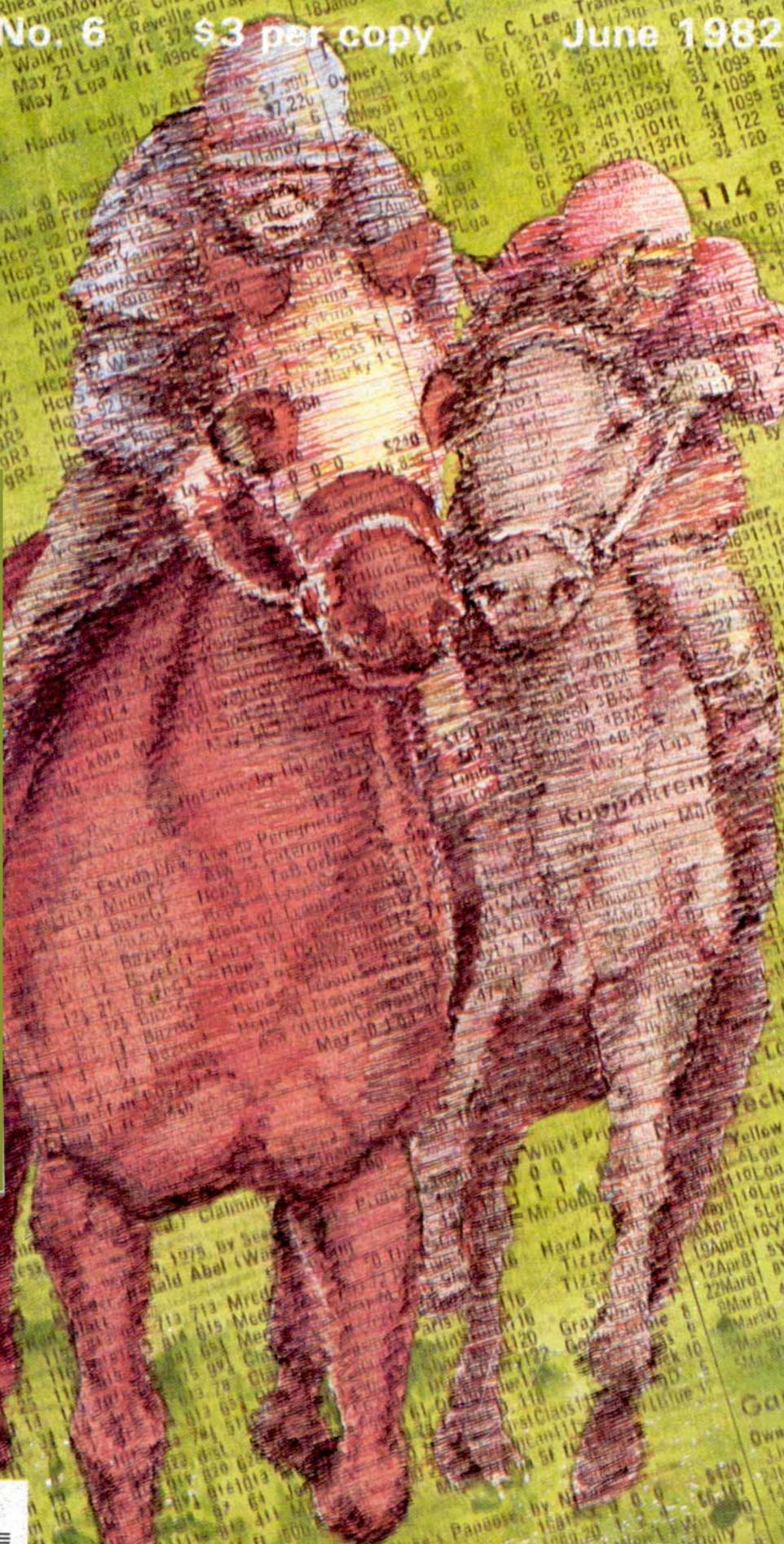


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Vol. V, No. 6 \$3 per copy

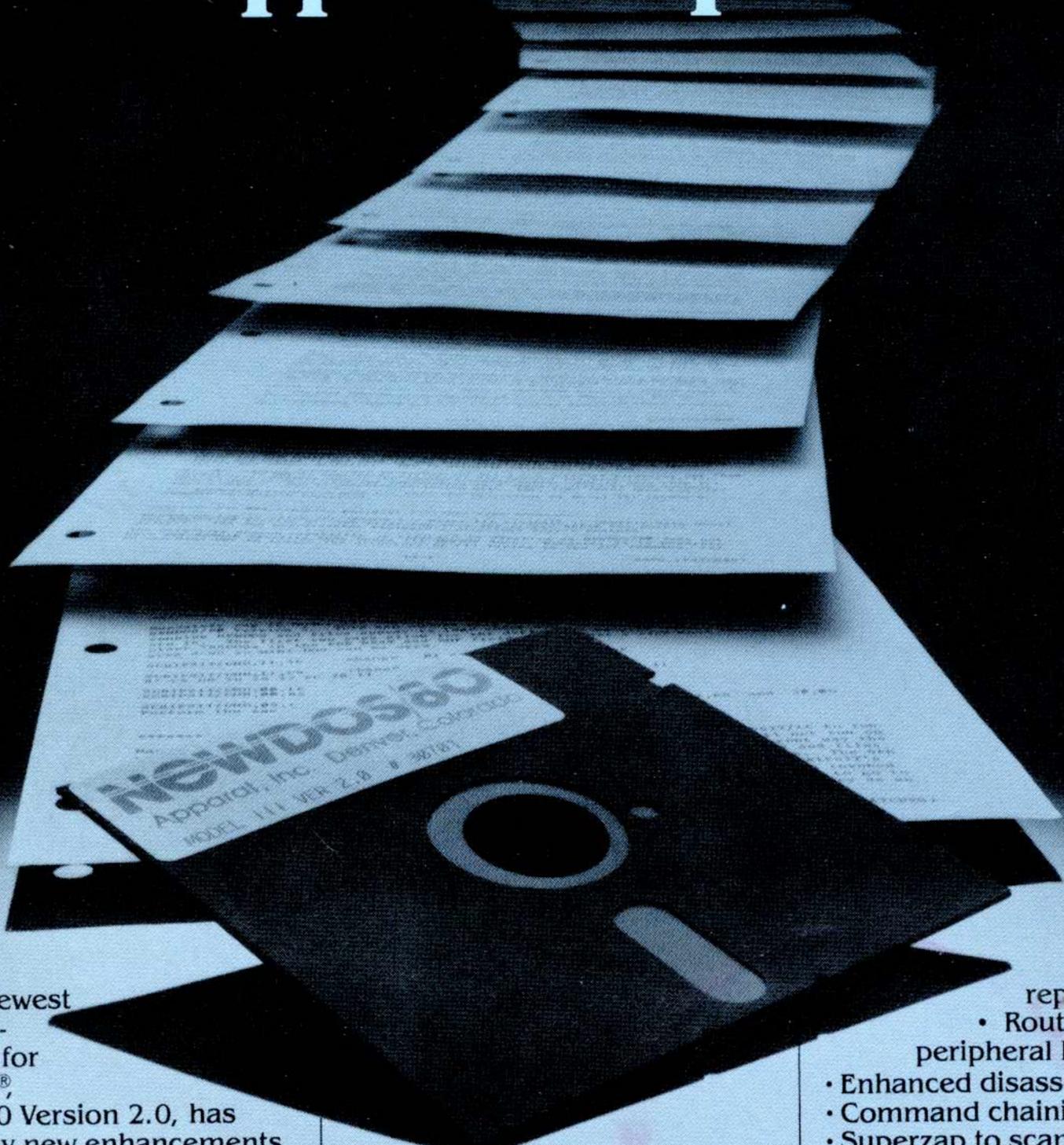
June 1982



Leo Christopherson on games.
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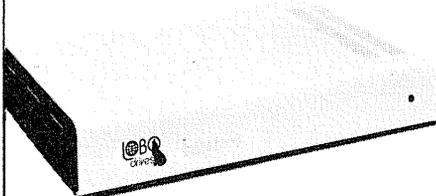
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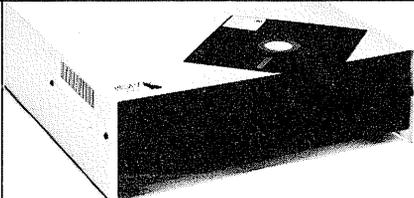
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LDOS includes a powerful extended disk BASIC, smart terminal emulator, and many other useful utilities that make it worth far more than its low price. It runs on any Model I or Model III with at least one disk drive.

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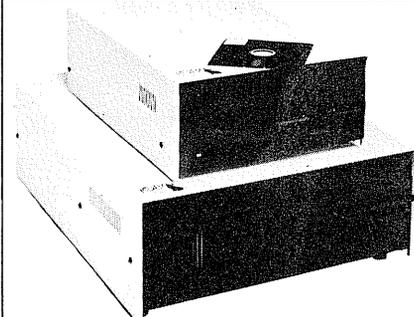
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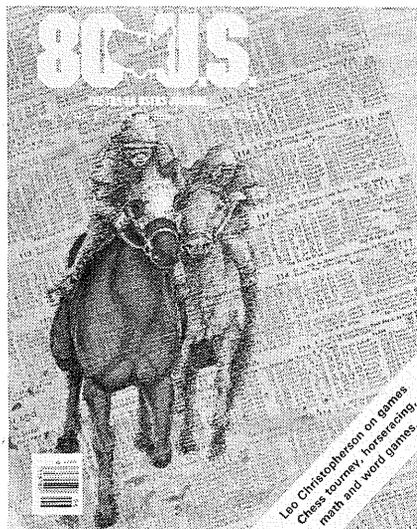
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OUR COVER for this "Game" issue is a Seattle Daily Racing form with the horses and background painted by Pam Galloway, Spokane, Washington.

2 80-U.S. Journal

80-U.S.

THE TRS-80 USERS JOURNAL

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Volume V. Number 6 — June 1982

ARTICLES

The gamester

16

Bob Krotts

The trials and tribulations of a computer game addict.

Sargon II vs. Sfinks 3.0

19

Don Scarberry

A chess game evaluation with the two opponents playing against each other.

A computer carrel

24

Leo B. Christopherson

A spoof of computer games as educational tools.

Dazzle

30

Model I/III

David Leupp

Head-to-head competition for two players in this word game. Requires quick reflexes and fast thinking.

Parimutuel horse race

32

Model I/III and Color Computer Alan Goozner and John Steiner

Use strings of color graphics to simulate horses. Place your bets according to the odds, and take your chances, with the computer deciding "the winner".

Almost a joystick

39

Model I

John T. Phillipp, M.D.

Connect the Atari™ joystick in parallel with Model I arrow keys without interfacing difficulties.

LDOS for beginners

43

Model I/III with disk

T. A. Daneliuk

Part I: Device independence, ROUTE, and LINK commands.

Play ball! 46
Model I/III Larry Krengel
A five minute baseball simulation with printed game sheets.

Robot math 50
Model I/III Jeffrey C. Ruble
An educational math drill for K-4 featuring an animated speaking robot.

Solitaire 57
Model I/III Robert D. Miller
This "Golf" version of the card game uses the computer to shuffle, deal and keep score.

Exploring the Color Computer 62
Color Computer T. R. Dettmann
How to produce sound from a cassette through your television using a BASIC program.

Quirks, fixes, tips and tricks 65
Pocket Computer R. Shane Causer
Every computer has a manual, but all manuals are not created equal. This article fills in some missing information for those not familiar with computer programming.

Checkbook 68
Model I/III J. L. Latham
Part I: Use NEWDOS/80 to write a checkbook management program and find out more about NEWDOS/80 operation.

Menus 75
All models with disk T. R. Dettmann
A sensible approach to building functional menus.

Files and foibles 91
All models T. R. Dettmann
Use binary trees to deal efficiently with large random access files.

ZBASIC 2.0 Compiler 104
Model I/III Jim Klapproth
An evaluation of Simutek Computer Products' latest compiler.

REVIEWS

Polaris 99
Reviewed by Pete Carr

Eliminator 100
Reviewed by Jim Klapproth

Quick Quiz 100
Reviewed by Cameron Brown

Cave Hunter 101
Reviewed by Bob Perez

Telewriter 102
Reviewed by Darrel Wright

DEPARTMENTS

Editorial 4
By Cathy Doud

Letters to the Editor 6, 8

Items at Random 12

Notes 56

@ News 78
By Spencer Hall

Captain 80 95
By Bob Liddil

Tandy Topics 97
By Ed Juge

New Products 106

Unclassified Announcements 112

Advertiser Index 112

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June, 1982 3

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"What does an android look like?" I asked Mike after I'd been doing the typesetting and pasteup at *80-U.S. Journal* for about two months. I needed to know so that I could come up with some catchy art for a program in the February, 1982 issue that featured a tic tac toe grid with little android-like critters in it.

"Haven't you ever seen Android Nim?" Mike asked in amazement.

"No. I've never seen any computer games except one in a restaurant. *I don't play games.*"

Mike took a few minutes right then (in the middle of trying to produce that February issue) to give me my first introduction to computer games.

"Well, I don't play games either... but isn't this clever? Look at the way they *look* at each other... now watch! I know how to win, but I just made a mistake... let's see what happens!"

"We've got a real complicated new game in for review," Mike hinted to me one afternoon a few weeks later. It was Olympic Decathlon, which made a great effort to be realistic in effect. "Come, on Cathy—have a try at it," said Don Scarberry (our Editor), as he nudged me toward the Model III.

"But I don't play games. I've never had the least interest in them!" I tried to be as emphatic as possible, but Mike was standing behind me and said, "Oh, give it a try, just for the heck of it."

I slammed into the wall during the pole vault, plodded along in the running events, scratched in the long jump and went back to what I'd been working on. "But I don't *like* games," I muttered to myself.

It took me weeks of working at *80-U.S.* to realize that the crowd of people in the mail room (after about 4:00 p.m. every night) wasn't jammed around the Model III to find out about subscription information, they were *playing games!* Some nights the participants would even *work* as much as an hour overtime in that room. People wandering into the building late in the afternoon always seemed to disappear behind the mail room door.

Boomp, boomp, boomp, boomp,

boomp, boomp, boomp, giggle, giggle, giggle, boomp, boomp, boomp. I couldn't resist the open doorway to the editor's office and the sight on the screen of the Color Computer. "What's that, Bob?" (Bob is in charge of circulation.)

"Cave Hunters," he said, deep in concentration. Boomp, boomp, boomp, giggle.

Well, that did it. He was using a joystick and it looked like something I could handle. Besides, the game had a cute sound to it. I sat down for my first computer game in the middle of a hair-raisingly busy time in my production schedule.

After half an hour of not giving up that joystick to anyone else, I finally felt guilty and let Eva (our secretary) have a go at it. Pretty soon we were making so much noise that the editor couldn't continue phone conversations in the same room with us, gave us a dirty look that meant settle down, and marched off to the advertising department to continue his phone conversation with New York.

All afternoon, I kept wandering by the open doorway to admire Bob's skill in evading the Cave Creatures. I was hooked, but refused to play again.

We are starting to get some results back on the reader survey that appeared in the April issue, and I asked Mike how those results related to games. A random sample of the results showed that those readers bought approximately the same amount of game programs last year as business programs. I can't imagine *anyone* buying a micro-computer just to play games—those business programs and other *useful* applications were the reason for having the equipment. Amazing! Refined, intelligent people who use computers don't play games.

"It's time for lunch. What do you want?" Maggie (the comptroller) asked just now over my shoulder. Mike said, "Here's ten Pac-Mans. You know what I like."

We've been invaded! They've even got Mike (the Chief). What else (or who else) is left?

"But I don't play games..."

Cathy Doud

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Letters

Your programs appear to be typed by typewriter rather than being copies of actual running programs. This is okay, but it does increase the chance for error on your part. The chance for error on my part remains almost the same either way, but I wish you would consider printing actual copies of running programs.

Please tell me what the symbol \wedge is. This appears in line 80 of the "Payback" program on page 30 of your April 1982 issue...

**Jens E. Larsen, Jr
Cochran, GA**

The symbol your refer to is the caret. On Models I and III this is the same as the up-arrow and mathematically means "to the nth power". The Model II normally uses the caret instead of the up-arrow for exponentiation, as do most other computers. Acutally, it is the Model I and III which are the exception rather than the rule.

As for our program listings: They are actual print-outs of running programs. We list them on a C-Itoh daisy wheel printer, which incidentally, has the caret instead of the up-arrow. We prefer the look and print quality of this printer over that obtained with a dot-matrix printer.
—Ed.

I am a 74-year old subscriber to your magazine which I think is the best for TRS-80 owners. Please keep up the Terry Dettmann series of tutorial articles. I think the ones on arrays are excellent! I like his other articles also. We need (or at least I do) the most basic and complete explanations and examples we can get. So many writers assume the reader is familiar with his subject. If they were, there would be no need for the articles at all! Keep up the good work.

**E. J. Hillstead
Maitland, FL**

I wish to express my professional displeasure at Associate Editor Jim Klaproth's review of Lazy Writer in the March 1982 issue of *80-U.S. Journal*.

My wife and I have been using our
6 80-U.S. Journal

TRS-80 Model I and III microcomputers primarily as word processors for these past two years, and in that time we have struggled with the vagaries and vicissitudes of Electric Pencil, Scripsit and Prosoft. We were on the verge of purchasing two other Z-80 based micros just to have access to other, hopefully better CP/M based word processing programs when we decided to buy one last program — Lazy Writer. Over the past eight months, we have used it almost daily in our work (as syndicated travel writers, for television scripts, on a book, with reviewing, and handling numerous correspondence), and have therefore gained the perspective of experience with Lazy Writer that Klaproth lacks. Lazy Writer is, in our opinion, without exception the best, easiest and most versatile word processing available for the TRS-80. Period.

Naturally Lazy Writer is not perfect! I am occasionally frustrated by certain limitations that appear as our text requirements become more and more sophisticated. But what makes Lazy Writer superb is the responsive, personalized support that the Walshes and ABC Sales make to improve their product. Many times I have written or telephoned with queries, comments and criticisms, which have all been helpfully answered. What's more, a number of our suggestions and needs have been in fact incorporated into Lazy Writer updates. It's like having one's own personal programmer on tap. Lazy Writer functions so well for us that when we recently purchased a pair of more reliable and powerful micros to handle all of our work, we opted for LNW-80s just to be able to use this particular word processing program. (Theresa Walsh just wrote to me to say that they are working on a CP/M version of Lazy Writer that should be completed by June.)

As for Klaproth's opinion that the Lazy Writer documentation is only "fair", let me state with the authority of a member of the National Book Critics Circle and a former book editor for a major magazine that Theresa Walsh's manual is one of the more lucid, digestible and usable pieces of computer documentation written. Most computer documentation is utterly incompre-

hensible, exceedingly dry and totally useless without long and learned study and experimentation, but we were able to follow Lazy Writer instructions step by step the first time we initialized. Klaproth's criticism about specific printer documentation and support was premature nitpicking since Lazy Writer announced, produced and mailed out modules and additional documentation making use of several popular printers' capabilities nearly three months before the review was published. I know magazines work with substantial lead time between the writing and printing of an article, but there was sufficient time for you to verify and update your data before going to press.

Incidentally, this letter is being printed with the new Line Printer IV proportional spacing module. Until now, we have used this particular printer only for billing, labels and data processing, but the Lazy Writer module works so well that we are beginning to use it for some correspondence.

I hope that in future Jim Klaproth's software reviews will be more responsible and less subjective. Perhaps it would be a better editorial policy to assign such reviews to a user, rather than a critic, for a more accurate and objective analysis and evaluation. Thank you.

**Daniel Grotta; Writer
Boyetown, PA**

Thank you for your recent letter in regard to my review of Lazy Writer. I always welcome contrasting opinions and comments. My intention certainly was not to offend anyone who is currently using this excellent word processor. As a writer, I'm sure you realize that nothing one writes can be 100% objective. We as humans, are constantly making comparisons against similar known objects and standards. In the case of Lazy Writer, I used Scripsit and Newsprint as reference points to guide my overall impression of Lazy Writer. You, yourself, in your letter showed your lack of objectivity when you expressed your distaste for the other three word processors and your overwhelming support for Lazy Writer.

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Letters

One of the objectives of my reviews is to point out to prospective buyers that any particular product may not be suitable for all users. Obviously, *Lazy Writer* fit your needs quite adequately; but, at the time of the review, mine were not met. We were never informed, and I have yet to see anything officially in print, that a proportional spacing module is available for the *Line Printer IV*. Perhaps now that this module is available, I may begin to use *Lazy Writer* more frequently. However, after considering the price difference between *Lazy Writer* and *Newsprint* (which had *Line Printer IV* support all along), and the features of both, I would still personally choose to buy *Newsprint*. However, I would be the last one to recommend *Newsprint* to everyone.

As for the documentation, I personally found the content too brief and lacking in example and detail — attributes that you find appealing. The packaging of the Model I version in a 25-cent file folder and the use of a non-proportional printer to print the manual left a lot to be desired considering the premium price commanded by *Lazy Writer*. Perhaps this was nitpicking; but, the prospective buyer should be aware of these items.

Again, I thank you for your constructive comments on my review and hope you will feel free to comment on future *80-U.S.* articles. — *Jim Klaproth*

I wish to congratulate Chuck Tesler for having written what I consider to be tops in the word processing field: *Newsprint*, which I recently purchased from Prosoft after reading the review in the February 1982 edition of *80-U.S. Journal*. Of the numerous word processing programs I've used on my TRS-80 Model III — and they've been many — *Newsprint* by far outpaces the others. I make my living writing, and a good living it is...so every bit of electronic help I can get is appreciated.

Newsprint gives excellent software assistance, particularly in my case. Of course, I would honestly say this under any circumstances. As it is however, I work under a bit of a handicap — and therefore can add emphasis to my praise for Chuck's

program. I have only one hand to use on my computer keyboard.

This limitation has severely impeded my use of many facets of other programs. In *Scriptsit*, for example, try spanning the keyboard from the control key "@" to "S" to insert a left-out word or letter, using one hand. Impossible. I have a rather large hand and I can't even come close. So a rewrite of a line—or sometimes an entire paragraph—is necessary. Aggravating! And, in my case, reducing *Scriptsit*'s usability, not only in the insert function but in many others where the required handsman isn't feasible.

However, with *Newsprint*, I find only one case where I encounter the above roadblock...and that's the deletion function. No way can I reach across the space between the CLEAR key and the "D" to delete whatever needs to go. So I do it the hard way.

And this I can live with. The ease of the rest of the program more than makes up for this lone shortcoming. ...Pass along my word of thanks to Chuck. *Meaningfully*. He's made my work a lot easier!

