crime. I suspect, however, that the methods described are ones that Klein’s real-life counterparts... deal with effectively.”**

---

I thoroughly enjoyed this highly readable and suspenseful novel. A surprise ending is a delightful dessert to an excellent book.
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by Bruce Powel Douglass

The Echo General-Purpose (GP) speech synthesizer is a versatile add-on built around the Texas Instruments TMS 5200 speech processor chip, an enhanced version of the chip used in Speak and Spell. It models the human voice track using linear predictive coding.

The serial version of the Echo GP requires an RS-232 interface. The parallel version, which looks just like a printer to the computer, plugs into the printer port of your expansion interface, or any Centronics-type parallel printer port. (I used the parallel version for this review.)

Routines in firmware called Text-Talker convert standard ASCII text into voice output. If you have the parallel version, you need only LPRINT your text to hear it spoken. You can access a number of features of the Echo GP by entering a CNTRL-E (CHR$($)5) followed by an appropriate command. These features include pitch control, volume control (there is also a volume knob on the front of the Echo GP), punctuation modes, speech rate, “caps” mode, letter mode, word pronunciation, and others.

You can also choose to output phonemes rather than words. This option is useful because a large number of words are incorrectly pronounced by the Echo GP. Take “begin,” for example. Echo GP normally pronounces this word “be-jin.” Using phonemes allows you to correct the pronunciation. The manual contains a table of commonly mispronounced words and misspellings that you can use to force correct pronunciation. For example, to pronounce “begin” correctly, you should spell it “big in.” To pronounce “achieve,” you should spell it “ucheeve.”

You can control the voice output with the CNTRL-E command sequences. The pitch goes from male to female, and the voice can be flat or intonated. English intonation often depends on context, so although Echo cannot copy normal speaking intonations, it is an improvement over simple monotone speech.

The volume control is equally easy to control. For example, if your application for the Echo is in education, it is nice to be able to accent important words or phrases from within the program. The same is true for games.

The speech rate has a compressed mode, in which speech is almost twice as fast as normal. With just a little practice, this is still very understandable. The “caps” mode means that groups of capital letters will be spoken as single letters rather than as a word (IBM is pronounced as three separate letters instead of “ibm”). The letter mode is similar, but it spells out all words rather than pronouncing them as a whole. The Echo GP normally pronounces all words it finds unless it does not recognize it as a word (for example, “zps” will be spelled out), or if the “word” is a number. The character string 12.23 is spelled out “One Two Point Two Three.”

The manual describes the phonemes used by the Echo GP and how you can use them for best results. How to place stress on syllables and how to insert pauses, as well as pitch and volume control, are all covered, and a table of phoneme codes is provided.

I am pleased with the Echo GP. It is not good for proofreading documents by routing them to the printer, since it will mispronounce many words. However, for programs that require speech synthesis, it is a useful and extremely flexible tool. An internal buffer also lets your computer continue with what it needs to do before the text has been spoken.

While speech synthesis technology is not yet to the level of human speech, it is readily understandable, and pitch and intonation control go a long way towards making it pleasant. Certainly the Echo GP is vastly superior to those talking games that use the cassette port. The Echo GP provides a quality synthesized voice for a modest cost.

DBASIC 1.0
Frank Hogg Laboratory, Inc.
770 James St.
Syracuse, NY 13203
Color Computer, 64K,
Hogg Lab’s FLEX operating system
$30 when purchased with FLEX,
$40 alone

by Scott L. Norman

With the recent availability of FLEX, Color Computer owners can choose from a wide variety of new software packages: high-level language compilers and interpreters, data-base managers, word processors, and more. One new FLEX interpreter is DBASIC from Frank Hogg Laboratory.

A Little Background

Before deciding to make the minor hardware modifications necessary to use FLEX on your machine, how will you benefit from the system? After all, FLEX by itself leaves you with 48K of perfect stupidity—there is in effect no programming language aboard, just RAM. The Hogg Lab version of FLEX includes a command, CBASIC, which
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“OMNITERM has my vote as the top TRS-80 terminal program available today” Kiblaud Microcomputing, June 1981, pages 16-19. OMNITERM is $55 (plus shipping if CC) Call for 24 hour shipment. Manual alone $15, applied toward complete package. Visa, MasterCard, and COD accepted. MA residents add 5% tax. Dealer inquiries invited.

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REVIEWS

copies the Color and Extended Color Basic ROMs to RAM so that you can use these interpreters without erasing FLEX from memory, but this is of limited use. After all, you had the Color Basics before you started! Besides, this command restricts you to cassette I/O, or so it is a giant step backwards.

DBASIC
DBASIC provides a fairly inexpensive means for using Radio Shack Disk Color Basic to produce files that can be examined and manipulated by standard FLEX utilities. The actual I/O chores are handled by FLEX, but this is transparent to the user. With one exception, which I'll discuss later, you simply program in Disk Color Basic.

Getting Acquainted
DBASIC consists of two binary disk files, DBASIC.CMD and DBASIC.SYS, and a utility called RTF.BAS that converts existing Radio Shack ASCII files to FLEX format. Both DBASIC files must be present on the same disk at run time. If you purchase DBASIC and FLEX at the same time, everything will be delivered on one single-sided, double-density disk. If you purchase DBASIC separately, copy the new files to the system disk. DBASIC will only work with the Hogg Lab's implementation of FLEX and can be run on a single-drive system. A pair of drives makes life much easier, though. I'll describe operation with one drive.

Once FLEX has been booted up, the DBASIC command invokes a routine that moves the Basic interpreters from ROM to the upper half of RAM, shuffling ports of the code to avoid interference with FLEX itself. The system now reads the DBASIC.SYS file, which contains modifications to Disk Basic's initialization routine. When memory has settled, you receive two more messages: the standard Disk Extended Color or Basic logo, plus one for DBASIC. The usual Color Basic cursor replaces FLEX's ++ + prompt.

A couple of minor differences show up immediately; for one thing, PRINT MEM returns a value of 22567, which is 256 bytes fewer than that returned by Disk Basic immediately after startup. If the FLEX system disk is still in the drive, the DIR command can be used to obtain a directory listing. The directory format resembles that of FLEX more than that of Disk Basic, however. It dis-

plays file name, extension, file size (in 256-byte sectors, not grans), and date of file creation. The Radio Shack format includes information about file type (ASCII, binary, and so on), but this is not preserved by DBASIC; the extension has to be used to indicate the nature of each file, instead.

A few other differences are spelled out in the documentation. Disk Basic's Back-up, Copy, and DSKIN commands have been replaced by their FLEX equivalents. Print Free(0) will often return erroneous numbers, since FLEX measures everything in sectors instead of grans. A new command, FLEX, has been added to the Basic vocabulary; naturally enough, it returns the system to the operating system.

For the most part, you program in DBASIC just as though FLEX didn't exist. If your program creates output files that are to be manipulated by other FLEX utilities, they should be saved in ASCII format by appending ,A to the Save command, as usual. Either a period or a slash can be used to separate the file name and extension. If you want to specify a drive number, it should precede the file name (0:MYFILE.XYZ would be appropriate). Note that a colon is required between drive number and the file name, in contrast to FLEX's period.

The one major difference between DBASIC and Radio Shack's standard Disk Color Basic is that DBASIC will not support random (direct access) files. None of the associated commands such as Field, LSET, RSET, and so on, are recognized. You can use all the commands normally used for sequential files, of course, but be aware that disk files created under DBASIC will be incompatible with standard Disk Color Basic. All cassette files, though, are compatible.

Some Simple Experiments
My first effort working with DBASIC was a short program segment that I saved to disk in ASCII format. (The BAC extension is mentioned in the documentation as a convenient way of identifying ASCII programs.) Just as advertised, programs can be reloaded with DBASIC’s Load command; it can also be listed from FLEX. When I saved the same program in tokenized form, however, List wouldn’t work. DBASIC would still accept it using the Load command, however, just as the original Mi-
crossoft interpreter accepts both forms of Basic programs with a single command.

Continuing the theme of manipulating files created by DBASIC, I stored a second program segment in ASCII format, making sure that its line numbers were higher than those in my first trial program. I was then able to use FLEX's Append command to merge the two segments.

I found this works with data files, too. As a quick test, I copied and ran the simple checkbook program that appears on page 28 of the Radio Shack Disk System manual. The output file, CHECKS.DAT, was automatically generated in ASCII. This is where I first got a glimpse of the advantages of running under a full-fledged DOS; I could use FLEX's List command to examine the data file, independent of the program that created it.

In principle, other utilities then could have been used to work on the file. Of course, this flexibility requires that you pay a little more attention to system operation than is required for stock Basic. For example, when running DBASIC it is quite possible to load an ASCII file that is not a program. The consequences may be interesting, but they are unlikely to prove useful!

Using Stock Programs

DBASIC would be of very limited interest if it were unable to use programs written for the standard Color Basics—subject to the sequential file restriction, of course. Therefore, I decided to try running a fairly serious commercial program under FLEX via the DBASIC package. The example I chose was Trans Tek's C.C. Writer (CCW) word processor, a friendly line-oriented editor that I often use for correspondence.

C.C. Writer is written in Basic and outputs ASCII text files, so it seemed to be a natural candidate. Trusting to dumb luck, I booted FLEX, called DBASIC, and loaded the cassette containing the master copy of CCW; standard practice is for each user to make his or her own disks from the tape.

Everything went like clockwork. At the end of the loading process, a DBASIC disk catalog appeared on screen, verifying that the various files making up C.C. Writer at this stage were indeed present. CCW's loader program puts the two main program segments, CCW.DAT and CONVERT.
“Incidentally, DBASIC will also read Color Computer machine-language cassette programs.”

Converting Your Old Basic Programs

Earlier I mentioned the RTF program, which converts ASCII files stored in Radio Shack's Color DOS format to similar files that can be read by FLEX. This is the tool to use if you have Color Disk Basic programs that you would like to run under DBASIC.

RTF itself is loaded from DBASIC. The Run command brings up a four-item menu, giving you the option of listing a directory for a Radio Shack or FLEX disk, copying from Radio Shack to FLEX format, or returning to DBASIC. The copy option prompts you for the numbers of the drives holding the two disks (these are the same) and the name and extension of the original file. Next, you insert the source disk in the drive. After it is read, you receive a prompt that identifies the starting grain (in decimal and hex, no less) and asks you to insert the destination (FLEX) disk.

Hitting the enter key starts the conversion process. The file is listed on screen as the conversion proceeds. Large files have to be copied in several stages, but this is no problem as RTF prompts you to switch disks as needed. After completion of the process, an “All Done” message appears on the screen. If you now examine the directory of the FLEX disk, you will find your converted file, old extension and all. Again, since this will be an ASCII file, it can be manipulated by FLEX utilities.

A Bug and Its Cure

While most of DBASIC's operating characteristics are quite benign, I did encounter one bug. There is a pretty simple fix, though, and something of a surprise twist to the whole affair.

The bug appeared when I tried to use the graphics commands of Extended Color Basic. Whenever a graphics screen was called up, the desired display appeared on about the ninth line of the screen preceded with eight lines or so of garbage. The top of the graphics was there, but it was displaced downwards from its rightful position. Of course, this meant that about eight lines of desired material were lost from the bottom of the screen.

The nature of the undesired stuff varied, depending on whether or not any programs had been run before the graphics commands were used. At various times, I saw square wave patterns, circular arcs, and isolated dots. The background of the garbage screen was always the correct color as defined by the Color Basic commands. Text displays were not affected; PRINT@0 put a character at the extreme upper left corner of the screen, just as it should.

I discussed this with Frank Hogg and Tom Speer, the author of DBASIC. Their first opinion was that the problem lay with FLEX's file control blocks, which might cause a DBASIC graphics display to begin at locations other than a 256-byte page boundary, contrary to the rules of Extended Color Basic. The fix that they recommended was inserting a FILES 1 or FILES 3 command in a program anywhere ahead of the commands that call up graphics. These Files statements reserve more or less buffer space than the default of two buffers, and thus move the start of the graphics RAM. This works perfectly well.

The Files statements can also be entered from the command mode before your program is run. The command mode is especially useful for FILES 3, which halts execution if included in a program; this has to do with reserving more space than the default. Having to enter Run twice to get a program running can be an annoyance.

If you want to write programs requiring more than three buffers, 'FILES n' also takes care of the graphics bug if one of the following values of n is used: 6, 8, 9, 11, or 14.

A few days after I brought this matter up, Frank Hogg informed me that the same bug occurs in Disk Color Basic itself—the numbers are just different! Sure enough, the same effects do crop up, and for the same general reason. For the record, you can get clean graphics in Disk Color Basic for the following numbers in a Files statement: 2, 5, 7, 9, 11, and 13.

Summary

DBASIC is evolving along with the Color FLEX DOS. My copy of FLEX was version 5.0, but by the time this review appears, purchasers will be receiving version 5.0.1. The difference is that 5.0.1 uses software-defined text screens giving 24 lines of either 51 or 64 characters, like Martin Consulting's Colorterm intelligent terminal program. This affects the way in which DBASIC must store and piece together code from the Basic ROMs. Hogg Labs promises to keep track of changes, though, so the DBASIC shipped at any time will be compatible with the contemporary version of FLEX. Future versions may even cure the graphics bug once and for all.

Other than the restriction to sequential files, DBASIC imposes no particular restrictions. Most programming tasks can be carried out just as for Extended Color Basic, with the added advantage of having I/O files that can be examined and manipulated outside of their parent programs.

The language is of dubious value if you are not interested in reading and writing disk data files, but then FLEX itself has little to offer if you are only interested in writing totally self-contained Basic programs. If you are seriously contemplating stepping up to FLEX, however, DBASIC is a reasonably priced addition to your programming library.
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** REVIEWS **

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**Ultra-Term**
Don Burgan
United Software Associates
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Models I & III
$59.95

by Stewart E. Fason

The Ultra-Term smart terminal package is running my new direct-connect, auto-answer modem and I couldn’t be happier. It is easy to operate—you need no arcane knowledge to run the program.

Features

With Ultra-Term, you can transmit and receive files without converting them to ASCII (if Basic) or hex (if machine language). Because other terminal programs may demand files be sent in ASCII or hexadecimal, two programs included in the package will automatically convert a file so that it can be sent to any system, and convert a file received in hex back to machine language.

It is compatible with all major operating systems: TRSDOS, NEWDOS, DOSPLUS, LDOS, and MULTIDOS.

Ultra-Term lets you receive an unlimited number of files while unattended, as long as the computer sending data is also using Ultra-Term. When two computers using Ultra-Term are talking, they can send files just as they are on a disk. This method is usually faster than using ASCII or hex—converting one byte of a machine-language file to hex requires two bytes, and a compressed Basic file converted to ASCII will be about 30 percent longer. Furthermore, the size of the file transmitted is limited only by the size of the disk, rather than by the buffer size at each end. Ultra-Term also verifies every bit to ensure accuracy.

It lets you set your RS-232 parameters to conform with the system on the other end. Most bulletin boards use 300 baud, 7-bit words, one stop bit, and even parity. Compatibility is no problem among TRS-80 owners, but I often talk to IBMers, Apples, Commodores, Burroughs, or who knows what. If they can’t use my RS-232 settings, I must be able to use theirs.

Ultra-Term automatically dials pre-programmed telephone numbers, or one that the operator enters through the modem. It lets a colleague on the west coast access my computer long after I have left for the day. He can use my system (with some limitations) as though he were at my keyboard. He can upload, download, and leave messages (which can be password protected).

The package lets you turn the printer on or off by pressing three keys simultaneously. It has a 1K buffer, which makes life easy for slow printers.

When the operator on the other end sends an ASCII bell (control G, hex 07), a tone comes through your cassette port. If you have an amplifier hooked up, the other end can signal you with audio at any time.

Ultra-Term lacks some frills—it has no auto-log-on and you can’t modify control characters, for example. Don’t expect a fancy leather-bound notebook containing the disk and documentation. The manual is only eight pages long, but as I’ve said, the program is simple. For $59.95, you can’t beat it.

***

**Doughflo**
Alphanetics
P.O. Box 597
Forestville, CA 95436
Model I and III, disk system
$79.95

by Bruce Powel Douglass

Until I received Doughflo, my checking account never balanced. But as my business began to grow, I needed to know where my money was going, and where it was coming from. How much do I spend on computer equipment? Software? Office supplies? Women? A hand accounting system is just not the way to go.

Doughflo from Alphanetics is the program that solved all my accounting problems. My accounts balance to the penny and I have monthly records of all my financial dealings. Thirty-three categories for income and expenditures define my subtotal categories, such as personal costs, equipment costs, business costs, taxable income, and total expenses. With Doughflo, I not only keep track of the final balance, but I can easily and quickly see where my everyday expenses lay.

Doughflo is a convenient way to solve a variety of common income and expenditure analyses, tax preparation, and bookkeeping tasks; this is true for both the household and for the small business. For the household, it is an excellent bookkeeping system; for the business, it is simply the easiest way to keep track of your income and expenses.

Doughflo requires at least 32K RAM and one disk drive. It comes on three disks for the Model I and two disks for the Model III. There is a large ASCII file of instructions and two identical copies of Doughflo, in case one copy gets zapped. Sample data files are also enclosed and these are used in the manual to show the workings of Doughflo.

My version of Doughflo cannot be backed up and only works in single density for the Model I, but by the time you read this, Doughflo will be unprotected by Alphanetics, allowing you to use your favorite operating system and even double density.

I dearly love Doughflo, but there are a couple of small points that I dislike about the system. First, the manual is not particularly outstanding, and it is not provided in a printed form—it is supplied on disk. You must route it through your own printer. It would be difficult to read the manual by listing it to the screen and pausing the listing with shift @, but it can be done. It would be much more convenient to supply a printed manual.

In terms of content, the manual is helpful but lacks referencing (such as a table of contents or an index). Fortunately, a cursory reading of it is all that is necessary to use Doughflo, because the program itself is menu-driven.

You can configure Doughflo using the CATGEN option from the main menu. The default is to use only one drive, requiring you to switch your program and data disks frequently. If you configure it for a multiple-drive system, Doughflo stores this on the program disk, and you are not required to switch disks.

CATGEN also lets you create your categories and set up the reports generated by Doughflo. Various categories can be summed in any order and the results labeled for meaningful presentation, either to the screen or the printer. You can define up to eight such subtotal reports. The system I set up is shown in
TONIGHT ON YOUR TRS80

KEEP THE WEST BEAUTIFUL
It's up to you! Outlaws and renegade Indians on all sides. Even the train's been hijacked by outlaws with all the payroll on board. Can you clean up THE WILD WEST by Clifford Abrahams?

EXPLORE MARS
Fortunately your craft can jump over small boulders and pits and can blast away at the larger boulders. But watch out - the natives are not friendly. Join the MARTIAN PATROL by Rick Maurice.

DRIVE THROUGH THE NIGHT
Hostile competitors, oil slicks, wandering pedestrians and a treacherous racetrack all combine to make this a real challenge. Roll your TRS up to the starting line for GRAND PRIX 80 by Rick Maurice.

SAVE YOUR HOME CITY
Steady your nerves, keep a sharp lookout, and prepare for battle. Fiendish aliens are all around, and if they destroy the city, you're next. It's a SPACE ATTACK by Clifford Abrahams.

Orders to: MELBOURNE HOUSE SOFTWARE INC.
Dept. CS 347 Reedwood Drive, Nashville, TN 37217

Cassettes (16K Model II/III)
- 26518 PENETRATOR $24.95
- 26542 STRIKE FORCE $15.95
- 26565 COBBLEMAN $15.95
- 18775 THE WILD WEST $15.95
- 18760 MARTIAN PATROL $15.95
- 18743 GRAND PRIX 80 $15.95
- 14074 SPACE ATTACK $15.95

Visa and M/C orders can be phoned in: 615/361-3738

Dealer orders and queries: 800/251-5900 (ask for a Melbourne House operator)

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- 26734 STRIKE FORCE $19.95
- 26760 COBBLEMAN $19.95
- 19172 THE WILD WEST $19.95
- 19139 MARTIAN PATROL $19.95
- 19111 GRAND PRIX 80 $19.95
- 14049 SPACE ATTACK $19.95

TOTAL: $ _______

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S&H: $2.00

TOTAL: $ _______

Enclosed is my check or money order for $ _______

Please charge my □ Visa □ MasterCard Card #: _______ expiration date _______

Signature ____________________________ Name ____________________________

Address ____________________________ City __________ State __________ Zip _______
Table 1. Sample Expense and Income Categories

<table>
<thead>
<tr>
<th>Expense Categories</th>
<th>Income Categories</th>
</tr>
</thead>
<tbody>
<tr>
<td>A Gas and Electricity</td>
<td>1 Deposits</td>
</tr>
<tr>
<td>B Postage</td>
<td>2 Magazine Writing</td>
</tr>
<tr>
<td>C Office Supplies</td>
<td>3 Book Writing</td>
</tr>
<tr>
<td>D Computer Hardware</td>
<td>4 Manual Writing</td>
</tr>
<tr>
<td>E Computer Software</td>
<td>5 Program Royalties</td>
</tr>
<tr>
<td>F Miscellaneous Equipment</td>
<td>6 Job Income</td>
</tr>
<tr>
<td>G Reference Materials</td>
<td>7 Nontaxable Income</td>
</tr>
<tr>
<td>H Phone Bills</td>
<td></td>
</tr>
<tr>
<td>I Printing Costs</td>
<td></td>
</tr>
<tr>
<td>J Advertisement Costs</td>
<td></td>
</tr>
<tr>
<td>K Media Costs</td>
<td></td>
</tr>
<tr>
<td>L Insurance</td>
<td></td>
</tr>
<tr>
<td>M Rent</td>
<td></td>
</tr>
<tr>
<td>N Auto Insurance</td>
<td></td>
</tr>
<tr>
<td>O Personal Insurance</td>
<td></td>
</tr>
<tr>
<td>P Eating Out</td>
<td></td>
</tr>
<tr>
<td>Q Groceries</td>
<td></td>
</tr>
<tr>
<td>R Savings</td>
<td></td>
</tr>
<tr>
<td>S Auto Maintenance</td>
<td></td>
</tr>
<tr>
<td>T Miscellaneous Expenses</td>
<td></td>
</tr>
</tbody>
</table>

The permanent files are arranged by months. You can have more than one month in the intermediary file, so you can do bimonthly, trimonthly, or even yearly reports just as easily as monthly reports. When you load in the intermediary file for inputting data, you will see the last record read in. For example,

<table>
<thead>
<tr>
<th>Entry Number........</th>
<th>Date 03/31/82</th>
</tr>
</thead>
<tbody>
<tr>
<td>Category Receipt/CK#</td>
<td>Name Description Amount</td>
</tr>
<tr>
<td>Z C30332*</td>
<td>Mastercard</td>
</tr>
</tbody>
</table>

This is the standard data display screen. The entry number tells you where the entry occurs in the intermediary file. The data is the date given to the record. The category assigned to the entry tells the type of expense/income it is. The Receipt/CK# is for further identification of the entry. For checkbook balancing, this is the check number, or deposit slip number. The C in this column tells Doughflo automatically that this is a check. The * tells that the check has been entered but not yet cleared by the bank. The Name/Description column lets you say to whom the check was written and for what purpose, or to identify the entry further. The amount is negative because it is a check, hence money leaving your account. The entry is assumed to be negative (even though you don’t enter a minus sign) unless a plus sign precedes the amount.

You can edit a file by deleting entries, adding entries, or editing an entry. You have full editing capabilities for each column in the record, so you can easily alter the date, amount, whether the check has cleared, or whatever. You can display records in several ways. You can seek an entry by entry number and display it in the same format as above. To display the next entry, press the N key, or press P to display the previous entry. The F key is used for scan forward and the R key for scan in reverse. The entries are displayed one after the other (in the direction requested) until the last entry is reached or the first entry is reached, or you tell it to stop.

Pressing B causes the program to compute a balance up to the current entry. You are asked for the beginning entry. If you press the enter key, the first entry is assumed. A balance is calculated by adding up all the amounts. The result looks something like Table 2. After this, you can save the file to disk or not, when you exit to the menu.

From the main menu, you can sort by category, date, name/description, or receipt/check number. You can sort all permanent files, or the intermediary file. You can save the intermediary files into the permanent monthly files. This option searches through the intermediary file and puts the various entries into the monthly files in which they belong.

Doughflo’s report generation is very good. The output may be sent to the printer or to the video screen. Doughflo assumes 66 lines per page, and cannot be used to output escape sequences to change the printer’s font. If you are content with standard formatting, Doughflo is quite adequate. It supplies two top titles with your title name and the date ranges for the report. The summary report generates the grand totals for each category and the percentage each category total is of total expenses and total income. The summing report generates similar information for each of your subtotal categories.

Doughflo is an excellent income/expenditure analysis program. It will tell you where your money goes and where it comes from.
Star Micronics GEMINI-10

$419.88 UPS DELIVERED
- 100 characters per second, bi-directional, logic-seeking printhead action (48 lines/min) with 2X print buffer, expandable to 4X on-board
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- 150 x 144 hi-resolution dot-addressable graphics matrix
- Subscripts, superscripts, underlining, backspace, plus 2X user-programmable character ROM, perf skip, vert/horz tabs
- Friction/tractor standard, handles 3-part forms (8.5")

### PRINTERS

<table>
<thead>
<tr>
<th>Printer Type</th>
<th>Price</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anadex DP-950A</td>
<td>$1499.88</td>
</tr>
<tr>
<td>Anadex DP-969A</td>
<td>$1499.88</td>
</tr>
<tr>
<td>Centronics 192-1</td>
<td>$909.88</td>
</tr>
<tr>
<td>Centronics 192-3</td>
<td>$949.88</td>
</tr>
<tr>
<td>Centronics 352</td>
<td>$1649.88</td>
</tr>
<tr>
<td>Centronics 353</td>
<td>$2394.88</td>
</tr>
<tr>
<td>C. Itoh Proprinter</td>
<td>$499.88</td>
</tr>
<tr>
<td>w/RS-232C</td>
<td>$469.88</td>
</tr>
<tr>
<td>C. Itoh Proprinter 9</td>
<td>$734.88</td>
</tr>
<tr>
<td>w/RS-232C</td>
<td>$789.88</td>
</tr>
<tr>
<td>C. Itoh F-10 Starwriter, 40 cpi</td>
<td>$1499.88</td>
</tr>
<tr>
<td>Parallel or RS-232C</td>
<td>$1799.88</td>
</tr>
<tr>
<td>C. Itoh F-10 Printmaster, 55 cpi</td>
<td>$1999.88</td>
</tr>
<tr>
<td>Parallel or RS-232C</td>
<td>$2199.88</td>
</tr>
<tr>
<td>F-10 Tractor</td>
<td>$299.88</td>
</tr>
<tr>
<td>Dataliner 2000</td>
<td>$1089.88</td>
</tr>
<tr>
<td>Dataliner Tractor</td>
<td>$1499.88</td>
</tr>
<tr>
<td>Dataliner Cable</td>
<td>$499.88</td>
</tr>
<tr>
<td>Diablo 630</td>
<td>$1299.88</td>
</tr>
<tr>
<td>Diablo 630</td>
<td>$1299.88</td>
</tr>
<tr>
<td>Diablo 630 KSR</td>
<td>$599.88</td>
</tr>
<tr>
<td>630 Tractor</td>
<td>$314.88</td>
</tr>
<tr>
<td>DMP-SS Printer</td>
<td>$499.88</td>
</tr>
</tbody>
</table>

### MODEMS

- The LYNX TRS-80 direct-connect modem features auto-dial, auto-answer,
- Hayes Smartmodem feature programmable in any language, auto dial & auto answer, full & half duplex, keyboard control, user-selectable modems, LED status lights & an audio monitor. Comes complete with power supply and modular telephone cable. 300 Baud $239.88, 1200 Baud $299.88

### TRS-80 SOFTWARE

**NEWSCRIP 7.0**
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**NewScript** $109.99

**MAIL LABEL OPTION**
- Create mailing labels from NEWSCRIP files. Format 9 up, 3 up, etc. Works with NEWSCRIP files. Upgrade your older library of files with this handy program.

**SCRIPTS/NEWSCRIP CONVERSION**
- Takes either Electric Pencil or Script files and converts them to NEWSCRIP files. Specify Model I or III when ordering.

**Electric Webster**
- A 50,000 word dictionary for NEWSCRIP. It can be selected from the main menu. The Electric Webster features spell checking, options on change & a "browse" feature allowing you to choose spellings or to enter your own. Fully compatible with NEWSCRIP.

**Electric Webster** $134.88

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REVIEWS

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Mikeegraphic Graphic System
Mikeegraphic Corp.
P.O. Box 3813
Bellevue, WA 98009
Model I and III
$340

by Jake Commander

Many TRS-80 owners might argue that the machine’s single greatest weakness is its inability to display high-resolution graphics. Whereas many micros can boast a resolution of 256 by 192, the TRS-80’s graphics performance of 128 by 48 looks puny by comparison. True, even these 6,144 pixels can be made to do some fascinating work, but it’s usually a case of speed fooling the eye into not noticing the ragged, stepped edges of such poor resolution.

If you’ve drooled enviously at the Mikeegraphic advertisements, here’s a chance to see how it performs in real life.

The Mikeegraphic Board from the Mikeegraphic Corporation offers a hardware option to upgrade the graphics of the TRS-80 from third to first class. After installing the board in the keyboard unit, you can hook up an extra module to allow resolutions of 384 by 192 on a Model I or a massive 512 by 192 on a Model III. That’s 73,728 and 98,304 dots respectively!

With this kind of resolution, many more serious tasks in the realm of computer-aided design and management (CAD/CAM) can be undertaken. What makes it even more effective is that the graphics can be intermixed with text to allow labeled diagrams and the like. A demo program supplied with the package amply demonstrates its many features. In addition to the normal low-resolution graphics, the system allows high-resolution graphics of 384 by 192 on the Model 1, 512 by 192 on the Model III, or medium-resolution graphics of 192 by 192 on the Model I, and 256 by 192 on the Model III (all in combination with inverse video).

Mikeegraphic has opted for a memory-mapped video display similar to the normal TRS-80 system. Whereas normal video is mapped from 3CO0 to 3FFF hex, the Mikeegraphic video is mapped from C000 to EFFF hex. That’s 12K of RAM at the top of memory, making the TRS-80 memory map look like Fig. 1.

Notice that in a 4K system, the top 4K is untouched by the Mikeegraphic system but the 12K immediately below it is commandeered for the medium- and high-resolution graphics. This works out very conveniently for maintaining software (such as driver routines) that may use the top RAM in your system. If you have less than 48K, your resident software will be below the Mikeegraphic RAM anyway. If you do have 48K then you retain the use of your upper 4K for high-RAM software — this is more than adequate under normal circumstances.

The 12K that’s set aside for high resolution is flipped in with a port output command. In fact, all options in the system are selected by this method, with port 254 (hex FE) being the control port. Four output bits are used to select any or all appropriate combinations of the following options:

Bit 7—Select Mikeegraphic RAM (12K)
Bit 6—Select mid-resolution mode
Bit 5—Select normal TRS-80 graphics
Bit 4—Select inverse video

I would have preferred another port than 254, as this is already a de facto standard for the control of most high-speed clock modifications. This has to be accounted for by using bit 0 (which controls the high or low clock speed) along with the four control bits outlined above.

It’s a simple matter to mix text with high-resolution graphics in much the same way as with low-resolution graphics. Under normal circumstances an unmodified TRS-80, any byte placed in video RAM that has a value less than 128 is displayed as a character. The shape of this character is fetched from a character-generator ROM that is preprogrammed to generate the appropriate shapes according to the ASCII char-

---

Fig. 1. The TRS-80 Memory Map
acter set (plus a few extra on the Model III). However, when the byte in video memory has a value between 128 and 191, the displayed shape is no longer fetched from the character generator ROM. Instead, a system called “bit-mapping” comes into play. On the TRS-80, the lower six bits are taken from the display byte and loaded into a shift register. As the electron beam scans down the face of the screen, each bit is displayed in a carefully synchronized sequence as a white point if it’s a 1, or a dark point if it’s a 0. Each of the six points controls a particular pixel, hence the term “bit-mapping.”

The Mikee Graphics system detects all bytes that are graphics characters and (ignoring the normal six graphics bits) uses its own method of bit-mapping the pixels. So if the normal TRS-80 video RAM is filled with graphics characters (they would normally be dummy graphics blanks), the whole of the screen will be given over to the Mikee bit-mapped graphics. However, if you throw a letter A into normal video RAM, it will switch out Mikee at that character position and display the correct character generator shape. This neat touch does away with the need to generate ordinary text from the bit-mapped pixel graphics—exactly what you have to do on the Color Computer if you want text in high-resolution display mode.

Apart from text generation, the graphics are pretty logical. Any bit set anywhere in the 12K of Mikee Graphics RAM lights any one of the 73,728 or 98,304 points on the screen (according to Model I or III use). It’s as simple as that.

So much for the theory. What about the practical aspects of receiving and installing the package? Well, the system comprises a small printed-circuit board that fits inside the keyboard unit and attaches via a multi-way connector to the main graphics unit (a small gray box). You’re also supplied with an installation and instruction manual…and a magnifying glass! No, it’s not for small print—the manual is exceptionally clear and contains numerous photographs illustrating step-by-step installation instructions. Separate sections cover Model I and Model III installations, and some software examples help you get the thing into action.

The magnifying glass is to help you check your soldering for any bridges or solder balls. As you have to make 15 soldered connections, a thorough checkout with the glass makes rather good sense. Not only that, but when you’ve finished the subsequent computing session, you can start collecting butterflies.

A tool kit is available from Mikee Electronics for those people who’ve never dabbled with a soldering iron, but if you have no previous soldering experience, get somebody else to install it—soldering to integrated circuit pins can become a tragic mess to a beginner. The unit is easy to install, though, and worked the first time on my Model III.

**Critics**

I have a couple of small gripes, but they’re far outweighed by the excellent performance of the system. I’ve already grabbed about the use of port 254 as the control port. This could be a minor nuisance if you have a high-speed clock.

When you turn the system on, it doesn’t default to normal TRS-80 graphics. It’s necessary to output to port 254 to set the computer to its standard display mode. I think this is a disadvantage.

I can thoroughly recommend Mikee Graphics to any Model I or III owner with a need for high-resolution graphics.

---

**Epson MX-80 and 100**

$49.95

by L. W. C. Dye

When the Epson MX-80 arrived about two years ago, it rapidly pushed established printers aside and captured about 40 percent of the small-printer market. However, with the rapid advances in technology, it seems that whatever we buy today is obsolete tomorrow. The Microbuffer and MXPLUS are two products that will make your Epson perform as it never

---

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Westlake Village, CA 91362
Epson MX-80 and 100
$159

**MXPLUS**

Dresselhaus Computer Products
Box 929
Azusa, CA 91702

---

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(904) 269-1918 for technical assistance and Dealer Information

Integrated Cash Register Systems from as low as $449.

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ICR-FutureSoft
Software of Tomorrow…Today — 211
did before and make a new printer seem less attractive.

The Microbuffer

The Microbuffer comes in two versions—the serial MBS-8K and the parallel MBP-16K. The parallel version is Centronics compatible, buffers 16,000 characters, and replaces the standard Centronics interface on the Epson. The serial version buffers 8,000 characters and supports both hardware and software handshaking at speeds from 300–19,200 baud. The 8K buffer on the serial version was probably a space limitation because the RS-232C components fill the majority of the board.

Both versions are built on high-quality PC boards. There is one socketed ROM on the board and all other components are soldered. The installation instructions are thorough and clear. Although my board slipped right in, the instructions point out some possible tight spots due to minor variations in the Epsons and how to handle them.

My printer and my computer were flying now and running faster at 4,800-baud serial than they had been running parallel. The buffer was soaking up the lines and freeing the computer as fast as it could transmit. Unless I was sending a lot of graphics over the cable, the computer could get ahead of the printer and the buffer would slowly fill. When it does get full, the computer must again wait for the buffer to empty enough to get another line in but the computer will always stay 8K to 16K ahead of the printer.

To illustrate the speed difference, I ran four tests with both the Microbuffer and an unbuffered Epson serial interface board. The first test was printing a 6,380-character text file with my word processor with right-justification and emphasized print turned on. The second test was the same text file but with right-justification and emphasized print turned off. The third test was an LLIST of the 13K word processor itself. The last test was an LLIST of a small 2.5K program that could not fill the buffer.

The Epson normally prints at about 80 cps, but slows down to about half that when printing emphasized or double strike. The word processor goes through additional work for the right-justification and needs more time to get a line ready.

Table 1 shows the results of these tests. In every test with the Microbuffer, the computer was done before the printer and was available for more work. Using the unbuffered serial board, the computer and printer always finished together so only one time is shown. The print time improvement is dramatic for the Basic word processor, but minimal for the LLIST’s. However, the computer is freed up earlier in all cases. Note that the buffer filled about 45 seconds into the 13K LLIST but the computer was still freed up three minutes earlier than it would have been.

The MXPLUS is another PC board add-on for the Epson. To install it, you remove the 1B ROM and plug it into the MXPLUS board. The board is then plugged into the 1B socket and one connection is made to the 3C chip with a test clip. The instructions are clear but the installation is very tight and the board could be made a little smaller. It takes a little juggling with the test clip on 3C to get a good connection and ensure that it is not shorting out another pin. The MXPLUS board ends up under the Microbuffer, but there is adequate clearance.

The MXPLUS contains firmware programming to give you hardware control of many of the Epson, Grafix, and Grafix+ functions. The online, form-feed, and line-feed buttons are your controls and a small sticker is supplied as a reminder of the nine functions provided. They are:

- Reset All Functions
- Condensed Print
- Double Wide Print
- Emphasized Print
- Double Strike
- Perforation Skipover
- Italics (with Grafix)
- Indentation
- Eight lines per inch

MXPLUS is activated by pressing and holding the on-line button until the Epson beeps. The on-line light will blink in a short on, long off pattern if none of the functions are turned on. This is also the reset function, and a press of the form-feed button will turn all functions off.

Each additional press of the on-line button will take you to the next function. If the on-line light is in the short on, long off pattern, the function is off. If the pattern is long on, short off, the function is on. The functions are toggled on and off with the form-feed button. You can quit at any time by pressing the line-feed button to escape and then the on-line button to ready the printer.

Emphasized print will still override condensed print just as on a normal Epson, but in general, you can mix software and hardware control. Hardware-selected wide print will not turn off at the end of each line, however. Perforation skip prints 58 lines then skips eight for LLISTS and such. It should be turned off if pagination is under program control. Indentation moves the left margin in six spaces to allow three-hole punching or binding, but if a line wraps, the continuation is not indented. The eight-lines-per-inch function also resets top-of-form except with Grafix+.

With MXPLUS, I can now print documents in double width, condensed print for that bold look. Since you can stop the printer and switch modes at any time, changing type styles in the middle of a document without inserting control codes is possible.

The only problems I found were the lack of indentation on wrap-around lines and that the first character on a double-width wrap around will be single width—minor problems indeed compared to the features added.

Both the Microbuffer and the MXPLUS are good “value added” modifications to the Epson that add features to an already excellent product and save you some time, too.

<table>
<thead>
<tr>
<th>Tests at 4800 baud</th>
<th>Buffered Time</th>
<th>Unbuffered Time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Computer</td>
<td>Printer</td>
</tr>
<tr>
<td>6K Text—Justified and Emphasized</td>
<td>2:35</td>
<td>4:06</td>
</tr>
<tr>
<td>6K Text—Regular unjustified</td>
<td>2:05</td>
<td>2:38</td>
</tr>
<tr>
<td>13K LLIST</td>
<td>1:44</td>
<td>4:59</td>
</tr>
<tr>
<td>2.5K LLIST</td>
<td>0:09</td>
<td>1:17</td>
</tr>
</tbody>
</table>

Table 1
**Review Digest**

*Computers for Everyone*, Jerry Willis and Meri Miller, Dilithium Press, Beaverton, OR, $6.95, soft cover, pp. 262.

"Despite its annoying tone, I would recommend this for people who know little or nothing about computers and don't mind sifting through the verbosity and corny jokes. It can be a relatively painless way to learn the basics. It is loaded with useful information and has illustrations that are both amusing and informative." *Classroom Computer News*, October, p. 64.

---

**PDS (Partitioned Data Sets)**, Misosys, 5904 Edgehill Rd., Alexandria, VA 22303, Model I or III, LDOS, $40.

"Basically PDS is a file on a disk that itself contains subfiles. . . . It is a sophisticated utility for a sophisticated audience. It is an excellent complement to the file-handling procedures already found in LDOS, and will find particular application by users who have large disk-storage problems." *InfoWorld*, November 29, p. 100.

---

**Beta-80**, MECA, 5677 Sunset Ave., Yucca Valley, CA 92284, Model I, $699 single density, $849 double density.

"I was bound and determined to find effective mass storage at low cost. I pored over computer journals for months before I learned about a small company in California called MECA. They had just started production of a digital-cassette storage device called the Beta-80, which was designed to interface directly with the TRS-80 Level II. I have owned my Beta-80 for well over a year now, with no more than a handful of lost bytes." *80 U.S.* Journal, December, p. 101.

---

**El Diablero—An Adventure Game**, Computerware, Dept. C., Box 668, Encinitas, CA 92024, Color Computer, $19.95 cassette, $24.95 disk.

"Your 'situation' in El Diablero is that you awake, dazed and confused, in the middle of the desert . . . knowing that you have been learning the techniques of sorcery from an old man in these parts. The problem is that you can't remember anything you have learned, and you can't find the old man. You must learn to use this 'magical' power . . . another excellent game from Computerware." *68' Micro Journal*, November, p. 14.

---

**DiscatER**, softERware, 16007 Miami Way, Palisades, CA 90272, LDOS, Model I and III, $39.95.

"Although DiscatER is a floppy-disk-cataloging program, it actually keeps track of each file on the disk . . . . This is an extremely functional product at an excellent price. DiscatER is simple enough to be used by people with minimal computer proficiency . . . ." *InfoWorld*, November 15, p. 49.

---


"Madam Rosa's Massage Parlor falls far short of all expectations (whatever yours may be) and it's not even a very good adventure. It was written on the level of a slightly voyeuristic 15-year-old recluse without the deviousness one would expect for $15." *Rainbow*, November, p. 66.

---

**Outhouse**, Soft Sector Marketing, 6250 Middlebelt, Garden City, MI 48135, Model I or III, $15.95 cassette, $19.95 disk.

". . . . what we have here is a game that is fast and funny. But is it a good game? I have played a few fast action games that just did not appeal to me. Fortunately, Outhouse is not one of these. There are enough different types of aliens to give the game variety and hold your interest. There is enough variance in speed to give a seemingly endless challenge." *80 U.S.* Journal, December, p. 101.

---

**Color Fan**, Atomic City Electronics (Atomtronics), 3195 Arizona Ave., Los Alamos, NM 87544, Color Computer, $34.95.

"Most readers . . . . are aware of the power supply and heat problems of the Color Computer, and have seen several of the published 'fixes'. Atomtronics has now come up with a 3" cooling fan for the Color Computer that is easy to install and will help alleviate some of these problems. . . . This is a product that we have needed for the Color Computer for a long time, and will greatly extend the life of parts and pieces in the computer." *68' Micro Journal*, November, p. 15.

---

**Roman Checkers**, Tandy/Radio Shack, Radio Shack Stores, Color Computer, $29.95.

"Don't let the name fool you. Roman Checkers is Radio Shack's version of the popular board game, Othello. This RS product is a surprisingly clever rendition of the board game that uses 'reversible discs' . . . ." *The Rainbow*, November, p. 55.
February
5  Computer Swap America Santa Clara County Fairgrounds, San Jose, CA.
7-9  Technical Education Research Centers, Cambridge, MA. Microcomputers in Education Washington, DC.
14-17 IEEE Computer Society, Silver Spring, MD. Computer Science Conference Orlando, FL.
16-18 TALMIS, Oak Park, IL. 3rd Annual Software Publishers and Computer-Based Training Conference Ambassador West, Chicago, IL.
18-21 2nd Annual Pacific Computer Expo Convention and Performing Arts Center, San Diego, CA.
23-25 Future Computing Inc., Richardson, TX. Personal Computer Retail Forum Loews Anatole, Dallas, TX.

March
1-3  IEEE Computer Society, Silver Spring, MD. COMPCON Spring '83 San Francisco, CA.
8  IEEE Computer Society, Silver Spring, MD. MICRODELCON Newark, DE.
10-12 The Council for Exceptional Children, Reston, VA. Use of Microcomputers in Special Education Hartford, CT.
14-15 Michigan Association for Computer Users in Learning, Wayne, MI. MACUL '83 Dearborn, MI.
16-18 IEEE Computer Society, Silver Spring, MD. 16th Annual Simulation Symposium Tampa, FL.
17-19 Arizona State University, Tempe, AZ. Microcomputers in Education ASU campus.
18-20 West Coast Computer Faire Brooks Hall, San Francisco, CA Civic Auditorium.
25-26 1983 Small College Computing Symposium St. Olaf College, Northfield, MN.
29-31 IEEE Computer Society, Silver Spring, MD. Workshop on Computer System Organization New Orleans, LA.

April
4-8  IEEE Computer Society, Silver Spring, MD. Tutorial Week East '83 Orlando, FL.
10-13 Association for Computing Machinery (ACM)/SIGAPL, Washington, DC. APL83 Sheraton Washington Hotel.
17-22 Infocom '83 Town & Country, San Diego, CA.

Coming Next Month

The March issue of 80 Micro will feature several you-can-build-it hardware projects. Topics include a $5 CP/M modification for the Model I, an audio amplifier, a guide to constructing an EPROM programmer, and computer security with a credit card. We'll also have a cassette operating system and the first installment of a Lisp interpreter series.

Our new Color Computer column will make its debut. Called The Color Key, it's authored by Scott Norman. Model II owners will find a special surprise beginning in March. Each month, we'll print conversion tables for a few Model I/III programs to make them usable on the Model II.

In Fun House, Richard Ramella introduces an adventure game that players can customize with names they choose for characters and locations.
The Original Magazine for Owners of the TRS-80™ MicroComputer
MODEL I • MODEL II • MODEL III • POCKET COMPUTER • COLOR COMPUTER

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for TRS-80 Owners

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A. NANOS SYSTEMS CORP.
TRS-80 At Your Fingertips Complete quick reference guide to basic, assembly language and graphic codes— all at your fingertips for all TRS-80 computers (specify computer).
Assembly Language Section: N/A for Color Computer

B. A Word Processor, Data Management System and Cleanup
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RS-232-C Interface: Read sense switches (Model I), connector fault, data transmission, framing, data loop, baud rate generator
Disk Drives: Disk controller, drive select and restore, track seek and verify read, read/write/verify all tracks and sectors, formatting, disk drive timer, disk head cleaner

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<thead>
<tr>
<th>SMART TERMINAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enables your TRS-80 to be used as a data communications terminal to a time-sharing system, computer bulletin board, or another computer, via the RS-232-C interface.</td>
</tr>
<tr>
<td><em>MEMORY BUFFER</em> holds data for transmission or data received from other computer.</td>
</tr>
<tr>
<td><em>CASSETTE or DISK</em> may be used to load or save data from memory.</td>
</tr>
<tr>
<td><em>AUTOMATIC TRANSMISSION</em> of data from memory.</td>
</tr>
<tr>
<td><em>AUTOMATIC STORAGE</em> of incoming data at user's option.</td>
</tr>
<tr>
<td><em>TRANSMIT</em> or RECEIVE WITH VERIFICATION options included for communication between two TRS-80s using Smart Terminal.</td>
</tr>
<tr>
<td><em>FULL CONTROL KEYS</em>, including control key mapping into any ASCII character. True BREAK key. Lower case supported on Model I.</td>
</tr>
<tr>
<td>Ruffled LINE PRINTER ECHO for incoming data.</td>
</tr>
<tr>
<td>Disk and cassette files fully compatible with ELECTRIC PENCIL** and SCRIPSET programs.</td>
</tr>
<tr>
<td>Baud RATE and RS-232-C CHARACTERISTICS can be reset from within the program.</td>
</tr>
<tr>
<td><em>SAVE PROGRAM</em> option creates &quot;personalized&quot; back-up copy of program with all options set as specified by user.</td>
</tr>
<tr>
<td>ON PROGRAM supports both cassette and disk systems. Program is compatible with PADDLE II and other TRS-80 &quot;work alike&quot; computers.</td>
</tr>
</tbody>
</table>

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- *PRINT* output on video display or line printer.
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- *SAVE* and *READ* disk files (MON-4 Only).
- *INPUT* and *OUTPUT* of disk sectors (MON-4 Only).
- Sending and RECEIVE data over RS-232-C Interface (MON-4 Only).
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## BUSINESS 100 PROGRAM LIST

<table>
<thead>
<tr>
<th>NAME</th>
<th>DESCRIPTION</th>
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<tbody>
<tr>
<td>RULE7</td>
<td>Interest Apportionment by Rule of the 78’s</td>
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<tr>
<td>AMTNU1</td>
<td>Amortization computation program</td>
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<td>DATE</td>
<td>Time between dates</td>
</tr>
<tr>
<td>DAYEAR</td>
<td>Day of year a particular date falls on</td>
</tr>
<tr>
<td>LEASEDAT</td>
<td>Interest rate on lease</td>
</tr>
<tr>
<td>BREVKEV</td>
<td>Breakeven analysis</td>
</tr>
<tr>
<td>DEPRSL</td>
<td>Straightline depreciation</td>
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<tr>
<td>DEPRPPY</td>
<td>Sum of the digits depreciation</td>
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<td>DEPREDE</td>
<td>Declining balance depreciation</td>
</tr>
<tr>
<td>DEPRDBD</td>
<td>Double declining balance depreciation</td>
</tr>
<tr>
<td>TAXDEC</td>
<td>Cash flow vs. depreciation tables</td>
</tr>
<tr>
<td>CHECK2</td>
<td>Prints NBS checks along with daily register</td>
</tr>
<tr>
<td>CHECKBK1</td>
<td>Checkbook maintenance program</td>
</tr>
<tr>
<td>MORTGA/A</td>
<td>Mortgage amortization table</td>
</tr>
<tr>
<td>MULTIN</td>
<td>Computes time needed for money to double, triple, etc.</td>
</tr>
<tr>
<td>SALVAGE</td>
<td>Determines salvage value of an investment</td>
</tr>
<tr>
<td>RRVARN</td>
<td>Rate of return on investment with variable inflows</td>
</tr>
<tr>
<td>RRCNST</td>
<td>Rate of return on investment with constant inflows</td>
</tr>
<tr>
<td>EFFECT</td>
<td>Effective interest rate of a loan</td>
</tr>
<tr>
<td>FVAL</td>
<td>Future value of an amount (compound interest)</td>
</tr>
<tr>
<td>PVFL</td>
<td>Present value of a future amount</td>
</tr>
<tr>
<td>LOANPAY</td>
<td>Amount of payment on a loan</td>
</tr>
<tr>
<td>REGWTH</td>
<td>Equal withdrawals from investment to leave 0 over</td>
</tr>
<tr>
<td>SIMDISK</td>
<td>Simple discount analysis</td>
</tr>
<tr>
<td>DATEVAL</td>
<td>Equivalent &amp; nonequivalent dated values for obligations</td>
</tr>
<tr>
<td>K00NDF</td>
<td>Present value of deferred annuities</td>
</tr>
<tr>
<td>MARKUP</td>
<td>Markup analysis for items</td>
</tr>
<tr>
<td>SINKFUND</td>
<td>Sinking fund amortization program</td>
</tr>
<tr>
<td>BONDVAL</td>
<td>Value of a bond</td>
</tr>
<tr>
<td>DEPLETE</td>
<td>Depletion analysis</td>
</tr>
<tr>
<td>WARR</td>
<td>Value of a warrant</td>
</tr>
<tr>
<td>BONDVAL2</td>
<td>Value of a bond</td>
</tr>
<tr>
<td>EPIEST</td>
<td>Estimate of future earnings per share for company</td>
</tr>
<tr>
<td>BETA</td>
<td>Returns alpha and beta values for stock</td>
</tr>
<tr>
<td>PORTFOLIO</td>
<td>Portfolio selection model - e.g., what stocks to hold</td>
</tr>
<tr>
<td>OPTWRITE</td>
<td>Option writing computations</td>
</tr>
<tr>
<td>EVAL</td>
<td>Value of an option</td>
</tr>
<tr>
<td>BAYES</td>
<td>Bayesian expectations</td>
</tr>
<tr>
<td>VALRNG</td>
<td>Value of perfect information</td>
</tr>
<tr>
<td>VALAD</td>
<td>Value of additional information</td>
</tr>
<tr>
<td>UTILI</td>
<td>Derives utility function</td>
</tr>
<tr>
<td>SIMPLX</td>
<td>Linear programming solution by simplex method</td>
</tr>
<tr>
<td>TRAN</td>
<td>Transportation method for linear programming</td>
</tr>
<tr>
<td>EQQ</td>
<td>Economic order quantity inventory model</td>
</tr>
<tr>
<td>QUEP</td>
<td>Queueing Model (waiting line) model</td>
</tr>
<tr>
<td>CV</td>
<td>Cost-volume-profit analysis</td>
</tr>
<tr>
<td>CONDPROF</td>
<td>Conditional profit tables</td>
</tr>
<tr>
<td>TOLOS</td>
<td>Opportunity loss tables</td>
</tr>
<tr>
<td>FQAO</td>
<td>Fixed quantity economic order quantity model</td>
</tr>
<tr>
<td>EQO</td>
<td>As above but with shortages permitted</td>
</tr>
<tr>
<td>EQQOPT</td>
<td>As above but with quantity price breaks</td>
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<tr>
<td>QUEQCB</td>
<td>Cost-benefit waiting line analysis</td>
</tr>
<tr>
<td>NCFANAL</td>
<td>Net cash flow analysis for simple investment</td>
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<td>Profitability index of a project</td>
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<td>CAPI</td>
<td>Cap. Asset. Pr. Model analysis of project</td>
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<table>
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<tr>
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<th>DESCRIPTION</th>
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<td>WACC</td>
<td>Weighted average cost of capital</td>
</tr>
<tr>
<td>CMPBAL</td>
<td>True rate on loan with compensating balance required</td>
</tr>
<tr>
<td>DISC</td>
<td>True rate on discounted loan</td>
</tr>
<tr>
<td>MERG</td>
<td>Merger analysis computations</td>
</tr>
<tr>
<td>FRAT</td>
<td>Financial ratios for a firm</td>
</tr>
<tr>
<td>NPV</td>
<td>Net present value of project</td>
</tr>
<tr>
<td>PRINDAS</td>
<td>Lapse year price index</td>
</tr>
<tr>
<td>PRNPDA</td>
<td>Pasche price index</td>
</tr>
<tr>
<td>SEASIND</td>
<td>Constructs seasonal quantity indices for company</td>
</tr>
<tr>
<td>TIMETR</td>
<td>Time series analysis line trend</td>
</tr>
<tr>
<td>TIMEAV</td>
<td>Time series analysis moving average trend</td>
</tr>
<tr>
<td>FUTRNF</td>
<td>Future price estimation with inflation</td>
</tr>
<tr>
<td>MAILPAC</td>
<td>Mailing list system</td>
</tr>
<tr>
<td>LETWRT</td>
<td>Letter writing system with links with MAILPAC</td>
</tr>
<tr>
<td>SORT3</td>
<td>Sorts list of names</td>
</tr>
<tr>
<td>LABEL1</td>
<td>Label maker system</td>
</tr>
<tr>
<td>LABEL2</td>
<td>Name label maker</td>
</tr>
<tr>
<td>BUSBUD</td>
<td>DODE business bookkeeping system</td>
</tr>
<tr>
<td>TMCLK</td>
<td>Computes weeks total hours from timeclock info.</td>
</tr>
<tr>
<td>ACCTPAY</td>
<td>In memory accounts payable system stored in memory</td>
</tr>
<tr>
<td>INVOICE</td>
<td>Generate invoice on screen and print on printer</td>
</tr>
<tr>
<td>INVENT</td>
<td>In memory inventory control system</td>
</tr>
<tr>
<td>TELDIR</td>
<td>Computerized telephone directory</td>
</tr>
<tr>
<td>TIMUSAN</td>
<td>Time use analysis</td>
</tr>
<tr>
<td>ASSTON</td>
<td>Use of assignment algorithm for optimal job assign.</td>
</tr>
<tr>
<td>ACCTTRE</td>
<td>In memory accounts receivable system stored in memory</td>
</tr>
<tr>
<td>TERMSP</td>
<td>Compares 3 methods of repayment of loans</td>
</tr>
<tr>
<td>PAYNET</td>
<td>Computes gross pay for given net</td>
</tr>
<tr>
<td>SELLPR</td>
<td>Computes selling price for given after tax amount</td>
</tr>
<tr>
<td>ARBCOMP</td>
<td>Arbitrage computations</td>
</tr>
<tr>
<td>DEPRSF</td>
<td>Sinking fund depreciation</td>
</tr>
<tr>
<td>UPSZONE</td>
<td>Finds UPS zones from zip code</td>
</tr>
<tr>
<td>ENVELOPE</td>
<td>Types envelope including return address</td>
</tr>
<tr>
<td>AUTOEXP</td>
<td>Automobile expense analysis</td>
</tr>
<tr>
<td>INSF</td>
<td>Insurance policy file</td>
</tr>
<tr>
<td>PAYROLL</td>
<td>In memory payroll system</td>
</tr>
<tr>
<td>DILAN</td>
<td>Dilation analysis</td>
</tr>
<tr>
<td>LOANATRD</td>
<td>Loan amount a borrower can afford</td>
</tr>
<tr>
<td>REP</td>
<td>Purchase price for rental property</td>
</tr>
<tr>
<td>SALELEAS</td>
<td>Sale-leaseback analysis</td>
</tr>
<tr>
<td>RCRNPABD</td>
<td>Investor’s rate of return on convertible bond</td>
</tr>
<tr>
<td>PORT</td>
<td>Stock market portfolio storage - valuation program</td>
</tr>
</tbody>
</table>

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76 • 80 Micro, February 1983
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VISA
DEALER INQUIRIES WELCOME

80 Micro, February 1983 • 79
Las Vegas doesn't like the unlucky. Mad Max and I had been walking the Strip for three days, trying to set up a mini-Cafe with a card table, the PMC, and Galaxy Invasion, and getting chased away from all the best places. Our hotel bill was overdue, and the van was lost at the Prairie Sunset Rest Home. We were about to gamble our last $3.70 at the MGM Grand when the bouncers threw the 10-year-old girl out in front of us.

"I was not card counting!" she yelled. "This is another system altogether! You take probability theory and—"

Max and I didn't listen to the rest, partly because she started shouting differential equations and partly because we'd never seen a child with battleship-gray hair. It wasn't battleship gray exactly, it was—

"Mercedes Silver," she introduced herself, "I dyed it when I was into punk, but I outgrew that now I'm in college." Max was gaping, but I managed to shake hands. "Did you see those guys at the casino? I was just trying a blackjack analysis I worked out on a TRS-80 at the Hop—"

At the words "TRS-80" we were all ears. "The Hop?"

"Johns Hopkins Center for Mathematically and Scientifically Precocious Youth," Mercedes said. "I've got a B.S. there; I'm supposed to go back for a master's this semester. My dad's a Radio Shack dealer in Baltimore. He sent me to Suzuki programming school when I was 3."

Max interrupted. "You say you have this gambling system—"

"Sequential forecasting. Probability analysis. Geez, don't you guys know from calculus or anything?"

"You can play cards," Max continued. "There's this nurse at a rest home outside of town who won this van full of TRS-80s that belongs to us, and if you could challenge her to a game. . . ."

We climbed over the fence at Prairie Sunset and found the van in the staff parking lot. "Geez," Mercedes said again. "I was expecting something, you know, with bright colors and maybe a mural."

"There's some more mail here forwarded from Peterborough," Max said. Considering where we were, the letter was appropriate:

I need help getting past the guard at the beginning of Asylum. Are you supposed to trade with him? Or kill him? He keeps catching me and putting me in a straitjacket. And what do you do with the invisible inmate by the guard? What key do I need to open the doors where the inmates giggle or say "Let me out and I'll kill you"? What do I need to get into the officers' wing and stay there? And where do I get that?

Tom Abelson
6537 N. Keating
Lincolnwood, IL 60646

This letter started our usual argument. Max insisted we leave Tom to his fate—Max is an adventure Darwinist—and I wanted to help the readers and boost our image. A pay-phone call to William Denman, Med Systems president and cameo player in Asylum II, brought a compromise.

Fight, trade, or whatever, said Denman, you cannot get past the first guard; he'll always put you in the room with the burning straitjacket. Roll around if you find yourself on fire. If you slide a newspaper under the door and poke the keyhole to retrieve the key, you'll be able to tiptoe out and face a second guard; punch him and knock him out, and then frisk him to get enough keys and items to keep you going for a long time.

Past that, Med Systems sells hint sheets for $1. Remember Max's motto: "There are no invisible inmates, only inmates' voices coming from behind doors."

Speaking of Med Systems (or whatever they'll call themselves; there's talk of a merger and a name change), Denman revealed that Randall Don Masteller, author of the Warrior of Ras trilogy, has six more games due in early '83. A second, advanced trilogy will load characters from the first, which is recommended ("The odds are that, if you try any of these games as a Level I warrior, you will not come out alive"). A Wizard of Ras trilogy, while it won't load warrior characters, lets you do everything from throw stones to cast spells. Both feature better graphics than Dunzhin, Kaiv, and The Wylde; when you're attacked by monsters, the display zooms in on your immediate area, letting you see whom you're hacking and who's sneaking around for a flank attack.

* * * * *

"Mr. Max, is it?" came a voice from behind us. "Thinking of stealing back the truck?"

"Van," Max corrected, smiling back at the figure in white. "Actually, Nurse—"

"Lovelace. Ada Lovelace."

"—my friend here was hoping you'd agree to a rematch."

"Blackjack," Mercedes smiled by way of introduction. "You look like a woman who stands on 17."

* * * * *

It was no contest. On the first hand, Nurse Lovelace lost the Color Computer and Astro-Blast. Next, Mercedes claimed the Models Is and our adven-
ture collection; next, two IIs and the Melbourne House library. The van and everything else took another half hour, during which I read some Gamer’s Cafe feedback or input or whatever they call that section in the front of the magazine:

Michael Johnson (3138 Doggit Drive, Spring Arbor, MI 49283) writes to say that Jim Daniel’s patch in the November 1982 issue, adapting the Alpha Products joystick to Voyage of the Valkyrie, works on the Model I but leaves Mod III owners out in the cold. Jim wonders whether the two PEEK statements (16458 and 16459) in line 10000 would be hardware-specific. Any Model III Wagnerians out there with a patch for the patch?

** ** **

“On the road again,” bellowed Max—who usually prefers the Doors to Willie Nelson and who sings like the casserole port voice in Panik—as we headed out of town on Route 93. “Time to set up the awning and get computers on the sidewalk again, do the Johnny

Appleseed of games bit. Anybody beat my score on Sea Dragon?” (No one has yet; send in those scores and screen photos, all games welcome.)

“I taught in the Pocket Computers and get us a printer,” Mercedes said, watching my monthly struggle with Scripsit. That “I” and “us” made Max and me turn around in the middle of driving and writing. “I own all this stuff now, you know. It’s a kick.”

Well, she’s right. First my partner Winthrop goes Color Berserk and ends up in a rest home, and now we men are working for a 10-year-old. We’re supposed to be taking her to Baltimore. Maybe her dad can get us a copy of Poltergeist.

---

### Apple Panic
- Mad Max: 51,400
- Winthrop: 81,000*

### Armored Patrol (AI)
- Mad Max: 105,980
- Winthrop: 1,000,000**

### Cosmic Fighter (Big 5)
- Mad Max: 52,400
- Winthrop: 88,950

### Demon Seed
- Mad Max: 64,910
- Winthrop: 39,200 + +

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* Method I, Winthrop recorded 281,000 points using Method II.
** Winthrop still had six ships left, but he got bored.
+ Novice mode. Max got 69,480 in the expert mode.
++ Winthrop got through all nine swamps, too.

Gamer’s Cafe readers are invited to submit their high scores, for these and other TRS-80 games. We’ll print unvalidated scores, but validated scores (a photo of the screen) will, of course, rank higher in prestige.

---

### New From Pel-Tek

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**A new and exciting arcade game for the TRS-80 Mod I or III 16K**

- Four levels of play against the computer
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- Real time graphics: dribble, pass, steal the ball, play the boards
- Control the whole team
- Sound effects & Joystick compatible

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**Dealers inquiries Welcome**

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**80 Micro, February 1983 • 81**
If you just bought another computer, boy are you gonna be sorry.

Epson.
The new Epson QX-10 is unlike any personal computer you’ve ever seen. It’s a computer for people who don’t have the time to learn computers; a computer you can be using within minutes.

And fortunately, you don’t have to take our word for it. Here’s how Byte, one of the computer industry’s most prestigious magazines, describes the QX-10.

**The first anybody-can-use-it computer.**

“The Epson QX-10 (is) a computer for less than $3000 that may well be the first of a new breed of anybody-can-use-it ‘appliance’ computers. In addition to being a highly integrated word processing/computer system that offers as much usable processing power as almost any existing microcomputer, the QX-10 ... system is designed to be used by people with minimal technical knowledge. We’ve certainly heard that claim before, but Epson has delivered on this promise in a way and to an extent that no microcomputer manufacturer has done.”

That’s nice to hear from a magazine like Byte, of course, but it doesn’t surprise us. It’s just what we intended the QX-10 to be all along.

**More computer. Less money.**

But useability isn’t the only thing the QX-10 has going for it. As Byte says, “the QX-10 gives you a great deal for your money.”

“Help is available at any time through the HASCI (Human Application Standard Computer Interface) keyboard Help key. Text can be entered at any time just as you would in a conventional word processor. The Calc key turns the system into a basic 4-function calculator. Graphics can be created via the Draw key. The Sched (schedule) key gives you access to a computer-kept appointment book, a built-in clock/timer/alarm, and an event scheduler.”

**Advanced hardware for advanced software.**

As for hardware, Popular Computing, another industry leader, says: “The QX-10 includes ... a number of advanced hardware features ... The basic components of the system are a detachable keyboard, a high resolution monochrome display, and a system unit containing two 5 1/4 inch disk drives. The drives use double-sided, double-density disks (340K bytes per disk) and are amazingly compact ... The QX-10 uses an 8-bit Z80A microprocessor. The system contains 256 bytes of RAM. Some of the RAM is ... battery powered ... which lets the computer retain information when the power is off.”

**You won’t have to wait much longer.**

The new Epson QX-10 may very well be the computer you’ve been waiting for. And fortunately, you won’t have to wait much longer — it will be appearing soon in computer stores all across the country. In the meantime, write Epson at 3415 Kashiwa Street, Torrance, CA 90505, or call (213) 539-9140. We’ll be happy to send you copies of our reviews.

After all, as Popular Computing puts it, the QX-10 will “do for computing what the Model T did for transportation.”

And we couldn’t have said it better ourselves.
We’ve known for some time that kids make up a significant portion of the TRS-80 population. Still, we weren’t ready for the response we got to our first annual Young Programmer’s Contest.

The number of entries—nearly 200—was, by itself, impressive. But what struck us was the ambition, skill, and creativity shown by the entrants. Even some of the programs that didn’t win are good enough to be published, and will appear in future issues.

Our three-man panel of judges scored the entries in five categories:

*Programming elegance.* Here we looked at how well the program was written and performed its task, and how attractive the screen displays were. We also considered the ease with which the program could be used.

*Documentation.* First, we looked for descriptions of how to use the program and how it worked. We gave extra points for when flowcharts, variable lists, program listings, and tables were included.

*Originality.* This was a tough one to measure, since little software under the sun is entirely new. We finally decided to measure originality by how much creative thinking went into designing the program.

*Error-trapping.* How tough was it for us to crash the program?

*Usefulness.* In the case of a game, we measured usefulness by how entertaining it was.

**The Grand Prize**

The grand-prize winner turned out to be 16-year-old David Schmidt’s Quest for the Key of Nightshade, an adventure game for the Model I. Quest is one of the better adventure games we’ve seen in a while, and it scored high in every category.

What impressed us the most about Quest was the fascinating and internally consistent world it paints. David gives the land of Nightshade so much detail that it seems almost three-dimensional. And what greater praise can be given to a fantasy than that it seems real?

Quest was one of four games that won prizes. But games aren’t all you’ll find in the next 78 pages. Here’s a quick look at our other winning entries:

Project Deep Dive, by Michael John Lake, won first place in the 14-18 category. The game puts you in a submarine, which must fight its way through a tunnel to get to its base. First prize in the 11-13 category went to Carl Huben for his submission Music Composer, which tells you how to turn your computer into a piano keyboard. And topping the 10-and-under category was Terry Myers’ program Super-Draw, which lets you draw and save figures on your Model III.

Larry Brackney’s TRS-Turtle took second prize in the 14-18 group. It lets you use your Model I to explore some of the features of Logo. In the 11-13 group, second place was won by Beth Norman for her adventure game Lair of Kraken. And Nathan Miller’s joystick game Byte-Cycles was runner-up in the 10-and-under category.

Lloyd Kupchango’s Boxing Game, a machine-language arcade game for the Model I, finished third in the 14-18 group. We had a tie for third in the 11-13 category—Jennifer Neidenbach’s Foreign Flag Quiz and Scott Steele’s bulletin board program CASS-80. And third place in the 10-and-under group was won by Adam Wells for his submission countdown.

If you’re interested in seeing what kids are doing with their computers these days, by all means check out the Young Programmer’s Contest winners.

And if you’re 18 or under, start working on your entry for our next competition. This year’s contest set some pretty high standards to match.
Quest for the Key of Nightshade

by David Schmidt
Grand Prize

The objective of Quest for the Key of Nightshade is threefold. First, the adventurer must attempt to increase the size and strength of his army. Next, the adventurer must try to collect five pieces of a key that lay scattered throughout the Land of Nightshade. Once all pieces have been collected and the adventurer has a large and powerful army, he can attempt to capture Castle Nightshade. The purpose of this is to rescue the good king who is held prisoner by the evil emperor currently ruling the land.

The Display
The screen display is divided into five sections. The uppermost section merely displays the game's name. The section furthest to the left displays the status of the entire army. In the middle of the screen is a graphic map depicting the terrain around the player. The lowermost section is used as a communications box. Its purpose is to display warnings and other necessary messages. The section furthest to the right displays the current options available to the player and requests a command. The display always depicts the status and options pertaining you, the player, and your army.

The Map
The land of the nightshade is 30 by 30

Living Beings

Crimson Reaper

Domain: Castle
Fighting Ability: 15
Special Attributes: None

The Crimson Reaper is a highly trained warrior. He wears partial plate armor and a helm. The Reaper is armed with a bastard sword and a spiked shield.

The Crimson Reaper has awesome strength and speed. Pain has no effect on him. So, to remove him from battle, he must be killed.

These warriors guard the treasures of Castles Death Shadow and Gray Stone. The Reapers never talk and are rarely seen outside of a castle. Because of their great fighting power, they are feared by all. In fact, many people believe the Reaper is not a human at all, but a disciple of the beast.

Firedrake

Domain: Castle
Fighting Ability: Variable
Special Attributes: None

The firedrake is the true dragon. It stands about 10 meters tall and has a wingspread of over 20 meters. This beast has immense claws and fangs, and it breathes fire.

The dragon is located in Castle Nightshade. Its purpose is to protect the imprisoned king. The fighting ability of the dragon is determined by the skill level you choose.

Jo-Toe

Domain: Water areas
Fighting Ability: 4
Special Attributes: None

The jo-toe is 2 meters tall and looks like a cross between a wingless bird and a reptile. It has very large webbed feet. The powerful tail is used for balance and propulsion in the water. The jo-toe has a long neck and a small head which is mostly beak.

Kathake

Domain: Desert
Fighting Ability: 5
Special Attributes: Treasure carrying

The kathake is a female warrior from the desert tribe of the Thake. This human is armed with a large curved sword called a kantana. She wears a cloak and has little or no armor.

The kathake, though not a good sword fighter, is very quick and
units. Each unit is one possible location you can occupy. The display shows a small portion of the map with your party in the center. The map depicts the terrain for four units in each direction. As you move you stay stationary relative to the display while the map moves under you. Small graphic characters on the map symbolize conditions present at that location. The meanings of the symbols are in Table 1.

Landmarks such as rivers, lakes, mountains, and deserts are in the same positions during each game. The locations of man-made objects like bridges, towns, cities, castles, and tombs, vary however, from game to game.

**Marketplace**

In the marketplace you can buy all items for yourself and your army. Marketplaces can be found in any human settlement. Items will cost more in a smaller settlement than in larger cities. When you buy an item, you buy it for the entire army. Certain items such as weapons, armor, and men always require you trade in present equipment. The medium for trade in the marketplace is gold fashioned into small pieces.

**Weapons and Armor**

Weapons and armor make an army more powerful. The greater the number of weapons, the greater the fighting strength. The fighting ability is a number representing fighting strength. You can find this number by adding the armor class and sword class, plus one. The higher the number, the greater you are in battle. Fighting ability is subject

| Mountains | Desert |
| Water | Bridge |
| City | Town |
| Castle Death Shadow | Castle Grey Stone |
| Castle Nightshade | Tomb |
| Marsh |

**Table 1. Symbols**

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therefore she is not to be taken lightly. The greatest danger is that they will use any means to win at battle. For example, females will approach a male seductively, only to kill him once close enough.

The kathake’s primary form of livelihood is piracy. The women travel in nomadic bands across the desert in search of a prize. The males of the tribe stay near the camp, while the females become the warriors.

Kathakes always carry the treasures of their victims with them.

**Kilgard**

- Domain: Open
- Fighting Ability: 7
- Special Attributes: Edible

The kilgard is a 6-meter long, fur-covered serpent. The fur of the beast is a greenish-brown, which helps it to hide well in long grass and trees. The snake has very large venomous fangs that can pierce most types of armor. Large folds of pointed skin protrude from the head, helping directional hearing.

The kilgard is a quick and agile fighter for its size. The snake will lunge at an enemy with its immense fangs while its tail whips around, striking a blow on the opponent. This beast will attempt to smother the life out of an enemy by coiling around him and then constricting.

The kilgard is a nocturnal creature. It can be found in shady knolls during the day. The kilgard’s favorite place is a large tree limb.

The flesh of the kilgard has an enjoyable taste; in fact, many humans consider it a delicacy.

**Merlad**

- Domain: Water areas
- Fighting Ability: 11
- Special Attributes: Treasure carrying

The merlad is an amphibious humanoid. The creature is covered with scales and has a membrane protruding from the rear parts of its body. The merlad has gills and can also breath air directly. It has large fangs and claws.

The primary weapon of the am-

---

**Metore**

- Domain: Water areas
- Fighting Ability: 8
- Special Attributes: Edible

The metore is a cross between a shark and an alligator. The fish is about 3 meters long and looks very much like a shark. The skin of the fish is very rough and thick. It has massive saw-edged teeth and an extremely powerful jaw. Its fins have bones in them and can be used like feet.

The fish fights like a shark in the water and like an alligator on land. The fish will attempt to rub its skin against its prey because its skin is like coarse sandpaper. The fish also thrash with its tail. The metore is driven into a frenzy by the presence of salt in the water.

The fish hunts for food—it is a total carnivore. With the boned fins, the metore can make excursions onto land to hunt or to sun itself. The fish live in deep underwater caves. Their flesh is edible and tastes much like pork.

When entering the water, you’d better hope a metore isn’t swimming silently under you.

---

**Quandar**

- Domain: Mountains
- Fighting Ability: 5
- Special Attributes: Treasure carrying

The quandar is a ½-meter tall feline humanoid. It is an intelligent social animal armed with a small sword. Although it is the same size as a human, it possesses far greater

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continues from page 85

**Phibian**

- Domain: Water areas
- Fighting Ability: 7
- Special Attributes: Treasure carrying

The phibian is a trident. The beast can throw the weapon as far as 40 yards with great accuracy. The trident is also used like a lance at close hand-to-hand combat. When not armed with a trident, the merlad is still very dangerous, using its fangs and claws to fight.

Merlads live in small, partially submerged cities. A merlad’s primary food source is fresh water clams, crawfish, and fish. The creatures will kill humans who get too close to their cities, and reap the benefits from their purses.

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continues on page 88

86 • 80 Micro, February 1983
3 display formats: 51/64/85 columns × 24 lines
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**THE ORIGINAL**

Simply stated, Telewriter is the most powerful word processor you can buy for the TRS-80 Color Computer. The original Telewriter has received rave reviews in every major Color Computer and TRS-80 magazine, as well as enthusiastic praise from thousands of satisfied owners. And rightly so.

The standard Color Computer display of 32 characters by 16 lines without lower case is simply inadequate for serious word processing. The checkerboard letters and tiny lines give you no feel for how your writing looks or reads. Telewriter gives the Color Computer a 51 column by 24 line screen display with true lower case characters. So a Telewriter screen looks like a printed page, with a good chunk of text on screen at one time. In fact, more on screen text than you'd get with Apple II, Atari, TI, Vic or TRS-80 Model III.

On top of that, the sophisticated Telewriter full-screen editor is so simple to use, it makes writing fun. With single-letter mnemonic commands, and menu-driven I/O and formatting, Telewriter surpasses all others for user friendliness and pure power.

Telewriter's chain printing feature means that the size of your text is never limited by the amount of memory you have, and Telewriter's advanced cassette handler gives you a powerful word processor without the major additional cost of a disk.

**64K COMPATIBLE**

Telewriter-64 runs fully in any Color Computer — 16K, 32K, or 64K, with or without Extended Basic, with disk or cassette or both. It automatically configures itself to take optimum advantage of all available memory. That means that when you upgrade your memory, the Telewriter-64 text buffer grows accordingly. In a 64K cassette based system, for example, you get about 40K of memory to store text. So you don't need disk or FLEx to put all your 64K to work immediately.

**64 COLUMNS (AND 85!)**

Besides the original 51 column screen, Telewriter-64 now gives you 2 additional high-density displays: 64 × 24 and 85 × 24! Both high density modes provide all the standard Telewriter editor capabilities, and you can switch instantly to any of the 3 formats with a single control key command. The 51 × 24 display is clear and crisp on the screen. The two high density modes are more crowded and less easily readable, but they are perfect for showing you the exact layout of your printed page, all on the screen at one time. Compare this with cumbersome "windows" that show you only fragments at a time and don't even allow editing.

**RIGHT JUSTIFICATION & HYPHENATION**

One outstanding advantage of the full-width screen display is that you can now set the screen width to match the width of your printed page, so that "what you see is what you get." This makes exact alignment of columns possible and it makes hyphenation simple. Since short lines are the reason for the large spaces often found in standard right justified text, and since hyphenation is the most effective way to eliminate short lines, Telewriter-64 can now promise you some of the best looking right justification you can get on the Color Computer.

**FEATURES & SPECIFICATIONS**

**Printing and formatting:** Drives any printer (LPVI/VI, DMP-100/200, Epson, Okidata, Centronics, NEC, Ith, Smith-Corona, Terminet, etc.). Embedded control codes give full dynamic access to intelligent printer features like: underlining, subscript, superscript, variable font and type size, dotgraphics, etc.

Dynamic (embedded) format controls for: top, bottom, and left margins; line length, lines per page, line spacing, new page, page numbering, conditional new page, enable/disable justification.

Menu-driven control of these parameters, as well as: pause at page bottom, page numbering, baud rate (so you can run your printer at top speed), and Epson font. "Typewriter" feature sends typed lines directly to your printer, and Direct mode sends control codes right from the keyboard. Special Epson driver simplifies use with MX-80.

Supports single and multi-line headers and automatic centering. Print or save all or any section of the text buffer. Chain print any number of files from cassette or disk.

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— The RAINBOW, Jan. 1982

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Apple II is a trademark of Apple Computer, Inc.; Atari is a trademark of Atari, Inc.; TRS-80 is an trademark of Tandy Corp; MX-80 is a trademark of Epson America, Inc.
to change by fatigue and randomness. A list of sword classes and armor classes is in Table 2.

Food, Water, and Potions

Food, water, and potions are required to play the game. You use food and water to feed your army, and can only carry 25 units of each. One unit is consumed during each turn. The supplies can be bought in the marketplace or can be acquired in the wilderness. Food supplies are replenished each time you kill an edible beast. Water stores can be refilled by entering any body of water (either a lake or a river).

You can carry only 10 potions at any time. When consumed, they refresh you and return the fatigue number to 0 percent. Potions cannot be found in the open—they must be bought in the marketplace. If an army is out of food and water (represented by a negative number on the status display) for several days, all members will die from starvation or dehydration.

Fatigue

As you move and fight across the land, you are bound to become tired. This factor is displayed in the status list strength. The coat of the animal is so fine that it is often illegally hunted just for this purpose.

Quandars are not very good fighters. Their tactics consist of running whenever possible. If this is not plausible, they will attempt to disarm their opponent so that they can use their strength advantage in hand-to-hand combat.

Quandars are generally a thieving race. Because their ancestry is feline, they are very stealthy. For this reason they can enter a dwelling and burglarize it before the occupants even know of their existence. Most quandars become outlaws, but some live in harmonious coexistence with man. They carry the prizes from their crimes.

Sand Devil

Domain: Desert
Fighting Ability: 6
Special Attributes: Edible

The sand devil appears to be 2 meters tall and part man, part beast. Actually the beast is as far removed from a man as is a sneeth. It has no intelligence and acts purely on instinct. A horn protrudes from the top of its head, and long claws sit on the end of its fingers. The sand devil has awesome strength but is rather slow.

The sand devil will fight every-
as a percent. The lower the percent the less tired you are; the higher the percent the more tired you are. This factor can be affected by a number of things: terrain, equipment, army's state of health and the battles fought.

If the fatigue number reaches 100 percent, men may begin to die. The dead men's supplies will automatically be distributed evenly among the remaining crew. In these situations you will die last. Fatigue percentage is the average fatigue percent of the entire army.

**Encounters**

As you enter tombs or castles, or just wander across the land, you are bound to run into other living beings. When this happens, you may retreat. The fighting abilities of beings will vary as much as their domain. Killing these beings can be beneficial: survival, treasure, key piece, and entrance to a tomb or a castle. The outcome of a battle is determined by the relative fighting numbers of the beings and your army, and by the numbers of each. The only exception to this rule is when the army is in the water—then they can't defend themselves. A detailed list of the beings is in the sidebar.

**Castles and Tombs**

Castle Death Shadow, Castle Grey Stone, and tombs are the locations of treasures and possibly key pieces. You can attempt to conquer a castle or a tomb by killing the beings defending them. In this case you gain the entire treasure. You can also attempt to burglarize a castle, gaining only part of the treasure. To do this a thief must be present in the ranks of the army. After you and your party have left the structure, it will be reinitialized.

![Program Listing](https://example.com/program_listing.png)

**Castle Nightshade**

Castle Nightshade is the final objective of the game. It is three large connected towers with no windows. The only entrance to the castle is through a locked door that can only be opened with a completed key. A den of fire-drakes protect the castle and its contents. Only when the king is free is the game finished.

**Skill Level**

The skill level option is added to always make the game a challenge. The greater the number you enter, the tougher the resulting game will be. This number has an effect on randomness of encounters, number of beings per encounter, and the fighting ability of certain beings.

---

**David Schmidt**, age 16, can be reached at 6513 W. 32nd St., Loveland, CO 80537.
TRS-80 Model I, II, III

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015E8IFM(X,Y)=1*THEN8GOSUB2600
226 IFPRD(3-INT(C6)/5)=1*THENGOSUB6805
227 FORA=V16430TO16441:POKEA,0:NEXT
228 IFAA=VTHENVIR=9867,"** WARNING **:IPRINT926,-"FATIGUE
LEVEL HIGH -":GOSUB8580
1:";CHR$(94),"E":PRINT8437,CHR$(92):PRINT8501,"S":IFPM
(X,Y)=3THEN1-627;GOSUB1750;GOTO25ELSEPRINT8562,"(R) EST":
239 IFPO=VTHENVIR=823,"(T) ARE PUTATION":I=756;GOSUB1750ELSE6=I
92:GOSUB1750
258 IFAS="THEN260ELSEFATIF="E"E240;ELSEFATIF="S"THEN260ELSEFATIF="S"
1/THEN920ELSEFATIF="AS"="R"ANDM(X,Y)<33 THEN300ELSEFATIF="AS"=TTANDDID
4DENDM(X,Y)<33 THEN340ELSEGOSUB8580
252 GOSUB8280;GOTO252
260 IFY-1=THEN931ELSE1=0;E=1;GOTO120
270 IFX-1=THEN931ELSE1=0;E=1;GOTO120
280 IFY-1=THEN931ELSE1=0;E=1;GOTO120
290 IFX-1=THEN931ELSE1=0;E=1;GOTO120
300 PRINT8696,"(< REST >)":GOSUB8580;D=0;E=1;FA=PA=8-8F-8P7
(M(X,Y)):IFFA+8F+8P7(M(X,Y)):OVPN8580;FA=PA=8-8F-8P7
310 PRINT8859,":EXPLORATION INTO AND BEYOND THE PERIMETER":PRI
195992,"WILL AVAL YOUR QUEST NOTHING":GOSUB8580;GOTO126
320 FA=FA+PA+8F+8P7(M(X,Y)):PO=PO-1;WAS=WAS-1-WM(W(X,Y)):I(F
1/0<1ANDAS="R")THENPA=PA+3ELSEIFPO=1THENPA=PA+6
325 IFF0<1ANDAS="R")THENPA=PA+2ELSEIFWA<1THENPA=FA+5
326 GOSUB8400:PRINT8683;"= WATER SUPPLY GONE":GOSUB8580
327 IFPO=VTHENVIR=863;"= FOOD SUPPLIES OUT":GOSUB8580
328 X=X+D;Y=Y+Y:EIFWA<4THEN36ELSEIFPO<1 THEN350
329 IFAS="THEN9370
330 IFPA=VTHENVIR=280;GOTO2027ELSE190
340 PO=PO-1;FA=PA=PRINT8861,"= ELIXIR POTION TAKEN":I=PRINT9
17,"= YOU ARE NOW RESTORED TO 0 % FATIGUE":GOSUB8580;GOSUB8280;
GOTO2027
350 PRINT8865,":STARVATION ":PRINT8932,"ALL DIE":G
355 GOTO870
360 PRINT8865,":DEHYDRATION":PRINT8932,"ALL DIEW":G
365 GOTO870
370 PRINT8696,":EXHAUSTION":PRINT8932,":ALL DIED":G
375 FP=95:PRINT8666,"= EXHAUSTION":I=(M(X,Y))3THEN0ELSEFATIF=
RUG(W+T+1):I=FA=WR+W+1THEN300ELSEFA=T:AFPO=90
376 IFPO=VTHENRF=97
380 PO=PO+PO*H/(WR+T):AS=WAS=WAS+W/W/(WR+T):PO=PO+PO*H/(W
R+T)
381 IFPO=VTHENVIR=258:GOTO2027
382 IFWA=V25THENW=25
383 IFPA=VTHENPO=10
385 IFPA=VTHENVIR=9385:"= 1 MAN DIES":GOTO837
386 PRINT930,"="A:="MEN DIE":G
387 GOSUB8580;GOTO190
388 PRINT931,"= ONE NONE Die":GOSUB8580;GOTO190
389 PRINT932,"= ALL DIED":G
390 GOSUB870
395 PRINT8686,"= INPUT ERROR":GOSUB8580;RETURN
396 PRINT931,"= ALL DROWN":G
397 GOSUB870
398 GOSUB8580;PRINT8057,"= YOU HAVE JUST ENTERED A":;IPR
19F8580;GOSUB1749:"= DO YOU WISH":PRINT9303,"TO
400 PRINT8367,"= MARKET PLACE":I=1-499;GOSUB1749
400 GOSUB1601;IFAS="Y:THEN83ELSE830"
401 PRINT8056,"= WHAT DO YOU WISH TO PURCHASE":GOSUB8580;GOSUB
405 PRINT8240,"(A)ROR":PRINT8304,"(F)OOD UNITS":PRINT8936,"(I
410 NEPO":PRINT4532,",(M) EN":PRINT4564,",(S) WORDS"
415 PRINT8556,"(P)OTIONS":PRINT8624,"(W)ATER UNITS":I=1-756;GOSU
420 B1750:IFAS="F:THEN84ELSE83A:"="THEN08ELSEFA="S":I=THEN08ELSE
425 N8580;GOSUB8580;GOTO8835
428 GOSUB8080:PRINT8367,",(L)EATHER":PRINT8341,",(C)HAINMAIL":F
430 PRINT945,"(F)ULLPLATE":I=326;GOSUB1758:IFAS="L:THEN70ELSE83A"
435 ="C:THENVIR=2ELSE83:"="THEN83ELSEFA="S:THEN92ELSEFA="S:THE
440 N8580;GOTO840
450 IFPO=(T):PO="(W) ADD:"GOSUB1189;H=H:PO=GOSUB2340;I=HFP;HENGOSU
454 B1440;GOSUB8580;
460 GOSUB8160:IFAS="N:THEN78ELSE8IE:"="THENG-C:"AR=AS(TQ):G
465 GOTO180ELSE830
470 GOSUB8380;IFB=E:THEN93ELSE9F="THEN10ELSEF="T:W(R+T):
480 PRINT8367,"(B) READINESS":GOSUB8160:IFAS="N:THEN10ELSEF="T:WENH
485 LSEG=G-P:IFETHEM=E:RETURNELSE=N:RETURN
490 D=15;E=0;FO=3;GOSUB870:FO=E1;GOTO1700
495 D=15;E=0;FA=1;GOSUB870:FA=E1;GOTO1700
500 GOSUB8080:PRINT8367,",(H) SHORTWORD":PRINT8431,",(I) ONGWORD":
510 PRINT8495,",(B) ROADWORD":PRINT8559,"(T) WO-HANDED":I=1-62;GOSU
520 B1758:IFAS="T:THEN64ELSE83A:"="T:THEN65ELSE83A:"="T:THEN66E
530 LUNGSOB1400;GOSUB8580;GOTO980
90 IFPO=(T):PO="(W) ADD:"GOSUB1180;H=H:PO=GOSUB240;IP4F=HPSHENGOSU
1440;GOSUB8580;GOTO1200
910 GOSUB1601:IFAS="N:THEN78ELSE8IE:"="THENG-C:"AR=AS(TQ):G
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continued from p. 49

Sneeth

Domain: Open
Fighting Ability: 10
Special Attributes: None

The sneeth is 2 meters long and closely resembles a terrestrial badger. The creature’s torso is covered with a 5-centimeter thick calcium carapace. Two large tusks protrude from the lower jaw. The animal has a long powerful tail that resembles the tail of a rat.

The sneeth’s main attack strength lies in its ability to teleport from location to location. The creature will use its tusks to thrust up and gore the opponent in battle. The sneeth will also use its tail as a weapon, flailing it about like a mace.

The sneeth is primarily a subterranean creature with poor eyesight and superb hearing. Ground hogs and other small rodents are the sneeth’s primary sustenance. The animal is attracted to shiny or curious objects and will fight if necessary to obtain them.

Wolfaft

Domain: Mountains
Fighting Ability: 7
Special Attributes: None

The wolfaft looks like a 2-meter tall horse, although it is actually more like a wolf. The beast is black in color and is very heavyset. Being a carnivore, it has numerous sharp teeth. The wolfaft also has a horn in the middle of its forehead.

The wolfaft fights using its horn and its teeth. Given the chance, the beast will also attempt to trample its prey. The creature is powerful in battle and eats everything that it kills.

The wolfaft usually hunts in packs. Humans and humanoids are natural prey, as are other creatures. Although resembling a horse, wolfafts are far too dangerous to be used as a mount.

Xantau

Domain: Mountains
Fighting Ability: 14
Special Attributes: Treasure carrying

The xantau is a 5-meter long carnivore that resembles a terrestrial tiger. This beast has large front teeth and an extremely powerful set of jaws. When standing on its hind legs, the xantau can attain a height of over 8 meters, allowing it to see over the tops of most smaller trees.

The xantau is one of the most dangerous beasts in the Land of Nightshade. Even though the creature is of tremendous size, it still possesses great speed and agility. The coat of the xantau is so thick that most swords can’t even penetrate it. In battle the creature fights with its teeth and claws.

Xantau live in caves far removed from settlements of human beings. They are extremely protective of their families and will fight to all ends to protect them. They primarily eat wolfafts and other large forest-dwelling beasts.

The flesh of the xantau produces no ill effects when eaten by man; in fact, it is often used for medicinal purposes.
CHESS PROGRAM

1981 Paris World Microcomputer Chess Championship

SFINKS 3.0

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80 MICRO, FEBRUARY 1983

The paper contains text in various fonts and colors, including bold and italics. It appears to be a list of features for a chess program named SFINKS 3.0, possibly for an 80 Micro computer. The text includes many technical details and references, indicating it might be a manual or a advertisement for the software. The layout is dense with information, typical of technical documentation. The text is not fully transcribed here due to its complexity and density.
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Project Deep Dive is an arcade-style game with sound in which you command a submarine going down a long winding tunnel. You gain points for destroying other objects, and for docking at the end. After docking you start over again until you are destroyed.

Project Deep Dive will run on the Model I or III with 16K or Disk Basic with 32K.

About the Program

The original version of Deep Dive had only a slow speed, no sound, slower graphics, and less action. After realizing the potential of game programming, I quickly expanded the original game into what it is now.

This program contains machine language, so be careful when typing it in. Be sure to save copies before running it, or you may experience full Basic crash, resetting your system and destroying the program in the process. (It is a good idea to save any program with POKEs or machine language before running it.)

To save time, and memory, you can leave out all the remarks and the instructions occupying lines 1020-1090.

To hook up the sound, either put the large gray plug for the cassette recorder into the input jack of an amplifier, or use your cassette recorder directly with an earphone or speaker.

To set up your recorder first take out any tape and press record and play while holding down the record tab micro switch in the top left corner inside the cassette compartment. Then remove all the plugs from their jacks and put the large gray plug into the auxiliary jack. Then take an earphone or speaker and plug it into the ear jack. You will now be able to hear sound when the game is run.

To control your ship, use the greater-than and less-than keys (AND>) to move left and right. To shoot, use the numeric keys 1-6 on the numeric keypad or top row. Keys 2 and 5 fire straight down, 1 and 4 fire left, and 3 and 6 fire right. (They line up on the numeric keypad in the directions you are shooting.) Key 0 produces a force field, which vaporizes the objects immediately around you. For continuous movement or fire, keep the key pressed down.

When you start, you have 40 units of energy (displayed at the top of the screen). Each time you shoot you lose one unit of energy, but gain one unit each time you move down a line. The force field uses 10 units of energy, which means you should use it sparingly.

After reading the directions you will be asked if you want to start with fast speed. Press N to start with the slow speed, which is best for beginners. When playing at fast speed, you obtain double the points you would obtain with slow speed.

The first things you will come across are mines (#). They are worth two points. Next are torpedo launchers (A), which shoot torpedos (!) at you. They are worth 10 points. Then there are the sidemovers (H), which move sideways randomly. These are worth 20 points. Finally are the quick bombs, either up-arrows or left brackets, which pop up all over the screen. They are worth 10 points.

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After going through the quick bombs, you must blast through a wall and dock. This is tricky, but you could use the force field to make a quick, easy opening. To dock with the docking port (Y), be sure you are centered directly above it. You get 200 points for docking and five points for each unit of energy you have left. You can then start again, keeping your score and gaining more points.

Your game ends when you crash or miss docking. If you have a high score, you will be asked for your name. Then you will be asked if you want a printout of your score; if so, press P, get your printer ready, and press Y.

You can press E to end the game, D to see the directions, or another key to start playing again.

Correcting Errors

If, while you are playing the game, the computer suddenly displays Memory Size?, reboots the DOS, or hangs up, then something is wrong with the data statements, USRs, POKEs, or other related function. This also might be the problem if the sounds don't work correctly, the tunnel is drawn strangely or the sidemovers don't work. To correct these problems start by checking lines 2000–8800 for errors. If you spot no problems, check the rest of the program starting from the beginning.

How This Game Works

By looking at the listing you might think this program is poorly structured. When it was first written, it was correctly structured, but because of upgrades, some of the design logic was lost.

I have included comments in the listing that describe what various lines do. All the single-letter variables are used for the program, as well as variables, A%, H%, H!, XX, AS, and NS.

I included some machine-language subroutines in the program to speed up a few functions. These routines draw the walls, show the energy, move the sidemovers, and make the music.

To protect the routines in high memory without answering the memory-size question, I POKEd the address of where the machine language is to start into locations 16561 and 16562. Then to reset other internal Basic registers I used a clear statement. Then the routines are POKEd into protected memory.
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102 • 80 Micro, February 1983
SCRINPUT

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SCRINPUT, (SCReen INPUT), is a fully relocatable 908 byte machine language routine that replaces the BASIC INPUT statement. Instead of entering data one item at a time, SCRINPUT allows you to create a video form on the screen of your disk based Radio Shack TRS-80 Model 1 or 3. Data entry is then a simple matter of filling in the blanks. Up to 80 "data fields" can be created on one video screen. Each field is assigned a length, screen position and one or more data types: Upper case alpha, lower case alpha, numeric or punctuation. Only characters matching type specifications can be placed in the field.

After defining data fields and specifying screen information, (Caps lock, Case reversal, cursor symbol and initial cursor location are among the features that can be activated), SCRINPUT is called via the BASIC USR function.

A flashing cursor symbol indicates where keyboard entered data will appear. As each character is entered, the cursor moves right one position. At the end of a data field, SCRINPUT repositions the cursor to the start of the next field. Keystrokes of invalid type are ignored.

Arrow keys can be used to move the cursor from one data field to another. Error correction is a simple matter of overtyping the bad characters with new data. The whole process is very similar to traditional screen oriented word processors.

SCRINPUT assigns all data fields to standard BASIC variables. These can be handled by your BASIC program in the same manner as information gathered by INPUT. You can even include error checking to insure that information is within reasonable bounds.

Be warned! SCRINPUT is only a utility and is designed for use within BASIC programs. If you cannot program, you can't use SCRINPUT. SCRINPUT works with any Disk Operating System (DOS) and comes with a 65 page manual containing sample programs, instructions and suggestions. Flow charts and source code are also included.

SCRINPUT has a 15 day money back guarantee: If you are not satisfied for any reason, return the package in good condition for a full refund. This is an enhanced version of the original SCRINPUT reviewed in the 4/82 issue of 80 Micro. Features added since that review include character insert and delete, user defined cursor character, a completely revised manual and alterations to allow easy use of SCRINPUT in the editing of existing data files.

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Music Composer

by Carl Huben
First Place
11-13

The lack of programs using the Color Computer's sound function is very disappointing. But I've come up with a program to use this interesting capability. This program is easy to use—it's even simpler than playing Beethoven's Fifth on a touch-tone telephone.

My program allows you up to 200 notes, with features such as save on tape, retrieve from tape, forward or backward play, editing, and the highlight of the programs, three keyboards.

How It Works

When first run, you are presented with four options. The first lets you recall sound from the tape, while the others specify the three keyboards.

The first of these keyboards, the piano keyboard, is set up like a real one, except in three rows.

On this scale, the letter T is middle C. This keyboard allows you five octaves, excluding sharps and flats. The first octave uses the keys E to O, going across. The next octave is from keys P to H. The keyboard continues in this manner. (You use the semi-colon, comma, and period keys to produce notes.)

One major drawback of this keyboard is its slowness. There is a delay between when you press a key and when the note is produced. The delay is most apparent in the highest octaves. When you press a key, the program searches through data to locate it, and then reads the number that represents that key. After that, it will produce a tone of the desired pitch. It will take the computer longer to reach the last keys than the first keys, because that is the order they are in the data statements. This delay is not present on the replay.

An advantage of this keyboard is its order, which can be helpful.

The next two keyboards are essentially the same. These are the A-Z and Z-A keyboards. These are much faster than the first, but lack the order present in the other. You only use the letter keys for these scales.

After typing out your great composition, you'll want to play it back. Just press the space bar. After entering whether you want forward or reverse play, your song will be played back, note for note (including the pauses between each note).

The program will ask if you want to edit the music that you've created. If you decide to, you will be asked the tones you want replayed. This is offered as a convenience for those who want to track down the sour note. Afterwards, you are presented with three choices: make changes, replay previously selected tones, or respecify replay numbers.

Program Listing

10 CLS:PRINT@9("MUSIC COMPOSER"
20 PRINT:PRINT:PRINT:PRINT(1)LOAD MUSIC FROM TAPE";PRINT
30 T(2)PIANO KEYBOARD";PRINT(3)A-Z SCALE KEYBOARD";PRINT(4
40 ) S-A SCALE KEYBOARD"
50 30 INPUT",;:INPUT"ENTER CHOICE";A
60 OR A GOTO 60,190,340,470
70 GOTO 30
80 CLS:PRINT:INPUT"HOW MANY FILES OF MUSIC PRIOR TO THE DESIR
90 ED ONE";B:IF B THEN 120
100 PRINT:PRINT"PRESS PLAY ON THE TAPE-DECK"
110 GOSUB 450 TO B:OPEN"I",-1,"MUSIC"
120 IF EOF(-1) THEN RUN 160
130 INPUT #1,AS
140 GOTO 90:NEXT
150 DIM T(200),S(280):PRINT"LOADING SOUND"
160 OPEN"I",-1,"MUSIC"
170 INPUT"S,A,MUSIC"
180 IF EOF(-1) THEN 500
190 PRINT #1,T(2),S(2)
200 L=2+1:GOTO 160
210 S=INKEY$:IF S="*" THEN 210

Variable Description

L Note length
S( ) Pause between stored notes
T( ) Stored notes
XX Present keyboard mode
Z Current number of note

Table 1. Variables

The Key Box

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Choosing to make changes gives you another three options: change a note, extend the music, or delete portions of your song. The program explains the extension and deletion of notes in your music.

The change-a-note function asks for the number of the note to change. You will then hear the lowest note in the keyboard you were in. Each time you press a key, the note gets higher, until you find the desired replacement note. Press the space bar, and it will be replaced. It will then ask the delay you want between this note and the next. You will then be forwarded to the playback mode so it can be played back.

Now you have your composition. You certainly don’t want to lose the work of 10 or 20 minutes, so use the save-on-tape feature. When you’re in the playback mode, say no to every question until it asks if you care to save on tape. Position your tape, and enter yes, then press any key to save.

After saving music on tape, you can use yet another feature, the loading function. When you enter this mode, you will be asked how many files of music are before the one you want. The program searches for your file, and loads it into memory.

The many options and features should provide hours of fun composing. Enjoy!

Carl Huben (age 11) can be reached at 6929 Lee Crest Drive, West Bloomfield, MI 48033.

---

### Table 2. Line Functions

<table>
<thead>
<tr>
<th>Line</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-50</td>
<td>Set up menu and input choice</td>
</tr>
<tr>
<td>60-180</td>
<td>Sound-loading routine</td>
</tr>
<tr>
<td>190-330</td>
<td>Piano keyboard function</td>
</tr>
<tr>
<td>340-470</td>
<td>A-Z and Z-A keyboards</td>
</tr>
<tr>
<td>480-490</td>
<td>Indicate no more notes</td>
</tr>
<tr>
<td>500-550</td>
<td>Play back music</td>
</tr>
<tr>
<td>560-570</td>
<td>Ask to edit and save</td>
</tr>
<tr>
<td>580-670</td>
<td>Save function</td>
</tr>
<tr>
<td>680-730</td>
<td>Subroutine to enter tone duration</td>
</tr>
<tr>
<td>740-970</td>
<td>Edit function</td>
</tr>
</tbody>
</table>

---

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</tr>
</thead>
<tbody>
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<td>DÖHHÉ BUGG</td>
<td>$15.00 T</td>
</tr>
<tr>
<td>#302</td>
<td>BLOCK BREAKER</td>
<td>$14.95 T</td>
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<td>$15.95 T</td>
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<td>DEMON SEED</td>
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</tr>
<tr>
<td>#305</td>
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</tr>
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Super-Draw

by Terry Myerson
First Place
10 and under

Super-Draw will make you and your TRS-80 creative. It lets you draw on the CRT, reproduce figures several times on the same screen, and save and recall drawings.

I wrote this program on a Model III with 48K and two disk drives. Only one disk drive is necessary to run the program, though, and you can use a joystick.

How to Use It

After the introduction to Super-Draw is finished, you can choose your sketch pad. The six possibilities are in Fig. 1.

For screen A, press the up arrow; for screen B, press the down arrow; for screen C, press the left arrow; and for screen D, press the right arrow.

For screens A–D, just press the arrow pointing to the part of screen you want white. For screen E, press any arrow, L (load), and then 0 (load 0). For screen F, press any arrow, L (load), and then 0 (load 0). When the computer is done, press C (convert).

Simple Drawing Techniques

To move the sketcher, use the arrow keys or the joystick. Hold down two arrow keys to draw diagonals.

To choose a new sketch screen or restart your drawing, press the space bar or the red button on the joystick.

The Key Box

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80 Microcomputing, 9/82

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InfoWorld, January 1982

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Microcomputing, June 1982

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80 Micro, February 1983 • 109
Advanced Drawing Techniques

To erase or move to another place on the screen, press CLEAR. Then move the eraser with the arrow keys or joystick. To exit, press enter or the red button on the joystick.

To change everything black to white and everything white to black, press C. To save a drawing, hit S and the drawing number (1-9). To load a drawing, hit L and the drawing number (1-9).

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Listing continued
1220 N=PEEK(X)
1230 PRINT$1,N,"","
1240 NEXTX
1250 PRINT960,"MODE:SKETCH";STRING$(20,128)
1260 CLOSE
1270 POKE 16396,195:POKE 16397,281
1280 X=E:Y=F
1290 GOTO 750
1300 PRINT960,"MODE:LOAD";STRING$(20,128);I=PEEK(15360)
1310 POKE15360,35
1320 A=INKEY$,
1330 A=VAL(A)
1340 IF A<>’$’ THEN 1800
1350 IF A<>’?’ THEN IF A<’$’ THEN 1320
1360 POKE 16396,195:POKE 16397,77
1370 OPEN"1",2,"DATA","+","DATA"
1380 INPUT#2,S
1390 INPUT#2,X
1400 INPUT#2,Y
1410 CLEAR
1420 IF EOF(2) THEN 1500
1430 Z=2*X+1
1440 INPUT#2,W
1450 IFX=96ITHENGOTO1477ELSEPRINTCHR$(W)
1460 GOTO1220
1470 GOSUB1650
1480 GOSUB1680
1490 ZX=0
1500 CLOSE
1510 POKE 16396,175:POKE 16397,201
1520 GOTO750
1530 IFS=1THENIFY<24RESET(X,Y)ELSESET(X,Y);RETURN
1540 IF=2THENIFX<24SET(X,Y)ELSERESET(X,Y);RETURN
1550 IF=3THENIFX<64RESET(X,Y)ELSESET(X,Y);RETURN
1560 IF=4THENIFX<64SET(X,Y)ELSERESET(X,Y);RETURN
1570 IF S=5THENRESET(X,Y)
1580 IF S=6THENSET(X,Y)
1590 RETURN
1600 IFY>44THENY=0
1610 IFY<1THENY=43
1620 IFX<1THENX=127
1630 IFX>128THENX=0
1640 RETURN
1650 PRINT960,"MODE:SKETCH";STRING$(20,128)
1660 RETURN
1670 OUT236,16
1680 A=255-INV(0)
1690 IF=8THENRETURN
1700 IFAND16THENGOTO 260
1710 IFAND15THENY=1
1720 IFAND2THENX=Y+1
1730 IFAND4THENX=X+1
1740 IFAND6THENX=1
1750 RETURN
1760 A=255-INS(0)
1770 IF=16THEN176ELSEPRINT960,"MODE:SKETCH";STRING$(20,128)
1780 GOTO570
1790 PRINT960,"MODE:CONVERT SKETCH SCREEN";E=X+F=Y
1800 FOR Y=0 TO 43
1810 FOR X=0 TO 127
1820 IF POINT(X,Y) THEN RESET(X,Y) ELSE SET(X,Y)
1830 NEXT Y,X
1840 X=E:Y=F
1850 ON S GOTO 1870,1890,1910,1930,1950,1970
1860 PRINT960,"MODE:SKETCH";STRING$(20,128);GOTO570
1870 S=2
1880 GOTO1860
1890 S=1
1900 GOTO1860
1910 S=4
1920 GOTO1860
1930 S=3
1940 GOTO570
1950 S=6
1960 GOTO1860
1970 S=5
1980 GOTO1860
1990 X=E+F=Y
2000 PRINT960,"MODE:PRINT HI-RESOLUTION GRAPHICS ON OKIDENTA 83A"
2010 FOR X=0 TO 127:FOR Y=0 TO 5:GOSUB 2740:NEXT Y:PRINTCHR$(Z);=Z: NEXT X
2020 FOR X=0 TO 127:FOR Y=6 TO 11:GOSUB 2740:NEXT Y:PRINTCHR$(Z);=Z: NEXT X
2030 FOR X=8 TO 127:FOR Y=12 TO 17:GOSUB 2740:NEXT Y:PRINTCHR$(Z);=Z: NEXT X

Listing continues
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- **RELIABLE**
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The CCCOS operating system allows you to save, load, verify or run both BASIC and machine language files. Data files are also supported.

- **MOTOR CONTROL**
On board relays are provided for both cassette ports on the TC-8C.

- **SPARE EPROM SOCKET**
The TC-8C has a spare EPROM socket on the board. You can install either 2716 or 2732 EPROM's. This memory space can be used for any of your application programs or you could install the optional JPC Products monitor program - JBUG.

- **JBUG MONITOR**
The JBUG Monitor is a 2K relocatable monitor program with fantastic features for the Color Computer user.

- **ASSEMBLER**
Line assemble any machine language program directly into memory using standard 6809 assembly language mnemonics.

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Set, clear or continue from break points.

- **CASSETTE OR EPROM**
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- **SUPERB DOCUMENTATION**
The TC-8C and the JBUG Monitor come with complete and extensive user manuals (JPC’s documentation is praised almost as highly as our hardware and software). Complete command descriptions and background information are provided. Examples and sample programs are provided to help the novice and experienced individual take full advantage of the TC-8C and the JBUG Monitor.

- **READY TO GO**
The TC-8C comes completely assembled and tested with the CCCOS operating system. It is backed with a 30 day Money Back Guarantee and a 90 day Full Warranty.

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80 Micro, February 1983 • 113
sketch mode. Start creating your function with the arrow keys or joystick. To convert the sketch screen, press C. To restart function drawing, press the space bar or the red button on the joystick.

To save a function hit enter, then S, then name the function (using one character). To load a function, hit enter, L, and the name you used (using one character). To exit the sketch pad, press enter and then E.

To load your function into the sketch pad, position the sketcher where you want the top left corner of your function, press break, and then the function name (using one character).

To draw your function again on the same sketch pad, repeat the instructions in the last paragraph. To exit the program hit the orange key.

Terry Myerson (age 10) can be reached at 233 Pine Cone Trail, Ormond Beach, FL 32074.

<table>
<thead>
<tr>
<th>Introduction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>R</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>Y</td>
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<tr>
<td>L</td>
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<tr>
<td>S</td>
</tr>
<tr>
<td>AS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Program</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>N</td>
</tr>
<tr>
<td>A</td>
</tr>
<tr>
<td>S</td>
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<td>X</td>
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<td>Y</td>
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<td>AS</td>
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<td>O</td>
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<tr>
<td>T</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Function Creator</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Variable</strong></td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>Y</td>
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<tr>
<td>N</td>
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<tr>
<td>AS</td>
</tr>
<tr>
<td>P</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Table 1. Variables</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>FOR X=0 TO 127:FOR Y=18 TO 23:GOSUB 2740:NEXT Y:LPRI NT CHR$(2);:Z=0:NEXT X</th>
</tr>
</thead>
<tbody>
<tr>
<td>FOR X=0 TO 127:FOR Y=24 TO 29:GOSUB 2740:NEXT Y:LPRI NT CHR$(2);:Z=0:NEXT X</td>
</tr>
<tr>
<td>FOR X=0 TO 127:FOR Y=30 TO 35:GOSUB 2740:NEXT Y:LPRI NT CHR$(2);:Z=0:NEXT X</td>
</tr>
<tr>
<td>FOR X=0 TO 127:Y=42;GOSUB 2740:LPRI NT CHR$(2);:Z=0:NEXT X</td>
</tr>
<tr>
<td>PRINT$969, &quot;MODE: SKETCH&quot;;STRINGS$(35,128)</td>
</tr>
<tr>
<td>X=E+1:GOTO 570</td>
</tr>
<tr>
<td>CLOSE:PRINT969, &quot;MODE: SKETCH&quot;;STRINGS$(51,128)</td>
</tr>
<tr>
<td>RETURN 570</td>
</tr>
<tr>
<td>POKE 16396,175:POKE 16397,281</td>
</tr>
<tr>
<td>PRINT 16499,1</td>
</tr>
<tr>
<td>ON ERROR GOTO 2710</td>
</tr>
<tr>
<td>PRINT$95, &quot;SUPER-DRAW: FUNCTION CREATOR&quot;;STRINGS$(15,179)</td>
</tr>
<tr>
<td>PRINT:PRINT:PRINT</td>
</tr>
</tbody>
</table>
| X=25 TO 40:SET(40,Y);SET(80,Y)
| X=40 TO 80:SET(40,Y);SET(80,Y) |

<table>
<thead>
<tr>
<th>Main Program</th>
</tr>
</thead>
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<tr>
<th>FOR X=0 TO 33:Y=60</th>
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</table>

| 2230 | X=0:Y=60 |
| --- |

| 2320 | SET(X,Y) |
| --- |

| 2330 | N=PEEK(14440);OUT 236,16;A=255-INPUT(X) |
| --- |

| 2340 | IF INKEYS="C" THEN 2690 |
| --- |

| 2350 | IF N AND 1 OR A=16 THEN 2380 |
| --- |

| 2360 | IF N AND 2 THEN 2610 |
| --- |

| 2370 | IF N AND 128 THEN 2130 |
| --- |

| 2380 | IF N AND 8 OR A AND 1 THEN Y=Y-1 |
| --- |

| 2390 | IF N AND 16 OR A AND 2 THEN Y=Y+1 |
| --- |

| 2400 | IF N AND 32 OR A AND 4 THEN X=X-1 |
| --- |

| 2410 | IF N AND 64 OR A AND 8 THEN X=X+1 |
| --- |

| 2420 | GOSUB 2330:GOTO 2230 |
| --- |

| 2430 | IF Y<25 THEN Y=38:SET(X,Y);RETURN |
| --- |

| 2440 | IF Y>39 THEN Y=27:SET(X,Y);RETURN |
| --- |

| 2450 | IF X<42 THEN X=78:SET(X,Y);RETURN |
| --- |

| 2460 | IF X>79 THEN X=42:SET(X,Y);RETURN |
| --- |

| 2470 | SET(X,Y);RETURN |
| --- |

| 2480 | PRINT9129,"L TO LOAD, S TO SAVE, E TO EXIT TO SUPER-DRAW" |
| --- |

| 2490 | AS=INKEYS;IF AS="1" THEN 2390 |
| --- |

| 2500 | IF AS="B" OR AS="L" OR AS="S" THEN GOTO 2410 ELSE GOTO 2390 |
| --- |

| 2510 | IF AS="P" THEN GOTO 260 |
| --- |

| 2520 | IF AS="L" THEN 2520 |
| --- |

| 2530 | PRINT$9129,"SAVE: TYPE FUNCTION FILE" |
| --- |

| 2540 | AS=INKEYS;IF AS="" THEN 2440 |
| --- |

| 2550 | POKE 16396,195;POKE 16397,77 |
| --- |

| 2560 | OPEN"0",1,"FUNC";AS="/FUC" |
| --- |

| 2570 | FOR X=42 TO 78 |
| --- |

| 2580 | FOR Y=27 TO 38 |
| --- |

| 2590 | FOR P=1 THEN SET(X,Y) ELSE RESET(X,Y) |
| --- |

| 2600 | NEXT Y,X |
| --- |

| 2610 | POKE 16396,175:POKE 16397,281:GOTO 2270 |
| --- |

| 2620 | PRINT$9130,"LOAD: TYPE FUNCTION FILE" |
| --- |

| 2630 | AS=INKEYS;IF AS="" THEN 2530 |
| --- |

| 2640 | POKE 16396,195;POKE 16397,77 |
| --- |

| 2650 | OPEN"1",2,"FUNC";AS="/FUC" |
| --- |

| 2660 | FOR X=42 TO 78:FOR Y=27 TO 38:IF POINT(X,Y) THEN PRINT1,"1";"," |
| --- |

| 2670 | ELSE PRINT1,"0";"," |
| --- |

| 2680 | NEXT Y,X |
| --- |

| 2690 | CLOSE;POKE 16396,175:POKE 16397,281:GOTO 2270 |
| --- |

| 2700 | PRINT$9130,"LOAD: TYPE FUNCTION FILE" |
| --- |

| 2710 | AS=INKEYS;IF AS="" THEN 2530 |
| --- |

| 2720 | POKE 16396,195;POKE 16397,77 |
| --- |

| 2730 | OPEN"2",3,"FUNC";AS="/FUC" |
| --- |

| 2740 | FOR X=42 TO 78:FOR Y=27 TO 38:IF POINT(X,Y) THEN RESET(X,Y) |
| --- |

| 2750 | ELSE SET(X,Y) |
| --- |

| 2760 | FOR X=0 TO 255:PRINT CHR$(8);NEXT X |
| --- |

| 2770 | DATA 0,6,12,18,24,30,36 |
| --- |

| 2780 | FOR Q=0 TO 8:READ 0:IF Y=0 THEN 2770 ELSE NEXT Q |
| --- |

| 2790 | GOTO 2780 |
| --- |

| 2800 | IF POINT(X,Y) THEN Z=4+1:RESTORE:RETURN |
| --- |

| 2810 | DATA 1,7,13,19,25,31,37 |
| --- |

| 2820 | FOR Q=0 TO 8:READ 0:IF Y=0 THEN 2810 ELSE NEXT Q |
| --- |

| 2830 | GOTO 2820 |
| --- |

| 2840 | IF POINT(X,Y) THEN Z=4+2:RESTORE:RETURN |
| --- |

| 2850 | DATA 2,8,14,20,26,32,38 |

| Listing continues |

114 • 80 Micro, February 1983
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I was fascinated by turtle graphics and turtle geometry ever since they were first introduced into the computer industry. I was first exposed to the concept of turtle geometry when I heard about a new package from Terrapin Inc. called Logo. What was this new language that so excited educators?

Turtle geometry is a new math system based on the movements of a turtle. It is oriented to the local area of the turtle, rather than from a central point. The paths the turtle takes are drawn on the monitor—hence, turtle graphics.

The student writes a program for the turtle to follow. Normally this program consists of single command statements such as:

Forward :X—This command tells the turtle to move forward X steps.
Left :X—This instructs the creature to turn left X degrees.

Students using this language are encouraged to “play turtle.” That is, the student pretends he is the turtle.

Not only is Logo good for teaching computer literacy, but it also develops a more organized and logical thought process. It gives students a better chance of learning to program the computer, because Logo is much easier to program than Basic.

There was only one problem keeping me from enjoying turtle geometry and graphics. There were no Logo packages available for my computer, a Model I.

I enjoy writing Basic programs, but now I had a challenge. I had no Assembly-language background, and I wanted to write a totally new language for the TRS-80. I knew I couldn’t write another Logo, but I could write a program that uses turtle geometrygraphics.

Originally TRS-Turtle was nothing more than Etch-a-Sketch with fancy commands and a function that let the computer memorize the current screen and recall it later. The first method I used was quite slow. I then rewrote the routine to read the screen much more quickly. The second thing I did was put in a Jump command, along with several other commands to erase graphics. Fi-

--- TRS-TURTLE VERSION 1.5 ---

20 REM BY LARRY J. BRACKNEY COLUMBUS EAST HIGH SCHOOL
30 REM TITLE PAGE AND VARIABLE INITIALIZATION LINES 40-160
40CLS:CLEAR863
50 TS(1)="+CHR$(164)+STRINGS(5,108)+CHR$(144)
60 TS(2)="+CHR$(136)+CHR$(183)+CHR$(191)+CHR$(142)+CHR$(143)+CHR$(191)+STRINGS(3,143)+CHR$(191)+CHR$(143)+CHR$(191)+CHR$(140)+CHR$(164)+CHR$(144)
70 TS(3)=STRINGS(6,140)+STRINGS(2,143)+STRINGS(2,140)+STRINGS(2,143)+STRINGS(5,148)
80 PRINT$9394,"TRSTURTLE VERSION 1.5 BY LARRY J. BRACKNEY.
90 PRINT$719,"COLUMBUS EAST HIGH SCHOOL 1982-83"
100 PRINT$976,"PRESS THE SPACE BAR TO BEGIN..."
110 FOR T=1 TO 4 PRINT$9469+"*",TS(T);:NEXTT
120 X$="INKEY$s:IPX$=" THEN120
130 CLEAR2000:DEFSTRA,B,D,S:DEFINTC,E-R,T-Z
140 DIMS(200),IN(200),LX(200),LY(200),SC(7),CMS(20):PORT=1:TO20:
READCMS(T):NEXTT
150CLS:W=1:T$="HELP":CLS=STRINGS(10,128):A$=":";B$="X=64:Y=24:GO
160 TO1360
170CLS:A$="X=64:Y=24:GO
180 REM MAIN INPUT ROUTINE LINES 180-188
190 POKEVARPTR(A),0:PRINT$960,B=CHR$(143)+" THEN180
195 ENRESET(X,Y):SET(X,Y):GOTO180
200 IPA<>CHR$(31):THEN220
210 A$="":B$="":PRINT$960,STRINGS(10,128)
220 IPA=CHR$(13)THENGOTO250:ELSEIFA=CHR$(8)THEN380
230 IPA="":THEN=TS=GOTO250
240 B=CHR$(1):IFLEN(B)>1THENVIB=1
250 L$(W)="VIB="+1:TS=B
260 FOR T=1 TO 20:IFB=CHR$(7)THENW=W-1:NEXTTELENEXTT
270 IFB=CHR$(1)THENW=W-1
280 IFB=CHR$(10)THENW=W-1
290 IFB=CHR$(11)THENW=W-1
300 FORCN=1 TO 20:IFB=CHR$(CN)THEN328ELENEXTT
310 W=W-1:GOTO320
320 ONCGOTO160,400,512,620,730,840,970,1100,1230,1360,1440,1490
330,350,370,1950,1660,1810,1380
340 NTH=1:BS$="":PRINT$960,CLS;
345 IFPL=THEN1960ELSE180

The Key Box
Model I or III
16K, 32K RAM
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Listing continues
nally, I added program-writing capabilities such as List, Run, and FIX.

TRS-Turtle starts out with a short title page that prompts the user to press the space bar to begin. Then a small blinking square (the turtle) appears at the screen, and a block cursor appears at the lower left of the screen.

After typing in the appropriate command, press the enter key as in normal Basic. Do not type in line numbers.

When entering a direction command (for example, Left), the computer will prompt you with a question mark. The computer is asking you for a number from one to nine. This number represents the number of steps in that direction the turtle can take. The direction commands are the only commands that have this format. Two other commands (Jump and List) require optional input after they are entered; these will be explained later.

In addition to the ability to type in

"Originally TRS-Turtle was nothing more than Etch-a-Sketch with fancy commands..."

commands, two other keys have functions. The clear key erases the entire line. The up arrow will repeat the last command. Thus, instead of typing in 20 Left commands, just one and the up arrow can be used to generate 20 repeated commands.

Now for a brief summary of the commands.

- **Right**—Moves the turtle right (X) steps. Turtle will leave a trail unless Hide is used.
- **Left**—Moves the turtle left (X) steps. Turtle will leave a trail unless Hide is used.
- **Up**—Moves the turtle up (Y) steps. Turtle will leave a trail unless Hide is used.
- **Down**—Moves the turtle down (Y) steps. Turtle will leave a trail unless Hide is used.
- **<Up**—Moves the turtle left and up(X) steps. Turtle will leave a trail unless Hide is used.
- **Up>**—Moves the turtle right and up (X) steps. Turtle will leave a trail unless Hide is used.
<Down—Moves the turtle left and down (X) steps. Turtle will leave a trail unless Hide is used.

<Down—Moves the turtle right and down (X) steps. Turtle will leave a trail unless Hide is used.

Clear—Clears the screen. Clear does not affect learned screens or listings in memory.

Learn—Leans the current screen, and puts it in memory. The learned screen is called back by Remember.

Remember—Recalls learned screens, and puts them on the screen.

Jump—Gives the user control of a blinking turtle. Move him around with the arrow keys and press the space bar to stop the turtle. The current X and Y coordinates are given at the bottom of the screen.

Find—Finds the turtle. The turtle draws instead of erasing as in the Hide command.

Hide—Hides the turtle. The turtle erases instead of drawing as in the Find command.

Basic—Returns the program to Basic.

Help—Gives a directory of all available commands.

List—Lists the program in memory. Lines can be listed on the screen or on a printer.

Fix—This deletes the last line typed from the listing, allowing the user to replace the line. Note: The user can only Fix the last line typed.

Run—Runs the program in memory. The turtle goes through all of the steps drawing the picture the user wrote.

Forget—Deletes all lines of the user's program and learned screens.

These commands are straightforward with a few exceptions. When typing Jump, a blinking turtle appears. The user moves the turtle by using the arrow keys. When the desired location for the turtle is found press the space bar.

Now for some notes on a sample listing. Listings may be given on either the printer or on the screen. To make a screen listing pause, hold down the shift key. A sample listing might look like this:

```
1:  UP  9
2:  LEFT 9
3:  RIGHT 7
4:  RIGHT 7
5:  DOWN 3
6:  UP 2
7:  JUMP 0
```

The numbers to the far left are the line numbers of the user's program.
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These line numbers shouldn’t exceed 200 unless you wish to modify TRS-Turtle.

The word after the colon is the actual statement. Commands other than directions, Hide, Find, and Jump will not be listed. The numbers to the far right are the command values. This simply means that as a direction is typed, the number of steps the turtle takes is displayed here. Commands other than directions will have a 0 in this place.

The numbers after the Jump command, X=XXX Y=YYY, are the positions to which the turtle jumped. These numbers are only displayed if a Jump command is encountered.

The Fix command will delete the last line of the program. TRS-Turtle draws the picture as you type it in, thus making it easy to spot your mistakes. After spotting an error, type Fix. This gets rid of the last command. Now type in a new command. After the correction run the program and it will draw the corrected picture. You can then continue typing more commands.

The Program

Lines 10-160 handle the title page and variable initialization. Lines 160 and 170 seem to repeat each other, but do not change them or you will run into problems. Many other situations may arise where it appears I have merely repeated myself. Don’t be fooled—everything is necessary.

Lines 180-380 control the user input. Line 180 is the main line; it reads the input and assigns it to AS. AS is then added to BS after enter is pushed. The computer compares BS to CMS(X). If BS is equal to CMS(X), then it goes to the appropriate routine. This routine also checks for backspacing and nonexistent commands. If a command the computer doesn’t know is typed in, the computer branches to the proper error message.

Lines 390-1340 move the turtle in the appropriate direction. Lines 400-490 make the turtle draw to the right. The first few lines control user input and convert the input to a digit. Next a For...Next loop draws the line in the correct direction that number of steps.

Lines 1360-1420 memorize the screen. The screen is stored into seven variables SC(1-7). These variables are called back by the Remember routine.

The Remember routine lies between lines 1440 and 1470. All this does is recall the variables stored in the Learn routine.

The Jump command is controlled from lines 1490-1640. This routine PEEKs keyboard address 14400 for the arrows and the space bar. The numbers received are acted upon in the appropriate fashion.

The List routine (lines 1660-1790) goes through a loop, calling up the array of variables and printing them on either the printer or the screen.

Line 1810 sets the command counter back one to erase the last command. It then jumps back to the input routine.

The Run routine is in lines 1830-1900. This routine goes through the command list that the user typed in and executes each command.

The variable RL is the flag that keeps individual routines from sending control back to the input routine. Instead control is returned to line 1890, which goes to the next command to be executed.

Lines 1920 and 1930 are the error messages. No language should be without them, and mine is no different. I have only included two messages, but these should be sufficient for most mistakes.

The Help routine is located in lines 1950-1990. This routine sets a variable flag, HE, and memorizes the screen. The flag sends control back to Help instead of line 180. The computer then gives the user a list of available commands, and then restores the previous screen.

Finally, line 2010 is the data statement in which all 20 TRS-Turtle commands are stored. If you don’t like the word chosen for the commands, this is the line to change.

Notes for Tinkerers

Here are a few suggestions for possible modifications. A routine could save the user’s program to disk or cassette. A program change could make the left and right commands more realistic (that is, LEFT :X where X is the number of degrees the turtle would turn). Of course this change would require that the turtle’s forward movement routines be changed to move at that angle. How about new commands in general? They wouldn’t necessarily need to deal with turtle geometry (they could be text commands).

Happy turtling.

Larry Brackney (age 15) can be reached at 2525 16th St., Columbus, IN 47201.
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1. Speed increases of 10 - 100 times are typical after compilation.
2. Compiled code can be RELOCATED to run anywhere in memory.
   Code is even ROMable!
3. ZBASIC 2.2 NOW SUPPORTS BOTH RANDOM and SEQUENTIAL DISK I/O.
4. ZBASIC 2.2 is now a super tool for business programmers: RANDOM ACCESS FILES, and PRINT USING statements are supported as well as a HIGH PRECISION MATH package (with no rounding problems).
5. Special BUILT-IN MACHINE LANGUAGE COMMANDS to increase program operation by as much as 1000 times! Special commands are implemented for fast memory searching [CPDR, CPIR], block memory moves [LDIR, LODR], inputting and printing HEX numbers, inserting MACHINE LANGUAGE into COMPILED CODE, disabling and enabling interrupts, inverting memory, 16 bit PEEKS and POKEs, and stack control, debug and much more.
6. ZBASIC 2.2 compiles the ENTIRE PROGRAM into a 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.
7. NO ROYALTIES imposed on registered ZBASIC owners.
8. Typical COMPILATION TIME is TWO SECONDS for a 4K program.
9. Use TRS-80 Basic to write ZBASIC programs!
10. Compile many existing programs with only minor changes. (Some BASIC programming experience is required.)
11. Fully compatible with both the Model I and the Model III. Mod I compiled programs work on a MODEL III, and vice-versa. ZBASIC works with NEW/DOS-80, NEW/DOS+, DOSPLUS, LDOS, MULTIDOS, ULTRADOS, TRSDOS etc.
12. BUILT-IN and much improved MUSIC and SOUND EFFECTS commands.
13. Improved CHAINING for disk users.
14. TIME? now available on DISK version.
15. ZBASIC 2.2 now has an INPUT @ command [similar to PRINT @].
16. The TAB function will now tab 255 columns on a printer. [BASIC cannot tab past column 64.]
17. NEW/DOS 80 2.0 USERS can use the CMD "dos command" function!
18. NEW and EASIER to use USR COMMANDS.
19. New math functions to calculate XOR and INTEGER REMAINDERS
20. Logical STRING COMPARISONS are now supported.
21. The disk commands INSTR, MID$ ASSIGNMENT are now supported on both DISK AND TAPE ZBASIC.
22. DEFSTR is now supported.
23. Eight disk files may be opened simultaneously; random, sequential or mixed.
24. LINE INPUT$, is now supported.
25. Invoke the compiler by simply hitting these two keys: "<" "<".
26. NEW 100+ PAGE MANUAL WITH DESCRIPTIONS AND EXAMPLES.
27. 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:

1. ATN, EXP, COS, SIN, LOG, TAN, and exponentiation. (However, subroutines are included in the manual for these functions.)
2. ERROR, ON ERROR GOTO, ERL, ERR RESUME.
3. No direct commands like AUTO, EDIT, LIST, LIST ETC., although these commands may be used when writing programs.
4. Others NOT supported: DDBL, CINT, CSTR, DEFNN, FIX, FRES.
5. Normal CARTETE I/O. (ZBASIC supports it's own SPECIAL CARTETE I/O statements)
6. SOME BASIC COMMANDS MAY DIFFER IN ZBASIC. For instance, END jumps to DOS READY, STOP jumps to BASIC READY etc.
7. 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 you 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 2: 7 MIN. 34 SEC.**
** ZBASIC Execution speed MOD 1, LEVEL 2: 0 MIN. 18 SEC.**
** Basic Program size [WITHOUT VARIABLES]: 695 BYTES**
** ZBASIC Program size [WITHOUT VARIABLES]: 2735 BYTES**

[Remember that the ZBASIC program includes an 1879 byte subroutine package.] Program shown exactly as compiled and run in BASIC and ZBASIC.

---
2 NEW GAMES
FROM COMPUTER SHACK!

Once again Computer Shack brings you a revolution in computer games. Over the past few years COMPUTER SHACK, has published some of the finest software on the market. Now, with the help of many great programmers and an abundance of public support, we’ve managed to become one of the best software companies in the country, specializing in the TRS-80.

Computer Shack strives to be the best, to come out with new games, new ideas, and new techniques. We want to be the pacesetters of the industry. We were first with an all graphics Dungeons and Dragons game. Called DUNGEON ESCAPE, it combined spontaneous action and spectacular sound routines with an almost impossible quest. DUNGEON ESCAPE became an immediate success. Written by Bill Dunlevy, DUNGEON ESCAPE is still going strong after two years.

Then in 1982, we peaked with two legendary games that put Computer Shack on the top of the arcade market: CYBORG and JOVIAN. Both written with the combined talents of Bill Dunlevy and Doug Frayer, they became overwhelming successes. CYBORG, a totally original game, uses nine screens at a time with 20 different levels of play. A brilliant contest of skill as well as intelligence, it has been called a “TRS-80 classic” by Bob Lidell in 80 US. JOVIAN, brings to your screen, effects like you’ve never seen before. you take a trip to JOVIAN space where you maneuver your space sled around mines and fast moving aliens in order to achieve your final goal, the destruction of all JOVIAN life. Both CYBORG and JOVIAN have received rave reviews on a national level, not only because of their creativity behind each of them, but because they have used many new programming techniques. One of the most original techniques is a new type of wrap around screen that will amaze and dazzle you.

Now, in 1983. Computer Shack reaches new heights with two great new games, sure to storm the market and set the standard for all games that follow.

First we bring you ASSAULT, another great game by Doug Frayer and Bill Dunlevy. Along with their usual array of spectacular graphics and sound, they’ve given their new creation something rarely found in computer games these days, originality. ASSAULT isn’t just a copy of another game. Using total imagination, the programmers have managed to create what promises to be another “Classic”. Using a creative concept, the game places you in a mountain haven, surrounded by sparkling gold. Your goal: destroy the monsters trying to steal the gold and zap all the poisonous mushrooms. Fantastic graphics and sound, this program uses Dunlevy and Frayers “wrap around graphics” “ it uses 9 screens at a time. With many different levels.

Next we give to you LIBERATOR, an arcade action game written by John Crane. LIBERATOR is great for all arcade buffs and adventurers, alike. While working on perfecting an automated robot, your creation goes berserk, capturing your five lovely assistants and running off to different locations in the industrial park. Now you must search out your assistants. Being careful of Beer Barrels, Little Robots, Waterfalls, Elevators, flying boulders etc. If you’re hit, it’s all over. LIBERATOR is sure to become popular, with its 5 totally different screens.

COMPUTER SHACK
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Master Charge and VISA OK. Please add $3.00 for shipping in the U.S.A. $5.00 for Canada or Mexico. Proper postage outside of U.S. Canada: Mexico. Dealers: We are distributors for all items in this ad. Write for our catalog and price list

122 • 80 Micro, February 1983
GAMES MODEL I/III

<table>
<thead>
<tr>
<th>Game</th>
<th>Price</th>
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<tbody>
<tr>
<td>ASSAULT</td>
<td>19.95/21.95</td>
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<td>ARACHNID PLUS</td>
<td>19.95/21.95</td>
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<tr>
<td>CYBORG</td>
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<td>DUNGEON ESCAPE</td>
<td>15.95/19.95</td>
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<td>GREYMOON</td>
<td>15.95/19.95</td>
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<td>JOVIAN</td>
<td>19.95/21.95</td>
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<tr>
<td>LIBERATOR</td>
<td>19.95/21.95</td>
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<tr>
<td>SIMON and MERFUNKEL</td>
<td>15.95/19.95</td>
</tr>
<tr>
<td>ALIEN DEFENSE</td>
<td>By Soft Sector. 15.95</td>
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<tr>
<td>CATAPILLAR</td>
<td>15.95/19.95</td>
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<td>FORTRESS</td>
<td>15.95/19.95</td>
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<tr>
<td>OUTPOST</td>
<td>By Soft Sector. 15.95/19.95</td>
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<tr>
<td>RALLY by Soft Sector</td>
<td>19.95/21.95</td>
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<tr>
<td>SUPERVADERS</td>
<td>15.95/19.95</td>
</tr>
<tr>
<td>DEVILS TOWER</td>
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<tr>
<td>FORBIDDEN CITY</td>
<td>39.95</td>
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<td>FORBIDDEN PLANET</td>
<td>39.95</td>
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<td>PANIK</td>
<td>19.95/24.95</td>
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<tr>
<td>DEFIANCE</td>
<td>24.95</td>
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<tr>
<td>ASYLUM II</td>
<td>19.95/24.95</td>
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<td>DUNZHIN</td>
<td>29.95/29.95</td>
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<tr>
<td>KAV (DUNZHIN II)</td>
<td>19.95/24.95</td>
</tr>
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<td>LADYBIRD</td>
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</tr>
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<td>LASER DEFENSE by Med Systems</td>
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<tr>
<td>INSTITUTE by Med Systems</td>
<td>19.95/22.95</td>
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<td>ARMORED PATROL</td>
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<td>ELIMINATOR</td>
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<td>SEA DRAGON</td>
<td>19.95/24.95</td>
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<tr>
<td>DEMON SEED</td>
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<td>PENETRATOR by Melbourne House</td>
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<td>15.95/19.95</td>
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<tr>
<td>VENTURE by Horizon Software</td>
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Modem Programs Model I/III

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<td>DISK DOWNLOAD SYSTEM (DOS)</td>
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<tr>
<td>INFO EX BULLETIN BOARD and DOWNLOAD</td>
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<td>MODERN GAMES (Chess, Checkers, &amp; Other)</td>
<td>19.95/19.95</td>
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<td>39.95</td>
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<td>ULTRA TERM</td>
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<td>EP-SET 80 by Computer Shack</td>
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<tr>
<td>MONTHLY BILL SYSTEM by Computer Shack</td>
<td>149.00</td>
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<td>LAZY WRITER by ABC Sales</td>
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<td>POSTMAN by Soft Sector Disk only</td>
<td>175.95</td>
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<td>Small Business CHECK WRITER Disk Only</td>
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<td>Small Business BILL SYSTEM Disk only</td>
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<td>Small Business INVOICE WRITER Disk only</td>
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Color Computer

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<td>COLOR TAPE COPY by Big Systems Tape</td>
<td>15.95</td>
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<td>COLOR BIT by Big System Tape</td>
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<tr>
<td>COLOR BORANZA by Soft Sector Tape</td>
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<td>MASTER CONTROL by Soft Sector Tape</td>
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<tr>
<td>TAPE DIRECTORY by Soft Sector Tape</td>
<td>14.95</td>
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<tr>
<td>STAR FIRE by Intellectronics</td>
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<td>DUNKEY MUNKY by Intellectronics</td>
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<td>PLANET Inversion by Spectral Assoc</td>
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<td>INVADERS REVENGE by Med Systems</td>
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<td>ASTRO BUST by Mark Data Products</td>
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<td>HATMIRE by Mark Data Products</td>
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<td>KATTERPILLAR by Tom Mix</td>
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<td>PROMWRITER with CS instruction book</td>
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<td>16K Memory Chips Model I or III</td>
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misc. MODEL I/III

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<tr>
<td>FAMILY TREE by Computer Shack</td>
<td>29.90/29.90</td>
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<tr>
<td>MULTI DOS Extended Basic</td>
<td>29.95</td>
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<tr>
<td>MULTI DOS NEW version (with zap and Tape Util)</td>
<td>98.95</td>
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<td>MULTI DOS New 2 Dos</td>
<td>39.95</td>
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<td>SUPER DOS</td>
<td>19.95</td>
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<td>DOS PLUS version 3.4</td>
<td>149.00</td>
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<td>DOS PLUS II (for the Model II)</td>
<td>249.95</td>
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<td>LDOS</td>
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DISKS

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<td>Single Density BASF Disks</td>
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<td>DOUBLE DENSITY BASF DISKS</td>
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<tr>
<td>DOUBLE DENSITY FLIPPY DISKS</td>
<td>29.95</td>
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<tr>
<td>90 TRACK DOUBLE DENSITY DISKS</td>
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<td>DISK SAVERS (vinyl sleeves)</td>
<td>20 for 6.00</td>
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<td>COLORED BOXES (holds 10 disks)</td>
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<td>DISK BOXES (50 Disks; Flip tops)</td>
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80 Micro, February 1983 • 123
The Lair of Kraken

by Beth Norman
Second Place
11-13

I wrote this game, The Lair of the Kraken, for a 32K Extended Color Basic Color Computer. It is a computerized, underwater Dungeons-and-Dragons game.

The object is to travel through an underwater palace, battling monsters and finding objects. You need one of these objects to kill the Kraken (a type of monster) and set yourself free. The game creates a random character for you.

Monsters with different strengths are randomly placed in the dungeon’s rooms. When entering a room containing a monster, you can fight or run. If you run, you may be caught! Your chance to hit a monster is raised or lowered according to your character’s ability scores (strength or intelligence). Since Lair of the Kraken is not too difficult to win, it is aimed at kids. If you wish to make the fighting odds tougher or easier, then add:

575 IF S<5 THEN W=10 ELSE W=13

Change the W = 10 and W = 13 to two other numbers from 1 to 20 (the second W should be higher than the first). The lower you make these numbers, the easier it is to hit monsters. If you want to make the fight with the Kraken harder, add ELSE W = W + 4 to the end of line 585, which reads:

585 IF PP<>0 THEN W=W-6

The Key Box

Color Computer
32K RAM
Extended Color Basic
THOR symbol of new power for your Model I/III Computer

THOR INTERNAL MODEL III

All the hardware and easy directions to install one or two drives—With TRSDOS™ (NEWDOS™ for dual drives)
Kit containing one/two drives:
Single 40 ..... $449/$ 649
Dual 40 ..... $599/$ 875
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One or two drives—Price includes one drive with NEWDOS™, case and power supply—Slot for second drive
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Connect up to 254 computers of most any make over as much as 5000 feet of cable—Share 4.5 to 60 megabytes or more of disk storage—Call for additional information and prices.

CALL 1-800-641-3885 for orders only.

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14 IN and 15 OUT—Each port a full 8 bits—Connector to attach to Model I/III bus—Complete with cable and case—Requires 5 volts at 150 ma. Assembled and tested
For Model I Only ..... $29.95
For Model III Only ..... $34.95

THOR VERBOARD

Add a separate control computer to your Model III (For Model I requires a Model I Digital Port)—Verboard attaches to the Model I/III bus—Operates independently while your Model I/III performs other tasks—Has provision for 8K RAM or 16K EPROM—8 input and 8 output parallel ports as well as two serial ports are included.
With a detailed manual
Kit 1K RAM ..... $99.95
Assembled and tested ..... $129.95
EPROM Basic for simplified programming ..... $49.95

THOR CONTINUOUS LINE ADDRESS

For technical information or in Colorado call 303-337-5909

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Dealers enquiries welcome

See List of Advertisers on Page 387

80 Micro, February 1983 • 125
CONVERT YOUR TRS-80 MODEL-I OR III INTO A DEVELOPMENT SYSTEM

Complete instructions and sample schematics are included to help you design your own simple stand-alone microcomputer systems. THESE SYSTEMS CAN BE AS SIMPLE AS FOUR ICs: one TTL circuit for clock and reset, a Z-80, an EPROM, and one peripheral interface. When the In-Circuit-Emulation cable is plugged into the Z-80 socket of your stand-alone system, the system becomes a part of your TRS-80. You can use the full power of your editor/assembly's debug and trace program to check out both the hardware and the software. Simple test loops can be used to check out the hardware, then the system program can be run to debug the logic of your stand-alone device.

Since the program is kept in TRS-80 RAM, changes can be made quickly and easily. When your stand-alone device works as desired, you use the Developmate's PROM PROGRAMMER to copy the program into a PROM. With this PROM, and a Z-80 in place of the emulation cable, your stand-alone device will work by itself.

The DEVELOPMATE is extremely compact: Both the PROM programmer and the In-Circuit-Emulator are in one small plastic box only 3.2" x 5.4". A line-plug mounted power supply is included. The PROM programmer has a "personality module" which defines the voltages and connections of the PROM so that future devices can be accommodated. However, the system comes with a "universal" personality module which handles 2750, 2508 (8k), 2716, 2516 (16k), 2532 (32k), as well as the new electrically alterable 2816 and 48016 (16k EEPROMs). The COMPLETE DEVELOPMATE 81, for Model I, with software, power supply, emulation cable, TRS-80 cable, and "universal" personality module ....................... $329 DEVELOPMATE 83, Model III version, same as above .................. $329 PM2 PERSONALITY MODULE for 2732A EPROM .................. $15 PM3 PERSONALITY MODULE for 2764 EPROM .................. $15

ORION INSTRUMENTS
172 Otis Avenue, Dept. M, Woodside, CA 94062
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LISTING CONTINUED
600 PRINT"USE THE SPACE BAR";PRINT"TO STRIKE, "B"";
605 IS=INKEYS
610 IF I$=" THEN 605
615 X=RND(-TIMER)
620 X=RND(Timer)
625 PRINT;PRINT"YOU STRIKE!";IF X<W THEN 640
630 PRINT;PRINT"YOU HIT THE "K" IS "
635 PRINT;PRINT"DEAD!";RETURN
640 PRINT;PRINT"YOU MISSED!";X=RND(20)
645 PRINT;PRINT"YOUR FIST STRIKES!" IF X>Y THEN 1525
650 PRINT"IT MISSES!";GOTO 600
655 GOTO 650
660 GOTO 650
665 INPUT"YOUR COMMAND";A$,
670 IF A$="M" OR A$="E" OR A$="W" OR A$="S" THEN RETURN
675 IF A$="W" THEN GOSUB 385 ELSE IF A$="C" THEN GOSUB 335 ELSE 650
680 GOTO 665
685 PRINT"PLEASE USE N, E, W, S, OR C.";
690 GOTO 665
695 CLS
700 PRINT"YOU ARE A POOR "B",";
705 PRINT"BARELY KIRKING A LIVING AS A FISHERMAN."
710 PRINT"ONE DAY, YOU ARE OUT ROWING WHEN YOU HEAR A SWEET
715 SOUND COMING FROM BEHIND A ROCK, YOU"
720 PRINT"INVESTIGATE AND FIND THAT IT IS THE SINGING OF A GROUP
725 PRINT"OF MER- MAIDS."
730 PRINT"THEY SURROUND YOUR BOAT AND MAKE STRANGE PASSES IN THE
735 AIR WITH THEIR HANDS. ONE INFORMS YOU THAT THEY HAVE CAST A
740 WATER- BREATHING SPELL ON YOU."
745 PRINT"PRESS ANY KEY TO CONTINUE."
750 IS=INKEYS
755 IF I$=" THEN 730
760 CLS;PRINT"THEY DRAG YOU UNDER THE SURFACE AND YOU FIND
765 THAT YOU CAN BREATHE, TALK, AND MOVE FREE- LAY UNDERWATER."
770 PRINT"THEY TAKE YOU FAR, FAR DOWN TO THE TOP OF A STAIRCASE
775 INDIANA TO VAARIOUS PASSAGeways AND ROOMS."
EE Software by

PABSoft
Excellence in Technical Software

LINEAR CONTROL SYSTEMS
State Variable Analysis ............. $25
Advanced S. V. Analysis ............. $25
Transfer Function Anal. ............. $25
All Three ................................ $60

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80 Micro, February 1983 • 127
LISTING CONTINUED

980 GOTO 890
985 PRINT"YOU GO 40 FT. SOUTH.;GOTO 790"
990 PRINT"YOU GO 40 FT. EAST AND COME TO A ROOM.;
995 PRINT"YOU GO 40 FT. EAST AND COME TO A ROOM.;

920 IF EES<DDS THEN 925 ELSE 930
darkto see, as a matter of fact.;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".;".";

960 PRINT"WHERE ARE EXITS WEST AND SOUTH;";KK=KK+1
965 GOSUB 665
970 IF A$="W" THEN 985 ELSEIF A$="S" THEN 995 ELSE PRINT"CAN'T GO THAT WAY.;";
975 GOSUB 865
980 GOTO 970
985 PRINT"YOU GO 40 FT. WEST AND COME TO A ROOM.;";IF L2=0 THEN
840 ELSE PRINT IT'S EMPTY.;"
990 GOTO 860
995 PRINT"YOU GO 30 FT. SOUTH.;"
1000 PRINT"YOU ARE NOW IN AN INTERSECTION GOING EAST,WEST,AND N
ORTH.;";GOSUB 665
1005 IF A$="W" THEN 1195 ELSE IF A$="W" THEN 1030 ELSE IF A$="N" THEN
1025 ELSE PRINT"CAN'T GO THAT WAY.;"
1010 GOSUB 665
1015 GOTO 1045
1020 PRINT"YOU GO 30 FT.NORTH AND FIND YOURSELF IN A ROOM.;":
IF KE=0 THEN 915 ELSE PRINT IT'S EMPTY.;"
1025 GOTO 960
1030 PRINT"YOU GO 50 FT. WEST AND FIND YOURSELF IN A ROOM.;":
IF MBL=0 THEN 1040 ELSE PRINT IT'S EMPTY.;"
1035 GOTO 860
1040 PRINT"THIS IS A GIANT PIT.;";EES=10;GOSUB 1190
1045 IF EES<DDS THEN 1050 ELSE 1055
1050 PRINT"THERE IS NO WAY TO CLIMB DOWN. YOU LEAVE GO 50 FT.
EAST.;";GOTO 1080
1055 PRINT"S;INCE YOU HAVE A ROPE,YOU MAKE A LADDER AND CLIMB DO
WN.;";GGS="LAMPS;";HH$="SHOVEL.;";GOSUB 515
1060 GOSUB 1420
1065 IF EE=1 THEN 1080
1070 GGS="LAMPS;";HH$="SHOVEL.;"
1075 GOSUB 1485
1080 PRINT"THERE ARE EXITS SOUTH AND EAST.;";MM=MM+1
1085 GOSUB 665
1090 IF A$="S" THEN 1110 ELSE IF A$="E" THEN 1105 ELSE PRINT"CAN'T GO THAT WAY.;"
1095 GOSUB 665
1100 GOTO 1090
1105 PRINT"YOU GO 50 FT.EAST.;";GOTO 1000
1110 PRINT"YOU GO 70 FT. SOUTH AND THE PASSAGEWAY TURNS WEST
.;";PRINT"YOU GO 30 FT. WEST AND IT TURNS NORTH.;";PRINT"YOU GO 10 FT.
NORTH AND COME TO A ROOM.;";IF NN=0 THEN 1120 ELSE PRINT IT'S
S EMPTY.;"
1115 GOTO 1150
1120 GGS="ROPE;";HH$="DAGGER.;";GOSUB 515
1125 GOSUB 1420
1130 IF LL=6 THEN 1150
1135 LL=LL-1
1140 GGS="ROPE;";HH$="DAGGER.;"
1145 GOSUB 1485
1150 PRINT"THERE ARE EXITS NORTH AND SOUTH.;";NN=NN+1
1155 GOSUB 665
1160 IF A$="N" THEN 1180
1165 IF A$="S" THEN 1185
1170 PRINT"CAN'T GO THAT WAY.;";GOSUB 665
1175 GOTO 1160
1180 PRINT"YOU GO 40 FT.NORTH.;";GOTO 790
1185 PRINT"YOU GO 10 FT.SOUTH AND THE PASSAGEWAY TURNS EAST
.;";PRINT"YOU GO 30 FT.EAST AND IT TURNS NORTH.;";PRINT"YOU GO 70 FT.
NORTH AND COME TO A ROOM.;";IF MM=0 THEN 1040 ELSE PRINT IT'S
S EMPTY.;"
1190 GOTO 1080
1195 PRINT"YOU GO 70 FT.EAST AND COME TO A ROOM.;";IF OO=0 THEN 1
200 ELSE PRINT IT'S EMPTY.;";GOTO 1200
1200 PRINT"THE FLOOR IS COVERED WITH MUD WHICH HAS DRIFTED IN
FROM THE OCEAN FLOOR.;";PRINT THEN YOU NOTICE...";
1205 GOSUB 515
1210 GOSUB 1420
1215 IF LL=6 THEN 1260

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Listing continued

1228 LL=0
1229 PRINT"YOU TRIP ON SOMETHING HARD UNDER THE MUD.";EES="SE";GOSUB 1390
1238 IF EES$="DDS THEN 1235 ELSE 1240
1235 PRINT"AS YOU DON'T HAVE ANYTHING TO DIG WITH, YOU MUST LEA
1235 GOTO 1231
1240 PRINT"GOOD! YOU HAVE A SHOVEL TO DIG WITH. YOU FIND A PIN E
1240 SWORD INLAID WITH GEMS. AN INSCRIPTION ON THE HILT SAYS:
1245 PRINT"PRINT"; **SWORD OF ANDON***
1250 PRINT"; **DOWN WITH KRAKEN***
1255 PRINT"; **GOOD LUCK, TRAVELER!**; PRINT
1260 PRINT"THERE ARE EXITS EAST AND WEST.":EES="O0=00+1
1265 GOSUB 665
1270 IF A$="E" THEN 1285 ELSE IF A$="W" THEN 1280 ELSE PRINT"CAN'T
1270 GOTO 1270
1280 GOTO 1270
1285 GOSUB 1000
1290 PRINT"YOU GO 60 FT.EAST AND COME TO A ROOM.";R$="KRAKEN
1295 :S=1:T=10
1299 PRINT"AS YOU ENTER THIS GIANT ROOM YOU SEE A BEAUTIFUL GIRL IN
1299 GONE SPLITLY, A GIANT WALL SLIDES SHUT, COVERING YOU.
1300 PRINT"YOUR ONLY ESCAPE!"
1305 PRINT"THEN YOU SEE THE HIDEOUS KRAKEN. YOU PREPARE TO
1310 PRINT"PRESS THE SPACE BAR TO CHARGE,"; PRINT B$ ".
1315 IS=INKEYS
1320 IF IS<" " THEN 1300
1325 GOSUB 560
1330 PRINT$="STRING$=";PRINTTAB(15-LEN(B$)/2);B$;PRINT"THE VICTOR:PRINTSTRING$=";PRINT$;
1335 PRINT$="STRING$=";PRINT"SINCE YOU HAVE KILLED THE KRAKEN, THE CAGE
1340 PRINT$="STRING$=";PRINT"DISAPPEARS AND THE BEAUTIFUL GIRL IS FREED!"
1345 PRINT$="STRING$=";PRINT"SHE IS THE PRINCESS OF THESE WATERS, AND CAN NOW RULE
1350 PRINT$="STRING$=";PRINT"THEM IN PEACE."
1355 PRINT$="STRING$=";PRINT"SHE PRESSES A BUTTON ON ONE WALL AND THE CEILING
1360 PRINT$="STRING$=";PRINT"SLIDES BACK. WITH A WHISTLING CALL, SHE SUMMONS A GIANT T
1365 PRINT$="STRING$=";PRINT"S SHE LIVES HAPPILY UN-TIL THE END OF THE STORY."
1370 IS=INKEYS
1375 IF IS=" " THEN 1345
1380 PRINT$:PRINT$="STRING$=";PRINT"WITH THE TORTOISE'S HELP, SHE MOVES ASIDE A GREAT
1385 PRINT$:PRINT$="STRING$=";PRINT"ROCK THAT THE KRAKEN HAD SET IN PLACE, RE-VEILING A WEALTH
1390 PRINT$:PRINT$="STRING$=";PRINT"OF TREASURE."
1395 PRINT$:PRINT$="STRING$=";PRINT"HEAVILY LADEN WITH RARE TREASURES, YOU CLIMB ABOARD
1400 PRINT$:PRINT$="STRING$=";PRINT"THE TORTOISE'S BACK AND HE BRINGS YOU TO THE SURFACE."
1405 PRINT$:PRINT$="STRING$=";PRINT"YOU MARRY AND LIVE HAPPILY EVER AFTER."
1410 NEXT CC
1415 RETURN
1420 PRINT$:PRINT$:PRINT$="STRING$=";PRINT"THERE'S A "R$" IN HERE!"
1425 PRINT$:PRINT$:PRINT$="STRING$=";PRINT"WOULD YOU LIKE TO FIGHT OR RUN?";AS
1430 IF AS="1" OR AS="2" THEN 1440
1435 PRINT$:PRINT$:PRINT$="STRING$=";PRINT"PLEASE USE 1 OR 2;GOTO 1425
1440 IF AS="1" THEN GOSUB 560 ELSE 1450
1445 RETURN
1450 FF=RND(-TIMER);F=RRND(10)
1455 IF FF<6 THEN 1460 ELSE 1450
1460 PRINT$:PRINT$:PRINT"YOU GOT AWAY!":RETURN
1465 CLS;PRINT$="STRING$=";PRINT$"THE "R$" CAUGHT YOU!":PRINT$"YOU'RE FORCED TO FIGHT ANYWAY!"
1470 FOR T=1 TO 750:NEXT T
1470 GOSUB 560
1475 RETURN
1480 IF=LL=10
1485 PRINT$:PRINT$:PRINT$="STRING$=";PRINT"IN THIS ROOM THERE IS A "GGS" AND A "HHS"."
1490 INPUT$="TYPE IN THE FIRST TWO LETTERS OPPOSITE ONE YOU WISH";AS:
1495 IF AS="LEFT$"(GGS,2) OR AS="LEFT$"(HHS,2) THEN 1500
1495 PRINT$:PRINT$:PRINT$="STRING$=";PRINT$"PLEASE USE "LEFT$"(GGS,2) OR "LEFT$(HHS,2)".":GOTO 1
1500 IF AS="RIGHT$"(GGS,2) THEN IIS=GGS ELSE IIS=HHS
1505 PRINT$:PRINT$:PRINT$="STRING$=";PRINT$"THE "IIS" IS TAKEN."
1510 TS=TS+$AS
1515 IJS=IJS+$IIS$*;
1520 RETURN
1525 PRINT$:PRINT$:PRINT$="STRING$=";PRINT"I'M AFRAID YOU'RE DEAD!":GOTO 1370
1530 DATA GIANT CRAB,2,4,GIANT PIRANHA,6,3,SEA HYDRA,4,5,GIANT O
1535 CTOUS,7,6,SEA SERPENT,5,7,SEA DRAGON,3,8
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Byte Cycles

by Nathan Miller
Second Place
10 and under

Byte-Cycles is a one- or two-person joystick game for people of all ages. The object of the game is to fill as much of the screen as you can with the trail of your byte-cycle while avoiding the trail of your opponent’s byte-cycle. You can win by forcing your opponent into your trail or into a wall. Variations include a screen filled with an array of stars you must avoid, and a circle-triangle-star maze you must negotiate to win.