Walt Crede
Des Moines, IA

While reading the reviews in the April 1982 issue of *80-U.S.* I noted the information reported by Thomas Dowd regarding the paper tractor he purchased for his MX-80 printer. I too, have an MX-80 printer and although mine is an F-T model with both feeds available, I had problems when I wanted to use small sheets or when I wished to fill a sheet close to the bottom. I am sure that the problem could be circumvented by programming but I looked for a simple solution since I use fan-fold or roll paper for most of my printing.

I found a device called a *Paper Porter* which is similar to the device described by Mr. Dowd. There is, however, a considerable difference. The price on my *Paper Porter* was \$4.50 including shipping anywhere in the continental U.S. when purchased in single lots and \$3.25 in lots of five. The source for these devices is: Beeline Services, 211 East Allegan Street, Otsego, Michigan 49078.

It doesn't seem to me that the device Mr. Dowd purchased for \$23.00 could be that much better so this letter will give your readers, with similar problems, an alternate source for a single sheet tractor.

Incidentally, the *Paper Porter* holds the sheets at the top, which allows me to leave my LPRINTTAB in my word processing program alone and only change the line length in *FORMAT* mode when using smaller paper sheets.

Larry Meehan
Bremerton, WA

I wanted to send you this short note to tell you how much I enjoy your fine magazine. You really hit the jackpot with the February 1982 issue. Keep those BASIC programs for Model I coming. Also, Jim Perry's excellent @NEWS column is my only source of what is happening at Exatron. Best wishes...

James Thompson
Lake Park, FL

There has been a change in writers of the @NEWS column. During the switchover, we missed an installment in the May, 1982 issue. Jim Perry's time is being utilized fully at Exatron, and Spencer Hall has taken over the column. If you have been following the articles in *80-U.S.* with any regularity, you will have noted that Spencer is an avid *Stringy Floppy* fan and his first contribution to the column (in this issue) displays his enthusiasm. — Ed.

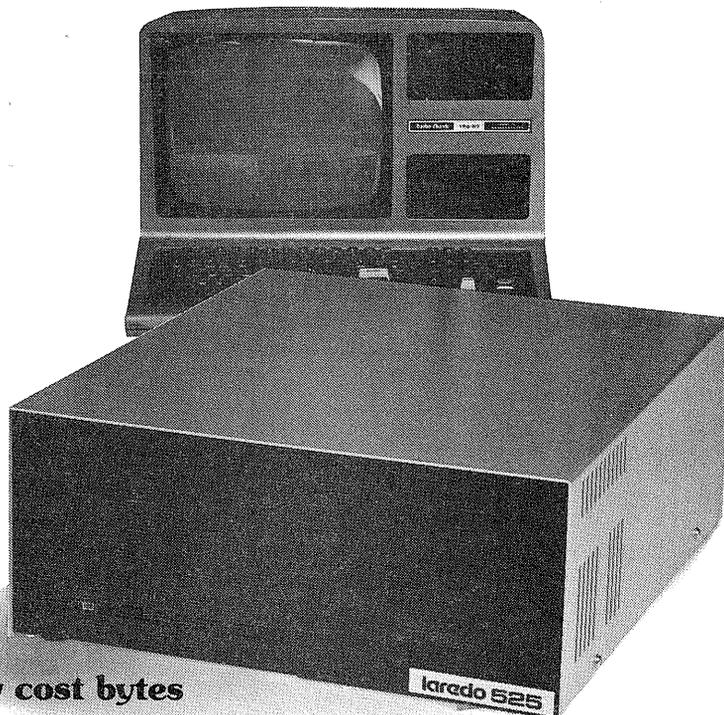
Those calculations by James King were good! (*Double precision function routines*, James E. King, *80-U.S.* February 1982). But Dettmann is best time after time. The medical issue (March 1982) was good, but when Dettmann is on the cover — well, he should always wear a jacket and tie!

If you're in computing and serious, you're crazy; but at least I can prove I read *80-U.S.*. It is good! Thank you.

F. J. Eshlohm
Swedum
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Guilty as charged. — Ed.

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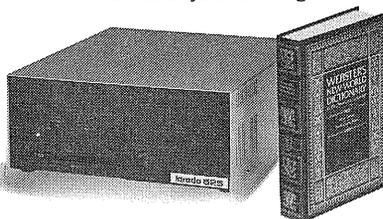
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By Brian Howarth

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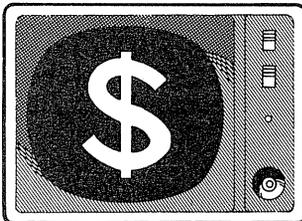
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By Andrew Bartorillo

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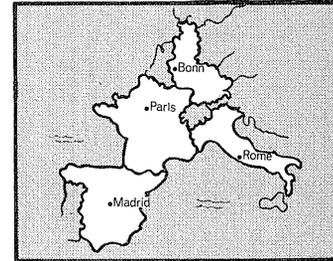


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By Chuck Acree

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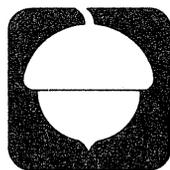
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By Cindy & Andrew Bartorillo

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Items at random

This issue marks the first half-year of *80-U.S. Journal* as a monthly. Talk about time flying when you are having fun! It seems that everyone around here is going at 150 mph instead of the usual 110. But how did we make the transition?

In some ways it was much easier than any of us anticipated. Everyone said "sure I can", and they did. But after about three or four issues it was apparent that even though they all could, it was next to impossible to ask everyone to keep up a pace at something more than full capacity. No time out for vacation or sick leave. So, going monthly clearly called for a couple of new people to ease the workload.

One of those new people is Sherry Miksell, who brought with her several years in typesetting and production. Cathy Doud and Sherry are now the production department. The fact that Cathy wrote the editorial for this issue shows what happens when everyone is too busy! (You don't really believe that everyone around here plays games — do you?)

Helene Dalton has joined us and has the position of accountant. The days of balancing the checkbook and paying the bills in 30 minutes are long gone. We have actually grown to the point where a full-time accountant is required.

Cameron Brown, who has been a reviewer (and chief proofreader) on a part-time basis for the past couple of years, has now come on full-time as an editor.

To find the physical space for these new people, we have converted one-half of our warehouse space into office space. The building is in progress while I write this (in April), and should be done by the time you read it.

We welcome these new people, and hope their stay with us will be pleasant and rewarding.

Corrections

In our April 1982 issue we published a review of *Berserk* submitted by author Roy Seney. He purchased his version from Microworks and listed this company as the source of the product. While Microworks is definitely a source, they are not the originators of the program. The original source should have been listed as Mark Data Products, 23802 Barquilla, Mission Viejo, CA 92691, Phone (714) 768-1551.

Also in the April 1982 issue, the article Vitamin BB by Negley Monet, says that BIONIC BASIC is for Models I and III. This is not true at all according to author Monet. BIONIC BASIC is for Model I only.

In our March 1982 issue we published an article called "JKL Patch" by John T. Phillipp, M.D. Dr. John has written us to say that you must be careful when choosing the correct listing to use. Listing 1 is designed to be used with the 35-track NEWDOS 2.1, but *not* the 40-track version. Listing 2 will work with NEWDOS 2.1, 35 or 40-track version as well as with NEWDOS80 1.0. You can use listing 2 and not have to worry about whether or not you have 35 or 40 track drives.

In this issue

This issue is devoted almost entirely to games. We figured that with summer on its way, and more leisure time available, games would be an appropriate topic.

The trials and tribulations of a computer game addict are spelled out by Bob Krotts in an article entitled "The gamester".

Shades of the old *Personal Computing* magazine return once again with Don Scarberry's chess tournament between Sargon II and Sflinks 3.0. Our typesetter even has those little chessmen in it so we could print authentic boards! I chuckled all the way through this one during proofing. It's definitely Don at his best!

Leo Christopherson took time out of his busy schedule to write a spoof on games as educational tools. Leo ought to know, he is a school teacher. It's called "A computer carrel. Before you run off to your dictionary, a carrel is a small work space.

Dazzle is a rather long, but good, fast-action, two player word game with sound. It was written by David Leupp of Dayton, Ohio and made the rounds in our office quite well before we set it to print.

A simulated horse race is presented by Alan Gozner and John Steiner. It's for the Model I, III and Color Computer. No, you can't take it to the race track, but you can bring the race track to you.

John T. Phillipp tells us how to interface Atari joysticks to the TRS-80 for better control of games. Tim Daneliuk starts a two-parter on LDOS for beginners and Larry Krengel presents a computer baseball game. There is a robot math program by Jeffrey C. Ruble, "Golf Solitaire" by Robert D. Miller and Associate Editor Dettmann hits three times this issue with "Exploring the Color Computer", "Files and Foibles" and in Basically BASIC, "Menus".

R. Shane Causer gives us Quirks, fixes, tips and tricks for the Pocket Computer and J. L. Latham starts a series on using NEWDOS/80 to write a checkbook program.

Spencer Hall has taken over the @NEWS column and tells about the new Stringy Floppy for the Model III among other things.

There's also Tandy Topics, Captain 80 and a bunch of reviews to consider. All in all, a very fun issue to put together and we hope you enjoy it.

Remember that nice days are *made* not had! Tell them all that you saw it in *80-U.S. Journal!*

Mike

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June, 1982 13

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

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

Uh...three legends.

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

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

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

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ABCDEF GHI JKLMN abcdefghijklmn ABCDEF GHI JKLMN abcdefghijklmn 01234
ABCDEF GHI JKLMN abcdefghijklmn ABCDEF GHI JKLMN abcdefghijklmn 01234
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The gamester

The trials and tribulations of a computer game addict

Bob Krotts, Kettering, OH

I am an addict—a computer addict. There is no drug that is capable of causing the dependency that I have on my TRS-80 Model III computer. It follows me to work and home daily. The power plugs are becoming worn due to constantly pulling them out of electrical receptacles every time I change the location of the computer. On occasion, my very understanding wife (with a tear in her eye and memories of the past) has gently removed the console from the bedside where I had fallen asleep from computer exhaustion.

I could care less about business programs—I love games—all types of games—adventure, arcade, graphic—any and all that require cunning, deduction, or practice, to master. During the past year that I have had my computer, I have accumulated over a hundred such programs and, hopefully, there is no end in sight!

I first realized how hooked I was when I noticed that all of the toll-free order numbers of the major software companies were etched in permanent memory. I began to mentally calculate when the next catalog from different sources would arrive at my doorstep. I even felt a hollow feeling in my stomach when a major computer magazine—like *80-U.S. Journal*—would arrive even a day late in the mail! I have been known to telephone individuals in the software business all over the country just to see if there are any good new games that are available but not yet in the catalogs and magazine ads.

I would like to devote this column

to giving helpful hints to the thousands of other game players throughout the world. Believe me, these hints are from the voice of experience!

How many times have you found yourself hunched over your computer console in the middle of the night—*totally stuck* at some point in an adventure-type game? Your mind refuses to accept defeat from this inanimate object and, subsequently, you refuse to get up and admit to yourself that you are stuck. To make matters worse, if a friend just happens to stop by, glance at the game, and suggest something really simple that *works* . . . you would really feel bad, right?

The solution is simplicity itself. Get up! Force yourself to leave the game for at least half an hour and do something entirely different (get a drink, take a short walk, etc.). *Then* return to the computer game. At this time, your mind will have forgotten some of the repetitive moves you performed which took you to this dead-end method of reasoning. Hopefully, you will try something new and different—and it should work!

Have you ever noticed that (upon attempting a game you gave up on the day before) you have been able to return to it and discover something really *simple* that you overlooked previously? My nickname for this syndrome is *computer burn-out*. Try my solution. If you try it and it doesn't work (and your friend *still* walks over and gives you a quick and easy solution), then either punch out your friend for being so smart, or toss a brick through the

screen! Seriously, though, all games on the market *must* have a solution. Don't be afraid to try something far-fetched or unusual—it may just be the clincher that you need to get out of your predicament!

Do you *laugh* at people who always make a *location map* while playing *adventures*? You have a *superb* memory and don't need simple maps—right? That might be the reason that you find yourself stuck in mazes or similar locations that suddenly pop up during the game. If two or more locations are outwardly identical—yet only *one* has (or can do) what you need, chances are that you will miss the difference and/or presume something to be true that is not.

Teleportations are becoming popular in various games (where the player is sent from one location to another), and often the gimmick is that both locations are *identical* in appearance! It really doesn't take very long to sketch a brief map, and it may save *hours* of frustration later in the game.

Once you have successfully completed a challenging game, you will find yourself basking in a happy glow of contentment. Your mind will then ask, "What next?". Before you try another game, (please) replay the same game and jot down in a notebook the places you had trouble, as well as the solution. You will be surprised just how easy it is to forget some of your moves. It can be extremely embarrassing if you tell a friend that you completed a game and, when he asks you the solution to a minor problem, you are unable to

reply. Of course, you can always act a bit snotty and tell him that *you* didn't need any help, but if he is *really stuck* and needs help, he will not appreciate your attitude.

Many programs have a *save game* feature that can be very handy. One of my favorite games, distributed by Adventure International, is called Galactic Empire. This particular "thinking man's game", has a different random setup every time it is played. Not only is it different—it can range from darn near impossible to reasonably challenging.

I took advantage of the save game feature. I made a backup copy of this CLOAD game, ran the program, and kept playing it until I found a beginning setup that I liked. Immediately following the backup copy, I recorded the saved game. In this manner, the program can be loaded, then easily reloaded (fresh, or at the position I saved) in the game.

It also can't hurt to save the game at least twice, since occasionally, you may get a bad load on the saved portion of your tape. However, if a bad load still runs, you can occasionally find yourself in very interesting situations that can be more fun than the original!

My philosophy is that—given enough time—any adventure-type game can be solved. However, most people become impatient and frustrated if they cannot find the solution after many serious attempts. Software companies are aware of this and—rather than be bothered by questions over the telephone—they came out with *hint sheets* for sale! Hint sheets are usually exactly that: just hints—not the solution! The sheets suggest a course of action that may indirectly give the answer or aid in the reasoning of some of the major problems to be found in the game. Remember, though, that some people still may not get the hint. In fact, some of the really tough and challenging games almost need a hint sheet for the hint sheet! Perhaps, after certain games have been available for a year or so, we may find complete *solution sheets* for sale some day.

Many of us have been known to sit at our sacred computer for hours



playing various arcade games. You can almost bet that every good arcade game is (or very soon will be) available for the home computer. It may not be exactly the same, but it usually is close enough!

I would like to make a prediction. The Gamester predicts that (during the next year) the original arcade game manufacturers are going to do their best to put a halt to similar unauthorized home computer programs. Subsequently, I believe that (unless agreements are made concerning royalties) sooner or later, many games that are almost the same will no longer be available legally to the general public. However, the *benefit* should outweigh the *loss* in the long run. Software authors will have to become more imaginative in creating original arcade games—and we should soon expect some really fantastic games!

Has it ever bothered you that a game will accept over a hundred words that it has in its vocabulary—but you are not told *what* words? If you are logical in your thinking, it will make sense.

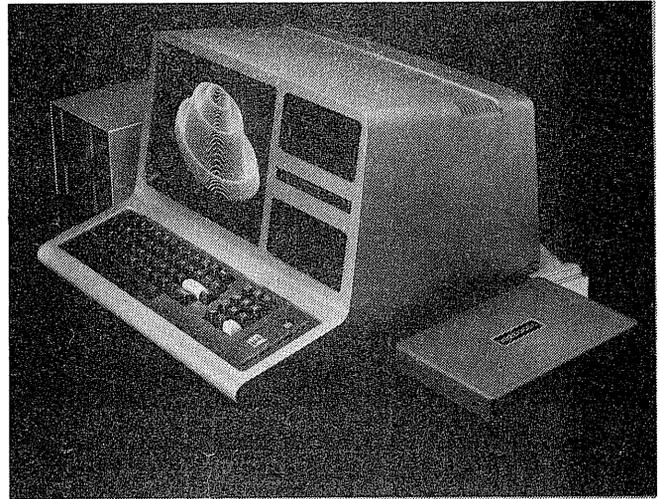
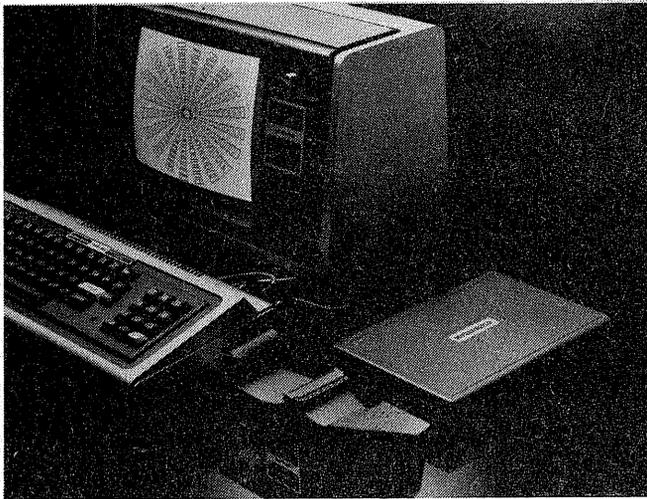
During the game, different locations are shown, and various

objects can be carried and/or used. Usually, the object is used as expected. For example: keys open doors, shovels can dig, etc. However, the more interesting games allow objects to be used in other ways. For instance, if you have a locked cabinet with hinges that are screwed in, and you *don't* have a screwdriver or key, try something else. Perhaps a coin or I.D. card in your possession will unscrew the hinges. Maybe you can pick the lock with a pin. If common sense doesn't seem to do the job—use your imagination. After all, *something* will work. Also, remember that occasionally, an object is inserted in the game that has absolutely *nothing* to do with your actions and *never* will be needed to complete the game. It is simply there to confuse you.

I sincerely hope that I have been of some assistance to my fellow game players. Games are becoming extremely diversified in category and method of play—so keep your eyes out for some really good stuff coming our way!

Remember: as long as there are games for the computer, there will always be The Gamester! ■

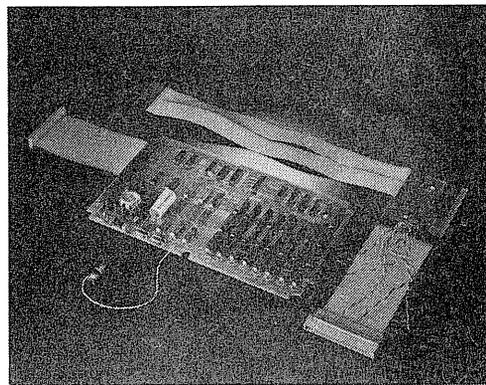
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Sargon II vs. Sfinks 3.0

Chess tournament

Don Scarberry, Editor

The title of the ad read "Prize Winning Chess". There was a small profile of the Sphinx of Egypt just to the left of the title. The ad continued: SFINKS 3.0 (new) — "Prize winner in Paris in the 1981 Microcomputer Chess Championship; Sfinks 3.0 is the fastest and strongest chess program ever written.

These seemed like awfully strong words for the small, inconspicuous advertisement I'd seen while browsing through a recent issue of *80-U.S. Journal*. At any rate, the ad did its job. I was definitely interested! I wanted to see if the claims were justifiable, so I immediately solicited a Model III disk version for review purposes.

In the days when the Model I was popular, I had followed the success of Sargon, and the later Sargon II. Sargon was a very popular chess game. It wasn't superb, but it was one of the best around at the time. What better way to review a new chess game, especially one that boasts being the fastest and strongest chess program ever written, than to have it compete in a tournament with a formidable oppo-

nent—Sargon II? I scheduled a tournament.

The stage was set. Sfinks would be played on a new Model III TRS-80, and Sargon II would be played using an older Model I. Both machines contained dual disks and 48K of RAM. Sfinks had somewhat of a hardware advantage, however. It requested to have a printer and small audio amplifier installed before it would commence with the tournament.

I checked the rule book (Sfinks' documentation) and sure enough, after each pair of moves, Sfinks would provide a printout if a printer was attached. It would also provide us with an audible indication of each of its moves if connected to an audio amplifier. This guy was prepared to play chess!

The Tournament

Both opponents would battle it out in my recreation room while seated face-to-face on parallel tables. I was to mediate (be a key punch operator for) a chess tournament consisting of three games.

Sfinks was to my left—Sargon II

to my right. I went through some sophisticated mental calisthenics in order to determine which of the two players would start with white. Sargon II won the coin toss and Sfinks became the underdog by having to settle for black.

A major problem was determining which levels of difficulty to select for each player. Sargon II contains six levels, while Sfinks offers nine (see the table of response time for Sfinks later in the article). I chose level two for Sargon and reflected a bit about my choice for Sfinks. Sfinks sort of reminded me of Muhammed Ali. You know — high spirited and cocky. I decided that since he had made such brash claims in the advertisement, he ought to start at level two also. He just wouldn't be able to think about his moves as long as Sargon. Besides, no one was looking.

I fired up the machines, answered all of the prompts, and the first game was quickly underway. The ice was broken, and a chilly quiet settled over the room.

Sargon moved immediately D2-D4. Sfinks, just as quickly, replied with D7-D5. All of a sudden, the

Software evaluation

silence was shattered by what sounded like a Bantam rooster suffering from a lack of male hormones! I shot up from my place, fell backward over my chair and crashed into the wall.

As I slithered to the floor, I remembered the little amplifier that Sfinks uses to alert his opponent after each move. I had inadvertently turned the volume all the way up. After regaining my keypunching composure, I cursed my way back to my seat. "Loud mouthed son of a . . . (gun)!"

I punched Sfinks' move into Sargon's keyboard, and the game was on again. The first four moves were swift and to the point.

Game Number One

	Sargon	Sfinks
	-----	-----
1.	D2-D4	D7-D5
2.	C2-C4	C7-C6
3.	G1-F3	G8-F6
4.	B1-A3	E7-E6

Sfinks seemingly becomes the aggressor on move five, and takes Sargon's knight:

5.	E2-E3	F8-A3
----	-------	-------

Sargon, not to be outdone, replies on move six by capturing a bishop. Sfinks evidently senses a battle and castles early:

6.	B2-A3	E8-G8
----	-------	-------

Sargon replies

7.	F1-D3	-----
----	-------	-------

But Sfinks begins to get real pushy with:

7.	-----	D8-A5+
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and puts Sargon in check. After:

8.	D1-D2	A5-D2+
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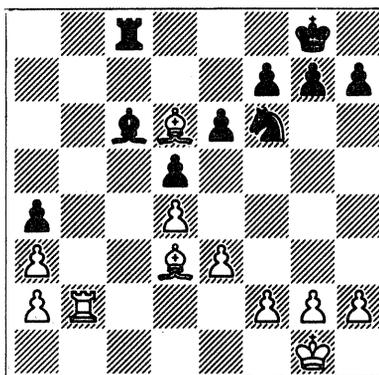
Sfinks has forced a queen swap and threatened Sargon's king again. A short verse began to run through my head: "Fly like a butterfly, sting like a bee."