After loading Byte-Cycles from the cassette, type Run and press the enter key. The program will print information on how to play Byte-Cycles. Whenever there is a pause and you are finished reading, press any key.

After the instructions, you will need to answer a few questions before play begins:

● 1 or 2 players? Your answer to this question tells whether you want to compete with someone or practice alone.

● Draw? If you answer yes to this question, you will be able to cross trails and hit walls. This is usually for fun or practice, not competition.

● Stars? If you want the screen to be filled with a lot of dots, answer yes here. You will be asked for the number of dots to be used. If you hit the dots during play you are destroyed.

● Circle, triangle, star? In this option, the screen shows two half circles with gaps at each side. Inside the circles is a triangle with a star inside. The object is to get into the triangle and hit the star. This is very hard!

When using the joystick, you must be very careful to keep the handle against the rim. You can move in any of eight directions: up, down, left, right, and the four diagonals. To change directions, move the handle to the extreme position of the direction you want. Leaving the handle in the middle of the joystick will destroy you. Also, you must not reverse directions. To go the opposite way, make a small corner since reversing directly will explode you.

Nathan Miller, age 10, can be reached at 3309 SW Malcolm Court, Portland, OR 97225.

Program Listing

10 DIM HF(63),VF(63),PH(63),PV(63),A(50)
20 HF(0)=1:VF(0)=1:HF(63)=1:VF(63)=1:PH(0)=-1:PV(0)=-1:PH(63)=
30 1:PV(63)=1
32 CLS
25 PRINT"WHEN THERE IS A PAUSE AND YOU ARE READY TO CONTINUE, PRESS ANY KEY."
27 IF INKEY$="" THEN 27
30 CLS
40 PRINT"WELCOME TO BYTE CYCLES":PRINT"WRITTEN BY NATHAN MILLER"
50 PRINT"OCT. 13, 1982"
60 IF INKEY$="" THEN 50
60 CLS
70 PRINT"IMAGINE YOURSELF INSIDE A COMPUTER. YOU ARE PLACED ON A LARGE FIELD IN A CYCLE THAT LEAVES A TRAIL WHEN IT MOVES. YOUR MAIN CONSIDERATION IS TO DESTROY THE OPPONENT BY MAKING HIM RUN INTO A TRAIL OR FORCING HIM INTO THE WALL. AT THE SA"
80 PRINT"ME TIME YOU MUST AVOID THE TRAILS AND WALLS. WITH THE STARS OPTION, YOU AND YOUR OPPONENT CAN BE DESTROYED BY RUNNING INTO A STAR. IN THIS SIMULATION PLAYERS CONTROL THEIR CYCLES WITH JOYSTICKS BUT THEY MUST HOLD JOYSTICKS ON THE RIM OR EXPLODE"
100 IF INKEY$="" THEN 100
110 CLS
Listing continues
120 INPUT"1 OR 2 PLAYERS";NP
130 IF NP=1 OR NP=2 THEN 128
140 INPUT"DRAW";DS
150 IF DS="YES" THEN PMODE 4,1;PCLS:SCREEN 1,1;GOTO 810
160 IF NP=2 THEN INPUT"RIGHT PERSON'S NAME";RS:INPUT"LEFT PERSON'S NAME";LS
170 INPUT"STARS";SS
180 IF SS="YES" THEN INPUT"HOW MANY STARS";NS
190 IF SS$="YES" THEN INPUT"CIRCLE,TRI.,STAR";CTS
200 PMODE 4,1;PCLS:SCREEN 1,1
210 LINE(8,0)-(255,191),PSET,B
220 ON NP GOSUB 268,378
230 PCls:LINE(0,0)-(255,191),PSET,0,X=128,Y=96:IP SS$="YES" THEN
240 X=128:Y=96:FOR X=1 TO NS:PSET(RND(128)*2-RND(96)*2):NEXT X
250 IP CT$="YES" THEN 290 ELSE X=128:Y=96:GOTO 320
270 ELSE
280 PSET(D128,96)
290 DRAW"BM128,96SBM-5,2E5P5BL3L4":DRAW"BM128,96BM-6,2E6F6"
310 X=288:Y=171
320 H=JOYSTK(0):V=JOYSTK(1)
330 PSET(X,Y)
340 X=X+HF(H):Y=Y+VF(V)
350 IF PFPINT(X,Y)=5 THEN 700
360 GOTO 320
370 X=128:Y=96:FOR X=1 TO NS:PSET(RND(128)*2-RND(96)*2):NEXT X
380 X=128:Y=96:FOR X=1 TO NS:PSET(RND(128)*2-RND(96)*2):NEXT X
390 IF SS$="YES" AND CT$="YES" THEN 400 ELSE X=288:Y=160:Y=96:Y=96:GOTO 420
420 H=JOYSTK(0):V=JOYSTK(1):H=JOYSTK(2):V=JOYSTK(3)
430 PSET(X,Y):PSET(X+2,Y)
440 X=X+HF(H):Y=Y+VF(V):X=X+2:Y=2+FV(V)
450 IF PFPINT(X,Y)=5 THEN 700
460 IF PFPINT(X+2,Y)=5 THEN 750
470 GOTO 420
480 X=128:Y=96
490 H=JOYSTK(0):V=JOYSTK(1)
500 X=128:Y=96:X=128:Y=96
510 IF X=0 THEN X=255
520 IF Y=0 THEN Y=255
530 IF X=255 THEN X=255
540 IF Y=255 THEN Y=255
550 PSET(X,Y)
560 GOTO 490
570 X=128:Y=96:X=128:Y=96
580 H=JOYSTK(0):V=JOYSTK(1):H=JOYSTK(2):V=JOYSTK(3)
590 X=128:Y=96:X=128:Y=96
600 IF Y=2 THEN Y=191
610 IF Y=0 THEN Y=191
620 IF X=255 THEN X=255
630 IF X=0 THEN X=255
640 IF X=255 THEN X=255
650 IF Y=2 THEN Y=255
660 IF Y=0 THEN Y=255
670 IF X=255 THEN X=255
680 PSET(X,Y):PSET(X+2,Y)
690 GOTO 500
700 FOR R=1 TO 20:CIRCLE(X,Y),R,85:NEXT R
710 ENd=4:C=4 THEN 730
720 IF NP=2 THEN 220 ELSE CLS:X=8:C=0:GOTO 120
730 PCls:IF NP=1 AND CT$="YES" THEN PCls:LINE(0,0)-(255,191),PSET,T;B:GOTO 290 ELSE IF NP=1 AND SS$="YES" THEN PCls:LINE(0,0)-(255,191),PSET,B:GOTO 270 ELSE IF NP=2 AND CT$="YES" THEN 400 ELSE IF NP=2 AND SS$="YES" THEN LINE(0,0)-(255,191),PSET,B:GOTO 380
731 IF NP=1 AND CT$="YES" AND SS$="YES" THEN X=128:Y=96:GOTO 320 ELSE X=88:Y=96:XB=2:Y=96:LINE(0,0)-(255,191),PSET,B:GOTO 420
740 GOTO 370
750 FOR R=1 TO 20:CIRCLE(X+2,Y),R,85:NEXT R
760 FOR D=0 TO 250:NEXT D
770 IF X=2 THEN 730
780 IF NP=2 THEN 820 ELSE CLS:X=8:C=0:GOTO 120
800 GOTO 120
810 IF NP=1 THEN 480 ELSE 570
820 IF ZXXZ THEN 850 ELSE 830
830 CLS:PRINT"CONGRATULATIONS,";LS$;"YOU WIN!!"
840 IF INKEY$="" THEN 840 ELSE CLS:X=8:C=0:GOTO 120
850 CLS:PRINT"CONGRATULATIONS,";RS$;"YOU WIN!!"
Boxer is a machine-language game that will give your reflexes the ultimate challenge. The object is to punch a randomly appearing bag. Use the up- and down-arrow keys to move and the left- and right-arrow keys to punch.

Listing 1 is a Basic version of Boxer. String packing was used to do the animation. After you have played a few games and leave the computer, the game will go into the demonstration mode. To exit the demonstration mode just hit any key. Even though I did almost everything possible to speed up the game, it still runs pretty slowly.

Listing 2 is an Assembly-language version of Boxer. The only difference between the Basic version and this one is that the Basic program has a demonstration mode and the Assembly-language program does not. Boxer requires 32K of memory to assemble. To use this version you have to run Program Listing 3 first. This program POKes random numbers into a large memory block. The machine-language program will then use these numbers to randomly position the bag you are supposed to punch.

My high score is 720 points.

Lloyd Kupchanko, age 16, can be reached at 24 Quesnell Circle, Edmonton, Alberta, Canada T5R 5M9.

---

Boxer
by Lloyd Kupchanko
Third Place
14–18

Program Listing 1

1  '  ***********************************************
2   '  BOXER
3   '  BY
4   '  LLOYD KUPCHANKO
5   '  ***********************************************
6
7  10 GOTO470
8  15 '  TESTS FOR KEYBOARD INPUT
9  20 A=PEEK(14550)
10  30 IFX<@THEN20ELSE=T-1
11  40 IFV<@THEN23ELSE=V-1
12  45 '  IF IN DEMONSTRATION MODE THEN LINE 450
13  50 IFD=THEN450
14  60 IFA=32THEN110
15  70 IFA=64THEN130
16  80 IFA=8THEN150
17  90 IFA=16THEN130
18 100 GOTO20
19 105 '  **** RIGHT HAND SWING ROUTINE
20 110 V=V-1;T=T-1;PRINTX,A18;PRINTX,A28;PRINTX,A38;PRINTX,A48;IPPEEK(15370+X)=191THENN250ELSEIPPEEK(15434+X)=191THENN250
21 115 '  **** RIGHT HAND MISS ROUTINE
22 120 PRINTX,25;PRINTX,A35;PRINTX,25;PRINTX,A25;PRINTX,A15;PRINTX,A25;PRINTX,25;PRINTX,25;PRINTX,A5
23 125 '  **** LEFT HAND SWING ROUTINE
24 130 V=V-1;T=T-1;PRINTY,A68;PRINTY,A78;PRINTY,A88;PRINTY,A

Listing 1 continues

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Foreign Flag Quiz

by Jennifer Neidenbach

Third Place
11-13

This program prints the flags of 10 different countries. The player tries to guess the country to which the printed flag belongs. If the answer is correct, the program continues with the next flag. If the player guesses incorrectly, the program gives the correct answer.

Line Functions

Lines 5–10 hold remark statements. Lines 15–75 are instructions.


Line 9999 directs the program to the goodbye routine. Lines 10000–10020 hold a subroutine to outline the flag and print question.

Lines 11000–11105 hold a subroutine to ask question and check the player’s answer. Lines 11200–11240 hold the goodbye routine, and Line 11245 is the end.

The Key Box

Model I or III
16K, 32K RAM
Cassette or Disk Basic

Jennifer Neidenbach (age 13) can be reached at 3057 Shawnee Lane, Drayton Plains, MI 48020.

Program Listing

5 'FOREIGN FLAG QUIZ
10 'INTRODUCTION
15 CLS:PRINT:PRINT:PRINT:PRINT
20 PRINTTAB(20)"FOREIGN FLAG QUIZ"
25 PRINTTAB(14)"WRITTEN BY JENNIFER NEIDENBACH"
30 PRINT:PRINT:PRINT:PRINTTAB(14)"PRESS <ENTER> FOR INSTRUCTIONS"
;INPUT 2
35 CLS
40 'INSTRUCTIONS
45 CLS
50 PRINTTAB(13):"THIS IS THE "FOREIGN FLAG QUIZ","'
55 PRINTTAB(12):"I WILL PRINT THE FLAGS OF TEN DIFFERENT"
60 PRINTTAB(12):"COUNTRIES, AND YOU TYPE IN THE COUNTRY"
65 PRINTTAB(13):"THAT FLAG BELONGS TO:";PRINT
70 PRINTTAB(13):"PRESS ANY KEY TO BEGIN."
75 IS=INKEY;IP=** THEN QUIT 75
80 'BEGINNING OF QUIZ
85 'FLAG ONE -- POLAND
90 CLS:GOSUB 11000
95 FOR I=14 TO 49:PRINT$I+320,CHR$(191);PRINT$I+304,CHR$(191);:
PRINT$I+440,CHR$(191);:NEXT I
100 CS="POLAND";GOSUB 11000
110 'FLAG TWO -- SWITZERLAND
115 CLS:PRINT$663,"WHAT COUNTRY DOES THIS FLAG BELONG TO?"
120 FOR I=14 TO 49:PRINT$I+126,CHR$(191);:PRINT$I+192,CHR$(191);:
:PRINT$I+256,CHR$(191);:PRINT$I+320,CHR$(191);:PRINT$I+384,CHR$(191);:
:PRINT$444,I,CHR$(19);:NEXT I
125 FOR I=52 TO 69:RESET(1,13):RESET(1,14):RESET(1,15):NEXT I
130 FOR I=50 TO 63:RESET(1,13):RESET(1,14):NEXT I,12
135 FOR I=50 TO 63:RESET(1,17):RESET(1,18):NEXT I
140 'FLAG THREE -- GREECE
145 CLS:GOSUB 11000
150 'FLAG FOUR -- JAMAICA
155 FOR I=15 TO 18:PRINT$I+126,CHR$(191);:NEXT I
160 FOR I=21 TO 24:PRINT$I+126,CHR$(191);:NEXT I
165 FOR I=30 TO 37:SET(1,1):SET(1,12):SET(1,13):SET(1,14):SET(I,15):NEXT I
170 FOR I=42 TO 49:SET(1,1):SET(1,12):SET(1,13):SET(1,14):SET(I,15):NEXT I
175 FOR I=50 TO 97:SET(1,7):SET(1,10):SET(1,11):SET(1,14):SET(I,15):NEXT I
180 FOR I=30 TO 97:SET(1,18):SET(1,19):SET(I,22):NEXT I
185 CS="GREECE";GOSUB 11000
190 'FLAG FIVE -- JAMAICA
195 CLS:GOSUB 11000
199 PRINT$167,CHR$(140);:PRINT$148,CHR$(140);:PRINT$17,CHR$(140);:
:PRINT$171,CHR$(140);:PRINT$149,CHR$(176);:PRINT$150,CHR$(176);:
:PRINT$166,CHR$(176);:PRINT$169,CHR$(176);:PRINT$239,CHR$(131);:
:PRINT$231,CHR$(131);:PRINT$221,CHR$(131);:PRINT$217,CHR$(140)::
:PRINT$218,CHR$(140);:PRINT$228,CHR$(140);:PRINT$229,CHR$(140);:
:PRINT$215,CHR$(131);:PRINT$216,CHR$(131);:PRINT$209,CHR$(176);:
194 PRINT$219,CHR$(176);:PRINT$226,CHR$(176);:PRINT$227,CHR$(176);:
:PRINT$226,CHR$(176);:PRINT$205,CHR$(131);:PRINT$206,CHR$(131);:
:PRINT$207,CHR$(140);:PRINT$208,CHR$(140);:PRINT$209,CHR$(131);:
Listing continues
COLOR COMPUTER

PROGRAMMABLE
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AT LAST—the COLOR COMPUTER's audio capabilities even SURPASS its great graphics! If you can program in BASIC—plug in the PSM cartridge and start to create life-like explosions, engines, animals, wind, water and other sounds limited only by your imagination. Complex sound effects are continuously maintained independently of your program. The PSM is a power-packed hardware/software combination and 100% compatible with ALL models of the Color Computer.

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• SEND UP TO 40 WPM
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Your Model I or III becomes a programmable keyboard that can send Morse from the keyboard or from stored messages. Keying is done either by the relay or by the audio output. Received Morse is decoded, displayed, stored and printed. The cassette earphone plug connects to the receiver speaker to cut off the air. No hardware except patch cords is required for many setups.

Model I $80.00  Model II $100.00

Cassette with instruction booklet only $19.95 postpaid. Model I or III, LEVEL II, with at least 16K required.

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Listing continued
Adding a modem to my Model I, Level II TRS-80 expanded my use of the computer by allowing me to call various bulletin board systems. By locating boards locally and in other parts of the country I made a host of new acquaintances and friends.

I thought it would be great if I had my own bulletin board so people could call me from other areas of the country. So, I began to contact different system operators for advice on how I might put my own board together. Unfortunately, the consensus of opinion was that without at least one disk drive, a bulletin board system would be impossible. It looked as though my dream of becoming a system operator would have to be put aside until I could buy a disk system.

The prospects of this happening were pretty dim, and I was not content to be just a user of other peoples’ bulletin boards.

I decided to tackle the “impossible” and write my own program for a cassette bulletin board system. I had only 48K of memory to hold the program and the messages, but nothing to lose by trying.

My original program stored the messages in arrays, which worked out okay until I found things that I wanted to change. If the changes required editing.

The Key Box

Model I or III
16K RAM
Cassette Basic
Modem
You Are Being Attacked by a Raging...

Caterpillar

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Written by Larry Ashmun

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FORTRESS II
Only The Fast Survive!

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Written by Larry Ashmun

ALIEN DEFENSE
Defend Planet from 6 Different Types of Alien Attacks

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Written by Larry Ashmun
EN(MGS(VN)-1):GOT0530ELSEIF LEN(MGS(VN))>63THEN PRINTCHR$(8):;GOTO 5381ELSE MGS(VN)=MGS(VN)+AS:GOTO 5301
5302 PRINT:GOT05005
5400 PRINT:"List":"PRINTCHR$(14):INPUT""Starting line #":NL:IF NL<0 THEN PRINT:GOTO 5420 ELSE FOR X=NL TO 0:PRINTX":.";PRINT"MG$(XH):NEXT X:PRINT:GOTO 5005
6000 PRINT:PRINT:"Print Quiz Questions":PRINT"I will post one question a week. Post answers in comments to me when you hang up. I thank you.
6001 PRINT"Example":PRINT"26 of the A":PRINT"would be"PRINT"26 letters of the alphabet":PRINT"Now for this weeks equa.
The Ultimate in Mailing Packages
POSTMAN MASS MAILING SYSTEM

For the serious businessman who has as little as 100 name mailing list or 200,000 names, THERE IS ONLY ONE SYSTEM FOR YOU!

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 all 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 "swipe" sections of the data file in and out of the computer's memory. This is the foremost of all the list features because of its relative uniqueness among mail list handlers written for the TSS-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 huge mailing lists. Files need not be sectioned into smaller "byte" 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 the Postman. For example, a 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 POSTLETTER program, the user has an easy to use form letter generator which will merge a generalized letter production with a word processing system (e.g., LAYWRITER, etc.), with the name and address information from the POSTMAN MASS MAILER data base. POSTLETTER 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 by eliminating the need for a separate sort operation after entering a stack of new names. POSTMAN will allow the operator to add 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. The editor is capable of correcting many types of error that are 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 required on many addresses, the OVERLAY feature can make them with one keystroke. The needed changes which are common to many labels are entered into one label. When you wish to apply these common changes to any label, one command will do it.

SORT - Arrange your list in any alphanumeric 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.

SPECIAL STREET ADDRESS SORT - For the user with many addresses on the same street, POSTMAN will sort your entries by last house number after grouping those on the same street together. Local city lists can be 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 in the general "ballpark" of a label or sequence of labels.

LABEL PRINTING - One or a few or all addresses in your list can be printed on standard or nonstandard sized stock. Up to 5 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.

IMPORTING 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 use RAM needed to hold the program, allowing a greater number of labels to be kept in core, resulting in faster operation. Only 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 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 DIPREP program which allows the user to prepare a floppy disk for use with POSTMAN. This easy-to-use utility can be told to print any portion of the available space on a disk.

DATA INTEGRITY - A disk transfer's made using special write commands which inscribe 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 are given 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 a DOSPLUS Hard Disk Drive operating system, you will not destroy your entire data disk. We can't stop your machine from failing but we can protect your data.

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- Overview Available -

The POSTMAN system requires Mod I or Mod III, 48K. 2 disk drives minimum.

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- See List of Advertisers on Page 387

80 Micro, February 1983  •  157
At this time I added a routine that scans the MTS array, allowing users to quickly determine whether any board messages are specifically for them. I also added a user's log so anyone coming into the board could see who had used the bulletin board that day. This log can be reset by setting the value of UL to 0.

The latest version of my bulletin board has been up and running for several weeks now with absolutely no problems. The users are happier than ever with the board, and usage keeps on expanding.

The only negative comment I have had is that sometimes string input is slow. This occurs at times because I cleared only 2,400 bytes in line 0. While I could probably clear 400 more, I decided against it because it would leave no room for further modifications.

Some future enhancements that I anticipate are an expert's users mode, where all menus can be skipped, and a machine-language kill routine to quickly relocate messages and pointers.

The program has run smoothly and flawlessly, serving 933 users in slightly over two months. There have been a tremendous number of favorable comments, and even a number of "I see it running, but I still don't see how it can be done" statements.

Scott Steele, age 13, can be reached at 8738 Hillside Drive, Hickory Hills, IL 60457.
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Math Countdown

by Adam Wells
Third Place
10 and under

At my computer programming class, I was assigned to write a math program that would help little children learn basic ideas. Since I like astronomy, I decided to put a spaceship in the program.

Math Countdown will ask if you need directions. If you don't, the program goes right to the math. You can choose the operation you want: multiplication, division, addition, or subtraction. Then a spaceship appears at the bottom of the screen, with the number 10 to the left and a math problem above it. If you answer the problem correctly, the 10 will change to 9, and you will see another problem. If you get that one right, the 9 will change to an 8.

When you get all the way down to zero, the spaceship takes off. If you get a problem wrong, the program will say "Try again!" and repeat the problem.
To revise my program, you could add sound, or give a time limit for solution of each problem.

Table 1: Line Functions

<table>
<thead>
<tr>
<th>Lines</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Clears the screen</td>
</tr>
<tr>
<td>15</td>
<td>Clears 1000 bytes for string space</td>
</tr>
<tr>
<td>20</td>
<td>Makes double-sized letters</td>
</tr>
<tr>
<td>30-50</td>
<td>Makes the title page</td>
</tr>
<tr>
<td>60</td>
<td>Clears the screen</td>
</tr>
<tr>
<td>65</td>
<td>Makes double-sized letters</td>
</tr>
<tr>
<td>70</td>
<td>Asks if you need instructions</td>
</tr>
<tr>
<td>75</td>
<td>Clears the screen and makes double-sized letters</td>
</tr>
<tr>
<td>80-90</td>
<td>Figures out your answer</td>
</tr>
<tr>
<td>100</td>
<td>Tells you if you answered incorrectly</td>
</tr>
<tr>
<td>105</td>
<td>Clears the screen</td>
</tr>
<tr>
<td>110-210</td>
<td>Prints the instructions</td>
</tr>
<tr>
<td>220</td>
<td>Asks if you understand the instructions</td>
</tr>
<tr>
<td>230-240</td>
<td>Figures out your answer</td>
</tr>
<tr>
<td>250</td>
<td>Tells you if you answered incorrectly</td>
</tr>
<tr>
<td>255-256</td>
<td>Clears the screen and asks what operation (+, -, ×, ÷) you'd like to do</td>
</tr>
<tr>
<td>258</td>
<td>Tells you if you were wrong</td>
</tr>
<tr>
<td>260</td>
<td>Clears the screen</td>
</tr>
<tr>
<td>270-282</td>
<td>Makes the spaceship</td>
</tr>
<tr>
<td>285</td>
<td>Clears the screen</td>
</tr>
<tr>
<td>290</td>
<td>Prints the spaceship</td>
</tr>
<tr>
<td>300-305</td>
<td>Sets up the loop to give 10 problems and prints 10</td>
</tr>
<tr>
<td>310</td>
<td>Makes the addition problem</td>
</tr>
<tr>
<td>320</td>
<td>Prints the addition problem and figures out if your answer is correct</td>
</tr>
<tr>
<td>330</td>
<td>Tells you if you were wrong</td>
</tr>
<tr>
<td>340</td>
<td>Returns control</td>
</tr>
<tr>
<td>500</td>
<td>Clears the screen and makes the spaceship take off</td>
</tr>
<tr>
<td>505</td>
<td>Returns control</td>
</tr>
<tr>
<td>510</td>
<td>Clears the screen</td>
</tr>
<tr>
<td>520</td>
<td>Prints the ship</td>
</tr>
<tr>
<td>530-540</td>
<td>Prints 10</td>
</tr>
<tr>
<td>550</td>
<td>Makes the subtraction problem</td>
</tr>
<tr>
<td>560</td>
<td>Prints the subtraction problem and figures out if your answer is correct</td>
</tr>
<tr>
<td>570</td>
<td>Tells you if you are incorrect</td>
</tr>
<tr>
<td>580</td>
<td>Clears the screen</td>
</tr>
<tr>
<td>590</td>
<td>Prints the ship</td>
</tr>
<tr>
<td>600-610</td>
<td>Makes 10</td>
</tr>
<tr>
<td>620</td>
<td>Makes the multiplication problem</td>
</tr>
<tr>
<td>630</td>
<td>Prints the multiplication problem and figures out if you are correct</td>
</tr>
<tr>
<td>640</td>
<td>Tells you if you are incorrect</td>
</tr>
<tr>
<td>650</td>
<td>Makes the division problem</td>
</tr>
<tr>
<td>670</td>
<td>Prints the division problem and figures out if you are correct</td>
</tr>
<tr>
<td>680</td>
<td>Tells you if you are incorrect</td>
</tr>
<tr>
<td>690</td>
<td>Gets rid of the Ready prompt by creating an endless loop</td>
</tr>
</tbody>
</table>

The Key Box

Model I or III
16K, 32K RAM
Cassette or Disk Basic

Adam Wells, age 9, can be reached at 5229 S. Brentwood Drive, Las Vegas, NV 89120.
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★ Technical Superiority

At last! A double density controller for Model I with HIGHER PROBABILITY OF DATA RECOVERY THAN WITH ANY OTHER DOUBLE DENSITY CONTROLLER ON THE MARKET TODAY! The "DDC" from Aerocomp. No need to worry about the problems that keep cropping up on existing products. AEROCOMP'S new analog design phase lock loop data separator has a wider capture window than the digital types currently on the market. This allows high resolution data centering. The finest resolution available with digital circuitry is 125 ns (nano seconds). The "DDC" analog circuit allows infinitely variable tuning. Attack and settling times are optimum for 5 1/4 inch diskettes. The units presently on the market use a write precompensation circuit that is very "sloppy". Board to board tolerance is extremely wide - in the order of ±100 ns. The "DDC" is accurate to within ±20 ns. The bottom line is state of the art reliability!

★ Test Proven

Tests were conducted on AEROCOMP'S "DDC", Percom's "Doubler A" and "Doubler II" and LNW's "LNDoubler" using a Radio Shack TRS80 Model I, Level 2, 48 K with TRS80 Expansion Interface and a Percom TFD100 * disk drive (Siemens Model 62). Diskette was Memorex 3401. The test diskette chosen was a well used piece of media to determine performance under adverse conditions. The various double density adapters were installed sequentially in the expansion interface. The test consisted of formatting 40 tracks on the diskette and writing a 68B6 data pattern on all tracks. The 68B6 pattern was chosen because it is recommended as a "worst case" test by manufacturers of drives and diskettes. An attempt was then made to read each sector on the disk once - no retries. Operating system was Newdos/80, Version 1.0, with Double Zap, Version 2.0. Unreadable sectors were totalled and recorded. The test was run ten times with 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 data I/O errors, (3) single density compatibility and (4) simple plug-in installation. Compatible with all existing double density software.

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$139.95 for the BEST double density controller on the market.
$179.95 for "DDC" complete with DOSPLUS 3.3D
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The advances that make the "DDC" great are incorporated in the new AEROCOMP Single Density Data Separator ("SDS") 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:

<table>
<thead>
<tr>
<th>MFR &amp; PRODUCT</th>
<th>SECTORS LOCKED OUT</th>
</tr>
</thead>
<tbody>
<tr>
<td>PERCOM &quot;Doubler II&quot;</td>
<td>18</td>
</tr>
<tr>
<td>PERCOM &quot;Doubler A&quot;</td>
<td>250</td>
</tr>
<tr>
<td>LNW &quot;LNDoubler&quot;</td>
<td>202</td>
</tr>
</tbody>
</table>

Note: Same test procedures as "DDC".

★ "DDS" ...... $49.95 (use 1791 chip from your DD controller)
★ "DSD" with disk controller chip included ...... $79.95
★ Disk controller chip .... $34.95

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

Do you need a Single Density Data Separator?

The internal data separator in the WD1771 chip (RVS expansion interface) is NOT recommended by WD for reliable data transfer. Do you have any of these problems: Lost data, tracks locked out, CRC errors, disk retry? You need one!

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See opposite page
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★ 80-Track Dual-Head Drive ............................ $569.95

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COMBO D ............................................. $559.00
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COMBO E ............................................. $639.00
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COMBO F ............................................. $989.00
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COMBO G ............................................. $889.00
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COMBO H ............................................. $1289.00
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Order your AEROCOMP Disk Drive and use it with your system for up to 14 days. If you are not satisfied for ANY REASON (except misuse or improper handling), return it, packed in the original shipping container, for a full refund. (Hardware only. Special packages will be prorated). We have complete confidence in our products and we know you will be satisfied.

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\See List of Advertisers on Page 435

80 Micro, February 1983 • 165
States and Capitals

by Dennis Weide

Quick—what’s the capital of Ohio? If you guessed Cleveland, or Toledo, you’d better use this states program to refresh your memory.

My kids needed to learn the names of the states and their capitals, so I wrote this program to help them. It runs on the Color Computer and requires 32K of RAM and Extended Color Basic. For those of you with only 16K of RAM, I have included a short program that draws the map and leaves enough memory free for you to write your own program.

What Does It Do?
Start by entering PCLEAR 8. This clears all the graphics memory available. When you run the program a menu asks if you want to name the states or their capitals. After you enter your choice, the program draws a map of the continental United States on the screen. One state or one of the five Great Lakes is colored in and a dashed cursor ap-

<table>
<thead>
<tr>
<th>Line</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>STATES AND CAPITALS</td>
</tr>
<tr>
<td>20</td>
<td>BY DENNIS H. WEIDE</td>
</tr>
<tr>
<td>30</td>
<td>(C) 1982</td>
</tr>
<tr>
<td>60</td>
<td>CLS</td>
</tr>
<tr>
<td>70</td>
<td>PMODE4.5;PCLS:PMODE4.1;PCLS</td>
</tr>
<tr>
<td>80</td>
<td>PRINT:PRINTSTRINGS$(32,&quot;*&quot;</td>
</tr>
<tr>
<td>90</td>
<td>PRINTTAB(6)&quot;STATES AND CAPITALS&quot;</td>
</tr>
</tbody>
</table>
| 100  |PRINTTAB(14)"BY";PRINTTAB(9)"DENNIS WEIDE";PRINTTAB(11)"(C) 1982"
| 110  |PRINTSTRINGS$(32,"*") |
| 120  |PRINTTAB(6)"1. NAME THE STATES";PRINT |
| 130  |PRINTTAB(6)"2. NAME THE CAPITALS"
| 140  |H$="CORRECT";J$="WRONG"
| 150  |DIMA(1):DIMB(1) |
| 160  |DIM$(53):DIM$(53) |
| 170  |DIM$(53):DIMC(53) |
| 180  |DIMC(1):DIMD(1) |
| 190  |DIMD(1):DIMF(1) |
| 200  |DIMG(1):DIMH(1) |
| 210  |DIMI(1):DIMJ(1) |
| 220  |DIMK(1):DIML(1) |
| 230  |DIMM(1):DIMN(1) |
| 240  |DIMO(1):DIMP(1) |
| 250  |DIMQ(1):DIMR(1) |
| 260  |DIMS(1):DIMT(1) |
| 270  |DIMU(1):DIMV(1) |
| 280  |DIMW(1):DIMX(1) |
| 290  |DIMY(1):DIMZ(1) |
| 300  |DIMZ(1):DIMAA(1) |
| 310  |DIMSC(33) |
| 320  |FORY=1TO53:READ$(Y),S1(Y),S2(Y) |
| 330  |NEXTY |

Listing 1 continues
NAME THE STATES

TEACH YOUR CHILDREN

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ALPHA—Alphabet recognition for pre-schoolers.
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SIGMA-EX—Addition problems for the younger or slower learner.

Learning to Count Money—A three program system that teaches how to count money.

Available on cassette only for TRS-80 Models I and III. $6.95 each, two for $12.00, four for $21.00. Learning to Count Money $19.95.

Add $1.00 to total order for first class shipment.
Lines 3120–3780 each use a full statement to draw the map rather than a series of For...Next loops. This method draws the map faster since the program does not have to read data for the loops.

**Table 1. Line Description**

<table>
<thead>
<tr>
<th>Line Numbers</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>10–50</td>
<td>Program header</td>
</tr>
<tr>
<td>60–130</td>
<td>Display program menu</td>
</tr>
<tr>
<td>140</td>
<td>Define answer string (H5,JS)</td>
</tr>
<tr>
<td>150–310</td>
<td>Dimension all arrays</td>
</tr>
<tr>
<td>320–340</td>
<td>Read data statements</td>
</tr>
<tr>
<td>350–660</td>
<td>Draw and save high-resolution graphics letters</td>
</tr>
<tr>
<td>670–710</td>
<td>Select game (states or capitals)</td>
</tr>
<tr>
<td>720</td>
<td>Display hi-res screen</td>
</tr>
<tr>
<td>750–1060</td>
<td>Display letter pressed on hi-res screen</td>
</tr>
<tr>
<td>1090–3780</td>
<td>Draw map of U.S.A.</td>
</tr>
<tr>
<td>3970</td>
<td>Clear keyboard buffer</td>
</tr>
<tr>
<td>3800–3890</td>
<td>Choose state and screen, draw cursor</td>
</tr>
<tr>
<td>3900</td>
<td>Scan keyboard buffer for key pressed</td>
</tr>
<tr>
<td>4130–4210</td>
<td>Data (name of states)</td>
</tr>
<tr>
<td>4220</td>
<td>Additional Paint command for Michigan</td>
</tr>
<tr>
<td>4230–4330</td>
<td>End of round—try again?</td>
</tr>
<tr>
<td>4410–4450</td>
<td>Data (name of capitals)</td>
</tr>
<tr>
<td>4500–4580</td>
<td>Convert INKEY$ to string for display</td>
</tr>
<tr>
<td>4700–4720</td>
<td>Sound routines for right or wrong answer</td>
</tr>
</tbody>
</table>

**Fast Efficient Machine Language**

**Computer Action Games**

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**Haywire**

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<thead>
<tr>
<th>Product</th>
<th>Discount Price</th>
<th>Price</th>
<th>Contact Information</th>
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<tr>
<td>TRS-80 Color Computer</td>
<td></td>
<td>$588</td>
<td>CALL 26-3004</td>
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<tr>
<td>TRS-80 Model III Computer</td>
<td></td>
<td>$4098</td>
<td>CALL 26-6001</td>
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<tr>
<td>TRS-80 Model 16 Computer</td>
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<tr>
<td>Franklin ACE 1000 Computer</td>
<td></td>
<td>$559</td>
<td>CALL 26-4002</td>
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<tr>
<td>Smith Corona TP-I Daisy Wheel Printer</td>
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<tr>
<td>TRS-80 Model II Computer</td>
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<tr>
<td>TRS-80 I/III Hard Drives</td>
<td></td>
<td>$1988</td>
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<td>Commodore Texas Instrument Call for Prices</td>
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<tr>
<td>Micro Management Systems Inc.</td>
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<tr>
<td>ATARI Home Computers</td>
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<td>$629</td>
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<td>TRS-80 Printers MFG by Radio Shack</td>
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<td>Okidata Epson</td>
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<tr>
<td>Please write us for free</td>
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<tr>
<td>Copy of our customer discount price list upon request</td>
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<td></td>
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<tr>
<td>Copy of manufacturer's warranty upon request</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>80 Micro, February 1983 • 169</td>
<td></td>
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<td></td>
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</tbody>
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- AMDEK COLOR $359 RGB $739
- TECO B&W $99 GREEN $129
- TECO COLOR RGB $429
- NEW-BMC COLOR RGB $275

TEAC 1/2 SIZE DRIVES

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<tr>
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<th>Bare</th>
<th>Compl</th>
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<tbody>
<tr>
<td>40 TRK S/S</td>
<td>$209</td>
<td>$245</td>
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<tr>
<td>40 TRK D/S</td>
<td>$290</td>
<td>$329</td>
</tr>
<tr>
<td>80 TRK S/S</td>
<td>$290</td>
<td>$329</td>
</tr>
<tr>
<td>80 TRK D/S</td>
<td>$350</td>
<td>$375</td>
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TANDON DRIVES

<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>100-1 40 TRK S/S</td>
<td>$199</td>
<td>$235</td>
</tr>
<tr>
<td>100-2 40 TRK D/S</td>
<td>$280</td>
<td>$319</td>
</tr>
<tr>
<td>100-3 80 TRK S/S</td>
<td>$280</td>
<td>$319</td>
</tr>
<tr>
<td>100-4 80 TRK D/S</td>
<td>$340</td>
<td>$375</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>PROWRITER 8510</th>
<th>PAR</th>
<th>SER</th>
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<tbody>
<tr>
<td>$459</td>
<td>$559</td>
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<tr>
<td>PROWRITER 1550</td>
<td>$669</td>
<td>$749</td>
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<tr>
<td>F-10 40 CPS</td>
<td>$1.365</td>
<td>$1.365</td>
</tr>
<tr>
<td>F-10 55 CPS</td>
<td>$1.615</td>
<td>$1.615</td>
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<tr>
<td>F-10 TRACTOR FEED</td>
<td>$195</td>
<td></td>
</tr>
<tr>
<td>NEW QUME Sprint 11</td>
<td>$1.450</td>
<td></td>
</tr>
</tbody>
</table>

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- SIGNALMAN $85
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3180 LINE-(181,71),PSET
3190 LINE-(187,72),PSET
3200 LINE-(193,77),PSET
3210 LINE(163,81)-(168,78),PSET
3220 LINE(136,31)-(140,30),PSET
3230 LINE-(144,34),PSET
3240 LINE-(146,34),PSET
3250 LINE-(148,48),PSET
3260 LINE-(151,38),PSET
3270 LINE-(149,44),PSET
3280 LINE-(148,51),PSET
3290 LINE(142,31)-(158,27),PSET
3300 LINE-(149,38),PSET
3310 LINE-(152,31),PSET
3320 LINE-(156,29),PSET
3330 LINE-(159,33),PSET
3340 LINE-(155,34),PSET
3350 LINE-(158,35),PSET
3360 LINE-(149,39),PSET
3370 LINE-(159,33)-(155,37),PSET
3380 LINE-(153,43),PSET
3390 LINE-(153,47),PSET
3400 LINE-(158,53),PSET
3410 LINE(157,35)-(161,37),PSET
3420 DRAW"07X2/3"
3430 LINE-(165,42),PSET
3440 LINE-(166,47),PSET
3450 LINE(158,54)-(169,54),PSET
3460 LINE-(176,58),PSET
3470 LINE-(176,47),PSET
3480 LINE-(133,44),PSET
3490 LINE-(184,42),PSET
3500 LINE(172,52)-(172,68),PSET
3510 LINE(191,68),PSET
3520 LINE-(194,69),PSET
3530 LINE-(194,72),PSET
3540 DRAW"BM189,68;D3R6" 3550 LINE(172,64)-(159,67),PSET
3560 LINE(164,70),PSET
3570 DRAW"BM175,68;D4R5" 3580 DRAW"BM175,51;D4R13" 3590 LINE-(193,58),PSET
3600 DRAW"K4U9R2(U)"
3610 LINE(192,58)-(191,63),PSET
3620 LINE-(193,64),PSET
3630 LINE-(191,68),PSET
3640 LINE(197,51)-(209,51),PSET
3650 LINE-(210,54),PSET
3660 LINE(205,51)-(205,57),PSET
3670 LINE(199,46)-(207,47),PSET
3680 LINE(210,44),PSET
3690 LINE(204,36)-(205,39),PSET
3700 LINE-(203,43),PSET
3710 LINE-(203,47),PSET
3720 LINE(209,32)-(208,35),PSET
3730 LINE-(209,43),PSET
3740 LINE-(210,43),PSET
3750 LINE(202,68)-(209,58),PSET
3760 LINE-(210,60),PSET
3770 LINE-(206,61),PSET
3780 LINE-(202,60),PSET
3790 POKE135,0
3800 IFNP=53 THEN4230
3810 IFPS=2ANDNP>48 THEN4230
3820 X=RND(53):IFIC(X)=1 THEN3820
3830 IFPS=2ANDNP>48 THEN3820
3840 IFX=35 THENGOSUB4220
3850 IC(X)--1:PAINT(S1(X),S2(X)),0,0
3860 IFV=3 THENV=1 ELSEV=0
3870 SCREEN1,1
3880 A1=8:A2=152:A3=12:A4=160
3890 PUT(A1+8,A2)-(A3+8,A4),AA,PSET
3900 WW=RND(9999):A5=INKEY$:IFAA="***" THEN3900
3910 IF A5="CHB" THEN3900
3920 GOSUB750
3930 GOTO3890
3940 TF=TF+1:PUT(A1+8,A2)-(A3+8,A4),2Z,PSET:IFGS=2 THEN4590
```

Listing 1 continues
THE SOFT SOLUTION

USE YOUR TRS-80 WHILE IT PRINTS!

Don’t Spend Hundreds For A Buffer Box, Get The Soft Solution:

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210 Fifth Ave.
N.Y., N.Y.
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80 Micro, February 1983 • 173
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TAX PLANNING PERSONAL FINANCE BUSINESS ACCOUNTING for the
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TAX/BUDGET PLANNER—a valuable tool for personal budgeting and tax planning. The program calculates personal cash flow including federal income taxes. It can be used for such things as determining the timing for capital gains/losses, amounts of income tax withholdings and more. Using the keyboard, the user fills in six spreadsheets displayed by the computer. The user can go back and change any amounts on the spreadsheets. The program includes the relevant parts of the 1986 Economic Recovery and 1982 Fiscal Responsibility Acts, plus automatic calculation of:
1. tax liability per the tables or schedules.
2. tax liability per the averaging method (uses lower of 1 or 2).
3. capital loss and charity contribution carryforwards.
4. new minimum tax and self-employment tax.

BUSINESS BOOKKEEPER—General journal, general ledger accounting system. Accounts are created by keying in the journal entries. Features automatic posting to the ledger, automatic report generation includes (1) Balance Sheet, (2) Income & Expense, (3) General Journal and (4) Chart of Accounts.

MONEY MANAGER—Personal bookkeeping system that allows the user to track and report on his income and expenses plus checking account, savings account and credit card balances. Separate reports for business and personal income and expenses.

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BUSINESS BOOKKEEPER/MONEY MANAGER $49
(Department TB PLANNER/MONEY MANAGER) $7

Capital Software
1627 Peach Ct. E., Seattle, WA 98112

Program Listing 2. 16K Version

Listing 1 continued

10 ' USA MAP
20 ' BY DENNIS H. WEIDE
40 ' (C) 1982
60 ' 70 C:PRINT:PRINT:INPUT*:STATES 2, CAPITALS*:GS
80 CPYMOD:4:1:PCSL5:SCREEN:1:COLOR:0:1
90 LINE(8,8)-(255,191),PSET,B
100 LINE(135,142)-(135,192),PSET
110 LINE(9,142)-(255,192),PSET
120 LINE(8,8)-(255,166),PSET
130 LINE(34,4)-(42,16),PSET:DRAW"EM34,16";U:28B8D128BRU128BN48B8";
140 IFS=PGBN2=0
150 DRAW"BB8"
160 DRAW"BR1284ND1284R64D12484R8B4R84B8B4";
170 IFS=PGBN2=0
180 DRAW"BB8"
190 DRAW"BB8":U=128B128DD128BD128B4R4D128BD128BD128BD128BD128BD;
200 IFS=PGBN2=0
210 DRAW"BR12884D12884R64D12884R8B4R84B8B4";
220 LINE(36,20)-(36,22),PSET
230 DATA:32,22,36,34,36,41,33,47,32,64,35,75
240 GOUBR128";
250 DRAW"R2D2L2";
260 DATA:41,89,45,90,54,101,54,103,64,103,71,17,87,187
270 GOUBR128";
280 DRAW"R2D2L2";
290 DATA:29,97,112,97,115,103,117,104,115,109,116,116,125,124,128,
124,122,126,118,129,122,130,115,135,119,114,117,118
300 DATA:145,113,156,112,168,114,163,112,126,118,167,121,171,127,
171,139,171,178,129,178,129,177,116,117,126,175,138,138,175,
175,98,191,85,189,75,193,77,194,75,194,72,197,72,200,65,198,64,1
99,61,179,59,207,56,212,53
310 GOUBR128";
320 DRAW"U2R2D2D1";
330 LINE-(215,51),PSET
340 DRAW"U2L2U1L2U6";
350 DATA:229,229,41,35,218,34,218,26,215,27,218,25,207,35,204,
32,136,181,49,178,43,174,47
360 GOUBR128";
370 DRAW"R2D2L2";
380 DATA:216,54,168,43,2,169,34,159,32,4,147,22,142,25,126,26,3,
6,28,36,34,39,35
390 GOUBR128";
400 DRAW"U3R2D2R2U2";
410 GOUBR128";
420 DRAW"U7L2U2";
430 GOUBR128:GOSU1B100
440 DRAW"D2";
450 DATA:48,36,57,36,57,20,57,44,3,55,46,58,47,58,53
460 GOUBR128:GOSU1B100:GOSU1B200
470 DATA:32,54,75,54,49,54,49,72,4,65,87,67,98,64,93,64,103
480 GOUBR128:GOSU1B100
490 DATA:54,68,68,68,68,68,68,68,68,68,68,68,68,68,68,68,68,68,6
8,84,107,68,68,68,127,91,185,68,185,182,61,182,184
500 GOUBR128";
510 DRAW"L3D3";
520 DRAW"BM62,20:DBR2D6";
530 GOUBR128";
540 DRAW"R7U2D2D1ER2U140";
550 GOUBR128
560 DATA:129,124,102,84,112,84,112,93,119,96,131,96,133,
115,119,28,119,26
570 GOUBR128:GOSU1B100:GOSUB1B200
580 DRAW"BM127,81:D2R2D14";

Listing 2 continues
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**NEVINS MICROSYSTEMS INC.**
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10010
Most microprocessors don’t generate truly random numbers, and the Color Computer is no exception. At first, the program would always select the states in the same order. I found a very simple solution—human delay. I added the statement \( WW = \text{RND}(9999) \) to lines 690 and 3900. Each time the program scans the keyboard buffer for a key pressed, it must first generate a random number. If no key is pressed, then the line statement repeats. Since it is almost impossible for a person to respond with microsecond accuracy, the program executes these lines a different number of times on each pass.

**Hints**

The program must convert the keys pressed into graphics characters to be displayed on the hi-res screen. Therefore, use a moderate typing speed. If you make an error, just backspace to the incorrect character using the left arrow and retype from there.

The program will only recognize the letters A-Z, space bar, left arrow (for backspacing), break, enter, and period. You must spell out names of the states completely (use North Carolina, not N. Carolina). Abbreviate Saint (use St. not Saint).

**A 16K Version**

The short program in Listing 2 (and Table 2) allows you to choose the game you wish to play and then draws the map for you. By using a lower graphics mode, you can save a lot of memory. (Table 3 shows the modes and how much memory each uses.) By leaving out the sound and graphics text, you should be able to write a workable program using this map. The map will be drawn much slower because the program must read data statements for each line statement, but you can probably live with that.

Dennis Weide can be reached at 14201 Marquette NE, Albuquerque, NM 87123.

<table>
<thead>
<tr>
<th>Command</th>
<th>PMODE</th>
<th>Free Memory</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCLEAR1</td>
<td>0,1</td>
<td>9067</td>
</tr>
<tr>
<td>PCLEAR2</td>
<td>2,1</td>
<td>7531</td>
</tr>
<tr>
<td>PCLEAR4</td>
<td>4,1</td>
<td>4459</td>
</tr>
</tbody>
</table>

Note: PMODE 4,1 works best. PMODE 2,1 is very good and PMODE 0,1 is acceptable.

<table>
<thead>
<tr>
<th>Line Numbers</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>70</td>
<td>Chooses whether you name states or capitals</td>
</tr>
<tr>
<td>80</td>
<td>Selects hi-res graphics mode</td>
</tr>
<tr>
<td>90-130</td>
<td>Draws screen border and boxes</td>
</tr>
<tr>
<td>140</td>
<td>Selects screen title</td>
</tr>
<tr>
<td>150-200</td>
<td>Completes title on screen</td>
</tr>
<tr>
<td>230-1000</td>
<td>Draws map of U.S.A.</td>
</tr>
<tr>
<td>1010</td>
<td>Keeps map on screen-delete when using map in program</td>
</tr>
<tr>
<td>1020-1040</td>
<td>Subroutine for LINE(x,y) (multiple statements)</td>
</tr>
<tr>
<td>1050</td>
<td>Subroutine for LINE(x,y) (single statements)</td>
</tr>
<tr>
<td>1060-1080</td>
<td>Subroutine for LINE(a,b)-(c,d) (multiple statements)</td>
</tr>
<tr>
<td>1090</td>
<td>Subroutine for LINE(a,b)-(c,d) (single statements)</td>
</tr>
</tbody>
</table>

**Table 3. PMODEs**

**Table 2. Map Line Description**
THE COLORQUEST EXPERIENCE
For the TRS-80C and the TDP System 100 Color Computers

BEYOND THE CIMEEON MOON A real-time science fiction adventure game of mind-blowing magnitude — staged in deep space on a malign, sentient spacecraft. Written in fast machine code with 3-dimensional high-res graphics and sound. Choose from a myriad of fates. Survive the laser barrage set up by a guantlet of robots bent towards your destruction.

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THE NIBBLER & MS. NIBBLER A fast maze chase game featuring the nibbler man and three bumbling predators. Written in machine code and joystick compatible, this fun-packed game is enjoyed by all. MS. NIBBLER is similar to THE NIBBLER described above but features a different maze and MS. NIBBLER for the ladies.

COMBAT GAMEPACK 3 action-packed games featuring lifelike graphics and sound. EXTENDED BASIC required. 2-1-0 TANK COMBAT pits two players against each other in 5 different terrains. STELLAR BATTLE lets you pilot a flaming fighter through deep space fighting dorian squadrons. GALACTIC BLOCKADE is a favorite two-player arcade game of speed and skill.

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Spelling Challenger

by Larry Krengel

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You’d think that a spelling test would be easy to prepare for. After all, the student only has to memorize a list and repeat it on command.

But it isn’t as easy as it sounds. So when the teacher assigned my daughters 20 words a week for the entire school year, I wrote a program to make studying more enticing—enticing enough, I hoped, to beget good grades.

Spelling Challenger is actually three programs. The first scrambles a series of words and then presents them randomly. The child can either play it on the screen or from a printout.

The second, called Three Strikes, presents a word in which the letters have been replaced by asterisks. The task is to guess the letters. Three wrong guesses and you’re out.

The third is a synonym quiz. You enter a list of synonyms along with the original spelling list. The child’s job is to match the properly spelled word with its synonym.

I developed Spelling Challenger to take advantage of the Exatron StingrysFloppy’s @FREEZE option. Later, I added the option of storing data on tape. You can use the original (and shorter) ESF version by deleting lines 665, 667, 735, 737, and 7000-8080. If you’re using a Model I with disks, add 10 CMD“T”.

Larry Krengel can be reached at P.O. Box 94, Elmhurst, IL 60126.

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TBS-80 is a trademark of the Tandy Corporation.

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Area Code: 305/429-2209

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Listing continued

4030 PRINTTAB(20)"*** 1 - 2 - 3 STRIKES ***
4040 S=I(88-L);FOR Y=STO(S+Z+L)-1STEP2:PRINT@Y,"";NEXT
4050 PRINT@602;L;"letters"
4060 PRINT@16;"make a guess - ";A;735
4070 G=S;"G=INEKES;IF G=I("GOTO4070"
4080 PRINT@C,G;S,T=0
4090 PRINT@Y;L;"IFGS=MIDS(TS,Y,1)LPRINT@S+Z*Y-L-1;G;ST=1;C=1;T"
4100 NEXT
4110 IF T=0:GC=GC+1:PRINT@923,"STRIKE";GC
4120 IFGC=3:PRINT@832,;"YOU LOSE!!! The word was ";WS(X):GOTO4150
4130 IPC=Y+1:PRINT@832,"YOU WIN!!!";GOTO4040
4140 A=;A+2;PRINT@A-1," ";GOTO4040
4150 PRINT"do you wish another word?"
4160 IF A=0:AS=AS+INEKES
4170 IF AS="Y")OR AS="Y"
4180 IF AS="t"OR AS="N"
4190 GOTO4160
5000 REM ### scramble ###
5010 CLS
5020 PRINT"do you wish the scrambled words on a printer?"
5030 A="";AS=AS+INEKES
5040 IF AS="Y")OR AS="Y"LD=1;GOTO5060
5050 IF AS="t")OR AS="N")LD=0;GOTO5060
5060 GOTO5060
5070 IFLD=1:PRINT@Enter when the printer is ready,;WS:LPRI
5080 TAB((4))** SCRAMBLED SPELLING WORDS **CHR$(18)
5090 CLS:FOR X=10:CH=C(X)=0:NEXT:C(S)=1
5090 FORNS=1;TON
5100 RANDOM;X=RND(N);IFX=1GOTO5100
5110 C(X)=1
5120 L=LENGTHWS(X));WS=""
5130 FOR Y=1LOWHC(Y)=0:NEXT
5140 Y=RND(L);IFWPCH(Y)=1GOTO5140
5150 WC(Y)=1
5160 SW=SW+MIDSWS(X),Y,1
5170 IFLEN(WS)=LENWS(X):GOTO5140
5180 IF LPRINTTAB;15)WSWS;TAB(3)STRINGS(15," ");CHR$(10):GO
5190 CE=1:PRINTTAB(20)"SCRAMBLE";PRINTTAB(15):"enter 'G' if y
5200 IF A="G")OR AS="G"):CLS:FORX=10:PRINT@725,WS(X):PRINT@7
5210 STRINGS(20," "")FORX=10:NEXT:NEXT:PRINT@725,WS(X):GOTO527
5220 IFAS="";PRINTSWS(X):T=T+1
5230 IFAS="g";GOTO5220
5240 IFAS="WS(X):PRINT"good job!!!";GOTO527
5250 GOTO5280
5260 PRINT"Want to try another?"
5270 IF A="";AS=AS+INEKES
5280 IF AS="Y")OR AS="Y";GOTO5280
5290 IF AS="t")OR AS="N")GOTO5280
5300 CLS:GOTO5280
5310 NEXTNS
5330 CLS:INPUT"you have completed the entire list of words...";W
5340 WS:GOTO6000
6000 REM ### @FREEZE ###
6000 CLS
6020 INPUT"Has the @FREEZE program been loaded?";A$;
6030 IF LEFT$(A$,,1)="Y")AND LEFT$(A$,,1)="Y")GOTO6000
6040 INPUT"enter file number when wafer is ready...";F
6050 @FREEZE
6060 GOTO6000
6050 PRINT"an error has been encountered - has @FREEZE really be
6060 RUN "INPUTS:GOTO6000"
7000 REM ### SAVE ON TAPE ###
7010 CLS:WS=""
7020 INPUT"ENTER WHEN TAPE IS READY (E=Erase)";WS
7030 IFWS="E";GOTO6000
7040 FORX=1TO25
7050 PRINT#:1;WS(X),SS(X)
7060 IFWS(X+1)="PRINT#1,";"XX,";XX";GOTO6000
7070 NEXT
7080 GOTO6000
8000 REM ### READ FROM TAPE ###
8010 CLS:WS=""
8020 INPUT"ENTER WHEN TAPE IS READY (E=Erase)";WS
8030 IFWS="E";GOTO6000
8040 FORX=1TO25
8050 INPUT#:1;WS(X),SS(X)
8060 IFWS(X)="XX"WS(X)="";SS(X)="";GOTO6000
8070 NEXT
8080 GOTO6000
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Math Fun

by David Haan

Your children will have so much fun playing with your micro that they won't even notice they're learning addition and subtraction.

My 5-year old is very interested in simple arithmetic, and even more interested in my TRS-80. It seemed only reasonable to satisfy both his interests by letting him learn arithmetic on the computer.

The Basic and Assembly programs in Listings 1 and 2 form an exercise drill my son can use on his own (after I load it). The Basic program generates the random problems, sets limits of difficulty, checks answers, and keeps score. The Assembly-language program displays problems in large block letters, produces graphics displays, and plays sound routines.

Although I wrote these programs to run on a Model III disk system with 48K RAM, I've included a version that runs on a 16K Model III tape system.

**The Assembly-Language Program**

The Assembly-language routine is made up of five USR functions and a data base.

The first USR function, USR0, fills a 400H-byte local buffer with blanks. USR2 will use this blank area later to clear the screen.

USR1 puts the messages LEVEL= and $+ - \times /= on the screen in block letters. Two portions of the data base, starting at the labels LVLSTR and OPRSTR, move to the CRT memory to produce these letters. The LEVEL= message asks for the difficulty of the problems, and the $+ - \times /= message asks for the type of math operation.

USR2 is executed in response to a correct or incorrect answer. When the student enters the correct answer to a problem, this USR saves the contents of the CRT memory (after the Basic program generates a random graphics pattern). Then the routine moves the blank area produced by USR0 to the CRT memory. This clears out the screen. After a short delay, the random pattern is put back into the CRT memory. This process of flashing the random pattern on the screen is repeated eight times, followed by a musical tune. The musical tune indicating a correct answer is part of the data base starting at SNDBFW.

If the answer to the problem is incorrect, the routine plays a tune starting at

---

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Photo 1
Users vote no to the same
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The storage location WINL0S is used to tell USR2 whether the screen is to be flushed, and which tune is to be played. If the student’s answer is correct, 1 is POKEd from Basic into the location WINL0S. If the answer is wrong, a 0 is POKEd into this location. USR2 tests this flag to determine which routine it should execute.

The next USR function is USR3. When 10 problems have been answered either correctly or incorrectly, USR3 puts the word RIGHT in block letters on the bottom of the screen. Basic then calls USR4 to display the number of correctly answered problems (see photo).

USR4 is the routine used most often. Its function is to display in block letters the numbers 0-9 and the symbols for addition, subtraction, multiplication, division, an equal sign, a question mark, and a blank at the correct locations on the CRT.

This routine uses two storage locations into which the Basic program POKEs data. The first of these two locations is PNTLOC, where Basic POKEs an index into a table called LOCTBL. LOCTBL contains addresses of different locations on the CRT. The second storage location, NUMBER, is where the Basic program stores a number used by USR4 as an index into a table called NUMTBL. Each 16-bit entry in NUMTBL points to the data-base address where the character to be displayed starts. Using these two locations, the desired character is put into the correct area of the CRT memory. The photo shows a problem displayed using USR4.

**The Basic Program**

The Basic program that calls each of these USR functions is shown in Listing 1. Lines 140–220 perform initialization and setup. This portion defines the addresses of the entry points of each USR, loads the Assembly program, and defines the addresses of PNTLOC, NUMBER, and WINL0S. This portion also initializes the 400H-byte buffer of blanks via USR0. The variable LO defines the address of PNTLOC, VA defines the address of NUMBER, and WI defines the address of WINL0S.

---

“To hear the sound, I recommend the audio amplifier sold by Radio Shack.”

In lines 280–410, the LEVEL = and + − × /= questions are displayed by calling USR1. Then a subroutine at line 1870, via USR4, flashes a question mark behind each question. You can answer either question first. The LEVEL = question accepts a difficulty factor from one to four. The shift key is not required to indicate the math operation required, since the program checks for the unshifted value of the key, where necessary.

To put a question mark (or for that matter, any valid character) in the correct screen position, the index corresponding to the character to be displayed is POKEd into NUMBER via POKE VA,15 (15 is the index for the character ?—see NUMTBL in Listing 2). To specify the CRT location where this character is to be displayed, an index value is POKEd into location PNTLOC via a POKE LO,0. An index of 0 indicates the CRT display location behind the question LEVEL = (see LOCtbl in Listing 2). The messages LEVEL =, + − × /=, and RIGHT are coded to be displayed at specific locations.

The third part of the Basic program, lines 470–810, uses the difficulty level and the type of math function desired to generate and display a random problem. Once the elements of the problem have been determined based on the difficulty desired (lines 470–680), the problem is displayed (lines 690–810).

The fourth part of the program looks for and checks answers (lines 870–1150). Since I used the INKEY$ function, you need not press the enter key. Simply type in the number or character desired. Each digit of the answer is checked as it is entered. If it is incorrect, the error subroutine at line 1650 POKEs a 0 into WINL0S and USR2 is called to play a tune indicating an error. The student is then given another chance on the same problem. If he enters three wrong answers, lines 1740–1810 display the correct value. The program generates a new problem if this was not the tenth problem.

The fifth part of the Basic code generates the random graphics pattern and musical tune if the answer is correct (lines 1210–1400). Once the graphics pattern is finished, a value of 1 is POKEd into location WINL0S and USR2 is executed to generate the musical tune.

The sixth and last part (lines 1460–1590) tests to see if 10 problems have been answered. If so, the word RIGHT is displayed on the bottom of the CRT (see photo), and the number of problems answered correctly on the first try is flashed on the screen. Then, the whole process starts over at line 280, allowing a new level of difficulty or a different math function.

**Tape-System Modifications**

In the Basic program, replace lines 10–210 of Listing 1 with lines 10–210 of Listing 3. Depending on the size of your computer memory, you will have to assemble the Assembly program at a different origin address to stay within the confines of your RAM. Also, remember to redefine the locations in lines 180–210 of Listing 3 appropriately.
The only other change you need to make to the Basic program is in the USR calls. Since a tape system has only one USR function, all the USR calls have to go to the same address. To ensure the correct USR function is executed, I added a new assembly location, as defined by variable RO in line 180 of Listing 3. Each USR call in Listing 1 has to be changed to use this location as follows:

When a USR call in Listing 1 says X = USRz(A), replace it with POKE RO,2;X = USR(A), where z is the USR number used in the disk version of Listing 1. For example, you’d rewrite X = USR4(A) as POKE RO,4;X = USR(A).

As far as the Assembly program is concerned, the code in Listing 4 must replace lines 10–60 of the code in Listing 2. Location ROUTIN is where the POKE RO,z will place the number of the USR you wish to execute. Again, make sure your Basic program has defined the variables in lines 180–210 correctly. (Your Basic manual will tell you how under the section discussing the POKE.)

Program Execution
To run the programs, set memory size as determined by where you placed the Assembly code. If you have a disk system, just run the Basic program. If you are using a tape system, load the object code of the Assembly program, then the Basic program, and run. To hear the sound, I recommend the audio amplifier sold by Radio Shack. Plug the cassette port output jack into the amplifier input.

Changing Your Tune
Table 1 lists the parameters needed to generate the music. You can change the tune played by putting the hex value for the notes you want in the least-significant byte of a word. The note duration is in the most-significant byte of the same word. You calculate the duration by taking the frequency of the note in Hz and dividing that by the length in seconds of the duration desired. If you want to play an A above middle C for ½ second, divide its frequency (440 Hz) by 4, and place the resulting value in the high-order byte.

To see how this is done, look at the first three notes (G, E, middle C) shown in lines 5980–6030 of Listing 2. The hex value for G (A6) is placed in the low-order byte of the first word in line 5980. The hex value for E (C6) is placed in the low-order byte of the third word in line 6000. Finally the hex value of C (FE) is placed in the low-order byte of the fifth word in line 6020. The duration of each note is placed in the high-order bytes in lines 5980, 6000 and 6020. The data in lines 5990, 6010, and 6030 are short delays to separate the notes.

Well, that’s it. Try the program, and make whatever changes you want to the limits of difficulty or the tune the program plays.

David Haan can be reached at 4361 S. Estes St., Littleton, CO 80123.
740 POKE VA,11:GOTO 770
750 POKE VA,12:GOTO 770
760 POKE VA,13
770 X=USR4(A)
790 N4=R2-10*N3
800 POKE LO,6:POKE VA,N4:X=USR4(A)
810 POKE LO,7:POKE VA,14:X=USR4(A)
820 REM
830 REM
840 REM
850 REM
860 REM
870 POKE LO,8
880 GOSUB 1870
890 VH=VAL(A$)
900 IF V<10 GOTO 930
910 IF V<1 GOTO 850
920 GOTO 100
930 IF VH=V POKE VA,VH:X=USR4(A):GOTO 1210 ELSE GOSUB 1650
940 IF TR=3 GOTO 1748 ELSE GOTO 950
950 IF VH=INT(V/10) GOTO 970 ELSE GOSUB 1650
960 IF TR=3 GOTO 1748 ELSE GOTO 780
970 POKE VA,VH:X=USR4(A)
980 POKE LO,9:GOSUB 1870
990 VT=VAL(A$)
1000 IF VT=V-10*INT(V/10) GOTO 1020 ELSE GOSUB 1650
1010 IF TR=3 THEN GOTO 1748 ELSE GOTO 900
1020 POKE VA,VT:X=USR4(A):GOTO 1210
1030 IF VH=INT(V/100) GOTO 1050 ELSE GOSUB 1650
1040 IF TR=3 GOTO 1748 ELSE GOSUB 800
1050 POKE VA,VT:X=USR4(A)
1060 POKE LO,9:GOSUB 1870
1070 VT=VAL(A$)
1080 V1=V-10*INT(V/100):IF VT=INT(V/10) GOTO 1100 ELSE GOSUB 1 650
1090 IF TR=3 GOTO 1748 ELSE GOTO 1650
1100 POKE VA,VT:X=USR4(A)
1110 POKE LO,18:GOSUB 1870
1120 V0=VAL(A$)
1130 V1=V-10*INT(V/100):V0=V1-10*INT(V/10):IF V0=V2 GOTO 1150 ELSE GOSUB 1650
1140 IF TR=3 GOTO 1748 ELSE GOTO 1110
1150 POKE VA,VO:X=USR4(A):GOTO 1210
1160 REM
1170 REM
1180 REM
1190 REM
1200 REM
1210 IF TR=0 THEN NR=NR+1:NT=NT+1
1220 FOR I=1 TO 200: NEXT I
1230 CLS:PRINT CHR$(21)
1240 PRINT 8991,CHR$(255)
1250 FOR I=1 TO 6
1260 FOR X=1 TO 40
1270 NEXT X
1280 PRINT
1290 NEXT I
1300 PRINT CHR$(21)
1310 CLS:H=0:V=0
1320 FOR P=1 TO 7
1330 H=H+5:V=V+2
1340 FOR I=1 TO 10
1350 X=X+RND(H):XR=X+RND(V):Y=Y+RND(V):ZR=Y+V+23
1360 SET(X,Y):SET(Q+64,Z+23):SET(X,Z+23):SET(Q+64,Y)
1370 NEXT I
1380 NEXT P
1390 POKE W,1
1400 X=USR2(A)
1410 REM
1420 REM
1430 REM
1440 REM
1450 REM
1460 IF NT=10 THEN X=USR3(A):GOTO 1470 ELSE CLS:TR=0:GOTO 470
1470 FOR Z=1 TO 5
1490 GOSUB 1570
1510 POKE LO,12:POKE VA,SR:X=USR4(A)
1520 GOSUB 1570
1530 NEXT Z
1540 NR=0:NT=0:TR=0
1550 FOR I=1 TO 1000
1560 NEXT I:CLS:GOTO 260
1570 FOR I=1 TO 50
1580 NEXT I
1590 RETURN
1600 REM
1610 REM
1620 REM
1630 REM
1640 REM
1650 IF TR=TR+1:IF TR=1 THEN NT=NT+1
1660 POKE W,0
1670 X=USR2(A)
1680 RETURN
1690 REM
1700 REM
1710 REM
1720 REM
1730 REM
1740 TR=0
1750 POKE LO,8
1760 IF V<10 POKE VA,VH:X=USR4(A):GOTO 1810
1780 POKE VA,VT:X=USR4(A):POKE LO,9
1790 POKE LO,9:V0=V1-10*POKE VA,VO:X=USR4(A)
1800 POKE LO,10:V0=V1-10*POKE VA,VO:X=USR4(A)
1810 TR=0:FOR I=1 TO 1000: NEXT I: GOTO 1460
1820 REM
1830 REM
1840 REM
1850 REM
1860 REM
1870 POKE VA,15:IF L=0 GOTO 1800 ELSE POKE LO,0:X=USR4(A)
1880 IF F=0 THEN POKE LO,1
1890 X=USR4(A)
1900 A$="":FOR I=1 TO 50

Listing continues
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10 REM REMVARIABLE LO DEFINES ASSEMBLY LOCATION 'PNTLOC'
20 REM VARIABLE VA DEFINES ASSEMBLY LOCATION 'NUMBER'
30 REM VARIABLE WW DEFINES ASSEMBLY LOCATION 'WINLOS'
35 REM VARIABLE RO DEFINES ASSEMBLY LOCATION 'ROUTIN'
40 REM POKE RO,0:x=USR(A) INITIALIZES BUFFER IN ASSEMBLY RO
UTINE
50 REM POKE RO,1:x=USR(A) PRINTS "LEVEL=" AND "+x/-
60 REM POKE RO,2:x=USR(A) CORRECT ANSWER ROUTINE
70 REM POKE RO,3:x=USR(A) PRINTS "RIGHT"
80 REM POKE RO,4:x=USR(A) PRINTS A NUMBER OR CHARACTER OF T
85 CRT
90 REM
100 REM INITIALIZATION AND SETUP
120 REM
130 REM
150 PRINT:INPUT:ENTER DECIMAL ADDRESS OF ASSEMBLY LOCATION 'TAPM'
CD:";X
160 A=#256:POKE 16527,A
170 A=2$:A=2$:POKE 16526,A
180 ROM=3581:REM THIS IS HEX F203
190 LO=3583:REM THIS IS HEX F201
200 VA=3582:REM THIS IS HEX F202
210 WI=3584:REM THIS IS HEX F200

Program Listing 3. Changes to Basic Program for a Tape System

Program Listing 4. Changes to Assembly Program for a Tape System
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80 Micro, February 1983 • 197
The Intersoft C Compiler

by Rowland Archer

Although the C language is an interesting and useful programming tool, this package requires additional software and knowledge of Assembly.

The Intersoft C compiler is available for the Model I and III as well as Digital Research Corporation’s CP/M and Technical Systems Consultants’ Flex system for the 6809. I did most of my testing on a Model I, although I did manage to get some limited test time in under LDOS on a Model III.

The C language was developed at Bell Labs by Dennis Ritchie. Although C was developed on the UNIX operating system, and in turn most of UNIX was rewritten in C, it is not necessary to have UNIX in order to develop and run C programs.

C is usually classified as a medium-level language, meaning that it is a higher level than Assembly language, but lower than languages such as PL/I and Pascal. Functions written in C can perform many operations that are built into other languages, such as conversion between data types and reading and writing to files. This keeps the core of C simple and uncluttered, yet functions are available to do most of the things that you can do with higher-level languages.

The Program Listing shows a simple C program that accepts a line of text, reverses it, and prints it back out. To me, C feels more like Pascal assembly. The example program is explained in more detail in the sidebar.

Intersoft C is not a complete implementation of the C language. Although there is no standard for C, the de facto standard is described in Brian W. Kernighan and Dennis M. Ritchie’s book The C Programming Language (Prentice-Hall, Englewood Cliffs, NJ, 1978). Intersoft C is derived from Ron Cain’s Small C, which is a subset of the full C language.

Intersoft C is supplied on a TRS-80-formatted data disk with no operating system. You will need to copy these files onto a DOS disk. If you have only one disk drive, you will need a DOS with a single-drive file-copy function. There is an elaborate alternative procedure, described in the manual, that lets you copy the files to a DOS disk on a single-drive system using a text editor, a disk-based editor/assembler, and the DOS Load and Dump commands. If you use this approach, don’t waste time looking for the table of program load addresses mentioned in the manual—the addresses you need are printed on the disk labels.

Using Intersoft C

The Intersoft C package, as delivered, is not sufficient by itself for developing and running C programs. In order to use the system, you must own or purchase a disk-based, line-numberless text editor and a Z80 assembler program. To create C programs, you need an editor and an assembler because the C compiler’s output is Z80 Assembly code, which must be assembled before it can be run.

Before you can use the package, you must edit, compile, or assemble the support libraries: CSUPP/C and Z80LIB/MAC or Z80LIB/ASM, depending on your own version. The editing involves deleting some lines in the CSUPP/C file to make it work with your machine and assembler. I think this should be done by Intersoft since they are already supplying different versions of the system depending on the machine and assembler you own.

Before it can be compiled, a C program has to be typed into a file. I was surprised to find that the manual never describes the format of a C program source file, and it only hints at how you can create one. The first appendix casually mentions that you can use whatever text processing system you have available. It appears that you can use any text editor that creates plain ASCII files without line numbers. I used Radio Shack’s Scriptit word processor. You cannot use the TRS-80’s Basic text editor or EDTASM’s editor because they generate line numbers, which the C compiler does not tolerate.

The recommended assemblers are either a disk conversion of Radio Shack’s EDTASM, such as the one provided by Apparat with their NEW
DOS 80, or Microsoft's M80 macro assembler. Any disk-based assembler that is file-compatible with either of these should work, too.

Depending on which text editor, assembler, and operating system you use, life with the Intersoft C compiler can be either fairly smooth or downright tedious. Figure 1 shows the steps required to create, compile, and run a program under what I consider to be the best environment. Figure 2 shows the steps required under the least favorable environment.

In Fig. 1, your text editor allows direct entry of these special characters required by C:
- Braces, { }, used to delimit compound statements in C (like Begin... End in Pascal);
- Brackets, [ ], used with array variables to delimit the array index;
- Vertical bar, |, the logical “or” operator;
- Tilde, ~, the “one’s complement” operator; and
- Caret, ^, the logical “exclusive or” operator.

Although the TRS-80 does not include these special characters on its keyboard, there are several text editors available, such as Apparat's Flextext (a patch to Scripsit), that allow you to enter them directly.

The next step in Figure 1 is to run the C compiler, which produces Z80 assembler source-code statements from your C program. The compiler gives you the option of having the C program source text appear in the output file along with the assembler statements. This lets you determine which assembler lines came from each C program statement.

When you run the compiler, you must decide whether to define globals—allocate memory for global variables. This topic is a bit confusing, and the need to answer this question every time you run the compiler is an unusual requirement. Standard C handles this issue with the EXTERN declaration, which Intersoft C does not support.

Next, using Microsoft's M80 assembler, assemble the file that was generated by the compiler to create a standard "/REL" (relocatable object code) file. Finally, run L80, the linking loader, to combine the /REL file just produced with one or more other /REL files that contain C run-time support programs and library functions. This last step creates an executable code file (a TRS DOS "/CMD" file) which can be run directly from the DOS READY prompt.

Except for the extra step of running the assembler, this involves no more work than running most compilers. Generating and storing the intermediate assembler source file takes a little more time and disk space. The whole process of compiling, assembling, and loading a C program is made easier if your DOS allows you to create a file of keyboard commands and then run that file. Most TRS-80 DOSes call this feature the "DO file" or "chaining."

Now we come to Fig. 2. You would have to want to write C programs pretty badly to use this setup. The whole purpose of writing in a language like C is to

---

**Demo C program to read a line of text from the keyboard (STDIN) and write the reverse of that line to the CRT (STDOUT)**