Sargon manages to escape the ravages of Sfinks, and the game becomes a battle for position and control until move 18.

9.	C1-D2	B8-D7
10.	D2-B4	F8-E8
11.	E1-G1	B7-B6
12.	C4-D5	C6-D5
13.	A1-C1	C8-B7
14.	C1-C7	A8-B8
15.	F1-C1	A7-A6
16.	B4-D6	E8-C8
17.	C1-B1	A6-A5
18.	F3-E5	D7-E5

Sfinks appears to be in trouble, but continues.

19.	D6-E5	C8-C7
20.	E5-C7	B8-C8
21.	C7-B6	A5-A4
22.	B6-C5	B7-C6
23.	B1-B2	F6-D7
24.	C5-D6	D7-F6



After move 24:
Sargon C5-D6
Sfinks D7-F6

At this point, Sargon seems to have overcome his initial shock over Sfinks' opening aggressiveness, and regains precious position as witnessed by the next moves.

25.	B2-C2	C6-B7
26.	D6-C7	G8-F8

Sargon is now on the attack:

27.	C7-D6+	-----
-----	--------	-------

but Sfinks replies:

27.	-----	F8-G8
-----	-------	-------

and the battle continues uneventfully for a while.

28.	D6-C7	G8-F8
29.	F2-F3	F8-E7
30.	G1-F2	F6-E8
31.	C7-E5	H7-H6
32.	C2-B2	B7-C6

33.	B2-C2	E7-D7
34.	D3-A6	C8-A8
35.	A6-D3	F7-F6
36.	E5-F4	E8-D6
37.	F2-G3	A8-B8
38.	H2-H3	B8-B7
39.	H3-H4	G7-G5
40.	H4-G5	H6-G5
41.	F4-D6	D7-D6
42.	G3-G4	C6-E8
43.	G2-G3	E8-C6
44.	D3-G6	B7-B8
45.	G6-D3	B8-H8
46.	F3-F4	G5-F4
47.	G3-F4	H8-G8+
48.	G4-F3	G8-G7
49.	F4-F5	E6-F5
50.	F3-F4	G7-C7
51.	F4-F5	C6-B5

Sfinks is again in trouble.

51. ----- C6-B5 seems like a bad move, but Sargon fails to take advantage of it.

52.	C2-D2	B5-D3+
53.	D2-D3	D6-E7
54.	E3-E4	D5-E4
55.	D3-E3	C7-C2
56.	E3-E4	E7-F7
57.	D4-D5	C2-D2
58.	E4-A4	D2-D5+

Sargon captures another pawn and Sfinks' game seems almost hopeless at this point.

59.	F5-E4	D5-D2
60.	E4-F3	D2-A2

Wait! All is not lost! Sfinks seems to have equalized the game. The excitement begins.

61.	F3-E4	F7-G6
62.	A4-A5	A2-F2
63.	A5-C5	F6-F5+

Sfinks is now on the attack and is very much the aggressor.

64.	E4-E3	F2-A2
65.	E3-F4	A2-F2+
66.	F4-E3	F2-A2
67.	C5-C3	G6-G5
68.	E3-D4	F5-F4
69.	C3-C5+	G5-G4
70.	C5-C3	F4-F3

With:

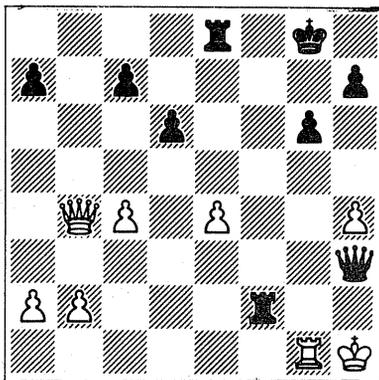
71.	C3-E3	F3-F2
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it is obvious that Sfinks is after a queen.

Software evaluation

15.	D1-D2	A8-E8
16.	E2-D3	F6-C3
17.	C1-C3	C6-B4
18.	D5-B7	G4-F3
19.	B7-B4	E7-G5
20.	D3-F1	G5-D2
21.	G2-F3	F7-F3
22.	G1-H1	D2-E1
23.	H2-H4	F3-F2
24.	C3-G3	E1-F1+
25.	G3-G1	F1-H3+

Checkmate



After move 25:
Sargon G3-G1
Sfinks F1-H3 Checkmate!

This final game was decisive. Sfinks again crushes Sargon. Time permitting, I would have preferred to set both computers at their highest levels and let them battle it out. Things might be a little different under these circumstances, but, quite frankly, I don't see how. As far as this tournament is concerned, Sfinks demonstrated superior performance. I thoroughly enjoyed watching Sfinks as he demonstrated human-like chess playing ability.

I lit a cigarette and sat back to rest for a moment as I reflected on the outcome of these events. I haven't enjoyed myself this thoroughly in a long time. Both monitors sat quietly watching my actions. I reached over, pulled the diskettes from the drives, and laid them to the side. A sparkle coming from the direction of Sargon's monitor caught my eye. Poor thing. I pulled a handkerchief from my pocket, reached over and dabbed the small drop of moisture that had accumulated in the corner of the video screen. It couldn't be... could it?

A Look at Sfinks 3.0

Now, for a little background on

Sfinks 3.0. The program is available on cassette or disk and requires 32K of memory. Documentation is provided which consists of five pages of instructions. This might seem rather skimpy at first, but not so. The instructions are simple, concise, and explain everything you need to know to get into trouble on the chess board.

Sfinks 3.0 will play at levels from one to nine. Each level of play represents the maximum response time of the computer. Below, is a table which lists those times:

Level	Max. Response Time
1	..... 6 seconds
2	..... 20 seconds
3	..... 50 seconds
4	..... 1 min. 10 seconds
5	..... 1 min. 50 seconds
6	..... 2 min. 14 seconds
7	..... 2 min. 50 seconds
8	..... 3 min. 50 seconds
9	..... unlimited

After selecting the level of play, a crystal clear representation of a chess board will be displayed, complete with chess pieces. The graphics used to represent each piece are very nicely done considering the limitations of the Model III. The screen not only displays a chess board, but virtually all other information you will need which pertains to the game.

In the upper left corner is the level chosen, while in the lower left, a digital clock (you didn't expect one with hands, did you?) displays the seconds, minutes and hours of each move. The space along the left side of the screen will display all of the moves up to the most current. When the number of moves exceeds the display capacity, they are scrolled upward without interfering with any other displayed information.

Entering moves into the computer is a snap. To enter the move P-K4 for white, press E2 and E4 in succession, without the hyphen. The hyphen is needed, but Sfinks enters it for you. This feature will save a lot of extra keystrokes during the course of a game. If you wish to correct an entry before the ENTER key is depressed, you may change it after first pressing the CLEAR key. If an illegal move is made, Sfinks will display "ERROR" and allow

you to reenter a correct one.

During a game, Sfinks will let you know he is thinking by blinking an asterisk near the left of the screen. He also keeps you informed of the best move presently being considered and as better moves are discovered, the display will be updated. He will continue updating the moves under consideration until a "best" move is found, and then move the appropriate piece on the board. An additional feature allows you to stop Sfinks at any point during his analysis, and respond with a move.

If you are using the audio alert, Sfinks will audibly indicate each of his moves as they occur. Simultaneously, if you have a printer connected, Sfinks will print each pair of moves for later scrutiny. This feature saved me much time in preparing this article. The printout is excellent for post game analysis.

If Sfinks is checking your king, he will display a + after his move. If he has no legal move, he will respond with, "I LOSE". I never got to see this feature, however, since I only play average (my average) chess.

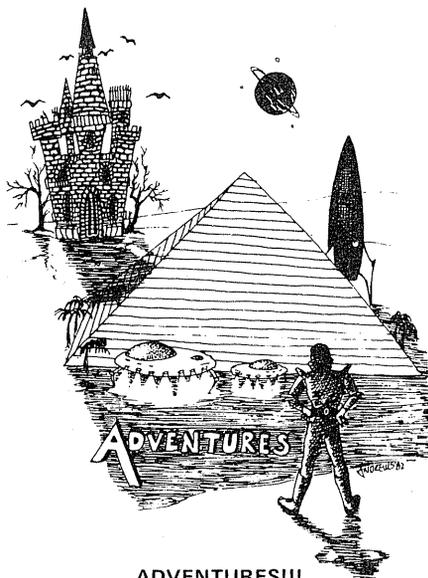
At times, if Sfinks can checkmate you, he will indicate his intention several moves prior to the actual mate. Was I shocked during a game when I saw the words "Checkmate in 2" appear on the screen! You never saw anyone perk up so fast in all your life! Sfinks can also detect a "drawn" game.

A handy feature for novice chess players is the "HELP" feature. Simply type S and Sfinks will usually suggest a move, if he can. To play a move other than the one suggested, simply remove the suggestion by depressing the CLEAR key and enter the desired move.

Herein lies much of the power of Sfinks as a formidable chess opponent. After he moves and is waiting for your response, the little asterisk doesn't stop blinking. As you are contemplating a move, Sfinks tries to anticipate what it will be. Sfinks thinks while you think! ■

Sfinks 3.0 is available from William A. Fink, P.O. Box 5912, Lighthouse Point, FL 33074, (305) 942-5706, \$39.95 for either version (cassette or disk).

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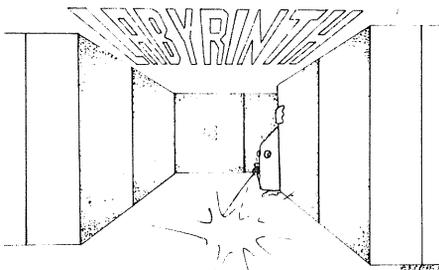
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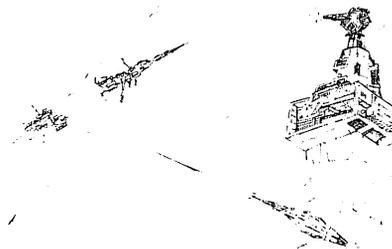
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OSI

A computer carrel

A spoof of games as educational tools

Leo B. Christopherson, Tacoma, WA

The Start of It

Mr. Skrushon looked up from his desk to see that Tom Higgins was on his way up to talk to him. "Here we go again," he thought, "He's come up with yet another idea designed to let him get out of doing his work properly."

"Excuse me, Mr. Skrushson," the boy began, eyes lit up with excitement, "but you know that sort problem you gave us to do? Well, I think maybe I've found a way to do that job faster!"

Skrushson sighed. What was this kid doing in his class, anyway? He should be in Krashet's instead. Those two really deserve each other.

As patiently as possible, Skrushson asked, "Tom, does your method use the bubble sort I explained to the class? Or are you off into some other area we're not studying yet?"

"Well, sir, I just thought that I had found a better way to do it, is all," Tom replied.

"All right, let me explain this to you one more time, Tom," he began. "You are here to learn good, solid programming methods. You are to do the work the way I specify because until you know the basics, you won't have a complete enough background in computers to compete with other programmers who do have that background. Though you don't recognize it yet, this work really is for your own good."

"And another thing, Tom," he went on, "no more talk about using our valuable time playing computer games! If you want games, play them after school on your own time, not ours. Or, of course, transfer to Krashet's class across the hall."

"I've tried, sir, but the class is full," Tom mumbled.

"What's that?" asked Skrushson.

"Nothing, sir. I guess I'd better get back to work," the boy said, turning away and heading back toward his seat, his eyes no longer lit up with excitement.

Skrushson thought sadly of the three students who had transferred out during the last month. Maybe it's true that they won't be playing games over there *all* of the time, but they will be wasting *some* of their time with them.

The door opened then, as a late student arrived. Skrushson glanced toward the door in annoyance at the sound of bleeps and crashes also arriving in the room from those infernal games across the hall. It was obviously "Game Day" again.

"Computer games!" he said to himself with conviction, "Bah, Humbug!"

Marler's Visit

That night at home, after the usual time spent with his family for dinner and other pleasantries, Skrushson headed for the computer carrel. The carrel was actually a small former bedroom into which he had placed his personal computer equipment. In addition to the computer and its peripherals, he had managed to squeeze in an adequate bookshelf, a few chairs, and a desk. Skrushson often thought this room had to be his favorite place in the whole house; perhaps in the whole world! Here, he could be alone and enjoy the tremendous feeling of accomplishment he experienced from programming.

Skrushson's wife did not share his

enthusiasm for the room, however. In fact, one night a few months ago, just before Christmas, she had dragged him out of there yelling, "Ebenezer, you come out of that stupid carrel and say hello to our guests, or I'm going to pound the dickens out of you!" The combination of his first name and the words "carrel" and "dickens" were enough to set everyone laughing, including Skrushson. From then on, his computer room was known as "a computer carrel". The kids had even taped a sign to that effect on the door, adding, "Do Not Disturb—by order of Ebenezer Scrooge!"

He figured the "Scrooge" part was the result of his not allowing the kids to use the computer for the arcade game his wife had mistakenly bought them for Christmas. Oh, well. Some day they'd understand.

His thoughts were interrupted by his wife's voice saying, "Right in here, Professor Marler. I'm sure Eb will be delighted to see you!"

And so he was. Marler was one of the few people who would be welcomed to Skrushson's hideaway. The professor used to occupy the room across the hall from Skrushson's room at the high school until he accepted a college position a few years back. Skrushson sorely missed the professor, particularly considering his replacement, gamester Bob Krashet.

"What the dickens are you up to, Ebenezer? It's old Marler come to see you tonight!" the professor said, and both men laughed.

"Terrific timing, Jake," said Skrushson to his friend, "I could use your advice with the program I'm

"Please Stand By for Three Important Messages!"

Unable to tear his eyes from the screen, Skrushson watched as another set of almost hypnotic whirls appeared. They seemed to draw him closer, until the screen was all he could see. It became his whole world. He felt himself falling forward . . .

The First of the Three Spirits

Skrushson awoke to a blank computer screen and to the sound of a voice calling his name, "Hey, Ebby, wake up! I've got to talk to you."

When he turned and saw who had said those words, Skrushson almost jumped from his chair in surprise! "What are you doing here, Billy? You died in that car wreck back in college! I went to your funeral!"

"Right you are, Ebby," the spirit answered. "But I've come back to have a little talk with you. For this special occasion, I wear the impressive title of "The Ghost of Computer Games Past." What do you think of that?"

"Ghost? I must be dreaming!" Skrushson said.

"Well, be that as it may, we have a little reminiscing to do, tonight, old friend," answered the ghost.

"You remember that time in computer class," Billy began, as Skrushson tried to adjust himself to his old roommate's presence, "when you reset the master program so that whenever Professor Black pressed the restart button, the computer would ring the fire alarm bell? You really had the old guy jumping!"

"No worse than your trick of making the printer spew out reams of paper when the BREAK key was pressed," retorted Skrushson, chuckling in spite of himself at the memory of paper flying straight up almost to the ceiling as the printer went into that nonstop, line feed routine of Billy's.

His former friend went on, "Remember those beautiful printer pictures of Snoopy made out of letters and asterisks and stuff? Or, how about that one Mr. Black caught you with: the present for me

on my birthday of the pretty lady in her birthday suit!"

Skrushson said wistfully, "I remember that time I got the computer and the printer so well synchronized that it would play The Star Spangled Banner as it printed out a picture of the flag. Now, that was really something!"

"Why did you do it?" asked Billy, suddenly.

"What? Do what?" Skrushson asked, coming out of his reverie.

"Why did you write that flag program, Ebby?" Billy seemed serious, now. "I mean, what possible good was there in it?"

"Why did I write that program to print the flag?" Skrushson thought about it. "I guess it wasn't very useful. I suppose I just wrote it for the fun of it," Skrushson confessed. "So what? What did you ask that for, anyway?"

"My job here tonight," responded the ghost, "was to remind you that no matter how you may feel now, there was a time when you occasionally took computers a little less seriously."

"Yes, we had fun, now and then," Skrushson admitted to the spirit, who was becoming less substantial by the second. "I don't have anything against computer games as such; it's just that I don't feel them to be of any use to a serious programmer. Do you disagree, Billy?"

But the spirit didn't answer. It had now faded away completely, leaving Skrushson with a feeling of something lost, and perhaps of something found again.

Turning back to the computer, he saw the now familiar pattern forming there. As the room began to fade around him, he remembered the promise of two messages still to come.

The Second of the Three Spirits

"I am the Ghost of Computer Games Present," said a familiar voice.

Ebenezzer Skrushson could hardly believe his eyes. The form that was appearing before him was that of his old college teacher, Professor Black.

"It's good to see you again, Professor," said Skrushson, "but I would hardly expect you to be the

one to represent computer games of any sort."

"I know!" agreed Black. "This is the most ridiculous thing I've ever gotten into. I'm supposed to show you around and give you a look at the sort of stuff that passes for computer activity for some of today's scatterbrained, immature programmers.

Professor Black came over and took Skrushson's arm, saying, "Well, let's get this stupid dream of yours over with. You always were a trouble maker, Skrushson. Imagine, turning our computer center into a pornographic print shop!"

Skrushson's smile at that remark turned into a frown as he saw that his computer room had become Mr. Krashet's room at school. Though the room was full of students and activity, no one seemed to take any notice of the two newcomers.

Black said, "Well, here's a den of iniquity, if I ever saw one. Look at this, games in every computer. These kids will never amount to anything at all."

Partly from curiosity, and partly to get away from the professor's negativism, Skrushson moved over to a computer to watch what was going on. Two students were in a heated argument. It involved something or other about where to put their gold: into buying food for their people, or into more military expansion. As the game proceeded, Skrushson saw that the goal was to become a successful ruler of a small, ancient kingdom. He was about to make some suggestions to the players, when he remembered that they couldn't hear him.

He moved on to the next machine. This machine had a chess game in it. The student seemed to be doing a pretty good job of trouncing the computer.

Next, they joined a small group of laughing students gathered around a computer which showed a graphic representation of a small humanoid doing a crazy sort of dance to some simple music. "Simple toys for simple minds," observed Black. Skrushson, thinking of his old flag and music program, couldn't quite agree.

Impressed at the advances in video graphics since his college days, Skrushson approached a

group of computers that were making all sorts of space war sounds. "This must be the stuff I hear from across the hall," he thought.

He was amazed at what he saw. These games moved fast! They were in real time! The graphics were excellent! The sound effects were great, now that he experienced them along with the actual games. Many of the games were in terrific color, too. He found himself wondering if his machine at home was capable of this kind of fast graphics work.

At the next computer, a group of students were planning some kind of war campaign. They were exploring a graphic landscape to gather money and supplies before they could launch themselves in a ship to carry on their game. It seemed to have more to it than first met the eye, and did look entertaining.

"Bah, Humbug!" said the Ghost of Computer Games Present.

Skrushson came upon Bob Krashet over in a corner of the room. He was talking to a few of his students. One boy was talking excitedly about a game idea.

Krashet heard the boy out, and then said, "That's one of the best ideas I've heard in quite a while! Go to it, Jack!"

"Well, I'll need some help with the graphics, and also with the sound effects. I don't exactly know how to get the program to run really fast, yet, either," Jack answered.

Krashet's response was, "Jack, I'm not going to write that program for you. If you know your computer can do certain things you need for your game, but you don't know how to program the machine to do those things yet, I'd say you're not ready to start your game program. There's no substitute for the hard work it takes to learn how to program a computer. Even though a writer may come up with a fantastic idea for a novel, he won't write much of a book if he can't understand many words in English, will he?"

Skrushson couldn't believe his ears. Here was Krashet giving Skrushson's own favorite little lecture. Perhaps he had misjudged the man.

Krashet looked directly at Skrushson and said, "These games

certainly stimulate creativity, don't they?"

"Yes, sir, they certainly do!" answered Jack as Skrushson realized that Krashet couldn't actually see him and had just happened to turn his head in his direction. It had given him quite a scare, and he was surprised to find himself starting to answer "yes" to the question, along with Jack.

Skrushson watched the Ghost of Computer Games Present fade away and the computer carrel reappear. He felt confused, and he knew he would need to give some thought to what he had seen tonight. Before he had time to accustom himself to his return, the whirls began to fill the computer screen and he knew he was about to experience the third message.

The Third of the Three Spirits

A wall of his room seemed to melt away. He found himself looking down the length of an endless corridor. Its exact shape was impossible to see. The long tunnel was in constant movement. All along the hallway were doors.

"Welcome, Ebenezer!" a voice boomed out.

"I'll bet you call yourself The Ghost of Computer Games Future, is that true?" ventured Skrushson.

"Right you are, Ebenezer," answered the ghost. "We are about to take a peek at the future. You must understand that the future is represented by a balance between various potentials which are continually changing and shifting. Thus, what we see here in the corridors of time, could actually come to pass, although they may well not, either. Is that understood, Ebenezer?"

"Yes," said Skrushson, who now thought he could explain the constantly changing path before them. "This looks very interesting, ghost, let's begin."

Skrushson could not exactly see the ghost. It was a wavering, hazy creature. It said, "Very well, follow me. Where I stop, you may open a door and look beyond. Most doors are locked, however, so we will not visit every future possibility."

Later, after the journey through time had ended, and Skrushson was back in his computer room, he went

back over what he had seen.

He had watched a young man working on a computer program which could accurately predict trends in our economy. Another group of people was putting a war games computer into operation, which was designed to accurately represent the reactions of countries in the world to each other. The program's purpose was to find the path to peace.

The young lady who had been playing chess in Krashet's room, was working on an artificial intelligence program which showed signs of learning chess well enough to beat the pants off any human player. What else might it be capable of?

Skrushson had witnessed a series of grownup arcade games. They had become trainers of various sorts: learn to drive a car, learn to fly a plane, learn to drive a Mars buggy, etc.

He had even recognized the student who had played with the dancing humanoid. The man was now designing whole ballets which could be performed using the computer's holographic, 3D image output. He was amusing himself by requiring the computer to show him the effects of the ballet being performed on the moon, with its lesser gravity.

Ebenezer Skrushson knew he had a whole lot to think about now. What had he learned from all of this? he wondered.

The End of It

The next morning, the family awoke to the sound of zaps, pops, whines, and crashes from the computer carrel. They ran into the room to find Skrushson intently playing that arcade game purchased last Christmas by his wife!

As the kids happily took their turns at it, too, Skrushson explained excitedly to his wife how he had an idea for a terrific program that blended graphics and sound effects into a game that could teach students what sorting in a computer meant.