```c
#include <stdio.h>
#define strlen 64

revstr(str, rstr)
    char str[], rstr[];
{
    int i, j;
    i = strlen(str) - 1;
    j = 0;
    while (i >= 0)
        rstr[j + i] = str[i--];
    rstr[j] = EOS;
}

main(argc, argv)
    int argc, argv[];
{
    char line[strlen], rline[strlen];
    puts("Type a line: ");
    putchar(EOL);
    gets(line);
    revstr(line, rline);
    puts("The reverse of what you typed is: ");
    printf(EOL);
    puts(rline);
}
```

*Program Listing, Sample C Program*

---

**Fig. 1. Steps required to create, compile, and assemble a C program using a text editor that allows the entry of C's special characters, and the M80 macro assembler.**

1. Use a text editor that allows typing of special characters (see text) to produce: \( \text{C Program Source} \)
2. Use the M80 version of the C compiler to produce: \( \text{Z80 Assembler Source, M80 format} \)
3. Use the M80 macro assembler to produce: \( \text{Relocatable Object Code (/REL file)} \)
4. Use the L80 loader to combine the above file with run-time libraries to produce: \( \text{Executable Object Code (/CMD file)} \)

---

**Fig. 2. Steps required to create, compile, and assemble a C program using a text editor that does not allow the entry of C's special characters and the EDTASM assembler.**

1. Use a text editor that does not allow the entry of special characters to produce: \( \text{C Program Source} \)
2. Use the preprocessor to translate escape sequences to special characters: \( \text{Preprocessed C Program Source} \)
3. Use the EDTASM version of the C compiler to produce: \( \text{Z80 Assembler Source, EDTASM format, no line #s} \)
4. Use the postprocessor to add line numbers to the above: \( \text{Z80 Assembler Source, EDTASM format, w/line #s} \)
5. Use EDTASM to combine the above file with run-time libraries to produce: \( \text{Executable Object Code (/CMD file)} \)
A Closer Look at the Listing

The program Listing is a C program which accepts a line typed at the keyboard, reverses it and prints it out on the CRT. This program demonstrates only a tiny fraction of C’s potential, but it may give you a feeling for the C language.

The first statement past the title comment is a compiler directive to “include” the file “stdio.h” at this point in the program. This causes the compiler to open stdio.h and compile its contents. Stdio.h contains “#define” statements for some implementation-dependent constants such as EOL and EOS, described below.

The “#define” statement is another compiler directive. As used here, it tells the compiler to replace the identifier “strlength” everywhere it occurs with the value 64. Using #define statements to establish symbolic constants makes it easier to change the value of a constant that is used in several places in a program.

A C program is a collection of functions, similar to the way a Pascal program is a collection of functions and procedures. Functions can be called from other functions and they can return values, just as SIN(X) returns the sine of X in Basic. They can also change the value of the variables passed as arguments, as you will see in a moment.

The first function defined in the listing is named “revstr”. It reverses what is in “str” and stores the result in “rstr”. The header line gives the name of the function and its formal arguments or parameters: rstr and str. The header is followed by a declaration that tells the data type of the function’s arguments. The declaration “char str[], rstr[];” says that str and rstr are character arrays. Using two brackets [ ] with no number in between says that these arrays can be of whatever size the calling function uses.

C uses { } like Pascal uses Begin and End, to delimit a compound statement. Right after its opening {, revstr declares two local integer variables, i and j. Memory is allocated for local variables when a function is invoked at run time, and deallocated when the function is exited. C has only local and global variables; it is not a block-structured language. (Block structure means that you can nest one procedure inside another; each procedure can reference variables in itself and all the procedures that enclose it).

The character arrays “str” and “rstr” are used to hold variable length text strings. C builds variable length strings by storing consecutive characters in adjacent elements of an array. An ASCII null (0) character is stored as a terminator after the last character in the string. This terminator is symbolically referred to as EOS—the End-Of-String character. EOS is one of the constants defined in the “included” file, stdio.h.

“A C program is a collection of functions.”

The first statement of the function revstr assigns the value “strlen(str)−1” to the variable i. This initializes i to be the index of the last character (before EOS) in str. “Strlen” is a C library function which returns the length of its string argument. It counts all the characters up to, but not including, EOS.

The variable j is initialized to zero in the next statement. This makes j the index of the first character of rstr.

The “while” loop is where the bulk of the work is done. It says to execute the loop body as long as i is greater than or equal to zero. In this case, the loop body is only a single statement. A compound statement, delimited by { }, can also be used.

The loop body statement, “rstr[j + +] = str[i--];”, copies the “ith” element of str to the “jth” element of rstr. The notation “i−−” says to subtract 1 from i after using it as an index to str. Similarly, “j++” says to increment j after using it as an index to rstr. If the “−−" or “++" appear before a variable, e.g. “−−j”, it means to decrement or increment the variable before using it.

When i is decremented below zero, the loop is done and the string in str has been copied backwards into rstr. An EOS character is then stored at “rstr[j]” to terminate rstr. The “]” character marks the end of the function.

Every C program must include a function called “Main”; this is where execution begins when the program is run. “Main” always has two arguments, “argc” and “argv[ ].” “Argc” tells how many arguments are on the command line which invoked the program; “argv [ ]” is an array containing addresses of the command line arguments themselves.

The example C program’s main function defines two character arrays “line” and “rline”, both dimensioned to have “strlength” characters. “Puts” is another C library function, standing for “put string.” It writes its argument to STDOUT, normally the CRT screen. Here it prompts the user to “Type a line: ”. The argument to “puts” is a literal string enclosed with double quote marks. The compiler stores the string and terminates it with an EOS byte.

The next call is to the function “putchar”, which writes a single character to STDOUT. In this case, the EOL or End-Of-Line character is written, forcing the cursor to move to the next line on the screen. EOL is defined in stdio.h.

The “gets” function is called to get a string from STDIN. The resulting string is stored in the variable “line.” This is followed by a call to revstr to reverse the string in line and store the result in rline.

Finally, “puts” and “putchar” are called again to type the closing message and rline, the reversed string.
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You must do the first extra step in Fig. 2 because the text editor, Scriptit for example, doesn’t allow you to type in C’s special characters. You can have this problem whether you are using EDTASM or M80. Intersoft supplies a preprocessor that translates two-character “escape sequences” into the “special” characters. For example, “(“ and “)”) are converted into “[]” and “[],” respectively. The preprocessor executes quickly (it is written in C and compiled to machine language) but it adds an extra step to every compilation. Intersoft has informed me that the next version of their compiler will directly recognize the escape sequences as alternates for the special characters, eliminating the preprocessor step.

The next inconvenience comes when you run the compiler. You must supply a “starting number for labels.” The compiler generates assembler source code labels of the form “CCxxxxx”, where “xxxxx” is a sequence number starting with the one you specify. If your program contains separately compiled modules, the burden is on you to make sure that there are no duplicate labels in the separate modules that must be assembled all together. There are no guidelines given for how far apart the starting numbers should be. It is totally dependent upon how many labels the compiler has to generate to compile a particular program.

The compiler generates a Z80 source code file that is not yet in EDTASM-compatible format, strange considering this is supposedly the EDTASM-compatible version of the compiler. You must run a postprocessor which adds line numbers and some header and trailer information that EDTASM expects. The postprocessor step takes about as long as compilation. It also produces an output file that is larger than the already big assembler source file. Running it on the 19.5K byte C run-time support library creates an output file of 26.5K bytes. I use two 40-track double-density disks that fit well. A user with one 35-track single-density drive would really be cramped.

The next step is to run EDTASM and load the assembler source code files produced by your separately compiled modules. In the original release of the compiler, you had to load the sources for the C run-time support library into EDTASM’s buffer, too. With a 48K byte machine, I only had 4K bytes of free space left in EDTASM after loading all the sources to assemble the short sample program in the listing. The compiler generates several consecutive blanks in each line of assembler source code it produces. By replacing consecutive blanks with single blanks, I squeezed out an extra 4K bytes of free space.

An update notice to the system describes a procedure that helps alleviate this memory crunch. You make a few minor changes to the support library source code, then compile and assemble the result, producing a core image file containing the executable version of the run-time library. You must also create a file of assembler EQU (equates) statements that associate a symbol with a hexadecimal address—one statement for each of 36 entry points in the run-time library.

When you compile a C program, you load the compiler output together with the EQU file into EDTASM and assemble it. The output of EDTASM is combined with the executable version of the

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support library by loading everything into memory and dumping it back out as a single file using TRS-DOS's Dump command. This allows you to write somewhat larger C programs, but still not nearly as large as with M80.

The manual suggests a tedious, unnecessary method of combining assembler source-code files in EDTASM's buffer: Load a file, write down the highest line number, then load previous files and renumber them to avoid line number conflicts, reload the first file, and so on. EDTASM lets you combine files that have conflicting line numbers, as long as you issue the N (renumber) command immediately after loading such a file. This command renumerates the whole file into one with nonconflicting line numbers.

There is a possibility of having multiple End and ORG statements in your file, since one is produced for each separately compiled module. Intersoft suggests searching the entire file using the F (find) command and deleting all but the first ORG and the last End statement. After doing this, you can finally use EDTASM's A command to create an executable code file on disk.

There is considerably more work to do in Fig. 2 than the diagram suggests. Much of the additional work is manual and tedious. You are limited to compiling much smaller programs if you use EDTASM, and there is a bigger demand on disk space. Keep in mind that you have to go through all these steps every time you have to recompile to correct a bug, or add a feature. I consider the compiler and EDTASM to be a very poor match.

I also take issue with the claim in Intersoft's advertising that no knowledge of Assembly is required. Using the assembler is an integral part of compiling a C program. Only partial instructions are given for using either M80 or EDTASM. At one point, the manual states: "You may find odd errors appearing when you attempt to assemble. A careful examination of the source code in memory will usually reveal the nature of the problem." How can you examine assembler source code to find a problem if you don't understand Assembly?

On the positive side, no royalty payments are required if you are interested in selling the software you develop with Intersoft C.

Language Features

As I mentioned, Intersoft C is not a complete implementation of the C language. If you are familiar with how Radio Shack's Tiny Pascal compares to full Pascal, you will have some idea of how Intersoft C compares to full C. Intersoft C is ahead of Tiny Pascal in several areas; it supports disk I/O, separately compiled modules, and integrated Assembly code.

Specifically, version 2.0 of Intersoft C does not provide:

- Long (32-bit) integers or floating-point numbers (the only data types supported are characters and 16-bit integers);
- Multi-dimensional arrays (only one-dimensional arrays are allowed);
- Structures, unions, typedefs, and storage classes;
- The "sizeof" operator;
- "Casts" (explicit data type conversions);
- The GOTO statement; and
- Compile-time initialization of external variables.

Intersoft says that version 2.5, not available at the time of this writing,
does have the following features, which were not in 2.0:
- The comma operator;
- Assignment operators (you must say X=X + 1 instead of X = X + 1, X = X*2 instead of X * 2, and so on);
- Conditional assignment—you must say:

\[
\begin{align*}
\text{if } (x > 0) \\
y &= 1 \\
\text{else} \\
y &= 2
\end{align*}
\]

instead of full C’s conditional expression:

\[
y = (x > 0) ? 1 : 2
\]

- The “&&” and “||” logical AND and OR operators, “&” and “|”, C’s bitwise AND and OR operators, are provided; in practice, this usually means that you have to use more parentheses, e.g.: 

\[
((x == 0) & (y == 0))
\]

instead of full C’s:

\[
(x == 0 && y == 0)
\]

On the plus side, the compiler does support:

- All the standard C control structures except GOTO: for, while, if...else, do...while, switch, break, continue, and return;
- Pointers to characters and integers and full pointer arithmetic;
- Functions being passed as arguments to other functions;
- Hexadecimal and octal constants entered in a C program;
- #include <file>, a directive to the compiler that can be placed anywhere in a program, telling the compiler to read the specified file, compile its contents, and then resume the original file from the next statement. (include does not work under TRSDOS on the Model I. Intersoft says this is due to a TRSDOS bug, but I have other compilers that provide an include feature that does work under TRSDOS);
- #define <constant> <value>, allowing definition of a constant at compile time; and
- ‘‘#asm” and ‘‘#endasm”, directives to the compiler that the code in between these two statements should be passed through unchanged to the assembler. This lets you “drop into” Assembly at any point in a C program. The manual tells how to pass data between a C statement and Assembly code.

The C compiler distinguishes identifiers as long as they are unique in the first nine characters. External identifiers are limited by whatever your assembler allows (in most cases six characters).

The compiler flags errors as it finds them in a C program and writes English error messages to the output file together with the offending C statement. It seems to do a good job of recovering from detection of an error and continuing compilation, although sometimes one C program error can result in several error messages.

Although there is no cross-reference facility built into the compiler, if you use the M80 assembler, you can use Microsoft’s CREF80 cross-reference program. There are no special debugging aids. You can use Put statements to write messages at strategic points in a program, or use an Assembly-language debugger together with the Assembly source-code output produced by the compiler. There is no built-in way to pause a running C program, such as the shift-@ convention of TRS-80 Basic.
File Handling

Intersoft C provides some nice features borrowed from UNIX's command-line interpreter. If your program uses the standard C library routines to read and write characters, you can redirect I/O to a file or files at run-time.

The standard input for C programs, called STDIN, defaults to the keyboard. The standard output for C programs, called STDOUT, defaults to the CRT screen. You can redirect STDIN to a file by including "<file name" on the command line; you can redirect STDOUT to ">>file name".

To illustrate this feature, a simple C program called CPY is provided. All CPY does is copy data from STDIN to STDOUT, but command line redirection of STDIN and STDOUT makes CPY very versatile. If you run it by typing "CPY" from the DOS ready prompt, everything you type at the keyboard is echoed on the screen.

"CPY <testfile" lists the contents of "testfile" on your screen, just like the TRSDOS List command.

"CPY <testfile>backup" copies "testfile" to "backup". If "backup" does not exist, it is created.

"CPY >newfile" puts everything you type at the keyboard into newfile; this is an easy way to create a short text file.

This is not all; by using ">>file name" instead of ">file name", output will be appended to the file rather than overwriting it. The append function does not work properly in TRS-DOS 2.3 due to a DOS bug, but it does work with most alternate TRS-80 DOSes.

I was favorably impressed at first by the way Intersoft C lets you open files from within a program without requiring you to specify in advance how many files your program will be using. Then I looked more carefully at the code for file opening and discovered a potential hazard. Memory is allocated for a file buffer and FCB (file control block) when a file is opened, but this memory is not released when the file is closed.

This means that every time you open and close a file, you have eaten away at free memory to the tune of 288 bytes. Intersoft says that version 2.5 of the system will have a dynamic memory allocation and deallocation scheme that will avoid this problem.

Although Intersoft C allows you to open a file in a random-access mode, there is no language support for reading and writing random file records. Sequential input and output to files is supported.

Performance

The C compiler is reasonably fast; it reads its source from disk and writes its output back to disk as it compiles. Running under LDOS and putting my input and output files on separate disk drives, a 360-line program took three minutes to compile, a rate of 120 lines per minute. It took another three minutes to run M80 and L80 to complete the process, totaling six minutes, or 60 lines per minute. This includes the time required to load the compiler, M80, and L80 from disk and type in the responses to the prompts.

It took two minutes to compile, assemble, and load Program Listing 1. The executable /CMD file produced was 4,500 bytes long. This is pretty compact for a file that can be run by itself, compared to what some microcomputer compilers produce.

The run-time speed of Intersoft C programs is impressive. A benchmark
program I ran that computes prime numbers using the Eratosthenes sieve algorithm ran in 123 seconds on Intersoft C, compared to 4470 seconds on Disk Basic! This is certainly a big improvement. All the C programs I ran seemed to be snappy, much closer to Assembly than to Basic programs in speed.

Documentation
The documentation for Intersoft C earns a grade of C. The manual says it’s not trying to be a tutorial, but I didn’t find it to be very successful as a reference manual, either.

It’s hard to be harsh on a manual that is written in a friendly, easy-going style, but in my opinion its omissions are unconscionable. For example, even though the manual is 94 pages long, there is no complete description of the Intersoft C language. If you are expected to own or purchase a book in order to use a product, the advertisement for that product should clearly state this. Unless you can write C programs in your sleep, you will absolutely need a book such as Kernighan’s (referenced earlier) to use Intersoft C.

About half the manual consists of source-code listings of the various support libraries and functions provided with the package. However, there are no instructions on how to use these functions. There are some comments in the listings, but you need Kernighan’s book to discover how to open a file, use the string functions, and read and write characters.

There is no index and only a very brief table of contents—it’s not particularly helpful to know the section number corresponding to each of the five appendices without knowing what’s in them!

Enough information is provided for the technically minded to determine how to interface Assembly routines with C programs. Restrictions and enhancements to full C are explained.

Conclusions
Despite its shortcomings, Intersoft C is a useful product. It allows you to build libraries of functions that you can combine to create new programs with relative ease. I have used the package frequently and I have yet to find anything that does not work as documented.

Based on the manual, the folks at Intersoft sound sincerely interested in supporting and improving their product. In several places they ask users to send suggestions and notify them of any bugs. They say that updates will be available but no specific update policy is described. Intersoft has stated that a $15 charge will allow the EDTASM version owner to upgrade to the M80 version of the product.

I feel that Intersoft C is somewhat overpriced considering the other software you must own to use the package, and comparing what you get to what some other TRS-80 compiler packages offer in its price range. If you already have the M80 assembler and linking loader, plus a text editor that lets you enter C’s special characters, I can recommend Intersoft C with the reservations noted in this article. I personally consider the combination of Intersoft C and EDTASM to be unacceptable.

Contact Rowland Archer at Flint Ridge Apt. 59, Hillsborough, NC 27278.
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Michael’s Game

by Nancy Modney

Your children don’t have to grow up afraid of micros. Start them off early with this game program that teaches letters and numbers.

Skeptical friends and family members often ask me what in the world I use a home computer for. I have at least one answer—it helps my child learn.

From the time David and I brought our son home from the hospital, his life has been filled with the sights and sounds of our TRS-80. The spare bedroom of our apartment had been the official computer workshop. When I discovered my pregnancy, a small crib and changing table were slipped into one corner. My hopes of a frilly pastel nursery were quickly dashed. Michael’s bedroom was decorated in shades of software!

When Michael was an infant, David would prop him up near the computer to watch. It was no wonder that Michael developed an intense interest in the TRS-80. As my son grew older, he was no longer content to remain passive. Michael wanted to play with his father’s toy too!

“Why don’t you write a program Michael can use?” I suggested to my husband. So he did.

The program is called Hear and See numbers, and the only instructions on the screen display is “Push any Key.” Each time Michael pushes a numeric key, that number is shown on the screen. Then that many boxes appear, one by one. Each rectangular box is accompanied by a beep through an amplifier connected to the cassette-out jack. (This is optional—the program can run without sound.) For example, Michael presses the 5 key. A number 5 appears on the screen, and five boxes are drawn, one at a time (with beeps). When he presses the 0 key, no boxes appear.

Of course, our little boy doesn’t press only numeric keys. When Michael pushes a letter key he sees that letter.

How the Program Works

Lines 10–50 are remark statements. Lines 60–90 set up the constants. Line 110 puts the computer into enhanced mode so the letters will be in large type for easy reading. Lines 120–140 name the program Hear and See Numbers, and print the instructions on the screen.

The program then drops through to line 290, beginning the first major routine, which determines if any key is pressed and analyzes what it is. Line 290 strobes the keyboard, looking for a key stroke. Notice that in line 300 there is no space between the quotation marks. If A$ has no value, then no key has been pushed and the program returns to line 290. Until a key is pushed, the program continues in this loop between lines 290 and 300.

If a key is pushed, the program then goes to line 310 to check if the key is a number greater than zero. If a letter or zero key was pushed, the computer goes to line 320, prints the letter on the screen, and returns to line 290.

If the key pressed was a number, the program goes to line 160 for the second major routine. Line 180 prints the number on the screen. Line 200 determines the number of boxes needed. Line 220 makes a buzz for each box counted. The program loops through this box-and-buzz routine enough times to equal the value (number) printed. The program then returns to line 290 to await another keystroke.

For Technical Buffs

Here is a more technical description of how the program makes sound. Lines 70 to 90 set up the constants P = 255, U = 9, and D = 10. P is used as a port number. In this case, port number 255 is the cassette port. U and D are numbers sent to port number 255. The number U sends the cassette port output high (up). The number D sends the cas-

The Key Box

Model I or III
16K RAM
Cassette or Disk Basic
Cassette jack amplifier optional
Conclusion

The buzzing is optional, but Michael lost interest more quickly when the sound was turned off. The audio is excellent feedback for a young child. If you don’t have an amplifier, Radio Shack offers one for $11.95 (catalog #277-1008).

Not only does Michael (age 2½) like this program, but his cousin (age 5) enjoys using it too. It’s a big hit when children come to visit.

Nancy Modney, and her son Michael, can be reached at 4144 N. Via Villas, Tucson, AZ 85719.

Program Listing

```
10 REM ** HEAR AND SEE NUMBERS ... FOR TRS-80 MODELS I & II 3 **
20 REM ** NANCY MODNEDY, 4144 N. VIA VILLAS, TUCSON AZ 85719 **
30 REM ** WRITTEN BY HUSBAND DAVID FOR SON MICHAEL D. MODNEY **
40 REM ** AUDIO AMPLIFIER IS OPTIONAL **
50 REM ** HOOK UP AUDIO AMPLIFIER TO GRAY CASSETTE OUT JACK **
60 DEFINT D-2
70 P=255
80 U=9
90 D=10
100 CLS
110 PRINT CHR$(23)
120 PRINT "HEAR AND SEE NUMBERS"
130 PRINT
140 PRINT "PUSH ANY KEY"
150 GOTO 270
160 CLS
170 PRINT CHR$(23);:
180 PRINT VAL(A$)
190 PRINT
200 FOR X = 1 TO VAL(A$)
210 PRINT CHR$(191)" ";
220 FOR Y = 0 TO 30 :OUT P,U :OUT P,D :NEXT Y
230 FOR X = 0 TO 100
240 NEXT Y
250 NEXT X
260 PRINT
270 PRINT
280 PRINT
290 A$ = INKEY$::
300 IF A$ = " " THEN GOTO 290
310 IF VAL(A$) > 0 THEN GOTO 160
320 PRINT A$"
330 GOTO 290
```

Using Scripsit

Using Scripsit is a word processing program for your TRS-80 Model III or Model I. It is easy to use and provides simple-to-understand instructions for each step. It is ideal for beginners and experienced users alike. The program includes a comprehensive tutorial on how to use SCRIPSIT, and provides step-by-step instructions on how to use it with your TRS-80. The program is easy to use and provides easy-to-follow instructions. The program also includes a comprehensive tutorial on how to use SCRIPSIT, and provides step-by-step instructions on how to use it with your TRS-80.

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26
Refrigerator Controller

by Doug Biedenweg

Got an old refrigerator lying around? This unit will let you control its lighting and temperature for all sorts of science projects.

Researchers need to simulate the temperature and light of various natural environments to properly study the lives of plants and animals. This micro-controlled incubator provides a means to do so.

First, you need to build a temperature and light-controlling input/output device. This interfaces a TRS-80 Model I to a standard home refrigerator. The I/O device regulates a heater-fan module and a bank of fluorescent lights.

This system has many possible uses. For instance, botanists can produce the oscillations in temperature that many seeds require to germinate, and can study plant growth under various temperature and light conditions. Bacteriologists and mycologists can study microbial colonies in situations close to those found in nature. This is particularly useful when studying food spoilage. Herpetologists can control body temperature cycles in snakes or lizards, and measure the effects these cycles have on digestive rates.

At home, the system will produce optimal conditions for terrarium. If connected to a small floor heater, it can save electricity during the winter months.

Materials and Methods

You’ll need 16K and Level II Basic. Fig. 1 shows the schematic for the interface device. Table I is a parts list.

The device uses a 4047 as an astable multivibrator, with a thermistor in the RC circuit, to produce an output frequency that is a function of temperature. This output of the 4047 feeds into the computer via the cassette port. The thermistor must be calibrated in the circuit, so that the circuit’s output frequency can be converted to a temperature.

The cassette auxiliary line is the output line from the computer to the heater circuit. The program (Program Listing 1) will make this line go high or low. When V = 0 or 1, OUT 255, V makes the output 0 V dc. When V = 4 or 5, OUT 255, V gives 0.85 V. When the output is high (0.85 V), the plus input voltage on the 741 rises above the 0.6 V set by the forward biased diode at the minus input. This causes the output of the 741 to go high, which closes the heater relay.

I used a double-relay system to the heater in our incubator to prevent the incubator from becoming too hot if the computer malfunctioned. The second relay was in series with the computer-controlled relay and its state (opened or closed) was determined by a bimetallic theremoregulator housed in the heater/fan assembly. The bimetallic theremoregulator was adjusted so that the relay would open and the heater turn off at temperatures above 40°C. The heater and fan ran independently. The fan ran continuously.

The output line from the computer to the light circuit (Fig. 1) is run from the computer cassette relay. The cassette relay can be closed under program control. When the relay is closed, enough current flows into the base of transistor Q3 to power the closure of the R1 relay, which will remain on until the cassette relay is opened.

Programming the Computer

The computer reads the temperature of the thermistor by measuring the period of the astable multivibrator using...
the "ear" port to input the signal. A machine-language program (Program Listing 2) allows the computer to determine the period of oscillation. The machine-language program is called from the Basic program (Listing 1), which also controls the incubator. Program Listing 3 is a Basic program that POKEs the machine-language program into high memory, where it is

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**TRS80 Color**

From the January 1981 issue of the CSRA Computer Club newsletter:

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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80 Micro, February 1983 • 213
used by Program Listing 1. You reserve space in memory for the machine-language program by entering 32511 when the computer requests the memory size. You then load and run the machine-language subroutine and the main program.

Program Listing 1 produces a sinusoidal temperature pattern (range 10–35 °C) with 16 hours of light and eight hours of darkness. Line 20 is the start of a one-minute loop that counts to 1,440 minutes, the number of minutes in a day. Lines 22 and 24 are a loop that just wastes time, allowing the loop that starts in line 20 to equal a minute in duration. Line 30 POKEs the address of the machine-language subroutine into the memory for use by the USR command. Line 40 calls the machine-language subroutine, which tells the Basic program the frequency of the output of the oscillator, X, and allows the computer to convert this output to a temperature in line 100.

The equation in line 100 is simply a polynomial curve fit of the thermometer/oscillator-pulse-output-(X)-versus-temperature (°C) curve. The constants in this equation must be obtained to fit the particular thermistor used. Line 90 defines the 24-hour temperature cycle that you desire in the incubator. In this program, TI, as a function of time, is sinusoidal and oscillates between 10 and 35 °C. The equations in lines 110–140 control the heater and lights in the incubator. If TM is less than or equal to TI, then the heater turns on. If S is less than 960 then the lights turn on. Following logically from this, when lines 110–140 set V to equal five, both the lights and the heater will turn on; when V equals four, the heater will be on while the lights are off; when V equals zero, both the lights and the heater will be off; and when V equals one, the lights will be on and the heater off. This is the information conveyed to the interface via the OUT statement given in line 160.

To modify the temperature cycle in the incubator, you simply change the equation in line 90. If you modify any part of the program, however, change the time-wasting loop in lines 22 and 24 to set the period of the loop that begins in line 20 equal to one minute. If your heater is more powerful than the one used here, or you want to control temperature more precisely, the loop that starts in line 20 can be sped up and TM can be accessed and compared to TI more frequently. The heater will then stay on (and off) for shorter periods of time and temperature fluctuations within the incubator will be smaller. If the loop, which starts at 20, is sped up, obviously you'll have to modify all facets of the program involving S to maintain a 24-hour cycle.

You can create a variety of special effects with the computer. You can simulate sun flecks by throwing random components into the main program that will turn the lights off for brief periods during the day. A random component to the temperature variation can also be simulated, or actual outdoor temperature can be read from a tape and used for control levels. You can also program the computer so that the photoperiod within the incubator will change over time to simulate fluctuations in day length. The number and types of photo and temperature cycles that the computer can set up and control is only limited by the imagination of the programmer.

**Results and Discussion**

Figure 2 compares setpoint temperature (TT), the temperature measured by the computer (TM), and the temperature measured by a thermistor operating independently inside the incubator.

<table>
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<td>9&quot; x 6&quot; x 5&quot;</td>
</tr>
</tbody>
</table>

| Table 1. Parts List for Interface Device |
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The independent thermistor showed that the I/O device thermistor readout (TM) was within ±3°C of the set point temperature. The timing cycle was within 0.5 s in 24 hours. These results indicate that this interface is capable of temperature and light control in a simple incubator.

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Joystick Compatible

Written by Y. Lempereur
Son of Pilot

by Randy Hawkins

Son of Pilot is a rewrite of "Pilot—The Language of Computer-Aided Instruction," which appeared in the July 1981 issue of 80 Micro. The original version was only usable on a cassette-based Model I. Son of Pilot should work on any TRS-80 system—any model, any memory size, and either cassette or disk based.

Pilot (Programmed Inquiry, Learning, or Teaching) is a simple, easy-to-learn language that is useful in education. Pilot lets you construct lessons that present information to students on the computer video display, ask questions to test for comprehension, and jump forward or backward in the lesson. Dr. John Starkweather developed Pilot's structure around 1970, and it has been implemented on many small computer systems.

The Basic Program Listing 1 POKEs the Pilot interpreter into high memory of any TRS-80. This program takes the place of the System tape created in the earlier article. To use Pilot, type in the program. Before you run the program, CSAVE it to tape or save it to disk, because any error in the program could cause your computer to return to the memory-size or cassette prompts or reboot the disk.

A method of checksums is used, so if you make a typing error, you are notified which line contains the error. Although the program POKEs numbers into high memory, you need not worry about setting the memory size, because it is handled automatically. As the program runs, you can see the line numbers advancing with the on-screen message. The program deletes itself in line 390 when completed.

The Pilot interpreter in Listing 1 is similar to the one from the earlier article—only the method of entry has changed. If you are successfully using the original version, you don't need to discard it and switch to this one. Both interpreters function exactly the same.

If all goes well as you type in the program, what has been accomplished? When you load a Basic program into memory and type run, the Basic interpreter located in ROM examines your program and acts on the individual commands. Basic is an interpreter that translates keywords like Print, For... Next, and If...Then into actions. Similarly, the short machine-language Pilot interpreter located in high memory also translates your Pilot programs into actions. Since Run is already used as the Basic go signal, Pilot uses the Name command as the signal to begin execution. Name is a Basic keyword that is not used for any important function.

Although the Pilot commands are explained in the original article, Program Listing 2 illustrates them and presents a sample program. Type in the program using the standard Level II input and editing features. When the listing is correct, type "NAME" and execute the program.

Each Pilot statement is numbered. The numbers can be any value from 0-32767, and the gaps between statements need not be regular. The numbers serve two purposes—to put the commands in order from first to last and to serve as reference points when a jump is made from one point to another. Following each number is a letter and a quotation mark. The letter identifies the type of statement, and the quotation mark isolates it from the rest of the line. (Some versions of Pilot use a colon rather than the quote; if you wish to use Pilot programs written for other systems, simply substitute the quote for the colon.)

The C command means "clear the screen and print the message that follows." The A command stands for "ask the question that follows." When the A command is found, the question is printed on the screen, a question mark is added, and the computer waits for the student to type in his answer and press enter. The student's answer is stored in a special temporary memory of the TRS-80. It can be reprinted on the screen by using the @ symbol in any other message. The W command means "clear the screen, and print the following message in wide letters."

The sample program gets the student's name in line 20, the screen is cleared and switched to wide letters in line 30, and the name is reprinted as "Hi Bobby!" using the @ symbol in the same line. The T command means "type the following message on screen." Following a question in an Ask command, you'll usually want to match the answer with the correct value. This is done in lines 70, 90, and 110. Line 70 illustrates that when several acceptable answers exist, they can be listed in the match statement separated by slashes; if any one answer is correct, then the match is successful.
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The program can jump forward or backward with the J command. As shown in line 150, the J is followed by the line number that you want to jump to. An E command signals the end of the program.

When a match is made with the M command, the TRS-80 asks itself, in effect, “Does the student’s response match the correct values listed here in the M statement?” If the answer is yes, then any command preceded by the letter Y is performed; any preceded by an N for no will be ignored. Conversely, if the match gives a no answer, the N commands are performed. So, if the student answers 2, line 100 will be typed. Any command can be preceded by a Y or N. When they are preceded with the yes/no conditional, the answer to the most recent match statement is used as the basis for skipping or executing that statement.

Pilot is easy to learn. Because it has a simple structure, you don’t need to worry about the mechanics of programming. Instead, you can concentrate on the lesson.

Many teachers and parents use Pilot to teach students a wide variety of subjects. However, many students also use Pilot to learn about computer programming. Pilot is an excellent first language for children. Since they are not overwhelmed by a large number of commands and rules, they can begin writing their own programs in less than an hour. Pilot teaches them to break a program idea into a series of smaller steps.

Any time you want to use Pilot to write a new program or to execute an old one, the procedure is the same. First, load the Basic program of Listing 1 and run it. This provides the TRS-80 with the special information it needs to translate Pilot programs into action. Next, load the desired program or type in a new one. Use the Name command to begin Pilot execution. You do not need to reload the interpreter of Listing 1 unless you return to the memory-size or cassette prompts, or turn off the power. You can even switch over to Basic and run several programs. Unless these programs alter high memory by POKEing into that area, Pilot will still be available for execution with the Name command.

Here are some tips for creating your own Pilot programs. Remember, when another user loads and runs your program, he might answer every question in lowercase, uppercase, or a combination of letters. Try to anticipate these combinations in your match statements. For example, even a simple yes or no question might look like this: 100 M"YES/yes/Yes/y"

If your program is too long to complete in one session, provide the option to skip over lesson units at the beginning of the program. If units 1, 2, and 3 begin at lines 1000, 2000, and 3000, then

10 CLS:PRINT"**TRS-80 PILOT Interpreter Ready**":DELETE10-400
400 PRINT:PRINT"Checksum error in line":I:I:STOP

Program Listing 1
include a section at the beginning of the program like the one shown in Listing 3. Remember that you cannot selectively begin Pilot execution at a particular statement. So, when you are writing and debugging a new program, and have already tested the section from line 10–1990, add a short line I J*2000 to jump past the debugged section and skip forward to the section of interest.

Then, just before you save the new program to tape or disk, remove line 1.

Because this version of Pilot has only the minimum set of commands, think of it as a tiny Pilot interpreter. If you find Pilot useful, consider investing in a more complete version. Several are available, including one from Radio Shack. They include graphics options, tape and disk input/output commands, and other advanced features.

I would be glad to answer any questions you may have, but please include a self-addressed, stamped envelope with your questions or comments.

Randy Hawkins is a chemical engineer. He can be reached at 6214 Hidden Cove, Corpus Christi, TX 78412.
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Helping You Help Yourself.
With some reconstructed cassettes and this index, you can shorten your Color Computer's loading time to less than 20 seconds.

Apart from providing a convenient way to organize your programs on cassette, this article explains how to use the cassette more efficiently for program and data storage. Perhaps it will even help you resist buying that disk drive for another few months.

First, since you have only a few usable kilobytes of RAM use short tapes. I always buy the most inexpensive cassettes that are held together with screws. I take them apart and throw away the tape, saving the hubs. From a supply of good quality tape, I run two minutes worth of tape onto one hub, cut the tape, fasten it to the other hub, and reassemble the cassette. This yields a 16K-per-side "shorty" cassette that rewinds in 10 seconds, yet holds several short programs or a few long ones on each side.

Even with these diminutive tapes, one of my cassettes contains 12 programs and requires an index for rapid loading.

The essence of an index is speed. If an index forces you to wait to see what is on the tape, then forget it! I want to load a short program and about one screenful of characters in less than 20 seconds. The standard technique using PRINT#-1 saves or loads 500 bytes in 9–25 seconds, depending on how the data is presented, because the data is first loaded into a buffer and then dumped to tape in a block. Each block has a leader train of sync bytes as well as a pause to let the drive get up to speed.

This system has some definite advantages, but speed is not the greatest of them. The block can contain up to 254 bytes. However, the buffer often dump when it is less than full. For large amounts of data the cumulative pauses and sync trains can add up to a significant amount of time. Anyway, I was already over my target.

You must record data in a block, but you can make a direct memory dump or core image of any specified size. This is the normal technique for recording machine-language programs, and it can be borrowed for the data storage as long as you know where the data is.

The program is in two parts. The first, Program Listing 1, is a general-purpose routine that sets up a string array of the desired size and pads it with space characters. It then obtains the memory locations of the array. With this house-keeping done, it loads data into memory or saves it from memory as if it is a machine-language program.

To do this reliably, set up the array in a predictable and immovable manner. Locate the setup routine before the main program, so the Clear statement won't affect other operations and also enable the placement of the array at the top of RAM. By defining the maximum number of records (MX) up front, you can easily make changes to accommodate more data. The POKE/PEEK in lines 110 and 130 let the value of MX survive the Clear statement. Predefine any variables used in obtaining the data address, since their subsequent creation changes the VARPTR value.

Strings are saved in memory from the top downward, so the lowest memory address is that of the highest element in the array. VARPTR for this element (line 180) then points to a location containing the length of that string element. The third and fourth bytes point to the actual location of the beginning of the string. All you have to do is PEEK those locations, calculate the two-byte address (line 190), then get the end-of-Basic-RAM address that is given in locations 39 and 40 decimal. If the main program makes USR calls to RAM routines or requires protected memory for other reasons, then the required address should be included in the Clear statement on line 120, as shown in the Color Computer manual.

The two parts of the program are shown together in Program Listing 2. In line 220, the data file INDAT is loaded for display and editing. The string data is modified using the MID$ statement (see line 320). The statement doesn't redefine the string but merely modifies it. It can't change in length, and it remains at the same memory location.

A few words are needed on the machine-language Save statement in line 420. The Color Computer manual is almost misleading in this respect. The only reference to CSAVEN is in the summary on page 192. It states correctly that CSAVEN has four parameters, but it incorrectly indicates that the first is a numeric variable and others are hexadecimal constants. In fact, the first parameter is the filespec and must be a string variable or a string literal en-
GAMES for Model III

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COLOR COMPUTER

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<td>Color Scramblman</td>
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<td>Typing Tutor</td>
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<tr>
<td>Bugout (Monitor)</td>
<td>16.95 n/a</td>
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<td>Adv. Int'l Games #1</td>
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<td>Deathplanet: The Dogstar Adv.</td>
<td>15.95 n/a</td>
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<td>Mean Craps Machine</td>
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<td>Ghost Gobbler</td>
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<td>Color Cosmic Invaders</td>
<td>17.50 20.50</td>
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<td>12.75 14.95</td>
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<tr>
<td>Oracle (Graphic Monitor)</td>
<td>n/a 22.95</td>
</tr>
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STICK 80 JOYSTICK

From Adventure International, this joystick is fully compatible with any level 1 TRS-80 Model I or III system. Assembled & tested, it simply plugs into your present system. Experience true arcade pizzazz and feel from your TRS-80. (Specify Model I or III). List $39.95. $31.75

SUPPLIES

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<th>Item</th>
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<td>Mailing Labels, 1 up, 5,000 quantity</td>
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<td>MX-80 Ribbon Cartridges</td>
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<td>Verbatim Diskettes, 5¼ &quot; $/DD</td>
<td>28.50</td>
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LDOS®

A disk operating system so good that Radio Shack has started selling them. A must for every Model III owner even if you have other advanced operating systems. Features full keyboard type-ahead, a true print spooler, hard disk support, data transportability between the Model I and III, Job Control Language, communications utility, 400 page manual, customer service number, and so much more! This is the one. List price $128.00. $114.95

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The Maxi Series from The Business Division offers maximum versatility and ease of operation that is unmatched. Maxi programs are compatible with each other and, where appropriate, will interface with major word processing and spreadsheet programs. A telephone support line is available for technical assistance, if needed.

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A data base management system for your most demanding business applications. Six different relational search techniques, 20 user-defined fields of 40 characters, record length up to 800 characters, calculated equation fields, and works with any major word processor. Price includes Maxi Utility. Requires 1 drive. List $149.95. $119.50

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Applied Microsystems, Inc.
612 Washington, Denver, CO 80203 390
closed in quotes. The remaining parameters can be either numeric variables or
decimal constants separated by commas. They define the start, end, and execute addresses respectively. None of
the parameters are optional, although the filespec can be a null string. For
data, the execute address is meaningless; I use 350 (15EH), which contains a
return, in case it gets executed by mistake.

**Program Operation**

After saving a file, as shown in line 600, CLOAD and run the program.

```plaintext
Andrew Sensicle can be reached at
119 Frost Drive, Whitby, Ontario,
Canada L1P 1G1.
```

---

Program Listing 1

```plaintext
100 MX = 13 'MAX RECORDS - 1
110 POKE 500, MX
120 CLEAR MX * 28 + 100
130 MX = PEEK(500)
140 P = 0: ST = 0: EN = 0 ' PREDEFINE POINTER AND ADDRESS VARIABLES
150 DIM NX$(MX)
160 FOR X = 0 TO MX ' FILL ARRAY
170 NX$(X) = STR$(27, 46); NEXT
180 P = VARPTR(NX$(MX)) ' GET POINTER
190 ST = PEEK(P + 2) * 256 + PEEK(P + 3) ' GET START ADDRESS OF ARRAY
200 EN = PEEK(39) * 256 + PEEK(40) ' GET END ADDRESS OF ARRAY
210 ' 400 'END OF PREPARATION ROUTINE NOW SAVE OR LOAD AS REQUIRED.
220 ' 500 'CSAVEM"FILESPEC", ST, EN, 350
230 ' 600 'CLOAD"FILESPEC"
```

---

Program Listing 2

```plaintext
10 ' "OCODEC" - CASSETTE INDEX
20 ' *****************************************
100 MX = 13 'MAX RECORDS - 1
110 POKE 500, MX
120 CLEAR MX * 28 + 100
130 MX = PEEK(500)
140 P = 0: ST = 0: EN = 0 ' PREDEFINE POINTER AND ADDRESS VARIABLES
150 DIM NX$(MX)
160 FOR X = 0 TO MX ' FILL ARRAY
170 NX$(X) = STR$(27, 46); NEXT
180 P = VARPTR(NX$(MX)) ' GET POINTER
190 ST = PEEK(P + 2) * 256 + PEEK(P + 3) ' GET START ADDRESS OF ARRAY
200 EN = PEEK(39) * 256 + PEEK(40) ' GET END ADDRESS OF ARRAY
210 CLS: PRINT@232,"LOADING INDEX";
220 CLOAD"INDAT"
230 CLS: FOR X = 0 TO MX
240 PRINT STR$(X + 1); TAB(4); NX$(X)
250 IF (X + 1) / 4 - INT((X + 1) / 4) = 0 THEN AS = INKEY$: IF AS = "" THEN 2600: ELSE IF ASC(AS) = 9 THEN 2600 ELSE IFX < CK THEN CLS
260 NEXT
270 ' 280 INPUT" ENTER LINE NO. "; X
290 IFX = 0 THEN 340
300 F = 1 ' SET SAVE FLAG GET NEW LINE
310 PRINT$(3): PRINT; ""; LINE INPUT NX$(X)
320 MID$(NX$(X - 1), 1) = NX$ ' SUBSTITUTE NEW FOR OLD
330 CLS: GOTO 230
340 IFX = 0 THEN 430
350 CLS: PRINT" REMIND TAP AND PUT CASSETTE"
360 PRINT$(10): "ON RECORD."
370 PRINT" PRESS ANY KEY TO CONTINUE";
380 AS = INKEY$: IF AS = "" THEN 380
390 CLS: PRINT@232,"SAVING PROGRAM";
400 CSAVE"OCODEC"
410 PRINT@232,"SAVING INDEX ";
420 CSAVEN"INDAT", ST, EN, 350
430 CLS
```

---

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226 • 80 Micro, February 1983
You could spend hours typing in your programs, Or you could get

With LOAD 80 you’ll avoid all the hassles while enjoying all the benefits

What exactly is LOAD 80? Simply put, it is a monthly dump of the major program listings in each issue of 80 MICRO. Since it was introduced in April of 1981, hundreds of TRS-80* users like yourself have discovered the advantages and benefits of LOAD 80. This comes as no surprise to Wayne Green, the innovative publisher who created LOAD 80. He knew from experience how frustrating and time consuming it was to keyboard and debug even a single published program, let alone the major program listings in an issue of 80 MICRO. He was sure that a great many people were as frustrated as he was, and would jump at the opportunity to have those programs available in “ready-to-load” form.

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80 Micro, February 1983 • 227
The Model 16

by Jim Hawkes

Radio Shack’s 16-bit entry, the Model 16, is a significant computer design. Although the labels micro, mini, and main-frame overlap in today’s marketplace, it is safe to say the Model 16 is a minicomputer. The machine has the potential to place the company squarely in competition with IBM, DEC, Burroughs, Wang, Data General, and others in the lucrative low-end minicomputer market.

Radio Shack has approached this market slowly, incorporating more intelligent (or programmable) microprocessors in their designs. Radio Shack’s first computer, the Model I, contained only two programmable devices, the disk controller and the CPU. The Model II added keyboard, video, and other I/O controllers. The latest design, the Model 16, incorporates what many consider to be the most powerful of the 16-bit microprocessors, the Motorola MC68000.

It appears that Radio Shack’s selection of the MC68000 may be as fortuitous as their selection of the Z80 for the Model I. The parallels of the CPU design decisions between the Model I and Model 16 is striking. When the Model I was in the design stages, the Z80 was just beginning to enter full production. Though there was very little software compared to its cousin the Intel 8080, the Z80 was thought to be a substantial improvement.

The same can be said with respect to the Intel 8086 family of 16-bit CPUs and the MC68000. The 8086 was released much earlier than the MC68000 and therefore had a substantial lead in software development. However, the Motorola microprocessor is thought to be superior—although it has very little software support.

Motorola was later than its principal competitors, Zilog and Intel, in entering the 16-bit market. By waiting, they were able to complete a design that contains over 68,000 transistors as compared to 29,000 in Intel’s 8086.

Radio Shack refers to the MC68000 in the Model 16 as “advanced 16/32 bit technology.” What defines a 16-bit machine remains a moot point. A simplistic view would label any processor that simultaneously reads or writes 16 bits to memory as a 16-bit processor; using this definition the MC68000 (68K) qualifies.

A more careful definition considers register widths and types as well as the instruction set of the microprocessor. Using this definition, the 68K may qualify as a 32-bit machine, since it contains 16 32-bit registers as well as a powerful instruction set. The MC68020 CPU is the true 32-bit device, having 32-bit data and address buses to complement its 32-bit internal registers.

In addition to processing four times as many bytes as 8-bit devices, the 68K prefetches instructions to the CPU before they need to be executed. When the CPU is ready to perform the next instruction, it is fetched from memory (called a cache) contained within the microprocessor. This type of look-ahead processing is called pipelining and results in faster operation since instruction fetch cycles do not interrupt instruction execution.

Another characteristic that distinguishes the microprocessor is a significantly broader range of instructions than its 8-bit counterparts. In particular, it performs hardware multiply and divide, tasks that require subroutines on most 8-bit CPUs. In addition, several instructions have been added to ease the manipulation of data structures.

Not only does the 68K operate on more bits with more instructions, it also
PROGRAMMING TOOLS FOR YOUR TRS-80™ MODEL I AND MODEL III

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The INSTANT ASSEMBLER is a powerful disk or tape-based assembler and debugger for the TRS-80. Now you can assemble directly to memory and immediately debug your program with the built-in stepping debugger. Quickly switch from assembler to debugger and back again without losing the source code. This feature makes INSTANT ASSEMBLER an excellent learning tool for assembly language programming.

INSTANT ASSEMBLER is absolutely unique among tape based assemblers in that it produces relocatable code modules that can be linked with the separate LINING LINKER, which is included in this kit and used for loading programs into either high or low RAM. This lets you build long programs with small modules. INSTANT ASSEMBLER also features immediate detection of errors as the source code is entered, a compactly coded source format that uses as much memory as the source file, and many operational features including single stroke entry of DEFB and DEFW, pinpoint control of listings, alphabetical listing of symbol table, separate commands for listing error lines or the symbol table, block move function, and verification of source tapes.

INSTANT ASSEMBLER's debugger provides single stepping with full register display, decimal or hex address of addresses, forward or backward memory displays, disassembly of object code in memory, memory display in ASCII format, and hex-to-decimal or decimal-to-hex conversion. The single-step will step one instruction at a time or at a fast rate to any defined address.

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 memory. The instruction manual is separately purchased for $5, 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 program MIMICMIND.

Specify Model I or Model II. TAPE INSTASM $29.95 on tape
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The Programmers Guide to the TRS-80 ROMS

INSIDE LEVEL II is a reference guide to the Model I and Model II 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 includes an entirely new, carefully compiled, comprehensive program structure which loads under the SYSTEM command and executes in both Basic and machine code with speed and efficiency of a compiler. In addition, Part II contains examples of how and where to include a lot of other information useful to the programmer including tape formats, ROM usage, relocation of Basic programs, USC 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 Micro 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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Model I only. SK-2 $24.95

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80 Micro, February 1983 • 229

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operates with more speed. The 68K, as it is implemented on the Model 16, operates at 6 megahertz compared to the 4-megahertz operation of the Z80 in the Model II and 16. These higher clock speeds translate into the execution of more instructions per second. The exact number of instructions executed at a time depends upon the application, since some instructions execute more rapidly than others. However, as many as 1.5 million instructions per second can be executed at the current clock setting on the Model 16.

Anyone following hardware developments will notice that the 68K runs faster in other manufacturers’ products. In fact, you might feel slightly swindled by the slower performance from the CPU. To be fair, however, some consideration must be given to the time frame of the Model 16’s design and the supporting ICs built into it. After all, one and a half million instructions per second is quite significant. (Incidentally, the 68K has been run under special conditions at speeds over 16 megahertz.)

Although speed and word size are important characteristics, perhaps the most important feature is the magnitude of addressable memory area. The MC68000 is capable of addressing 16 megabytes (million bytes) of memory. Since Radio Shack did not implement all the address lines, only 524,288 bytes (512K) are available. For most users this should be sufficient, particularly considering the fact that many large multi-user systems have operated on substantially less memory.

Two Systems in One

Essentially, the Model 16 is two computer systems in one. The 68K is augmented with a Z80A, the same microprocessor used by the Model II as the CPU. By designing the system so that the Z80 could be used as a stand-alone CPU, the Model 16 can duplicate the functions of a Model II. When not being used in the Model II mode, the Z80 serves as a slave processor to the 68K, relieving the 16-bit CPU from time-consuming I/O tasks.

The use of the Z80 in this manner is very important in the initial success of the Model 16, since it permits the use of existing Radio Shack software. This software makes the machine useful while 68K software support is being developed. Without the Z80, the Model 16 would not currently be a marketable product, since there is very little software available that uses the 68K.

External Storage

The disk storage system is substantially different in capacity, physical size, and operation than the Model II. The first thing you will notice is that the disks are inserted in a completely different manner than in the Model II—namely, upside down. The second noticeable operational aspect is the reduction in system noise.

One of the most unattractive features of the Model II is the incessant noise produced by the constant whine of the

---

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disk drives and cooling fan. If a Model II is installed in a very quiet location, the noise it creates is frequently more than unpleasant. The Model 16 has solved this problem. Once a drive has been activated it remains rotating for only 30 seconds; if there have been no I/O operations to the drives during this period, then they are turned off. The cooling fan, however, still remains a burden to the eardrum and connecting neural passages. Surely there must have been a quieter fan or better mounting method.

The floppy-disk drives used in the system are thinline double-sided, double-density, permitting approximately 1.25 million bytes of storage per drive. Since the drives are physically much smaller than the Model II units, two can be placed in the same space as the single drive, enabling 2.5 million bytes of storage in the confines of the Model 16 enclosure. Two additional floppy drives can be added, supplying a total capacity of approximately 5 megabytes.

The Model 16 also accepts the Radio Shack hard disk, which provides almost 9 million bytes of storage capacity per drive. Up to four drives can be added providing a total of 33 million bytes of hard-disk storage.

I/O Ports
The lack of sufficient serial I/O ports is the most serious design flaw in the Model 16. The input/output devices are exactly the same as the Model II. Namely, two RS-232 serial ports and one parallel port—woefully inadequate for a system designed as a multi-user system. With only two serial ports the system loses one third of its usefulness if a serial printer is utilized, and with two serial devices attached (such as printer and printer plotter), there is no room for terminals. (Radio Shack markets separately an RS-232C selector switch that lets you connect three peripherals to a single serial output port. Also, the DT-1 data terminals designed to work with the Model 16 in a multi-user configuration have their own serial and parallel printer ports.)

Internal Expansion
The Model 16 has space for only two additional cards on the system bus. This limits the number of options available to the user. For example, expanding to 1/2 megabyte of internal memory and adding a hard-disk controller would completely fill the system bus. This means the hi-resolution graphics board or ARCNET could not be installed when or if it becomes available. (Incidentally, ARCNET was not mentioned in the new September catalog.) (Radio Shack Computer Centers are claiming that ARCNET will be available “around the first of the year.” This contrasts with Radio Shack’s original release date of “second quarter of ’82.”)

Other Features
The Model 16 possesses two features that must have been the byproduct of good market research. No longer will
interior decorators be subjected to battle
ship gray. The system is packaged in
an attractive off-white enclosure that is
identical in dimensions to the Mod II. In
addition, a green phosphor screen has
replaced the old black-and-white CRT.
The keyboard is detachable and in all
respects seems identical to the Model II.

Current Operating System

The 16-bit operating system provided
with the computer is similar in com-
mand structure to the Model II’s
TRSDOS. However, there are two li-
brary commands that are not discussed
in the documentation. These com-
mands, Assign and Release, appear to
reflect Radio Shack’s intent to provide
multi-user capability. However, accord-
ing to knowledgeable sources, Radio
Shack’s plan to develop their own pro-
prietary operating system has been tem-
porarily abandoned. Instead, they have
purchased a multi-user, multi-tasking
operating system that is a descendant of
a well-known operating system, UNIX.
The proposed operating system is called
MTOS.

Proposed Operating System

There is nothing more useless than a
computer without software. Since the
Model 16 is capable of running Model II
software, it is not useless. However,
it’s “raison d’etre” was not to serve as a
Model II; after all, Model II two-drive
systems are more than $1,000 less than a
comparable Model 16. Radio Shack ad-
vertises the Model 16 system as a multi-
user system with a small caveat in the
September catalog, “available first
quarter 1983.” Undoubtedly, it is the
multi-user features of the 68K that at-
tract buyers.

If the information from Fort Worth
is accurate, the multi-user operating
system scheduled for release will be
vastly more sophisticated than anything
heretofore offered by Radio Shack. The
proposed release might be called
MTOS, Multiple Terminal Operating
System, and is designed as a UNIX
look-alike. UNIX is the highly ac-
claimed operating system designed at
Bell Labs primarily for minicomputers.
Although UNIX has been used pre-
dominantly in the academic commu-
nity, it has been forecasted by many as
the dominant operating system of the
16-bit generation of micro/mini com-
puters. However, MTOS will not con-
tain the full set of UNIX utilities and ini-
tially will probably not contain any
language, except possibly Cobol. One of
the best features of MTOS is the pro-
posed cost: free, to all Model 16
owners.

Probably one of the foremost consid-
erations in not initially providing a com-
plete UNIX system is the necessity of
royalty payments to Bell Telephone.
However, sometime during the first
quarter of 1983 a full UNIX develop-
ment system complete with utilities will
be offered, but it will not be free. This
system has been licensed from Bell and
will be fully supported. Because UNIX
is written in C, it would seem reasonable
that any development system must in-
corporate this language. Fortran and
Basic will likely be released in the sec-
ond quarter of 1983.

Supporting an operating system such
as UNIX represents a radical departure
from previous marketing philosophies,
since Radio Shack has never supported
any operating system but their own pro-
prietary systems. Whatever their rea-
sions are for making the change, it is a
welcome one. By providing UNIX they

offer a good, well-known, and respect-
ed operating system that cannot be easi-
ly dismissed by competitors. After all,
Radio Shack is entering a very competi-
tive environment, pitting itself against
well-known manufacturers such as IBM.

MTOS

MTOS, as currently proposed, is a
virtual-memory operating system. Con-
ceptually, virtual memory allows appli-
cation programs an almost limitless
amount of memory, even larger than
the total amount of internal memory in
the system. Virtual-memory systems
have been prevalent in mainframes and
large minicomputers for at least a de-
cade. However, this type of architecture
has not filtered down into the micro
world primarily because of program-
ning complexity, marketability, and
performance considerations. Virtual
memory systems require substantial
CPU overhead; some have estimated
approximately 25 percent.

(Motorola’s MC68010 CPU, along with
the MC68451 Memory Management
unit, is designed to process virtual mem-
ory without adding processor overhead.
Radio Shack has given no indication
that it plans to use these parts in the
Model 16.—Eds.)

In the 8-bit world, serving two or
more users in addition to giving up 25
percent of CPU time to an operating
system was just too much to ask, espe-
cially with only 64K of memory. Al-
though 8-bit speeds have increased and
integrated-circuit technologies have
produced larger and less expensive
memories, most software developers
did not believe there was a real market
for extremely sophisticated multi-user
systems, particularly since the 16-bit
processors were right around the
corner.

Paging systems are the most preva-
 lent type of virtual memory system. In a
virtual system a program is divided into
segments called pages, which are usu-
ally stored on disk. When the program
is initiated only a portion of the pages
necessary to begin execution can be
loaded into memory. However, at some
point during execution a page that is
not in memory will be required. The
absence of a necessary page is called a
page fault.

When a page fault occurs, program
execution must cease, and the missing
page must be copied into main memory
from disk. If memory is completely
used there may not be a place to put this
page. Thus, the operating system must
decide which page to remove. Pages are
continuously swapped in and out of
memory until program execution is
complete.

Virtual-memory environments usual-
ly provide dynamic memory allocation.
In a dynamic environment a user’s pro-
gram is not assigned to a fixed amount
of internal memory. As memory be-
comes available, the system distributes
it among the various users according to
a priority system. Suppose, for exam-
ple, a system is operating with three
users. If one of the users terminates,
then the two remaining users would
have additional memory allocated and
their programs would execute more ef-
ficiently since there would be fewer page
faults.

Thinking about the virtual environ-
ment will lead to a quick conclusion.
There is an enormous amount of I/O to
disk. This problem in the Model 16 is
addressed by both hardware and soft-
ware. The hardware component con-
sists of the Z80A, which can act as a
slave I/O processor for the 68K. When
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80 Micro, February 1983 • 233
"The Model 16 should be another Radio Shack success."

a user writes to disk, the 68K gives most of the problem to the Z80. In addition, the operating system contains a system module called the dispatcher, which determines the priority of program execution as characteristics of I/O boundedness change. For example, if a user program begins accessing a disk file, that user will not be serviced by the CPU for the same duration as other users not performing I/O tasks. However, once I/O is completed, normal CPU multi-tasking is restored.

In any kind of virtual system the memory demand can become too high and servicing page faults one after another can completely consume CPU operations. This phenomenon is called thrashing and is probably why Radio Shack suggests implementing the system with a minimum of 256K of memory and a hard disk. Floppy disks are extremely slow when compared to hard disks, and it is a difficult (if not impossible) task to implement a useful virtual-memory system in the floppy environment.

Other Operating Systems

CP/M, originally developed by Digital Research and subsequently adapted to many microcomputers, is currently available from at least two sources for the Model II operating mode of the Model 16. This operating system’s vast software library can be used immediately. A 16-bit version of CP/M is being developed by at least one well-known company. In addition, MP/M, the multi-user version of CP/M, will undoubtedly become available sometime within the next 12 months. Although CP/M or MP/M may be the oldest operating system for microcomputers, it is certainly not the only one.

Phase One Systems has offered, for some time, a multi-user system for the Model II as well as many other micro-based systems. Oasis-16 is their new multi-user system, which is compatible with their other systems. Thus, a program written in their Basic should run without modification under Oasis-16. The current multi-user Oasis system should operate in the Model II mode of the Model 16, except for patches to the disk I/O routines. However, I have not heard an official announcement nor seen a demonstration of this capability. Phase One is a dynamic and growing company that will eventually provide a good alternative operating system for Radio Shack’s newest computer.

Xenix, Microsoft’s version of UNIX, will eventually be adapted. (See Micro, September 1982, p. 300.)

Model II Operating Mode

About the only distinguishing characteristic of the Model 16’s mimicry of the Model II is the ability to use its double-sided drives to function as a two- or four-drive Model II.

Data and programs can be transferred to the Model 16 by inserting any Model II disk and applying a series of patches contained in a DO file called Thinline. These patches compensate for the different types of disk drives used in the two systems. Occasionally, you may need to move data and programs back to a Model II. In this case, execute the complementary DO file Unthin. The system is now patched to restore Model II compatibility. It takes about two minutes to execute either DO file.

Application Software

Radio Shack has released a 16-bit version of their Cobol compiler. Since this compiler is nearly identical to the corresponding compiler released for the Model II, a large number of programs should become available relatively soon. Since the new Cobol compiler generates object code for the 68K, the additional computing power of the 16 will substantially enhance program speed, especially if the program is not I/O intensive.

Radio Shack has compiled a number of Cobol software packages including General Ledger, Accounts Receivable, and Accounts Payable. In addition, Order Entry and Sales Analysis are available. Also, all programs advertised by Radio Shack for the Model II can be executed on the new machine.

Conclusion

The Model 16 is a powerful, competitively priced computer. It appears to have a high-quality operating system nearly ready to be released, and software support will undoubtedly be forthcoming.

The machine will satisfy the needs of many small-business users, particularly in the areas of accounting, word processing, and financial planning. The Model 16 should be another Radio Shack success.
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Horse Race II

by Danley Christensen

With this revision of the original Horse Race math program, you can tailor the game to meet the individual needs of your students.

In the September 1981 issue of 80 Micro, Michael J. Duffin’s article entitled “Math Derby” included a program called Horse Race. Horse Race is an educational math game in which each player has a horse on the screen, and the horse moves when the player answers a math question correctly.

Horse Race is ideal for situations in which the players have relatively equal math skills. Each player selects the type of problem he will answer on each turn and, based on the type selected, a correct answer advances that player’s horse a predetermined distance. A correct answer to an addition or subtraction question advances the horse one position; a correct answer to a multiplication question advances it two positions; and a correct answer to a division question advances it four.

I revised the program so players of differing skill levels could compete against each other—a first or second grader could compete against a fourth or fifth grader. This can be done by having the teacher select the type of problem for each player before the game begins, using the following problem codes:

- A—Addition
- S—Subtraction
- AS—Addition or Subtraction
- M—Multiplication
- D—Division
- MD—Multiplication or Division

Mr. Duffin developed an ingenious way of “timing-out” a player if the player takes too long to answer a question. This involves using the INKEY$ function to accept the keys hit, and then looking at the value of all those keys strung together. The only disadvantage is that the time limit is hard-coded into the program.

I changed this time interval variable so the teacher can further control the competition. Students with different skill levels can compete using the same type of problem but with different time allowances. I altered the time interval by making the top end of the timer/answer acceptance loop changeable so the teacher can enter the top value for each student before the race begins.

Another change involved the problems themselves. I wanted all the numbers to be randomly chosen. Using random numbers in addition and multiplication gives simple, straightforward answers. However, using random numbers in subtraction is more difficult because a negative answer can result, and using random numbers in division is the most difficult, because an answer can contain decimals. I rewrote the program so the answers to the subtraction and division problems would always be positive, whole numbers.

To guarantee this result, the program performs the opposite operation on the random numbers and uses that answer in the problem for the player. For example, suppose the player selects division and the computer randomly selects the numbers 7 and 9. Neither 9 divided by 7 nor 7 divided by 9 result in a positive whole number. So, the program performs the opposite operation (7 × 9) and puts that answer into the problem shown to the student: 63 divided by 7 = ?. In subtraction, the random numbers 7 and 9 would produce the
problem 16 - 7 = ?.
I wanted the teacher to control which numbers are used in the problems so he or she can exercise a student in the student's weak areas (e.g., the multiplication table for a specific number, such as 3 or 6). I set up a two-dimensional array into which a Y or N is stored for each math fact for each student. As the second random number is generated, this array is checked to see if the number generated is desired.

Only the second fact is checked, because if you want the table for 2, the problem 2 x 9 is valid so only one random number must qualify. If you selected the multiplication table for 2 and then checked both numbers, 2 x 2 is the only problem that would ever appear.

This revised game has been used successfully at the school where my wife works.

Danley Christensen is a data processing analyst and computer programmer. He can be reached at 17 Walnut Hills, Springfield, IL 62707.

---

**Program Listing**

1000 REM
1010 REM
1020 REM* HORSE RACE II
1030 REM* DANLEY E. CHRISTENSEN - OCTOBER 1981
1040 REM* BASED HEAVILY ON "HORSE RACE (MATH GAME) WRITING,
1050 REM* BY MICHAEL DUFFIN, AND PUBLISHED IN 80-MICROCOMPUTING,
1060 REM* SEPTEMBER 1981, PAGES 244-248.

1070 CLS: DIM AS$(10,3)
1080 P(1)=328 ; P(2)=520 ; P(3)=712
1090 FOR I = 1 TO 3
1100 W$(I) = ""
1110 C(I) = 0
1120 R(I) = 0
1130 NEXT I
1140 GOSUB 2530
1150 REM* SET PLAYING FIELD
1160 REM*
1170 REM* TABLE 1. List of variables I used in Horse Race II. Be sure to alter array sizes, if necessary, when customizing the program.

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Listing continues
1480 BS(J) = ""
1490 NEXT J.
1500 IF WS(I) = "S" THEN GOTO 1610
1510 IF WS(I) = "H" THEN GOTO 1730
1520 IF WS(I) = "D" THEN GOTO 1650
1530 IF WS(I) = "A" THEN GOTO 1760
1540 IF WS(I) = "M" THEN GOTO 1580
1550 R = RND(2)
1560 IF R = 1 THEN GOTO 1610
1570 GOTO 1760
1580 R = RND(2)
1590 IF R = 1 THEN GOTO 1730
1600 GOTO 1650
1610 Q = X + Y
1620 PRINT$ 0, Q$ = "Y" *=
1630 Z = Q - Y
1640 GOTO 1780
1650 X = RND(9)
1660 Y = RND(9)
1670 IF AS(Y, X) = "N" THEN GOTO 1660
1680 Q = X * Y
1690 Z = Q / X
1700 PRINT$ 0, Q$ = "X" *=
1710 Z = Q / X
1720 GOTO 1800
1730 PRINT$ 0, X * X$ = "Y" *
1740 Z = X * Y
1750 GOTO 1800
1760 PRINT$ 0, X * X$ = 
1770 Z = X * Y
1780 PRINT$ 64, "WHAT IS YOUR ANSWER, "; NS(I); ";"
1790 AS = INKEYS
1800 J = 1
1810 FOR K = 1 TO DT(1)
1820 BS(J) = INKEYS
1830 IF BS(J) = "" THEN GOTO 1850
1840 J = J+1
1850 FOR L = 1 TO 10
1860 NEXT L
1870 NEXT K
1880 D = VAL(BS(1)+BS(2)+BS(3)+BS(4)+BS(5));
1890 IF Z=D THEN GOTO 1960
1900 W(I) = W(I) + 1
1910 PRINT$ 0, D$ IS THE WRONG ANSWER, ";NS(V); ";"
1920 PRINT$ 64, "THE CORRECT ANSWER IS "; I$: ";"
1930 FOR J = 1 TO 550
1940 NEXT J
1950 GOTO 2020
1960 PRINT$ 0, Z$ IS THE CORRECT ANSWER - THAT IS VERY GOOD, ";NS(I); ";"
1970 C(I) = C(I) + 1
1980 PRINT$ 0, FOR J = 1 TO 550: NEXT J
1990 GOSUB 2070
2010 GOSUB 2070
2020 NEXT I
2030 GOTO 1400
2040 REM**********************************************************************
2050 REM* MOVE HORSE*
2060 REM**********************************************************************
2070 PRINT$ P(I), CHR$(32);
2080 PRINT$ P(I)+1,CHR$(32);
2090 PRINT$ P(I)+2,CHR$(32);
2100 PRINT$ P(I)+60,CHR$(32);
2110 PRINT$ P(I)+61,CHR$(32);
2120 PRINT$ P(I)+62,CHR$(32);
2130 PRINT$ P(I)+63,CHR$(32);
2140 PRINT$ P(I)+64,CHR$(32);
2150 P(I)+P(I)+1
2160 PRINT$ P(I), CHR$(178);
2170 PRINT$ P(I)+1,CHR$(140);
2180 PRINT$ P(I)+2,CHR$(132);
2190 PRINT$ P(I)+60,CHR$(160);  
2200 PRINT$ P(I)+61,CHR$(134);
2210 PRINT$ P(I)+62,CHR$(151);  
2220 PRINT$ P(I)+63,CHR$(131);
2230 PRINT$ P(I)+64,CHR$(171);
2240 IF P(I) > 376 OR P(2) > 568 OR P(3) > 768 THEN GOTO 2290
2250 REM**********************************************************************
2260 REM*** END OF GAME ***

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Listing continued

2288 REM******************************************************
2299 FOR J = 1 TO 200
2300 NEXT J
2310 CLS
2320 PRINT "WIN";
2330 PRINT: PRINT: PRINT "NAME","RIGHT","WRONG","% RIGHT";
2340 FOR I = 1 TO B
2350 Q = C(I) * 100 / (C(I) + R(I))
2360 PRINT NS(I),C(I),R(I),Q
2370 PRINT
2380 NEXT I
2390 END
2400 REM******************************************************
2410 REM* ENTRING GAME PARAMETERS
2420 REM******************************************************
2430 PRINT: PRINT "BESIDE EACH NUMBER BELOW, ANSWER 'Y' OR 'N' F
2440 PRINT "OR WHETHER OR NOT.
2450 FOR Y = 0 TO 9
2460 PRINT Y;
2470 IF A$(Y) = "Y" THEN 2500
2480 IF A$(Y) = "N" THEN 2510
2490 PRINT "PLEASE TRY THAT ONE AGAIN.
.:"; GOTO 2460
2500 YS = 1
2510 NEXT Y
2520 IF YS = 0 THEN PRINT; PRINT "ALL YOUR SELECTIONS FOR THIS STUDENT CANNOT BE 'N'. TRY AGAIN.
.:"; GOTO 2430
2530 PRINT
2540 INPUT "HOW MANY PEOPLE ARE PLAYING (1 TO 3)";NP
2550 IF NP<1 OR NP>3 THEN GOTO 2530
2560 FOR I = 1 TO NP
2570 PRINT
2580 PRINT "WHAT IS THE NAME OF PLAYER";I;
2590 INPUT NS(I)
2600 PRINT
2610 PRINT "HOW MANY SECONDS SHOULD THE COMPUTER WAIT FOR ";N
2620 INPUT "S";
2630 INPUT "ANSWERS";DT(I)
2640 PRINT
2650 PRINT "WHICH OF THE SIX PROBLEM CODES FOR ";NS(I);
2660 INPUT T WS(I)
2670 IF WS(I) = "A" OR WS(I) = "S" OR WS(I) = "D" OR WS(I) = "M" OR WS(I) = "H" OR WS(I) = "MD" OR WS(I) = "AS" THEN GOTO 2710
2680 PRINT; PRINT "USE ONE OF THE FOLLOWING PROBLEM CODES;
2690 PRINT ";";NOLUM = 100 - ALP
2700 IF NOLUM = 0 THEN PRINT "YOU MUST CHOOSE A CODE.
.:"; GOTO 2650
2710 PRINT "S";
2720 PRINT "M";
2730 PRINT "D";
2740 PRINT "H";
2750 PRINT "MD";
2760 PRINT "AS";
2770 WS(I) = "AS";
2780 PRINT; PRINT "PLEASE TRY THAT ONE AGAIN.
.:"; GOTO 2720
2790 YS = 1
2800 NEXT Y
2810 IF YS = 0 THEN PRINT; PRINT "ALL YOUR SELECTIONS FOR THIS
2820 STUDENT CANNOT BE 'N'. TRY AGAIN.
.:"; GOTO 2430
2830 PRINT: PRINT: PRINT "THE RIDERS IN TODAY'S RACE WILL
2840 BE;
2850 FOR I = 1 TO NP
2860 PRINT TAB(6) NS(I)
2870 PRINT: PRINT: PRINT "GOOD LUCK TO ALL RIDERS!!"
2890 PRINT
2900 PRINT
2910 PRINT: PRINT: PRINT TAB(10) "PRESS ANY KEY WHEN READY TO ST
2920 ART THE RACE"
2930 IF &s = INKEY$ THEN 2920
2940 CLS
2950 RETURN
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80 Micro, February 1983 • 241

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See List of Advertisers on Page 387

80 Micro, February 1983 • 243
Use your computer to translate your messages into an indecipherable mess; then, with this program, you can translate them back again.

Charles Babbage, the father of the modern computer, was an extraordinary cryptologist. Cryptanalysis was to him an extension of his interest in statistics and probability; he was the first to apply algebra to the task of deciphering encrypted messages. While all cryptologists of his day considered polyalphabetic ciphers (those using multiple keys) impossible to break, he cracked them and made it appear easy.

Using the computer to encipher and decipher plain language (plaintext) is a natural. Numerous machines have been designed to do this work over the years, most of them mechanical and electromechanical. There is considerable repetitive, trial-and-error work involved in creating a cipher and returning the cipher to readable form, so this is an ideal application for the computer. And when the truly demanding work of cryptology is involved, when the analyst attempts to discover the key to an encrypted message, the computer can relieve the tedium of searching, comparing, reading the percentages of letter and multi-letter repetitions, and apply bits and pieces of key after key to the unknown cipher.

There is more to deciphering a cryptic message than turning a machine loose on the cipher:ext. There are a number of approaches that sometimes pay off in short order, but more often it takes hours of challenging study and testing of possibilities before the slightest intimation of pay dirt.

The hours spent testing ciphers against possible keys can be reduced to minutes, or even to seconds, by a simple computer program. The simplest cipher is direct substitution of letters. If you lay out a line of alphabet and put below it another line

```
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z | A |---|
```

**Table 1**

```
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |
| A | B | C | D | E | F | G | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X | Y | Z |---|
```

**Table 2**

244 • 80 Micro, February 1983
Program Listing 1

10 ' This program demonstrates that the common trigraph "the"
20 ' requires something over 17,000 "throws" to be selected at random.
30 CLEAR 1000
40 RANDOM
50 FOR X=1 TO 20
60 FOR Y=1 TO 3
70 A$= CHR$(RND(26)+64)
80 B$=B$+A$
90 NEXT Y
100 IF B$="THE" THEN 170
110 PRINT B$""
120 B$=""
130 A=A+1
140 NEXT X

of the same alphabet, you get a cipher key by sliding the lower line one character to the left (or right).

The key to the cipher in Table 1 is wraparound, where the end of a line continues without punctuation onto the next line.

The alphabet slides one letter to the left, and the letter hanging over the edge moves to the other end. If you lay out two alphabets in series, wraparound takes place unobtrusively (see Table 2).

Now the lower alphabet can slide left quite easily, one letter at a time. The ciphertext is created by substituting, letter for letter, the plaintext in the upper row for the letters in the second row. So, to encode the word computer, C becomes D, O becomes P, M becomes N, and so on. The ciphertext becomes 'DPNQYUFS' and is no longer pronounceable.
A-Z 1 / ABCDEFGHIJKLMNOPQRSTUVWXYZ
THIS IS A REPRESENTATIVE PRINTOUT OF A PROGRAM THAT APPEARS IN HARD COPY AS YOU CANSE
ETHER ARE N EITHER SPACE OR PUNCTUATION THE STRAIGHT ALPHABET WILLPRODUCE THIS
SCOPE TO PRINT LANGUAGE AND IT WILL BE ENTERED UNDER MENU OPTION AS
SAME AS TESTING THE PROGRAM ACTION

Fig. 1. Option B Printout

**Program Listing 2**