He made up his mind to try to encourage creative tendencies, and to definitely get to know a certain Mr. Robert Krashet better. ■

100+ Reasons

DOS FEATURES

- A 252+ page technical manual with index and detailed table of contents.
- Commands **SYSTEM** and **PDRIVE** allow the user to configure/customize his/her own DOS
- Depending on installed hardware, **NEWDOS/80**, via the **PDRIVE** command, supports within one system, mixtures of single/double density, single/double head, 5 or 8 inch drives with single/double volume diskettes of up to 7680 standard 256 byte sectors. 80 track drives can read 35/40 track diskettes. Parameters for 10 drives may be pre-specified though only a maximum of 4 are in use at anytime. ADR not provided.
- LNW 5/8 and Omikron mapper boards supported.
- APPARAT, AEROCOMP, AM, LNW, and PERCOM, disk doublers supported.
- Most CPU speed up mods may be used though not specifically supported.
- Model I/III data diskette interchangeability when both computers are operating under **NEWDOS/80** version 2.0.
- Model I 2.3 TRSDOS compatible.
- **COPY** to/from Model I 2.3B and Model III TRSDOS diskettes (no other useage allowed).
- Single drive **COPY** and Copy By File features.
- Depending on installed hardware, the system volume may be single/double density, single/double sided, 5 or 8 inch and up to 7680 sectors.
- **RUN-ONLY** program mode restricts the operator to program defined input only.
- **MINI-DOS** allows the executing program to be interrupted by the operator to perform one or more of the 51 DOS commands executable under MINI-DOS, and then continue the interrupted program's execution.
- **CHAIN** or **DO** commands activate chaining whereby keyboard input comes from the specified disk file, allowing a pre-determined set of commands and/or parameters to be automatically inputted.
- Dump display to printer function.
- Enhanced **DEBUG** facility (14 commands) allows interrupting current program execution, inspecting/altering memory or disk, and resuming execution, continuous or single step, with/without stops.
- DOS vectors defined for Assembly Language programmers.
- DOS-CALL allows user programs and BASIC to execute DOS commands.
- The programmer may create his own resident DOS commands.
- Programs may enable/disable user routines driven off the timer interrupt.
- The programmer may create his/her own resident DOS commands.
- Model I built-in lower case driver, blinking cursor, auto key repeat.
- **ROUTE**ing of keyboard, display, printer and (Model III only) RS232C. May be routed to a user routine in memory, but not to/from disk unless via a user routine.
- Except for the spooler, there are no high memory routines for DOS or BASIC; this includes **ROUTE** and **CHAIN** functions.
- Lower case DOS commands honored.
- Full error messages displayed instead of error codes.
- 31 enhanced **COPY** parameters.
- Copy By File allows 6 criteria for file selection.
- 15 enhanced **FORMAT** parameters.
- Partial diskette **REFORMAT** permitted.
- File **PURGE** by wildcard extents and/or user files.
- **DIR**ectory command allows wildcard extents, user files, short or extended format, dump to printer.
- User may specify diskette's directory location.
- Expanded directory provides for up to 222 file entries.
- Some DOS commands may be aborted without reset.
- **R** command repeats last performed DOS command.
- **CREATE** command to pre-allocate a disk file.
- **ERROR** command displays error message associated with error code.
- **HIMEM** command sets/displays DOS/BASIC high memory address.
- **DATE** command sets/displays computer's date.
- **TIME** command sets/displays computer's time.
- Model III **FORMS** command for printer control.
- Model III **SETCOM** command for RS232 control.
- Enhanced **LIST/PRINT** commands for ASCII files with pause, abort and partial file listing.
- Alter chaining state via the **CHNON** command or commands within the chain file.
- A program or a chaining sequence may display a message with/without pause.
- **CLEAR** command to zero memory and to purge routes, user DOS commands and user timer routines.
- Commands to enable/disable BREAK key, blinking cursor, lower case driver
- **PROT** command to change diskette **NAME/DATE/PASSWORD**
- **ATTRIB** command to change a file's attributes.
- **CLS** command to clear screen.
- **AUTO** specifies the command to execute automatically at reset/power-on.
- **SYSTEM** specifies the default system configuration values (usually enable or disable) which become effective on RESET/POWER UP.
 - Diskette/file password checking
 - **RUN-ONLY** mode
 - Keyboard debounce (Model I)
 - Screen dump to printer (JKL)
 - **DEBUG 123** entry
 - **MINI-DOS**
 - Break key as keyboard key
 - Hardware lower case (Model I)
 - Assign default drive number for **DIR**
 - Assign default drive number for file creation
 - Memory protect value
 - Clear key as keyboard key
 - Disk master password required for full diskette or **CBF COPY**
 - Auto Repeat key function
 - **TIME/DATE** question on power-up
 - **TIME/DATE** question on reset
 - Display disabled until operator/program reenables
 - Manual operator chaining pause/abort
 - Manual operator **AUTO** command override
 - **R** = repeat last DOS command performed
 - Built-in lower case driver (Model I)
 - Lower to upper case toggle
 - Blinking cursor
 - Number of physical drives on computer
 - Number of disk I/O retries
 - Time delay for 1st repeat of auto repeat key
 - Specify the cursor character
 - Specify the write of the directory sector's address mark for Model I single density diskette in Model III format for easy Model I, Model III diskette exchangeability



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Why **NEWDOS/80**™ VER. 2.0 Is the Best DOS for your TRS-80 Model I or III Computer

DISK BASIC FEATURES

- In one statement from DOS READY, BASIC can be brought up, the number of files set, the memory size set and a program LOAded or RUN.
- **RUN-ONLY** prevents the operator from getting to READY or DOS READY, thus giving the program almost total control.
- Via the CMD function, all DOS commands are executable from BASIC, either directly or dynamically.
- **MINI-DOS** is available from BASIC.
- **DEBUG** is available from BASIC.
- **CHAINing** is available from BASIC.
- Variable passing between programs via the **V** parameter of RUN.
- Abbreviated commands:
 - (A)uto; (D)elete; (E)dit or comma; (L)ist or period
- Accidental text line deletion more difficult
- Text line scrolling forward or backward.
- Text page scrolling forward or backward.
- **DI** moves text line to new position
- **DU** duplicates text line to new position
- Built-in **RENUMBER** with line number and limited syntax error check. A portion of text may be moved to another part of the program with all references to that code resolved.
- Built-in **REFERENCE** function will display/print references to all line numbers, integers and variables. It will display references to a single line number, integer, string, function code (reserved word) or a group of packed or unpacked characters, and then allows displaying of each referencing text line in turn with editing as necessary.
- A program may be loaded into reserved high memory via CMD or MINI-DOS and its execution address extracted from the two bytes at 17411 (4403H).
- **MERGE** functions with packed or ASCII text files.
- Built-in text space eliminator and/or remark deleter.
- Built-in calendar date conversion.
- Dynamic **ERASE** of selected variables, keeping all others.
- Dynamic **KEEP** selected variables, **CLEARing** all others.
- After clearing an array via **ERASE** or **KEEP**, the array may be redimensioned via **DIM**.
- Dynamic text line deletion.
- Dynamic text line insertion via **MERGE**, which with dynamic **DELETE**, allows use of overlays.
- **SWAP** contents of 2 variables of the same type.
- Single Stepping starting at specified text line number.
- In-memory sort of up to 9 arrays in either ascending or descending order
- **RENEW** function to reinstate **NEWED** program.
- Full BASIC error messages, including associate DOS error message, if applicable
- With default start up parameters and no reserved high memory, 48K RAM has 38261 bytes available.
- SUPERZAP, DIRCHECK and other programs using only memory from 5200H to 6FFFH can be executed directly from BASIC without disturbing the program text or variables (if 8K BASIC free memory available, exclusive of string area).

FEATURES of NEWDOS/80 enhanced BASIC disk file I/O.

- In addition to TRSDOS sequential and random file types, **NEWDOS/80** has two new file types (Marked Item and Fixed Item) divided into five subtypes (**MF**, **MU**, **MI**, **FF** and **FI**)
- These five subtypes do not require **LSET**, **RSET**, **MKIS**, **MKSS**, **MKDS**, **CVI**, **CVS** or **CVD**; instead, **GETs** and **PUTs** are done directly to/from the variables named in a list.
- The string separating character sequence ";", " "; used with PRINT is not used with the new file types; instead only a comma is used as the separator.

- **MU** files are used as an option to the older PRINT/INPUT files.
- **FF** files are used as an option to the older RANDOM files.
- Record lengths up to 4095 bytes supported.
- Records may be all of the same length (**MF** and **FF**), of varying lengths (**MU**) or unknown length (**MI** and **FI**).
- Sequential files may be accessed randomly.
- Files may be accessed by Relative Byte Address to allow accessing of variable length or unknown length records.
- Existing files may be extended.

UTILITY PROGRAMS INCLUDED WITH NEWDOS/80

- **SUPERZAP** is a disk/memory display and modification program, also used as the vehicle for installing patches to **NEWDOS/80**.
- **DISASSEM** is a Z80 load module (CMD) disassembler that builds cross reference tables for all location references including those by JR instructions, includes in the disassembly printable characters for all hex bytes to help locate character strings and sends the disassembly to the display, printer or a disk file. The disk file can then be edited and/or assembled using EDTASM, if it is not too large.
- **DIRCHECK** is a program that displays directory contents and checks directory integrity (its primary function), displaying specific error codes to assist user attempts at directory trouble shooting and/or repair. Optionally will zero out unused (dead) file names.
- **EDTASM** is Apparat's enhancement of Radio Shack's 1978 tape editor/assembler program to operate from disk and with disk files. Requires purchase of that Radio Shack program (not a newer one) as a pre-condition of use of Apparat's EDTASM.
- **LMOFFSET** allows load module (CMD) transfer between disk and tape. Displays program start, end and entry addresses. Optionally allows load address relocation (not execution relocation) and subsequent execution as from non-disk BASIC via SYSTEM.
- **CHAINBLD** is a mini-text editor for creating/maintaining chaining files.
- **NEWDOS/80** manual chapter titles and page counts
 1. Introduction (5)
 2. DOS Library Commands (52)
 3. DOS Routines (12)
 4. DOS Features (14)
 5. DOS Modules, Data Structures, and Miscellaneous Information (12)
 6. Additional Programs Supplied on **NEWDOS/80** Diskette (22)
 7. Disk BASIC, non-I/O Enhancements (17)
 8. Disk BASIC I/O Enhancements and Differences (21)
 9. Error Codes and Messages (2)
 10. Glossary (9)
 11. Error Reporting, Incompatibility Handling, and Patching (8)
 12. Conversion Information and Miscellaneous Comments (9)
 13. ZAPs (increasing with time)
 14. Appendix A: Marked and Fixed Item File discussion (47)
 15. Appendix B: Marked and Fixed Item File examples (18)
 16. Index (4)
- Full time support staff
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NEWDOS/80 Version 2.0 for the model I is a separate and distinct product from the model III. Each is sold separately.

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June, 1982 29

Dazzle

A fast-action, two player word game with sound

Model I/III

David Leupp, Dayton, OH

Despite the thousands of computer games available, there are few that provide good head-to-head competition for two players. "Dazzle" is one that does. Dazzle is derived from the Parker Brothers "box" game called "Razzle", and is a word game requiring quick reflexes and fast thinking. A good vocabulary doesn't hurt, either!

The game is played as follows: A set of six letters is displayed on the screen. Each player tries to find a word using at least four of the letters in the set. The first to find a word is rewarded by the movement of a pointer toward his end of a score line at the bottom of the screen. The pointer starts each "set" in the middle of the six-interval score line, and the first player to move it to his end wins a point.

Points are registered on a separate score line on each player's side of the screen. The bottom pointer is reset when a point is won (finishing a "set"), and the game continues for a predetermined number of sets. During play, if either player feels that it is not possible to make a word from the six letters given, he may "challenge" his opponent, forcing him to find a word within a timed interval, or lose the point. If, on the other hand, the challenged player manages to find a word, he wins the point.

The computer performs a number of functions which make the game enjoyable to play. It selects the six-letter word combinations (ensuring that at least one vowel is always present), graphically keeps track of the scoring, and provides a visual countdown timer when either player challenges. The game includes a sound routine which provides appropriate sound effects for the timer, scoring, and other functions. The sound signal is sent to the cassette port, and is generated by a machine language routine POKEd into memory from the BASIC program. The program performs still another useful function by detecting and displaying which player responds first with either a guess or a challenge.

In terms of mechanics, each player uses three keys on his side of the board to make required inputs during play. The "Z" and "?" keys are used by the left and right player respectively to start the challenge timer. The timer is displayed on the screen on the side of the challenged player. The down arrow and "clear" keys are used by the players to signify when the word is guessed. The computer detects which is pressed first, and displays an arrow on the corresponding side of the board. The up arrow key is pressed by the left hand

player to signify that he has won a point. The right arrow key is pushed by the right hand player to register his points. These keys are pressed in response to a query by the computer, and are necessary in the event a player presses his "word" button before he has actually thought of a valid word.

The program has been written to work on either a Model I or III. Several minor enhancements are apparent when run on a Model III. The bottom pointer is displayed as one of the Model III special characters, and the shift keys can be used as "challenge" buttons. The latter is not possible on the Model I, as the left and right shift keys return the same value when pushed. The Model III enhancements are minor, and require some extra programming, but I feel the effort is worthwhile. If the effort isn't made, we'll continue to program for the Model I exclusively, and never make use of the nice features available on the Model III.

The program is also designed to work on any disk-based machine with 32K (or more) RAM. By replacing line 1410 with line 1460 (minus the REMark), it will run on Level 2 cassette-based machines with 16K (or more). The only peculiarity involved in running the program, beyond swapping the lines for cassette-based operation, is the setting of variable M in lines 1250 and 1380. M should be set to the same value at both places. The first routine sizes memory to the value of M, while the second POKEs the sound routine into memory starting at M. Suitable values for typical systems are given in the program comments.

Please note that the program is interspersed with comments. These will aid when the time inevitably comes that you want to make modifications or additions. The lines are numbered consecutively at intervals of 10 to aid in typing the program. This is a simple procedure, but one that we too often see neglected. The important variables are identified by comments at the initialization point, primarily in the block starting at line 2040.

Included with the BASIC program listing is an assembled version of the machine language sound routine which is POKEd into memory. The values sent to the cassette port, loaded into the A register in lines 230 and 270, are 09 and 10 to set the signal high and low respectively. The sound signal is actually controlled by bits zero and one (values of one and two), but bit four

See DAZZLE page 80

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Model I/III and Color Computer

Alan Goozner, Moorhead, MN (Model I/III version)

John Steiner, Riverside, ND (Color Computer version)

After walking into a Radio Shack outlet one Saturday afternoon, I impulsively walked out with a TRS-80 Color Computer (paid for, of course). I hurried home to put it to work, but little did I know what I was getting into. Having only a passing interest in computers until recently, I had to start learning a new language, something called "Extended Color BASIC".

I hungrily devoured the manuals and typed in and saved to cassette, all of the sample programs included in the sample program section, and even some of those I wrote while becoming familiar with the computer. Then, I went through the stage of buying every program book in sight, looking for programs that I could run on my computer. As luck would have it, very few programs would run (unmodified) on my machine, unless they were the most simple in structure. I attempted to rewrite some of them, and was even successful in modifying a few.

One of the major problems with a new model computer, is the lack of software available. Radio Shack has provided a large selection of games and a few utility and personal use programs on plug-in ROM cartridges. However, since I spent the money on the computer, my spouse had other plans for money than to invest it in software. This left me no alternative but to beg and plead with my friends and acquaintances who had already bought Model Is or Model IIIs, to let me have listings of their favorite programs.

One of my friends, Al Goozner, finally relented and gave me a listing of his Parimutuel Horse Race program. He wrote it while his Model I was new, and he was looking for software for his machine. After many hours spent hunched over the keyboard, and a few on the phone to Al, I succeeded in making it almost completely unrecognizable to the author.

The program uses strings of color graphics characters to simulate horses. (Well, they sort of look like horses, if you use your imagination.) The program is divided into five routines entered from a menu. After initialization and inquiry of player names, the menu is displayed.

The routines are: Review Pool, Place a Bet, Review

Odds and Program, Review Your Bets, and Call to the Post.

The win pool is displayed when one (1) is selected. Two (2) selects a routine to place your bet. After asking for player number, and horse number, it asks for the amount of your bet. Three (3) displays the horses names and their "odds" of winning. As you can see by reviewing the listing, the odds are completely random, so don't expect the odds chart to give you any insight as to which horse might win. The routine called Review Your Bets, displays the individual bets for each player upon request. Selecting number five (5) runs the race.

If you have a 16K non-extended BASIC machine, you must substitute the PLAY MU\$ in line 590 with a FOR...NEXT loop. A count of about 500 will allow you to read line 580 before it is written over by the print statement in line 590. Then you may also delete line 40, which is the "music" extended BASIC "play's".

I have also included the original listing for those with a Model I or III. The original program had some interesting features that I couldn't program. For example, there is a feature that prints and updates the leading horse's name as the race is run. Unlike the original program, there are only six players and horses instead of eight. This was done due to the 16-line screen format on the Color Computer. There was no more room for horses on the screen. I also added an option that allows the computer to bet at random on the horses if there are less than six players. This allows one person to bet against the computer and win.

Now, to get out the *Going Ahead With Extended Color BASIC* book . . . What was that PMODE command?

Parimutuel Horse Racing Model I/III Program Listing

```
11 REM *** PARIMUTUEL HORSE RACE ***
12 REM *** BY : AL GOOZNER ***
15 CLS:DEFINT I-L:CLEAR 344:DIM A$(8),I
    BETS(8,8),ITBET(8),L(8)
```

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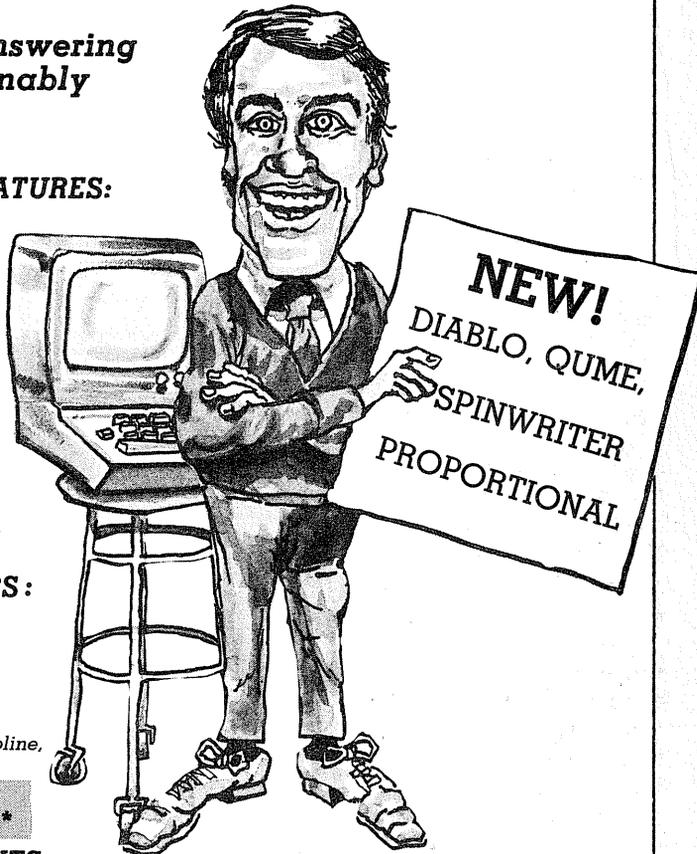
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Game

```
35 FOR I=1 TO 8
40 PRINT"PARIMUTUEL HORSE RACE PROGRAM"

45 PRINT"WHAT IS THE NAME OF PLAYER # "
;I
46 INPUTA$(I):CLS:NEXTI:CLS
50 PRINT"WHAT DO YOU WANT TO DO? REVIEW
POOL = 1, PLACE A BET =2
60 PRINT"REVIEW ODDS AND PROGRAM = 3, R
EVIEW YOUR BETS =4"
65 PRINT"RUN THE RACE = 5":INPUTI
70 IF I>5 GOTO 50
75 IF I=0 GOTO 50
80 ON I GOTO 500,200,300,400,600
200 INPUT"PLAYER # ";K:CLS
202 IF K>8 GOTO 200
203 IF K=0 GOTO 200
210 PRINT"OK ";A$(K);" ENTER POST POSIT
ION":INPUT IP
211 IF IP>8 GOTO 210
212 IF IP=0 GOTO 210
230 INPUT"HOW MUCH DO YOU WANT TO BET";
IBETS(K,IP)
235 ITBETS(IP)=ITBETS(IP)+IBETS(K,IP)
240 INPUT"PRESS ENTER TO CONTINUE";Z$:K
=0:CLS:GOTO50
300 CLS:PRINT"HORSE LINE UP":PRINT
330 PRINT"POST POSITION","HORSE NAME","
RATING"
340 FOR I=1 TO 8 : READ B$,C$
350 PRINTI,B$,C$:NEXTI
370 RESTORE:INPUT"PRESS ENTER TO CONTIN
UE";Z$:CLS:GOTO50
400 INPUT"PLAYER # ";I:CLS
410 PRINT"OK ";A$(I);" HERE'S HOW MUCH
YOU BET SO FAR"
420 PRINT"POST POSITION","AMOUNT BET"
430 FOR J=1 TO 8:PRINTJ,IBET(I,J):NEXTJ

440 INPUT"PRESS ENTER TO CONTINUE";Z$:C
LS:GOTO50
500 CLS
504 PRINT"TOTAL WIN POOL"
505 PRINT"HORSE #"," TOTAL BET"
510 FOR J=1 TO 8:PRINTJ,ITBETS(J):NEXTJ

540 INPUT"ENTER ";Z$:CLS:GOTO50
600 CLS:FOR I=1 TO 1500:NEXTI
605 PRINT:PRINT:PRINT:PRINT" C
ALL TO THE POST"
610 FOR I=1 TO 2000:NEXTI
620 CLS:PRINT"THEY ARE ENTERING THE STA
RTING GATE"
630 FOR I=1 TO 3000:NEXTI:CLS:PRINT:PRI
NT:PRINT
640 PRINT:PRINT"THEY'RE OFF !!!":FOR I=
1 TO 100:NEXTI

645 CLS
650 PRINT"POST POSITION",,, "FINISH LINE
"
660 PRINT:PRINT:FOR I=1 TO 8:PRINTI:NEX
TI
670 FOR I=4 TO 35:SET(7,I):NEXTI
680 FOR I=4 TO 35:SET(112,I):NEXTI
690 FOR I=7 TO 112:SET(I,4):NEXTI
700 FOR I=1 TO 8:LET L(I)=7
710 NEXTI
720 I=RND(390):IF I<56 THEN K=2 ELSE 72
5
722 GOTO 900
725 IF I<111 THEN K=3 ELSE 730
727 GOTO 900
730 IF I<166 THEN K=4 ELSE 735
732 GOTO 900
735 IF I<221 THEN K=7 ELSE 740
737 GOTO 900
740 IF I<271 THEN K=8 ELSE 745
742 GOTO 900
745 IF I<321 THEN K=1 ELSE 750
747 GOTO 900
750 IF I<371 THEN K=5 ELSE 755
752 GOTO 900
755 LET K=6
900 L(K)=L(K)+2:I=7+3*K:SET(L(K),I):IFL
(K) > 112 THEN 940
905 FOR K=1 TO 8:IF L(K)>PW THEN PRINT@
862,"IN THE LEAD # ";K
907 IF L(K)>PW THEN PW=L(K)
908 NEXT K
927 GOTO 720
940 PRINTK;" IS THE WINNER"
950 INPUT"PRESS ENTER TO CONTINUE";Z$
955 IF ITBETS(K)=0 PRINT"NO BETS ON THE
WINNER":END
960 CLS:PRINT:PRINT:PRINT:FORI=1 TO 8:B
=B+ITBETS(I):NEXTI:J=B/ITBETS(K)
970 PRINT"THE WINNING NUMBER ";K;" PAYS
$ ";J;" FOR EACH DOLLAR BET"
980 FOR I=1 TO 8
985 FOR N=1 TO 8
987 M=M+IBESTS(L,N):NEXTN
990 ITBET(L)=(IBETS(L,K)*J)-M
992 PRINTUSING"% %";A$(L);:
PRINT" WON (LOST) $ ";ITBET(L)
993 M=0
1000 NEXTL
2000 DATA "HOT DOG","LONG SHOT","LADY L
UCK","FAVORITE"
2010 DATA "HOT SHOT","FAVORITE","MAN-O-
WAR","MEDIUM"
2020 DATA "GO-FER-BROKE","LONG SHOT","B
ROKE-DOWN","LONG SHOT"
2030 DATA "MANFRED","MEDIUM","NASHUA","
MEDIUM"
```

**Parimutuel Horse Racing
Color Computer Program Listing**

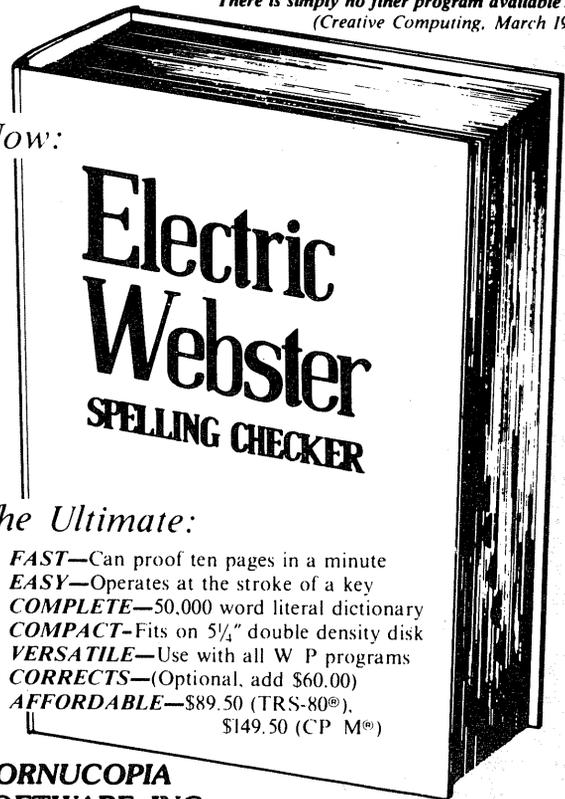
```

10 CLS: CLEAR 344: DIM A$(6), B$(6), C$(6), I
BETS(6,6), ITBET(6), L(6)
15 REM READS HORSE NAMES
20 FOR I=1 TO 6: READ B$(I), C$(I): NEXT
30 PRINT@64, "PARIMUTUEL HORSE RACE
35 REM "CALL TO THE POST" $
40 MU$="T6L4O2GO3CEGL8GGL4GEL8EEL4ECECO
2L2GL4GO3CEGL8GGL4GEL8EEL4EO2GL8GGL4GL2
03C
50 PRINT@128, "HOW MANY PLAYERS (1-6)?:
GOSUB 1160
60 A=VAL(A$): D=A
70 IFA<1 OR A>6 THEN PRINT "ENTER 1 TO 6 ONL
Y": GOTO 50
80 C=D+1: IFC=2 THEN 130
90 IFC<6 THEN PRINT "DO YOU WISH TO HAVE T
HE COMPUTER BET (Y/N)": GOSUB 1160
100 IF D=6 THEN 140
110 IFA$="Y" THEN 130
120 IFA$="N" THEN 140
125 REM COMPUTER BETS
130 A$(C)="COMPUTER": FOR I=1 TO 6: IBETS(C,
I)=RND(10)*10: ITBETS(I)=ITBETS(I)+IBETS
(C, I): NEXT I
140 REM NAME ROUTINE
150 FOR I=1 TO D
160 CLS: PRINT@64, "PLAYER "; I, ", ": PRINT "
WHAT IS YOUR NAME";
170 INPUT A$(I): CLS: NEXT I: CLS
175 REM MENU SCREEN
180 PRINT@64, "1--REVIEW POOL": PRINT "2--
PLACE BET": PRINT "3--REVIEW ODDS AND PRO
GRAM
190 PRINT "4--REVIEW YOUR BETS": PRINT "5--
CALL TO THE POST": PRINT "ENTER 1 TO 5":
GOSUB 1160
200 A=VAL(A$)
210 IFA<1 OR A>5 THEN PRINT "ENTER 1 TO 5
ONLY": GOTO 180
220 ON A GOTO 500, 230, 360, 400, 560
225 REM BET ROUTINE
230 CLS: PRINT@64, "": FOR I=1 TO D
240 PRINT "PLAYER #"; I, A$(I): NEXT
250 IF D=1 THEN K=1: GOTO 290
260 PRINT "INPUT PLAYER NUMBER (1 TO"; D;
")?": GOSUB 1160
270 K=VAL(A$)
280 IF K<1 OR K>D THEN PRINT "ENTER 1 TO
"; D; " ONLY": GOTO 260
290 PRINT@32*9, "OK, "; A$(K): PRINT "ENTER
POST POSITION (1 TO 6)": GOSUB 1160
300 IP=VAL(A$)
310 IF IP<1 OR IP>6 THEN PRINT "ENTER 1 TO 6
ONLY": GOTO 290

```

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```

320 PRINT "HOW MUCH DO YOU WISH TO BET
330 INPUT " (BE SURE TO PRESS <ENTER> )"; I
BETS(K, IP)
340 ITBETS(IP)=ITBETS(IP)+IBETS(K, IP)
350 GOSUB 1170: K=0: CLS: GOTO 180
355 REM ODDS & LINEUP ROUTINE
360 CLS: PRINT@70, "TODAY'S LINE UP": PRIN
T
370 PRINT "POSITION, NAME", "RATING
380 FOR I=1 TO 6: PRINT I; B$(I), C$(I): NEXT
390 GOSUB 1150: CLS: GOTO 180
395 REM BET TOTAL ROUTINE
400 CLS: PRINT@64, "": FOR I=1 TO D: PRINT I; A$
(I): NEXT
410 IF D=1 THEN I=1: GOTO 450
420 PRINT "ENTER PLAYER #": GOSUB 1160
430 I=VAL(A$)
440 IF I<1 OR I>D THEN 420
450 PRINT "OK, "; A$(I): PRINT "YOUR BET TO
TAL SO FAR IS
460 PRINT "POST POSITION", "AMOUNT BET"
470 FOR J=1 TO 6: PRINT J, IBET(I, J): NEXT
480 PRINT
490 GOSUB 1150: CLS: GOTO 180
500 CLS
505 REM WIN POOL SCREEN
510 PRINT@70, "TOTAL WIN POOL": PRINT
520 PRINT "HORSE #", "TOTAL BET"

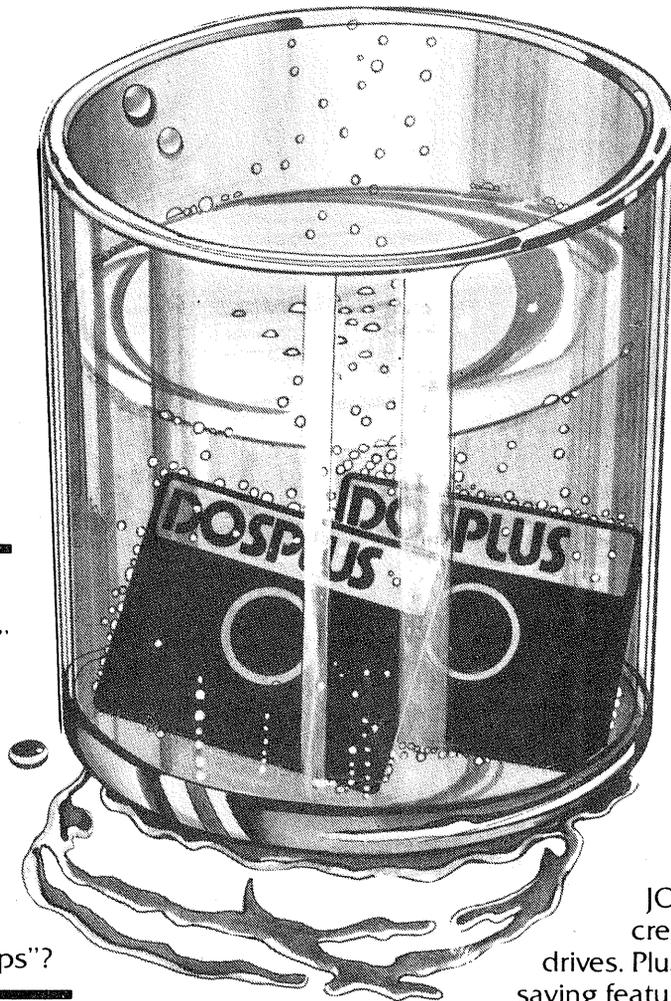
```

Game

```
530 FORJ=1TO6:PRINTJ,
540 PRINT USING"$#####";ITBETS(J):NEXT
550 GOSUB1150:CLS:GOTO180
560 GOSUB810
570 GOSUB1200
575 REM START ROUTINE
580 PRINT@260,"CALL TO THE POST";
590 PLAY MU$:PRINT@260,"THE HORSES ARE
";
600 FORI=1TO500:NEXT:PRINT@260,"ENTERIN
G THE STARTING GATE";
610 FORI=1TO999:NEXT:PRINT @260,"THEY'R
E OFF !!!";:FORI=276TO286:PRINTCHR$(128
);:NEXT
615 REM RACE GRAPHICS
620 FORI=1TO500:NEXT:FORI=260TO284:PRIN
T@I,CHR$(128);:NEXT
630 GOTO910
640 FORI=1TO500:NEXT:CLS:PRINT@224,B$(K
);" IS THE WINNER"
650 GOSUB1150
660 IFITBETS(K)=0THENPRINT"NO BETS ON T
HE WINNER":GOTO1240
665 REM PAYOFF ROUTINE
670 B=0:CLS:PRINT@64,"";:FORI=1 TO 6:B=
B+ITBETS(I):NEXTI:J=B/ITBETS(K)
680 PRINTB$(K):PRINT"THE WINNER NUMBER
";K;" PAYS
690 PRINTUSING"$$####.##";J;:PRINT" FOR
EACH DOLLAR BET
700 FORL=1TO6
710 FORN=1TO6
720 M=M+IBETS(L,N):NEXTN
730 ITBET(L)=(IBETS(L,K)*J)-M
740 IFA$(L)<>" THENPRINTA$(L); " WON (L
OST)";:PRINT USING"$$####.##";ITBET(L)
750 M=0
760 NEXTL
770 GOTO1240
780 DATA HOT DOG, LONG SHOT, LADY LUCK,
FAVORITE, HOT SHOT, FAVORITE
790 DATA MAN-O-WAR, MEDIUM, MANFRED, LO
NG SHOT
800 DATA BROKE-DOWN, LONG SHOT
805 REM RACE TRACK PRINT SUBROUTINE
810 CLS(0)
820 FORI=2TO482STEP32
830 PRINT@I,CHR$(133);:NEXT
840 FORI=30TO510STEP32
850 PRINT@I,CHR$(138);:NEXT
860 S$="STARTING":G$="GATE":L$="LINE":F
$="FINISH"
870 PRINT@0,S$;:FORI=8TO29:PRINTCHR$(32
);:NEXT
880 PRINT@480,G$;:FORI=485TO506:PRINTCH
R$(32);:NEXT:PRINTL$;
890 PRINT@24,F$;
900 RETURN
905 REM PRINTS HORSES
910 C$(1)=CHR$(128)+CHR$(142+48)+CHR$(1
41+48)+CHR$(136+48)
920 C$(2)=CHR$(128)+CHR$(142+16)+CHR$(1
41+16)+CHR$(136+16)
930 C$(3)=CHR$(128)+CHR$(142+32)+CHR$(1
41+32)+CHR$(136+32)
940 C$(4)=CHR$(128)+CHR$(142+96)+CHR$(1
41+96)+CHR$(136+96)
950 C$(5)=CHR$(128)+CHR$(142+112)+CHR$(
141+112)+CHR$(136+112)
960 C$(6)=CHR$(128)+CHR$(142+80)+CHR$(1
41+80)+CHR$(136+80)
965 REM SETS INITIAL HORSE POSITION
970 A=96:B=224:C=352:D=160:E=288:F=416
975 REM CHOOSES MOVING HORSE
980 ONRND(6) GOSUB 1080,1090,1100,1110,
1120,1130
985 REM UPDATES HORSE POSITIONS
990 PRINT@A,C$(1);:PRINT@B,C$(2);:PRINT
@C,C$(3);
1000 PRINT@D,C$(4);:PRINT@E,C$(5);:PRIN
T@F,C$(6);
1010 IFA=96+27THENK=1:GOSUB1140
1020 IFB=251THENK=3:GOSUB1140
1030 IFC=379THEN K=5:GOSUB1140
1040 IFD=187THENK=2:GOSUB1140
1050 IFE=315THENK=4:GOSUB1140
1060 IFF=443THENK=6:GOSUB1140
1070 GOTO980
1075 REM SETS NEW SCREEN POSITIONS
1080 A=A+1:RETURN
1090 B=B+1:RETURN
1100 C=C+1:RETURN
1110 D=D+1:RETURN
1120 E=E+1:RETURN
1130 F=F+1:RETURN
1140 GOTO640
1145 REM INKEY$ SUBROUTINE
1150 PRINT@448,"PRESS ANY KEY TO CONTIN
UE
1160 A=0:A$=INKEY$:IFA$=""THEN1160ELSE
SOUND100,1:RETURN
1170 PRINT@448,"ANOTHER BET(Y/N)?
1180 Z$=INKEY$:IFZ$=""THEN1180
1190 IFZ$="Y"THEN230ELSERETURN
1195 REM PRINTS LINEUP BY STARTING GATE
1200 PRINT@36,"LINEUP";:PRINT@100,B$(1)
;:PRINT@228,B$(3);:PRINT@356,B$(5);
1210 PRINT@164,B$(2);:PRINT@292,B$(4);:
PRINT@420,B$(6);
1220 FORI=1TO999:NEXT
1230 FORI=36TO420STEP64:PRINT@I,CHR$(12
8);:FORJ=1TOLL:PRINT@I+J,CHR$(128);:NEX
T:NEXT:RETURN
1240 PRINT:PRINT"ANOTHER RACE(Y/N)?
1250 Z$=INKEY$:IFZ$=""THEN1250
1260 IFZ$="N"THENENDELSEL0
```

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Almost a joystick

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Model I

John T. Phillipp, M.D., Glendora, CA

One of the things lacking on the TRS-80 Model I, is the ability to use a joystick. While hardly a major deficiency, many programs, especially arcade-style games, are improved immeasurably by joystick input.

There have been several articles written on how to interface joysticks to the TRS-80, and some versions are available commercially. A true joystick consists of a shaft, connected by a linkage, to two potentiometers (variable resistors) in such a manner that they vary in resistance as the shaft is moved to the points of the compass. For every position of the shaft, there is a unique value of the two resistors. Think of it as similar to SET/RESET graphics: for every point on the screen, there is a unique value of X and Y. The computer must convert the values of resistance into X/Y values.

This presents great difficulties in interfacing. The computer is a digital device, but the potentiometers are "analog" devices. That is, their resistance is proportional to the position of the shaft of the joystick. Connecting such joysticks to the computer requires an "analog-to-digital converter" (usually in hardware), and the software to support it. Another problem is that programs must be rewritten to accept input from the joystick. This is not difficult if the program is in BASIC, but what if you have to rewrite the input routines of a machine language pro-

gram? And most of the really good arcade games are in machine language!

In order to get around these problems with interfacing, I present "Almost A Joystick". If a program doesn't use a joystick for input, then it must use the keyboard. In game programs, it is common to find the "arrow" keys used to control the position of something on the screen, and the <SPACE BAR> used to "fire" a missile, ray, torpedo, or whatever. Since the TRS-80 keyboard consists of nothing more than 58 single-pole, single-throw switches, it should be possible to connect a joystick in parallel with the "arrow" keys in such a way that pushing the shaft of the joystick "north" is the same as pressing the up arrow, pushing the shaft "east" is like pressing the right arrow, and so on.

A special kind of joystick is needed for this, though. Pushing the shaft in different directions must close switches, not change the resistance of potentiometers. Such a joystick is available on the market—the Atari™ joystick (available from Computer Age, Inc., 4688 Convoy St., San Diego, CA 92111, two joysticks for \$18.00). Inside its case is a circuit board with five "bubble switches" on it. Four of these are at the points of the compass (N, S, E, W), and close when the shaft is moved. The fifth switch is closed when the "fire" button is pressed.

All that remains is to connect the joystick in parallel with the keyboard.

The TRS-80 keyboard is memory mapped. Each eight characters of the keyboard are assigned to one memory address, one bit for each character. Pressing a key sets (converts to binary "1") one of the eight bits of the byte at that address. Software in the ROM converts the value of the byte at that address to the ASCII code for the key. Fortunately, all of the keys we are interested in are on one row (row six) of the keyboard, so they are all values at the same address, 3840 hex (or 14400 decimal):

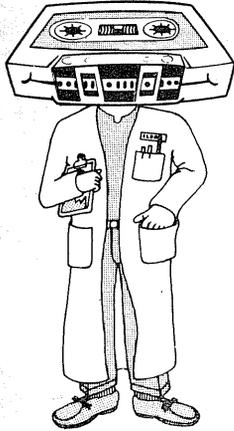
Bit	0	1	2	3	4	5	6	7
Val.	1	2	4	8	16	32	64	128
Key	ENT	CLR	BRK	UP	DN	LT	RT	SPC

Pressing a key will cause its value to be read from memory location 14400. For example, pressing the up arrow will cause "8" to be read. Pressing the space bar will cause "128" to be read, and so on. Pressing two keys at once will cause their sum to be read. The up arrow and the right arrow will cause $8 + 64 = 72$ to be read.

The Atari joystick has a nine pin connector, but only six wires: north (UP) white, south (DN) blue, west (LT) green, east (RT) brown, fire button (SPC) orange, and common—black. The TRS-80 keyboard has four integrated circuits on it: Z1 to

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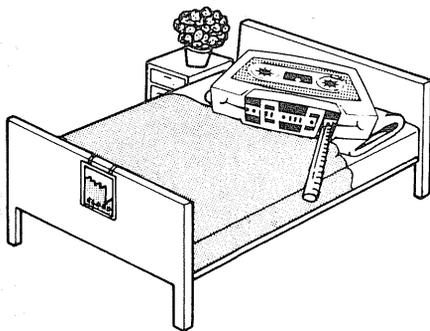
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Circle # 19

Evaluation

Z4, Z1 and Z2 select the memory address of the keyboard row, and Z3 and Z4 identify the bit which is set (which key of the row has been pressed). Since all of the keys we are interested in are on one row, we only have to solder the common wire (black) to the correct pin of Z1 or Z2, and the colored wires to the correct pins of Z3 and Z4, and the installation is complete.

Unfortunately, Radio Shack has made it difficult. It seems that there are several versions of the keyboard in use. I have one of the keyboards with a single-sided printed circuit board (PCB), the pins to which, I have to connect the joystick wires are not the same as those described in the *TRS-80 Microcomputer Technical Reference Handbook*, page 107 (keyboard schematic). This may have something to do with the use of the double-sided versus single-sided PCBs. I used an ohmmeter to check for continuity (zero ohms resistance) between the key contacts on the PCB and the pin of the integrated circuit before soldering, insuring that the wires were being soldered to the pin connected to the desired key.

key	Wire color (j.stick)	IC pin (mine)	IC pin (schem. in serv. manual)
common	black	Z2 pin 4	Z1 pin 12
UP	white	Z3 pin 15	Z3 pin 6
DN	blue	Z4 pin 15	Z4 pin 10
LT	green	Z3 pin 2	Z4 pin 4
RT	brown	Z4 pin 2	Same
space	orange	Z4 pin 6	Same

Once the wires have been soldered, run the following program:

```
10 CLS:PRINT@448,PEEK(14400)
   :GOTO10
```

Pushing the shaft of the joystick north should give the same value on the screen as pressing the up arrow. Pushing it northeast should give the same value as pressing the up arrow and the right arrow at the same time, and so on. All programs that were controlled by the arrow keys and the space bar will work with the joystick without modification. Since the joystick is in parallel, the arrow keys will still function as usual. ■

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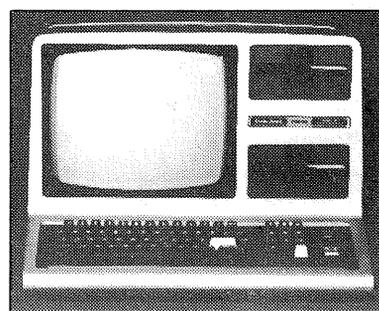
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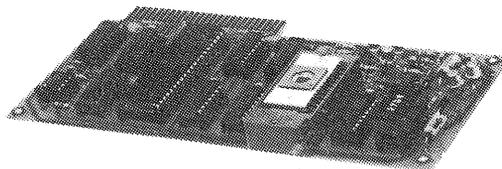
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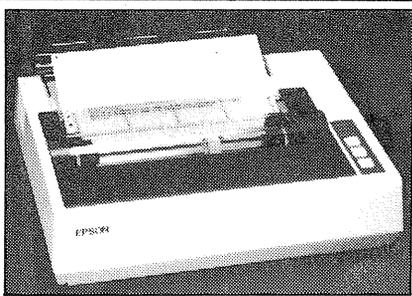
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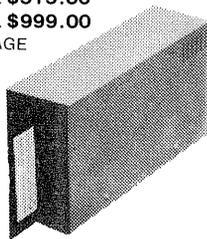
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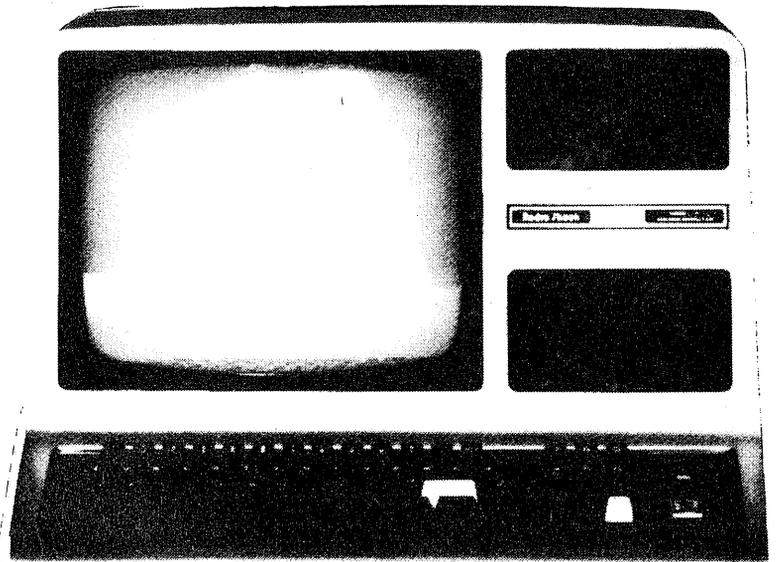
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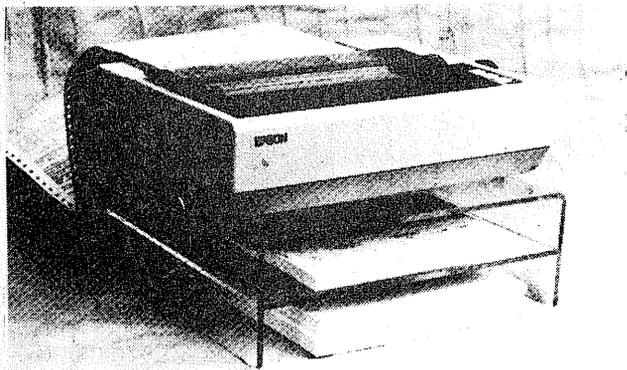


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LDOS for beginners

Part I: Device independence, ROUTE, and LINK commands

Model I/III with disk

T. A. Daneliuk, Chicago, IL

Introduction

With the advent of the LDOS operating system for the TRS-80 Models I and III, a whole new world of sophisticated systems software has been opened to the computer user. There are, of course, other "advanced" operating systems for these machines, but not one of these competing products offers the diversity of hardware support, breadth of features, and ease of use in one package as does LDOS.

It is not my purpose here to start another endless debate on the merits of one DOS versus another (otherwise known as DOSWARS!). It is also not my purpose to do a product review of LDOS. This has already been done in the pages of many magazines by various authors, including myself. Rather, my purpose is to discuss some of the highlights of the LDOS system. In particular, I'd like to stress the main philosophy and concepts of LDOS, because they are such a radical departure in the field of microcomputer operating systems. In other words, this is not a rehash of the LDOS manual, but rather an attempt to understand *why* the system is constructed the way it is.

When I started to write this article I had intended to cover much more

of the LDOS system than I actually ended up doing. It is simply impossible to cover in-depth, a system with as many facets as LDOS. Instead, I've tried to hit the real high points, and give you a flavor of what can be done once you learn to use the system.

A DOS overview

If you are new to the world of disk operation, the terminology and "buzz words" can be confusing. To understand the value of a package like LDOS it is important to have a good grasp of just what a disk operating system (DOS) is supposed to do.

We should first understand the notions of "devices" and "files" and how they differ. A device typically refers to one of the hardware peripherals like a keyboard or printer. Files (or "data sets") on the other hand, are collections of data arranged in some logical fashion. These collections are stored on the disks and given "filespecs" or names. A file could consist of pure data (like a mailing list), or it could be a program. The point is, that normally, devices and files are completely separate entities. As we shall shortly see, however, LDOS has the unique ability to

interchange devices and files.

In its simplest form, a DOS is responsible for controlling and communicating with the disk memory systems attached to the computer. These may be five-inch or eight-inch floppy disks, or the newer sealed hard disk systems. The DOS is in charge of allocating space for each file and keeping track of where on the disk each file is kept. It is also given the task of "file maintenance". This includes showing the user a directory of all available files, eliminating unwanted files and making archival copies of all important files.

Normally, a DOS is also given charge of controlling all the other peripheral devices. These include the keyboard, the video screen, the line printer and the RS-232 serial ports. The exact reason why this is done will become clear in the following section, but for the moment it is important simply to realize that the DOS controls all input and output (I/O) between the computer and its associated peripherals. The DOS is also usually responsible for managing the memory inside the computer, by determining where programs are to load and if certain memory areas are "protected" from having new data written in them. The programs

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Tutorial

which control or "drive" the peripherals are called "Peripheral Drivers". The various commands which the user may use in the DOS comprise the "DOS Library". Also, there are certain specialty programs supplied with a DOS which simplify the chores associated with using disks. These are called "Utilities" and typical examples are the FORMAT and BACKUP programs which all good DOS (and most bad DOS!) systems have. Notice that FORMAT and BACKUP are not part of the DOS library, but are actually separate programs. You can prove this to yourself by doing a disk directory of all files (including the invisible ones). While you won't see a separate file named DIR or LIST which are DOS library commands, you will see the files called BACKUP and FORMAT.

Since the TRS-80 computers were designed to be able to work without disks attached, many of the driver programs are already incorporated into the TRS-80 ROM (Read Only Memory). When disks and a DOS are used, the DOS may use the existing drivers in the ROM, or it may have its own special drivers to control peripheral operation. It is also important to realize that at any given time the entire DOS is not resident in the computer memory. Only the bare necessities of the DOS are permanently loaded into the computer to conserve memory usage. Thereafter, when a DOS command is issued, the appropriate part of the DOS is loaded from the master or "system" disk for that one command. This technique is called "Overlaying".

It is not difficult to see that a well-written DOS is the key to using a computer efficiently. It will allow the user maximum control of the peripheral devices without requiring a Ph.D. in computer science to understand the commands!

LDOS and device independence

As I suggested earlier, LDOS is very flexible in its treatment of devices and files. It sees them as being entirely interchangeable (with a few limitations). To be sure, the system has special drivers written for each specific piece of hardware,

but these drivers all share a common heritage which makes device/file interchange very simple.

What exactly does "device independence" mean? In its purest form, device independence permits any device (i.e., a peripheral) to take the place of any other device as a source or destination of data. Moreover, a truly device independent system will allow the user to substitute a data set (i.e., a file) for a device as a source or destination of data. LDOS very nearly meets these criteria completely.

Some restrictions were imposed on the Model III because of a change Tandy made in the new ROM, but for all practical purposes, LDOS is fully device independent. In case you are wondering who came up with this great concept, it has its roots in an operating system called UNIX. UNIX was written some time ago at Bell Laboratories to run on Digital Equipment Corporation minicomputers. It is therefore most impressive to see this concept successfully implemented on a microcomputer like the TRS-80.

LDOS gives the user control of its devices with two commands. The ROUTE command simply changes the source to one of the other peripherals. For example, normally the LPRINT command in BASIC sends its data to the line printer. Using the LDOS ROUTE, you could tell the system to send everything intended for the printer to the video screen. From then on, all LPRINT statements would result in data being displayed on the video screen *instead of* the printer. Notice that *any* device in the system (capable of some kind of output) could have been the new destination for the LPRINT statement. For example, we could have LPRINTed to the serial port. Notice also, that the device had to be capable of output. It wouldn't make much sense to try and LPRINT to the keyboard!

Another fascinating possibility with ROUTE is to substitute a file in place of a device. We could, for example, ROUTE all printer data to a file by the name of PRINTER/DAT.PASSWORD:1. Each LPRINT statement after that would store the data normally printed into a disk file instead. Do you want a practical

example? Ok, how about this: you're doing a long complicated computation in BASIC, and the program is written to print the results on the screen. You would like to keep a permanent copy of the results because computations take four hours each (also you can't use the printer because it took you until midnight to debug the program and the cat is asleep already!). Rather than rewrite the program, you simply ROUTE the screen to a disk file, and thereby permanently save the data.

A similar command to ROUTE is LINK. The difference between them is that, while ROUTE provides a new destination for data, LINK simply adds additional destinations. In our midnight example earlier, we might want to send the data to a disk file, the video screen, and the printer (the cat sleeps too much anyway). By LINKing the two devices and the file together the data would be sent to the multiple destinations. LINK can also be used to create multiple sources of data. I have used this command to force the system to recognize two different keyboards, one in the computer and one via the RS-232 port. Oh, by the way, the keyboard on the serial port was in another part of town and was communicating to me through a modem! Presto — instant remote data entry without a "host" program. One last example really shows off the versatility of LDOS. Since devices and files are interchangeable in the system, certain commands can be made to do unusual things. Instead of LISTing a file, try COPY FILENAME/EXT TO *DO (*DO is the video screen). Another useful application would be to send a file directly to the serial port (device *CL) by keying in COPY FILENAME/EXT to *CL.

All the possibilities of device independence cannot really be dealt with in depth here. Suffice it to say that the system is capable of doing much more than you will be able to dream up for it! ■

Part two of this article, covering file handling and the job control language, will appear in the next issue. —Ed.

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Play ball!

Model I/III

Larry Krengel, Elmhurst, IL

Batter up! It's that time of the year again... but, of all things, a baseball strike. How disturbing to have a warm summer afternoon, an easy chair and a can of beer, but no baseball game on TV.

Well, that's where I can help. Or, should I say, Tom, my TRS-80, can help. We treat him like one of the family. The only thing is, he gets a special diet. He eats electricity instead of hamburgers.

One Sunday afternoon last winter, even before spring training started, I became tired of watching basketball. I have never developed a taste for TV basketball. My 10-year old daughter and I were talking about the absence of baseball. That was all it took.

Suddenly, a program began to take form. The three of us (my daughter, Tom and I) began working on a program. The result of our collaboration was rather amusing. We played for most of the afternoon and produced enough game boards that both of my daughters could take them to school the next day.

Once again, in the wake of a baseball strike, there is an absence of baseball, and we have resurrected the program. Here it is. We are happy to share it with you.

The computer's role in developing the game is twofold. It produces continuous variations on a matrix which is used to determine if a "pitch" is a ball (B), strike (S), hit (H) or an out (O). It also prints out the game sheets. One is required for each player in a game.

Each game is one inning long. Each player is allowed either three outs or nine batters, which ever comes first.

The player that is at bat selects a coordinate on his "call matrix" (A1 to I9). He marks it off as he announces his choice to his opponent. His opponent then looks on his "pitch matrix." There, he sees the B, S, H or O, which tells the results of that call.

A player keeps track of the number of balls and strikes for each batter and the number of outs and men who get on base.

At the end of the game, all players convert the number of men who reached base safely to runs, by means of a chart provided by the computer.

If it sounds simple, you're right. A game takes about five minutes.

In teaching Tom to print out the game sheets, we have arranged for him to print as many as we request. He even calls us when he is done (CHR\$(7))!

OK! Let's... play ball!

Sample Game Sheet for Baseball

PITCH MATRIX										CALL MATRIX									
	A	B	C	D	E	F	G	H	I		A	B	C	D	E	F	G	H	I
1	S	B	B	S	O	B	B	B	S	1	.....	.....	.....	.....	.....	.....	.....	.....	.....
2	H	B	B	B	S	B	O	B	B	2	.....	.....	.....	.....	.....	.....	.....	.....	.....
3	S	S	S	H	B	S	B	S	B	3	.....	.....	.....	.....	.....	.....	.....	.....	.....
4	B	B	B	S	S	S	S	S	S	4	.....	.....	.....	.....	.....	.....	.....	.....	.....
5	S	S	S	B	S	B	B	H	H	5	.....	.....	.....	.....	.....	.....	.....	.....	.....
6	B	H	S	B	S	H	S	S	S	6	.....	.....	.....	.....	.....	.....	.....	.....	.....
7	B	S	S	S	S	S	H	O		7	.....	.....	.....	.....	.....	.....	.....	.....	.....
8	B	B	B	B	S	B	B	B	S	8	.....	.....	.....	.....	.....	.....	.....	.....	.....
9	S	H	B	B	B	S	B	H	B	9	.....	.....	.....	.....	.....	.....	.....	.....	.....

SCORE CHART

BATTER	BALLS	STRIKES	OUT	HIT/WALK
1	B B B B	S S S	O	H
2	B B B B	S S S	O	H
3	B B B B	S S S	O	H
4	B B B B	S S S	O	H
5	B B B B	S S S	O	H
6	B B B B	S S S	O	H
7	B B B B	S S S	O	H
8	B B B B	S S S	O	H
9	B B B B	S S S	O	H

RUN CHART

< 3 HITS OR WALKS = 0 RUNS	6 HITS OR WALKS = 4 RUNS
3 HITS OR WALKS = 1 RUN	7 HITS OR WALKS = 5 RUNS
4 HITS OR WALKS = 2 RUNS	8 HITS OR WALKS = 6 RUNS
5 HITS OR WALKS = 3 RUNS	9 HITS OR WALKS = 7 RUNS

Program Listing for Baseball

```

20 REM *****
30 REM *      BASEBALL      *
40 REM * BY LARRY KRENGEL *
50 REM *****
100 DIM D$(81),M$(9,9)
110 CLS:PRINTTAB(15)"BASEBALL GAME"
120 PRINT:PRINT:INPUT"HOW MANY GAME SHE
ETS WOULD YOU LIKE";HM
200 GOSUB 2000
210 RANDOM
    
```

Baseball game

```
220 N=81:A=1:B=1
300 FOR X=1 TO 81
310 Y=RND(N)
320 C=0
330 FOR Z=1 TO 81
340 IF D$(Z) <>"" THEN C=C+1
350 IF C=Y THEN GOTO 400
360 NEXT Z
400 M$(A,B)=D$(Z)
410 A=A+1
420 IF A=10:A=1:B=B+1
430 IF B=10 THEN GOTO 500
440 N=N-1
450 D$(Z)=""
460 NEXT X
500 LPRINTTAB(15)CHR$(14)"BASEBALL"
510 LPRINTCHR$(10)CHR$(10)
515 LPRINTTAB(11)"PITCH MATRIX";TAB(47)
"CALL MATRIX";CHR$(10)
520 LPRINT"      A B C D E F G H
I";TAB(41)"A B C D E F G H
I";CHR$(10)
530 FOR X=1 TO 9
535 LPRINTX;" ";
540 FOR Y=1 TO 9
550 LPRINTM$(X,Y);" ";
560 NEXT Y
565 LPRINTTAB(35)X;" ";".:.....
.:.....";CHR$(13)
570 NEXT X
600 LPRINTCHR$(10)CHR$(10)CHR$(14)TAB(1
1)"SCORE CHART";CHR$(10)
610 LPRINT"BATTER          BALLS
STRIKES          OUT          HIT/WALK"
620 FOR X=1 TO 9
630 LPRINT"  ";X;"          B B B B
S S S          O          H"
640 NEXT
650 LPRINTCHR$(10)CHR$(14)TAB(10)"RUN C
HART"
660 LPRINT" <3 HITS OR WALKS = 0 RUNS
6 HITS OR WALKS = 4 RUNS"
670 LPRINT" 3 HITS OR WALKS = 1 RUN
7 HITS OR WALKS = 5 RUNS"
680 LPRINT" 4 HITS OR WALKS = 2 RUNS
8 HITS OR WALKS = 6 RUNS"
690 LPRINT" 5 HITS OR WALKS = 3 RUNS
9 HITS OR WALKS = 7 RUNS"
710 HM=HM-1
720 IF HM=0 THEN PRINT"THAT'S ALL FOLKS
I":LPRINTCHR$(12)CHR$(7)CHR$(7):END
730 LPRINT CHR$(12):GOTO 200
2000 FOR X=1 TO 34:D$(X)="S":NEXT
2010 FOR X=35 TO 69:D$(X)="B":NEXT
2020 FOR X=70 TO 78:D$(X)="H":NEXT
2030 FOR X=79 TO 81:D$(X)="O":NEXT
2040 RETURN
```

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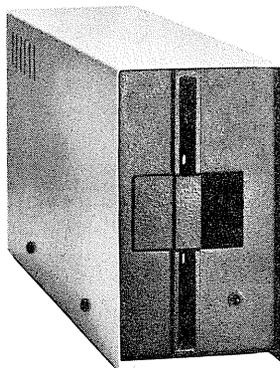
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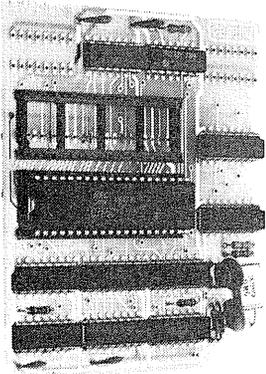
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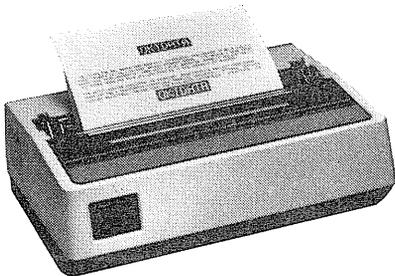
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Robot math

Plus and minus math for K-4

Model I with or without voice synthesizer
 Model III without voice synthesizer

Jeffrey C. Ruble, Port Angeles, WA

When my son Peter entered first grade, I decided to write some programs for our TRS-80 that he could use for drill work in math skills. Since first graders are just beginning to read, I felt that it was important to keep the amount of reading required of the child to a minimum. To help in this, I made use of Radio Shack's voice synthesizer (RSC#: 26-1180). My efforts yielded a program I have called Robot Math.

Robot Math features a talking robot who presents the student with a choice of five addition problems or five subtraction problems. Once the choice is made, the problems are presented by the robot, who nods his head if the answer is correct, and shakes his head if the answer is incorrect. The student is given two tries as the correct answer. The correct solution is given if the student fails on the second try.

What sets this drill program apart from others is the use of animation and voice. For example, if the student takes too long to respond to a question, the robot will begin to tap his foot impatiently. If the student gets a perfect score, he/she will be treated to a rocket blastoff with voiced countdown.

The program was "field tested" for two hours in a first grade class containing 30 kids. It, and the TRS-80, performed flawlessly, without the slightest adult intervention. I considered that a very rigorous test! Whenever I see one of those 30 kids, they usually ask me when I plan to bring Robot Math back to class. It evidently made quite a hit.

Robot Math will work on both Model I and III. While the voice synthesizer adds considerably to the program, it is optional. The number of questions asked, the number of tries at the correct answer, and the level of difficulty, can all be changed in lines 1140 to 1170. In addition, the data statements already contain the necessary phonemes, etc., to handle questions in multiplication and/or division.

Program Listing for Robot Math

```
1000 '*****
1010 '*      R O B O T  M A T H      *
1020 '*                                          *
```

```
1030 '* AN EARLY CHILDHOOD MATH *
1040 '*      DRILL PROGRAM          *
1050 '*      FOR TRS-80            *
1060 '*      WITH VOICE           *
1070 '*      SYNTHESIZER (OPTIONAL) *
1080 '*                                          *
1090 '*      AUTHOR:  JEFF RUBLE    *
1100 '*      PORT ANGELES, WA.     *
1110 '*****
1120 '
1130 CLS: CLEAR1000
1140 XP=5: '      NUMBER OF PROBLEMS
1150 MB=9:MA=0: '      MB,MA = MAX,MIN
      FOR PROBLEM FACTORS
1160 MS=12: '      MAX ANSWER FOR ADDITION
      PROBLEMS
1170 MI=2: '      MAX NUMBER OF TRY'S ALLO
      WED ON EACH PROBLEM
1180 '
1190 GOSUB2370
1200 '
1210 '      MAIN PROGRAM
1220 '
1230 IM=0:CLS:PRINTCHR$(23)
1240 FORI=32TO77:SET(I,1):SET(I,6):NEXT
      : ' DRAW BOX AND TITLE
1250 FORI=2TO5:SET(32,I):SET(77,I):NEXT

1260 WP=82:W$="ROBOT MATH":GOSUB2780 :I
      FPEEK(293)=73THEN1270 ELSEVO$=WV$(7):
      GOSUB2840 :TL=600:GOSUB2720
1270 P=296:PRINT@P,HD$(1);:PRINT@P+64,N
      K$(1);:PRINT@P+128,AR$(1);:PRINT@P+19
      2,LG$(1);:PRINT@P+256,FT$(1);: ' DRAW
      ROBOT
1280 TL=600:GOSUB2720 :WP=P+322:W$="HEL
      LO":GOSUB2780 :VO$=WV$(1):GOSUB2840 :
      TL=600:GOSUB2720
1290 TL=100:FORI=1TO2:PRINT@P+128,AR$(3
      );:GOSUB2720 :PRINT@P+128,AR$(1);:GOS
      UB2720 :NEXT: ' WAVES ARMS
```