```plaintext
10 CLS :CLEAR 5000
20 DIM AS(255), BS(26)
30 PRINT :PRINT :PRINT :PRINT :PRINTTAB(20) "CRYPTANALYST'S AIDE No. ONE"
40 PRINTTAB(26) "by Karl Andreassen"
50 PRINTTAB(28) "July 1982"
60 FOR X=1 TO 1000 : NEXT X : X=0
70 PRINT :PRINTTAB(5) "Crypto Aide No.1 affords three optional functions:"
80 PRINT :PRINTTAB(30) "C A"
90 PRINTTAB(5) "The program generates a standard alphabet against which the"
100 PRINTTAB(5) "cipher is compared 26 times, each comparison being slid one"
110 PRINTTAB(5) "letter along the alphabet. The alphabet is then reversed"
120 PRINTTAB(5) "and comparison made at each of 26 positions. " :PRINT
130 PRINT :PRINTTAB(30) "< B >"
140 PRINTTAB(5) "The analyst may enter a unique alphabet from the keyboard."
150 PRINTTAB(5) "It will be tested against the cipher input at 26 succeeding"
160 PRINTTAB(5) "positions, reversed and again compared at 26 positions."
170 PRINT :PRINT :PRINTTAB(30) "< C >"
180 PRINTTAB(5) "The analyst may enter a keyword. The program will construct"
190 PRINTTAB(5) "the unduped balance of the alphabet, for 26 comparisons in"
200 PRINTTAB(5) "forward and 26 in reverse order." :PRINT
210 PRINTTAB(10) "SELECT < A >," :SPACES(10) "NOTE: Program will require up to 60"
220 PRINTTAB(10) ".... < B >," :SPACES(10) "seconds preparation time for each"
230 PRINTTAB(10) ".... < C >," :SPACES(10) "trial, dependent upon input length."
240 PRINTTAB(10) "SUMMARY2(7,46); INPUT AOS"
250 IF AOS="A" OR AOS="a" THEN 280
260 IF AOS="B" OR AOS="b" THEN 290
270 IF AOS="C" OR AOS="c" THEN 300
280 CLS :PRINTTAB(10) "ENTER THE CIPHER UNDER STUDY EXACTLY AS RECEIVED.""
290 PRINTTAB(10) "SPACE BAR OK, BUT NO PUNCTUATION PERMITTED." :PRINT
300 PRINT :PRINT "IF ENTRY COMPLETE BEFORE AUTO CLOSE, TOUCH ASTERISK.""
310 PRINT :PRINT
320 X=X+1 : I=X
330 IF X>255 THEN 400
340 Z$=INKEY$ : IF Z$="" THEN 340
350 IF ASC(Z$)=-32 OR ASC(Z$)=13 THEN PRINT " "; GOTO 340
360 IF Z$="a" THEN 400
370 A$=X$+25
380 PRINT A$:X$;
390 GOTO 320
400 CLS :PRINT "TRANSLATION PROCEEDING NORMALLY."
410 FOR X=1 TO 26
420 A$=AS$+CHR$(X+64)
430 NEXT X
440 IF A$="C" THEN 810
450 FOR Y=1 TO 2
460 FOR X=1 TO 26
470 BS$=BS$+CHR$(X+64)
480 NEXT X
490 NEXT Y
```

"Virtually all ciphertext is sent and received in five-letter code groups."

At this point you can add 26 more cipherkeys by inverting either the plaintext alphabet or the cipherkey alphabet (but not both). You now have a program that will test ciphertext fragments against 51 different substitution keys. With pencil and paper it would take hours; a TRS-80 can do it in minutes.

Program Listing 1 produces a series of three consecutive letters, each randomly produced from the 26-letter alphabet. I've incorporated a word trap that stops the program when "the" is produced by chance, and screens the total number of three-letter groups formed to that point. Pure chance dictates that only once in $26 \times 26 \times 26 = 17,576$ tries will any given three-letter word appear. The selected word could come up the first try, or the program..."
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  Extending a line is as simple as two keystrokes, instantly the cursor jumps to the end of the program line and the editor is placed in the insert mode.

- Delete, copy or move statements:
  All you have to do is mark the line or block of lines and then tell the editor where to move or copy them.

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  Have you ever needed to change a lot of PRINT statements to LPRINTs?

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  Macro keys can cut your programming time in half. You can define each of the 26 letter keys (A-Z) to represent BASIC keywords, or any letter or number combination up to 6 characters per key.

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Listing 2 continued

500 IF A06="a" OR A06="b" THEN 810
510 CILS:PRINT "ENTER TEST CIPHER ALPHABET, 26 CAPITAL LETTERS," 520 PRINT "NO SPACES, NUMBERS, OR PUNCTUATION."
530 PRINT STRINGS(25,46):"1"
540 LINES INPUT BS
550 BS=BS+BS
560 PRINT BS:FOR X=1 TO 1000:NEXT X:X=0
570 GOTO 280
580 CLS:PRINT "ENTER KEYWORD, UPPER CASE ONLY. DO NOT USE A LETTER"
590 PRINT "TICK, AND DO NOT USE THE LETTER 'Z':";K15
600 PRINTSPACES(40);:LINES INPUT K19
610 X=LEN(K15)
620 FOR Y=1 TO X
630 BS(X)=MIDS(K15,Y,1)
640 BS=BS+BS(Y)
650 NEXT Y:X=X+1:N=W:GOTO 670
660 X=X-1
670 GOTO 41
680 IF W>26 THEN 780
690 A5=CHRS(W+64)
700 BS(X)=A5:="Assign letter to an array position"
710 FOR X=1 TO X="Prevent comparison of selection with itself."
720 IF BS(Y)=A5 THEN GOTO 670="If any letter repeated,"
730 NEXT X="selection is cancelled and another made."
740 BS=BS+BS(X)="Accumulate alphabet."
750 IF X>26 THEN GOTO 660="Cut-off selection at full alphabet."
760 IF MIDBS(BS,26,1)="Z" THEN 780 ELSE 770
770 PRINT "PROBABLE DOUBLE LETTER IN KEYWORD -- BEGIN AGAIN:";END
780 BS=BS+BS:PRINT BS
790 FOR A5=1 TO 1000:NEXT A9
800 IF A06="c" THEN X=0:GOTO 280
810 IF Y=1 TO 26
820 Z=Y+25
830 FOR X TO Z
840 CS=CS+MIDS(BS,X,1)
850 NEXT X
860 GOSUB 960
870 NEXT Y
880 IF D=1 AND Y=27 THEN PRINT "BOTH SERIES UNSUCCESSFUL. RESTART."
890 END
900 BS="":FOR Y=1 TO 2
910 X=26 TO 1 STEP -1
920 BS=BS+CHRS(X+64)
930 NEXT X
940 NEXT Y
950 PRINT "REVISED ALPHABET":GOTO 810
960 FOR X=1 TO 26="1 represents total cipher characters input."
970 P=ASCAS(X)):64
980 FS=MIDS(CS,F,1)
990 GS=GS+FS
1000 NEXT XI
1010 PRINT:PRINT "IF PLAIN LANGUAGE APPEARS, EUREKA!"
1020 PRINT "CIPHER ALPHABET HAS BEEN DISCOVERED:";PRINT
1030 IF D=0 THEN PRINT "A-Z"
1040 IF D=1 THEN PRINT "Z-A"
1050 PRINT X-26:"";CS
1060 PRINT:PRINT:PRINT "................NEXT COMPARISON? <Y>""
1070 PRINT ",,ANOTHER CIPHER ALPHABET? <O>"
1080 PRINT "PROCESS SUCCESSFUL DISCOVERY? <P>"
1090 PRINT STRINGS(26,46)"QUIT? <Q>"
1100 AI5=INKEYS:"IF AI5="THEN 1100
1110 IF AI5="Y" THEN CS="":GS="":CLS:PRINT:RETURN
1120 IF AI5="C" THEN 10
1130 IF AI5="P" THEN 1150
1140 IF AI5="Q" THEN END
1150 PRINT "PROMPT MUST BE ANSWERED AS LISTED":GOTO 1100
1160 CLS:PRINT:PRINT:"PRINT SUCCESSFUL CIPHER ALPHABET IS:"
1170 PRINT IF D=0 THEN PRINT "A-ZX-26:";"CS":PRINT
1180 IF D=1 THEN PRINT "Z-AX-26:";"CS":PRINT
1190 INPUT "PRINT HARD COPY <Y/N> ";AS8
1200 IF AS8="Y" AND D=0 THEN LPRINT "A-ZX-26:";"CS"
1210 IF AS8="Y" AND D=1 THEN LPRINT "Z-AX-26:";"CS"
1220 IF AS8="N" THEN 1060
1230 INPUT "PRINT HARD COPY OF PLAINTEXT DISCOVERY <Y/N> ";AS8
1240 IF AS8="Y" THEN LPRINT GS ELSE 1060
1250 GOTO 1060

might run for hours without hitting it:
A quick look at any text reveals that
"the" is a fairly common English word;
sooner or later, pure chance will pro-
duce a three-letter word.

For the odds against a chance arrange-
ment of letters producing four-letter
words, multiply the total above 26.

A message encrypted with the ingen-
uity of a battery of crypto specialists
carries within its framework its own
key. It follows that there is no unbreak-
able cipher, although Stanford Univer-
sity recently announced a computer
coding system believed to be virtually
impregnable against attack by any
analyst.

Thus the challenge: to create the most
secure cipher possible that yet can be
reasonably easy for the intended ad-
dresssee to decipher. And the other
side of the coin: to crack the most care-
fully concealed cipher for its key, and
ultimately, its message.

The Challenge

The give and take of enciphering and
deciphering messages can be called an
intellectual "game," although in mod-
ern dress it can be a game of life or
death, or of fortune played against pos-
sible incarceration. For many it can be
even more exciting than the "invader
from outer space" computer games.

I cannot quite call crypanalysis a
game, but even though it can be a dead-
ly serious undertaking, it is a game to
some people.

Computer data security is one of
those games. The more effective the secu-
ritry programmer, the more likely it is
that he has some kind of experience in
cryptology.

An entertaining and educational
book on crytpology is David Kahn's
It is available in most public and uni-
versity libraries and I highly recommend it.

Cryptaide One

The intent of this series is to use the
computer as a ciphertext tool, as well as
to create and decipher messages. This
first program for reading a cipher with
an unknown key explores the comput-
er's ability to assist in solving substitu-
cion ciphers. Most ciphers are based
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upon a variation of simple substitution, so before you begin to work on any unknown cipher, examine it for simple substitution.

There are three unknowns that must be addressed. If it uses substitution cipher, is the key one of the 51 common variations of strip cipher? Does the cipher key use a regularly interspersed version of the alphabet such as ANBOCPOQ...Z? Is a keyword used as the initial letters of the cipher alphabet?

Cryptanalyst's Aide I produces plaintext and cipher alphabets, so you can examine part of the received ciphertext against the cipherkey, when you make the A menu selection. Then slide the key one space left with each cycle until you have checked all 25 possibilities. Then invert the cipherkey alphabet and examine all 26 reverse-alphabet possibilities one by one.

The text resulting from substituting the ciphertext alphabet for the plaintext alphabet appears on screen, preceded by its serial number. Just above the serial number, either A-Z or Z-A signals the mode, straight or reverse, in which the cipherkey is operating. The resulting text appears without spaces as a solid line. When plaintext appears, it seems to leap out at you, even though at times some of the lines contain only a chance word or two that is recognizable.

The greater the bite of ciphertext that you enter into the program for translation, the more time the computer needs to prepare each of the 51 translations. If you enter a full array of 255 characters, each step takes 55 seconds; this amounts to an hour if none pan out. So only enter from 15-25 letters of the ciphertext initially.

The B menu option allows you to enter an alphabet of your own devising. This is helpful during ciphertext analysis when clues suggest a certain regular alphabet. The indicated alphabet can be entered and the result tested for generation of plaintext against one or all 51 variations of that alphabet. Further, if you discover plaintext from a selected fraction of the ciphertext in the A option, you can enter the discovered alphabet in the B option and enter up to 255 letters of ciphertext to read the message. This can save 10-50 minutes over entering the entire message in the menu A option.

A variation of the standard alphabet

"With the addition of a subroutine similar to that used in this Scripsit dictionary, you could enter the ciphertext... and wait for the computer to crack the cipher."

is the keyword option, choice C on the menu. In this variation, enter a word known to the sender and receiver of the message as the first letters of the cipher alphabet. If any letters are repeated in the word, such as the a in Alaska, omit the redundant letters. The program continues the alphabet from the word's last letter, omitting any letter used in the keyword.

If there is an underlying message in the approach to computer-assisted cryptography, it is to use the computer as a tool, and to increase the creative human effort. Don't rely on the computer to make the critical decisions, although the computer recognizes plain language when it appears, provided the program and the time are available to incorporate this function into your operation. With the addition of a subroutine similar to that used in the Scripsit dictionary, you could enter the ciphertext into the keyboard and sit back and wait for the computer to crack the cipher. Such a program has yet to be written.

Program Construction

Following a standard menu-selection routine, enter the ciphertext into the program beginning at line 320, using the INKEYS loop. It is easier to enter plain language or ciphertext groups as discrete words or groups using the space bar, even though the spaces aren't used. I include this feature for the operator's convenience, and spaces and carriage returns are bypassed by line 350.

When line 330 detects the 255th character, or when the operator touches the asterisk, the command proceeds to the alphabet-generating subroutines beginning at line 400. These subroutines lay the CHRS-generated letters in a string for later use.

Variations on the straight alphabet, where letters are interspersed at 1, 2, 3-or-more-space intervals, are entered at line 530 and used as the cipherkey alphabet instead of the standard alphabet.

When you enter a keyword, it is put through the routine beginning at line 650 and ending at 760 to add the missing letters in alphabetical order for a total of 26 letters. If you enter a repeated letter inadvertently in the keyword, line 770 rejects the entry and asks for a rerun. To accomplish this, the letter Z is unusable in the keyword, and if it does not appear as the 26th letter of the cipher alphabet, the rejection goes into effect. Since most keyword alphabets devised by casual cryptographers end in Z and since there is provision for entry of special keyboards through menu B, the automatic feature is a time saver.

With alphabets ready, the program translates the ciphertext into each version of test text as determined by the cipherkey for a total of 51 (52 including the original alphabet). Lines 900-940 invert the ciphertext; the resultant texts

---

**Fig. 2. Unsolved Crypto Message**

QYQDS CDMDQ CUYUL CQYQQ XMMEB XMNXC NMOIB JMYZC EMLCX JMOZS BCKZQ QXYZQ PMLCW DNOOD QYICD QFPTQ DEQEQQ RIDMY DMYUB QBMZQ QDNPQ CGYXQ MZMIV ECZMX CNMOI BZMZI DQOZQ SXQIO EMYYQ KMXQJ DQYWX XWZDI DKQEQ OJIDM FCCYM CDXJM OIBJX ZQMTX

---

250 • 80 Micro, February 1983
are produced in subroutine 960-990.

The submenu presents four options, each showing on screen the resultant translated text. If at the 26th reverse-alphabet you decide to enter another test key word, touching C reruns the program. If the first option Y turns up plain-language text, then the option P prints out that text. The program does not restrict printer width defaults, so if you want 60-character width and no line skipping at the top of the page, type

SYSTEM "FORMS P = 0 L = 0 W = 60" and answer the three succeed-
ing prompts. And if your eyes won’t stay open any longer, Q awaits your touch.

Karl Andreassen (24750 Chianti Rd., Cloverdale, CA 95425) enjoys electronics and jogging.

---

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See List of Advertisers on Page 387
Reproduce the video display on paper.

LP VII Screen Printout

Soon after I purchased a Radio Shack Line Printer VII, I needed a routine to duplicate the video display on paper. Most routines available for the TRS-80 (such as the built-in shift-downarrow * of the Model III) reproduce only alphanumericics. They usually translate graphic characters into dots.

The short subroutine shown in the Listing duplicates the video display on the Radio Shack LP VII. With the exception of special characters (codes 1-31 and 192-255 for the Model III) the screen is reproduced on paper (Fig. 1).

The LP VII supports two operating modes: character print mode (ASCII decimal 32-127) and graphic print mode. The control code decimal 18 switches from character print mode to graphic mode and control code 30 switches back to character print mode.

The program scans each line of the video display, first in the alphanumeric mode then in the graphic mode. The printing head faithfully reproduces any character and graphic patterns encountered. This routine repeats until the last line of the display is printed. Since this program is written in Basic it will take approximately 15 minutes for a complete screen printout.

**The Key Box**

Basic Level II
Model I or III
16K RAM
Line Printer VII

---

10 "True Screen Print for the LP VII"
20 "by Serge Y. Calmettes"
30 "1306 Kensington Cresc.
40 Belleville, Ont., Canada K8P 4T4
50 "**********************************
60 "The subroutine shown is line 50000
70 "The following is a data demo of this subroutine
80 CLS
90 PRINT$"527,"True Screen Print for the LP VII!
91 A=0:B=127:C=0:D=47
100 FOR X=ATOB$SET(X,C):NEXTX
110 FOR Y=CTOD$SET(Y,B):NEXTT
120 A=A+2:B=B+2
130 FOR X=ATOB$SET(X,D):NEXTX
140 FOR Y=CTOD$SET(Y,C):NEXTT
150 B=B+2:D=D+2
160 IF P=185GOTO100
170 GOTO100
180 FOR X=ATOB$SET(X,C):NEXTX
190 GOSUB50000
200 END

---

Figure 1

Program Listing

---

252 • 80 Micro, February 1983
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CP/M Assembly Language Programming by Ken Barbier. Microcomputers rely on integrated circuits, and now you can rely on the "integrated learning-by-doing" approach in this book. It details the hardware, its operating system, and assembly language programming. Your hands need leave the keyboard only to turn the page. $12.95, paper.

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Fun for the Younger Set

by Safi Bahcall

The Key Box
Model I or III
16K RAM Cassette Basic
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Introduce your 5-year-old to the TRS-80 with these math and word identification programs.

Program Listing 1, Word Program

10 CLS
20 CLEAR 1000
25 DIM A$(50),A2$(50)
30 RESTORE
40 FOR I=1 TO 20 : READ A$(I),A2$(I): NEXT
50 RA=RN=20
60 B$(1)="A":RA$(2)="A2":RA
70 B$(1)="B":RN=4
80 P(1)=242;P(2)=778;P(4)=818
85 PRINTCHR$(23)
90 PRINT$(RN),B$(2)
100 IF RN=0 THEN PRINT$(B$(1))
110 IF RN=1 THEN PRINT$(B$(1))
120 IF RN=2 THEN PRINT$(B$(2))
130 IF RN=3 THEN PRINT$(B$(3))
140 FOR Y=1 TO 47: SET(64,Y): NEXT
150 FOR X=1 TO 127: SET(X,23): NEXT
160 Y$=INKEY$: IF Y$="": THEN 160
165 IF Y$="B" THEN 700
180 IF Y$="D" THEN V=1
181 IF Y$="D" THEN V=2
182 IF Y$="H" THEN V=3
183 IF Y$="J" THEN V=4
190 GOTO 500
200 ' BAD GUESS
210 FOR X=62 TO 67: RESET(X,24): NEXT
220 FOR Y=24 TO 26: RESET(68,Y): RESET(61,Y): RESET(68,Y)
230 RESET(69,Y): NEXT
235 B$="J"
240 FOR I=1 TO 999:NEXT:CLS: GOTO 50
499 STOP
500 ' GOOD GUESS
510 CLS
520 T=191
530 PRINT@351,CHR$(176)+CHR$(176)+CHR$(176)
540 PRINT@313,CHR$(176)+CHR$(176)+CHR$(176)+CHR$(176)
550 PRINT@474,CHR$(188)+CHR$(188)+CHR$(188)+CHR$(188)
Listing continues

I decided that it was about time for my five-year-old sister to start playing with the TRS-80. A program written for her had to be not only interesting but fun—something she enjoyed. I remembered that she had a book of games for tots that she liked playing very much. One of the games was to try to find the different word among a group of words; for example, finding the word "boy" among 10 "boys." I put this game on the TRS-80 and made it simple enough so that my sister could use it. (See Program Listing 1.)

The Word Game

When you run the program, the screen clears and is divided into four sections, with one word in each. Three are the same and one (obviously) is different. You have a choice of pressing one of four keys: Y, U, H, J. These form a box in the center of the keyboard. For the corner on the screen that you think contains the different word, press the respective key. For example, if the odd word is in the top left corner, press the top left key, which in this case is Y. If the answer is right, a smiling face appears. If it is wrong, a sad face appears. If at any time you want a score, just press shift and S. A score will be displayed, including a percentage of correct answers.

The Math Program

I also wrote a math program (Program Listing 2) for my sister. It deals with simple addition. The game is really fun and I enjoy playing it too. My sister liked it so much that my mother had to
bribe her to quit and come to dinner.
When you run the math program, a cup appears in the middle of the screen, one pipe leads to the cup, and another pipe leads away from the cup. At the bottom of the screen there is an addition problem. The problem is to add the two numbers, each between 1 and 7. If the answer is correct, you see a drop moving slowly through the first pipe, then falling into the cup. When the drop hits the bottom, it spreads out, and another level of liquid is added. If the answer is wrong, one level of liquid is erased, and a drop starts moving through the second pipe. Just before the cup overflows, when you have answered at least 12 problems correctly, a smiling face appears, and the whole cup is drained. Then the program starts from the beginning with another problem and an empty cup.

"My mother had to bribe her to quit."

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To obtain all the resolution that is possible with Radio Shack’s Color Computer, you must properly adjust your color television. Those familiar with color televisions know that adjusting Convergem requires a special signal generator to produce the required patterns. These generators are available in manufactured or kit form but are not cheap.

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The program prints a title header and then a menu. Select the desired pattern by pressing the corresponding key. To see another listing of the menu, press M. You don’t have to press the enter key, because the program continuously scans the keyboard, allowing display of the pattern without disruption. Next, select the pattern you need for making the adjustment, and adjust the television in accordance with the manufacturer’s instructions.

You should first adjust gray scale, centering, and height/linearity. Then check purity followed by static convergence at the center of the screen. After adjusting static convergence, recheck purity. The next adjustment is dynamic convergence, using the vertical, horizontal, or cross hatch patterns. This is a time-consuming process, but is well worth it because it pays off in sharp, well-defined lines free of colored fringes. When adjusting the static or dynamic convergence, set the color intensity to minimum.

A word about safety is in order. The high voltages in a color television are lethal and will kill you. If you don’t have experience working inside a television, do not remove the back. Instead, use this program to determine whether or not adjustment is necessary, and call a

---

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Even if you have worked on televisions, but have never done convergence, either call a professional or do it under the supervision of someone who knows how. These adjustments are critical, interactive, and time consuming, and a great deal of practice is necessary to become proficient. If in doubt, get help.

The program consists of several subroutines. Each pattern is generated by a subroutine, and pattern selection is also accomplished by a subroutine. The patterns for centering and color bars are similar to those in the Radio Shack owner's manual.

When the program is first run, it prints the title and then goes to the pattern selection subroutine. It then prints the menu and waits for input from the keyboard. Control is then passed to the pattern-generator subroutine and is then returned to the input routine. Once the pattern is generated in memory for continuous display, the program waits for input from the keyboard. This is accomplished by using the INKEYS function. If you select a new pattern, it will be displayed until replaced. The program runs continuously until terminated by pressing E or break.

You can easily add custom patterns or displays. Add the appropriate characters to the keyboard input routine and write the appropriate subroutines to generate the display.

James Sanford (509 Forest Drive, Casselberry, FL 32707) works for the U.S. Navy. His hobbies include amateur radio and photography.
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This month's installment contains a bonanza of functions: Logical operators, shaping, indexing, and reduction are just a sample.

APL programs (user-defined functions) can be niladic, monadic, or dyadic. A niladic program is called by entering its name only. The programs Fahrenheit and Cone (from Part I of this series) were of this type.

```apl
)DEF FAHREN
1: 32 + (9%5) x CEL

)DEF CONE
1: 'THE AREA OF THE BASE IS'
2: 3.1416 x RAD * 2
3: 'THE VOLUME OF THE CONE IS'
4: (3.1416%3) x (RAD * 2) x HT
```

A monadic program requires one argument. Let's rewrite the program Fahrenheit in monadic form. The first name in the title line is the name of the function, the second is the variable name for the data that will be input.

```apl
)DEF FAHREN CEL
1: 32 + (9%5) x CEL
```

To call a monadic program, type the name followed by the value or values of CEL.

```
Enter: FAHREN 0
```

**Local and Global Variables**

Fahrenheit as written above does not save the Fahrenheit temperature that it computes in line 1. You can correct this by assigning the results of the computation to a variable. That value is then available outside Fahrenheit—it can be used in another operation or called by another program. Change the program to read:

```apl
)DEF FAHREN CEL
1: F = 32 + (9%5) x CEL
2: F
```

The second statement is needed to display the value of F, since the assignment statement does not do that.

Since the variable F is used inside Fahrenheit, and is also available to other programs, it is called a global variable. The variable CEL in this program is a local variable; its value is not available outside Fahrenheit. Prove that to yourself by entering CEL.

In the niladic version of Fahrenheit, the value of CEL must be assigned before calling Fahrenheit. Since it is assigned elsewhere, it can be used elsewhere. It is a global variable.

Another example of a niladic program is the Turtles program presented in Part II of this series. No data is required for Turtles, so it can't be rewritten in monadic or dyadic form. The program uses three variables: ROW1, ROW2, and INDX. Although they originate inside the program, they are
global variables and carry values out of the program when it has been executed.

)DEF TURTLES
1: ROW1=184 190 191 191 188 184 140
2: ROW2=130 129 128 128 131
3: INDEX=1
4: #ROW1
5: #ROW2
6: INDEX=INDEX+1
7: ¬(INDEX<8)/4

If you want the three variables to be treated as local variables, change the form of the title line to )DEF TURTLES; ROW1; ROW2; INDEX.

It's a good idea to treat any variables as local unless you have a specific global purpose in mind. In this way, you can use the variable names in another program without danger that they will carry in unwanted values.

Programs with Explicit Results

Fahrenheit as written can be called directly, but it cannot be used within another operation. To do that, you must rewrite Fahrenheit to produce an explicit result. At first this seems like the version above, but in a program with an explicit result, the form of the title line is different.

)DEF Z=Fahrenheit CEL
1: Z=32+(9/5)°F X CEL

Unlike F in the last example, the variable Z is local; it does not pass its value outside of the function Fahrenheit. Now that the program has an explicit result, you can call it directly (you could do this with the above version, too), or you can use it in another operation or program.

Enter: TEMP=Fahrenheit 10
Enter: TEMP
Result: 50

When a program is written with an explicit result, that result will be displayed. A separate line naming it is not needed.

Reduction

The reduction function is used only with vectors. It uses the slash symbol preceded by another symbol. When combined with a plus sign, all elements of the vector are added. For example, +/5 3 9 7 is evaluated in the same way as 5 + 3 + 9 + 7. The following example computes the mean of five numbers.

Enter: VEC=2 4 6 8 10
Enter: N=5
Enter: (+/VEC)%N
Result: 6

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If the parentheses are omitted, each element of the vector is divided by five before reduction is done. In the example above, the result is the same either way. Usually, however, a reduction operation should be enclosed by parentheses to ensure that reduction is done before the other operations.

Reduction can also be used with multiplication, using the symbols shift X/.

Enter: CUBE+2 3 4
Enter: X/CUBE
Result: 24

Reduction can also be used with subtraction and division, but it is probably better not to try. Because reduction is performed in right-to-left order, the results are hard to predict. For example, % / 36 24 12 6 would be executed in the following way:

12%6=2
24%2=12
36%12=3

It is difficult to think of an application for this computation where the hazards do not outweigh the benefits.

**Reduction with Maximum and Minimum Functions**

Reduction in combination with the maximum function returns the highest number in the vector. Minimum reduction returns the lowest number.

Enter: VEC←1 2 3 4 5 6 7 8 9 10
Enter: H/VEC
Result: 10
Enter: L/VEC
Result: 1

**Reduction with Logical Operators**

AND reduction yields a result of one only if all elements of a vector are one. OR reduction yields zero only if all elements are zero. NAND reduction produces zero if all elements are one; NOR reduction produces one if all elements are zero.

Here is an example of AND reduction:

¬((1 = &/B)/5)
Read: "Go to statement 5 if all elements in vector B are true."

**Index Generator (Monadic)**

The index generator, which uses the symbol shift L, produces a vector consisting of the integers one through the argument.

Enter: L 5
Result: 1 2 3 4 5

The next example combines the sum reduction and the index generator functions. First, a five-element vector is produced, and then its elements are added together.

Enter: +/I 5
Result: 15 (sum of 1 through 5)

**Shape Function (Monadic)**

The shape function produces the number of elements in a vector. When applied to a literal vector, shape works like LEN$ in Basic. It counts the number of characters, including embedded spaces. The symbol is shift P.

Enter: P 'JOHN JONES'
Result: 10

The following example computes the mean of the elements in a vector. It is more efficient than the mean done earlier because you don't have to count and enter the number of elements as a separate value.

Enter: VEC←2 4 6 8 10
Enter: +/VEC% P VEC
Result: 6

**Reverse Function (Monadic)**

This function reverses the elements in a vector. Shift R is the symbol. The example below uses both the reverse function and the index generator. Working from right to left, the index is generated, then it is reversed.

Enter: R ←I 9
Result: 9 8 7 6 5 4 3 2 1

**Reshape Function (Dyadic)**

Reshape (shift P) constructs a vector consisting of identical elements. Its size is indicated by the first argument.

Enter: P 5
Result: 5 5 5 5 5

Reshape can also create a vector consisting of graphics characters. Try P '#191'.

If more than one number or character follows the symbol, they will alternate in the vector that results. Try 60 P '90' - '9'.

The next example shows how the
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The reshape function can be used to duplicate the Basic LEFTS function.

Enter: NAME='1, MISS PIGGY'
Enter: NUMBER=2 P NAME
Enter: NUMBER
Result: 1.

Indexing Function (Monadic)

This function is written like a subscript following a vector name, that is, a value is enclosed in parentheses. The value within parentheses indicates which elements of the vector will be returned. Thus, VEC(4) returns the fourth element of the vector VEC.

More than one value can be accessed. VEC(2:3) produces a vector consisting of the second and third elements of VEC. An expression can also be used within the parentheses. VEC(1 + 2) returns the third element of the vector VEC.

The next example combines multiplication reduction with indexing.

Enter: VEC=1 2 4 8 16 32 64
Enter: X/VEC(2 4)
Enter: Result: 16

The next example selects a random character from a literal.
Enter: LETTERS=ABCDEF

As a way to perform a computation and print the result in a single statement.

Enter: Q=3 + 4 X7 X2
Result: 53

When quad is used on the right side of an assignment statement, it produces an input prompt.

JDEF MULT; ANSI
1: START='10X3=' 2: ANSI=Q
3: (ANS=30)/RIGHT
4: "WRONG"; START
5: RIGHT='YOU ARE RIGHT'.

Line 4 contains two statements separated by a semicolon. If you use multiple-statement lines, be sure the first statement is not a branch or a conditional statement.

To improve the appearance of this program, press the down arrow after 'WRONG'. The repeat question will then appear on a separate line.

Note the format of the title line. ANSI is a local variable because it is named in the title line and separated from the program name by a semicolon.
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Literals can be used with quad, but they must be enclosed in single quotes. A variation of quad is quote quad, produced by typing shift M. Quote quad allows the use of literals without single quotes. No prompt is displayed.

**Membership Function (Dyadic)**

The membership function (shift E) is a way of asking whether a character or a variable is a member of a set. For example, ‘A’E ‘ABCDE’ asks if A belongs to the set ‘ABCDE’. Since it does, a one is returned.

\[ 4 \text{E} \rightarrow 1 \]
Read: “Is a positive integer between 1 and 9?”

\[ 4.2 \text{E} \rightarrow 9 \]
Read: “Is 4.2 a positive integer between 1 and 9?”

In the second example, a zero will result, because 4.2 is not a member of the set.

If the argument to the left of E is a vector, then the resulting vector will consist of ones and zeros, indicating for each element of the original vector whether it is a member of the vector following E.

\[ \text{Enter: DIGITS} \rightarrow \text{‘0123456789’} \]
\[ \text{Enter: ‘R2D2’} \text{E DIGITS} \]
\[ \text{Result: 0 1 0 1} \]

**Take Function (Dyadic)**

The take function (up arrow) strips elements off the left side of a vector.

\[ \text{Enter: LEFT} \rightarrow 1 \text{E 5} \]
\[ \text{Enter: ‘21’LEFT} \]
\[ \text{Result: 1 2} \]

Although you have seen two other ways of duplicating the Basic LEFT$ function, this is the most direct method.

Take can also be used with literals. It could be used, for example, to restrict names in a mailing list to a certain length.

\[ \text{Enter: NAME} \rightarrow \text{‘YOUR NAME IS TOO LONG’} \]
\[ \text{Enter: ‘18’NAME} \]
\[ \text{Result: YOUR NAME IS TOO LONG} \]

Characters can be taken off the right side by using a negative integer with take.

\[ \text{Enter: ‘-18’NAME} \]
\[ \text{Result: R NAME IS TOO LONG} \]

**Drop Function**

Drop (shift, down arrow) also removes elements from a vector, but it removes the remainder of the vector, not the stripped-off items.

\[ \text{Enter: INDEX} \rightarrow 1 \text{E 5} \]
\[ \text{Enter: ‘2HINDEX} \]
\[ \text{Result: 3 4 5} \]

Used with a negative number, drop removes elements from the right side.

\[ \text{Enter: ‘-2HINDEX} \]
\[ \text{Result: 1 2 3} \]

The last example appears to be the same as 3HINDEX. However, there are situations in which only one of the two functions will work. For example, if the length of INDEX is not known, and you want to remove two elements from the left side, only drop would do the job.

**Grade-up (Monadic)**

The grade-up function, like the take function, uses the up-arrow symbol. Use it to arrange the elements of a vector from lowest to highest. The ordering is not done directly by grade-up. Instead, a vector is produced that is the index of the correct order. Here is an example:

\[ \text{Enter: VEC} \rightarrow 2 1 -4 7 3 9 -8 \]
\[ \text{Enter: ↑VEC} \]
\[ \text{Result: 73 2 1 5 4 6 \}

The lowest element of VEC is -8. Since that number would appear first if the vector were rearranged, a seven is the first digit in the index vector, indicating that the seventh element would be the first listed if the vector were reordered from low to high.

To do the actual reordering, use ↑VEC to index VEC, as follows:

\[ \text{Enter: VEC(↑VEC} \]
\[ \text{Result: -8 - 4 1 2 3 7 9} \]

**Grade-down (Monadic)**

Grade-down is the reverse of grade-up. Its symbol is produced by typing shift, down arrow, and it produces an index vector for rearranging the elements of a vector from highest to lowest.

\[ \text{Enter: ↑VEC} \]
\[ \text{Result: 6 4 5 1 2 3 7} \]
\[ \text{Enter: VEC(↑VEC} \]
\[ \text{Result: 9 7 3 2 1 - 4 - 8} \]

Both grade-up and grade-down can be used with literals.

**Index Of (Dyadic)**

This function is used to locate a value within a list. The argument before the symbol, shift I, is the name of the list; the argument following the symbol is the name of the value or variable being searched. When the search is for a literal, it must be enclosed in single quotes.

\[ \text{Enter: NAME} \rightarrow \text{‘GEOERGE P. SMITH’} \]
\[ \text{Enter: NAME} \rightarrow \text{‘P.’} \]
\[ \text{Result: 9} \]

The resulting integer indicates the position of the period character within NAME. If the character appears more than once, only the first position is returned.

\[ \text{Enter: NAME} \rightarrow \text{‘PE’} \]
\[ \text{Result: 2} \]

The next example removes the middle initial from a name. Line 1 locates the initial. Lines 2 and 3 isolate the first and second names through the use of the take and drop functions.

\[ \text{JDEF SHORTNAME: I; F; S} \]
\[ 1: \text{‘ENTER A NAME CONTAINING AN INITIAL’} \]
\[ 2: \text{NAME} \rightarrow \text{‘M} \]
\[ 3: \text{F=NAME\text{‘P’; \}} \]
\[ 4: \text{F=\{I+2\NAME} \]
\[ 5: \text{S=I+1\NAME} \]
\[ 6: \text{F,S} \]

The last program (see the listing) is a true-false test. The main program is called Test, and it uses a subroutine called Answer. The questions are put into the main program, and the answer key is entered in Answer as a vector assigned to the variable KEY. KEY contains ones and zeros corresponding to true and false answers.

Answer receives the student’s response in line 2, converts the letter response to a one or a zero in lines 4 and 6. The response is compared to the answer key in line 7 to determine the appropriate message. In line 11, RES is added to SCORE to accumulate the number of correct answers.

The questions and responses will be easier to read if lines are inserted between them. To do this, press the down arrow before the second single quote in statement 4 of Test, and in statements 8 and 11 of Answer.
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It's up to you to save your planet from the aliens. They've reached the other side of Devil's Tower. Robot Scouts come at you from the mountain, their war machines are firing down the valley, and their protector ships put up force fields to protect them. Your skill and reflexes may protect you. Machine language; good graphics and sound effects. For 1 or 2 players.

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**Demon Seed**

By Sorensen & MacKensiie from Trend

This arcade-style game is only for the strong at heart, who are persistent enough to try and try again until the Demons have been destroyed. Your powerful war cruiser has high energy missiles and defensive shields. Can you develop the skill to defeat them, and conquer the 3 special challenges? For 1 to 2 players.

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**FroGger**

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Written for the beginner or experienced user, this book explains what the floppy disk drive system is, how it works, how the disk I/O and interrupt functions should be incorporated into a working system, and how you can use it more easily and efficiently. Each function and operation described is illustrated with source code and flow chart. Includes information on complete disk I/O driver routines (Model I and III), small disk operation systems (SOS); all about TRSDOS file I/O.
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Twinkle, Twinkle, Little Star

by Bill Grout

Who says a computer can’t write? With a little bit of help from you, and some imaginative graphics, the TRS-80 becomes a poet.

Program Listing 1. “In a World Like This One”

5CLS
10PRINT"IN A WORLD LIKE THIS ONE"
20PRINT"By Bill Grout"
30FORX=1TO800:NEXTX
40CLS
45PRINT"For my parents"
46FORX=1TO800:NEXTX
47CLS
50FORX=1TO800:NEXTX
60PRINT"You don’t believe you did much in life"
70FORX=1TO1000:NEXTX
80PRINT"But it isn’t true"
90FORX=1TO700:NEXTX
100PRINT"in a world like this one"
110FORX=1TO1000:NEXTX
120CLS
130FORX=1TO200:NEXTX
140PRINT"You raised six honest and hard working sons and a daughter"
150FORX=1TO1200:NEXTX
160CLS
170FORX=1TO400:NEXTX
180PRINT"who are not perverts or criminals"
190FORX=1TO800:NEXTX
200PRINT"Nor who have psychological problems"
210FORX=1TO800:NEXTX
220CLS
230FORX=1TO500:NEXTX
240PRINT"nor who love power";FORX=1TO400:NEXTX
250PRINT":";
260FORX=1TO200:NEXTX

PRINT:PRINT"or"
270FORX=1TO400:NEXTX

Computers can read poems to you with surprisingly effective results. In fact, a computer can inject motion and graphics into a poem, offering avenues of expression not yet explored.

Professional poets may soon look into writing computer poems if for no other reason than to prove they can be technological, too. All you need to know is a little about programming in Basic.

Select a poem that you like; I selected a poem called “The Star” because I thought the computer could easily add graphics. When I began programming “The Star” on the computer, I discovered several things.

First, lines of the poem should appear on the screen, stay there long enough for the reader to understand them without being rushed, then they should go off and new lines appear. How much of the poem appears on the screen at a time varies to make the reading more inter-

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Displaying long blocks of words was less interesting to read than short segments of the poem that change regularly.

By programming the lines in a certain rhythm, you can imitate the way a poem might actually be read. It also allows you to project movement on the screen, something that no printed page allows.

The main programming problem is getting the rhythm of the display to read correctly. You can alter the length of time a line stays on the screen by using a print statement, then creating a pause using a For...Next loop. By experimenting, you can space the lines of poetry with different lengths of pauses. I found that I frequently use the following For...Next statements:

```
FOR X = 1 TO 1000: NEXT X
FOR X = 1 TO 800: NEXT X
```

Because I was typing in these two statements quite often, I made them into subroutines and referred to them with GOSUB statements.

If you refer to lines 10-40 of "The Star" program you will see that I begin with the title and my name, and then use the pause subroutine twice. This gives the viewer time to read the title and to create a short pause before the poem begins. In essence, determining how long the viewer will see the lines displayed on the screen is the major programming task. Because the length of the lines of poetry change, you have to experiment with different sizes of For...Next loops.

You must also consider where the lines will appear on the screen. Lines 10 and 20 place the title and author of the poem in the upper left corner. With lines 50 and 70, you can position the poem’s lines to the right, toward the center, by adding blank spaces within the quotes of the print statement. By using a statement like:

```
10 PRINT "" "" THE STAR"
```

you could print the poem’s title two lines down and 10 spaces to the left. In this way you can position the lines where you want them vertically and horizontally. You can also use PRINT@ statements as in line 310 to print "Venetian blind." Because I was unfamiliar with the display positions of PRINT@ statements, I just typed blank spaces between quotes to put text where I wanted. PRINT@ statements are invaluable if you want certain graphics effects, and I use a number of PRINT@ statements in "The Star."

Graphics effects are part of the fun of putting a poem on the screen. Because the poem is about stars, I thought a star or two falling out of the sky would be interesting. This happens in lines 130 and 140.

You’ll find a second attempt at graphics in lines 290-340. Here I tried to compare looking through falling snow to looking through a Venetian blind. You decide if this graphics display is effective. Whatever the result, your imagination and your programming abilities can add motion and interest to a poem.

One thing worth mentioning is what you don’t see on the screen. Because things turn on and off, the reader has to be assured that there will be enough time to understand the text before it scrolls off screen. And, when it disappears, the reader may need time to think about it. Therefore, between segments of the poem, you can place For...Next loops that leave the screen blank and give the reader time to reflect. Just as a comedian needs timing to tell a joke and get a laugh, you can improve the punch lines of your poem by lengthening or shortening the time before the next lines appear.

"The Star" may not be a masterpiece, but if you’re like me, you will enjoy experimenting with the computer and seeing your name in lights.

Bill Grout can be reached at 380 Channing Way, #171, San Rafael, CA 94903.
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80 Micro, February 1983 • 275
Program Listing 6. “The Star”

```
10 CLS:PRINT"THE STAR"
20 PRINT"by Bill Grout"
30 GOSUB 8000
40 CLS:GOSUB8000
50 PRINT"At midnight";"first line of poem
60 FOR X=1 TO 550:NEXT X
70 PRINT"a star"
80 GOSUB8000
90 PRINT"Maybe its your star or your star, we are not sure"
100 FOR X=1 TO 1680:NEXT X
110 CLS:PRINT"Plumeted from the sky"
120 GOSUB8000
130 FOR X=1 TO 800:STEP 64"First starfall"
140 PRINT",","","":NEX
150 PRINT"Leaving behind it the sparkling streak of"
160 FOR X=1 TO 600:NEXT X
170 CLS:PRINT"Where the star fell":FOR X=1 TO 1000:NEXT X;PRINT"Where"
180 "was undetermined"
190 GOSUB8000
190 PRINT"And so we have gone searching"
200 FOR X=1 TO 2080:NEXT X
210 CLS:PRINT"But some were thrown up like jack straws"
220 FOR X=1 TO 1380:NEXT X;PRINT"by the impact":FOR X=1 TO 700:N
230 PRINT"And came down every way and other craters"
240 GOSUB 1600
250 PRINT"From previous stars confuse the issue"
260 FOR X=1 TO 1200:NEXT X;CLS:FOR X=1 TO 800:NEX
270 PRINT"And then the snow comes abrupt"
280 GOSUB1600
290 FOR X=1 TO 6"Snowfall"
300 FOR X=1 TO 50:NEXT X
310 PRINT0800+(X*64);"a venetian blind"
320 IF X=6 GOTO350
330 PRINT4800+(X*64);"a venetian blind"
340 NEXT X
350 GOSUB1600
360 CLS:FOR X=1 TO 340:NEXT X
370 PRINT"And this is how you lost you"
380 GOSUB1600
390 PRINT"Another star fell"
400 GOSUB8000
410 FOR X=1 TO 10"Starfall #2"
420 PRINT080+(X*64);","","":CLS
430 NEXT X
440 PRINT"Perhaps yours."
450 FOR X=1 TO 1200:NEXT X
460 PRINT"You stopped to gaze out over the line"
470 FOR X=1 TO 1400:NEXT X
480 CLS:FOR X=1 TO 580:NEXT X
490 PRINT"Many of us were still in the tops of the trees"
500 FOR X=1 TO 1680:NEXT X
510 CLS:FOR X=1 TO 480:NEXT X
520 PRINT"And it was at that moment that you conceived the"
530 "science"
540 GOSUB1600
550 CLS:FOR X=1 TO 340:NEXT X
560 PRINT"to let go"
570 PRINT"to not try to possess the star"
580 GOSUB1600
590 PRINT"to create a final beauty"
600 FOR X=1 TO 900:NEXT X
610 FOR X=640 TO 1 STEP -67"Sparklerfall"
620 PRINT0800+(X*64);"CHR$(42)"
630 IF X<480 GOTO 650
640 CLS:NEXT X
650 FOR X=480 TO 600 STEP 67
660 FOR Y=1 TO 700
670 FOR X=480 PRINT$(X-X-X+15);"CHR$(42)"
680 NEXT Y
700 CLS:NEXT X
710 PRINT4444;"(( ()")";PRINT4444;"(( ()")
720 PRINT0000"
730 CLS:GOSUB8000
```

Program Listing 7. “Don’t Read This Poem”

```
10 CLS
20 PRINT"DON'T READ THIS POEM"
30 PRINT"By Bill Grout"
40 FOR X=1 TO 888:NEXT X;CLS:FOR X=1 TO 800:NEXT X
50 PRINT:PRINT:PRINT
60 PRINT"Do not read this there you did it, damn."
70 FOR X=1 TO 1000:NEXT X
80 CLS:PRINT "Now please"; FOR X=1 TO 380:NEXT X; PRINT "don't"
90 FOR X=1 TO 900:NEXT X
100 CLS:PRINT "You're screwing up my poem, you're supposed"
110 FOR X=1 TO 700:NEXT X; PRINT"to leave one line unread try ag"
120 FOR X=1 TO 580:NEXT X
130 PRINT "Don't finish this!": FOR X=1 TO 700:NEXT X; PRINT "*
140 PRINT "Hello, you packed in a teacup"
150 FOR X=1 TO 888:NEXT X;CLS:FOR X=1 TO 1000:NEXT X
160 PRINT:PRINT
170 PRINT "Thanks for your cooperation"
180 FOR X=1 TO 1000:NEXT X
200 CLS:FOR X=1 TO 800:NEXT X
```

Program Listing 8. “Poem of Hope”

```
10 CLS
20 PRINT "POEM OF HOPE"
30 PRINT "by Bill Grout"
40 FOR X=1 TO 800:NEXT X;CLS:FOR X=1 TO 800:NEXT X
50 PRINT "If you can face a tree beside my bed,"
60 FOR X=1 TO 900:NEXT X
70 PRINT "I sleep with a tree beside my bed,"
80 FOR X=1 TO 800:NEXT X
90 PRINT "a tree for you"; FOR X=1 TO 800:NEXT X
100 PRINT "next to my pillow"
110 FOR X=1 TO 900:NEXT X
120 PRINT "is a tree big as your wrist"
130 FOR X=1 TO 900:NEXT X
140 CLS:FOR X=1 TO 480:NEXT X
150 PRINT"A tree full grown the site of an Easter chick"
160 FOR X=1 TO 10100:NEXT X
170 PRINT"An oak in a teacup"
180 FOR X=1 TO 900:NEXT X
190 PRINT"And its limbs don't blow in the wind"
200 FOR X=1 TO 1000:NEXT X
210 CLS:PRINT:PRINT
220 PRINT"And they blow in the prayers."
230 FOR X=1 TO 1000:NEXT X;CLS:FOR X=1 TO 800:NEXT X
240 END
```

Program Listing 9. “My Poetry”

```
10 CLS
20 PRINT "MY POETRY"
30 PRINT "by Bill Grout"
40 FOR X=1 TO 800:NEXT X;CLS:FOR X=1 TO 888:NEXT X
50 PRINT "YOUR poems lack"
60 FOR X=1 TO 888:NEXT X; PRINT "CONTENT!"
70 FOR X=1 TO 800:NEXT X
80 PRINT"everybody tells me"
90 FOR X=1 TO 500:NEXT X
100 PRINT;"What can I do?"
110 FOR X=1 TO 480:NEXT X
120 PRINT
130 PRINT;"I think"
140 FOR X=1 TO 340:NEXT X
150 AS="potato peelings";BS="scotch tape";CS="living bras"
160 GOSUB2000
170 CLS:FOR X=1 TO 340:NEXT X
180 PRINT
190 PRINT;"What can I do?"
200 AS="Nasturtiums";BS="toilet paper";CS="iron on patches"
210 GOSUB2000
220 CLS:FOR X=1 TO 340:NEXT X; PRINT "I need to talk"
230 PRINT;"to one of the masters"
240 FOR X=1 TO 900:NEXT X
250 PRINT;"What if it's my heart?"
260 FOR X=1 TO 380:NEXT X
270 AS="bamboos";BS="meriweather";CS="back door"
280 GOSUB2000
290 CLS:FOR X=1 TO 480:NEXT X
300 PRINT
310 PRINT;"I think"
320 FOR X=1 TO 700:NEXT X
330 AS="Barley";BS="pig icon";CS="mistletoe"
```

Listing 5 continues

740 PRINT0444;"like children throwing sparklers"
750 FOR X=1 TO 1288:NEXT X
760 CLS:FOR X=1 TO 1288:NEXT X
770 END
780 FOR X=1 TO 1000:NEXT X
1010 RETURN
800 FOR X=1 TO 2000:NEXT X
8010 RETURN

Listing 6 continues

18 CLS
20 PRINT"DON'T READ THIS POEM"
30 PRINT "by Bill Grout"
40 FOR X=1 TO 888:NEXT X;CLS:FOR X=1 TO 800:NEXT X
50 PRINT:PRINT:PRINT
60 PRINT"Do not read this there you did it, damn."
70 FOR X=1 TO 1000:NEXT X
80 CLS:PRINT "Now please"; FOR X=1 TO 380:NEXT X; PRINT "don't"
90 FOR X=1 TO 900:NEXT X
100 CLS:PRINT "You're screwing up my poem, you're supposed"
110 FOR X=1 TO 700:NEXT X; PRINT"to leave one line unread try ag"
120 FOR X=1 TO 580:NEXT X
130 PRINT "Don't finish this!": FOR X=1 TO 700:NEXT X; PRINT "*
140 PRINT "Hello, you packed in a teacup"
150 FOR X=1 TO 888:NEXT X;CLS:FOR X=1 TO 1000:NEXT X
160 PRINT:PRINT
170 PRINT "Thanks for your cooperation"
180 FOR X=1 TO 1000:NEXT X
200 CLS:FOR X=1 TO 800:NEXT X
```

Listing 7 continues
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80 Micro, February 1983 • 277
Program Listing 10. “Get ‘Em”

10 CLS
20 PRINT "Print ‘time magazine article’"
30 PRINT "By Bill Grout"
40 FOR X=1 TO 880:NEXT X
50 PRINT:"The newest thing in the United States is:";PRINT:"PRINT"
60 FOR X=1 TO 1000:NEXT X
70 PRINT;"they’re frying!"
80 FOR X=1 TO 1000:NEXT X
90 CLS;PRINT;"They’re frying!"
100 RETURN

Program Listing 11. “Chickens”

10 CLS
20 PRINT "PRINT ‘chickens’"
30 PRINT "By Bill Grout"
40 FOR X=1 TO 880:NEXT X
50 PRINT:"Chickens are:";PRINT:"FOR X=1 TO 40";
60 FOR X=1 TO 880:NEXT X
70 PRINT;"creeps"
80 GOOSUB8888
90 FOR X=1 TO 700:NEXT X
100 PRINT;"for X=1 TO 1000:NEXT X"
110 IF X=3:GOOSUB256:"print256;"
120 NEXT X
130 FOR X=1 TO 880:NEXT X
140 CLS;FOR X=1 TO 400:NEXT X;PRINT#:040;"They wouldn’t believe it"
150 PRINT;"even if you told them you"
155 PRINT;"were frying"
160 FOR X=1 TO 700:NEXT X
170 PRINT;"their mother"
179 PRINT;"for X=1 TO 1200:NEXT X"
180 CLS;GOOSUB8888
200 END
208 FOR X=1 TO 900:NEXT X
300 RETURN

Program Listing 12. “Time Magazine Article”

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- 16 CLS
- 20 PRINT "PRINT ‘TIME MAGAZINE ARTICLE’"
- 30 PRINT "By Bill Grout"
- 40 FOR X=1 TO 880:NEXT X
- 50 PRINT:"The newest thing in the United States is:";PRINT:"PRINT"
- 60 FOR X=1 TO 1000:NEXT X
- 70 PRINT;"they’re frying!"
- 80 FOR X=1 TO 1000:NEXT X
- 90 CLS;PRINT;"They’re frying!"
- 100 RETURN

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Mod II Random Access

Terry Kepner
P.O. Box 481
Peterborough, NH 03458

While writing programs for the Radio Shack Model II recently, I have developed a few migraine headaches and discovered some disquieting facts about its Basic and TRSDOS’s Random Access (also called Direct Access) files interaction. The facts giving me these headaches deal with Field statements, buffers, and how TRSDOS and Basic mishandle these items.

When I began using the buffers Model II Basic uses to place and then retrieve information from the disk random-access files, I followed the instructions in the Tandy manual. These instructions explain how to use the Field statement to tell Basic how to divide the buffer into separate fields of information, and determine how many different items are in the buffer, as well as how many bytes are in each of these items through the RSET and LSET commands. Once Basic is told how to divide the buffer, you can put data into it or remove data from it.

When you have filled the buffer, transfer the data to the disk file. To use that information later, Get a sector (256 bytes of data) and Basic will place it into the buffer. You can change the Fielding of the buffer as often as you want; however, to divide the buffer and recover your information, you must use the same Field arrangements (not necessarily the same Field statement) you used when you Put that information on disk in the first place.

Fielding Buffers

I was storing a rather large inventory of items on disk, arranged by product number, name, price and a set of eight numbers, some single precision and some double precision. At this point I was loading the file with only the product names and their respective numbers. Rather than manipulate the numbers, I ignored them and Fielded only the portions of the buffer needed. When I read this file back into memory to verify the program and my data were correct I discovered errors.

Even though I had not initialized the prices or quantities to any values, the files contained outrageous numbers, seven and 16 digits in length, with incredible exponents.

It took a few minutes to trace the problem. When Basic assigns a space in memory to be a buffer, it does not set the buffer to zero, but leaves the memory unchanged. This means the buffer contains garbage, usually alternating sets of 00 and FF. Fielding a buffer assigns a variable name to a number of $C$, and $D$ remain unaffected. When you transfer the data in this buffer onto the disk, all four chunks are written. If you put data into $B$ without clearing the buffer, the next time you transfer this buffer to the disk the information in $A$ will be written to disk again. Unless you are writing to the same sector as before you will have problems with your data.

When you Set new data into $A$, it replaces the information already there. Likewise, when you Get a sector of information from the disk and place it into the buffer it replaces the data there. Altering the buffer when Getting a new buffer of information or Setting data into specific portions of the buffer allows you to load a sector from the disk, make the necessary changes and put the information back on disk. A problem arises only when you perform a series of Put operations which involve changing parts of the buffer, such as when you build a mailing list, or use the buffer for the first time after initializing Basic.

In these cases remember to set the buffer equal to nothing—(CHR$(0)). Use blanks (CHR$(32)) only if you are not using numbers—in the buffer. blanks are interpreted as numbers and not

"Fielding a buffer assigns a variable name to a number of contiguous bytes in the buffer."

280 • 80 Micro, February 1983
as zeros, CHR$(0) is interpreted as the number zero for integer, single precision, and double precision numbers.

Discovering that I had to set the buffer to nothing led directly to my next headache and the next problem.

According to the Model II manual the variable names in the Field statement are called Field names, and the manual explains: "Most string variables point to an area in memory called the string space. This is where the value of the string is stored. Field names, on the other hand, point to the buffer area assigned in the Field statement."

Since the buffer contains 256 bytes and Field names in the Field statement identify buffer space and not string variables elsewhere in memory, it seems logical to set a buffer equal to 256 bytes of any character, for example, CHR$(0).

This is not so, however; you must use two or more Field names to cover the entire buffer, such as:

FIELD #1, 256 AS D16, 1 AS D28
LSET D16 = STRING$(256,CHR$(0))
LSET D28 = CHR$(0)

Another Problem

I wanted an indication as to when I had reached an empty record in the file. I checked to see if D16 = "" (the null set, nothing). I found 256 bytes of nothing (length of D16, according to the function LEN(D16), was zero) was not equal to the null set: Surprise!

I tested to see if D16 was equal to CHR$(0); this worked.

My program lists a series of sectors to the video as an array. This array is spread over five sectors, and contains 19 elements. The first 64 bytes of the first sector is a general information area, and not part of the array. The second, third and fourth 64-byte chunks of the first sector are array elements one, two, and three. The remaining four sectors are divided into four chunks of 64 bytes each and comprise the other 16 elements of the array.

To save time I stored the number of active elements as a piece of data in the general area of the first sector. Only the necessary sectors are read when listing to the video. This is a real time saver when the last 17 elements are all blanks.

Several places require the array to be listed to the video, so I made the listing routine into a general purpose subroutine. Without specifically setting a flag and testing for it, I did not know how many elements had been listed to the video after returning from that subroutine. My program simply returned to sector 1 each time the subroutine was executed.

That was where the problem came up. Whenever I returned from the listing routine, I set the buffer equal to zero to eliminate the possibility of contaminating my data and reloading the buffer with sector 1.

As long as I had four or more entries from my array listed on the video, my update routine worked well. If less than four were listed to the video, not only did it not update as I wanted, but the routine erased much of the information in the first sector. I traced the problem—TRSDOS and Basic will not let you get the same sector consecutively.

If you Get sector 1, use the data and decide to set the buffer to zero (or blanks), and then try to Get sector 1 again, it will not work! To save processing time, TRSDOS intercepts the Get command and won't return you to the same sector twice. You are left with a buffer of spoiled data you cannot replace unless you load the buffer with dummy information and then return to the sector you want and load it on top of the unneeded data. You end up using twice as much processing time as intended, not to mention the extra coding necessary to determine if you have to use this dummy load technique to get your data into the buffer.

I have not had any further troubles with this null set complication. With this article as a guide, you shouldn't have any problems either.

Terry Kepner is a free lance programmer and writer. He writes a column in Programmer called "Overbyte" and a column in 80 Micro called "Feedback Loop."

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Radio Shack's disks for the Color Computer cost $599. You get a ROM pack, a 35 track double density disk drive, a two-drive cable, a reasonably well-written manual and a free (?) disk.

The ROM pack is about 6 1/4" by 4 1/4" and slips into the ROM cartridge slot on the right of the computer (where the games go). The disk cable connects to the end of the pack and runs to the drive(s).

Inside the ROM pack (see Fig. 1) is a printed circuit board approximately 5" by 3 1/2". The screw to the ROM pack is concealed beneath the label just after the period in "CAT NO." You will discover a ROM for the entire disk operating system (nothing resides on the disk at all) a double density disk controller, a few pots (which you probably should not touch), a crystal and some auxiliary circuitry.

The disk drive is 35 track double density. Imagine our surprise when we discovered that this Color Computer mini disk also worked fine on our Model I computers. Not only that, but our Model I disk drives worked fine on the Color Computer—and double density at that! Wow! This raises an interesting question: Will Radioshack ever start selling the ROM pack by itself for those of us who already own disk drives? Apparently they do not at the present time.

The system is shipped with a two-drive cable, but it can handle four. The four-drive cables are available from the Shack.

The manual is well put together. It covers setting up the disk system, general description of how programs/files are stored on a disk, interacting with the disk, sequential files, direct access (random) files and some technical information.

Each of the 35 tracks on the disk is divided into 18 sectors of 256 bytes. The system assigns disk space in granules—blocks of nine sectors (half a track). Therefore each granule contains 2,304 bytes, each track 4,608 bytes and the entire disk contains 161,280 bytes. The user available disk space (excluding the directory) consists of 156,672 bytes. If Radio Shack had given us 40 track double density drives, we would have had 179,712 bytes. And if they had given us 80 tracks...

Unlike the Models I and III, the Color Disk system does not have a DOS (Disk Operating System) mode. You are always in Disk Basic. The operating system uses about 2K of RAM leaving a 16K system with 6439 bytes and a 32K system with 22823. If you will not be using any high resolution graphics, you can do "P.MODE=0,1; P.CLEAR1" and have 11047 (16K) or 27431 (32K).

The lack of a DOS mode poses some inconveniences. You cannot list data files and you cannot run a particular program automatically. A partial solution to the former problem is our program Colorzap included in this article. There seems to be no software solution to the latter problem.

System Software

The system software on the ROM pack consists of DSKINI, Backup and Copy. The phrasing of these commands is:

DSKINI drive number
BACKUP source drive (TO destination drive)
COPY file name 1 TO file name 2

DSKINI is the equivalent of Format on the Model I. For instance, DSKINI0 formats the disk in drive zero (in about 40 seconds).

You can back up a disk on a single drive or from one drive to another. A back-up with a single drive 32K system requires six disk swaps.

COPY, as the name implies, copies a file. For example:

COPY "COLORZAP/BAS" TO "COLORZAP/BAS"
COPY "COLORZAP/BAS" TO "COLORZAP/BAS1"

Incidentally, as the manual indicates, all files must have an extension. The system assigns default extensions of BAS to Basic programs, BIN to machine-language software and DAT to data files. You may use your own extensions instead. If you save a Basic program as COLORZAP, it would appear in the directory as COLORZAP BAS. (Note that the slash does not explicitly appear in the directory. You may use either a slash or a period as the extension separator.)

You could run or load the program as just COLORZAP. However, when copying the program, be sure to specify the extension in both the source file name and the destination file name because the Copy utility will not assign them for you. As an example, suppose we had COLORZAP/BAS in the directory. COPY "COLORZAP" TO "COLORZAP/BAS" would produce an NE (no such file in directory) error. We forgot the extension in the source file name. COPY "COLORZAP/BAS" TO "COLORZAP/BAS" would work just fine. Unfortunately, LOAD "COLORZAP" will not work since it does not have an extension on the disk. We omitted the extension during Copy. You could retrieve it with LOAD...

The Key Box

Color Disk Basic
Color Computer
16K RAM
One disk drive
Interactive Disk Commands

I will now describe those commands you use to interact with the disk drive(s). If you are familiar with other systems you will recognize these to be a mixture of DOS and Basic commands. However, in the Color Computer environment, these are all Basic commands. Most, if not all, can be used within Basic programs to add zip to your software which was not always possible with the Model I. For instance, you can display the directory, ask for the amount of free space, rename a data file, and so on.

Many of these commands are fairly similar to their Model I and III counterparts. However, there are some specific differences.

The command Drive followed by a drive number allows you to change the default drive the system uses—provided that you have more than one drive. The drives are numbered from 0 to 3 (maximum). Under normal circumstances, the computer will look at drive 0 (the default drive) when loading, saving, and so on. By using the Drive command, you can specify that the system use a different drive. It is important to note that the Color Disk system looks at only one drive. For instance, in a multi-drive Model I system, if you request LOAD "COLORZAP", the computer will look through all of the drives starting with drive 0 until it finds the program. This is not true with the Color system. If it does not find it on the default drive, it is not there! (Unless you include a drive number with the file name.)

The command Save followed by a file name, A, saves the program in memory to the disk using the file name given. Remember that if your file name does not contain an extension, the computer will assign /BAS. Note that the file name can include a drive number. For instance, SAVE "COLORZAP" would save the program in memory as COLORZAP/BAS on the default drive, whereas SAVE "COLORZAP/V:15:1:2" would save it as COLORZAP/V:10 on drive number one.

The optional "A" appendage will save the program in ASCII format. This is necessary if you intend to merge the program with another program later.

You load a program with the command Load followed by a file name, R. Remember to include the drive number in the file name if the program you want is not on the default drive (normally drive 0). The optional "R" appendage will run the program after it has been loaded into memory. In addition, any files which were open before you issued this command will remain open.

The command Run followed by a file name, R, loads and runs the given file name from the disk. The optional "R" leaves open files open as above. You need not specify the extension when loading or running unless you assigned an extension other than /BAS. In other words, even though the program is saved to disk as COLORZAP/BAS, you can LOAD "COLORZAP" or RUN "COLORZAP" without the extension.

You cannot load or run a string. If you let A$ = "COLORZAP", you cannot then RUN A$.

When you want to save machine language programs presently held in memory, use the command SAVEM followed by a file name, first address, last address and execution address. As indicated, you must supply the first, last and execution addresses for the program. If you do not specify an extension in the file name, the computer will assign /BAS for binary.

The command LOADM followed by a file name, offset address loads the machine language program from disk. You would then run the program by typing EXEC to execute it. If you specify the optional offset address, the computer will locate it at the original first address plus the offset address. The program must be relocatable if it is going to be able to function at this new location.

The default in the Color system is VERIFY OFF, whereas in the Model I the default is ON. Verify double-checks all writes to the disk. This provides greater reliability, but it takes about twice as long. Unless you are experiencing problems with loading files, you probably do not need VERIFY ON.

DIR lists the directory for the disk (default drive). To see the directory on a specific drive, include the drive number appendage. A sample directory is shown below:

```
COLORZAP BAS 0 B 2
MENU BAS 0 A 2
DRAGON DAT 1 A 1
VIDETEX BIN 2 B 1
```

The first eight characters are the file name. Then there is a space followed by the extension. (As mentioned above, the slash or period before the extension is not indicated on the disk itself.) There are then three columns of information.

The first column shows the file type.

0—Basic program
1—data file
2—machine-language program
3—editor/assembler source program

The next column indicates the storage format of the file:

A—ASCII
B—Binary

And the last column shows the number of granules assigned to the file.

There are some problems with the directory. The directory keeps scrolling on the screen. In order to stop it, you have to press shift, @. A disk can contain up to 68 files, so on a really
full disk, you may have to list the directory several times before locating the file you want. Sixty-eight files is the equivalent of five screens zipping by at a good clip. Even speed readers will experience problems. At three in the morning, virtually all programmers will experience problems reading the directory. Radio Shack should have included a stop-between-screenfuls feature.

A reasonable solution to this problem is our Menu program included with this article. It closes up the spacing between the file name and the extension and includes the slash. We have eliminated three columns of information. Programs are sorted alphabetically. We eliminated scrolling and you can even run a Basic program from the menu.

The Free function requires the drive number. Free by itself is considered a syntax error. PRINT FREE(0) will display the number of free granules on drive 0. Unlike the Model I, the Free command operates on only one drive at a time. It does not indicate the free space on all the drives, only the drive you request. Note that this is a function, not a command! You can state:

```
X = FREE(0)
P = SOR(FREE(0))
```

and so on.

The command Kill followed by a file name removes the file from the directory and frees up the space which had been assigned to it. You must include the extension when killing a file from the disk. KILL "COLORZAP" would not work—KILL "COLORZAP/BAS" would.

The command Rename followed by old file name to new file name changes the name of a file in the directory. Be sure you include the extension in both the old file name and the new file name. It follows the rules pointed out in the Copy utility above.

The command Merge followed by a file name, _R_ merges the file from disk with the program currently in memory. You must have saved the file with the ".A." (ASCII) appendage. Any duplicate line numbers will be replaced by the ones from the merged file. If you include the optional "R", the resulting program in memory will be run and any files open before the merge will remain open.

The manual suggests you type the command Unload followed by a drive number before removing a disk from the drive. It closes any files on the specified drive. The drive number is optional; if not included, the Unload will operate on the default drive.

**Disk File Commands**

The Color system allows the user both sequential and direct access (random) file formats. The Color system uses commands similar to the Models I and III. They are as follows.

The default values are two buffers (1 and 2) and a buffer size of 256 bytes. If you need a different number of buffers or a different buffer size, use the command Files followed by buffer number and buffer size. The buffer size seems to be the total amount of buffer space available, not the amount per buffer. There is also a File Control Block (FCB) of 281 bytes per buffer.

To open a data file for processing use the command Open followed by "mode", buffer number, file name and record length. The modes are:

- "O" Output—Sequential output
- "I" Input—Sequential input
- "D" Direct—Random input and/or output

Next is the number of the buffer to be used.

Buffer 0—screen or keyboard
- Seems to be opened and closed automatically by ordinary Prints and Inputs.
- User seems to have no control over this.

Buffer 1—tape recorder
- "R" printer
- Buffer 1-15—disk files

Then supply the file name and optionally the record length if using direct access files. You can have record lengths less than 256 or greater than 256 if desired. This eliminates the Model I random file hassle of having to calculate the starting positions of logical sub-records.
THE ULTIMATE IN COLORCOMPUTING
For the TRS-80 Color Computer and Tandy System 100 Personal Computer

Super "Color" Writer II
The Rolls Royce of Word Processors

The Super "Color" Writer is a FAST, machine code, full featured, character (screen) oriented word processing system for the TRS-80® Color Computer and ANY printer. The video display is styled after a professional phosphor (green characters on black background) display for hours of use without eye fatigue (optional orange on black). The unique print WINDOW frees you from 32, 51 or 64 character lines FOREVER!! This window can be moved anywhere in the text file, up, down, left or right to display the text as it will be printed without wasting paper. You can create or edit Super "Color" Terminal files, ASCII files, BASIC programs or Editor/Assembler source listings. It's simple enough for beginners with 4K and ... for the professional writer with a 52K disk system and a lot to say, there's plenty of room to say it!!

COMPARISON CHART

<table>
<thead>
<tr>
<th>SYSTEM SIZE</th>
<th>SUPER &quot;COLOR&quot; WRITER</th>
<th>THE COMPETITION</th>
</tr>
</thead>
<tbody>
<tr>
<td>4K</td>
<td>16K</td>
<td>32K</td>
</tr>
<tr>
<td>6K</td>
<td>256K</td>
<td>512K</td>
</tr>
<tr>
<td>16K</td>
<td>16K</td>
<td>32K</td>
</tr>
<tr>
<td>32K</td>
<td>256K</td>
<td>512K</td>
</tr>
</tbody>
</table>

TAPE: Text space
N/A 7K 23K N/A 2K 18K

ROMPAK: Text space
2.5K 16K 31K N/A N/A N/A

DISK: Text space
N/A 5.5K 21.5K N/A 0.3K 16.5K

Page length
YES NO NO

Video Window
YES NO NO

Edit any ASCII File
YES NO NO

Programmable Function
YES NO NO

The figures speak for themselves and with professional features like "Easy commands" 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!! In their September '82 issue, "80 MICRO" says, "The Color Computer has finally come of age. Nothing illustrates that coming of age better than this offering (SUPER "COLOR" WRITER) by Nelson Software." The Super "Color" Writer takes full advantage of the new breed of "smart printers" with Control codes 1-31, 20 Programmable control codes 0-255 for special needs. Works perfectly with all Epson, Radio Shack, Okidata, NEC, IDS, Centronics, Comix, Smith Corona, Diablo etc., Matrix, or Letter Quality Printers.

CHECK THESE FEATURES!!

User friendly • Easy commands • 32K Compatible • Window • Key beep • HELP table • 128 character display • Menu for Memory/Machines • Full cursor control • Quick paging • Scrolling • Word wrap around • Tabs • Repeat all functions • Repeat last command • Insert character & line • Delete character, delete to end of line, line to cursor, line block • Block move, copy & delete • Global Search, Exchange & Delete • Merge or Append files • Imbed Control Codes in text • Underline • Superscripts • Subscripts • Headers, Footers & Auxiliary footnotes on odd, even or all pages. • 128K memory space • Non-breakable space 4.1 centering modes: 5, 8, 10 & 16.7 CPI. • Full page & print formatting in text • Single sheet pause • Set Page length • Line length, Line spacing, Margins, Page numbers • Title pages • Printer baud: 110, 300, 600, 1200, 2400 • Linefeeds after CR • Soft & hard formfeed • Works with 8 bit printer/fax • and more!

Super "Color" Writer II Disk
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 II. 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 one whole BOOK without ever touching a thing! Includes comprehensive 90 plus page Tutorial Manual.

TAPE $49.95 ROMPAK $74.95 DISK $99.95

Tutoral only $15.00 (Refundable with purchase)

ORDERING
INCLUDE $3.00 for shipping in the U.S. & Canada, $6.00 for foreign orders. O.D.D. add $2.00.

Super "Color" Terminal
The Ultimate in Smart Terminals

The Super "Color" Terminal turns the Color Computer into a Super-smart terminal with all the features of VIDEOTEX™ plus much more. COMMUNICATE with Dow Jones & Compuserve and with computers like the TRS-80® MODEL I, II, III, IIIE, IV, BE, IB or even RS-232 direct! Save the data to tape or print it! Reduces ON-LINE cost to a minimum!

FEATURES
10 buffer size settings from 2-30K • Buffer full indicator • Prints buffer contents • Full 128 ASCII keyboard • Compatible with Super "Color" Writer files • UPLOAD & DOWNLOAD ASCII files, Machine Language & Basic programs • Set RS-232 parameters • Duplex/Half/Full • Baud Rate: 110, 300, 600, 1200, 2400, 4800 • Word Lengths: 5, 6, 7 or 8 • Parity: Odd, Even or None • Stop Bits: 1-2 • Special line mode • Print screen • Tape save & load for ASCII files, Machine code & Basic programs • Unique clone feature for copying any tape.

Super "Color" Terminal Disk
The disk version of the Super "Color" Terminal works with the TRS-80C Disk system and has all the features listed above plus many more! Use with up to four Disk Drives • Call a directory, print FREE space, kill disk files, save and load text files or BASIC programs • Echo capability in full duplex • Lower case masking • 10 Keystroke Multiplier (MACRO) buffers that can be saved on disk to perform repetitive log-on tasks and send short messages (up to 256 characters) • Programmable prompt or delay for send next line • Selectable character trapping • Set printer baud rate to 110, 300, 600, 1200, 2400 • Operators Manual.

TAPE $39.95 ROMPAK $49.95 DISK $59.95

Operators manual only $10.00 (Refundable with purchase)

Super "Color" Mailer
Correspondence-Mailmerge

The Super "Color" Mailer is a powerful multi-purpose file merging program that uses files created by the Super "Color" Writer II. One of Super "Color" Mailer's most popular uses is producing customized form letters — at a fraction of the time and expense of individually typed letters. With Super "Color" Mailer you can combine a Super "Color" Writer II file containing a form letter with a file containing a list of names and addresses. You can even insert special words and phrases — unique to each addressee — into the body of the letter. Other Super "Color" Mailer uses include creating invoices, printing mailing labels, addressing envelopes, and producing "boiler plate" legal documents out of many different paragraphs. Features include: the ability to selectively print mailing lists by any of up to 10 user definable fields, automatically prints current date & address & salutation & closing & P.S. etc. prints any ASCII file & justification.

TAPE $39.95 DISK $59.95

Super "Color" Disk-ZAP
The Ultimate in Disk Repair Utilities
A must for all Color Computer Disk system owners. A high-speed machine code Disk Utility that can copy sectors and tracks • repair directory tracks and sector errors. Disk-ZAP has a special screen display that displays sector, track and memory contents in HEXADECIMAL and ASCII at the same time with double cursors that can be moved in any direction. With Super "Color" Disk-ZAP you are able to verify or modify disk sectors at will. You can even type right onto the Disk! You can send sector contents to the printer or any other RS-232 device in either ASCII or HEXADECIMAL listing. Search the entire Diskette for any ASCII or HEXADECIMAL string. Comes complete with comprehensive manual.

DISK ONLY $99.95

COMING SOON!
Super "Color" Calc
Electronic Spread Sheet
The finest electronic spread sheet and financial modeling program available for the Color Computer. It is a sophisticated tool to use, calculating and planning all. Project figures into the future to answer the "What if?" questions you face. Create files compatible with the Super "Color" Writer II. Combine spreadsheet sheets with your documents to create ledgers, projections, statistical & financial reports & budgets.

AVAILABLE AT DEALERS EVERYWHERE. IF NOT, ASK WHY!!

TRS-80 is a registered trademark of the Tandy Corp.
SECURE PROGRAMS

COPY-NOT

COPY-NOT IS A COPY PROTECTION PROGRAM WHICH
PERMITS BASIC SOFTWARE AUTHOR TO PROTECT HIS
CREATION FROM PIRATES. PROGRAMS ON THE DISK ARE
DATA ENCRYPTED. PROGRAMS IN MEMORY RUN IN AN
ENCRYPTED MODE FOR MAX-PROTECTION.

COPY-NOT satisfies external security needs by forcing the
would-be pirates into the assembly language code where he must
stay for several hundred hours before he can attempt to breach the
security of COPY-NOT.

COPY-NOT is an external security program for "BASIC" software
authors. It is a menu-driven tutorial program that comes with a 41 page
owners manual and technical support registration card. COPY-NOT signi-
ficantly modifies TRSDOS 2.3 by killing off three TRSDOS modules thus
achieving a net overhead of less than 2565 bytes. COPY-NOT stores all "BAS"
compressed files on the disk in encrypted form. COPY-NOT significantly modifies "DOS READY" function, but still allows library
command execution. It's "DO/JCL" file allows up to nine DOS sequence
commands. It has no impact on available memory during execution, and
renders "BASIC" equal to "GARBAGE". Furthermore, it allows the soft-
ware author to place his 120 character title line on each diskette and has an
AUTO serial number feature that places your digit serial number on
each application program diskette, and increments the serial number by one. It even has a simultaneous manufacturing feature that allows you to
make up to three application programs at once. COPY-NOT error checks
during execution and forces frustrated pirates into the assembly language
code.

COPY-NOT'S MANUAL AVAILABLE FOR
$8.00. MANUAL PRICE APPLIED TO
COPY-NOT ORDER.
$275.00
OR

CODE4

CODE4 is an internal security encryption program that is undecryptable
by a micro-computer with its 1.6 x10^17 keys. CODE4 is a MICROSOFT
COMPILLED BRUN utility program that handles ASCII files with FIELD
lengths of 256 characters or less. Generally, the file must not be longer
than 24,194 bytes or 300 lines. CODE4 will handle small SCRIPST/UC
REV01 compressed files of 10 pages or so. CODE4 comes with its list
source which will allow easy customization of its RANDOM NUMBER
GENERATOR by selecting a prime number between 11 and 999999.
CODE4 can be used with multiple keys. If time would allow 25 master keys of
1.6 x10^17 each, (2.56 x10^14) keys then CODE4 would give the CRAY an
undecryptable problem. There are no file protectors so CODE4 disks can be
backed-up, but if you don’t know the pass number (EX. 125125.125125.3,
200.255), bulk erase and start over, you have just lost the file. The program
is MENU driven and features five run modules: ENCODE, DECODE, SAVE
FILE, ZERO FILE, and RETURN TO DOS. Like its big brother CODE-4, CODE4
is for use on a 48K, two-disk Model I system. It is available on a
tingle density TRSDOS 2.3 disk, and comes with a sample ASCII file. and start up INSTRUCTIONS.

$19.95

TO: H P B VECTOR CO.

130 CENTER STREET
E. STROUDSBURG, PA. 18301

Allow Two Weeks for Delivery
P.S. MONEY ORDERS ARE RUSH ORDERS.

The command Close followed by a buffer number closes the files specified. Close by itself
also closes all open files.

The command Write followed by a buffer number and your data list writes the data list to
the specified buffer. Write does not directly place the data onto the
disk. In the case of sequential
files, the information in the buffer is placed on the disk either
when the buffer is full or
when you close the buffer. With direct access files, you place
the information on the disk by the
Put statement following the Write.

The command Print followed by a buffer number and data list is similar to the Write command
but avoid it unless you know exactly what you are doing. This is
the old Model I way of putting in-
formation onto the disk. It re-
quires the user to specify explicit-
ly the commas, semicolons and quotation marks. The prob-
lems inherent in using this com-
mand probably kept most Model
I users from ever attempting ran-
don access files.

Print followed by a buffer number, Using format and data list is another leftover command from
the Model I that you want to avoid unless you have very pe-
cular needs! Print and Print Us-
ing can be very useful for partic-
ular file requirements. The prob-
lem is that you definitely have to understand how the information is
stored physically on the disk. If you want to experiment with these commands, we urge you to
use our COLORZAP program so that you examine what was
actually put on the disk.

The command Input followed by a buffer number and variable names loads data from the spe-
cific buffer. The command Line Input followed by a buffer number and your data loads an
en-
tire block of data from the spe-
cific buffer until it encounters the first <ENTER> (0D hex).

Other Functions

Use the EOF (buffer) function to detect if you have reached the end of the file. Use the LOC
(buffer) function to determine the correct record number. Use the LOF (buffer) function to
determine the last record number in the file.

Use the function Field followed by a buffer number and field size as field name with di-
rect access files to format the buffer. Use the function Get fol-
lowed by a buffer number and record number with direct ac-

Program Listing 1

10 REM COLORZAP
20 REM NICH WINTN
30 REM 10/22/81
40 REM
50 CLS:CLEAR588: DIM M$(16), X$(22):BSL=CHR$(528):BR=159
60 FOR X=1 TO 16:READ A$(X):NEXT
70 DATA 1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16
80 FOR X=1 TO 2:READ X$:NEXT
90 DATA 1,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23
100 CLS: INPUT "HOW MANY DRIVES DO YOU HAVE":RD=INT((MD-1):IF RD<
110 THEN RD=1
120 NAME RD="D":IEPD="D":GOTO 150
130 PRINT "ERROR!":PRINT "ERROR":PRINT "ERROR":GOTO 150
140 FOR I=1 TO 16:PRINT A$(I):NEXT:
150 PRINT "ERROR!":GOTO 150
160 GOSUB 436
170 FOR I=1 TO 2:PRINT I$:NEXT:GOTO 150
180 GDOS=1
190 IN$:GOSUB 436
200 IF IN$="YES":IF IN$="NO":GOTO 240
210 IF IN$="YES":IN$:="YES"="NO":GOTO 240
220 IF IN$="NO":IN$:="NO"="YES":GOTO 240
230 IF IN$="YES":IN$:="YES"="NO":GOTO 240
240 GOSUB 436
250 IN$:GOSUB 436
260 GDOS=1
270 IF IN$="YES":IN$:="YES"="NO":GOTO 240
280 IF IN$="NO":GOTO 150
290 IF IN$="YES":GOTO 150
300 IF IN$="NO":GOTO 150
310 IF IN$="YES":GOTO 150
320 IF IN$="NO":GOTO 150
330 IF IN$="YES":GOTO 150
340 IF IN$="NO":GOTO 150
350 IN$:GOSUB 436
360 IF IN$="NO":GOTO 150
370 IN$:GOSUB 436
380 IF IN$="YES":GOTO 150
390 IF IN$="NO":GOTO 150

Listing 1 continues

286 • 80 Micro, February 1983
THE MOST POWERFUL WORD PROCESSOR AND ALL PURPOSE
COMPUTER PROGRAM AVAILABLE FOR THE TRS-80.

LOOK AT ALL THESE FEATURES

1. INSERT characters, words, lines, paragraphs or other files.
2. DELETE characters, words, lines, paragraphs.
3. COLUMNS. CopyArt II can be instructed to print your text from one to six columns. Super easy to use! No complicated commands. Great for doing newsletters, magazine layouts etc. NO MORE CUT AND PASTE!
4. SORTING. Sort lines of text by any field. Sort up to 550 items in less than 7 seconds. Sort indices, table of contents, names, words or whatever in descending or ascending order. Used with CopyArt's math function it is great for small inventories, receivables, payables etc.
5. Screen widths from 32-255 characters wide. Screen widths can be changed to allow formatting your text as you want.
6. MATH. Built in MATH function for doing calculations on columns or rows. Used with the SORT command, CopyArt II can do a small inventory of 290-380 items, keep track of small receivables or payables, general ledgers or home financial reports. Super floating point precision up to 32 digits!
7. *GRAPHICS. CopyArt has a built in graphics program that allows inserting graphics within your text. Drawings, graphs, illustrations, cartoons etc. may be used within newsletters or company reports. Graphics commands include: Plot between points, Circles, Squares, Fill, Erase, Draw, Move, Pixel cursor controls and more.
8. *GRAPHIC CHARACTERS. CopyArt has in a built in graphics character generator. Used for typesetting large letters from 3 to 25 times normal size! Yes, you can even print characters down the page as well as across. Black on white or white on black.
9. JUSTIFICATION is fully supported. *Proportional spaced justify is supported.
10. *SUPER OR SUB-SCRIPT.
11. UNDERLINES.
12. BOLD FACTING.
14. HELP. Help is available for all the commands at the touch of a key while using the word processor. Super for training inexperienced secretaries. Great reminder for experienced people as well. MENU DRIVEN Help for over 45 commands.

Table 3. Disk Basic Keywords

<table>
<thead>
<tr>
<th>Keyword (C17F)</th>
<th>Token</th>
<th>Location (C1DB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIR</td>
<td>CE</td>
<td>CBCF</td>
</tr>
<tr>
<td>DRIVE</td>
<td>CF</td>
<td>CDE9</td>
</tr>
<tr>
<td>FIELD</td>
<td>CF</td>
<td>CFE0</td>
</tr>
<tr>
<td>FILES</td>
<td>D1</td>
<td>D050</td>
</tr>
<tr>
<td>KILL</td>
<td>D2</td>
<td>C622</td>
</tr>
<tr>
<td>LOAD</td>
<td>D3</td>
<td>C6B9</td>
</tr>
<tr>
<td>LSET</td>
<td>D4</td>
<td>D026</td>
</tr>
<tr>
<td>MERGE</td>
<td>D5</td>
<td>C6B8</td>
</tr>
<tr>
<td>RENAME</td>
<td>D6</td>
<td>CF3F</td>
</tr>
<tr>
<td>RSET</td>
<td>D7</td>
<td>D025</td>
</tr>
<tr>
<td>SAVE</td>
<td>D8</td>
<td>C632</td>
</tr>
<tr>
<td>WRITE</td>
<td>D9</td>
<td>CF8A</td>
</tr>
<tr>
<td>VERIFY</td>
<td>D10</td>
<td>D66B</td>
</tr>
<tr>
<td>UNLOAD</td>
<td>D11</td>
<td>D146</td>
</tr>
<tr>
<td>DSKINI</td>
<td>D12</td>
<td>D448</td>
</tr>
<tr>
<td>BACKUP</td>
<td>D13</td>
<td>D175</td>
</tr>
<tr>
<td>COPY</td>
<td>D14</td>
<td>D20C</td>
</tr>
<tr>
<td>DISK$</td>
<td>D15</td>
<td>D3FF</td>
</tr>
<tr>
<td>DISKOS</td>
<td>D16</td>
<td>E074</td>
</tr>
<tr>
<td>LOADM</td>
<td>D17</td>
<td>CEEC</td>
</tr>
<tr>
<td>SAVE</td>
<td>D18</td>
<td>C6B1</td>
</tr>
</tbody>
</table>

The last two items are not in the table of names or the table of addresses. They are stored as the token for Load (or Save) followed by 40 (M). The addresses were found by examining the beginning of the Load (and Save) code.
Speedy Word-Finder
REFWARE Thesaurus 2.0
Save TIME.
Improve your WRITING.
Help your SPELLING.

REFWARE Thesaurus 2.0 takes just 7 seconds to find groups of synonyms and related words for any of 24,800 nouns, adjectives, verbs, and adverbs. Substitutes synonyms in your own sentences. And helps you find the correct spelling of hard-to-spell words.

"Anybody who does any sort of writing, whether it be straightforward letters, or an occasional piece of documentation, or notes for a short speech at your local Lion’s Club can use Thesaurus." -- Software Critic, October 1982

"...one of the pioneering reference tool programs." -- CompuFacts, April 1982

"...absolutely no programming knowledge whatsoever is required..." -- Interface Age, August 1982

REFWARE THESARUS 2.0: 24,800 adjectives, nouns, verbs, and adverbs speedily find the most accurate words for your ads, letters, reports, and speeches.

REFWARE THESAURUS Builder 1.0: Series of eight Basic utility programs enables physicians, educators, lawyers, businessmen, or other professionals to develop specialized thesaurus disk of hard-to-remember technical words for personal use.

MINIMUM System Required TRS 80 * Mod I or Mod III 48K with two disk drives. * A Trade mark of Tandy Corporation

Credit card orders phone (814) 238-8996

Dealers: Write for prices. FREE demo disk with minimum order.

REFWARE Reference Software Division
David C. Whitney Associates, Inc.
P.O. Box 451, Chappaqua, N.Y. 10514

Specify: Mod I Single Density ( )
Mod III Double Density ( )

<table>
<thead>
<tr>
<th>Qty.</th>
<th>Title</th>
<th>Unit Price</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6,200-word Adjectives 2.0</td>
<td>$24.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6,200-word Nouns 2.0</td>
<td>$24.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6,200-word Adverbs 2.0</td>
<td>$24.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6,200-word Verbs 2.0</td>
<td>$24.95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete 24,800-word</td>
<td></td>
<td>$89.95</td>
<td></td>
</tr>
<tr>
<td>Refware Thesaurus 2.0</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Thesaurus Builder 1.0</td>
<td></td>
<td>$149.95</td>
<td></td>
</tr>
</tbody>
</table>

Sales Tax
(N.Y. state residents only)

Enclosed $................ | Check ( ) Money Order ( ) TOTAL $ 

Postage and handling $3.00

Card #

Exp. Date

Interbank #

Signature

Name

Address

City.................State.........Zip

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828 • 80 Micro, February 1983
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CONTINUES ON THE NEXT PAGE...
along with their tokens and the locations for their code. A token is the compact way in which these Basics store the keywords, or commands. These tokens are ASCII codes between 129 and 250. The keyword "SCREEN", for example, is stored as BF (hexadecimal) or 191. This takes one byte of memory as opposed to six bytes if "SCREEN" were stored in its expanded, or ASCII, form.

When storing a command, Basic looks through the first column of the tables and determines what token should be stored. When executing a command, Basic takes the token and executes the code starting at the address specified in the third column. In each table at the start of the first and third columns there is a number. This number indicates where in the Color Computer's memory the table containing the keywords or addresses is located. Table 1 lists Extended Basic keywords and Table 2 lists the locations of the Extended Basic functions. Table 3 shows Disk Basic keywords and Table 4 lists Disk Basic functions.

You may be able to call some of these routines from within your own programs—Basic or machine language. For instance, Table 1 indicates that the address of the RENUM command is 35337 (BA9B hex). You can renumber any program resident in memory with RENUM starting with line 10 in increments of 10. Or, try EXEC 35337 for the same result!

The Disk Directory

Using the program Colorzap, you can look through the disk and examine any track and sector you desire. You might want to start by looking at track 17 sector 3. This is the beginning of the directory. As indicated in the manual, an entry in the directory consists of the program name, left justified in bytes 0-7, then an extension in bytes 8-10 (see sample directory screen, Fig. 2). The rest of the bytes in the entry specify the file type, whether it is ASCII or not, the starting granule, and the number of bytes

---

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used in the last sector. When you kill a program or file, the first character of its name is reset to a space.

If you want to look at a particular program, look it up in the directory, and note the starting granule and number of bytes in the last granule. Then look at track 17 sector 2, the file allocation table. The byte in this sector which corresponds to the starting granule will have in it a granule number (00–43 hex) or a last granule marker (CO–C9 hex). If the byte is another granule, write it down and look up its position in the table.

Now you have a list of granules, a last granule marker, and the number of bytes in the last granule. The last granule marker indicates which sector (0–9) of the granule is the last one used, so you now have all the data needed to trace the program, except which tracks and sectors correspond to a given granule. This information is available in Table 5. For example, if you knew from the directory that the file you want started with granule 2C, Table 5 would inform you to look at track 23 sector 01.

**Color Disk Storage**

What will you see when you look at a file? If it is a binary format Basic file, the first byte will be FF and the next two bytes will be the program length in bytes. The program lines will be after this in binary format.

Program lines in binary format consist of a two-byte pointer to the next line, a two-byte line number, the program line with the keywords compressed into single-byte equivalents (see Tables 1–4) and a byte 00 to indicate end of line. Three 00 bytes in a row indicate end of program.

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value you specify (see Program Listing 2). Its heart is a short (22 byte) machine-language routine which gets POKEd just below the top of the first 16K of memory. RAMSET then asks for a value to use in filling memory. All of RAM is filled with this value except 16370–16383 (3FF2–3FFF) and 32754–32767 (7FF3–7FFF) and then control returns to Basic.

Why do this? It is very useful if you are trying to find out where a piece of machine-language software resides. Run RAMSET, load the machine-language program, then load Pager. You will know you have found the program when the monotony of the pages you are stepping through suddenly changes.

Find the first byte of the program. Call the page number P and line that the byte appears on L and the column C. Then the beginning address is P*512 + L* 32 + C – 1. You can find the ending address in a similar fashion. You can find the starting address by: Printing 256*PEEK (157) + PEEK(158). You can now use the SAVEM command to save “BLAST THE BEASTIES” onto disk.

However, the program will not necessarily run properly. The disk system reserves addresses 1536–2440 (0600–0988 hex) for its own use. This moves the high-resolution graphics screens up in memory. Any program which relies on the screen’s starting at a particular address will not work properly. Any program which runs in the locations that the disk system uses will not run either.

The program VMOVE (16K disk) takes the tape version of Radio Shack’s Videotex terminal program and places it onto disk in such a way that you can run it using LOADM and EXEC (see Program Listing 3). Videotex normally starts at 1728 (06C0 hex). VMOVE reads it in from tape starting at a location 1000 hex higher (that is the &H1000 after the CLOAD). VMOVE then appends a 17-byte program which will move Videotex back down where it belongs and saves the program to disk automatically.

Menu (16K disk) will help you clean up the screen listing of the disk directory (see Program Listing 4). Unlike most other directories, the Color disk does not store a name for the disk or the date the disk was created. We find both of these to be rather useful features and have implemented them into Menu. Select option two in the program and supply the name (up to eight characters) and the date (MM/DD/YY). These will be stored in the last sixteen bytes.

---

Program Listing 4

```plaintext
10 'SEROM PROGRAM
20 'BY PHIL MARTEL 1981
30 A=493FF
40 READ D: IF D<>0 THEN POKE A,D,A+A+1: GOTO 40
50 DATA26,88,134,0,14,63,242,167,137,64,8,167,130,148,8,8,38,24
60,126,160,39,1
70 INPUT"WHAT DO YOU WANT RAM LOADED WITH?";D
80 POKE 16366,D
90 EXEC 16363
```

Program Listing 5

```plaintext
80 'PATCH FOR SAVING VIDEOTEX ON DISC
90 '8.1.1981 BY PHIL MARTEL
100 CLEAR PRINT "PUT YOUR VIDEOTEX TAPE INTO YOUR CASSSETTE. PRESS THE SPACE BAR TO READ IN THE TAPE."
110 IF INKEYS<>"" THEN 110
120 CLEAR"*VIDEOTEX",&H3000
130 A=4H1FF
140 READ D: IF D<>0 THEN POKE A,D,A+A+1:GOTO110
150 DATA26,88,134,0,14,63,242,167,137,64,8,167,130,148,8,8,38,24
160,126,160,39,1
170 DATA-1
180 CLEAR PRINT "PLACE YOUR DISC IN DRIVE B AND HIT THE SPACEBAR"
190 IF INKEYS<>"" THEN 190
200 SAVE"VIDEOTEX",&H16C8,&H1FF7,&H1FF7
```

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(294 • 80 Micro, February 1983)
of track 17 sector 18 which is not used by the disk system at all. Menu’s main function shows you what is in the disk directory (option one). Indicate which drive you want to use. The computer will display the name and date of the disk, the number of free granules left, the number of files on the disk and an alphabetically sorted listing of the directory (see sample menu listing in Fig. 3). The listing will be shown in two columns with a maximum of 24 files per screenful. If the listing extends over more than one screenful, you can go back and forth through your directory using the right arrow for forward and the left arrow for backward.

In addition, you can move a flashing cursor in front of any file in the listing by using the up arrow or down arrow. Simply position the cursor before the Basic program you wish to run and press enter and Menu will load and run that program automatically. Note that only Basic programs can be run from Menu, not machine-language programs.

With Colorzap (32k disk) you can do a lot of things, some of which we have indicated earlier in this article. But be careful! There is no danger in examining the contents of your disk, but be sure you know what you are doing before you attempt to modify the contents of the disk.

The program will ask you how many drives you have attached to the computer (1-4). If you indicate that you only have one drive, you will no longer be asked to specify the drive you wish to examine; otherwise, indicate the drive number (0-7). You will then be asked to enter the track number (0-34) and the sector within that track (1-18) to be displayed.

Your disk will now fire up and the first 128 bytes of the drive/track/sector specified will be displayed (see sample screen in Fig. 2). The far left column (going down) indicates the drive number, track number and sector number. The next two columns will show the relative byte within the sector for the start of that line of information. Then the next eight bytes of the sector are shown in hexadecimal in groups of twos. And finally, those eight bytes are shown in ASCII (Note that ASCII values from 0 to 32 are all displayed as spaces.) You can scroll forward (right arrow) or backward (left arrow) through the disk contents. Pressing clear allows you to specify another disk/track/sector to display.

To alter your disk memory press M for modify. A flashing cursor will now appear over the hex portion of the screen. You can move this cursor around with the four arrow keys. To alter disk memory, type over old hex values with new hex values.

You have not changed anything on the disk. If you want to abort any alterations now, press clear. To accept the alterations indicated, press enter. You will have one last chance to leave the disk contents unmodified or to finally make the modifications.

<table>
<thead>
<tr>
<th>DEVELOP &amp;</th>
<th>1/24/B</th>
<th>2 GRAMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>30DESIGN/BAS</td>
<td>JOY1/BAS</td>
<td></td>
</tr>
<tr>
<td>40PIONOS/BAS</td>
<td>JOY2/BAS</td>
<td></td>
</tr>
<tr>
<td>ALIGN/BAS</td>
<td>KALEIDO/BAS</td>
<td></td>
</tr>
<tr>
<td>BEASTS/BAS</td>
<td>LLIST/BAS</td>
<td></td>
</tr>
<tr>
<td>CALC/BIN</td>
<td>MASTERDVG</td>
<td></td>
</tr>
<tr>
<td>CANVAS/BAS</td>
<td>MEMORY/BAS</td>
<td></td>
</tr>
<tr>
<td>CANVASDAT</td>
<td>MENU/BAS</td>
<td></td>
</tr>
<tr>
<td>COLORZAP/BAS</td>
<td>MSIC/BAS</td>
<td></td>
</tr>
<tr>
<td>DATABASE/BAS</td>
<td>PAGER/BAS</td>
<td></td>
</tr>
<tr>
<td>DISASSEMB/BAS</td>
<td>PALETTE/BAS</td>
<td></td>
</tr>
<tr>
<td>DRAWING/BAS</td>
<td>PEG/BAS</td>
<td></td>
</tr>
<tr>
<td>FIB/BAS</td>
<td>POINTS/BAS</td>
<td></td>
</tr>
</tbody>
</table>

30 PROGRAMS

Fig. 3. Sample Directory Listing from Menu

---

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80 Micro, February 1983 • 295
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by Joel Belcher

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I have a better way. Type the screen layout on your CRT and let your computer count the spaces for you. At the same time, why not let the computer pick up the field prompts and the input fields? If you have that much information, why not let your computer write the program for you? I’ll show you just how easy it is to do.

The Program Generated

First, we’ll consider the final product. Let’s say you’ve built, loaded, and run a program. (See Listing 1.) The first action the program takes is to clear the display and then prompt the user at line 15 to enter the record number desired or enter a zero to end the program. If you enter 50 as the record number, the program will respond that record 0 (you haven’t added any records yet) is the

<table>
<thead>
<tr>
<th>Variable</th>
<th>Full Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>F$()</td>
<td>Fields</td>
<td>Array for disk buffer</td>
</tr>
<tr>
<td>EL5</td>
<td>Erase line</td>
<td>Prints 63 spaces and 63 backspaces</td>
</tr>
<tr>
<td>LR</td>
<td>Last record</td>
<td>Holds last record on file</td>
</tr>
<tr>
<td>RN</td>
<td>Record number</td>
<td>Holds current record number</td>
</tr>
<tr>
<td>YNS</td>
<td>Yes/No</td>
<td>Used in all prompts that require a yes/no answer</td>
</tr>
<tr>
<td>NE</td>
<td>New</td>
<td>Flag used to indicate a new record is being added</td>
</tr>
<tr>
<td>IC</td>
<td>Item to change</td>
<td>Holds number of item (field) to be changed</td>
</tr>
<tr>
<td>I</td>
<td>Input location</td>
<td>Holds location of input</td>
</tr>
<tr>
<td>IL</td>
<td>Input length</td>
<td>Holds length of input field</td>
</tr>
<tr>
<td>IN5</td>
<td>Input string</td>
<td>String used to hold inputs</td>
</tr>
<tr>
<td>PL</td>
<td>PEEK location</td>
<td>Holds video memory location of cursor</td>
</tr>
<tr>
<td>VB</td>
<td>Video byte</td>
<td>Byte from location PL</td>
</tr>
<tr>
<td>KB$</td>
<td>Keyboard string</td>
<td>String to hold input from INKEYS</td>
</tr>
<tr>
<td>KB</td>
<td>Keyboard</td>
<td>Holds ASC of KB$</td>
</tr>
<tr>
<td>W</td>
<td>Wait</td>
<td>Used in For...Next loop for delay</td>
</tr>
<tr>
<td>FNVM(P)</td>
<td>Video memory</td>
<td>PEEKs memory locations used by Basic to retrieve current cursor location</td>
</tr>
<tr>
<td>FNST(S(T)</td>
<td>Strip</td>
<td>Strips leading blank from numbers</td>
</tr>
</tbody>
</table>

Table 1. Listing 1 Variables

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Telex: 206995
highest record on file, and will prompt you again for a record number. Enter 1 as the record number and the program will respond with "Record 1 does not exist. Do you want to add it (Y/N)?" Enter Y and the program will display the screen to be filled in, with the cursor over the first character of the first field. Type in your name and press the enter key. (Note: The cursor cannot be moved out of the input field.) The cursor moves to the first character of the second input field.

After the screen is filled in, you are prompted: "Enter the number of the item to change. (0 to store screen.)" If you've made any mistakes, enter the field number and the cursor is positioned there. Type the correct entry or move the cursor over the incorrect character and type the correct character over it. Press enter and the field is updated.

When all entries are correct, enter 0 and the screen is stored on the disk; the program then prompts you for another record number. If you enter 1, record 1 is retrieved from disk storage and displayed. The program then prompts you at line 15 for the item number to be changed. Only when entering new records does the program take you through each input field. When you are finished with the record entry and editing, enter 0 as the record number and the program closes all files and ends.

The variables used and a description of the program are in Tables 1 and 2.

The Program Generator

This is the program that lets you create a screen display by typing the display on the CRT. (See Listing 1.) It will scan the screen and save all prompts and input fields. The fields and prompts will then be used to build a program to allow entry and editing by record number and item number.

When you run the program, it will be in the screen-creation mode and the screen will clear. A flashing cursor will be in the upper right corner of the display. Use the four arrow keys to control cursor movement. Press alphanumeric keys to display the corresponding characters at the current cursor location, and the cursor will move one space forward.

The screen size is limited to 14 lines of 64 characters. The bottom two lines are used for prompting the operator during program execution. The clear key has been defined as a control key. The functions available are: CTRL L, for loading a screen from disk; CTRL S, for saving a screen to disk; CTRL D, to delete a line; CTRL I, to insert a line; and CTRL M, to move a line.

Once you have composed a screen, save it to the disk by pressing CTRL and S at the same time. The screen will clear and the prompt "Screen name" will be displayed. Enter up to eight characters with no extension, as /SCR will be appended to the file name.

After the screen is saved it will be displayed again. Press CTRL B to build the program. Line 15 will display the status of the program generation. If a numeric field is found as the screen is being scanned, the program will place a graphics block over the first character of the input field and ask you for the precision of the numeric field.

After decoding the screen, the program will ask for the starting line number and then the increment for lines. The program will then ask for the line number for the INKEYS routine (50000 is fine). Next the program will ask for the file name (this is for the data file and program file and should only be seven characters long). If two or more data files are needed, the program will append a one or two to the file name and add the extension /DAT.

As the program is generated, the program lines will be displayed on the screen. After generation is completed, the program will be saved to the disk, this time with /PRO appended to the file name. The program will then be loaded and run.

Note: If you have added fields to a program and regenerated it, the file size will be larger, causing a field-overflow error when the program is run. Close and then kill the data file and rerun the program so the proper file size can be established for the disk file.

The program begins by loading PLC

<table>
<thead>
<tr>
<th>Lines</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-20</td>
<td>Set strings and clear memory, dimension arrays</td>
</tr>
<tr>
<td>30-40</td>
<td>Open and field the data files</td>
</tr>
<tr>
<td>50-100</td>
<td>Input the record number. If the record is on file, it is retrieved and displayed; if the record number is equal to the last record on file plus one, the program asks if you want to add the record. If so, the buffer is cleared and the flag NE is set. If the record number is greater than the last record plus one, the last record number is printed and the request for the record number is repeated</td>
</tr>
<tr>
<td>110-200</td>
<td>Print the disk buffer</td>
</tr>
<tr>
<td>210</td>
<td>Check the new flag. If it is set, the user is taken through each input field</td>
</tr>
<tr>
<td>220</td>
<td>Enter the item to change, or enter 0 to store the data and return to the record number request</td>
</tr>
<tr>
<td>230</td>
<td>Branch to the line to set variables for INKEYS routine</td>
</tr>
<tr>
<td>240</td>
<td>If 0 is entered, store the screen data then branch to the record-number request</td>
</tr>
<tr>
<td>250</td>
<td>Branch into the display routine</td>
</tr>
<tr>
<td>260</td>
<td>Just for safety</td>
</tr>
<tr>
<td>270-350</td>
<td>Set the variables up for calling the INKEYS routine Load the current value of the disk buffer into INS and call line 50000. When execution returns from 50000 INS will hold the edited value</td>
</tr>
<tr>
<td>50000</td>
<td>Set the number of characters entered to 1, prints INS at the prompt location, then backs the cursor up to the first character on the input field. Pads INS with blanks to make it equal the input length</td>
</tr>
<tr>
<td>50010</td>
<td>PL gets the location of the cursor (the video memory location). PEEK location PL and store character in VB</td>
</tr>
<tr>
<td>50020</td>
<td>POKE location PL with CHR$(252) (the cursor), strobe INKEYS 25 times if no key is input, replace character and strobe INKEYS again if no character is input, and then branch back to line 50010. If a character is input replace the video character and store ASC of KBS in KB</td>
</tr>
<tr>
<td>50030</td>
<td>If left arrow is on first character GOTO line 50010, else back cursor up one space and subtract 1 from IN</td>
</tr>
<tr>
<td>50040</td>
<td>If key is right arrow and number of characters input (IN) is greater than or equal to input length (IL), GOTO 50010; otherwise, move cursor forward one space and increment IL by one</td>
</tr>
<tr>
<td>50050</td>
<td>If key is enter then return</td>
</tr>
<tr>
<td>50060</td>
<td>If key is greater than or equal to a space and less than or equal to a lowercase z, and if the number of characters input is greater than the input length GOTO 50010. If IN is less than IL, print KBS, change INS to match, and increment IN by one. Otherwise, POKE PL with KB and change last character of INS to input character. (Printing the character at the last position of the input field moves the cursor out of the input field)</td>
</tr>
<tr>
<td>50070</td>
<td>GOTO line 50010</td>
</tr>
</tbody>
</table>

Table 2. Listing 1 Line Functions
A critic* called my accounting systems “very impressive” and “very reasonable.”
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with the starting line number and J with 1. LS(J) will hold the program lines. Each statement needs a line number, and \( L S(J) = F N S T S(PLC) \) stores the line number for us. \( F N S T S \) removes the leading blank by converting the number to a string and returning the second through last digits. To start the next line, a GOSUB 1690 is executed. This

Hello thayuh. This is Eben Flow, proprietor of the Fish or Cut Bait Company, buyer and seller of lobster bait for 49 years. My hobbies are collecting linoleum samples, squashing flies and playing pac-person on my home computer.

But here on Martinicus Rock, off the coast of Maine, the power can be a tad erratic. So, to cure the brownout and blackout problems, and to keep them spikes and surges off my picture tube, I got me a **MAYDAY** Uninterruptible Power Supply from SUN RESEARCH. Them fellas fixed me up real good and real light on my pocketbook, too. Got me a **MAYDAY** for my mini-calculator with a voltage regulator and everything for only 325 clams. They even included the battery in a nice waterproof box. Handy out here, you know. Now, if **MAYDAY** would only keep them sea dogs out of my barrel . . .

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---

**Table 3. Listing 2 Variables**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Full Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>V$( )</td>
<td>Video array</td>
<td>Array pointed to the video display</td>
</tr>
<tr>
<td>VV$()</td>
<td>Video verbatim</td>
<td>Array to hold video array during disk I/O</td>
</tr>
<tr>
<td>VS()</td>
<td>Video one</td>
<td>Array used to hold prompts during screen decoding</td>
</tr>
<tr>
<td>FS()</td>
<td>Field start</td>
<td>Holds starting and ending fields that will fit in a 256-byte record. If the subscript is incremented to 2, then a second disk file is needed. Works with above variable</td>
</tr>
<tr>
<td>FE()</td>
<td>Field end</td>
<td>Hold number of buffers needed</td>
</tr>
<tr>
<td>NB</td>
<td>Number of buffers</td>
<td>Holds 0 if no input, 1 if string input, 2 if integer input, 3 if single-precision input, 4 if double-precision input</td>
</tr>
<tr>
<td>M()</td>
<td>Mode</td>
<td>Keeps sum of field lengths: If file length grows larger than 256, the number of buffers is incremented</td>
</tr>
<tr>
<td>FL</td>
<td>File length</td>
<td>to 2, and the file length is zeroed</td>
</tr>
<tr>
<td>L()</td>
<td>Location</td>
<td>Array to hold Print @ location for prompt</td>
</tr>
<tr>
<td>I()</td>
<td>Input</td>
<td>Array to hold start of input field</td>
</tr>
<tr>
<td>IL()</td>
<td>Input length</td>
<td>Array to hold length of input field</td>
</tr>
<tr>
<td>LS()</td>
<td>Line</td>
<td>Array to hold program lines generated</td>
</tr>
<tr>
<td>LL</td>
<td>Line</td>
<td>Used as a subscript for array holding prompts, input locations, lengths during screen decoding</td>
</tr>
<tr>
<td>LN</td>
<td>Line number</td>
<td>Holds number of line being scanned during screen decoding</td>
</tr>
<tr>
<td>US()</td>
<td>Using</td>
<td>Array to hold Using strings for input fields</td>
</tr>
<tr>
<td>QS</td>
<td>Quote</td>
<td>Holds CHR$(34), quote ('')</td>
</tr>
<tr>
<td>FNSTS(T)</td>
<td>Strip</td>
<td>Strips leading blank from number</td>
</tr>
<tr>
<td>FNPP(F)</td>
<td>POKE position</td>
<td>Returns location to POKE cursor. Used to point numeric fields out during screen scanning</td>
</tr>
</tbody>
</table>

**Program Listing 1**

```
10 : ****************************
20 : * 1982 Joel Belcher / Weller & Associates *
30 : * P.O BOX 658 MONTICELLO, AR. 71655 *
40 : * (501) 367-5235 *
50 : ****************************
60 CLEAR10000:DIMV$(14),VV$(14),VLS$(55),L$(55),I$(55),IL$(55),M$(55)
   ,LS$(100),US$(55),QS$=CHR$(34):DEFNPPS(A) = MID$(STR$(A),2):ELS=STRIN
   GS$(63,32)+CHR$(29):J=1:DEFPNPF(I) = (I-1)*64+B1-1+15360
```

Listing 1 continues
adds the line increment to the program line counter (PLC) and I to J. When the program is saved to the disk, the program is saved in the ASCII format. If a program line is built using graphics characters between quotation marks instead of an alphanumeric string, the graphics characters are saved as the string. When the program is loaded and listed the graphics string is part of the program.

All prompts must have a colon or exclamation point as the last character. The 64th position of a line must be left blank. Only 14 lines are allowed for screens. The input field must be one or more dashes, pound signs or a pound sign preceded by a dollar sign. The numeric fields are saved in US( ) and placed in a Using statement for the program. If a colon was not found, a scan is made for an exclamation point. If one is found, the line is saved, but no input field is searched for. Field prompts should have a number as the first character (see Fig. 1), because when editing the file the user will need to know the field numbers.

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300 CL$1:INPUT"SCREEN NAME ",SSN:OPEN"R",1,SSN+:"CR",64:FIELD 1,
64 AS V$: =FOR(I=1TO4:GET1:V$(I): =V$:PRINT$(I-1)+64:V$): =NEXTI:
CLOSE:RETURN
310
320 PS(I)=TYPE ? (2)=INTEGER (3)=SINGLE PREC (4)=DOUBLE PREC
330 FS(I)=1:NB=1
340'
350 PRINT#896,ELS,"WORKING ON SCREEN ";
360 LI=1:FOR J=1TO14:LL=1
370 FORJ=1TOLEN(V$(I)):IFMIDS(V$(I),I,J)="" THENL(I)=L(I-1)
64+I-I:AI=I:IT=7:NEXTI ELSENEXTI:LI=69:GOSUB560
380 A2=INSTR(A1,V$(I),"="):IF A2=0 THEN A2=INSTR(A1,V$(I),"=")-1
390 V$(LL)=MIDS(V$(I),AI,A2=(A1-I))
400 IFINSTR(A2,V$(I),"="):THENI=INSTR(A2,V$(I),"="):ELSEI=80
410 IFINSTR(A2,V$(I),"="):THENH=INSTR(A2,V$(I),"="):ELSEH=82
420 IFNIRR(A2,V$(I),"="):THENI=INSTR(A2,V$(I),"=")
430 IFITP2(TIMETHEN1:T2=D:PEEK(FP(N)(I)):POKEFP(N)(I),252:PRINT#896,ELS
440 IF PSI=\"1\" AND VIS(LL)="": THEN NEXT I:GOTO 578 ELSE I=2P2-TI
450 TIMETHEN1=LI=(I-1)+64+BI-I
460 B2=INSTR(V$(I)," ");"
470 I=MP(LL)>THENUS(NLL)=MIDS(V$(I),B1,B2-B1)
480 I=BJB2:IL(LL)=B2-B1
490 IFM(LL)=THENL=0
500 IFM(LL)=THENL=IL(LL)
510 IFM(LL)=THENL=2-TLEN(2)
520 IFM(LL)=THENL=4
530 IFM(LL)=THENL=8
540 FLFL=FA:IF FL=256 THENFL(NB)=FL-LA:PE(NB)=LL-LA:NB=NB+1:
550 FLFL=FA ELSEFL(NB)=FL-LA:
560 IF IC=64 THENPRINT#896,ELS,"WORKING ON SCREEN LINE I":ITEMLL;
570 LL=I+1:GOTO370 ELSENEXTI
580 IFN(LB)="";
590 PRINT#896,ELS,"INPUT STARTING LINE ";FLC
590 PRINT#896,ELS,"INPUT INC FOR LINES ";INC
600 PRINT#896,ELS,"INPUT FILENAME ";DFS
610'
620 PRINT#896,ELS,"INPUT LINE NUMBER FOR INKEY SUBROUTINE ";SLC
630 SLC=FNSTS(PLC)+CLS:DIM F$("+FNSTS(LL)"");
640 GOSUB1698
650 LS(J)=FNSTS(PLC)+ELS=STRINGS(63,32):CHR$(29):DEFPWNM(PE
660 EK(1614)+PEEK(1614)*256:DEFPWNM=T=MIDS(STRS(T),2)
670 EK(1618)+PEEK(1618)+256:DEFPWNM=T=MIDS(STRS(T),2)
680 GOSUB#1698
690 LS(J)=FNSTS(PLC)+
700 FOR I=1TO100
710 LS(J)=LS(J)+"OPEN","Q","S","FSTN(I)","Q","DFS","FNSTS(I)
720 FORK=1TO8:FL=0:GOSUB1698:LS(J)=FNSTS(PLC)+FIELD+FNSTS(K)
730 FORK=8:KTOE(K)
740 IFN(I)=THENLS(LS(J)=LS(J)+":+FNSTS(IL(I))"+ASP(I)+"FNSTS(I)"
750 I=I+1
760 IFI=2 THENLS(LS(J)=LS(J)+":2ASF(I)+"FNSTS(I)"+":I=2
770 IFI=3 THENLS(LS(J)=LS(J)+":4ASF(I)+"FNSTS(I)"+":I=4
780 IFI=4 THENLS(LS(J)=LS(J)+":6ASF(I)+"FNSTS(I)"+":I=6
790 IFI=4 THENLS(LS(J)=LS(J)+":8THENL=LS(SJ)+I:GOSUB1698:LS
800 (J)=FNSTS(PLC)+FIELD+FNSTS(K)+"ASSN":"FL=0:ELS
810 EFL=FL-A1=LEN(LS(J))
820 NEXTK
830 NEXTI
840 FOR I=1TO100
850 GOSUB1698
860 LS(J)=FNSTS(PLC)+IF RN=0 THEN CLOSECLS:END
870 GOSUB1698
880 LS(J)=FNSTS(PLC)+IF RN=LN=1 THEN "Q+S+" RECORD+"Q+S+L"+Q+S+I" IS THE HIGHEST RECORD ON FILE:Q+S+"GOTO+FNSTS(CRN)
890 GOSUB1698
900 LS(J)=FNSTS(PLC)+IF RN=LN=1 THEN 8996,ELS+Q+S+"RECORD+Q+S+L"+Q+S:" DOES NOT EXIST. DO YOU WANT TO ADD IT (Y) +Q+S:"I"NPUTYN:"IFNS=Q+S+N+Q+S+THEN+FNSTS(CRN)
910 GOSUB1698
920 LS(J)=LS(J)+2GOTO:"ER=PLC:Kx=1:JP=2
930 GOSUB1698
940 LS(J)=FNSTS(PLC)="I"
950 FOR I=1TO100:FLLEN(LS(J))=236THEN1=I-LS(J)=LEFTS(LS(J),I):
960 LS(J)=LS(J)+2GOSUB1698:LS(J)=FNSTS(PLC)+"ELS=LEN(LS(J))=I"

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<th>Capacity</th>
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</tr>
</thead>
<tbody>
<tr>
<td>TM100-1</td>
<td>SS,40T</td>
<td>$195</td>
</tr>
<tr>
<td>TM100-2</td>
<td>DS,40T</td>
<td>$259</td>
</tr>
<tr>
<td>TM100-3</td>
<td>SS,80T</td>
<td>$275</td>
</tr>
<tr>
<td>TM100-4</td>
<td>DS,80T</td>
<td>$349</td>
</tr>
</tbody>
</table>

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---

**Listing 1 continued**

1670 LS(J)="FNSTS(PLC)+" GOTO+FNSTS(BR)
1680 PRINT"DCONE-----SAVING PROGRAM AS";F$=DFS$+/"PRO";PRINTFS:OP ENQ",.L;FS=FOR;MP=PRINT;LS(K);NEXTCLOSE;PRINT"RUNNING" F S$=RUNFS
1690 PRINTLS(J):PLC=PLC+INC;J=J+1:RETURN

---

**Program Listing 2**

---

**Program Generation Demo Screen!**

(1) Name : 

(2) Age : 

(3) Address : 

(4) Sex : 

(5) Address : 

(6) City : 

(7) State : 

(8) Zip : 

---

**Figure 1**
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for peripheral cards; a joystick/paddle connector. A full 72-key typewriter-style keyboard that includes 12 key numeric pad, upper/lower case with shift and alpha lock, full cursor control, and special keys for use with Visicalc. Built into the unit is a 50-watt power supply and cooling fans which permit use of all 8 peripheral expansion slots without power or overheating problems.

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Table 4. Listing 2 Line Functions

<table>
<thead>
<tr>
<th>Lines</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>60</td>
<td>Clears string storage, dimensions array</td>
</tr>
<tr>
<td>70</td>
<td>Points VS(1) to video memory so VS(1) is first line of video display, VS(2) is second line, and so on</td>
</tr>
<tr>
<td>110</td>
<td>Sets number of characters input to 1 and line number to 1, then homes cursor</td>
</tr>
<tr>
<td>120</td>
<td>PEEKs cursor location and stores character, then POKEs a graphics block in that location. INKEY is scanned until key is input</td>
</tr>
<tr>
<td>130-190</td>
<td>If clear key is depressed (PEEK(14400) = 2) and (L)oad, (S)ave, (I)nsert, (D)elete, (M)ove, or (B)uild depressed then perform function</td>
</tr>
<tr>
<td>200-250</td>
<td>If arrow key or shift arrow key depressed then move cursor in proper direction</td>
</tr>
<tr>
<td>270</td>
<td>If key is =&gt; blank and key is &lt;= lowercase z, and if the number of characters input is &gt; input length then go to line 120. If number of characters input is &lt; input length then print character input. Otherwise, POKE character input into video memory</td>
</tr>
<tr>
<td>290</td>
<td>Save screen to disk</td>
</tr>
<tr>
<td>300</td>
<td>Load screen from disk</td>
</tr>
<tr>
<td>330</td>
<td>Set field start to 1 (FS(1) = 1) and number of buffers to 1 (NB = 1). Field start and field end (FE( )) hold the items that will fit in the 256 characters allowed for a record. If more than 256 characters are needed, FS(2) to FE(2) will hold the item for the second disk file. The program will create as many disk files as are needed to hold the screen</td>
</tr>
<tr>
<td>360</td>
<td>LL is a counter for each item read. Loop from first line to 14th line. II holds last character checked</td>
</tr>
<tr>
<td>370</td>
<td>Loop from II to LEN of screen length. If the character is &gt; blank then store location as Print@ position for prompt, store character count in A1, and terminate loop. Otherwise continue loop. If the loop terminates without finding a character &gt; blank then store a number &gt; 64 in II so line will not be scanned again</td>
</tr>
<tr>
<td>380</td>
<td>Look for: and store its position in A2; if not found look for ! and store its position minus 1 in A2</td>
</tr>
<tr>
<td>390</td>
<td>Get prompt from position A1 to A2 and store it in VI($ )</td>
</tr>
<tr>
<td>400</td>
<td>Look at characters for last prompt forward for input field -&gt;, #, or $. $ is only used if followed by #</td>
</tr>
<tr>
<td>430</td>
<td>Load B1 with start of input field. If it is a numeric field (TI&lt;CT1) place a graphics block over the first character of the field and prompt for precision for field. Otherwise, load B1 with start of field and set mode to 1 (MC = 1)</td>
</tr>
<tr>
<td>440</td>
<td>If TI equals T2 and no prompt found (VI($LL) = '''' ) then go to the next line. Otherwise, set mode to 0</td>
</tr>
<tr>
<td>450</td>
<td>Load I(LL) with input location</td>
</tr>
<tr>
<td>460</td>
<td>Find end of input field</td>
</tr>
<tr>
<td>470</td>
<td>If mode is &gt; 1 then get using string from position B1 to B2</td>
</tr>
<tr>
<td>480</td>
<td>Calculate input length</td>
</tr>
<tr>
<td>490-530</td>
<td>Based on mode, load LA with proper size for field statement</td>
</tr>
<tr>
<td>540</td>
<td>Sum field size to file length. If file length is &gt; 256 characters then: file length (first buffer) = field length-last amount; file end (first buffer) = LL-1; field length-last amount; increment number of buffers to 2; file start (second buffer) = LL-1. Otherwise: file length (first buffer) = field length; and file end (first buffer) = LL-1</td>
</tr>
<tr>
<td>560</td>
<td>If last character checked (II) &lt;= 64 then print line currently working on and go to 370; else, next line</td>
</tr>
<tr>
<td>580-1690</td>
<td>Asks for the starting line number, the increment between lines, and the file names for the program and data files. The program will have /PRO appended to its file name and the data file will have /DAT appended to its name. If more than one file is required, the file name will include the file number</td>
</tr>
<tr>
<td>630</td>
<td>Starts building the program. LS(J) will hold each line built. GOSUB 1690 increments J by one and adds the line increment to the program line counter (PLC). Quotation marks must surround strings in a print statement. They are entered by using QS. PRINT &quot;THIS IS A TEST&quot; is built by LS(J) = ''' + QS + &quot;'THIS IS A TEST'&quot; + QS. Basic requires a string to be surrounded by quote marks, but quote marks cannot be part of a string</td>
</tr>
<tr>
<td>680-700</td>
<td>Build the open statements for the data files (like OPEN&quot;R&quot;,1,&quot;FILENAME&quot;,196)</td>
</tr>
<tr>
<td>720-800</td>
<td>Builds the field statements. If one grows larger than 240 characters a new line is started</td>
</tr>
<tr>
<td>810</td>
<td>Stores a pointer for a branch back to &quot;Change the Record Number,&quot; used in line 880</td>
</tr>
<tr>
<td>910</td>
<td>Stores the array pointer J and the line number. These are used by line 1050 to finish the jump-past-the-buffer nulling statements if the record is already on file</td>
</tr>
<tr>
<td>1070</td>
<td>Stores the line number of the start of the display to use later</td>
</tr>
</tbody>
</table>
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<thead>
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<th>DRIVE 0</th>
<th>DRIVE 1</th>
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<td>Single Side, 40 Track</td>
<td>$595</td>
</tr>
<tr>
<td>Double Side, 40 Track</td>
<td>$729</td>
</tr>
<tr>
<td>Single Side, 80 Track</td>
<td>$729</td>
</tr>
<tr>
<td>Double Side, 80 Track</td>
<td>$819</td>
</tr>
</tbody>
</table>

The disk drives we sell for the Model III are the Tandon drives. Drive 0 includes the controller board, power supply, cables and all mounting hardware. Complete instructions are included for installation. It takes 30 minutes to an hour to install disk drives in a Model III. No soldering is required. TRSDOS operating system is not included in this low price.

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---
Peek Pong

by Charles Gulick

Peek Pong demonstrates that the illusion of speed is possible even in Basic, if the programmer uses all the tools at his command. You'll find it challenging and worth the time it takes to type it in.

The action is like that in ping pong or handball, and your opponent never misses. The object is to return the ball as many times as possible to an unseen adversary who hits it toward you at random angles. Your best score during any playing session is displayed as the "Score to Beat," and the score for your last set is also given.

The Action

I perked up this game with an audio module, so turn on your amplifier/speaker system before loading. Answer CASS? with enter, and answer the memory-size prompt with 32746, and then CLOAD and run.

The message "K to play, Q to quit" appears midscreen. A reminder of the paddle control keys appears on the right side of the screen. The three controls were chosen for their convenient positions. Place the first two fingers of your right hand over the < and > keys. These keys move the paddle left and right. Place a finger of your left hand over the S. This key stops the paddle in its mad dash back and forth. This control is crucial for getting higher scores.

When you miss the ball, you hear a five-note raspberry. On the Model I an 8 shows you where you were; on the Model III an X. To play again, hit K, and immediately get in position for the next serve. That's all there is to playing Peek Pong.

The Program

Lines 330 and 340 POKE the sound subroutine into high memory. Line 310 calls the random sounds. Lines 20-40 POKE the walls into video RAM (VIDRAM), although the top wall is invisible. Line 50 prints the masthead and the midscreen K/Q message.

Line 70 creates the paddle. It must be three 131s wide, because the paddle moves that far for each depression of < or >. This is a key trick for speeding up the action. It also means you will not always be able to position the paddle so the ball hits it in the center. Thus, some judgement comes into play.

The action for each game begins at line 80, which provides for random release of the ball by your unseen opponent. The ball (B = 176) shows up at line 90, to which the play continues to return until you miss. This line also calls forth the bounce sound if the ball and paddle meet. Note S is reinitialized here to zero

---

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until the sound is needed again.

Lines 100–140 watch for your control keys, and keep busy erasing and re-
POKEing the racket according to your instructions. Line 150 erases and moves
the ball to its next POKE location at a speed slightly under the speed of light.
Lines 170–190 check the top, left, and right walls to see whether the ball is
about to bounce, in which event they summon the bounce sound and redirect
the ball.

Line 200 is where your paddle contacts and returns the ball and hits are
scored. Line 210 records the more likely event that the paddle does not hit the
ball, and you get X (on Model I) and a little tune to cheer you up for the next
round. Line 230 GOSUBs five times to the USR function and randomizes the
notes.

Line 250 keeps a permanent record of the highest score achieved. Any number
of players can play in rotation trying to top this score.

Whence the Speed?

Peek Pong is fast—sometimes frustratingly so. And this proves that Basic
need not be regarded as the arch enemy of graphic games action. Several hurry-
up features are incorporated into this program. PEEKing and POKEing are
themselves faster than PRINT @s, and at least in this game environment, faster
than Set/Reset techniques. Moving the paddle in increments of three also
speeds the action, as does elimination of all spaces between characters. Ran-
domizing the ball's angle off the top (invisible) wall, rather than having it
bounce logically (as it does off the side walls) simulates a crafty opponent
and adds liveliness to the action. Even the inclusion of sound adds to the feel
of fast action.

Here's a tip for when you have trouble making contact with the ball: Use $ to
stop the paddle in the vicinity of the ball's descending trajectory.

The computer can make an absolutely lethal shot that will prevent the game
from going on forever. It occasionally wields this blow from a corner, and no
amount of dexterity will save you. Also, some of the serves will prove to be
aces, unless you're psychic and have speed-of-light reactions.

Charles Gullick can be reached at 300 W. Royal Palm Road, Boca Raton, FL
33432.
### SOFTWARE

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Color Life

by Larry F. Perry

Teach your students about the development of communities of organisms with this revised Game of Life for the Color Computer.

As a teacher of environmental biology, I thought the Game of Life could be useful in classroom discussions of communities of organisms. Unfortunately, I found that my Color Computer Life program, written in Basic, bored my students because it was too slow. So, I added some machine-language calls from Basic, and Color Life is the result.

As explained in the program's introduction, John Conway designed the original Life program in the late 1960s. It is a mathematical game that simulates the rise, fall, and alterations of a society of living organisms.

When you run Color Life (Program Listing 1), the title page is displayed while the machine-language subroutines are POKEd into memory. Almost all programs I've seen that POKE machine code into memory use data statements and decimal numbers. Since I use hexadecimal numbers frequently, I decided it would be easier to use strings of hex numbers, read those strings two characters at a time using lines 150–200, and let the computer convert all of the numbers.

After the title page is displayed, you are asked if you need instructions. If you do, press Y. If you don't, press any other key. You are then asked if you want to step through the generations, one generation at a time. Stepping lets you observe each generation carefully. Press Y to activate the step mode. To display the next generation when in the step mode, press the space bar. If you don't want to step, press enter.

After making your step selection, you are asked to select the speed at which the generations are to be displayed. Press 1 or enter for fast, 2 for medium, or 3 for slow. At this point you are told how to change the speed of the display and how to get into the step mode during the game. If you decide to add a glider (a small number of organisms that move while repeating the same series of patterns) or some other pattern to the one on the screen while the game is in progress, press C. If you want to get out of the step mode while the game is in progress, press G.

After selecting a speed, you are given another set of instructions and questions. You can either start your own colony or let the computer place a random population on the screen. Press 1 if you decide to place your own colony; press 2 for the computer placement.

To speed up the placement of a colony, I incorporated the following time-saving options: for placing an organism, press 0; to delete, position the cursor over the square you want to eliminate, and press clear; to place preprogrammed sample colonies, position the cursor wherever you like and press 1, 2, or 3; and to speed your own insertion you can advance the cursor left, right, up, or down each time you insert or delete by pressing L, R, U, or D. The latter step makes inserting your own colony fast and easy. When you finish placing your colony, press S. You will be greeted by a few notes that might sound familiar to you.

When the program begins, the generation number is displayed at the top left of the screen, and the population number is at the top right. These two items are a must if you want to know what is happening to your colony. Color Life also displays the births and deaths of the organisms. If all the organisms die, Color Life ends and tells you at what generation they died. If the colony stabilizes, or you want to start another colony, press E, and you will be asked the series of questions again. That's it for the Basic program.

Now for the "miracle worker." I wrote this for those of you who know

---

Program Listing 1

5 REM HX = START ADDRESS OF MACHINE LANGUAGE SUBROUTINE
10 CLEAR500: HX = 4H6F7
20 CLS: PRINTSTRINGS$(32,191);: PRINTSTRINGS$(32,"*");: PRINT "COLOR LIFE"
30 PRINTSTRINGS$(64,175);: PRINT" VERSION 2.0"
40 PRINTSTRINGS$(32,199);: PRINT" WRITTEN BY L.F. PERRY";
50 PRINTSTRINGS$(32,255);: PRINT" JANUARY 31, 1982"; PRINTSTRINGS$(64,19

Listing 1 continues

---

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nothing about programming in Assembly language and think it is too hard or abstract. I split the program into three parts and wrote them in a form that closely resembles the logic of a Basic program. This is not efficient, and it makes the program execute more slowly, but it demonstrates that writing machine-language subroutines is not as difficult as you might think.

In Program Listing 2, the routine loads in the start address and checks to see if each screen address has a birth or death marker in it. It replaces the black death-marker with a white block and replaces a blue birth-marker with a red block. After looking at all screen addresses, it returns to the Basic program.

The routine in Program Listing 3 is even simpler. The first screen address is loaded in and checked for a red block. If it has one, then the X register has 1 added to it. Then, the next screen position is checked. After all screen addresses are checked, the number in the X register is stored at 6FE and 6FF, and then control returns to Basic.

The most complicated routine is in Program Listing 4. The beginning screen address is loaded and checked to see if it has an organism. If not, then each of the eight surrounding squares are checked to see if they contain red or black blocks. The B accumulator is incremented each time one is found. If at the end of the check the B accumulator equals 3, then a blue block is placed at that position. When a block is placed, or when the B accumulator doesn’t equal 3, nothing happens, and the next screen position is checked. When a red block is encountered, a label is stored at address 6FD. (In this case I used the number 1 for the label.) This tells the computer that the square being checked contains an organism. The same series of events happens here. Each address around the central block is checked, but when the program gets to the address 7F9 hex, it finds that a 1 is stored at hex 6FD. Then the program branches to the routine telling it to place a death marker (black block) in the position if less than two or more than three organisms surround the central block. The screen address is then checked for the end, and the program either continues, if the end of screen is not encountered, or returns to Basic. The comments should help you to follow the logic of the program if you aren’t familiar with Assembly language.

You might want to change the background color or the colors that are used in this program to show births, deaths, and adults. To change the background color, alter lines 480 and 690 so they
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produce the color you want. Next, figure out the number that represents that particular solid color block. For instance, CHR$(207) is the solid block for white and CHR$(191) is red. Change the number to hex. An example would be, PRINT HEX$(191). The computer will print BF, the hexadecimal number for 191.

Now that you know the procedure to find the hex number, look at line 60 in the program. The first part of the string is CFA$80BF. The computer looks at this to determine the color of the block with which it compares the screen address or loads the accumulator in the machine-language subroutines. The CF = white block, AF = blue block, 80 = black block, and BF = red block. The first one is the screen color, so change it if you don't want a white background. The other three numbers can be changed to other colors to represent the births, deaths, and adult organisms. If you want to change other aspects of the program, the variables are listed in Table 1.

Listing 1 continued

430 DEFUSR0=6H700:BF=USR(0)
435 REM CALL ROUTINE TO COUNT NUMBER OF ORGANISMS - PLACES TH
440 AT NUMBER AT ADDRESSES 6FF & 6FF
445 DEFUSR0=6H730:BF=USR(0)
450 REM LOOK AT ADDRESSES WHERE POPULATION COUNT IS STORED, C
455 HANGE TO DECIMAL, GIVE TO PP
460 IFPP=0 THEN 80
470 GOTO350
475 REM END OF SCREEN LOOP
476 REM PLACE RANDOM POPULATION ON SCREEN
480 CLS(5)
490 FOR X=1056TO10535
500 RN=RND(5)
510 IFRN=2THENPOKEx,6BF
520 NEXTX
530 GG=0:GOSUB1210:GOTO420
535 REM END OF RANDOM POPULATION ROUTINE
540 REM SET GEN AND POP TO 0
545 REM SELECT OPTIONS
550 GOSUB1110:CLS:PRINT"YOU HAVE A CHOICE BETWEEN STARTING
560 REM YOUR OWN COLONY OR LETTING THE COMPUTER START ONE. 1) START
570 REM OWN COLONY 2) LET COMPUTER START COLONY 3) END GAME"
565 PRINT:PRINT"A BLUE SQUARE INDICATES A BIRTH, A BLACK SQUARE A
575 DEATH, AND A RED SQUARE A LIVE ORGANISM.";PRINT:PRINT"NOTE:I
580 F THE COLONY DIES OR YOU WANT TO START OVER PRESS <E>.
585 PRINT:PRINT"PICK (1), (2), OR (3)."
590 INKEY$:I=INKEY$:I=INKEY$:I="THEN588"
590 INKEY$:I="THEN588"
600 IF I="1" THEN 0:GOTO630
610 IF I="2" THEN 0:GOTO480
620 IF I="3" THEN 620
620 GOTO580
625 REM INSTRUCTIONS FOR PLACING ORGANISMS
630 REM PRINT PRESS THE UP, DOWN, LEFT, OR RIGHT ARROW TO PO
640 SITION CURSOR OVER POINT YOU WANT AN ORGANISM TO BE PLACED, PRE
650 SS <O> AND A RED SQUARE WILL REPLACE THE CURSOR. WHEN YOU
660 HAVE PLACED ALL";
PRINT "OF YOUR ORGANISMS PRESS <S> AND THE GAME WILL START."
650 PRINT "IF YOU WANT CURSOR TO MOVE IN A CERTAIN DIRECTION WHEN
INSERTING OR DELETING PRESS <U>, <D>, <L>, OR <R> AND IT WILL ADV
ANCE EACH TIME THE <O> IS PRESSED."
660 PRINT "$TO DELETE A BLOCK PRESS <CLEAR>, TO PLACE A GLIDER PRESS
S <G>.
670 PRINT "$PRESS ANY KEY TO START";
680 C$=INKEY$;I$F$="""THEN660
685 REM THIS SECTION ALLOWS USER TO PLACE ORGANISMS ON SCREEN
690 CLS(5)
700 GG=1656
710 IFGG$=1856 THENENG$=1856
720 IFGG$=1535 THENENG$=1535
730 ZZ=PEEK(GG):POKEGG,176:FORX=1TO18:NEXTX:POKEGG,207:FORX=1TO
18:NEXTX:POKEGG,7
740 A$=INKEY$;THENG$="""THEN710
750 IF$=CHR$(12) THENPOKEGG,48:IF$=1 THENENG$=GG+1 ELSEIF$=2 THEN
ENG$=GG-1 ELSEIF$=3 THENENG$=GG-2 ELSEIF$=4 THENENG$=GG+3
760 IF$=CHR$(9) THENPOKEGG,191:POKEGG+1,191:POKEGG+2,191:POKEGG+3,1
191:POKEGG+9,191:POKEGG+10,191:POKEGG+11,191:POKEGG+12,191:
POKEGG+13,191:POKEGG+14,191:POKEGG+15,191:POKEGG+16,191:
POKEGG+17,191:POKEGG+18,191:POKEGG+19,191:POKEGG+20,191:
POKEGG+21,191:POKEGG+22,191:POKEGG+23,191:POKEGG+24,191:
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POKEGG+29,191:POKEGG+30,191:POKEGG+31,191:POKEGG+32,191:
770 REM SELECTION OF 1, 2, OR 3 PUTS SIMPLE POPULATION ON SCREEN
780 IF$="1"GOSUB920
790 IF$="2"GOSUB930
800 IF$="3"GOSUB940
810 IF$=CHR$(8) THENPOKEGG,48:GG=GG-1:GOTO710
820 IF$=CHR$(10) THENPOKEGG,48:GG=GG-2:GOTO710
830 IF$=CHR$(94) THENPOKEGG,48:GG=GG-3:GOTO710
840 IF$=CHR$(9) THENPOKEGG,48:GG=GG+1 ELSEIF$=2 THENENG$=GG+1
ELSEIF$=3 THENENG$=GG-2 ELSEIF$=4 THENENG$=GG+3
850 IF$=CHR$(9) THENENG$=GG+1 ELSEIF$=2 THENENG$=GG-2 ELSEIF$=3
THENENG$=GG+3
860 IF$=CHR$(9) THENENG$=GG+1:PLAY"O:D#FC:#02:C#G";GOSUB1218:PS=0:G
OTO420
870 GOTO740
875 REM END OF PLACEMENT LOOP
876 REM DISPLAYS GENERATION AT WHICH POPULATION DIED
880 CLS$;PRINT"256,""COLONY DIED AT""""G""""GENERATIONS"
890 PRINT "$PRESS ANY KEY TO START AGAIN";
900 ES=INKEY$:I$F$="""THEN900
910 GOTO340
915 REM THREE SAMPLE POPULATIONS
930 POKEGG,191:POKEGG+1,191:POKEGG+2,191:POKEGG+3,191:POKEGG+4,
191:POKEGG+5,191:POKEGG+6,191:POKEGG=7,191:POKEGG+8,191:
940 POKEGG,191:POKEGG=1,191:POKEGG=2,191:POKEGG=3,191:
POKEGG=4,191:POKEGG=5,191:POKEGG=6,191:POKEGG=7,191:
950 REM STEPPING ROUTINE
950 DLs=INKEY$:I$F$els="""THEN950
960 I$F$els=CHRS$1:THEN370
970 I$F$els="""THEN880:GOTO420
980 I$F$els="""THEN550
990 I$F$els="""THEN710
1000 GOTO950
1005 REM END STEPPING ROUTINE
1050 REM SELECT STEP Y OR N - DEFAULT IS NO
1100 CLS$;PRINT"323:3,""DO YOU WANT TO STEP THROUGH THE GENERATIONS?
1005 REM END STEPPING ROUTINE
1100 REM SELECT STEP Y OR N - DEFAULT IS NO
1100 CLS$;PRINT"323:3,""DO YOU WANT TO STEP THROUGH THE GENERATIONS?
1120 A$=INKEY$:I$F$els="""THEN1020
1130 I$F$els="""Y""THENXX$=GOTO1080
1140 XX=0
1150 CLS
1155 CLS
1160 REM SELECT SPEED - DEFAULT IS FAST
1160 PRINT"PRINT""SELECT THE SPEED YOU WANT."
1170 PRINT"1) FAST (3 GEN/SEC)"
1180 PRINT"2) MEDIUM (15 GEN/MIN)"
1190 PRINT"3) SLOW (30 GEN/MIN)"
1200 PRINT"321:6,""NOTE: TO CHANGE SPEED OF DISPLAY WHEN GAME IS IN PROGRESS PRESS <P> FOR FAST, <M>
AND <S> FOR SLOW SPEED. TO GET GAME INTO STEP MODE PRESS <L>"
1110 PRINT "$ADDITIONS TO THE COLONY PRESS <C>
1120 OUT OF STEP MODE PRESS <G>";
1130 IF$els=1 THENPRINT$="""THEN1120
1140 IF$els=2 THENPRINT$="""THENVSP=300:RETURN
1150 IF$els=3 THENPRINT$="""THENVSP=600:RETURN
1160 SP=1:RETURN
1170 CLS$;PRINT"321:5,""DO YOU NEED INSTRUCTIONS?"
1180 A$=INKEY$:I$F$els="""THEN1180
1190 I$F$els="""Y""THEN220
1200 GOTO540
1210 REM PRINT AT TOP OF DISPLAY SCREEN - GEN & POP
1210 PRINT@8,STRINGS(32,143);PRINT","GEN=""PRINTE16,""POP=";RE
1220 TURN

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0000
0700 ORG $700
0700 8E0420 LDX #$420 START OF SCREEN
0703 A680 LDA 0,X+ GET COLOR OF BLOCK
0705
*AT THIS ADDRESS.
0705 B106F8 CMPA $6F8 IS COLOR BLUE?
0708 2705 BEQ $70F YES, THEN BRANCH
070A 200E BRA $71A NO, THEN BRANCH AND
070C *
070C 12 NOP
070D 12 NOP
070E 12 NOP
070F B606FA LDA $6FA GET A RED BLOCK
0712 A782 STA 0, - X PUT THE RED BLOCK
0714
*IN THE ADDRESS BEING CHECKED.
0714 8CO600 CMPX $5600 END OF SCREEN?
0717 25EA BCS $703 NO, GET THE NEXT
0719 *
0719 39 RTS YES, THEN RETURN TO BASIC
071A B106F9 CMPA $6F9 IS COLOR BLACK?
071D 2703 BEQ $722 YES, THEN BRANCH.
071F 20F3 BRA $714 NO, GO CHECK END OF
0721 *
0721 12 NOP
0722 B606F7 LDA $6F7 GET A WHITE BLOCK.
0725 A782 STA 0, - X PUT WHITE BLOCK
0727 *
0727 8CO600 CMPX $5600 END OF SCREEN?
072A 25D7 BCS $703 NO, THEN GET THE
072C *
072C 39 RTS YES, THEN RETURN TO BASIC
072D 12 NOP

Program Listing 2

0000
0000
0000
0000

0730 ORG $730
0730 108E000 LDY $50000 CLEAR Y REGISTER
0734
0734 8E0420 LDX #$420 START OF SCREEN
0737 A680 LDA 0,X+ GET COLOR STORED AT
0739 *
0739 B106F9 CMPA $6F9 IS THE COLOR RED?
073C 270A BEQ $748 YES, THEN BRANCH.
073E 8CO600 CMPX $5600 END OF SCREEN?
0741 25F4 BCS $737 NO, THEN GET THE
0743 *
0743 10BF06FE STY $6FE YES, STORE THE
0747 *
0747 39 RTS RETURN TO BASIC.
0748 3121 LEAY 1,Y ADD ONE TO COUNT.
074A 20F2 BRA $73E GO CHECK SCREEN
074C *
074C 12 NOP

Program Listing 3

Article continues
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<thead>
<tr>
<th>Address</th>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0000</td>
<td>$6F7:</td>
<td>White Block</td>
</tr>
<tr>
<td>0000</td>
<td>$6F8:</td>
<td>Blue Block</td>
</tr>
<tr>
<td>0000</td>
<td>$6F9:</td>
<td>Black Block</td>
</tr>
<tr>
<td>0000</td>
<td>$6FA:</td>
<td>Red Block</td>
</tr>
</tbody>
</table>

*Table 1. Program Variables*

---

**Important Addresses:**

- **HEX** $6F7: White Block
- **HEX** $6F8: Blue Block
- **HEX** $6F9: Black Block
- **HEX** $6FA: Red Block

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**HX** Beginning of area used by machine-language subroutine

**DS** Machine code to eliminate death cells, change birth cells to adult organisms

**ES** Machine code to count number of organisms

**FS** Machine code to check for births and deaths and mark them

**GS** Machine code to check for births and deaths and mark them

**ZS** Temporary variable to load machine code into memory

**XS** Number POKEd into memory

**GE** Number of generations

**PP** Number of organisms in population

**XX** IF XX = 1, then Step generations

**SP** 1 = fast display, 300 = medium display, 600 = slow display (delay)

**GG** Screen address used in placing organisms on screen

**ZG** Temporary storage for number stored at GG

**PS** Variable to advance cursor for GG

---

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The best way to master the program is to type and run it. The examples illustrate its use; alter the program to fit your needs. Remember the variables listed at the beginning of the program; incorporate your changes so you do not forget them.

The input subroutine is in lines 790-990. The line input statement in line 790 allows alphanumerical input with no preceding question mark. The cursor position depends on X and Y.

Listing continues
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Lines 800 and 810 check the input: If C is set to 1 the input moves to the numeric field Z. If you input a non-numeric character the length of Z and Z8 and it is not equal the program jumps to the error subroutine. Any key clears the input and you can try again.

Line 830 compares the length of Z with L(0) and L(1). Lines 850-880 check the digits after the decimal point. A statement like A# = ABS(A# - FIX(A#)) would be easier but produces truncation errors. The test counts the characters from right to left to a decimal point. Increase line 850 for more than 12 digits after the decimal point.

If C(2) is set to 11 check the amount in line 900. If A = 11 jump to line 950 and display with Edit.

Special Handling

The special handling variable C(3) stores input in the right variable. For LS=XX, store your input with F(LS)=Z or LSET P8(LS)=Z8. Write your own subroutines to check for a record with the same key value or to write a record. In the Listing all jumps are made to 930 (see line 920). If C(3)=1 you can jump to your own coded subroutine. Remember to return with GOTO 930. After all inputs the computer asks if the data is okay. If your answer is Yes press Enter; otherwise type N and then the line number question will appear. Change any input; depending on LS in each input statement, variables change to their new value.

Write programs with multiple inputs and a mask on the screen. Store my routine in one file and edit it to write a new program.
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SALES FORECAST FOR 1983

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80 Micro, February 1983 • 331
Concatenate your programs on tape.

Color Computer Merge

John Heusinkveld
2161 E. Gerrado Brio
Tucson, AZ 85718

Mergers are popular in business these days. This program lets Extended Basic Color Computer users join the fun. This program concatenates 2-10 programs saved on tape in the order they appear on tape and saves the resulting program so you can CLOAD and run it. Radio Shack does not provide any method for merging programs saved on tape on the Color Computer, although Color Disk Basic contains a Merge command. Unless you have the money for a disk drive, however, this will not help you.

Since my bank balance wasn't quite that healthy, I decided to write my own merge utility. I experimented with various CSAVEMs and CLOADMs, but all I could do was make the computer hang up.

Finally, I discovered that programs saved in ASCII format can be accessed line by line from tape using INPUT # - 1. I also found that properly formatted data files can be loaded as programs. Using these two bits of information, I created a simple program that concatenates two programs by reading them into a string array, and then writing that array to tape. I later rewrote the program to accommodate up to 10 files (see the Program Listing).

How To Use Merge

Save all of the programs to be merged on tape in the order they are to appear in the final listing, using CSAVE "file name", A. Neither Radio Shack manual covers the A option for CSAVE; it saves a program on tape as a string data file so that each line appears as one string. You can CLOAD this and other text files as if they were programs, although they require more tape and take longer to load.

Next, CLOAD and run Merge. The program will ask for the number of programs to be merged and the file name of each. Be sure that none of the programs have overlapping line numbers, as this will cause errors. The program will also ask for the file name under which you want to save the final copy. After you have given all this information, the message "Ready Cassette" appears. Press the play button on the cassette recorder and press enter. The cassette should begin alternating starting and stopping until it has loaded all of the programs (they are listed to the screen as they are loaded).

When it has finished, the computer will display "Rewind". Rewind your cassette or place a new one in the recorder and press enter. The computer will tell you to press record. Do so and press enter again. The cassette will go on and the merged programs will be saved as one under the file name you gave.

Finally, load this program and make any modifications you wish, and then save it without the A option to speed loading.

Merge should not introduce any errors into your program, with the exception that some programs, especially those which use many read and data statements, may behave differently when combined with others. You will have to work these bugs out of your programs, but be reassured that they do not appear too often. The other, more serious problem is the memory limitation: in a 16K system, the maximum size for the array is about 850. I wrote this program on a 32K machine; 16K users will have to change line 5 to read 5 CLS:PCLEAR1: CLEAR 10000:DIM$L$(850). If you run out of memory, you will get an error; I did not protect against this because doing so wastes precious RAM. 

The Key Box

Color Computer
32K RAM
Extended Color Basic

Program Listing

10 CLS:PCLEAR1:CLS:CLS:PRINT"UTILITY"
20 PRINT"COLOR COMPUTER MERGE"
30 PRINT"MERGE 2-10 programs from tape"
40 PRINT"Merges programs into Color Disk"
50 PRINT"SAVE the merged program onto tape"
60 PRINT"MERGE 2-10 programs from tape"
70 PRINT"Merges programs into Color Disk"
80 PRINT"SAVE the merged program onto tape"
90 CLS:PCLEAR1:CLS:CLS:PRINT"UTILITY"
100 PRINT"THE KEY BOX"
110 PRINT"COLOR COMPUTER"
120 PRINT"32K RAM"
130 PRINT"EXTENDED COLOR BASIC"

332 • 80 Micro, February 1983
SToppers! The BASIC Breakpointer
By Roxton Baker
Author of "TRAKCESS"

Stopper is a unique machine language utility for debugging your BASIC programs on a Level II or Disk BASIC Model I or III.

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- Single step next instruction or line in full
- Determine exactly where an error occurred or set up powerful BASIC breakpoints
- Stop when variable is unequal to a value
- Stop when variable is equal to a value
- Trace a variable value to screen or printer
- Pause, slow-step and single step
- Selectively execute statements and lines

These examples will show how easily STOPPER is used:

Break when line 100 is hit for the 5th time
Break when X is equal to 10
Break when X is not equal to 10
Trace a variable value to screen or printer
Execute next statement or full line


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TASORT

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- A, B and C, D types
- D, E and A, B, C, D types

MAILing MANager also allows easy maintenance of file data with deletion and editing commands. The MAILing MANager manual also includes "Programming Notes" in case you want to modify the screen or printer output. Note that this is NOT required. MAILing MANager supports about 60 names on a 14K machine, 398 on a 48K machine. MAILing MANager respects high memory if you are using another high memory driver (for lower case, printer, etc.). MAILing MANager is available on cassette, complete with documentation for $99.95.

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Transmuter
by Jon Mark O’Connor

Sometimes, you just have to relabel a program’s variables. When you do, merge the program with Transmuter; relabelling will be a breeze.

Transmuter lets you relabel your variables. Normally, you wouldn’t relabel them for personal use. But, if you write for a computer magazine, your variables must make sense. For example, instead of using ZS to represent car payment, you should use CP.

Transmuter uses a PEEK and POKE approach, and it can change almost any combination of letters and numbers within a program. Changing mathematical signs (+ – *) is more difficult, but you can do it. Transmuter can also give you a list of all your variables and can show you the location of any token in your program, as well as send these lists to your printer.

Transmuter also contains a spot-checking function that lets you scan the lines, and upon reaching the desired variable, gives you the option to change it. If you hit Y to change it, the change appears on the screen. If you respond N, the scan continues.

Label changes must be identical in length to the original label. Transmuter has a low-level interpretive algorithm for the change. For instance, Transmuter doesn’t know if you DEFSTR A at the top of your program. If you indicate A$ for change, it won’t change a single A. This isn’t a drawback, however, because you can change all As later.

Transmuter treats labels as separate entities. Once a matching label is found, the change occurs. If you want to

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**TR-80 is a trademark of Tandy-Radio Shack**
change a one-character label, the program scans until it finds the character and then continues. If you have:

```
AAA
BA
A
```

the subsequent change will be:

```
XAA
BX
X (change A to X)
```

Array counters are protected. If you have the label A(A) in your program, the first A will be changed. If you go through the program a second time and

```
"Array counters are protected."
```

indicate A for change, the protected A in parentheses will be changed since it is the first occurrence of the letter.

Change all two- or three-character labels first. As in the above array, A(A), here are the possibilities:

```
A(A)
(A)
A(
(A)

If you have something like this:

```
AAA(B-2)
```

you could indicate:

```
AAA
AA(A
2)
AA
A(
(B

So, even though you cannot touch the minus sign or change it directly, you do have other options.

To change numbers, you could, for example, make all PRINT@960s change to PRINT@320s by either indicating:

```
960 to 320
```

or

```
@96 to @32
```

Be careful when changing numbers,
because you might inadvertently change that one POKE that will send your computer into the void of no return. Always check the accuracy of the numbers.

The Program
After a data search by Transmutor, you'll be asked for the first line number of your program. If you enter 2, but your program begins with line 10, Transmutor will begin at line 10. The last line number can be entered as a specific line or you can hit the hyphen, which will take you to the end of your program.

The menu requests that you either insert any variable for change (up to three characters) or hit ** to see a listing of all your variables/ STRINGS, or hit TOK for a token search. After a variable change request, you are prompted to tell what change you wish to make. You can then select spot-checking. If you don't desire spot-checking, you will see the line numbers followed by the variable, if it's in the line.

If you select TOK, you can request any token. Remember that the math signs are also tokens. A frequently used sign, the equal sign, will produce furious action to either the screen or printer.

To eliminate data lines, I have included the 5712 method at the end of the listing. If you would rather use this than type in the data lines, change the first GOSUB in line 60275:

```
60275 GOSUB 62136...end of line
```

The data read takes .96 seconds. The 5712 method takes 14 seconds, and this wait time could become significant.

Merge Transmutor with your program in the normal manner.

Jon Mark O'Connor lives at 56 Eustis Parkway, Waterville, ME, 04901.
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340 • 80 Micro, February 1983
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Head pat or patronizing bone?

Tandy recognizes outside softwriters but everyone isn’t jumping for joy.

Some computer cowboys will be bunking at Tandy’s ranch under a program started last October to help independent writers of TRS-80 software.

According to published reports, the Fort Worth firm’s Outside Software Support Program will provide independents with:

- Marketing and technical assistance;
- Possible inclusion in a software referral guide sold through Radio Shack stores; and
- Access to TRSDOS and its source code.

The program is Radio Shack’s first attempt to provide help to software writers outside Tandy, or who are not writing for in-store sales.

Is the program a big departure from the past? “I would say it is,” observed Computer Merchandising Director Ed Juge. “It is a method to allow us to reach vertical markets that are very definitely good markets but which we are not capable of adequately servicing.”

Vertical markets, he explained, include software for lawyers, doctors, dentists, print shops, and parts stores. But is the program for all independents? That question’s answer is fuzzy. And that’s stirred suspicion of the program among some prominent TRS-80 software writers.

Asked if Tandy would screen out of the program’s referral guide software competing with Tandy’s, Juge told 80 Micro, “The whole point of doing this is to make software available for vertical market applications that we simply can’t make available and don’t have the expertise to sell and properly demonstrate if we did make them available.”

Although Vice President for Computer Merchandising Jon Shirley echoed Juge’s remarks, he widened the opening in the corral gate. “We’re not very interested in marketing to vertical industries, for example,” he told Computer Business News. “But there’s a lot of TRS-80 software out there for vertical markets, and we want to help those people. It’s not limited to vertical market software, though.”

“I just think Tandy is just trying to throw a bone to the turkeys,” one large software maker said privately. “I have an opinion that it’s playing a game, but I don’t have any foundation on which to base that other than I distrust Tandy implicitly.”

“We were unimpressed with their announcement,” said Bob Snapp, head of Snappware in Cincinnati, OH. “We don’t feel it is a great step forward for software authors. And we don’t intend to participate in the program.”

Apparat Inc. will be submitting software to Tandy for review, but it has low expectations. The Denver, CO, company’s best seller, NEWDOS80, competes with Tandy’s operating system, TRSDOS, and its announced system, LDOS, made by Logical Systems Inc. in Mequon, WI.

Jason Matthews, Apparat’s manager of software research and development, noted, “Tandy’s not going to ask us to do anything with our operating system because it will blow LDOS out of the water.”

Another maker of software competing with Tandy’s questioned the program. The maker, who requested anonymity, said the “theory” behind the program failed to meet the practice.

Interviewed about two weeks after Tandy announced the program, the maker observed, “Right now this looks like it was a press announcement rather than something substantial.”

He found the documentation for the program disappointing. “Not one word was in there about Tandy reviewing or recommending software,” he said. “What was in there was they’d provide us with information about entrance points into the ROM and how to do a fast INKEY$ and other really wonderful tidbits of information that were available to the hobby clubs three years ago. But the hobby clubs had a helluva lot more detail than Tandy was willing to give today.”

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<th>DG115P and DG115S</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum spike energy dissipation</td>
<td>50 joules one time -25%</td>
<td>50 joules one time -25%</td>
</tr>
<tr>
<td>Maximum voltage</td>
<td>7000 volts</td>
<td>6000 volts</td>
</tr>
<tr>
<td>Clamping spike voltage</td>
<td>55 volts</td>
<td>55 volts</td>
</tr>
<tr>
<td>Surge current</td>
<td>0.01A rms</td>
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<tr>
<td>Maximum clamping current</td>
<td>No greater than 1.5A</td>
<td>No greater than 20A</td>
</tr>
<tr>
<td>Clamping response time</td>
<td>2/20us</td>
<td>2.2/20us</td>
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<tr>
<td>Noise rejection</td>
<td>10 nanoseconds (10 x 10^-9 sec)</td>
<td>10 nanoseconds (10 x 10^-9 sec)</td>
</tr>
<tr>
<td>Frequency range</td>
<td>20 Hz to 100 MHz</td>
<td>20 Hz to 100 MHz</td>
</tr>
<tr>
<td>Mode noise protection</td>
<td>Transient and common</td>
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</tr>
<tr>
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TOLL FREE orders only
the Cornsoft Group in Indianapolis, IN, was skeptical of the value of the program's referral guide. He said Tandy currently distributes a "source book" with listings of independent software makers. The makers pay $10 to be listed in the book.

"People are going to be leary of a buyer's guide—especially if it turns out like the Source Book," he said. "It didn't really tell you anything. It was still a buyer beware sort of thing. Most people are not comfortable dealing in that kind of situation."

He sees the Color Computer market benefiting most from the program.

"I think it has the potential to help Color Computer authors much more than it does the Model I and III authors," he said. "New Color Computer owners are more dependent on Radio Shack for software than Model I and III owners are. The I and III owners are familiar with the independent sources to buy software—software only stores, consumer magazines and that kind of thing."

Dan Nelson, general manager of Nelson Software in Minneapolis, MN, said his enterprise has submitted several of its Color Computer programs to Tandy for review.

"I think it's about time Tandy pursued third-party vendors," he noted. "Third-party vendors usually cover a specific application in greater detail and are able to provide better support to their customers than Tandy has been able to offer."

Nelson said Tandy prepared a software-maker source book last June for distributors of its Color Computer clone, the TDP-100. That listing resulted in a number of distributor inquiries about Nelson's products, but no sales yet.

"The local distributor came in and viewed the software," Nelson said. "He was really interested in games. Apparently, he hasn't landed enough accounts to buy any from us."

He added, "Prior to this third-party announcement, we would submit software to Tandy and they would send us a form letter saying we'd hear from them in 90 days. We never heard anything from anybody, ever."