```

1300 '
1310 TL=600:GOSUB2720 :PRINT@P,HD$(2);:
  PRINT@P+128,AR$(2);:' PRESENT MENU
1320 PRINT@P+322,"      ";WP=324:W$="PR
  ESS":GOSUB2780 :VO$=WV$(8):GOSUB2840
  :WP=390:W$="1 FOR <+>":GOSUB2780 :VO$
  =NV$(1)+" "+NV$(4)+" "+OV$(1):GOSUB28
  40 :WP=454:W$="2 FOR <->":GOSUB2780
  :VO$=NV$(2)+" "+NV$(4)+" "+OV$(2):GOS
  UB2840
1330 '
1340 K$=INKEY$:TL=20:' INPUT CHOICE
1350 OP$=INKEY$:PRINT@P+256,FT$(2);:PRI
  NT@P+192,LG$(2);:GOSUB2720
1360 IM=IM+1:IFIM=500THEN1210
1370 PRINT@P+256,FT$(1);:PRINT@P+192,LG
  $(1);:GOSUB2720 :IFOP$=""THEN1350
1380 OP=VAL(OP$):FORI=0TO2:PRINT@320+64
  *I,BL$;:NEXT
1390 PRINT@P,HD$(1);:PRINT@P+128,AR$(1)
  ;:TL=600:GOSUB2720
1400 IF (OP=1) OR (OP=2) THEN1430
1410 PRINT@P-58,"?";:PRINT@P+64,NK$(2);
  :PRINT@P+128,AR$(4);:TL=200:GOSUB2720
  :PRINT@P-58," ";:PRINT@P+64,NK$(1);:
  PRINT@P+128,AR$(1);:GOTO1310
1420 '
1430 GOSUB1490
1440 GOSUB1710
1450 GOTO1210
1460 '
1470 '           END MAIN PROGRAM
1480 '
1490 '           PROBLEM GENERATION
1500 '
1510 RANDOM:WP=388:W$="1 SECOND PLEASE"
  :GOSUB2780 :VO$=NV$(1)+" "+WV$(5)+" "
  +WV$(6):GOSUB2840
1520 F1(1)=INT(5*RND(0)):F2(1)=INT(5*RND
  (0))
1530 IF(OP=2)AND(F1(1)<F2(1))THEN1520
1540 P$(1)="#" +STR$(1)+" " +STR$(F1(1)
  )+OP$(OP)+STR$(F2(1))+" "=":IF(OP=1)TH
  ENA(1)=F1(1)+F2(1)ELSEA(1)=F1(1)-F2(1
  )
1550 FORI=2TOXP
1560 PRINT@P+256,FT$(2);:PRINT@P+192,LG
  $(2);
1570 F1(I)=INT((MB-MA+1)*RND(0))+MA:F2(
  I)=INT((MB-MA+1)*RND(0))+MA:' GENE
  RATE FACTORS
1580 IF(OP=1)AND(F1(I)+F2(I)>MS)THEN157
  0
1590 IF(OP=2)AND(F1(I)<F2(I))THEN1570
1600 P$(I)="#" +STR$(I)+" " +STR$(F1(I)
  )+OP$(OP)+STR$(F2(I))+" "="
1610 FORJ=1TOI-1
1620 IFP$(J)=P$(I)THEN1570
1630 PRINT@P+256,FT$(1);:PRINT@P+192,LG
  $(1);
1640 NEXTJ
1650 IF(OP=1)THENA(I)=F1(I)+F2(I)ELSEA(
  I)=F1(I)-F2(I)
1660 NEXTI
1670 PRINT@384,BL$;
1680 '
1690 RETURN:' END PROBLEM GENERATION
1700 '
1710 '           TESTING ROUTINE
1720 '
1730 WP=704:W$="#" RIGHT":GOSUB2780 :NR
  =0:NR$="" :WP=832:W$="#" WRONG":GOSUB2
  780 :NW=0:NW$=""
1740 FORI=1TOXP
1750 TR=1:' TR=NUMBER OF TRY5
1760 CU=384+2*LEN(P$(I))+1:IFCU<>2*INT(
  CU/2)THENCU=CU+1:' CUR
1770 PRINT@384,BL$;:PRINT@P,HD$(2);:PRI
  NT@P+128,AR$(2);:WP=384:W$=P$(I):GOSU
  B2780 :' PRESENT PROBLEM
1780 IFPEEK(293)=73THEN1800 :' TEST F
  OR MOD III
1790 VO$=WV$(2):GOSUB2840 :VO$=NV$(I):G
  OSUB2840 :VO$=WV$(3)+" "+WV$(4):GOSUB
  2840 :VO$=NV$(F1(I)):GOSUB2840 :VO$=O
  V$(OP):GOSUB2840 :VO$=NV$(F2(I)):GOSU
  B2840
1800 CT=0:AS$="" :A1$=INKEY$:' CT=COUNT,
  AS$=ANSWER STRING
1810 CT=CT+1:PRINT@CU,"?";:TL=20:GOSUB2
  720 :IFCT>100THEN1840
1820 A$=INKEY$:PRINT@CU," ";:GOSUB2720
  :IFA$=""THEN1810
1830 GOTO1860
1840 CT=CT+1:PRINT@CU,"?";:TL=18:PRINT@
  P+192,LG$(2);:PRINT@P+256,FT$(2);:GOS
  UB2720 :IFCT>200THENNW=NW+1:NW$=NW$+C
  HR$(138):PRINT@848,NW$;:GOTO1930
1850 A$=INKEY$:PRINT@CU," ";:PRINT@P+19
  2,LG$(1);:PRINT@P+256,FT$(1);:GOSUB27
  20 :IFA$=""THEN1840
1860 PRINT@CU,"";:AS$=AS$+A$:IFASC(A$)=
  13THEN1900
1870 PRINTA$;
1880 A$=INKEY$:CT=CT+1:IFA$=""THEN1880
1890 IFASC(A$)<>13THENPRINTA$;:AS$=AS$+
  A$:IFLEN(AS$)<3THEN1880
1900 A=VAL(AS$):GOSUB2090
1910 IFA=A(I)THEN1970
1920 TR=TR+1:IFTR<MT+1THEN1770
1930 PRINT@P+192,LG$(1);:PRINT@P+256,FT
  $(1);:PRINT@384,BL$;:WP=384:W$=P$(I):
  GOSUB2780 :PRINTA(I);:TL=500:GOSUB272
  0

```

Math game

```

1940 TL=200:FORJ=1TO3:PRINT@384,BL$:;GO
SUB2720:PRINT@384,P$(I);:PRINTA(I);:
GOSUB2720:NEXT
1950 IFPEEK(293)=73THEN1970: ' CHECK
FOR MOD III
1960 VO$=NV$(F1(I)):GOSUB2840:VO$=OV$(
OP):GOSUB2840:VO$=NV$(F2(I)):GOSUB28
40:VO$=WV$(4):GOSUB2840:VO$=NV$(A(I
)):GOSUB2840:TL=1500:GOSUB2720
1970 PRINT@P,HD$(2);:PRINT@P+128,AR$(2)
;:IFPEEK(293)=73THEN TL=200ELSE TL=1000

1980 GOSUB2720
1990 TL=20:FORJ=0TO5:PRINT@P+126,"*";:G
OSUB2720:PRINT@P+126," ";:GOSUB2720
:NEXT
2000 FORJ=P+127TO384STEP-1:PRINT@J,"*";
:NEXT:' RAYGUN
2010 FORJ=P+127TO384STEP-1:PRINT@J," ";
:NEXT
2020 TL=200:GOSUB2720:PRINT@P,HD$(1);:
PRINT@P+128,AR$(1);:GOSUB2720
2030 NEXTI
2040 IFNR=XPTHENGOSUB2220
2050 TL=500:GOSUB2720
2060 '
2070 RETURN:' END TESTING ROUTINE
2080 '
2090 ' RESPONSE
2100 '
2110 PRINT@P+128,AR$(1);:PRINT@P,HD$(1)
;

2120 IFA=A(I)THEN2160
2130 TL=75:FORJ=1TO3:GOSUB2720:PRINT@P
,HD$(2);:GOSUB2720:PRINT@P,HD$(1);:G
OSUB2720:PRINT@P,HD$(3);:GOSUB2720:
PRINT@P,HD$(1);:NEXT
2140 WP=P+322:Q=RND(4):W$=ESS(Q):GOSUB2
780:VO$=EV$(Q):GOSUB2840:IFTR=2THEN
NW=NW+1:NW$=NW$+CHR$(138):PRINT@848,N
W$;
2150 TL=1000:GOSUB2720:GOTO2180
2160 TL=75:FORJ=1TO3:GOSUB2720:PRINT@P
,HD$(4);:GOSUB2720:PRINT@P,HD$(1);:N
EXT
2170 WP=P+322:Q=RND(6):W$=PSS(Q):GOSUB2
780:VO$=PV$(Q):GOSUB2840:NR=NR+1:NR
$=NR$+CHR$(138):PRINT@720,NR$;:TL=100
0:GOSUB2720

2180 W$=" ":GOSUB2780
2190 '
2200 RETURN:' END RESPONSE ROUTINE
2210 '
2220 ' ROCKET
2230 '
2240 CLS:PRINTCHR$(23)

2250 FORJ=29TO41:SET(60,J):SET(68,J):NE
XT
2260 FORJ=56TO72:SET(J,41):NEXT
2270 PRINT@864,CHR$(181);
2280 SET(57,39):SET(56,40):SET(53,41):S
ET(69,39):SET(72,40):SET(73,41)
2290 SET(64,27):SET(61,28):SET(65,28)
2300 TL=10000:FORJ=10TO0STEP-1:PRINT@12
8+(10-J)*64,J;:VO$=NV$(J):GOSUB2840:
GOSUB2720:NEXT:PRINT@832,"BLASTOFF!!
";:VO$="BL99SST 21FF":GOSUB2840:GOSU
B2720
2310 FORJ=10TO-1STEP-1:PRINT@128+(10-J)
*64," ";:NEXT
2320 TL=50:FORJ=1TO16:PRINT@928,CHR$(13
2):PRINT:GOSUB2720:NEXT
2330 CLS:TL=1000:GOSUB2720
2340 '
2350 RETURN:' END ROCKET
2360 '
2370 ' PROGRAM DATA INPUT
2380 '
2390 ' ROBOT BODY PARTS
2400 HD$(1)=" "+CHR$(136)+CHR$(183)+CHR
$(191)+CHR$(187)+CHR$(132)+" ":' HEAD
LOOKING STRAIGHT
2410 HD$(2)=" "+CHR$(187)+CHR$(187)+CH
R$(191)+" ":' HEAD LOOKING LEFT
2420 HD$(3)=" "+CHR$(191)+CHR$(183)+CH
R$(183)+" ":' HEAD LOOKING RIGHT
2430 HD$(4)=" "+CHR$(160)+CHR$(159)+CHR
$(191)+CHR$(175)+CHR$(144)+" ":' HEAD
LOKING DOWN
2440 NK$(1)=" "+CHR$(179)+CHR$(191)+CH
R$(179)+" ":' NECK
2450 NK$(2)=" "+CHR$(160)+CHR$(179)+CHR
$(191)+CHR$(179)+CHR$(144)+" ":' SHRU
GGED SHOULDERS
2460 AR$(1)=" "+CHR$(150)+CHR$(191)+CHR
$(191)+CHR$(191)+CHR$(169)+" ":' ARMS
AT SIDE
2470 AR$(2)=CHR$(131)+CHR$(131)+CHR$(19
1)+CHR$(191)+CHR$(191)+CHR$(153)+" ":
' OUTSTRETCHED ARM
2480 AR$(3)=CHR$(131)+CHR$(131)+CHR$(19
1)+CHR$(191)+CHR$(191)+CHR$(131)+CHR$(
131)
2490 AR$(4)=" "+CHR$(133)+CHR$(191)+CHR
$(191)+CHR$(191)+CHR$(138)+" ":' ARMS
UP FOR SHRUG
2500 LG$(1)=" "+CHR$(171)+CHR$(131)+CH
R$(151)+" ":' LEGS
2510 LG$(2)=" "+CHR$(171)+CHR$(131)+CH
R$(183)+" ":' LEGS FOOT UP
2520 FT$(1)=" "+CHR$(131)+" "+CHR$(131
)+" ":' FEET
2530 FT$(2)=" "+CHR$(131)+" ":' FEE
T RIGHT UP

```

Math game

```

2540 '
2550 BL$=STRING$(21,128):OP$(1)=" +":OP
    $(2)=" -"
2560 '
2570 '          WORD AND PHONEMES
2580 DIMNV$(20),OV$(4),WV$(8),PS$(6),PV
    $(6),ES$(4),EV$(4)
2590 FORI=0TO20:READNV$(I):NEXT
2600 FORI=1TO4:READOV$(I):NEXT
2610 FORI=1TO8:READWV$(I):NEXT
2620 FORI=1TO5:READPS$(I),PV$(I):NEXT
2630 FORI=1TO4:READES$(I),EV$(I):NEXT
2640 DATA "Z*#R8^U", "W877NN", "T(UU", "=
    R.&", "FOOR", "FA;#&VV", "SI#K0S", "S54V4
    NN", ") ) * & T", "N;4&N", "T33NN", "#8L45V5N
    N", "T0W38LVV", "=RRITTEENN", "F^ORTTEENN
    ", "F#!FTT.EENN", "SIK0STEENN", "S3V4NTEE
    NN", ") ) * TTEEN", "NAA&NTEENN", "T0W3NT&"
    : ' 0-20
2650 DATA "PL76S", "MAA5#&NN76S", "T;5&MS"
    , "DE.V;7A#EDID B;5E": ' +,-,X,/
2660 DATA "H38L8^U", "N6MBL", "W867T", "IIZ
    Z", "S54K5NT", "PL.&Z", "RO^BA;8T M99="
    , "PR33SS": ' HELLO,NUMBER,WHAT,IS,SECO
    ND,PLEASE,ROBOT MATH,PRESS
2670 DATA "GOOD", "G<$5D", "GREAT", "GR@*&T
    ", "RIGHT", "R;5ET", "YES", "Y43SS", "SUPE
    R", "S(UUP//": ' PRAISES
2680 DATA "NO", "N8OU", "SORRY", "S;8RRE", "
    NOPE", "N8OP", "WRONG", "R21+N": ' ERROR
    ANNOUNCEMENTS
2690 '
2700 RETURN: '      END PROGRAM DATA INPUT
2710 '
2720 '          TIME OUT
2730 '
2740 FORTI=1TOTL:NEXT
2750 '
2760 RETURN: '      END TIME OUT
2770 '
2780 '          ROLL OUT WORDS
2790 '
2800 FORK=1TOLEN(W$):PRINT@WP,RIGHT$(W$
    ,K);:TL=20:GOSUB2720 :NEXT
2810 '
2820 RETURN: '      END ROLL OUT WORDS
2830 '
2840 '          VOICE GENERATOR
2850 '
2860 '          VO$=PHONEME COMING IN
2870 IFLEN(VO$)=0THENRETURN
2880 POKE16383,63:POKE16383,32
2890 FORVX=1TOLEN(VO$):POKE16383,ASC(MI
    D$(VO$,VX,1)):NEXT
2900 POKE16383,32:POKE16383,63:POKE1638
    3,32:TL=200:GOSUB2720
2910 '
2920 RETURN: '      END VOICE GENERATOR

```



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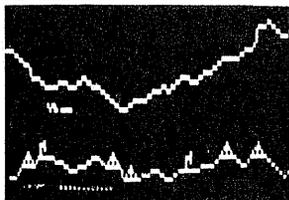
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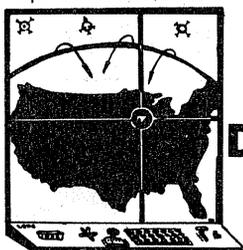
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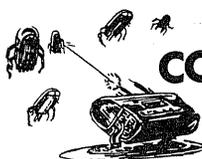
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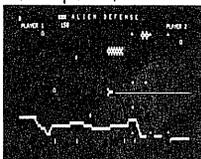
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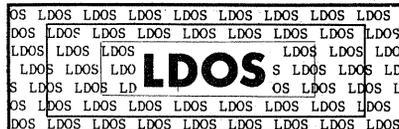
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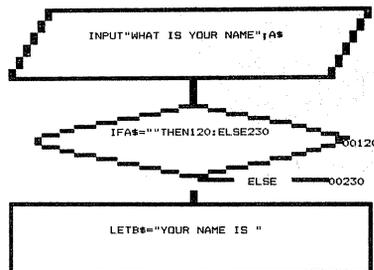
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Notes

Model III DEBUG PATCH

DEBUG, supplied on your TRSDOS Model III system disk, cannot display or modify memory below 5600H. Here is a three byte which will solve that problem. Under TRSDOS READY, type:

```
PATCH *5 (ADD=4EDA,FIND=56,CHG=00)
<ENTER>
PATCH *5 (ADD=4F00,FIND=56,CHG=00)
<ENTER>
PATCH *5 (ADD=5069,FIND=56,CHG=00)
<ENTER>
```

Your DEBUG utility can now display all of memory and alter any part of RAM. *Thanks to Daniel Schultz, Carmel, Indiana*

General information for Model II

The methods of handling input and output on the Model II are very different from the methods used on the Model I. Model I input and output are almost completely memory mapped. Blocks of addresses were assigned to input and output devices and either had the address decoding circuits directly cause the input or output device to accept or deliver data via the data bus or contained memory that was independently accessible by the input or output circuits. This meant that with the exception of the cassette, all input and output could be, in theory, accessed directly via PEEK and POKE. It was not practical with the floppy disks because they were operating too fast for the slow BASIC PEEK and POKE to keep up with them.

Many who upgraded from Model I to II were distressed to find that POKE and PEEK had been dropped from the Model II BASIC. Even if they manage to patch them into their Model II, they will be much less useful because the Model II is not memory mapped for input and output. Even the video, which has nearly 2K of video memory, is directly written by the CPU and not memory mapped as the Model I video memory is. In the Model II, normally all addresses from 0000H to FFFFH have regular RAM assigned to them.

The 4K of ROM in the Model II and the video memory are accessed by a form of bank switching. At start-up, the ROM is automatically switched in to replace the lower 4K of RAM. This happens when the machine is powered up or the RESET switch is pressed. After it has served its purpose, it is switched back to RAM via one of the ports.

The video memory is switched in place of the top 2K of RAM via output port FFH. If the byte output to this port has the most significant bit set, (a value of 128 or larger), then addresses FF80H through FFFFH will access the video memory but if output to port FFH does not have this bit set these addresses will refer to ordinary RAM. Even if the PEEK and POKE devotees also had acquired OUT so that they could set this bit, they would probably find that PEEK and POKE were not such a

fast way of getting their information to or from the screen. They even stand a good chance of fouling up or even crashing the system. Other bits of the output to this port are used for other purposes and it would be possible to accidentally turn off the video altogether or have the computer trying to use banks of RAM that do not exist. Access to the video memory by the CPU is limited to the vertical retrace time and if access is attempted at other times, wait states will be used to hold off the CPU while the video is being refreshed from the video memory. The relatively slow BASIC commands might wind up being even slower due to the CPU being in wait states for so much of the time. Too much waiting may also interfere with memory refresh and crash the entire system.

Assembly language programmers can take advantage of an SVC to access the video memory via the normal operating system. Perhaps BASIC programmers would do better to use a machine language subroutine that calls this SVC for access to video memory. The SVC can either copy a buffer in RAM into the video memory or copy the video memory into a buffer in RAM. The buffer must be located below FF80H, since it is impossible to access both the upper 2K of RAM and the video memory at the same time.

The use of other bits output to port FFH is interesting. Besides bit seven being set for video memory access and cleared for normal RAM access, the other bits control various functions. Bit six can be set to disable the video and so blank the screen without disturbing the video memory. Bit five must be set to enable the real-time clock interrupts to be generated. Setting bit four switches to the 40 character line display instead of the usual 80 character line. Bits zero through three are probably the most interesting of the other bits, although their function is not yet implemented. They are part of the provision for expansion beyond 64K. For the time being, you are well advised to leave these bits as zeros, otherwise you may be telling your computer to address memory that does not exist. In theory, this provision could handle up to a total of 256K of memory using a bank switching system. The memory is divided into pages of 32K. Page zero is always addressed by addresses 0000H through 7FFFH, but the numbers output through the lower four bits of port FFH determine which of the other pages is addressed by addresses 8000H through FFFFH.

Although the Model II has a 4 Mhz clock, for critical timing you can't simply count up the states as listed in Z-80 programming books and divide by four to get the time in microseconds. The memory used in the Model II is rated at 200 nanoseconds and during an MI cycle there is only about 250 nanoseconds from the time the CPU puts out the signals and the time it reads the data bus. Considering the timing tolerances and the delays of the signals in going through the various gates and buffers, this 50 nanosecond leeway is not enough for reliable operation, so a wait state is introduced in every MI cycle. The other memory cycles have a bit more time so that the extra wait state is not required. Therefore, add one quarter of a microsecond for each byte of opcode, but not for bytes of data or addresses. *Thanks to David S. Tilton, Manchester, New Hampshire.* ■

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Solitaire

A version known as "Golf"

Model I/III

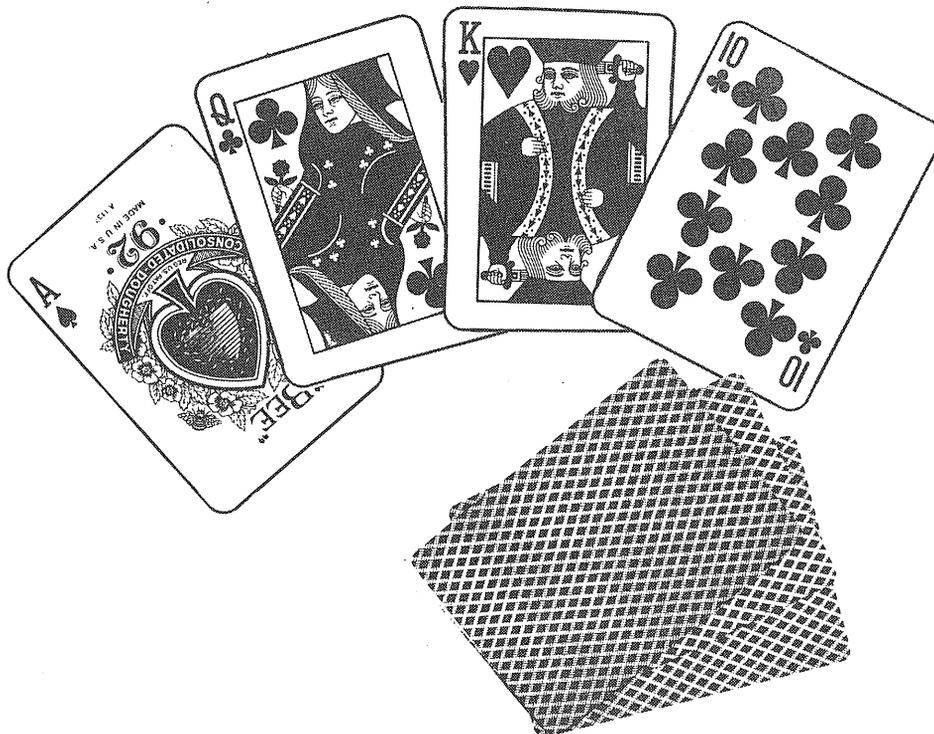
Robert D. Miller, Hopewell, VA

Before computers there was Solitaire! Actually, there still is Solitaire, but many of us have forsaken the age-old pastime for a more sophisticated means of whiling away the hours, namely the home computer. As a recreational tool, the computer has been programmed to play chess, checkers, backgammon, bridge, poker and a seemingly endless variety of games. Why not program the computer to play Solitaire as well?

Certainly the most tedious part of any game of Solitaire is the shuffling and dealing of the cards, not to mention keeping the layout tidy as the game progresses. Of course, there's that problem of avoiding the temptation to "cheat" in order to make the game come out right. Well, the computer is a proven whiz at dealing a deck of cards! Keeping the layout tidy is certainly not a problem and when it comes to keeping potential "benders-of-the-rules" in line, the computer can be merciless. The computer can take away the drawbacks of the game and still leave behind the challenge that has always been the drawing (pardon the pun) card of Solitaire. Why not give it a try?

Actually, Solitaire is not an individual game, but rather a collective term encompassing well over a hundred card games. The varieties are almost endless, but most versions have one thing in common, and that is dealing out part of a deck of playing cards into a layout (or tableau). Then, the remaining cards (stock) are used along with the cards in the tableau to build a stack or stacks of cards, usually based on rank, color or suit. The object of most games is to use all the cards in the tableau and the stock in building the stack(s).

The version of Solitaire I selected to adapt to the computer is known as "Golf." It is not one of the more widely known versions of Solitaire, but it is, nonetheless, quite a challenge to play. It requires skill as well as luck in order to win. An added feature is that it is not based on the color or suits of cards, but just the rank, so it lends itself quite easily to a black and white video screen. Before getting into the computer version of the game, let me briefly describe how the game is played with a regular deck of 52 playing cards.



Card game

After the cards are shuffled, 35 of them are dealt face up into a tableau of seven columns by five rows. The cards in each column overlap in such a fashion that the top half of each card can be seen, with the lowest card in each column being fully exposed. The 36th card is dealt face up below the tableau as the start of the discard pile. It is upon this card that play begins.

The object of the game is to selectively remove cards from the tableau, placing them on the discard pile, thus reducing the number of cards in the tableau to a minimum (ideally, zero). Only the bottom (fully exposed) cards from each of the seven columns are available for play. In order for one of these cards to be used, its rank must be one higher or one lower than that on the discard pile (Ace is low, King is high). For example, a six on the discard pile can have either a five or a seven played on top of it, a Jack can be topped with a Queen or a ten, and an Ace (the lower extreme) can be topped with (only) a deuce. The only exception to this rule is when a King (the upper extreme) is present on the discard pile. At this point, the sequence must end. In other words, a King can be played on a Queen, but a Queen may not be played on a King. Other than this, the sequence can continue up and down, indefinitely, until no more cards are eligible for play. When this occurs, the top card of the remaining 16 cards is turned up and placed on the discard pile. Play then continues as before, with additional cards being turned up as necessary. The game ends when either no more play can take place (you may only go through the deck once) or the tableau has been completely removed to the discard pile.

It should be noted that it is not mandatory that every qualifying card from the tableau be used before turning up the next card from the stock. In some cases, it may be good strategy to "hold off" on playing a certain card until later. Experience will be the best teacher when it comes to this matter.

In playing this game, it is possible to keep score by counting the number of cards left in the tableau at the end of each hand. In this way, one can compete with another player. In fact, it is from this concept that the game gets its name, Golf. Each deal of the cards is a "hole" and one plays either nine or 18 holes in an attempt to get the lowest score possible. Incidentally, if you are fortunate enough to dispose of all the cards in the tableau and still have undealt cards left over, then the number of those cards becomes a negative score for that "hole." Believe me, that doesn't happen too often!

The computer version of Golf follows the rules just described. A few other features have been added to make the game more enjoyable.

A few seconds after entering RUN, the CRT will display a graphic representation of the tableau of 35 cards and the discard pile. The columns are numbered one through seven. To select a card from the bottom of any column for play on the discard pile, just press the key corresponding to the appropriate column number. The card will disappear from that column and reappear as the top card of the discard pile. To turn up a card from the undealt portion of the deck, press the @ key. The outline of the discard pile will appear to "flip" over as the new card appears as the top card.

Don't worry about making a wrong move! First of all, the computer checks to make sure each move is legal. If it isn't, it will simply ignore your keystroke. Likewise, if you press @ when there are no cards remaining in the deck, nothing will happen. To keep you posted on the status of the game, the computer always displays the number of cards remaining in the tableau as well as the number of undealt cards yet to be played.

What about those "extra's" I mentioned? Well, for one, if you "change your mind" (we won't call it cheating!), you can literally "take back" a move by pressing the "up arrow" key (displayed as a left bracket on some systems). In fact, you can play the entire hand in reverse by repeatedly pressing this key! You can use this feature to test different strategies from a given position.

When you have completed playing a hand and want to play another, press the "N" key, and the computer will reshuffle the deck and deal the cards again. If you would like to play the exact same hand over again, press the "S" key and the computer will deal the cards exactly as they were dealt the time before. Now, if someone is watching you play and boasts that they could have done better with a given deal, you can make them eat their words! Just press "S" and let 'em try!

When you are finished using the program, just press "E" and the computer will return you to a BASIC ready condition. Here is a summary of all the commands:

Summary of commands

1-7— Select card from numbered column of tableau for play on discard pile.

@— Turn over next card from undealt portion of the deck.

Up arrow— Reverses play one move.

N— Start new game with reshuffled deck.

S— Start same game over with same deck.

E— End of game.

The program listing that follows has sufficient REMARKS in it to guide you through. I would like to point out some of the techniques used, particularly in generating the graphics.

Lines 260-330 are used to form the graphic outlines of the cards as they appear in the tableau and the discard pile. B1\$ is a concatenation of graphic and cursor control characters that forms the outline of the upper half of one card. B2\$ is the sum of seven B1\$'s to form an entire row. Similarly, B3\$ and B4\$ are used to generate the graphics necessary to represent the lower halves of a row of cards. B5\$ is the complete outline of the single card used as the discard image and B6\$ and B7\$ are used to "blank out" a portion of the CRT when a card is removed from the tableau.

Lines 340-440 are used to create the sequence of images needed in order to make the discard pile appear to "flip" when a card is dealt. Seven different card images are used, each successive one representing a proportionally smaller outline of a card. The subroutine at line 890 is then used to flash the images from large to small and then to large again in such a succession that the card image appears to be flipping on the CRT.

There are four arrays used by the program. A\$(52) is used to store the string values of the deck of cards. B(5,7) is used to store the numeric representation of each card

Card game

in the tableau, with the "zeroth" element of each column (e.g., B(0,1), B(0,2), etc.) being used to store the number of cards remaining in each column. The array C(52) is used to keep track of the cards played so that the game may be "backed up" one step at a time. In conjunction with this D(52) is used to store the origin of the card played so that it can be returned to its original position when play is reversed.

Lines 660-760 are used as a simple INKEY\$ function to accept keyboard input and check it for applicability to the game situation. If the input keystroke doesn't meet the proper conditions for play, the program loops back to the INKEY\$ line as if nothing happened.

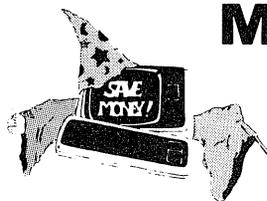
I believe that Golf is an entertaining and challenging version of Solitaire. I had played it for months before the thought occurred to me to try to adapt it for play on the computer. That, too, has proved to be a challenge, but a very worthwhile one. I hope that you will find the resulting program to be enjoyable. Fore!