In the past, said the software maker requesting anonymity, Tandy has taken from a year to a year and a half to review software submitted to it. Juge said that won't be the case under the new program. "I doubt," he replied, "that one of our people will spend more than a day on any one package. It's not a review as if we're going to resell it."

The software maker also complained about the rates Tandy has paid independents in the past. "The LDOS people are getting $12 a copy from Tandy," he said, "which is not calculated to make you rich in a hurry."

Another element of the program, TRSDOS access, was rapped by Matthews of Apparat.

"If I were to write a program and put it on the market, I wouldn't put it out under TRSDOS if I knew anything about other operating systems," he said. "People have lost confidence in TRSDOS," he added. "If you buy something in TRSDOS this year, next year Tandy changes it, and all your programs are out to lunch."

"TRS-80 users," he declared, "are pretty sophisticated and they're getting pretty tired of this. They're getting tired of Tandy changing its mind every two minutes."

Matthews surmised opening up TRSDOS access is Tandy's reaction to competition from DOSPLUS.

He explained any independent software writer can buy a stripped-down version of DOSPLUS from Microsytems Software for $2 or $3 a disk. "By
Your TRS-80 Model III already speaks BASIC and now you can teach it APL too, thanks to STSC’s APL™ PLUS® /80 Application Development System. Once you’ve run APL on your TRS-80, we’re sure you’ll both think of it as your first language.

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```
Develop a subroutine which enumerates all the combinations of N things taken from a population P. Its result is a table showing each of the possible combinations in a different row. Examples:

<table>
<thead>
<tr>
<th>3 COMB 4</th>
<th>2 COMB 4</th>
<th>4 COMB 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3</td>
<td>1 2</td>
<td>1 2 3 4</td>
</tr>
<tr>
<td>1 2 4</td>
<td>1 3</td>
<td>1 2 3 5</td>
</tr>
<tr>
<td>1 3 4</td>
<td>1 4</td>
<td>1 2 4 5</td>
</tr>
<tr>
<td>2 3 4</td>
<td>2 3</td>
<td>1 3 4 5</td>
</tr>
</tbody>
</table>

0 = N + COMB P R
[1] make sets of N things from P choices
[2] recursive algorithm by Allen J. Rose
[3] +(N)+*(N+1)P0 0 in(N)P0 0
[4] +(N)+*(N+1)P1 1 in(N)P1
```

This example is found in the textbook provided with the APL™ PLUS/80, APL An Interactive Approach, by Leonard Gilman and Allen J. Rose. A detailed explanation of this APL solution is included in our free information package.

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- utility program libraries
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80 Micro, February 1983 • 345

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The future in Flatbush

Issac Asimov raps on computerized horizons at Brooklyn College conference.

A legislative commission focused on the challenges of living in a computerized society at a conference held at Brooklyn College in New York City.

Issac Asimov, author of 263 books and Barker for Radio Shack computers, headlined the speakers at the session.

“There are no limits, in my opinion, to what computers can do...We have had nothing since writing, maybe since fire, with this potential to change our society,” said Asimov, sporting his familiar gray muttonchop sideburns and western string tie.

The creator of the Foundation series of science fiction novels predicted computers will change literature. Readers will no longer be “passive receptacles,” he maintained, but interact with novels.

Computer simulation will be a significant development for future societies, he told the some 150 conference attendees.

Before legislatures, businesses, or individuals make any decisions, they will create future scenarios via simulations, he said.

No one can predict the future—even with computers—he added. He cited an event in Wethersfield, CT, where a meteor hit a home. The chances of an outer space object doing that are very remote, he noted, yet it’s the second occurrence in recent times it happened in Wethersfield.

“That tells me one thing. God is mad at Wethersfield, Connecticut,” he quipped.

He predicted future computer games will create the illusion of participating in the contest by use of 3-D holograms. On existing video games, he observed: “You can’t play these games without learning something. It’s not worth learning, but it’s learning.”

Asimov said he uses his TRS-80 Model II only for rudimentary word processing and knows little about the micro. One day, he related, he feverishly searched the machine’s documentation to discover how to print a number with an exponent. A quick call to Fort Worth solved his problem. “Did you look up superscript?” the service man asked.

After Asimov’s address, panel discussions and workshops were held on privacy, education, and social changes.

Two experts squared off during the panel on protecting individual rights in a computerized age.

James Howard, an attorney and vice president of ICS Group Inc., argued governments threaten privacy more than banks and private sector businesses.

“National financial institutions,” he said, “are painfully far from calling up information on customers at will.”

CitiBank needed to merge 20 data bases to get the information it needed for its home banking pilot project, he noted. The cost was tremendous.

Howard, former acting chief counsel for the National Telecommunications and Information Administration during the Carter years, said: “It is the government agencies that pose the greatest threat to privacy. Government, and not the private institutions, are the driving force behind the invasion of privacy.”

That assertion was questioned by George Trubow, a flamboyant professor of information law and policy at John Marshall Law School in Chicago.

“We are losing our ability to define ourselves,” he argued. The information about us in computer banks is used to define us, he contended, and to predict how we will behave. If a business can predict human behavior, then it can program human behavior, he maintained.

The biggest private sector threat to privacy, however, may be your next door neighbor, he said. “I’m less worried about Big Brother,” he observed,
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The manual is written in plain English, and is easy to follow. Because some of you want even more help, we're working on LAZYBOOK, a complete guide to word processing with your TRS-80 and LAZY WRITER.

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80 Micro, February 1983 • 347
"than little brother next door with his personal computer."

Fear of a massive central computer containing files on every citizen is misplaced fear, according to Norma Rol- lins, director of the Privacy Project for the New York Civil Liberties Union. She explained computer networking can create an omniscient data base without a large central computer being built.

Computer size occupied a prominent place in the discussions of the panel on the effects of computers on human values.

Opening the afternoon session on a nostalgic note, Brooklyn College Department of Computer and Information Science Chairman Frank Beckman said during the 1950s, computers were "quite impressive, not the sneaky little machines we have today."

If the old vacuum-tube technology were used to build an IBM 3081 today, the computer would be the size of the Houston Astrodome and require the Gulf of Mexico to cool it, said Denos C. Gazis, assistant director for IBM's Computer Sciences Department.

He claimed he has more computing power in his bedroom than IBM's research department had when he joined it in 1961. Harvard Associate Vice President for Information Services and Technology Howard Resnikoff told listeners he envisioned a day when a microcomputer would be the size of a bacterium. The micro, he said, could be programmed to alert physicians when something is wrong in a body or even cure the ill.

A few years ago, he observed, people were concerned with creating life artificially. "Now we are on the verge of something more startling," he said. "The creation of thought without any life at all."

Dr. Resnikoff, wearing a gray pin-stripe suit and sporting a beard without moustache, predicted if legislative concern over automation produced limitations on using robots "overseas interests will reap the rewards of our concerns—not American workers."

"The possibility of good [from computers] is limitless," he said, "but the possibility of evil is not negligible."

Despite humanity's penchant for recording knowledge, history's shown old wounds are best healed with the passage of time. But computers will change that, too, according to Gazis. "Computers," he said, "will take away our benign ability to forget."

H

ightmares into sweet dreams

A company named TRW plants seed for would-be personal computer service network.

Have you had this nightmare? You sit at your micro, try a cold boot, and nothing happens. Unless you're electronically inclined, you suddenly experience a sick, sinking feeling where your stomach ought to be.

Relax. It was only a dream. But should it become a reality, a company named TRW may be some help to you in the future. The firm's Fairfield, NJ, Customer Service Division has opened a personal computer service center in Dallas, TX, and has its sights set on opening more next year.

John Harnett, the division's director of planning and development, said in a statement the center will offer the general public the high caliber of service historically reserved for large commercial computer users.

"We're taking the hassle out of personal computer repair for the individual consumer," he observed. "The speed and efficiency of service this center will provide are going to set standards for the industry."

The center will service most major brands of computer-related equipment including video games and TRS-80s. "That's not one we're actively seeking," TRW Marketing Communications Manager David F. Gill said of Tandy's micros, "because Radio Shack has its own service centers. On the other hand, if they bring it in to repair it, we will certainly repair it."

The centers might offer a service alternative to TRS-80 owners who've upgraded their micros with foreign parts and add-ons. "We will service it with whatever parts it has," Gill told 80 MICRO, "the only limitation we have on that is obviously the availability of spare parts to us."

Gene Carson, one of the center's managers, feels short turnaround time will be a major plus for the store. "When your personal computer breaks down," he said in a statement, "you won't have to ship it to a remote service center and wait days or weeks for its return. Just drop the equipment off at our center and in most cases, we will have it ready for you within 24 hours, sometimes even while you wait."

The center will do chiefly component repair, Marketing Communications Manager Gill explained. Components will be repaired on their original boards. However, there's an exception to this rule when there's heavy traffic in an item. "We'll say, 'Okay, these boards are the ones that typically go bad,' " Gill said. "We'll stock those boards, replace them when they come in, and turn them around in 10 minutes."

He explained, "A lot of things that go wrong with a micro are very common and don't require an exotic part or something of that nature."

"Printers give the biggest problems of the mechanical devices," he continued. "Any mechanical device is subject to wear."

Inside the micro, he noted, problems usually originate with disk drives, which are mechanical, or blown fuses.

He added, "The biggest single problem is mishandling diskettes."

Prices at the center are fixed at $25, $50, and $100, Gill said. If it appears a repair will cost more than $100, a customer is notified. "We will do an estimate on it," he added, "and stick to that estimate."

Manager Carson said the center warranties repairs for up to 90 days. Future
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But I won't stop there. If you have a question, or a problem, call me. You won't get an operator, or order taker. You'll get me. And if I can't talk to you on the spot, I'll call you back. And I'll fix your problem. FAST.

Now I could say a lot more about these programs, but you really won't know how good they are until you try them. So, order the programs you need, and try them for 14 days. If you're not convinced that these are the programs for you, send them back, and I'll refund your money.

My price for these programs is only $289.00 each, postpaid. I could charge hundreds more, but I want you to have the best programs at the best possible price. So mail or call your order in today. I'll make sure you'll be satisfied.

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*TRS-80 is a trademark of Tandy Corporation.
plans call for service contracts where customers can sign yearly agreements to cover maintenance and service on their equipment.

The center also provides computer supplies, software, publications, and a computer bulletin board.

Gill added the center will upgrade a customer's micro. "We will not recommend anything," he said. "However, if someone comes in and asks if this thing is going to work, we will look at it and tell them if it will or won't."

Extensive expertise and a large parts inventory are keys to the center's effectiveness, Carson maintained.

"Our four managers have nearly a half century experience among them," he said. And according to TRW, its service division services more than 700,000 pieces of equipment for 80,000 customers and makes more than 2 million service calls annually.

"We have an extensive parts inventory," Carson added, "and what we don't have we can get overnight from one of our commercial repair centers."

Carson's statement mystified Jon Campbell, press relations manager for Texas Instruments' Consumer Group. "I spoke to the people that run our repair center and they have not heard from TRW about this," he told 80 Micro. "They were a little puzzled. How could TRW do repairs on the 99/4A if they haven't contacted us for spare parts?"

He said, "We do not have any outside arrangements to repair our units and we are not looking for any."

He added if a 99/4A was still under warranty when TRW repaired it, the TI warranty would be voided.

Texas Instruments has 50 exchange centers in the nation, he explained, where, if a 99/4A breaks down, its owners may exchange it for a new one or have it repaired. Exchanges are free during the warranty period, $45 after the period ends. Costs for repairs range from $25 to $80.

Other computer manufacturers hadn't heard of TRW's efforts in servicing personal computers.

Commodore, whose business systems are serviced by TRW, was unaware the TRW center might be servicing VIC 20s.

A spokesman for Commodore said if something goes wrong during the VIC 20's warranty period, it can be returned to point of purchase for a new machine.

After the warranty expires, he added, VIC 20s are sent to one of Commodore's factories and the user is sent a factory reconditioned unit within 48 hours.

"The Commodore 64," he said, "is only being sold through computer dealers. All computer dealers are required to be service centers as well. The dealers can solve 90 percent of the problems that come up. The other 10 percent will be referred to regional service centers."

An Atari spokeswoman said she recommended Atari computers be brought only to the 1500 service centers the firm has established across the country.

For firms, like Apple, requiring their dealers to provide service, TRW could offer an alternative service channel. A number of dealers and distributors have approached TRW, Marketing Communications Manager Gill claimed, and said the service center approach was a "great idea." He added, "They'd rather concentrate on selling and let us service it."

The first TRW center opened last October. This month or next, TRW will be assessing it to see if they should start up more of them. "If things are growing and we've got a steady trend upward, we will expand to as many as 15 more places next year," Gill said.

Planning and Development Director Harnett added, "Besides providing first-rate service, I believe these centers will help take some of the mystique out of computer usage."

"The more people realize that computers can be like other equipment they use daily to make life easier, the more computers will be found in the smaller office and home. By repairing them quickly and effectively, we're promoting this message."

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**BUSINESS**

Rent-a-computer

*If you're in Champaign-Urbana, IL, you don't have to own a micro.*

BY P. GREGORY SPRINGER

SPECIAL TO 80 MICRO

Is rent-a-computer the next big thing, an idea whose time has come? The McDaniel family of Champaign-Urbana, IL, hope so, and they've begun a business to test the theory.

In the heat of summer—in a former typewriter supplies store on the main campus at the University of Illinois—Marvis Jerry McDaniel, his son Myron McDaniel, and other investors opened Micros Unlimited Inc., a name with a big claim to keep. Twenty-seven computers, most of them TRS-80 Model IIIIs, have been stationed in individual four-foot-by-five-foot carpeted cubicles, with printers and paper and all the peripherals anyone would ever need. Epson printers come furnished in each booth, with a daisy wheel letter-quality printout available at an extra charge. There's room for 60 computers in all, and the McDaniels hope not only to expand the business locally, but in other locations as well.

Who wants to rent time on a computer?

"Students, especially graduate students, are the prime market," explained the senior McDaniel, who graduated in engineering from Illinois in 1953.

"Law students, graduates who need cover letters and resumes written, people who need to swap address blocks and do multiple printing."

"I've been working as an independent consultant for computers for 20 years here," he said, "and we have not yet begun to explore the use of media in getting computer possibilities understood by the students. More than half our customers now are students, but—they're going to have to be hit on the side of the head to get it through to them what word processing is all about. They might think it's only for business, they have no clear idea of what they are capable of doing with computers."

To help publicize the initial opening of Micros Unlimited, engineers, com-
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puter science students, the liberal arts and science school, and commerce departments were invited to several open house demonstrations of what microcomputers can do for the busy student who's all thumbs at a keyboard.

While McDaniel spoke, a customer walked into the brightly lit reception room and inquired about an IBM Displaywriter to rent. "We'd have to charge $20 an hour for that!" whispered the younger McDaniel, after the customer is told none is available at the moment. "That's a $12,000 machine!"

Micros Unlimited might not be able to offer a computer user every model he or she would desire, but it's making an effort to have variety and simple access for inexperienced users.

"There are too many variations of software to deal with for most dealers to be able to explain them properly," Jerry McDaniel continued. "Scripsit is easiest to learn. We teach it in a matter of minutes. Within 30 minutes to an hour, we have people working on it.

"A German student came in this afternoon and composed two letters in 45 minutes. He had no previous computer experience.

"Most software documentation is disappointing, perhaps keeping more people away from computers than drawing them to them. The manuals are written by people who know the hardware and assume that everyone else does too. We tried the AppleWriter for six hours one night and gave up. The manual was terrible.

"Micros Unlimited will write its own instructions for customers. What do you want to do? How do you do it? Books and manuals often don't tell you what will happen when you follow their instructions. It's like a game. How do you turn on the machine in the first place, for example? The switches aren't where you can see them."

For an hourly rental fee averaging $3.80, students, businessmen, and university faculty have been coming to Micros Unlimited and learning about computers in the process. Word processing software is available for term papers, theses, letters, and reports. VisiCalc, Cobol, Pascal, and Fortran are also available for solving engineering problems, financial projections, and scientific calculations. Programs to check spelling and grammar have helped some students with papers that need reworking before they can be submitted for a grade. For the slight fee charged, it can be a reassuring pregrade reading.

When asked what would prevent home computer owners from merely copying these software programs for their own use, McDaniel replied: "The law. Everyone must sign a release when they work here, stating that they are renting the equipment and the software. It's like any recording or duplicating copyright problem. Also, our diskettes are write protected with tabs."

Although Micros Unlimited uses Scripsit for most of its word processing customers, the problem of underlining and superscripts—frequent requirements for college students—hasn't been fully dealt with yet. "Sometimes they will add the underlines manually," McDaniel said. "We aren't using SuperScripsit at this time. We do have ScriptPlus available for certain jobs. We also have WordStar and CP/M for other jobs. We have a variety of computers."

In addition to setting up a work space for computer users who can't afford to own their personal machine, Micros Unlimited sells and rents out both hardware and software.

"We rent machines to businesses; it's usually too expensive for individuals. The Democratic congressman team uses one of our machines 22 hours a day these days. We also rented out Profile III+ to them, although we try to avoid renting software. We encourage people to buy it by charging a hefty amount. We try to be fair to the creators of software."

The McDaniel family stresses Micros Unlimited is basically aimed at the individual who needs a short-term use of word processing or computing capability. To encourage this, they've formed a club. It offers members:

- A disk;
- Four hours of free time;
- Free unlimited use of instruction tape and cassette;
- Discounts on future rentals;
- Free use of a spelling and grammar checker; and
- Discounts of up to 20 percent on the programs, books, disks, and magazines.

The hardest thing to stock so far, they have found, is the magazine rack. For some reason, the local news service has been protective with the distribution of popular computer magazines. "We had to go out and raid his place to get any in here at all," McDaniel explained. "It's about time to go out and make another raid, too."
EXPENSIVE – The LNW System Expansion II and built-in comes with a full 32K of 200ns RAM, RS232c 20 MA current loop serial interface. That’s for starters. Next, consider our heavy gauge steel case, power indicator lamp, gold-plated connectors, FR-2 glass epoxy circuit board with solder mask and silk screen legends. Then there is the parallel printer port, screen printer port, real time clock, and extra heavy duty onboard power supply with over current protection, over voltage protection and thermal shutdown. If that’s not enough then there is the floppy disk controller, guaranteed operation at a 4MHz CPU speed and our 6 month warranty. Every one of these features is STANDARD. This is true system expansion. You get every ‘expensive’ feature without spending more.

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*"8" drive operation requires special cable, 8" double-density requires 3.3.9 CPU speed-up modification or LNW-80 4MHz computer.
GAMES

Custer's Lewd Stand
Clad only in hat and boots, Little Big Horn loser chases Indian woman and whips up national imbroglio.

BY JOHN P. MELLO JR.
80 MICRO NEWS EDITOR

From coast to coast, a microcomputer game depicting the alleged rape of an Indian woman by General George Armstrong Custer has been slammed by concerned groups. But the pasting "Custer's Revenge" has taken in public may only fuel sales, according to two blue marketeers.

"I think the controversy is going to accelerate the game's sales considerably," contended Daniel Ellis, publisher of The Dirty Book, a twice-a-year listing of "erotic" software.

Asked how the Custer's Revenge flap would affect his games, J. P. Nelson said, "I think it can only help them. Nelson, board chairman of Computer Kinetics Corporation located in Westlake Village, CA, explained his firm makes three coin-op games placed "strictly in adult locations."

Stuart Kesten, president of American Multiple Industries in Northridge, CA, reportedly predicts his firm will sell 750,000 copies of Custer's Revenge. If that prediction proves true, the game would gross more than $3.7 million for American Multiple.

The corporation makes two other blue games—"Bachelor Party" and "Beat 'em and Eat 'em"—but neither has sparked the outrage caused by Custer's Revenge.

When American Multiple demonstrated the game last October at the National Video and Audio Conference in New York City, some 100 people representing women's and American Indian groups demonstrated against it.

Since Custer's packaging includes a reference to Atari, the game giant entered the melee, claiming its good name had been sullied. It alleged American Multiple had tried to cash in on Atari's trademark and filed a lawsuit against the American Multiple in federal district court in Los Angeles.

Legal action against American Multiple is also contemplated by the American Indian Movement.

Meanwhile, local governments joined the controversy. In the Sooner state, the Oklahoma City City Council adopted resolutions condemning the game. And the Los Angeles Board of County Supervisors adopted a three-pronged attack against it.

Opponents of Custer rail the game because they claim it condones rape, is racist, and is sexist.

Betty Rosenstein, head of the Los Angeles County Commission on the Status of Women, declared, "We are horrified that there are games in which entertainment of the players comes from the act of rape and sexual assault against women."

"We are very disturbed at its idea that rape is acceptable, that it's supposed to be fun," observed Helen Parolla, director of New York City's YWCA Center for Public Policy.

The National Organization for Women also found the game offensive. Among its objections: The game trivializes the pain and humiliation suffered by the one in three women raped in her lifetime and promotes the idea a manly man is a rapist.

"It's making the player of the game a third-party participant in the rape," noted a spokesperson for Women Against Pornography in New York City. "This is a new dynamic. In the past, a person has been a viewer of pornography, not a participant. You are maneuvering Custer over to the Indian woman tied to a post. You're maneuvering him to rape her."

"It rewards a player for rape," she said. "That's how you win the game. It's making rape something to be rewarded for."

The spokesperson's comments become more sobering in light of recent findings in The Journal of Communication published by the Annenberg School of Communication at the University of Pennsylvania.

In a study of pornography, Penn researchers discovered male and female students who watched a large number of blue movies found rape less objectionable than similar students who watched nonerotic films over the same period of time.

Repeated attempts by 80 Micro to reach American Multiple's president by telephone failed. However, Custer's creator, Joel Miller, reportedly denies the 7th Calvary's fearless leader rapes anyone. "He's seducing her," Miller is quoted as saying, "but she's a willing participant."

Kesten told wire service reporters: "Our object is not to arouse; our object is to entertain. When people play our games, we want them smiling. We want them laughing."

"The idea of the game itself is to have fun, not just to have a cheap sexual joke," he said. "These games are not meant to arouse and I would wonder about anyone being sexually aroused by them."

Custer's detractors also found the game racist.

Resolutions adopted by the Oklahoma City City Council stated, "Responsible citizens representing all segments of society are repulsed both by the vulgarity of this video game and its calculated insult to minority groups in
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America.”
And in a letter to Kesten, YWCA National President Jewel Freeman Graham and National Executive Director Sara-Alyce P. Wright declaimed:
“It is a sad symbolism in our society when the sexual overpowering of a nude Indian woman by an American general is considered by your company either comedy, victory, or fun. The blatant racism of a white male attacking an Indian woman in this suggestive manner contributes to the continuation of a racist-sexist society.”
The National Organization for Women declared the game promoted the acceptability of raping Indian women, masked and trivialized the racial genocide practiced by the real Custer, and used the new technology to degrade the American Indian community rather than advance ideas of equality and humanity.
“As American Indians,” said Rudy Martin, public relations director for the American Indian Community House in New York City, “we are vehemently opposed to the exploitive use of our race for the titillation of the public. We see this disgusting video game for what it really is: a sexist, racist, sadistic expression, the sole purpose of which is to fill the pockets of its creators and promoters.”
He asked: “Would the characterization of a people be acceptable if it depicted Begin attacking a Palestinian woman, Prince Charles chasing a female IRA member, or Hitler having his way with a naked Jewish maiden? We think not.”
“Tomorrow it will be an attack against someone black or brown or homosexual,” Rosenstein of L.A. County added. “And then an assassination against a president. Do we want to live in a community with that kind of sickness?”
“The only result this game will have,” Martin said, “will be to promote a casual attitude toward racism, a misguided sense of white, male superiority, and the reinforcing of the stereotyping of American Indians as something less than human.”
He called the game “a statement of the deterioration of what was proclaimed proudly as American society,” and said “it serves only to perpetuate the violent and sexist characterization of American people in the eyes of the world.”

Banks: Strung-out lawsuit.

“We have enough sickness and violence in our community without adding more to it,” Rosenstein observed. “I guess the real question is, do we really want to have a community where recreation is based on humiliating and degrading and dehumanizing women.”
Apparantly, these issues were less nettlesome to Atari, lambasted for making the medium for Custer’s unsavory video deeds.
“Atari takes a very dim view of this use of our product,” Atari Consumer Products Division President Michael Moore said in a statement.
“We are quite upset,” he continued, “with someone who has chosen to use our product for a purpose which was not intended.
“We intended the product for whole-
some family entertainment, but to say that Atari is responsible for this occurrence would be as illogical as censoring a camera company for making cameras because a few people take pornographic photographs.”
Although Custer’s opponents want the game banned, they realize the law offers them little recourse.
“Unfortunately,” lamented Moone of Atari, “some individuals take refuge behind certain legal precepts to the dismay of the majority of the people.”
“We’re not looking to run into the First Amendment,” Atari attorney Kenneth Nussbacher told the New York Times. He said American Multiple failed to adequately disassociate itself from Atari and capitalized on Atari’s name and trademark.
Kesten of American Multiple saw
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Because it is basically a magazine for the TRS-80 Color Computer, the RAINBOW gives you just enough information to meet your monthly needs. So you can expect both news and what is new. It's like a pot of gold where there is something for everyone and the fact that you have never seen it before is exhilarating.

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Atari's lawsuit as a compliment. "Here we are," he told UPI, "a little company, brand new to this industry, and we're already attracting a lot of attention from someone as big as Atari."

He told the daily his games do not say they're made by Atari. He said there is a statement in small print on the back of the game's package disassociating Custer from Atari.

"We're going to try and file a class-action suit," said Dennis Banks, national director of the American Indian Movement. "We know it's a strung-out lawsuit. It's hard to file a class action against a video game or movie."

Having Custer banned by court action smacks of censorship, however, and censorship is something most opponents to the game are shying away from.

"We are not talking of censoring," Rosenstein of L.A. County observed. "We are talking about sensitizing the community."

However, the three-point plan Rosenstein's commission proposed and L.A.'s county supervisors adopted included drafting legislation to prohibit video games like Custer and instructing the county's counsel to study adopting a similar ordinance on the local level.

Glynis Edgar, director of community relations for the Oklahoma Human Rights Commission, said her agency hopes the anti-Custer resolutions adopted by the Oklahoma City City Council "will discourage folks from buying [the game] and discourage stores from wanting to have it."

She added, "By no means are we advocating it be banned."

But Edgar admitted when one adult book store owner in Oklahoma City was contacted by opponents to Custer after the city council's action, it was apparent he wasn't going to be deterred from carrying the game.

Atari called on all concerned parents to write American Multiple and "hope the public outcry will persuade the maker to remove their product from the market."

How effective will that be?

"Stuart Kesten," Banks said, "told our people he has invested too much money in it to bring it off the market."

---

14 Illini and a robot Rubick solver

"Yes, I refer to Robbie as 'him,' rather than 'it,'" confessed Daniel Talken, one of 14 engineering students at the University of Illinois responsible for the creation of a robot that solves Rubick's Cube in his own overhead mechanical hands. "He's really a toy, though."

Apart from giving the machine eyes, nose, mouth, and personality, the creation of Robbie Rubick is especially noteworthy for the team effort which went into his design.

When a member of Tau Beta Pi Engineering Honor Society first came up with the idea, three branches of the fraternity set out independently to solve the necessary problems involved. The computer engineers developed the program for solving any scrambled cube. The mechanical engineers worked on the device to manipulate a standard cube with electrical signals. And the electrical engineers were responsible for connecting the computer to the mechanics. Each group worked independently of the others. Five months and $450 later, Robbie was born.

"Most of the work was done on faith, luck, and hope," Talken said. "None of us knew whether or not the others were going to be able to interface with all the plans."

Using a color-sensing electric eye, computerized brain, and mechanical hands to twist and turn the cube, Robbie accepts a solution from his terminal in about two-
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tenths of a second. An average of 10 moves is needed to complete the cube, which takes nearly six minutes of twisting and turning. “Most people who can solve the cube can beat the mechanics, but no one has yet been faster than the computer.”

So far, Robbie—who made his first public appearance at the annual U of I engineering open house before an applauding audience of 4,000—has been acknowledged nationwide through the New York Times, Paul Harvey, and the CBS Evening News.

“The next step is to add color photo sensors,” continued Talken, “so that Robbie can read the initial configuration himself and solve the cube in the push of a button. There will be a Robbie Rubik II.”

—P. GREGORY SPRINGER

Tandy wants your phone business

After waging a guerrilla war against the AT&T monolith (80 Micro, January 1983, p. 384), Tandy Corporation has moved to bolster its competitive position in the telephone business.

The Fort Worth, TX, firm has bought a manufacturer of business telephone equipment and announced it’s getting into telephone paging.

Acquisition of the assets of Interconnect Telecommunications Systems Inc. of Lexington, KY, was revealed at Tandy’s annual stockholders meeting held in Fort Worth in November. Tandy did not disclose how much cash it paid for the firm.

For its 1982 fiscal year ending June 30, 1982, the Interconnect firm, which serves parts of Kentucky and Ohio, had sales of $8.5 million, Tandy said in a statement.

During the same fiscal year, Tandy’s telephone and related equipment sales increased 35 percent over FY 1981. The sales represent 6.5 percent of the firm’s $2 billion in sales for FY 1982.

Chairman John V. Roach told stockholders Tandy also intends to open “four or five” experimental telephone stores early next year. The stores, which Roach claimed will offer customers “a totally new concept in telephone merchandising,” will be opened in Lexington and Louisville, KY, and Fort Worth.

“Since the concept is new,” Roach said in a statement, “we will reserve most of the details until the first store opens. The name of the new chain will be Radio Shack Telephone Center. Our primary thrust in the phone business will continue to be through the regular Radio Shack stores.”

According to The Wall Street Journal, the new stores will “probably” sell devices linking computers and telephones. In existing stores, the Journal added, Tandy is expected to begin marketing equipment early this year for electronic mail between personal computers.

Timothy Diachun, chairman of Interconnect, will join Tandy as vice president for telephone marketing.

Roach also announced Radio Shack would start marketing pocket pagers early this year. Although the retail price hadn’t been finalized, he said, it would be significantly lower than the $175 to $200 being paid for basic units today.

He noted in a statement Tandy has signed contracts with radio common carriers or Bell operating companies in 54 cities. Those include New York, Boston, Chicago, Los Angeles, Houston, Atlanta, San Diego, Fort Worth, Dallas, San Francisco, Philadelphia, Baltimore, and Washington, DC.

Under the agreements, he explained, the carriers would offer paging services at a fraction of the current basic rates for paging. Those rates range from $10 to $20 a month.

“We are hopeful that once again,” Roach said, “we will be able to take a product from its traditional market (i.e., commercial and emergency use only) and, with a new breakthrough in cost, make it a mass market item.”

Tandy’s chairman added the move “could open the door to us becoming a factor in the emerging mobile telephone market and the future personal, carry-it-with-you-
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anywhere market. The day is coming, for better or worse, when you cannot avoid communications wherever you are.”

“All this,” Roach observed, “is designed to help us make good on one of our new trademarks, ‘Make Radio Shack Your Telephone Company.’”

**British mag gives Dragon tepid review**

“The similarity between the Tandy and the Dragon 32 is almost uncanny and the reason is not simply because the same chips have been used.”


“The first thing that strikes you about the system,” the British microcomputer magazine said, “is that it has a ‘proper’ keyboard although the quality of the particular unit chosen is a little dubious.”

“Readers who are familiar with the TRS-80 range of systems,” the reviewer said, “might be hoping that the format of the text screen found on the Dragon 32 would be an improvement. No such luck, it’s still 16 lines of 32 characters in text mode with no lowercase letters, reversed uppercase being used instead.”

The reviewer was critical of the Swansea, Wales, micro’s color. He said “the primary colors are not clean: red, blue, and green and not ‘off’ shades.”

When the Dragon is fired up, a memory check might surprise some users. Although the micro is touted as a 32K machine, only 24K is available for programming.

“The missing 8K of RAM hasn’t really vanished,” the reviewer explained, “is being used for the system variables and to create high resolution graphics areas. While this means less space for you to program in, it does mean that when you come to use the high resolution graphics your memory doesn’t shrink dramatically like some other systems we could mention!”

“For those into data handling,” he continued, “the cassette interface can be used for data files through Basic although the reliability of the system is not particularly good. The interface seems slightly level sensitive, but my main criticism would have to be the lack of decent messages; single letters displayed on the screen don’t count as messages in my book!”

The reviewer added there are two interesting cassette commands. Files can be skipped by using SKIPF. Using MOTOR will allow a tape recorder to be controlled from the keyboard. That can save time fiddling with the remote plug.

Programs may be halted during running by pressing shift @. Pressing any key but break will restart the program.

Simple, single-tone noises can be produced from the Dragon using SOUND, the reviewer said. More complex sounds can be created using PLAY. That function, he said, is similar to one found in Sharp’s computers. A complete note passage, pauses, and changes in tempo, may be programmed into a string made up of a note name, octave, duration, and volume.

The reviewer found the micro’s printer port a bit of a mystery. “A quick count of the available peripheral devices inside the Dragon 32 leads one to wonder just how they managed to create this extra parallel port as there simply aren’t enough bits available,” he observed.

“The only possible explanation of this,” he said, “is that the printer shares the same PIA as the joysticks; it uses the port as an output whereas the joysticks use it as an input.”

Contrary to the opinion of one Tandy-UK executive and the experience of 80 Micro’s Jake Commander, Computing Today was skeptical of plugging Radio Shack ROM packs into the Dragon.

“The indications are that they should [work],” the reviewer noted, “but without complete information on the pin connections of the Dragon 32, I’d rather not suggest that you plug one in and try!”

Documentation for the micro wrung a tepid response from the reviewer. “The manual...as manuals go,” he said, “is not too bad. There are a number of small errors which may well have been cleared up by the time the machine hits the streets in a big way, but the main feeling is one of missing information.”

“There are no details on any of the hardware, interface connections or add-ons. Nor are there any facts about the monitor program and how to get 6809-code into the system.”

For those “really interested” in pursuing the Basic on the Dragon, the reviewer suggested they buy two books from Tandy, Going Ahead with Extended Color Basic and the Color Computer Technical Reference Manual.

“Just what has the Dragon 32 got over its rivals?” the reviewer asked. “Well, if you were looking for a home computer to play games with and maybe try a little programming on, it does have the advantage of a reasonable amount of RAM and an almost decent keyboard.”

“As an alternative to the Tandy Color Computer it wins on price alone although it certainly doesn’t look as nice.”

“As for its other rivals, the Atari and Texas systems, the choice of ready-to-run games and add-ons possibly tends to weigh against the Dragon 32.”

“Another possible source of concern is what Mettoy [the parent company of Dragon Ltd.] has never been in the computer market before whereas both the others have a long pedigree but, in reality, there is little that can go wrong in a system like this that cannot be simply and easily fixed.”
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Let's talk about exercise physiology this month. I'll use the regression program published in December 1982's "Copernica Mathematica" to create an equation for aerobic points based on distance and time. I'll also develop the concepts of moving averages and autocorrelation of time series data to monitor the heart rate and look for periodicities and trends.

Basic Physiology

The heart functions as a pump to move blood (which carries oxygen and food to the muscles and carbon dioxide and waste products away from the muscles). There are two major controls of the heart: nervous and the so-called "Starling's Law of the Heart."

Nervous control of the heart is mediated through both the sympathetic and parasympathetic nervous systems. The sympathetic pathway passes through the spinal cord, synapses in a group called a ganglia, and then continues on to innervate the heart. When excited, these fibers stimulate the heart rate (tachycardia) as well as the strength of the contraction (controlled by altering the myocardial contractility). The parasympathetic innervation is mediated through cranial nerve X, called the vagus, which originates in a portion of the medulla called the vagomotor center. It slows the heart (bradycardia) by inhibiting the sino-atria node from initiating a heartbeat.

These two nervous pathways control the heart rate for relatively short time periods. For example, the alarm clock rings and you jump out of bed. What keeps the blood pumping to your heart and brain and not to your feet?

A number of reflexes send nervous information to the brain. One such reflex is the baroreceptor—certain receptors in the circulatory system, such as those located in the carotid and aortic bodies, are sensitive to pressure. When the blood pressure gets too low, their rate of firing slows, indicating to the brain that the pressure needs to be increased. If their rate of firing is too fast, the pressure is too high, so the brain is told to slack off.

The cardiac accelerator nerves secrete norepinephrine and the adrenal medulla secretes epinephrine (adrenaline), increasing the heart rate and raising the blood pressure. The vagus secretes acetylcholine, which slows the heart rate.

Starling's Law of the Heart is a mechanical approach—it says all the blood pumped to the heart must leave the heart. If you increase the venous return (the amount of blood returning to the heart via the veins), then the heart must pump all that blood. Otherwise, your veins would quickly become distended. This reflex is important in long-term control of the heart.

The lungs' job is to exchange used gases from the blood with fresh gases from the outside air. The functional unit of the lung, an alveolus, is shaped like a very small grape. A thin membrane surrounds this alveolus; through this membrane, carbon dioxide diffuses from high (in the capillary blood) to low (in the alveoli) concentration; oxygen diffuses from high (alveoli) to low (capillary blood) concentration. Once in the blood, oxygen is carried by hemoglobin to the tissues, and carbon dioxide is carried back from the tissues.

The distribution of blood changes with demand. When you eat, more blood goes to your stomach and liver; when you run, the amount of blood to these organs is greatly reduced and the amount of blood going to the working muscles increases tremendously. Normally, the veins, liver, and spleen serve as a reservoir of blood for when it is needed. The brain receives a constant 25 percent of the blood flow regardless of activity.

The Effects of Exercise

The anticipation of a workout usually raises the heart rate and blood pressure a little. When you begin exercising, though, the amount of blood returning to your heart is greatly increased—the blood reservoir is mobilized. This increases the heart rate. Even the breathing rate has an effect on heart rate. As work output increases, the nervous system also has a role in controlling the flow of blood to the muscles and away from organs such as the liver and stomach, a process called blood shunting. The adrenal medulla is called upon to release epinephrine, which further increases heart rate and causes vasosconstriction of the peripheral vessels, also improving shunting. As you can see, a variety of mechanisms increase blood flow through working muscles to supply oxygen and nutrients and remove wastes.

The body is a lazy critter—it will work, and improve the mechanics and abilities of its parts, but only under duress. If little stress is placed on the body, it adapts to this life of leisure. If strenuous activity is placed on the body, and the body is allowed to adapt, it does so.

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**Computerized aerobic mathematics**

---

**Program Listing 1**

```
10 REM ****** AEROBICS ******
20 CLS:PRINT"AEROBICS PROGRAM BY"
30 PRINT"BRUCE POMEL DOUGLASS"
40 INPUT"ENTER TIME OF RUN IN MINUTES, SECONDS";M,S
50 INPUT"ENTER DISTANCE IN MILES";D
60 TIME=M/60; TIME IN MINUTES (DECIMAL FORM)
70 PPS=18.6181*D-.554151*TIME-1.21753
80 PRINT"AEROBIC POINTS EARNED =";PPS
90 PRINT"AVERAGE MILE TIME (MIN/WILL )";TIME/D
100 PRINT"AVERAGE VELOCITY (MPH )";D/TIME*68
110 INPUT"ENTER YOUR 5-MINUTE RECOVERY HEART RATE";HR
120 IF HR<128 THEN PRINT"YOUR RECOVERY IS NOT ADEQUATE - SLOW DOWN OR REDUCE SPEED" ELSE PRINT"GOOD RECOVERY! DISTANCE AND SPEED NOT EXCESSIVE"
130 END
```
Program Listing 2

18 REM PRINT "** AUTOCHAFT **"
20 REM * WRITTEN BY 
30 REM * BRUCE POWELL DOUGLASS 
40 REM * DEPT. PHYSIOLOG 
50 REM * UMD MEDICAL SCHOOL 
60 REM 
70 CLS PRINT "DEMO=";CHR$(1);CHR$(48);CHR$(84);CHR$(112);CHR$(144);CHR$(172);CHR$(200);CHR$(288);CHR$(292);CHR$(296);CHR$(290);CHR$(284);CHR$(278);CHR$(272);CHR$(266);CHR$(260);CHR$(254);CHR$(248);CHR$(242);CHR$(236);CHR$(230);CHR$(224);CHR$(218);CHR$(212);CHR$(206);CHR$(200);CHR$(194);CHR$(188);CHR$(182);CHR$(176);CHR$(170);CHR$(164);CHR$(158);CHR$(152);CHR$(146);CHR$(140);CHR$(134);CHR$(128);CHR$(122);CHR$(116);CHR$(110);CHR$(104);CHR$(98);CHR$(92);CHR$(86);CHR$(80);CHR$(74);CHR$(68);CHR$(62);CHR$(56);CHR$(50);CHR$(44);CHR$(38);CHR$(32);CHR$(26);CHR$(20);CHR$(14);CHR$(8);CHR$(2);"","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","","",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EXPECT A MIRACLE
Listing 3 continued

978  * THEN JUST CHANGE ALL THE LPRINTS TO PRINTS.
980  TP$="TIME: *STRINGS(S$,-1)=":LPRINT TP$
990  FOR I=1 TO AN-MA
1000  Y=Y(I):IF Y=0 THEN 1400
1005  N=M(I)
1010  LPRINT USING "####: ";N;
1020  "S-SMOOTHED DATA, G-UNSMOOTHED DATA"
1030  IF Y>0 THEN LPRINT TAB(Y"SC+1):";TAB((Y"SC+1)";"
1040  IF Y<0 THEN LPRINT TAB(N"SC+1):";TAB(Y"SC+1):";
1050  LPRINT TAB(57);";
1060  NEXT I
1070  LPRINT TP$
1080  CLS:PRINT TAB(28);"OPTIONS:"
1090  PRINT1, REDISPLAY OUTPUT RESULTS"
1100  PRINT2, REDO MOVING AVERAGES";
1110  PRINT3, END PROGRAM"
1120  AS=INKEY$:IF AS=""THEN 1120 ELSE VAL(AS) GOTO 418,795,11
1130  48 1130  GOTO 1120
1140  48 1140  END
900  REM ROUTINE TO POKE THE MACHINE LANGUAGE PROGRAM HEART/ASM
9010  REM INTO MEMORY FOR LEVEL II FOLKS
9020  AD-32512:"AD70" IN MEMORY
9030  FOR I=AD TO 32602
9040  READ AP,POKE,LA
9050  NEXT I
9060  REM MAKE SURE MEMORY IS SET TO BELOW 7F000
9070  W=32560;MS=F$(W+16561)++;TP$=W"SC+1)++;TP$=W"SC+1)++;TP$=W"SC+1)++
1080  DATA 243, 62, 42, 59, 0, 60, 33, 86, 255, 205, 13, 38, 21
1090  3, 221, 225, 17, 0, 33, 0
1100  DATA 0, 58, 64, 58, 254, 16, 40, 53, 254, 1, 48, 3, 35, 2
1110  4, 242, 221, 117, 8, 221, 35
1120  DATA 221, 211, 6, 221, 33, 35, 0, 19, 213, 229, 221, 2
1130  29, 1, 253, 39, 205, 86, 0, 22
1140  DATA 225, 225, 209, 58, 6, 254, 191, 48, 4, 62, 191
1150  24, 2, 62, 32, 58, 0, 60, 24
1160  DATA 196, 213, 225, 195, 154, 10, 98, 40, 48, 41, 0

Listing 4 continues

Program Listing 4

0020 ;******************************************************************************
0030 ; ASSEMBLED IN MSL EDITOR/ASSEMBLER
0040 ; THE PROGRAM STORES THE TIME INTERVAL BETWEEN
0050 ; HEART BEATS EACH TIME THE <ENTER> KEY IS PRESSED.
0060 ; THE PROGRAM RETURNS TO BASIC WHEN YOU PRESS THE
0070 ; <BREAK> KEY. NO PARAMETERS NEED BE PASSED FROM BASIC
0080 ; BUT THE Z(1) ARRAY MUST BE DECLARED TO BE AT LEAST 200
0090 ; ELEMENTS => AND <= INT BEER
0100 ; ON EXIT, HL HAS THE NUMBER OF BEATS STORED
0110 ;******************************************************************************
0120 ;
0130 ; FF00 FF13 ; ORG $FF00 ; UP IN THE MEMORY STRATOSPHERE
0140 ; 3840 ; KEYERD EQU 3840H ; KEYBOARD LOCATION FOR <ENTER>
0150 ; 2600 ; VARPTR EQU 2600H ; DOWN ARROW, ETC
0160 ; 0230 ; BASIC EQU 0230H ; BASIC ENTRY POINT
0170 ; 0060 ; DELAY EQU 0060H ; DELAY TO AVOID REPEAT CHARACTERS
0180 ; 0300 ; SCREEN EQU 0300H ; VIDEO MEMORY
0190 ; 0000 ; EXPECT UNION HOME KEY
0200 ; FF00 FF01 ; DI ; DISABLE INTERRUPTS
0210 ; FF01 FF02 ; LD A," ;
0220 ; FF03 FF05 ; LD (SCREEN),A
0230 ; FF06 FF07 ; LD ARRAY; VARIABLE NAME TO REFERENCE
0240 ; FF08 FF09 ; CALL VARPTR ; GET ADDRESS OF Z(9)
0250 ; FF0C FF0D ; MBSR D ; DE HAS ADDRESS
0260 ; FF00 FF01 ; POP IX ; NOW IN IX REGISTER PAIR
0270 ; FF00 FF01 ; LD IX,00H ; INITIALIZE 4 OF BEATS
0280 ; FF12 FF13 ; LD HL,00H ; INITIAL COUNT FOR HEART BEAT
0290 ; FF15 FF16 ; LD A,(KEYERD)
0210 ; FF1B FF60 ; CP CPDOWN ; DOWN ; ARROW KEY TO QUI T
0220 ; FF1A FF33 ; JR Z,BACK ; RETURN IF <DOWN ARROW> KEY
0230 ; FF1C FF61 ; JR Z,EXIT ; RETURN <ENTER> KEY
0240 ; FF1D FF62 ; JR Z,STASH ; STORE HEART BEAT COUNT
0250 ; FF20 FF23 ; INC HL ; UPDATE COUNT
0260 ; FF21 FF22 ; JR Z,LP; IF NOT EITHER, THEN LOOP
0270 ; FF23 FF70 ; STASH LD (IX),I ; STORE LAB
0280 ; FF26 FF29 ; INC IX ; UPDATE PRINT
0290 ; FF28 FF7B ; LD IX,(X) ; STORE MBS
02A0 ; FF2C FF00 ; INC IX ; UPDATE POINTE R
02B0 ; FF2D FF08 ; LD HL,00H ; ZERO COUNTER
02C0 ; FF30 FF13 ; JR Z,D ; UPDATE BEAT COUNT
02D0 ; FF43 FF67 ; NEXT ROUTINE DELAYS FOR ABOUT 1/10 SECOND

by improving its functions.

The heart responds to exercise during exercise by increasing the strength of each contraction (so that the chambers of the heart are emptied more completely each beat) and by increasing the rate of the contractions. The increase in heart rate may be as dramatic as 40 to 200, or an increase of 500 percent. The stroke volume (the amount of blood pumped each contraction) increases as well, although less dramatically—usually 10 to 35 percent. After a heart rate of about 180, stroke volume will actually decrease because the heart doesn’t have time to adequately fill before the next beat is due. In well-trained athletes, the cardiac output (stroke volume times heart rate) can increase six- to sevenfold during severe exercise.

In the long term, the heart becomes stronger. The chamber walls thicken, providing more muscle power for the expulsion of blood into the waiting aorta. Therefore, it does not have to beat as often to supply enough blood to the body. Most, but not all, people find their resting heart rates decrease after a few months of regular endurance exercise. (My resting pulse rate stabilizes at 40 to 45 beats per minute when I’m in shape, and after a few weeks of inactivity returns to 65 to 70 beats per minute.) Jim Ryun had a resting heart rate of 72 beats per minute when he held the world record in the mile, though.

To take your heart rate, use either the autocorrelation program (presented later in this column) or a watch. Place a finger or two on the radial or brachial arteries on the wrist, or better, on the carotid artery on the neck, just beside the trachea. Count the number of beats in 10 seconds, and multiply by 6. You should take your resting heart rate before getting out of bed in the morning.

Muscles get better with use, too. Running and other such endurance exercises will not increase muscle mass, as heavy strength exercises will. In fact, they may decrease the size of a limb by using up fat stores in and around the muscle. Research by Dr. William Winder, here at the University of South Dakota, has shown that with a minimum of about one hour per day the enzymes involved in electron transport (oxidative phosphorylation) will increase. The muscles also increase in myoglobin, a cousin of hemoglobin. The capillaries (tiny blood vessels where the exchange of gases, nutrients, and waste products with the working tissues
WHY I SUBSCRIBE TO 80 MICRO

Before I read my first issue of 80 MICRO I thought, “What’s all the fuss about? It’s just another microcomputing magazine; isn’t it?” Sure I knew that 80 MICRO had published an awful lot of pages of TRS-80 information (10,000 in its first three years), but I had assumed most of it was filler, just like those other computer magazines.

Boy, was I wrong! One day, while at a friend’s house, I happened to see a copy of 80 MICRO lying on his coffee table, I picked it up and began to read. I immediately realized that 80 MICRO was no ordinary micro magazine. That one issue provided me with more useful information on my TRS-80 than any other single source I had ever read. It was just packed with features like honest reviews of hardware and software, dozens of programs for business or pleasure, and page after page of money-saving ads. (I saved hundreds of dollars on computer-related purchases in the first year of my subscription ALONE.) I went out and bought my own copy of the magazine that very day. And I’ve been a regular subscriber ever since.

QUESTION 1: Why does this TRS-80 user subscribe to 80 MICRO? (More than one answer may be correct. Circle the answer which is most correct.)

a) 80 MICRO provides him with more useful information than any other single source—over 10,000 pages in the first three years.

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c) 80 MICRO’s hardware and software reviews give him the truth, the whole truth, and nothing but the truth.

d) The ads in 80 MICRO save him literally hundreds of dollars on computer-related purchases every year.

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Begin.

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Measuring Your Fitness

You may be familiar with Dr. Cooper's book, *The New Aerobics*. The book uses an aerobic-point scale to measure work done. Distance and time are both important for determining the stress effect on the cardiovascular system. His book presents tables of interpolated data of points versus time and distance. I contacted Dr. Cooper's lab for the equation they use in determining the number of points per time and distance, and was informed that they would be happy to send it to me, for a mere $1,500. Since I figured the editors at 80 Micro wouldn't be too keen on that expense, I simply took a representative number of points from the table and with a regression program, I made my own:

\[ \text{POUNDS} = 10.6181 \times \text{distance} - 55415.1 \times \text{time} - 1.21753 \]

where the distance is in miles and the time is in minutes.

Cooper recommends 30 points per week as a minimum for reaching an adequate state of fitness. Think of the points as a measure of the stress placed on the body that demands adaptation of the cardiovascular and muscular systems. They are related to energy output, but since it takes as much energy to walk 10 miles as it does to run it, you can see that the amount of energy per unit time is a more important criterion for fitness. Thus, running a mile gives more points than walking the same mile, and running 10 miles at eight minutes per mile gives more points than running five miles at the same pace.

(For course, I know all true computer programmers are in excellent physical shape, but if you're over 30 and haven't worked out for a while, don't start running right away without a doctor's approval. It takes time to be macho.)

Program Listing 1 (Aerobics) asks for the beginning and ending time for your run, the distance you covered, your resting heart rate, rate at the finish of the run, and heart rate five minutes after the finish. It will calculate the aerobic points (according to the equation derived above) and average velocity, and will caution you if your five-minute pulse is not adequate.

You should take some precautions. Running has an incredible injury rate for a noncontact sport—it's stressful on the heart and circulatory systems, and also on the muscles, tendons, ligaments, and joints. For this reason, you should always warm up and warm down thoroughly and stretch constantly to avoid shortening the muscles by using them in a shortened range of motion (running). If you follow a good plan of stretching and warming up and down, you should be able to avoid much of the trouble plaguing many runners—particularly if you are a low-mileage runner (under 40 miles per week).

Your pulse should normally go above 150 during the course of the run, but it will not improve your fitness to go beyond 180. Determine this pulse rate by pressing your fingers either to the carotid artery beside the trachea or the radial or ulnar artery of the wrist, counting the number of pulses in 10 seconds and multiplying by 6. During your warm-down, walk around and stretch, and five minutes after the finish of the run, take your pulse again. It should be below 120 (20 beats in 10 seconds). If it is not, then your run was too hard, and you should slow down.

Statistical Analysis

Now let's consider time-series analysis with moving averages and autocorrelation. Autocorrelation is simply the correlation of a time series with itself. But shouldn't a time series have a high correlation with itself?

A time series is a collection of data points collected at various points in time. An ECG (electrocardiogram) monitors the heart rate (and electrical vectors), for example, and produces a series of data points—a time series. A plot of stock market prices over a period of time is also a time series. Two questions are often asked about time series:

- Is there a periodic (seasonal) aspect to the series?
- Is there an overall trend in the series?

Autocorrelation will determine periodic fluctuations in the time series; moving averages will remove the periodic fluctuations and reveal the overall trend. In this sense, the two functions are opposites. I'll discuss autocorrelation first.

If you imagine a time series consisting of two states (0 and 1) and display the values (0's are shown as spaces), you get something looking like Fig. 1.

If you wanted to perform a correlation, you could align the series with itself, and compare states. If for a given time, both are on or both are off, then
add in a 1 into the correlation sum; if not, then add in a 0. That looks something like Fig. 2.

Of course, this correlation is perfect, as you would expect. Remember that the equations for correlations are:

$$r = \frac{\Sigma(xy)}{\sqrt{(\Sigma x^2)(\Sigma y^2)}}$$

where:

$$\Sigma xy = \Sigma X \Sigma Y$$

$$\Sigma x^2 = \Sigma (X)^2$$

$$\Sigma y^2 = \Sigma (Y)^2$$

$$N$$

X and Y = raw scores

Autocorrelation is just a special case of the garden-variety product/moment correlation. You can see that from these equations the autocorrelation function (since X and Y are the same) reduced down to unity. Not very interesting, is it?

But something interesting happens if you move the series over a bit—see Fig. 3.

"Autocorrelation will determine periodic fluctuations in the time series."

Now you no longer have a perfect correlation! You made a copy of the original time series, and then added a constant to the time for each interval. Watch what happens when you move it over more (see Fig. 4). You moved it over and regained the perfect correlation! How did that happen?

The amount you moved the series over is called the phase shift of the series. In autocorrelation, you correlate a series with itself, but add various phase shifts to the correlation to discover periodicities in the data. Normally, the equation for autocorrelation takes a slightly different format that the normal correlation equation because you are correlating one time series with itself, but at different time-phase shifts:

$$\Phi(p) = \frac{1}{2N+1} \Sigma f(i+p)$$

You can see the autocorrelation function $$\Phi(p)$$ (where p is the phase shift) is a function of phase shift. By changing the phase shift, you can determine the periodic fluctuations in the data.

Autohart (Program Listing 2) monitors your heart rate and then performs an autocorrelation on it. The output is a histogram (called an autocorrelogram) on the screen. Since the heart rate is fairly regular, you should get a nice big peak at the fundamental heart rate, but you will notice a second peak at about 20 times per minute. That is from the breathing rhythm, which affects heart rate. Since it is also periodic, you will get another peak farther away from the center.

The autocorrelogram is often displayed with only positive phase shifts, since it will be symmetrical about p = 0. There is no reason why you cannot perform an autocorrelation with real, continuous functions, such as commodity prices. The autocorrelation function gives you essentially the same information as the Discrete Fourier Transform, although in a somewhat different format.

Moving averages does the opposite to autocorrelation—it removes periodic fluctuation in a type of data smoothing and reveals an overall trend devoid of

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the periodicities. Moving averages will remove only those periodicities that you tell it to remove—it is like passing your time-series data through a filter to remove some noise, or unwanted information. In fact, this data filter is called a low-pass filter.

If you begin with a set of numbers X(1), X(2), X(3), . . . the moving average of order N is defined to be the sequence of means shown in Fig. 5. If you set \( Y = M(X) \) (the series Y(i) is the moving average of the series X(i)), the Y series will be smoothed, since each number in the X series is replaced by the arithmetic mean of the ith through the \((i + n - 1)th \) data points in the X series. This will effectively filter out periodic fluctuations with a frequency higher than the filter (N). In this way, the moving averages filter reduces the amount of variation present in a set of data, specifically, the periodic fluctuations with a higher frequency than the order of the moving average. This process will reduce the number of data points in a manner dependent on the order of the moving average (number of raw data points—order of moving average).

The Autohart program (see Listings 2 and 3) gathers time series data about your heart beats and finds the periodic fluctuations in it (via autocorrelation) and the overall trend (via moving averages). There should be two periodic fluctuations, as shown in the autocorrelogram—from the period of the heart beat itself, and another due to the influence of the respiratory feedback inhibition on the heart rate.

Autohart is easy to use—I've included both a disk and a Level II version. For disk users, assemble the machine-language routine HEART/ASM to sit at FF00H. When you enter Basic, make sure the memory size is set to below that. If you have only 32K, then adjust the ORG of HEART/ASM. If you are a Level II user, I have provided an extra routine that takes the data statement equivalent of the program (lines 10000 and up) and POKEs them into memory at 7F00H.

Type run and messages will tell you how to operate the program. The machine-language routine keeps a counter going until you press enter. Then it stores the value of the counter, and starts over. It keeps doing this until you press the down-arrow key. It uses the ROM call VARPTR to find the integer array Z(i), and stores the values there. On return, the HL register pair (and the USR function) have the value of the number of times you pressed the enter key.

Take your heart rate as I described earlier and every time you feel a beat, press the enter key. Take at least 100 beats—it will take a little while to learn how to keep with the pulses. Don’t hold the key down very long—the machine language routine only waits 15/100 seconds before scanning the keyboard again. Press the key and let go. The upper left corner of the screen will toggle a space with a graphics block each time you press it. If it did not change, the routine stored two beats, not one, and you need to let go sooner.

When you press the down arrow, Basic takes over and turns the Z(i) integer array into a single-precision array of seconds between beats, and another array of the cumulative time in seconds. Autohart calculates and displays the average heart rate, and then shows a plot of the beats. Each second is divided into thirds. A tall graphics block indicates a heart beat.

Press the enter key, and an autocorrelation will be performed with 60 phase shifts (20 seconds with \( \frac{1}{2} \)-second intervals for the phase shift). You should have at least 100 points to do this, although you can do it with fewer. Then the program draws an autocorrelogram on the screen. Remember, this is the correlation of a time series with itself with various phase shifts. If you’re lucky and get enough points with accurate enough timing for your data entry,
This is the first anniversary of MONEY DOS. During the last year I have dealt with the basic strategy of investing. I’ve covered bond analysis, convertible securities, rental property evaluation, IRAs, portfolio analysis, commodity trading, and option trading. My programs were designed to help you make investment decision making.

A MONEY DOS hotline was set up with a toll-free number where one could get my 30-second comment about the market. The Hotline following has now grown (late October) to over 1,000 calls each weekend...for good reason. My observations about investing have proven to be sound. For example, those who began calling in March 1982 were surprised to hear my very bearish posture on precious metals, the stock market, and my advice to buy precious metals. The famous gold analyst, James Dines, was telling his subscribers to sell.

They were also surprised when I told the callers in July, “We are on the verge of the most awesome rally in market history,” and, “We are seeing lows that we will never see again in our lifetime.” Joe Granville, the self-proclaimed market minder, was telling his subscribers that the Dow was going much lower.

The September column elicited the most response. I shared a commodity trading system that had averaged over 38 percent profit for 10 years—remember the $50,000 bet! What is important is that the specific recommendations in MONEY DOS have been good. I receive hundreds of letters from callers and writers. An often posed question is why I offer free advice. A recent letter from a man who has closely followed the column and called every weekend states, “For almost a year I have been profiting from your advice and, so far, you haven’t tried to sell me a damn thing. There’s gotta be a catch somewhere J.M. Why are you writing MONEY DOS?” Well, the catch is that I’m writing a book (my second), which should be released one year hence. The MONEY DOS columns are, generally speaking, excerpts therefrom. Your comments give me valuable insights as to the clarity of my writing. Besides, when it is published, maybe I’ll have a few of you interested enough to buy it.

In future columns I shall deal with general investment strategies: buying stocks and paying no commission; arbitrage, the riskless investment; convertible securities; using VisiCalc to obtain a fantastic portfolio analysis; annuities and other ways to defer taxation; short-term option trading; and strategies when interest rates are low. Remember to take into account the two-month lag time from manuscript submission to publication as specific advice may be stale when you read it.

The most exciting new feature to MONEY DOS is the bulletin board system. The idea came from one of my clients, who has had a TRS-80 for three years. With a BBS and the appropriate password my clients can access day or night my latest advice, place an order, check their account status, or ask a question. During market hours they can get a rapid confirmation.

My hardware for the system is a Model III, 48K, currently using an old 80-track Aerocomp drive. When you read this it will be running on a hard drive. I chose the Lynx auto-answer/auto-dial modem for this dedicated service as it has a built-in RS-232. I use MicroSystems’ Micro-80 BBS system, which I modified extensively for this service. The parameters are: 300 baud, 7-bit words, 1 stop bit, and even parity. The BBS operates 24 hours a day, seven days a week. One can see the BBS as 16 file cabinets one on top of the other. The general public has access to cabinets A and B. The balance are reserved for my colleagues and clients. At any time you can access my current recommendations, ask a question, or make suggestions. Should you want to act on the advice, do so at your own risk and place the order through your broker. The public has no access to the Order Entering section. Currently, I am ill-equipped to accept new accounts, even at my minimum.

One section is updated hourly during the market day where one can retrieve Hotnews (headlines from wire services), current market averages, commodity prices, signals from The System (see the September 1982 issue), current news on 20 widely held stocks, and my intraday market observations. At 4:30 p.m. (EST) the closing market and commodity prices appear, as well as the options that traded the most volume that day.

At 8 a.m. you can find opening stock trends in Europe, the London gold fixing, and a list of suggested covered-option writes as well as the 10 puts and calls that, based solely on price versus historic volatility, are potentially very profitable, albeit risky. If you see a recommendation on which you want more in-depth information, you can request it. No one will ever call and try to sell you anything—that’s a promise. This service is free, save the direct-dial charge you pay Ma Bell.

The maiden voyage began on the 16th of October. Hundreds called the first week, and while I am flattered that they find it so interesting, some stay on for 30-40 minutes retrieving the same information several times. You will save time and money having a printer ready so you can get a printout and read it at your leisure. To print, you must have one of the smart terminal programs. Please limit your access time to 10 minutes. The access number currently is (305) 655-2340. It might be changed when you read this, but a call to the MONEY DOS weekend hotline (800-327-3389, or in Florida 305-655-3389) will update if needed. The hotline operates from 9 p.m. Friday-7 a.m. Monday.

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TRILOGY DRIVEN TO DRIVES

HANDLES 5" 8" AND WINCHESTER DRIVES IN A SINGLE BOARD!!!

TRILOGY replaces our M3DC1 series of drive controllers, yet provides more, and better features. The name TRILOGY stems from the fact that the controller will handle (a) 5 inch single, double and the NEW QUAD Density drives, (b) 8 inch single and double density drives, and (c) internal Winchester drives.

The neat thing about TRILOGY is that it will handle all three types of drives simultaneously, and the drives can be specified as to which logical device they are. For example, the Model III will handle four disk drives and up to four Winchester drives. We have designed the TRILOGY so that the user can set up drives 0 and 1 as double density 5 inch drives, drive 2 as a 5 inch quad density drive, drive 3 as 8 inch single density drive, and drives 4,5,6, and 7 as Winchester drives. Of course the above combination is totally user selectable. The user can decide which drives from 0 to 3 he wants to be 5 inch, 8 inch single, double or quad density.

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NOTE: For supporting 8 inch single and double density drives the user will have to install a clock speed up board in his system. The 8 inch drives running double density require a CPU clock of 4.0 MHz. The virgin Model III has a 2.02 MHz clock. The Winchester support on the TRILOGY is identical to our old series of M3DC1 board and as such would still need the Winchester accessories kit, Winchester host adapter, Winchester controller, and a Winchester drive.

FEATURES
- GOLD PLATED EDGE CARD CONNECTIONS
- SILKSCREENED AND SOLDERMASKED PRINTED CIRCUIT BOARD
- POLARIZED POWER CONNECTIONS
- IC SOCKETS USED THROUGHOUT
- HIGHEST GRADE PRINTED CIRCUIT BOARD MATERIAL
- THOROUGH TESTING OF CONTROLLER

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which includes the switching power supply, drive mounting brackets and all necessary cables to complete the installation of disk drives into your Model III.

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With 8" Drive Support

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Two D/S 80 Track Drives

Model 325 ............ $3995.00
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One S/S 40 Track Drive

Model 326 ............ $4495.00
One TM603 Winchester &
One D/S 80 Track Drive

P-31 Green Phosphor CRT ......................... $89.00

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M3CB1-3  Complete Kit ....................... $129.95
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  - Onboard direct connect modem kit .......... $39.95
  - 2K/4K Eprom kit .......................... $11.95
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DEALERS WELCOMED
Stand back as I open this closet door in the game room of the Fun House. Don't be alarmed by what happens next. Wheee! Out clatter half a million dice. There should be enough for everyone to take five each. We're going to play some dice games, and I'm happy to say that craps is not one of them.

The games are called Fifty, Show Up, Drop Dead, and Martinetti. Separate Color Basic and Level II listings are given for Martinetti, but the program listings for the other three games will work equally well in Level II and on the color machine.

These are games that require only one person and the computer. The computer not only plays against you, but is the scorekeeper and umpire.

Fifty

When I was a kid, like every other kid I had a Monopoly set. As time passed I kept losing parts of the set until I had nothing except the two dice.

That's when I was forced to learn some interesting dice games. The first one I learned was Fifty.

I remember Fifty as a tricky game. It turns out it's quite a simple game when the computer keeps score and takes its turns without bragging or complaining.

You and the computer race to see who can score 50 points first. You throw two dice in turn. Only doubles (two ones, two twos, and the like) have any effect on the score. If you throw two sixes, you get 25 points. If you throw two threes, you lose all the points you have. If you throw two ones, two twos, two fours, or two fives, you get five points.

When a player gets a total of 50 or more, the computer says who wins.

Show Up

Again, you and the computer take turns and play against each other. Whereas Fifty was a button-tapping race, Show Up combines strategy and luck.

Both players start with 100 points. Whenever the pot is emptied, the players each give an amount equal to one-tenth of the lowest stake. Example: If

```
100 REM * FIFTY / TRS-80 COLOR BASIC AND LEVEL II *
110 CLS
120 FOR Q=1 TO 2
130 IF Q=1 THEN PRINT "YOUR TURN" ELSE PRINT "MY TURN"
140 INPUT "TAP ENTER TO ROLL";X
150 A=RND(6)
160 B=RND(6)
170 PRINT A:B
180 IF A=3 AND B=3 THEN PRINT "LOSE ALL POINTS"; T(Q)=0: GOTO 21
190 IF A=6 AND B=6 THEN PRINT "25 POINTS"; T(Q)=T(Q)+25: GOTO 21
200 IF A=B THEN PRINT "5 POINTS"; T(Q)=T(Q)+5
210 IF A<>B THEN PRINT "NO SCORE"
220 IF T(Q)>49 THEN PRINT "You Win"; GOTO 290
230 IF T(Q) < 49 THEN PRINT ""; F(Q)=F(Q)-1
240 IF T(Q)<1 THEN PRINT "You Lose"; GOTO 21
250 IF T(Q)<1 THEN PRINT "YOU LOSE"; GOTO 21
260 NEXT Q
270 INPUT "TAP ENTER TO CONTINUE";X
280 GOTO 110
290 GOTO 290
300 END
```
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Floppy Disk Services, Inc. is a contracted SIEMENS drive dealer. Do not let the prices fool you, we buy in very large quantities to get the best price and pass that savings on to you! All systems are of the highest grade components and our cabinets are custom designed with you in mind! If not 100% satisfied, call us and we will promptly refund your money.†

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FD2-1
Show Up

100 REM * SHOW UP / TRS-80 COLOR BASIC AND LEVEL II *
110 CLS
120 P(1)=100
130 P(2)=100
140 FOR Q=1 TO 2
150 IF P=0 GOSUB 390
160 IF Q=1 THEN PRINT "YOUR TURN" ELSE PRINT "MY TURN"
170 A=RND(6)
180 PRINT
190 PRINT "YOU";P(1);" ME";P(2);" POT";P
200 PRINT
210 PRINT "THE POINT IS";A
220 IF Q=1 THEN INPUT "YOUR BET";X
230 IF Q=2 GOSUB 470
240 IF X<X OR X>P(2) OR X>P THEN PRINT "IMPOSSIBLE"; GOTO 220
250 B=RND(6)
260 C=RND(6)
270 IF Q=1 THEN PRINT "YOU"; ELSE PRINT "I"; "ROLL";B+C
280 IF B>A AND C>A THEN PRINT "WINNER"; P(1)=P(1)+X; P=P-X
290 IF B>A OR C>A THEN PRINT "LOSE ALL"; P(1)=P(1)-X; P=P-X
300 IF B=A AND C=A OR C=A AND B=A THEN PRINT "WIN 1/4"; P(2)=P(2)+INT(P(2)/4)
310 IF B=A AND C=A THEN PRINT "DOUBLE POINT. TAKE POT"; P(1)=P(2)=P(1)+P(2)
320 IF P(1)<1 THEN PRINT: PRINT "I WIN"; END
330 IF P(2)<1 THEN PRINT: PRINT "YOU WIN"; END
340 INPUT "TAP ENTER TO CONTINUE";X
350 CLS
360 NEXT Q
370 GOTO 140
380 IF P(1)>P(2) THEN S=INT(P(1)/10)
390 IF P(2)>P(1) THEN S=INT(P(2)/10)
400 PRINT "ANTE: 1/10 OF LOW STAKE"; S
410 PRINT
420 PRINT
430 P=P+S*2
440 P(1)=P(1)-S
450 P(2)=P(2)-S
460 RETURN
470 PRINT "I'LL BET";
480 FOR T=1 TO 500
490 NEXT T
500 IF A>3 THEN X=1
510 IF A=1 THEN X=P; IF X>P(2) THEN X=P(2)
520 IF A>2 THEN X=INT(P(2)/3); IF X>P(2) THEN X=INT(P(2)/3)
530 IF A>3 THEN X=INT(P(2)/10); IF X>P(2) THEN X=INT(P(2)/10)
540 IF X<1 THEN X=1
550 PRINT X
560 FOR T=1 TO 500
570 NEXT T
580 RETURN
590 END

Drop Dead

100 REM * DROP DEAD / TRS-80 COLOR BASIC AND LEVEL II *
110 CLS
120 P(1)=0
130 P(2)=0
140 C(1)=5
150 C(2)=5
160 CLS
170 FOR Q=1 TO 2
180 IF P(1)>P(2) AND C(2)=0 OR P(1)>C(1) AND C(1)=0 GOTO 528
190 IF C(1)=0 GOTO 490
200 IF Q=1 THEN PRINT "YOUR TURN" ELSE PRINT "MY TURN"
210 PRINT "THROWING";C(1)
220 IF C(2)>1 THEN PRINT "DICE" ELSE PRINT "DIE"
230 PRINT "TAP ENTER TO ROLL";
240 AS=INKEYS
245 IF AS="" GOTO 268 ELSE GOTO 240
260 PRINT STRINGS(4*C(Q)+2,"")
270 PRINT"
280 FOR A=1 TO C(Q)
290 B(A)=RND(6)
300 PRINT B(A);" ";
310 NEXT A

320 PRINT "**"
330 PRINT STRINGS(4*C(Q)+2,"**")
340 C=0
350 FOR A=1 TO C(Q)
360 IF B(A)=2 THEN C=C+1
370 IF B(A)=5 THEN C=C+1
380 NEXT A
390 PRINT
400 IF C=0 GOSUB 610
410 IF C=0 GOSUB 690
420 IF C(1)=0 AND C(2)=0 GOTO 510
430 PRINT
440 PRINT "SCORE: YOU";P(1);" ME";P(2)
450 PRINT "DICE: YOU";C(1);" ME";C(2)
460 PRINT
470 INPUT "TAP ENTER TO GO ON";
480 CLS
490 NEXT Q
500 GOTO 170
510 PRINT "ALL OUT OF DICE"
520 PRINT
530 IF P(1)>P(2) THEN T=T+1

Listing continues
Turn your
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When someone goes broke, the winner is named.

This program deals only in whole numbers, no fractions; so there will be times when the ante doesn’t exactly equal the total of the lowest stake. And unless you bet at least four points, the computer won’t pay off in those “WIN 1/4” situations.

Confused? Then play the game and see how easy it really is.

### Drop Dead

I don’t like the name of this game, but it would be dishonest if I called it anything except what it’s really called—Drop Dead. However, it’s the dice that drop dead, not the player.

This game is all luck and no skill. There is absolutely no strategy, and to play all you have to do is tap enter over and over. Still, it can be a lot of fun to see what happens next.

Both you and the computer start out with five dice and take turns throwing. In each turn your score increases by the total of all the dice. However, if either a two or a five turns up, two things happen. First, you get no score for the turn. Second, the two and five dice are removed so you have fewer dice to throw your next turn.

Play in a round continues until one of the following happens: Both players lose all their dice; or one player loses all the dice and the other player is ahead in points. If a player who is ahead loses all the dice, the trailing player continues to throw until either losing the last die or pulling ahead.
COLOR FOR THE 80's

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*$99 Kit price does not include case or power transformer

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<tr>
<th>Item</th>
<th>Price</th>
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<tr>
<td>CHROMAatr kit</td>
<td>$99</td>
</tr>
<tr>
<td>CHROMAatr assembled &amp; tested</td>
<td>$169</td>
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<tr>
<td>RF modulator with switch box</td>
<td>$42</td>
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<tr>
<td>Mod 1 ribbon cable</td>
<td>$12</td>
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<td>Mod 3 ribbon cable</td>
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<td>Cassette software</td>
<td>(free with CHROMAatr)</td>
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<tr>
<td>Diskette software</td>
<td>(free with CHROMAatr)</td>
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<tr>
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<tr>
<td>N.Y.S. residents add 7.25% sales tax</td>
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<td>Shipping and handling (USA)</td>
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My vote for the best advertisement in this issue goes to ________________ (company) whose Reader Service number is ________________.

A. What is your age?
   1. Under 12 or under
   2. 12-20
   3. 21-30
   4. 31-35
   5. 36-45
   6. 46-55
   7. Over 55

B. How much interest do you have in articles on the following products? (If no interest, so much interest)
   1. Printers
   2. Plotters
   3. Modems
   4. Disk drives
   5. Hard disk drives
   6. PNLONL micros

C. If you plan to buy a new printer during the next year, how much do you expect to spend?
   1. Under $200
   2. $201-$500
   3. $501-$750
   4. $751-$1,000
   5. $1,001-$5,000
   6. Over $5,000

D. If you plan to buy a plotter during the next year, how much do you expect to spend?
   1. Under $200
   2. $201-$500
   3. $501-$750
   4. $751-$1,000
   5. $1,001-$5,000
   6. Over $5,000

E. If you plan to buy a new modem during the next year, how much do you expect to spend?
   1. Under $200
   2. $201-$500
   3. $501-$750
   4. $751-$1,000
   5. $1,001-$5,000
   6. Over $5,000

F. If you were planning to purchase a new microcomputer, would you buy another TRS-80?
   1. Yes
   2. No

G. What is your major application for your TRS-80?
   1. Word processing
   2. Business
   3. Freeware
   4. Education
   5. Games
   6. Multiuse
   7. Other

H. If you use a Model II, which type of software would you like to see more of?
   1. Word processing
   2. Business
   3. Freeware
   4. Education
   5. Games
   6. Multiuse
   7. Other

I. Do you use your micro at home as a source of revenue?
   1. Yes
   2. No

J. Where do your computer use a microcomputer?
   1. At home
   2. Both of the above
   3. At work
   4. Other

K. On a scale of 1 (no interest) to 5 (great interest), please rate your interest in the following regular columns:
   1. 60 Minutes
   2. 80 Applications
   3. Money DOS
   4. Coopers Mathmatica
   5. Reviews
   6. Medical Opinion
   7. News
   8. Feedback Loop
   9. Beneath the Keyboard
   10. New Products

Books

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332R89
This game goes on forever. At the end of each round, a score is given on the series as a whole; then a new round begins.

**Martinek**

Martinek is the original name of this game, although I don’t know why. I’ve altered it slightly so it fits the Color Computer screen.

To start, the computer draws the playing board, which is made up of 10 squares numbered 1 to 10. Then it places the two players’ tokens at the starting position. These are at screen left. Your token is below the board, the computer’s on top of the board.

When it’s your turn, tapping enter rolls three dice. The values

```
Listing continued
670 IF Q=1 THEN PRINT: PRINT "YOU WIN"; ELSE PRINT: PRINT "I WIN";
680 GOTO 690
690 END
710 M=M:INPUT "NUMBER";N
720 FOR I=1 TO 7
730 IF M=R(Z) AND M=S(Q) GOTO 480
740 IF M=0 GOSUB 638: GOTO 460
750 IF M>R(Z) OR M>S(1) THEN PRINT: PRINT "WRONG. I WIN";: END
760 NEXT Z
770 END
```

**Martinek—Color Basic**

```
100 REM * MARTINEK / TRS-80 COLOR BASIC 4K *
110 CLS(8): BS-STRINGS(32,128)
120 PRINT"MARTINEK ";
130 C(I)=8: P(I)=1: S(I)=1: S(8)=1: Y=6
140 PRINT @ 129:"1 2 3 4 5 6 7 8 9 10"
150 FOR X=2 TO 62: SET(X,Y,3): SET(X,Y+5,3): NEXT X
160 FOR X=2 TO 62 STEP 6: FOR Y=6 TO 11: SET(X,Y,3): NEXT Y: NEXT X
170 X(8)=0: Y(8)=4: X(1)=0: Y(1)=13: SET(X(1),Y(1),1)
180 SET(X(8),Y(8),0)
190 FOR Q=1 TO 8 STEP 7: PRINT @ 256,""
200 PRINT @ 256,""
210 IF Q=1 THEN PRINT "YOUR TURN. "; ELSE PRINT "MY TURN. ";
220 INPUT "TAP ENTER TO ROLL";
230 Q=RND(6): H=RND(6): J=RND(6)
240 PRINT G;H;J; IF Q=8 GOTO 350
250 FOR I=1 TO 7
```

(Listing continues)
FUN HOUSE

of the dice are shown.

Now, here’s the tricky part. To advance, you must use one, two, or three dice that equal the number in the next square and then enter that number.

For example, if the dice show totals of one, two, and five, you enter 1 because 1 = 1, 2 because 2 = 2, and 3 because 1 + 2 = 3. You continue your advance in any turn as long as you keep coming up with totals equal to the number in the next square. To end a turn, type 0 (zero) and tap enter.

When you reach square 10, work your way back down to one. The player who returns to the beginning first is the winner.

The computer plays automatically and shows its totals.

Oh, I forgot to mention that mistakes are costly. If you enter a total that isn’t equal to the next square or isn’t equal to any of your dice added together, then the computer wins the game immediately. However, you aren’t punished for not seeing a possible move, except for the fact that the computer plays perfectly and you must do the same to win even half the time.

Coming Attractions: Next month you and I are going to write an adventure column together. Sharpen your imagination.
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80 Micro's
Young Programmer's Contest
1983–1984

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If you are an aspiring Programmer, 18 years or younger, enter 80 Micro's 2nd Annual Young Programmer's Contest. Your entry may be for any TRS-80. Programs will be judged on originality, documentation (more on this below), and program elegance. The age categories are 11 and under, 12 through 14, and 15 through 18. All entries will be judged by the 80 Micro staff.

Rules
1. Final entries must be in by November 1, 1983.
2. All entries must be submitted in a 10 x 13" envelope and must include: typewritten, double-spaced documentation; a printed copy of the program listing; a magnetic disk or cassette containing the program listing, the documentation, and any figures or tables; and a completed entry blank.
3. Documentation should consist of an explanation of the program, its purpose, how to use it, and the necessary software and hardware needed to use it (including memory requirements). Good documentation also points out the interesting algorithms and program techniques used without giving a line-by-line account.
4. Entries must be original and unpublished.
5. All winning programs become the property of 80 Micro.
6. The category in which you will be judged will be determined by your age as of November 1, 1983. You must not have turned 19 by that date.
7. You may submit as many entries as you like, however, each one must be submitted separately and must have all of the information and materials stated above.

The 80 Micro Young Programmer's Contest

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Model III
Model II/16
Color Computer
Other______________________________

Include this form with your entry and return to:

Young Programmer’s Contest
80 Micro
80 Pine Street
Peterborough, NH 03458

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Listing 1 continued on p. 32

780 IF L=2:Int(FL/2)THENGS=""ELSEGS=" "800 QQ:QQ+6:PRINT:QQ,GS:PRINT:QQ+4,GS:IF QQ>52THENQQ=330
820 IF CK=5:Int(CK/5)THENPRINT:0793,EXIT:CHRS(95):GOTO720 ELSEPRINT
*:GOTO720
840 ON M GOTO 860,880,900,920
860 RUN "DREADER\BASE"
880 IFPEEK(&403E)<>0 THEN RUN "SORT50\BASE" ELSE RUN "SORT\BASE"
900 RUN "PRINT\BASE"
920 CLS:PRINT:052,STRINGS(64,140)" Thank you for purchasing g and using MAGINDEX!":PRINT:STRINGS(64,140):"CMD.S"

Program Listing 2

20 REM ****************************
40 REM  SORT/BAS a simple SHELL routine
60 REM *** COPYRIGHT (c) 1981 by
80 REM *** Charles P. Knight
100 REM *** for use with MAGINDEX program
120 REM *** USE LDOS 5.1 ONLY
140 REM ****************************
160 IFPEEK(&403E)<>0 THEN RUN "SORT50\BASE"
180 IFPEEK(&403E)<>0 THEN PRINT:WRONG OPERATING SYSTEM - LDOS 5.1 ONLY!
200 STOP
220 ONERORDGOTO140:CLS:CLEAR29000:DEFINTA=2:DIM S(800)
240 ONERORDGOTO320:CLS
260 OPEN"I,1,"TRANSFER/DAI":
280 INPUT1,V1,D2,D2S,IN,
300 CLOSE
320 ONERORDGOTO:GOTO340
340 PRINT:CAN'T SORT WITHOUT FILE TRANSFER/DAI:RUN "MAGINDEX"
360 IPIN=880THENIM=ELSEPRINT:There are IN records to sort.
380 PRINT:This is an EXTERNAL sort. It moves data around on the disk
400 PRINT:rather than bringing it into memory. As a result, the maximum
420 PRINT:file size is limited only by the amount of space remaining on
440 PRINT:your disk. The disadvantage is that it takes a good deal of
460 PRINT:longer to perform.
480 PRINT:Be sure you have BACKED UP your disk before running this
500 PRINT:
520 CLS:CMD T:
540 OPEN"R,1,"DIRECTARY/DAI":D2S,32
560 FIELD1,32 AS A1S:Get1,IN:SET EOF(1)
580 M=N
600 M=INT(N/2):PRINT:512,"Now making sort pass # ":USING"###":M
620 I=1
640 L=1+M
660 GET1,I:V1S=A1S:Get1,L:V2S=A1S:IF V2S>=V1S THEN J20
680 LSET1A=V1S:PUT1,L:LSET1A=V2S:PUT1,I
700 I=1-M:IF I THEN E40
720 J=D+1:IF J THEN E60 ELSE E20

Listing 2 continued

740 CLOSE:CMD R:
760 RUN "MAGINDEX"
780 PRINT"512,Initializing memory for sort."
800 CMD"T:\OPEN"R,1,1,4,9,5,1,GET1,IN:SET EOF(1)
820 FIELD1,32ASF1S:GET1,IN:SET EOF(1)
840 FORX=1 TO IN
860 GET1,X
880 ES(X)=F1S
900 NEXTX
920 CMD"O,IN,ES(1)
940 FORX=1 TO IN
960 LSET1S=ES(X)
980 PUT1,X
100 NEXTX
120 GOTO740
140 IF PEK/2+1=THENPRINT:NOT ENOUGH MEMORY - REDUCE THE SIZE OF
160 YOUR SYSGEN!!!":RUN "MAGINDEX":ELSEPRINT:ERROR = "ERR,ERR:STOP

Program Listing 3

20 REM ****************************
40 REM  SORT/BAS a simple SHELL routine
60 REM *** COPYRIGHT (c) 1982 by
80 REM *** Charles P. Knight
100 REM *** for use with MAGINDEX program
120 REM *** USE WITH LDOS 5.0 ONLY
140 REM ****************************
160 CLS:CLEAR29000:DEFINTA=5:DIM S(800)
180 FOLK=15360,97:IFPEK(15360)=97THENLC=-1ELSELC=0
200 CLS
220 ONERORDGOTO320
240 OPEN"I,1,"TRANSFER/DAI":
260 INPUT1,V1,D2,D2S,IN,
280 CLOSE
300 ONERORDGOTO:GOTO340
320 PRINT:CAN'T SORT WITHOUT FILE TRANSFER/DAI:RUN "MAGINDEX"
340 IPIN=880THENIM=ELSEPRINT:There are IN records to sort.
360 PRINT:This is an EXTERNAL sort. It moves data around on the disk
380 PRINT:rather than bringing it into memory. As a result, the maximum
400 PRINT:file size is limited only by the amount of space remaining on
420 PRINT:your disk. The disadvantage is that it takes a good deal of
440 PRINT:longer to perform. A 400 record file, for example, takes about
460 PRINT:half an hour to sort. If you must that you have
480 PRINT:BACKED UP your disk before running this sort.
500 PRINT:You should sort the file before running the PRINT module
520 INPUT:Do you wish to sort this file now?ES:IFLETS=E5,1="n"
540 ORLETS=E5,1="n":THENRUN "MAGINDEX"
560 CLS
580 OPEN"R,1,"DIRECTARY/DAI":D2S,32
600 IF LTHENPOKE27208,0XH:POKE27209,0X3C:REM DIRECT BUFFER TO S
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920 IFIPS$="2"THEN2S$="Diskette is double sided"ELSE2S$="Diskette is single sided"
921 IFIPS$="2"THENTVS$="double sided"ELSETVS$="single sided"
922 XX$=XX$+TVS$  
940 NTS$="Diskette is formatted for "+FJ$+" cylinders"
941 XX$=XX$+"+"+FJ$+" cylinders"  
950 RETURN
980 PRINT328,CHR$(31);;PN=0;PRINT866,STRINGS$(59,32);
1000 PRINT312,"Magixprint programm code (C) 1981 by Charles P.
Knight"
1020 PRINT228,IN;"files in system";R2;"disks"
1040 PRINT834,." 1>............ Print file to printer"
1060 PRINT" <2>............. Search for specific file"
1080 PRINT" <3>............. Print file to screen"
1100 PRINT" <4>............. Return to master menu"
1120 PRINT" <5>............. Printout of files by disk"
1140 PRINT" <6>............. Printout of files by disk"
1160 PRINTSTRINGS$(54,140);
1180 PA=9603
1200 PRINT$8032,KT$;",
1220 IKS$=INKEY$;PRINT8096,"Please key your selection. Do not press enter.
1240 IFIPS$="THEN1320
1260 PRINT$PA,"(1);"+PRINT$PA,"1;",
1280 PA=PA+1;IPA$=PA$;PRINT81005,"",
1300 FORi=1TO3:NEXTi
1320 IFIPS$="1"ORIK$=6"THEN1220
1360 ONIKGOTO1400,2160,3000,3220,3248,3880
1380 REM ********** Print files to printer ************
1400 IFS$=PRINT328,CHR$(31);PRINT328,"Press <ENTER> to print whole file"IN"Begining record #";IPS$=AL$=VAL(IPS$);
1420 IPNAS$="A";IN="NEW"
1440 IFIPS$="THEN1400;GOTO1800"
1460 IFIPS$="THEN2A;IN=A;1=NF$=0"
1480 PRINT"You may use either LONG or SHORT form printout."
1500 IFIPS$="THEN1800"
1520 IFIPS$="THEN2A;IN=A;1=NF$=0"
1540 IFIPS$="THEN1400;GOTO1800"
1560 IFIPS$="THEN1400;GOTO1800"
1580 IFIPS$="THEN1400;GOTO1800"
1600 IPSTRINGSNAS$="NQS","NHS","DTS.GO10120"
1620 LPSTRINGS$="KS"
1640 LPRINTTAB$(9);X5S$;
1660 LPRINTTAB$(9);X6S$;
1680 LPRINTTAB$(9);X1S$;",NHS;
1700 LPRINTTAB$(9);X2S;
1820 PRINT320,CHR$(31);PRINT320,NA$;"ABS;"+NQ$;"NF;
1840 PRINT830,APS$;"UPS;
1860 PRINT824,SSS$;
1880 PRINT85S1,MS$;","ELS;
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Program Listing 5

20 REM ****************************
40 REM *** DREAD/BAS - Diskette directory reading ***
60 REM *** program for LDOS operating system. Reads disk ***
80 REM *** and creates data files containing directory info.
100 REM *** information. COPYRIGHT (c) 1982 by ***
120 REM *** Charles P. Knight. ALL RIGHTS RESERVED ***
140 REM *** at least two disk drives required 3 preferred ***
160 REM Version 1.2
180 REM
200 REM
220 REM CLEAR2000;DIMABS(7),MOS(12)
240 ABS(1)="Full";ABS(2)="X:";ABS(3)="xxxx:*";ABS(4)="Write";ABS(5)="Read";ABS(6)="Exec";ABS(7)="None"
260 MOS(1)=Jan;MOS(2)=Feb;MOS(3)=Mar;MOS(4)=Apr;MOS(5)=May;MOS(6)=Jun;MOS(7)=Jul;MOS(8)=Aug;MOS(9)=Sep
280 MOS(10)=Oct;MOS(11)=Nov;MOS(12)=Dec
300 DEFSN(X)=LEFT$(XS,INSTR(XS," ",")")
320 REM Initialize
340 GOSUB2620
360 PRINT@125,"DREADER/BAS. COPYRIGHT (C) 1981 BY C. P. KIGHT"
380 GOSUB2920
400 PRINT@771,"Enter your name, please: ";S=798:S=S+20:GOSUB270
420 KSSS:ABS(IFX=T)="THEN400ELSEPRINT@771,STRING$(9,32)
440 IFX=0="",ABS(I)="",ABS(S)="",ABS(R)="",ABS(T)="",ABS(U)="",ABS(V)="",ABS(W)="",ABS(X)="",ABS(Y)="",ABS(Z)=""
460 PRINT@835,"What drive will the directory file be written on:";S=084:S=0:1:GOSUB2700:D2=VAL(A):IF D2<3ANDG0THEN460
480 D2=FNSD(0)
500 PRINT@899,"Do you want to print disk labels as the disks are read?";S=954:S=3:GOSUB2700:IFLEFT$(AS,1)="Y"ORLEFT$(AS,1)="y"THENL=1:ELSEL=0
520 PRTVY=7710896647PE64:PRINTVY,CHR$(251);"EN
540 PRINT@895,"Enter drive containing disk no DN;PRINT@899,"En
ter"CHR$(34)"@CHR$(34)"when finished entering";S=873:S=S+1:GOSUB2700:IFLEFT$(AS,1)="Y"ORLEFT$(AS,1)="y"THENL=1:ELSEL=0
580 DI=FNSD(1)
600 PRTVY=66725564:PRINTVY,CHR$(250);"NEXTTVY;GOSUB2200
620 REM Loop through directory
640 GOSUB1680;GOSUB1680;PRINTF"Free granules=EK"K"
660 OPEN"RO",1,"DIRSYS.RS0LT0F"+DI$32
Once you discover how much time and money you can save using LOAD 80—and just how easy it is to use—you may never want to keyboard another program as long as you live.
Listing 5 continued

1660 RETURN
1670 REM GET DISK NAME, PASSWORD, AND DATE
1670 ONEROBGOTO3160:OPEN"RO",1,"DIR/SYS.RSRTL0FF"+D1$;32
1672 ONEROBGOTO3340
1674 FIELDs,16ASXNS,16ASXNS
1676 GET2,7
1678 DNS=NS:DNS=LEFT$(DNS,8):DNS=NS$=";"+RIGHT$(NS,8)
1680 PRINT@133,DNS$"
1682 CLOSE1
1684 RETURN
1686 OPEN"RO",3,"DIR/SYS.RSRTL0FF"+D1$,1
1688 FIELD3,1ASRSK$ 
1690 EE=0
1692 FORM=7095
1694 GET3,X
1696 TV=TASC(RR)
1698 IFNOTVAND1THENEE=EE+1
2000 IFNOTVAND2THENEE=EE+1
2002 IFNOTVAND4THENEE=EE+1
2004 IFNOTVAND6THENEE=EE+1
2006 IFNOTVAND1THENEE=EE+1
2008 NEXTX
2100 CLOSE3
2102 IFSEEK((18179+(10*D1))AND4THENEEK=EE*1.5ELSESEEK=EE*1.26
2140 EE=INT(EE)
2140 RETURN
2160 REM Write directory file to disk
2160 OPEN"R",2,"DIRECTRY/DAT"+D2$:32
2170 FIELD2,12 AS K18,2 AS K2,2 AS K9,1 AS K9,1 AS K
O5,2 AS L12,2 AS L25,2 AS L125,2 AS L44,2 AS L55,1 AS ENS
2220 RETURN
2260 LSETLT1=NS:LSETLT2=MK1S(AB):LSETKT3=AP$:LSETKT8=AP$:LS
ETK3=UP$:LSETK8=MPS
2280 LSETLT1=MK1S(MO):LSETLT2=MK1S(DA):LSETLT3=MK1S(YR):LSETLT4=
 MK1S(Nk):LSETLT5=MK1S(NG):LSETENS=CHR$(24-1)
2300 PUT2,IN
2320 RETURN
2340 REM WRITE HEADER FILE DATA
2360 OPEN"R",3,"HEADER/DAT"+D2$:25
2380 FIELD3,16 AS J18,2 AS J2,2 AS J3,1 AS J4,1 AS J5,1 AS J
65,2 AS J75
2400 LSETLT1=LEFT$(DNS,8)+RIGHT$(DNS,8)
2420 LSETLT5=MK1S(EE):LSETJ3=MK1S(EK)
2460 PUT3,DN
2480 CLOSE3
2500 RETURN
2520 LPRINT"Disk #"DN:"DNS
2540 LPRINTDS="G2$;LPRINTD8$"NTS
2560 LPRINT"Free Gran:""EE"Free Space:""EK.K."
2580 LPRINTLPRINT
2600 RETURN
2620 CLS
2640 G1S=STRINGS(64,191):G2$=STRINGS(2,191)+STRINGS(68,32)+STRIN
GS(2,191):G3$=STRINGS(2,191)+STRINGS(68,140)+STRINGS(2,191)
2660 PRINTG1S2G2S2G2S2G2S2G2S2G2S2G2S2G2S2G2S2G2S2G2S2G2S2G2S2G2S
2660 PL4KE16383,191
2680 RETURN
2700 C$=C$+1$;A$="";LPRINT8,STRINGS(C,95);M1$=S
2720 PRINT@1,MCHR$(63);X$=INKEYS;PRINT@1,MCHR$(95);IFXS="THEN
2720
Are you tired of searching the latest magazine for articles about your new Color Computer? When was the last time you saw a great sounding program listing only to discover that it’s for the Model I and it’s too complex to translate? Do you feel that you are all alone in a sea of Z-80’s? On finding an ad for a Color Computer program did you mail your hard earned cash only to receive a turkey because the magazine the ad appeared in doesn’t review Color Computer Software? If you have any of these symptoms you’re suffering from Color Computer Blues!

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Concerning the problem of expanding RAM in the TRS-80 computer, three vendors in your magazine advertise RAM expansion to 64K RAM, Omikron, Memory Merchant, and Freedom Technology International. Are you saying that these products don’t work? Or that they don’t provide 64K of usable RAM?

I am now using the Omikron Mapper I and am tempted to update it to the extra 16K RAM, except that you and everyone else states that it can’t be done.

C.H. Wheaton, IL
J.R.
Sherman Oaks, CA

That’s not exactly what I meant. The Z80 CPU (or any other processor with a 16-bit address line) can access only 64K bytes of memory, either RAM, ROM, or a mixture of the two. The TRS-80 is designed with a 12K ROM that contains Basic, the TRS-80 operating system, and 48K RAM of user memory (there’s an additional 1K of RAM for video memory, and a bank of 2K addresses that aren’t used, plus a few miscellaneous bytes used for system overhead). This means that whenever a machine-language program, such as VisiCalc, is used, the memory positions occupied by the Basic ROM aren’t used.

The Omikron Mappers I and II and other 64K modifications reconfigure the TRS-80 to turn off the ROMs and use their own operating system software and hardware. When you use the Mapper I, the 48K of memory used is the standard memory in your computer and your ROMs are ignored. Putting in the extra 16K of RAM replaces the ROM, as far as the Mappers are concerned, giving you a total of 64K of RAM. The Z80 isn’t addressing more than 64K of memory, it’s just accessing the lower 16K bank of RAM in the Mapper I instead of the 12K of ROM on the TRS-80 main circuit board. This translates into more user space for you since your computer is no longer wasting the lower 16K bank of addresses as unusable ROM.

How does one become an independent repair technician for modified Radio Shack computers?

J.C.
Los Angeles, CA

First, learn enough electronics to work on sophisticated equipment without destroying it; second, get the schematics and technical manuals for the TRS-80 computers so you’ll know where things are and what they’re supposed to be doing; and third, advertise your availability as a service technician.

If you want to get a job with Radio Shack, either at a Computer Center or at an independent dealer store, you have to provide Tandy with a resume stating what electronics school you graduated from, or what your qualifications are as an electronics technician (what companies you’ve worked for, how long you’ve been doing it, etc.), as well as a letter declaring that you’ll abide by their rules and regulations regarding the proprietary secrets of their products, and that you will not sell repair parts without installing them yourself.

If you succeed in convincing Tandy that you’re an honest person and know what you’re doing, they’ll send you to a training seminar in Fort Worth to certify you for repairing their equipment.

Other than that you’re on your own. If you don’t know anything about electronics, enroll in a local technical school course that provides you with hands-on experience.

I have a 48K Model I (with buffered cable and twisted-pair Expansion Interface “fixes,” and the new two-chip ROMs with two MPI disk drives. The system refuses to CLOAD in Disk Basic. I have tried to CLOAD Basic programs using different types of DOSes without success. System tapes load trouble-free. Basic programs CLOAD perfectly in Level II Basic. I understand the CMD”T” and CMD”R” commands, but they seem to have no effect. After a CMD”T” and CLOAD, the recorder turns on and the system locks up.

D.S.
Austin, TX

That’s a toughy! Your problem is probably a bad RAM bit (or series of bits). If there was a problem with the ROM chips, then you wouldn’t be able to CLOAD under either Level II or Disk Basic. It can’t be the cassette port of the CPU for the same reason. Since the Expansion Interface isn’t used for cassette I/O, either for circuitry or for machine-language code, the buffered cable and fixes are likewise removed from the list of suspects. Similarly, when loading a tape program, DOS lets the ROMs do all the work. This leaves only the RAM in the keyboard unit. I suggest that you run a RAM-check program to see if you can trap the problem chip. If the unit fails the test, you’ve found your problem. If it doesn’t fail, take the unit (CPU and Expansion Interface) to your local computer center and have a technician examine it.

The only other choice you have is to use MULTIDOS (Cosmopolitan Electronics Corp., P.O. Box 89, Plymouth, MI 48170, $99.95), which has a special DOS command that drops into Level II completely. After loading your program in a normal Level II environment, you reset the computer and go back into Disk Basic, where you’ll find your program waiting.

I have a Model I, Line Printer VII, and the Printer Interface Cable (26-1411). I recently purchased the bus-decoding version of the Microconnection (Microperipheral Corp.)
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My problem is that I can’t operate the modem and the printer simultaneously. I could plug the printer to the modern’s port on the rear except that the LP VII is set to 600-baud operation. How can I add other peripherals that plug into the expansion (Exatron’s Stringy Floppy, joysticks and so forth) and have them all on-line?

D.A.
Smithfield, VA

That’s an easy one. Alpha Products (79-04 Jamaica Ave., Woodhaven, NY 11421, (212) 296-5916) makes a series of cables called Expandabus that lets you plug several devices to the expansion port simultaneously. The two-device cable is $29, the three-device cable is $44; the four-device cable is $59; and the five-device cable is $74.

Since different devices use different ports for their I/O, you should have no problem connecting your peripherals to the expansion bus and eliminating the need to plug and unplug cables each time you want to use a different peripheral.

I have a Model I and I want to connect a large video monitor to use in my high-school class. The TRS-80 uses two wires and a ground to go to the video display, and the monitor I have needs only one wire and a ground. What do I do?

B.H.
New Rochelle, NY

First, a little background: The monitor used on the Model I is a modified TV set. To make the video as inexpensive as possible, Radio Shack used what is known as a hot-chassis TV. The ground on the TV is isolated from the wall-current ground, and can range as much as 30 volts over the normal zero-volt ground. The computer uses a “true” ground. Obviously, to just connect these two together would be disastrous. To get around this problem Radio Shack uses an optical-isolator inside the monitor to separate the computer signals from the video signals. To ensure the separation, the optical-isolator is powered by the computer, not the TV. If you examine the technical manual on the Model I, you’ll discover that the three lines to your video are labeled video, 5-Volt, and ground. Since a normal monitor only needs the video and ground lines, connecting the TRS-80 to it is easy, just ignore the 5-Volt and connect the other two lines to your monitor.

One word of caution, before beginning to operate on your Model I, make sure that the monitor you have is not a hot-chassis. If you don’t know, take the unit to a TV technician and have it checked out. For more detailed instructions on how to modify your computer, see pages 96-98 of The Custom TRS-80 by Dennis Kitz (JIG Inc., 1260 West Foothill Blvd., Upland, CA 91786, (714) 946-5805).

This letter is to acknowledge the receipt of a #GN42G green phosphor CRT for my Model I, as advertised by Langley-St. Clair Instrumentation Systems (132 West 24th St., NY, NY 10001) in the September issue of 80 Micro. Since I ordered the CRT by phone only four days ago, the service is remarkably prompt considering that the majority of suppliers are known for their slow service. Although the instructions contained no diagrams, they are in plain English and I was able to install the new CRT in about 20 minutes.

The difference in the quality of the display is most gratifying; it has a much more “professional” appearance to it. The contrast is much better and it’s easier to use for sustained periods of time.

The question I have regards the Model III. I’m thinking of getting one and I want to know if the #GN42G green CRT can be transferred from my Model I to the Model III.

Yes it can. Langley-St. Clair is sending you the instructions on how to do it.

Is there a company that makes a light pen for the standard Color Computer? If not, what would it take to modify the light pen for the Model I or III for use with a Color Computer?

D.C.
Mobile, AL

Spectrum Projects (93-15 86th Drive, Woodhaven, NY 11421, (212) 441-2807) sells a light pen for the Color Computer. It connects to your joystick port and works with both Color Basic and Extended Basic. It retails for $14.95.

As for converting a light pen from the Model I or II to the Color Computer, it depends on how the individual light pen is constructed.

I have a Model I, Level II with a 48K RAM, Expansion Interface, three disk drives, and a Line Printer VI, all from Radio Shack.

When I use Radio Shack’s Inventory Control System, the forms do not advance properly. When a page is printed, the printer advances to the next page, but instead of stopping at the same place on the wall page it goes too far by one line. By the time I have printed several pages, the printer is printing on the page perforations. Can you suggest a fix?

S.G.
Miami, FL

What you want to do is check memory location 4028 (PRINT PEEK (16424)) and see what value is stored there. This should be the number of lines per page. Since you’re experiencing problems with one line feed too many, use the POKE command to reduce this number by one (POKE 16424, PEEK(16424) - 1). It should now form feed one line less than before and stop exactly where you want it to stop.

I have a standard 48K, two-disk-drive Model III, and I want to add two external drives to it. Can I use double-headed drives with my system and DOSPLUS 3.4? I would like to add one 40-track and one 80-track double-headed drive, or would it be better to use two 40-track DH drives for compatibility?

Also, will I be able to run Radio Shack’s Profile program after converting it to DOSPLUS on this system? And will it be able to take advantage of the increased available space?

H.C.A.
Seattle, WA

DOSPLUS will let you use any combination of single and double-headed drives on your computer, up to the limit of four drives. Rather than add one 40-track and one 80-track, why don’t you just get two 80-track double-headed drives? After all, you already have two 40-track drives in your main computer case. Don’t be worried about swapping the disks from drives 1 and 2 to drives 3.
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80 Micro, February 1983 • 409
and 4, you can use the Skip command to make the 80-track drives read the 40-track drives (but don’t try to write on the 40-track disks with the 80-track drives). The October Feedback Loop column and a letter further on in this column provide more information on this subject.

How can I make a disk with track 0, sector 0 in single density and track 0, sector 1 in double density?

R.K.
Fallston, MD

Kim Watt, author of Super Utility and programmer for Powersoft (11500 Simmons Fwy., Suite 125, Dallas, TX 75229, (214) 484-9428), is the only one I know who has solved this problem, and he’s not telling his secret. Instead, he’s selling a master disk to software producers that creates distribution disks with track 0 formatted in both single and double density.

My Micromatic printer system, which uses the IBM 1980 terminal with the Micromatic Interface, has started to print F instead of B. Local technicians found one of the two PROMs in the interface to be working improperly, but can’t fix it because they don’t have the correct PROM program.

Unfortunately, my telegrams to the Micromatic Corporation were returned and their telephone number has been disconnected. Please help!

W.P.
Agana, Guam

I can’t find anything about them, can anyone else help?

I own a 16K computer with Color Basic 1.0 that has been upgraded from 4K. When I replaced the keyboard after installing the RAM, the H and O letters didn’t work. I checked the keyboard connection and it seemed OK. When I tried the keyboard again, it worked. What happened?

Also, my computer will occasionally turn itself off while I’m using it. What could cause this? And do you know where I can get schematics for my computer?

Finally, the numbers on the bottom of my PC board are 7809137-D and 1018543. What version does that make my computer?

R.R.
Kanona, NY

Your problem after installing the RAM was a loose keyboard connection, as you thought. By reopening the unit and pushing the keyboard around you pushed the keyboard into better alignment, curing the complaint.

Your computer turns itself off because you have a sudden-death power supply! Some power supplies are poorly soldered and as the computer gets warm, the parts sometimes break contact, killing the power to the computer for a millisecond or so. This is just long enough to pull in the protection circuitry, which turns off the computer to prevent damage. The solution is to take a soldering iron and gently reflow the solder of the parts of the power supply, especially around the resistors.


You have the version D board. The latest version is the E board.

I am 13 and in 8th grade. I am also hooked on Basic programming and can’t wait to get my own Model III. I have heard that a Japanese company is making a computer that uses English for programming (i.e., 10 PRINT THE SUM OF 2 & 3). I’m worried that Basic will become obsolete in a few years. Is this true?

R.W.
New York, NY

Yes, computers using English are being developed, and by several companies. The difficulty with programming in English is that English requires so many words to construct commands (compare your example with 10 PRINT 2 + 3) that a good portion of memory and time is used in decoding the command. As processors speed up, can address more memory, and the cost of memory drops, these problems will become trivivial. The only problem left is inertia in the marketplace. There are approximately 2 million microcomputers in private hands now, and almost all use a dialect of Basic. Also, the ability to program is based more on experience than on the language used. Someone who has been programming Fortran for 10 years obviously has an advantage in logical thinking and problem-solving techniques than a beginner in Basic.

I don’t think you need to worry about the English-programming com-
puters replacing Basic computers; besides, if they do, you’ll find it much easier to write your programs since Basic is based on simple English commands.

My problem is with my RS Tandon TM-100 disk drive on my Model I. When trying to back up a disk using NEWDOS80, the screen says “Motor Speed Too Slow.” With NEWDOS Plus it says to try the Format command, which in turn responds with “Can’t Format.” What’s up?

T.R.
Weslaco, TX

It sounds like your disk drive needs to be checked out. You have two choices: Take the drive to RS and have them look at it, or buy a disk-drive test program such as the DiscoTech (Microcomputer Products, P.O. Box 11129, Santa Rosa, CA 95406, $29.95) or the Floppy Doctor (The Micro Clinic, 17375 Brookhurst #114, Fountain Valley, CA 92708, $29.95).

Either of these programs will tell you if your disk drives are running at the correct speed. Floppy Doctor includes an extensive disk diagnostic that will also check your drive’s head alignment, write sense switch activity, track-to-track read/write interference, track-to-track switching accuracy, and several other functions. Once the problem has been located as being either software or hardware, you can take the appropriate corrective action.

The letter from D.T. about blowing a fuse in the Expansion Interface power supply and the subsequent erratic operation are close to what happened to my Model I. Here’s what I found:

• The fuse in the power supply can be replaced by cutting open the case, unsoldering the blown fuse, soldering two clipped-off leads from a resistor onto the ends of a new fuse of the same power rating, soldering the new fuse back into the power supply, and taping the case back together. This saves money and time over getting a replacement power supply when the problem is only a blown fuse.

• The intermittent and erratic operation of the disk drives was due to the Expansion Interface being turned on and off due to a broken lead of the power rectifier, MDA202. MDA202 is mounted flush on the board with the
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leads soldered to the foil on the other side of the circuit board. One lead had crystallized and broken right where the lead goes into the plastic case of the rectifier, making it almost impossible to discover by visual inspection.

Subject to temperature changes and vibrations, the lead would either make the connection and allow power to the Expansion Interface, or break the connection and stop power. Every time the Expansion Interface was turned on, it sent a signal to the disk drives to start, as they do whenever the computer is turned on normally. However, in this case the main CPU remained on while the Expansion Interface turned on and off, causing all kinds of havoc with the programs and disks.

In my case, the resultant shocks and constant on/off cycles killed my disk controller, the FD1771B chip.

Since I replaced the FD1771B chip and the bad rectifier, everything has worked fine, with one exception. I managed to break the ribbon cable connecting the CPU board to the keyboard, but repaired it by using leftover wire from my Archbold Speedup kit.

This problem would have been expensive for a shop to repair, especially with all the modifications my computer has and the near invisible broken lead. I found the culprit by hooking up my voltmeter to the various power-supply components and flexing them by hand while watching the voltmeter readings.

Before you go sawing into your power supply to replace a blown fuse, check the catalog number on the bottom of the unit. If the catalog number is 400007, remove the rubber feet and unscrew the four bolts holding the unit together, then replace the fuse and reassemble the power supply. If, on the other hand, the catalog number is 400004, you will have to see the unit apart to get at the fuse.

About the broken lead, that’s the hard way to find a problem. Unfortunately, there isn’t an easy way either. I have a similar problem. One of the chips on my CPU board is pulling the 12-volt line down to 8 volts. Everything works fine until I try to plug in my Holmes Engineering 5-MHz speedup kit (the Sprinter II). Whenever I type A = 1 and press enter, I get a syntax error. All other math operations similarly fail. One of these days I’ll tear into the CPU and find that chip, but as long as it works without the speedup kit plugged in, I’m not in a real hurry.

I’m a part-time consultant, and I’ve leased a Model III and Daisy Wheel printer in my business name for home use. I can’t get the insurance company that carries my homeowner’s policy (or any other insurance company, for that matter) to cover the equipment. It seems the premiums on $5,000 aren’t worth the insurance company’s time and effort.

Are there any insurance companies that specialize in writing these kinds of policies?

J.M.
Los Angeles, CA

Personal computers are usually included with the contents coverage of a homeowner’s policy, as long as the monetary coverage you have is sufficient to include the computer in that coverage. For example, if you have contents coverage of $25,000 and the contents of the house are valued at $24,000 and you buy a $5,000 computer, then your coverage will be short by $4,000. You should always make sure that the insurance contents coverage of your homeowner’s policy more than covers the actual cash value of the contents of your home.

This is the category most home computers fall into, myself included. Since I don’t have an office and I don’t have clients coming to my house (even though I have a room dedicated to my computer stuff) my policy’s coverage includes the $10,000 I have in computers, peripherals, and software.

Unfortunately for you, by putting your computer in your business’s name, you’ve automatically made it ineligible for standard contents coverage (all homeowner’s policies exclude equipment owned by a business from their coverage, figuring that the business has a separate policy to cover its equipment).

There are two ways for you to get coverage for your equipment. The first is Inland Marine Coverage, which is used to insure items kept at home that are owned by a business (for example, a carpenter’s tools are owned by a business, but the carpenter keeps them at home). This type of coverage is usually available with a minimum premium of about $50–$100.

The other choice you have is called an Office Endorsement policy. If you have an office in your home where you receive customers or appointments, you need the Office Endorsement policy added to your homeowner’s policy. This policy requires that you increase your homeowner’s contents policy coverage to specifically include the equipment you use.

For more information on these policies, you’ll have to contact your insurance agent.

My thanks for your response (January 1983). Since then I have been experimenting and found that the software works well with only a few minor inconveniences if the Epson is initialized to standard-size characters instead of compressed. The following lines accomplish this, and return to TRS-DOS:

10 LPRINT CHR$(27) CHR$(18) "A" CHR$(140);
20 CMD "S"

I have a Model II and use mostly menu programs. Since 80 Micro prints many interesting programs for the Model I and III computers, I’m looking for some translation instructions that will enable me to convert these programs to run on my Model II. I’m certain that something like this must have been done long ago and perhaps has been printed in an earlier issue. I use TRS-DOS 2.0A and CP/M 2.25-C.

S.R.
Palatine, IL

Well, there is a partial solution in the offering: 80 Micro will soon be publishing Model II conversions of selected Model 1/III articles. Other than that you’re on your own. Fortunately, most of the Model I/III Basic commands are duplicated on the Model II. The only commands that cause a problem for conversions are PEEK and POKE, neither of which is available in TRS-DOS Model II Basic.

If you buy the TRS-80 Microcomputer Newsletter Reprints (catalog #26-2115, $4.95) you will find a comparison chart of the Basic commands of the Model I, II, and III computers, so you will be able to look up which commands aren’t compatible between the three computers. You will also find a conversion chart for translating the
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I have a Model III 48K with an 80-track Percom drive and controller. Is there a DOS that will format 35- to 80-tracks in single- or double-density on an 80-track drive so I can copy files to them for compatibility with other systems?

G.R. Fairport, NY

Yes, but there's a problem you should watch out for: The 35-track drive heads write a magnetic path twice as wide as an 80-track drive head. If you have a 35-track disk formatted by an 80-track drive, it can be read by either an 80- or 35-track drive. It can be written to by either drive type.

The problem comes when you try to read the disk directory in the 35-track drive after it has been written to by both the 35- and 80-track drives. When writing to the disk in the 35-track drive, you lay down a double-width magnetic path (any write operation causes the DOS to update the directory, laying down the wider path there also). This is easily read by the 80-track drive. But when the 80-track drive writes to the directory, it writes on only half the path put there by the 35-track drive. Now, when you put the disk in the 35-track drive, it sees not only the new information put there by the 80-track drive, but also the leftover information from the previous 35-track write operation. Since the drive head can't tell the two signals apart, you get garbage. But the 80-track drive will still be able to read the track properly.

This is only a problem when you're performing multiple read and write operations to a 35- or 40-track disk in an 80-track drive.

MULTIDOS is easily capable of formatting 35- or 40-track disks on an 80-track drive, in either single or double density. The data disks used for this can easily be read by any DOS on the market, except NEWDOS, TRSDOS, and ULTRADOS. In fact, if the other DOS is LDOS, you can easily swap the data disks between LDOS and MULTIDOS. DOSPLUS can also read and write 35-track disks on 80-track drives, but requires the use of a convert utility to transfer Model I data disks into Model III data disks.

I suggest you get MULTIDOS (Cosmopolitan Electronics Corp, P.O. Box 89, Plymouth, MI 48170). At $99.95 it's the best DOS available.

You can also use Super Utility Plus (see Feedback Loop in December 1982 issue) to format and copy to 40-track disks in an 80-track drive.

I need the service manual for Model I disk drives. I think the repair charges are out of step since it's so easy to adjust the stepping relay and align the head, yet I hesitate to do anything without a service manual.

F.H. Flint, MI

You can buy the service manual (catalog #26-1160) for Model I disk drives from National Parts (817) 870-5662 for $3.03 and $1.50 shipping and handling. Before digging into your drives, I suggest that you get a disk diagnostic program like Floppy Doctor or DDT.

“"The 35-track drive heads write a magnetic path twice as wide as an 80-track drive head.""

I have a Model I with 48K and one disk drive. I use NEWDOS80 2.0, and TRSDOS 2.3. Under DOS the system works fine, but when I try to use Basic nothing works. Under NEWDOS80, Basic loads and the ready prompt appears, but when I try to load a program the trouble starts. When I press the letter O, I get an L followed by a question mark, a graphic symbol, and then the word error. This happens each time I type L until the system locks up. Rebooting repeats the experience or the system goes into the 32-character mode and locks up.

TRSDOS won't even go into Basic. Instead, it goes into a repeating process of going into Basic, rebooting, going into Basic, rebooting, and so on.

The TRSDOS TESTIA/CMD tells me the ROMs are fine, but all the interface RAMs are bad. Using the memory test program published in 80 Micro (March 1980), the interface RAM checks out OK.

Your help is greatly appreciated.

L.W. Brookfield, WI

The first thing I would do is disconnect the keyboard/Expansion Interface cable and use Q-Tips and isopropyl alcohol to clean the edge connectors of both the Expansion Interface and CPU boards (both sides, top and bottom). Then remove your disk-drive cable and clean its edge connectors on the interface board and inside the disk drive cabinet. Finally get the Floppy Doctor (see previous letter in this column) and use it to check out your disk drives and your system’s RAM. Cleaning the edge connectors cures about 90 percent of the memory problems in the Model I. Since one memory test said all the Expansion Interface RAM was bad and another didn’t, I suspect that the cable was fouling things up. Not all memory tests are equal. The M1-Worm Test is one of the better tests, taking hours to thoroughly test the RAM.

If, after cleaning the connectors, you still have the same problem, I suspect that the disk-drive interface circuitry is malfunctioning, especially since two different DOSes have the same problem on your system. This means you’ll have to take the system in for repairs at your local Radio Shack Computer Center.

Terry Kepner is a free-lance writer and programmer, and the vice president of Interpro. He’s been writing about microcomputers since 1979.

Update

In the December issue of Feedback Loop, I said that 80 Micro had more ads and articles about the Color Computer than either The Rainbow or Color Computer News magazines. At the time that it was written (approximately August/September) it was a true statement.

However, the microcomputer industry changes so rapidly that by the time this statement appeared, it was outdated. The latest issue of The Rainbow (my October 1982 issue) contained about 90 advertisers, and was 130 pages thick. Color Computer News has had a similar growth.

If you’re looking for products and information on the Color Computer, check out these two magazines.—Terry
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First let’s consider the areas in which difficulty might occur:

- Something is wrong with the computer circuit that reads tapes.
- Something is wrong with the tape recorder.
- Something is wrong with your technique in loading the tapes.
- Something is wrong with the tape.

The problem can be a combination of things. For instance, your tape recorder can be in marginal condition, but still be able to load most tapes. When you attempt to load a flaky tape, however, it will fail. Your aim should be to optimize all four of the above conditions for easy tape loading.

---

The program NODOS80 from the Anniversary Issue did not appear in the Load 80 directory but is included on the cassette. Since this is a tape utility, it is not included on the disk. This special Load 80 tape is expanded to 40 minutes instead of the usual 30.

---

Table 1 is a partial list of manufacturers who supply products to ease loading difficulties.

### Hardware Modifications To the Loading Circuit

Radio Shack improved the cassette port on newer Model Is, the Model III and the Color Computer, but the early Model I cassette port was dismal. In many cases good-quality tapes will not load, or will load only in a narrow volume range.

If your machine prints MEM SIZE? instead of MEMORY SIZE? it is one of the newer machines and has a modified cassette port for easy loading. This is the XRX III modification, and for years the Shack offered it as a free upgrade to older machines. Today there is a $15 service charge, but the cost is easily worth it.

One note: The XRX III modification creates a window at 500 baud, so it will not read files created by high-speed tape loaders like KWICOS from Kwik Software or Rapid System Loader (April 1982, 80 Micro, page 188).

Another way to improve poor loads is to filter the signal coming from the tape recorder. Devices like the Acu-Data from Alphanetics or the Lemon-Aid Loader from Lemons Tech Services improve the quality of the tape signal before it reaches the keyboard. These devices are indispensable for loading Model I/III tapes at 500 baud.

The LM339 chip on the earliest Color Computers has a distressing tendency to blow up when loading a tape at high volume. When the chip blows up the

---

### Table 1. Products to Improve Tape Loading

<table>
<thead>
<tr>
<th>Program</th>
<th>Title</th>
<th>Page</th>
<th>Comments</th>
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<tr>
<td>1</td>
<td>COPYRIGHT/BAS</td>
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<td>None</td>
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<td>2</td>
<td>NIGHTSHD/BAS</td>
<td>85</td>
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<tr>
<td>3</td>
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<td>5</td>
<td>TURTLE/BAS</td>
<td>116</td>
<td>None</td>
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<tr>
<td>6</td>
<td>BOXER/SRC</td>
<td>134</td>
<td>Needs EDTASM</td>
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<tr>
<td>7</td>
<td>FLAGS/BAS</td>
<td>149</td>
<td>None</td>
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<td>8</td>
<td>CASS80/BAS</td>
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<tr>
<td>9</td>
<td>MATHCDWN/BAS</td>
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<td>None</td>
</tr>
<tr>
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<td>PRESKOOL/SRC *</td>
<td>184</td>
<td>Needs EDTASM</td>
</tr>
<tr>
<td>12</td>
<td>PROGGEN/BAS</td>
<td>296</td>
<td>None</td>
</tr>
</tbody>
</table>

* Disk versions for disk, cassette versions for cassette. Remarks statements in source code listing are deleted to make room for this program on Load 80, and to enable Assembly in a 16K cassette-based machine. Cassette versions are modified to run in 16K.
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---

Please send me the following:

<table>
<thead>
<tr>
<th>Tapes</th>
<th>Magazines</th>
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<tr>
<th>ITEM</th>
<th>COST</th>
<th>QTY.</th>
<th>TOTAL</th>
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<tbody>
<tr>
<td>Load 80 Tapes</td>
<td>$9.97</td>
<td></td>
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<tr>
<td>August 1982 Double Issue</td>
<td></td>
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<tr>
<td>add $1.50 per tape for postage &amp; handling</td>
<td>$17.97</td>
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<tr>
<td>80 Micro add $1.00 per magazine for postage and handling</td>
<td>$3.50</td>
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TOTAL

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Bill my: ☐ MC ☐ AE ☐ VISA

NAME

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CARD #_________EXP. DATE_________

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Marcia Stone

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Fact #3: Fact #1 + Fact #2 = INCREASED SALES, which means more money for you. And that's a fact.

For information on selling 80 Micro, call 800-343-0728 and speak with Ginnie Boudreau, our bulk sales manager. Or write to her at 80 Micro, 80 Pine St., Peterborough, NH 03458.
Correcting Your Recorder’s Head Alignment

The tape recorder has an extremely difficult job—it must store data on an audio tape with sufficient fidelity for the routines in ROM to convert it back to bits and bytes. In the recording and playback process a fair bit of electronic noise is added to the signal. It’s clear then that we must keep the recorder in top operating condition to have a fighting chance.

If you press the play button on your tape recorder without a tape in the machine, you will see three components come out. From left to right, they are a tape guide, which guides the tape on its way, the playback head, which does the actual reading and writing of the tape, and the pinch roller, which pinches the tape against a small metal prong called the capstan.

The single most important factor in loading tapes is the alignment of the playback head. If the alignment (also called the azimuth) of the recorder is different from the alignment of the tape, the signal will lose the important higher frequencies and cause extremely poor loading.

Correct head alignment is relative only to the alignment of the recorder that recorded the tape. In other words, if your head alignment is off and you record a tape, you will be able to read it, but will not be able to load a tape produced on your friend’s brand-new CTR-80. In our experience, head alignment varies widely on recorders used both in the home and in the computing profession. The best we can do is align our equipment to factory specifications.

The CTR-80 permits access to the head alignment screw through a tiny hole in the faceplate, but some recorders require that you drill a small hole. You will need a drill with a small bit (about 3/16”):

- Press play with no cassette in place. The playback head will come out to meet the cassette.
- If you look closely you will see a small Phillips screw about 1 millimeter behind the playback head, on the side of the head nearest the tape guide. This is the head alignment screw. On most recorders it is directly in line with the play button.
- Drill a small hole directly over this screw. Be careful not to damage the head mechanism.

You will need a small Phillips screwdriver to do the actual alignment. You can use a professional alignment cassette or you can align to individual cassettes. We recommend the latter.

- Insert the cassette and fast-forward to the middle of a program. Press play and turn the volume up about halfway.
- Use the small Phillips screwdriver to adjust the head alignment screw. Turn the screw until the sound is brightest and the pitch seems highest.
- The tape and your recorder should now be in the same alignment.

A Shack Mod and Maintaining Your Recorder

The playback heads on early CTR-80 recorders have a distressing tendency to erode tapes. A field collapse occurs when you press stop during a load, erasing the bytes currently on the tape head. For years Radio Shack installed (for free!) a capacitor to clear up this problem. Today it will cost you the $15 service charge but is well worth it.

To determine if your recorder needs this modification, remove the cover to the battery compartment. If the inspection sticker is marked earlier than 4A9 (April 1979) you need this modification.

Your recorder also requires periodic cleaning to stay in peak condition. Clean the playback head regularly with a cotton swab and isopropyl alcohol (not acetone) to prevent tarnishing. This alcohol can be purchased at a local drugstore. Simply ask for 97 percent rubbing alcohol with no dye or perfume additives.

The pinch roller and capstan pick up a varnish from the tape which prevents them from gripping the tape effectively. A cotton swab and isopropyl alcohol or acetone is in order here.

The playback head becomes magnetized after repeated use and will erase bits and bytes from the tape oxide. Monthly use of a tape demagnetizer (Radio Shack part #44631) will prevent this.

Next month we will go over the two remaining areas of difficulty: user skill and tape problems.

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PRICE BREAKTHROUGH

100% RS COMPONENTS, NO FOREIGN DRIVES OR MEMORY — FULL WARRANTY

<table>
<thead>
<tr>
<th>MOD III 48K</th>
<th>MOD II 64K</th>
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<tr>
<td>2 Drives RS232</td>
<td>1 Drive</td>
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8" double density is here for Model III’s.

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- 568K of storage on a single-sided 8 inch drive, when used with our controller & speedup MOD.
- The maximum storage capacity of your Model 3 will be 4,544 Megabytes - without a hard disk.
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- One 5½ single-sided and one 8 inch double-sided drive will store 1,244 Megabytes.
- Mix and match 5¼ and 8 inch drives, in any density, single or double-sided. All under software control.

1. Speedup $99.00. 2. General purpose speedup, which also works with 8 inch drives $129.00.

Here’s 3 good reasons to buy our system -

1. VERSATILITY
   - Don’t be fooled. Dependable drive controller will give you the flexibility to run almost any drive configuration you can imagine.
   - 5¼ and 8 inch drives in any combination.
   - Internal external drive combinations (up to a total of 4 drives external).
   - Single - and dual - headed drive combinations.

2. QUALITY
   - We use quality drives - MPI and now new generation Siemens.
   - We control our own disk drive installation kits of heavy steel - no shedding problems.
   - We are now using IBM field proven switching supply.

3. PRICE
   - Drive controller kit with first drive, 10K MEM, TRSDOS 1.3* $679
   - Second internal drive $279
   - Third drive (5¼ floppy with cable) $329
   - Fourth drive (5¼ floppy) $329
   - If these sound like good deals, but you don’t have the Model III yet, we’ve got the answer. TRS-80 Model III, 48K TRSDOS*, 2 drives $1099

Micro-Mega · P.O. Box 5665 · Arlington, Va 22206

Terms: Check or money order, no COD’s or credit cards, please. Add amount shown for postage and handling to price of item. All items shipped within 48 hours by first class or priority mail. Virginia residents add 4½ sales tax.

Micro-Mega...The Original GREEN-SCREEN

The eye-pleasing Green-Screen fits over the front of your TRS-80 Video Display and gives you improved contrast with reduced glare. You get bright luminous green characters and graphics like those featured by more expensive CRT units.

Don’t confuse the Original Green-Screen with a piece of thin film stuck to the face of your video tube, such as that advertised by others. The Original Green-Screen is mounted in a full frame perfectly matched to the color and texture of the TRS-80 Video Display. It is attached with adhesive strips which do not mar your unit in any way.

The full frame design of the Original Green-Screen “squares off” the face of your video display and greatly improves the overall appearance of your system.

(Specify whether for Model I or Model III)

THE GREEN-SCREEN...........................................$13.95
Add $1.50 for postage and handling.

Process Control Technology
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See List of Advertisers on Page 387

80 Micro, February 1983 • 419
A More Powerful Vocabulary

The Votrax Personal Speech System is a voice synthesizer that uses a highly articulated text-to-speech translator, achieving a translation accuracy rate of at least 95 percent for conversational vocabulary. It also has a programmable master clock, 350 programmable frequencies for speech and sound effects, and a built-in speaker, and can simultaneously provide speech and sound effects or speech and music.

To compensate for some of the idiosyncrasies of English or for specialized or technical vocabularies, users can define an exception word table. This allows you to store programs for words and proper names whose spelling violates the rules incorporated in the unit.

The PS System is equipped with both serial and parallel interfaces and an input buffer of more than 3,500 characters, subdivisible for a printer buffer. User-programmable speech rate and amplitude give more natural rhythm and greater control over word emphasis.

Other features include an audible alarm, a chime-prompted mode, oral error prompting, X-on/X-off, and RTS/CTS handshaking. Experimenters can use a ROM expansion socket and Z80 software capabilities.

The synthesizer sells for $395 from Votrax, 500 Stephenson Highway, Troy, MI 48084, (800) 521-1350.
Reader Service ▶ 560

Zaxxon Comes Home

Sega Enterprises' Zaxxon, one of the most popular arcade games of 1982, has been adapted by Datasoft for the Color Computer.

The vivid graphics display simulates aircraft flight, with your ship invading the floating enemy fortress. Navigating between laser barriers and fortress walls, you score by destroying missiles, ships, gunnery, and radar towers, heading toward a final confrontation with the enemy robot.

The game costs $39.95 on tape or disk from Datasoft, 9421 Winnetka Ave., Chatsworth, CA 91311, (213) 701-5161.
Reader Service ▶ 555

Versatile Dot-Matrix Printer

The D-82 F/T printer supports the full 96-character ASCII set at 40, 48, 66, 89, 96, or 132 characters on 8.5-inch paper. It features tractor or friction paper feed, 7 by 7 or expanded 14 by 7 matrix, 100-cps bidirectional printing, an 800-character buffer, and high-resolution, dot-addressable graphics.

The user can specify six different character sizes and one- or two-pass printing under program control. All electronic components are mounted on a single printed circuit board and can be serviced without disassembling the printer. A Centronics-compatible parallel interface is standard; options include an RS-232C serial interface, 2K buffer, high-speed serial up to 9,600 baud, and single-sheet paper tray.

The D-82 F/T measures 17 by 9.75 by 6.5 inches. It sells for $595 from Data Impact Products Inc., 745 Atlantic Ave., Boston, MA 02111, (617) 482-4214.
Reader Service ▶ 550

Stock Market Spreadsheet

Stockvue is a spreadsheet program that lets stockbrokers and investors scan information, change variables, and calculate potential profit and risk on investments.

The display includes calculations of dividends, interest (margined trades), trade commissions (either full service or discount broker), and opening cost according to Securities and Exchange Commission rules on margin requirements. Users simply plug in information related to the opening trade, plus hypothetical figures for a closing date and a likely price on that date. Stockvue posts all the results, including the bottom-line net return on investment.

The $129.95 program is available on disk or cassette for the Model III from Star Value Software, 12218 Scribe Drive, Austin, TX 78759, (512) 837-5498.
Reader Service ▶ 583

Monster Maze

Monster Maze is a challenging graphics game from Epyx/Automated Simulations.

Trapped in a web of blank alleys and seemingly endless halls, you must find gold bars and vitamins while over 40 mutant monsters try to find you. The vitamins give you strength to kill the monsters and escape with the gold. Be careful—you only have nine lives!

Screen graphics show the labyrinth from the wanderer's point of view. A map gives an overhead view, though monsters sneak up on those who look at it too long. Nine levels of play increase the challenge, and a monster maze is created for each game.

Monster Maze is available on disk (32K) or cassette.
DOES STRING COMPRESSION HAVE YOU TIED UP IN KNOTS?

LET TRASHMAN CLEAN UP THE MESS!

TRASHMAN is a machine language utility for the TRS-80 Models I and III. It was written by Glenn Tesler, the author of FASTER, and can reduce BASIC's string compression time by 95% (see table below).

### WHAT'S STRING COMPRESSION?

When a BASIC program changes a string (words, names, descriptions), it moves it to a new place in memory, and leaves a hole in the old place. Eventually, all available memory gets used up and BASIC has to push the strings together to free up some space. This takes time. Lots of time. The computer stops running for seconds or minutes, and you may even think it's "crashed." The keyboard won't work, and until all the strings have been collected, you just have to sit and wait. Then things run for a while, until string compression is needed again.

And again:

If you're using your computer for business, that wastes your money. If you're using it personally, it wastes your time.

### WHAT'S THE SOLUTION?

As soon as you start using TRASHMAN, those delays almost disappear. It uses less than 600 bytes of memory, plus 2 bytes for each active string. It works with other machine language programs and with all major operating systems. It's easy to use, comes with complete instructions, and can be copied to your own disks.

### WHAT'S THE CATCH?

If a BASIC program uses only a few strings, very little time is wasted in string compression, and TRASHMAN won't be helpful. But, if hundreds of strings, including large string arrays, are used, TRASHMAN is just what you need.

TRASHMAN is available on disk for just $39.95.

---

SAVING TIME WITH FASTER

"FASTER" speeds up most TRS-80 BASIC programs by 20-50%. It's helped hundreds of satisfied people and can help you. Detailed instructions make it easy to use. FASTER analyses your BASIC programs while they run, then displays a simple change, usually one line, that sequences program variables so the ROM will find them faster.

Does FASTER really work? Yes! Just check the reviews in Personal Computing, May, 1981, p. 116: "FASTER is effective and easy to use"; 80 U.S. Journal, April, 1982, p. 106: "I recommend FASTER to everyone"; and 80 MICRO (April, 1982, p. 40): "If you...would like a significant increase in the run-time speed, then buy FASTER."

FASTER runs on the TRS-80 Models I and III, 16-48K tape or disk, and all major operating systems. $29.95

"QUICK COMPRESS" takes only 278 bytes of memory, and removes the blanks and remarks from even the largest BASIC program in less than 3 seconds. It produces smaller, faster programs without altering their logic. $19.95

SPECIAL: FASTER and QUICK COMPRESS: $39.95

ERRATIC DISK DRIVES?

You can avoid unnecessary disk errors and repair bills by using RPM. This easy-to-use program measures the rotational speed and fluctuations of your disk drives, and warns you if they are running too fast, too slow, or unevenly.

Incorrect or erratic speed is a common cause of unexplained disk errors and loss of data. RPM's documentation explains how to detect and correct these problems quickly and easily. As 80 MICRO (April, 1982, page 41) said: "If your drives have problems I recommend RPM before paying to get it repaired."

RPM is supplied on diskette for the TRS-80 Models I and III. We suggest you order a copy before you need it. $24.95

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**NEW PRODUCTS**

(16K Level II) for the Models I and III. Either version is $29.95 from Epyx/Automated Simulations Inc., 1043 Kiel Court, Sunnyvale, CA 94086, (408) 745-0700. Reader Service 581

**96K for Model I**

Bigmem upgrades the Model I with 64K keyboard RAM, 48K available on power-up, with or without an expansion interface connected. With one, port switching the external memory from Level II Basic yields 80K RAM; by port command, 96K (minus 1.28K for video, keyboard, and input/output) is available for machine-language programs.

A board jumper will enable 2K RAM above ROM and ¾K RAM in the keyboard address space. This protected memory is suitable for special machine-language routines such as printer driver, keyboard debounce, or line renumbering.

New 64K RAMs replace the old 16K chips in the keyboard unit; an internally mounted memory controller board provides the means for bank switching the expansion interface memory.

Switching to the 64K mode either overlays the ROM with RAM or remaps the video, keyboard, and I/O to high memory for CP/M-compatible operation. The choice is determined by a second board jumper.

Installation involves cutting power-supply traces not used by the new single-voltage RAMs and soldering an internal cable that plugs into the controller board. The $180 kit includes eight 64K RAM chips, controller board, internal cable/connector, wire, solder, and detailed instruction manual.

For more information, write Microhatch, P.O. Box 501, DeWitt, NY 13214, or call (315) 446-8031 after 6 p.m.

Reader Service 569

**Cassette Stock Planner**

Stoktrak is a tracking/planning program for the investor who spends money on stocks instead of disk drives.

Handling up to 30 stocks per data file, the program provides reports on current value and yield, unrealized capital gains for each stock, realized gains for any stock sold, and quarterly and annual dividend records. A
NEW PRODUCTS

32-page user's guide is included.

It operates on a Model I/II with 16K Level II RAM, cassette, and optional printer. Price is $24 from David H. Barrett c/o Microserve, 1304 Kent St., Durham, NC 27707.

Reader Service ✂ 575

Business
Management Series

Century Software Systems has completed the first phase of its Business Management Series, seven professional decision-making tool packages for the Model II with CP/M or TRSDOS and at least 56K of memory.

Based on financial, statistical, econometric, and accounting theories, the series helps managers set policy for business, professional, or industrial companies. The programs, supplied with extensive documentation and examples, cover financial decisions ($345), lease-versus-purchase analysis ($295), statistical analysis ($320), real estate analysis ($395), econometrics ($310), financial-statement analysis ($345), and linear programming ($240).

A $50 demo disk displays sample runs from each package, and the seven manuals and demo disk are available for $350. The Business Management Series is produced by Century Software Systems, 1875 Century Park East, Suite 1730, Los Angeles, CA 90067, (213) 879-5911.

Reader Service ✂ 570

Educational
CRT Table

The EC5, a CRT table for school and training use, offers a 2-by-3-foot work surface, 4-inch casters (two with locking brakes), and positive stops that eliminate shelf slippage.

A cord organizer/modesty panel keeps cords and connectors off the floor and out of the way. The table's electrical supply unit features three outlets and a 20-foot cord with grounded plug.

The table weighs 58 pounds, ships via UPS, and is easily assembled with standard tools. For more information, contact Bretford Manufacturing, 9715 Soreng Ave., Schiller Park, IL 60176, (312) 678-2545.

Reader Service ✂ 571

CP/M Software Index

The third edition of Small Systems Group's CP/M Software Index lists 1,688 programs offered by 507 vendors, more than twice as many as the previous edition.
MODEL III HARD DRIVE
$1295.

It's no secret. We have a quantity contract to bring you the highest quality system at the lowest price available. The combination of Tandon Disk Drives and Western Digital's error checking and correcting Hard Drive Controller Board create the backbone of the Hard Drive Specialist System. The balance of the interfacing is by one of the oldest engineering teams in the Model III/Hard Drive business. These systems have been in testing since September of 1981 and have proven to be reliable and fault free. The first primary systems are available in a 5 meg version for $1295., a 10 meg for $1495., and a 15 meg for $1695. The secondary or add on systems are available in a 5 meg version for $895., a 10 meg version for $1095., and a 15 meg for $1295. Model I primary version add $50. All prices include our 120 day warranty and free shipping UPS ground. Compatible with DOSPLUS 4.0 and LDOS.

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Drive kit with one 40trk single sided drive $479.
Drive kit with two 40trk single sided drives $699.
Drive kit with two 40trk double sided drives $899.
Drive kit with one 40trk SS/8a 5meg hard drive system $1799.

Complete Model III Systems

48K one drive system $1495. 48K two drive system $1695.
48K with two double sided drives $1895.
48K one double sided floppy disk drive and one 5 meg hard drive $2895.
112K CP/M and Model III software compatible, with two disk drives and a 80 column green phosphor CRT $2699.

System options with free installation are a green phosphor CRT $89, a RS232c $89., DOSPLUS 3.4 $100., DOSPLUS 4.0 $200.

TANDON DISK DRIVES  ask for a FREE copy of DR. Roberts Disk Drive Manual with any drive purchase
TM100-1 40trk Single Sided/Double Density $199.
TM100-2 40trk Double Sided/Double Density $299.
- one drive case and power supply $49.95 2 drive cable $24.95

Model II Disk Bays

These bays consist of the TANDON slim line drives as used in the Model 16, case and power supply, and all the cables required.
one single sided drive bay $699.
two single sided drive bay $1099.

Model III RS232c Kit $89.
Green phosphor CRT Kit $89.
for your Model I, II, or III

COMPUKIT DOCTOR $29.95 by Jim Penny
System diagnostic for disk based Model III’s.
If you are sure if your Model III is working correctly
Compukit Doctor will check ROM, RAM, Keyboard, and Disk Drives. This fast machine program leads you through it
with documentation built into the program. $10.00 off on this program with any purchase on this page.

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Epson MX-80 $499. MX80/1 $559. MX100 $727.
Okidata 82A $459. 83A $727.
Verbatim SS/DD Box of 10 $25.95

See List of Advertisers on Page 387
NEW PRODUCTS

The index is organized into five major areas: systems programs, general applications, accounting, utility applications, and industry-specific software. These areas are broken down into 89 categories, ranging from data management and higher-level language processors to dairy and cattle programs and sports. Each entry gives a program description, price, vendor’s address and phone, and operating-system versions.

Single copies are $10 (California residents add 6 percent tax) from Small Systems Group, Box 5429, Santa Monica, CA 90405, (213) 392-1234.

Reader Service 557

Head Cleaner Disk

Cleaning your drive heads can increase their life, prevent read/write errors and head crashes, and provide a clearer screen. The Verfin dry nonchemical head cleaner disk removes oxide, smoke, and oil particles, and is safer than liquids or wet-process disks.

To clean the head, simply insert the Verfin disk as you would any other and engage the drive for 20 seconds. The disk’s nonabrasive soft polyester material absorbs contaminants.

Two disks ($24.95) can be used for 30 cleanings with single-sided or 15 cleanings with double-sided drives. They are available in 5¼- or 8-inch sizes from Zolman International Inc., 600 Montgomery St., 45th Floor, San Francisco, CA 94111, (415) 421-5340.

Reader Service 566

Watt-Watching Software

Energy Monitor is a software system that organizes data on energy units, expenditures, and energy use relative to climatic variables. It can handle from one to 90 independent buildings.

The program produces a set of six reporting formats. Each report illustrates energy use and documents conservation activity by fuel type at each building and for the system as a whole.

Managers can use reports to identify and set energy conservation goals and objectives, prepare energy budgets, verify invoices for billing and fuel delivery, and review the performance of energy-saving investments. Energy Monitor can also be used to compare the energy efficiency of various buildings within a system.

The program is available on disk for the 48K Model III. Its price is $245 from Addison-Wesley Publishing Co., Computer Software and Applications, Reading, MA 01867, (617) 944-3700.

Reader Service 580

Data and Text Manager for Color Computer

Homebase for Color Computer disk owners is an integrated system that provides a data-base manager, spreadsheet, and text processor in one menu-driven package. The $75 program also includes utilities for copying, merging, and synchronizing files and summarizing amount data fields.

The data manager lets you define up to 250 records in 49 data fields; add, change, and delete records and fields or move records within the file; and sort, sum, and reorder data. The text processor allocates up to 250 screens of text, letting you add, change, and delete files and edit with insert, delete, duplicate, move, and search and replace commands and four-direction cursor control.

Radio Shack or Epson printer owners can print all or selected records or data fields, with automatic formatting of dates, time of day, phone numbers, and dollar amounts. Users printing text can define left and right margins, line spacing,
Dateline: California, December 1982.

James Farvour...Programmer, Author and Adventurer Extraordinaire', who two years ago last spring came to popular public attention with his much heralded and nationally acclaimed publication Microsoft Basic Decoded & Other Mysteries, has done it again.

Leaving no stone unturned in his never ending quest to bring to the common man and programmer the information hidden for so long in the dark unchartered expanse of computer software, which was thought before to be unobtainable to mortal men, James Farvour brings to you...

TRSDOS 2.3 Decoded & Other Mysteries.

The diary of our intrepid explorers' journey through the internal operations of the TRSDOS operating system (used on the TRS-80 Model 1 computer) and what he found while he was there.

With the assistance of his trusted friend and long time companion Tandy, our hero brings to you, in the comfort of your own home, such wonders as...

- a fully commented source code listing at the end of each chapter along with (where appropriate) diagrams and descriptions of the data structures for the modules described, a discussion of the Model 1 system architecture as it pertains to operating system implementation, a general description of the Z-80 CPU register sets and interrupt modes, a description of the command line interpreter and the subroutines used by the TRSDOS commands module, the modules used by the file management system, the error message processor, the debug module available with TRSDOS, and much, much more.

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and six horizontal tabs, with standard, compressed, double-width, or emphasized characters.

Homebase requires 32K Extended Color Basic and one disk drive. For more information, contact Homebase Computer Systems, P.O. Box 3448, Durham, NC 27702, (919) 544-5408.

Reader Service 573

Model III Disk Upgrade

The Micro-Design MDX Upgrade for the Model III includes an MDX-6 floppy disk controller board, an installation kit with all required hardware for mounting two internal disk drives, and one 40-track TEC disk drive.

The MDX-6 controller board features a state-of-the-art LSI device designed specifically for read/clock recovery separation. All data and control lines from the CPU are buffered to assure accurate data levels to the 1793 controller chip. The board will control up to two internal and two external single- or double-density disk drives, and is compatible with all Model III DOSes.

The accompanying hardware includes a linear power supply, gold alodine aluminum mounting towers, and all required cables for installing both internal drives. The TEC drive has a track-to-track access time of 5 ms and is rated for both single- and double-density operation.

Installation requires a screwdriver and about one hour. The Upgrade is priced at $399, with additional TEC disk drives available for $219.95, from Micro-Design, 6301 Manchaca Road, Suite J, Austin, TX 78745, (800) 532-5001.

Reader Service 565

Hard Disks, Printers From Radio Shack

Radio Shack’s winter lineup of peripherals includes two new printers and hard disks for the Model I/III.

The DMP-400 ($1,195) is a 132-column dot-matrix printer that produces 140 cps at 10 characters per inch and supports proportional space, backspace, boldface, underline, and superscript and subscript. The DWP-410 daisy-wheel printer ($1,495) allows 10 or 12 cpi and proportional spacing, and prints over 300 words per minute.

For $2,495, Model III users can add a five-mega-
NEW PRODUCTS

byte Winchester drive with the LDOS operating system; up to three more drives ($1,995 each) can bring your TRS-80's total to 20 megabytes. Model I owners must buy a $39.95 hard-disk adapter package.

Other new Tandy products are a Model III business graphics analysis package for pie, bar, line, and scatter charts ($174.95), 48K Superscript for the two-disk Model I and one-disk Model III ($199), and a Color Computer game based on the recent movie \textit{Poltergeist} ($34.95).

All are available at Radio Shack Computer Centers nationwide.

Reader Service \#559

Smart Terminal Program

Colorcom/E is a smart terminal program on plug-in ROM cartridge for the Color Computer. It supports on-line and off-line scrolling, off-line printing of data, receiving and sending cassette files, and full and half duplex, and works with any serial printer. An optional word mode eliminates wordwrap. Data can be easily edited before printing or writing to cassette.

The program sells for $49.95 from Spectrum Projects, 93-15 86 Drive, Woodhaven, NY 11421, (212) 441-2807.

Reader Service \#577

Color Quartet

The Composer, a menu-driven music compiler for the Color Computer, allows you to write music using four separate voices over a seven-octave range. Key and tempo may be specified and changed as music is played.

The screen displays a colored kaleidoscope pattern and the number of the note being played. The latter helps in debugging music. Compiled music is saved as an independent machine-language subroutine, so that music and sound effects can be integrated into other Basic programs.

The Composer requires Extended Basic for cassette ($24.95) or disk ($29.95). It can be ordered from Speech Systems, 38 W. 255 Deerpath Road, Batavia, IL 60510, (312) 879-6880.

Reader Service \#572

Duplicate Your Tapes

Copy-Tape is a menu-driven utility that makes back-up copies of Basic or machine-language tapes on the 16K Model I or III. It displays the ASCII code of the program during loading and recording, and also verifies and advances tapes. On the Model III, Copy-Tape also converts 500 baud to 1,500 baud and vice versa.

The guaranteed cassette sells for $9.95 plus $2 postage from Modtec, Software 4144 N. Via Villas, Tucson, AZ 85719, (602) 293-5186.

Reader Service \#577

The Amazing Ben

The Amazing Ben is the first in a series of program sets designed to introduce programmers of all ages to the concepts of artificial intelligence. Using your knowledge of Basic, the set teaches you to write programs in Ben's language, allowing him to make decisions, evaluate different paths, and record data as he explores a sequence of increasingly difficult mazes.

The process involves examining your own thought processes while giving Ben rules for acquiring knowledge, and handling the computer as a symbol processor rather than a calculating device. The focus is not only on

\[ \text{See List of Advertisers on Page 367} \]
what Ben learns, but how he learns it.

Priced at $79.95, the program set is offered on 32K disk for the Model I/III. A Color Computer version might appear in the future, as will additional sets such as Elementary, My Dear Ben and Ben On the Asteroid.

For more information, contact Krell Software Corp., 1320 Stony Brook Road, Stony Brook, NY 11790, (516) 751-5139.

Reader Service 561

The Arranger

The Arranger is a fast machine-code program that automates and catalogs your disk library. The double-density Arranger disk stores the directories of up to 250 disks, 45 programs per disk, and lets you alphabetize all or part of your library file in a few seconds.

If you have changed one of your disks, you can update the library with one keystroke. During this update, the Arranger records DOS type, density, free grants, number of tracks, system or data, date updated, and current visible file names. A back-up function is built in.

The program works with the Models I or III with all popular DOSes and one to four disk drives, whether 35, 40, or 80 tracks. Its price is $29.95 from Triple-D Software, P.O. Box 642, Layton, UT 84041, (801) 456-2833.

Reader Service 582

Printer Optimizer

The Printer Optimizer is an independent 80-based spooler with its own power supply. It absorbs data from your computer at full speed and then sends it to a printer or modem, freeing the computer for other work.

A keypad and display let you program the unit to convert characters on a one-to-one, many-to-one, or one-to-many basis, or ignore characters that confuse your printer. Users can record new printers' command sequences for different type fonts and sizes, page formatting, and so on, and then access a different mode by simply pushing a button.

The Printer Optimizer also handles bidirectional RS-232 data transmission, data compression, and temporary halts in printing. It sells for $495. A plug-in serial RS-232 card or additional 64K memory cards are $125 each.

For more information, contact Applied Creative Technology Inc., 2723 Avenue E East, Suite 717, Arlington, TX 76011, (800) 433-5373.

Reader Service 552

Color Computer Joystick

Endicott Software has introduced an affordable, reliable joystick for the Color Computer. Hand-assembled and checked for durable service, the unit features smooth function for excellent cursor or game character control. A 90-day parts and labor warranty is included.

The joysticks sell for $18.95 each or two for $35.95, plus $2 apiece for shipping. For more information, contact Endicott Software, P.O. Box 12543, Huntsville, AL 35802, (205) 881-0506.

Reader Service 578

2,400-Baud Modem

A direct replacement for Bell 201B data sets, the MT201B modem provides 2,400-baud, full-duplex operation over four-wire leased lines, or half duplex over two-wire lines. The modem uses phase-shift modulation and synchronous data format, and communicates with other 201B- and 201C-compatible modems.


Reader Service 562

Mac Inker

Mac Inker is a device that automatically reinks ribbons for any printer, nearly eliminating ribbon replacement costs.

Once you load the cartridge and press the start button, Mac Inker meters and distributes the correct amount of ink across the ribbon. Printing stays crisp and legible, and ribbon life is extended almost indefinitely.

Different ink colors and cartridge loading stations for any current printer are available. Price is $54.95 from Computer Friends, 100 NW 86th Ave., Portland, OR 97229, (503) 297-2321.

Reader Service 574

Softrol for Recorders

The solid-state Softrol cassette-recorder controller
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See List of Advertisers on Page 387

80 Micro, February 1983 • 431
plugs between the computer and any standard-plug recorder, regardless of motor polarity.

The "soft" switch allows pushbutton positioning of tape to start of program without plug pulling, reduces switching noise that can cause "switch hits" on programs, and protects CPU relay contacts from possible early failure. A motor-off delay of about one second eliminates "pinch hits" on the ends of programs caused by capstan/pinch-roller pressure; the delay also automatically puts short silent gaps following saves for easier location of program starts.

Softrol can also be used to computer-switch any other DC load of from five to 15 volts and up to 1.5 amps, with or without the delay-off feature. It is available for $18.99 from Leons Tech Services, P.O. Box 0429, Buffalo, MO 65622, (417) 345-7643.

Reader Service 554

Eeeek! A Mouse!

Micro owners with a flair for tinkering can now put a new input device beside their joystick and light pen—a mouse.

The 3G Micromouse is a pointing device that moves the screen cursor as it is moved on the desk or table top, allowing the same eyes-hand coordination used in writing to direct cursor location. Buttons on the unit's top give commands, such as marking the beginning and end of a line in graphics work or deleting a letter in word processing.

The mouse is still primarily an OEM product, but 3G says that the work of rigging a TRS-80 interface is fairly simple—with one integrated circuit and a few transistors, the mouse's tail is hooked up to the cassette port.


Reader Service 568

Food Co-Op Software

FC/M (Food Co-Op Management System) is a software package for church, civic, educational, or other groups that simplifies the organization and management of co-operatives.

The documentation ($35) gives complete instructions for the setup and operation of a co-op for any size group, and shows you how to write your own program to keep track of the co-op's activities. The complete system includes the FC/M program in Cobol and the Radio Shack Cobol runtime package.

Price is $150 (Model I/III, 5½-inch disk) or $200 (Model II, 8-inch). Purchase of documentation is credited to purchase of the system.

For more information, write Barstrann Corp., P.O. Box 265, Mid City Station, Dayton, OH 45402.

Reader Service 558

Disk Controller Boards

Micro Mainframe (2227 McGregor Ave., Rancho Cordova, CA 95670, (916) 635-3997) offers two floppy-disk controller boards with upgrade kits for the Model III.

The FDC-3B ($79.95) will run 5½-inch drives in both single- and double-density
**Micrococccus** mi kro kok'us, n. a microscopic organism of a round form.

**Microcomputing**, mi' kro kom put ing, n. (Gr. mikros, small, and L. computo, to calculate.) The multi-system monthly journal for computer enthusiasts, containing all the information needed to turn your microcomputer into a powerful machine. Includes dozens of new programs, articles on innovative computer applications, buyer's guides, new programming techniques, accurate reviews of hardware and software, complete coverage of new products, tips on your system's hidden capabilities, hardware modifications, tutorials, utilities, book reviews, industry news. Plus features on computers in business, science, education and games. Written in understandable language by experts in the field of computing. Special emphasis is placed on the Apple, Atari, Commodore, Heath and IBM systems, but not to the exclusion of other systems.

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NEW PRODUCTS

modes. The FDC-3C ($99.95) will also run drives with both single- and double-headed configurations, and allows operation of 8-inch single- and double-density disks using DOSPLUS 3.4/4.0 software.

An installation kit with all cables, brackets, and screws for either is $39.95. A complete upgrade package containing the controller board, installation kit, power supply, and a 40-track drive is available for $349 (FDC-3B) or $369 (FDC-3C).

Reader Service 551

Model II Security

The Locker is a simple, effective, and reversible software extension that protects Model II programs against unauthorized modification or plagiarism, without hardware modifications or complex encryption.

The extension modifies the standard TRSDOS 2.0 operating system and Basic. It requires no additional RAM, disk space, Assembly-language coding, or user calls, and is permanent even through back-up. Your Basic program is not modified in any way; the only visible result is that List and LLIST will not work.

Price is $24.95 from The Management, P.O. Box T, Aledo, TX 76008.

Reader Service 553

DIFFERENT TRACK

A pair of two-dimensional products to introduce this occasional spotlight on unusual or novel items:

Bumperware 1.0 is an adhesive piece of white vinyl with the message "i’d rather be programming" (supports lowercase only) printed on it in red. “Written in the high-level language English,” according to the manufacturer (Opcode Software, 1909½ Vine St., Berkeley, CA 94709). Bumperware is hardware compatible with most automobiles, offices, and programming environments. It is priced at $5N+1 for quantity N, including tax and postage.

The Portable Keyboard is a laminated, 8½ by 11-inch reproduction of a computer keyboard (the TRS-80 is one of many models available), designed for the novice typist or the experienced one who wants to learn the position of special keys. Each key function is explained, so that the user can practice finger-finding without need of a computer or manual.

The keyboard costs $9.95 or two for $18 from Computer Practice Keyboard Co., 616 9th St., Union City, NJ 07087.

Reader Service 563, 564

January’s New Products section gave the wrong area code for Printer Graphist Ltd., makers of a dot-addressable graphics software package. The mailing address is P.O. Box 603, Newport, VT 05855, but the phone is Quebec number (819) 564-7704.
HOW TO USE YOUR EPSON WITHOUT WASTING COMPUTER TIME:

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1. Performance is based on bench mark test in the JAN 1982 issue of BYTE magazine, pg. 54, with LNW80 II as the comparison.
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