```

100 'GOLF->A SOLITAIRE GAME
110 'VERSION 1.3->MARCH 1981
120 REM *** ROBERT D. MILLER ***
130 REM *** 4005 YORKTOWN DRIVE ***
140 REM *** HOPEWELL, VA 23860 ***
150 REM *** (804) 458->4140 ***
160 REM *** SET UP ARRAYS ***
170 CLS: CLEAR 3000: DEFINT A-Z: DIM A$(52),
    B(5,7), C(52), D(52)
180 REM *** PRINT TITLE IN EXPANDED PRI
    NT ***
190 PRINT CHR$(23): PRINT@156, "GOLF"; : PR
    INT@394, "A VERSION OF SOLITAIRE"; : PR
    INT@734, "BY"; : PRINT@912, "ROBERT D. MILL
    ER";
200 REM *** READ IN CARDS ***
210 FOR I=1 TO 52: READ A$(I): NEXT
220 DATA A S,2 S,3 S,4 S,5 S,6 S,7 S,8 S
    ,9 S,10 S,J S,Q S,K S
230 DATA A D,2 D,3 D,4 D,5 D,6 D,7 D,8 D
    ,9 D,10 D,J D,Q D,K D
240 DATA A C,2 C,3 C,4 C,5 C,6 C,7 C,8 C
    ,9 C,10 C,J C,Q C,K C
250 DATA A H,2 H,3 H,4 H,5 H,6 H,7 H,8 H
    ,9 H,10 H,J H,Q H,K H
260 REM *** CREATE GRAPHICS FOR CARD OU
    TLINES ***
270 B1$=CHR$(151)+CHR$(24)+CHR$(26)+CHR
    $(149)+CHR$(27)+STRING$(6,131)+CHR$(1
    71)+CHR$(24)+CHR$(26)+CHR$(170)+CHR$(
    128)+CHR$(27)
280 B2$=B1$+B1$+B1$+B1$+B1$+B1$+B1$+CHR
    $(26)
290 B3$=CHR$(149)+CHR$(24)+CHR$(26)+CHR
    $(181)+STRING$(6,176)+CHR$(186)+CHR$(
    24)+CHR$(27)+CHR$(170)+CHR$(128)
300 B4$=B3$+B3$+B3$+B3$+B3$+B3$+B3$+CHR
    $(26)
310 B5$=B1$+STRING$(9,24)+STRING$(2,26)
    +B3$

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Card game

```

320 B6$=STRING$(9,128)+STRING$(9,24)
330 B7$=B6$+CHR$(26)+B6$+CHR$(26)+B6$+CHR$(26)+STRING$(9,128)
340 REM *** CREATE GRAPHICS FOR FLIPPING G OF CARD ***
350 C0$=STRING$(8,128)+STRING$(8,24)
360 C1$=CHR$(151)+STRING$(6,131)+CHR$(171)+STRING$(8,24)
370 C2$=CHR$(156)+STRING$(6,140)+CHR$(172)+STRING$(8,24)
380 C3$=STRING$(8,176)+STRING$(8,24)
390 C4$=CHR$(181)+STRING$(6,176)+CHR$(186)+STRING$(8,24)
400 C5$=CHR$(141)+STRING$(6,140)+CHR$(142)+STRING$(8,24)
410 C6$=STRING$(8,131)+STRING$(8,24)
420 C7$=CHR$(149)+STRING$(6,128)+CHR$(170)+STRING$(8,24)
430 Z$(1)=C1$+CHR$(26)+C7$+CHR$(26)+C7$+CHR$(26)+C4$:Z$(2)=C2$+CHR$(26)+C7$+CHR$(26)+C5$:Z$(3)=C3$+CHR$(26)+C7$+CHR$(26)+C7$+CHR$(26)+C6$
440 Z$(4)=C0$+CHR$(26)+C1$+CHR$(26)+C4$+CHR$(26)+C0$:Z$(5)=C0$+CHR$(26)+C2$+CHR$(26)+C5$+CHR$(26)+C0$:Z$(6)=C0$+CHR$(26)+C3$+CHR$(26)+C6$+CHR$(26)+C0$:Z$(7)=C0$+CHR$(26)+C0$+CHR$(26)+C0$+CHR$(26)+C0$
450 REM *** SHUFFLE CARDS ***
460 RANDOM
470 FORI=52TO1STEP-1:K=RND(I):A$(0)=A$(K):A$(K)=A$(I):A$(I)=A$(0):NEXT K
480 REM *** DETERMINE VALUES OF CARDS IN TABLEAU ***
490 FORI=1TO35:J=INT((I-1)/7)+1:K=I-(J-1)*7:GOSUB510 :B(J,K)=C:B(0,K)=5:NEXT T:GOTO560
500 REM *** SUBROUTINE TO DETERMINE VALUE OF CARD ***
510 C$=LEFT$(A$(I),1):C=VAL(C$)
520 IFC=1THENC=10
530 IFC$="A"THENC=1ELSEIFC$="J"THENC=11ELSEIFC$="Q"THENC=12ELSEIFC$="K"THENC=13
540 RETURN
550 REM *** PRINT CARD TABLEAU OUTLINE ON CRT ***
560 CLS:FORI=1TO5:PRINTB2$:NEXT:PRINTB4$:PRINT@795,B5$;:FORI=1TO7:PRINT@(I-1)*9+4,RIGHT$(STR$(I),1);:NEXT
570 REM *** FILL IN OUTLINE WITH CARD NAMES ***
580 J=1:FORI=64TO639STEP9:PRINT@I+3,A$(J);:IFINT(J/7)=J/7THENI=I+65
590 REM *** SET COUNTERS AND PRINT FOOTERS ON CRT ***
600 J=J+1:NEXTI:I=J:X=35:L=1:M=1:D(M)=I

```

```

610 PRINT@832,"# OF CARDS IN TABLEAU:";
:PRINT@872,"# OF CARDS IN HAND:";:PRI
NT@896,"PRESS @ FOR NEXT CARD";:PRINT
@960,"PRESS ^ TO TAKE BACK MOVE";:PRI
NT@936,"PRESS N FOR NEW DECK";:PRINT@
1000,"PRESS S FOR SAME DECK";
620 REM *** UPDATE STATUS OF REMAINING
CARDS ***
630 PRINT@854," ";:PRINT@854,X;:PRINT
@892," ";:PRINT@892,52-J;:PRINT@862
," ";:PRINT@862,A$(I);
640 REM *** GO COMPUTE VALUE OF THE UP
CARD ***
650 GOSUB510
660 REM *** ACCEPT INPUT AND TEST FOR V
ALIDITY ***
670 Z$=INKEY$:IFZ$=""THEN670
680 IFZ$="@ "THENJ=J+1:IFJ>52THENJ=52:GO
TO670 ELSEI=J:C(L)=0:L=L+1:M=M+1:D(M)
)=I:GOSUB890 :GOTO630
690 IFZ$="^"THEN830
700 IFZ$="N"THENCLS:GOTO460
710 IFZ$="S"THENCLS:GOTO490
720 IFZ$="E"THENCLS:END
730 Z=VAL(Z$):IFZ<1ORZ>7THEN670
740 IFB(0,Z)=0THEN670
750 IFC=13THEN670
    
```

```

760 Y=B(B(0,Z),Z):IFABS(C-Y)<>1THEN670
770 REM *** COMPUTE CRT POSITION OF SEL
ECTED CARD ***
780 REM *** AND MOVE SELECTED CARD TO D
OWN PILE ***
790 I=(B(0,Z)-1)*7+Z:B(0,Z)=B(0,Z)-1
800 Q=(I-1)*9+INT((I-1)/7)*65:PRINT@Q,B
7$;
810 IFB(0,Z)>0THENPRINT@Q,B3$;
820 X=X-1:C(L)=Z:L=L+1:M=M+1:D(M)=I:GOT
O630
830 REM *** ROUTINE TO TAKE BACK PREVIO
US MOVES ***
840 IFL=1THEN670
850 L=L-1:IFC(L)=0THENM=M-1:J=J-1:I=D(M
):GOSUB890 :GOTO630
860 B(0,C(L))=B(0,C(L))+1:I=(B(0,C(L))-
1)*7+C(L)
870 Q=(I-1)*9+INT((I-1)/7)*65:PRINT@Q,B
5$;:PRINT@Q+65," ";:PRINT@Q+67,A
$(I);:IFB(0,C(L))=1THENPRINT@C(L)-1)
*9+4,RIGHT$(STR$(C(L)),1);
880 M=M-1:I=D(M):X=X+1:GOTO630
890 REM *** SUBROUTINE TO FLIP CARD ***
900 FORN=2TO7:PRINT@795,Z$(N);:NEXT
910 FORN=6TO1STEP-1:PRINT@795,Z$(N);:NE
XT:RETURN
    
```

EDITOR'S NOTE: THE [IN THIS LISTING IS THE UP-ARROW.

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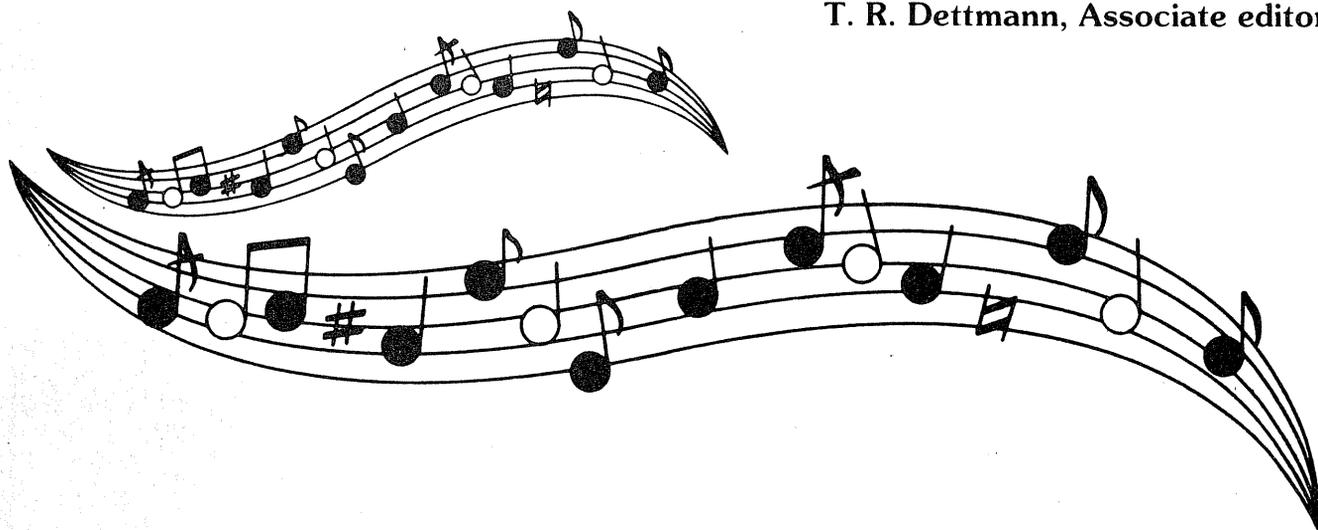


Exploring the Color Computer

Sound from cassette to TV with BASIC

Color Computer

T. R. Dettmann, Associate editor



If you have a Color Computer, you have probably played music with the system in the form of games and other programs that use the ability of the machine to generate sound. But what if you would like to play other, more complex music? Or, what about having a voice accompanying a program?

Suppose you would like to have a teaching program that combines the unique ability of the Color Computer to present fascinating visuals, and the ability of the cassette recorder to play back recorded information. You would also like to have the computer control the cassette and play the information through the speaker on the TV accompanying the visuals. Sound hard? Think it's going to involve you in soldering? Will you have to build complicated computer interfaces? What would you say if I told you it was *built into the Color Computer!*

It's true! The Color Computer has built-in circuitry to allow you to control the cassette port directly, and redirect what comes from the cassette to the speaker on your TV.

So far, I haven't really seen this used anywhere (or even mentioned outside the service manual and other technical manuals on the system). Nor have I seen *any* information to suggest that this could be of use to anyone other than assembly language programmers.

This ability is available from BASIC if you want it.

Cassette Control

In the Color Computer, all input/output (I/O) is handled through a pair of chips called "6821 PIAs" (Peripheral Interface Adapters). The 6821 is a two-way communication chip that allows the programmer an immense amount of flexibility in communicating with the outside world. There are command bits in the PIA that we can set (turn on to 1) or reset (turn off to 0). If we know where the bits are that we want, and which way we want them, we can establish whatever control we want.

Eventually, what we want to control is the sound output controller (an MC14529B chip). We also want to control the cassette motor (on and off). We could use MOTOR ON and MOTOR OFF, but we'll go direct for the moment.

The control bits we're interested in are the following:

Address (Hex)	Bit	Function
FF01	3	SEL1—first selection line
FF03	3	SEL2—second selection line
FF21	3	Cassette motor control
FF23	3	Sound enable

The Color Computer Service Manual (page 34) has a table of functions of the SEL1, SEL2, and sound enable bits:

Enable	SEL1	SEL2	Source Selected
1	0	0	6 bit D/A
1	1	0	Cassette
1	0	1	Cartridge
1	1	1	Not used
0	(can be anything)		Single bit sound

To use the cassette sound source, we need to set SEL1 on, SEL2 off, and enable on. This means we have to set bit three in an eight bit number to 1 or 0 without disturbing the rest of the bits. If we mess up and change the other bits, we'll change some other I/O function.

Most of us have used AND and OR at one point or another, without thinking about what they really stand for. If we think about using values 0 and 1 only, then an AND operation leaves the result: *1, only if both original items are 1.* Specifically,

- 1 AND 1 = 1
- 1 AND 0 = 0
- 0 AND 1 = 0
- 0 AND 0 = 0

The OR operation leaves the result: *1, if either of the original items are 1.* Specifically,

- 1 OR 1 = 1
- 1 OR 0 = 1
- 0 OR 1 = 1
- 0 OR 0 = 0

If we do an AND (or an OR) in BASIC, between two numbers, the result of the operation is found by doing the AND (or OR) operation on each number, *bit by bit!*

Think about what would happen if we OR'd the eight bit number 00000000 (that's binary for zero) with the number 00001000 (that's binary for eight). Doing a bit-by-bit OR, we get:

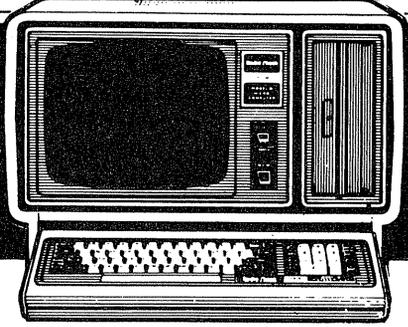
```

00000000
00001000
-----
00001000  result has bit 3 set!
    
```

This is called masking, and the 00001000 (eight decimal) is our mask. In order to set a particular bit, we use an OR with the number that corresponds to having that bit set.

Similarly, an AND operation is used to reset a bit that we want off. Simply AND with a number where that bit is reset. To set bit three of a number, OR with the number 8. To reset bit three, AND with 247:

Decimal	Binary	
8	00001000	Sets bit 3 with OR
247	11110111	Resets bit 3 with AND



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Article

Now, try out your cassette system. Hook up your cassette recorder, put some music in the recorder, and turn it on to play. We'll turn it on from the keyboard and direct the music to the TV.

Type each command directly (no line numbers). This will show the method. Later, this can all be incorporated into programs that you might want to do this in. The commands given are for the Extended BASIC system specifically, but don't require any particular amount of memory.

S1=PEEK(&HFF01) (Get current value in FF01)
S2=PEEK(&HFF03) (Get current value in FF03)
CM=PEEK(&HFF21) (Get current value in FF21)
SE=PEEK(&HFF23) (Get current value in FF23)

Turn cassette motor on

CM=CM OR 8 (Set bit 3 on for cassette motor)
POKE(&HFF21),CM (Cassette should turn on now)

Turn on the sound

S1=S1 OR 8 (Set bit 3)
S2=S2 AND 247 (Reset bit 3)
POKE(&HFF01),S1 (Put it back in the PIA)
POKE(&HFF03),S2 (Put it back in the PIA)

SE = SE OR 8 (Set bit 3)

POKE(&HFF23),SE (Put it back in the PIA)

At this point, the music (or whatever) from your cassette should be coming through your TV set. If it's not, check the volume controls on the cassette and on the TV as well as the cables. If everything is right, RESET the computer and try again.

If you aren't too confident about typing in the commands, put them in with line numbers as a BASIC program and then RUN the program after you've verified it.

This technique has great potential for such things as computer-aided instruction, interesting games, instructions for running programs, and so forth. I leave it to you to dream up your own possibilities. ■

Ed. Note— Now that you've digested the material in this article, it's time to learn the easy way to perform the same function. Place an audio cassette in the recorder and press the play button. In the command mode, type MOTOR ON: AUDIO ON and press ENTER. The sound should come from the TV speaker. To turn off the sound, type AUDIO OFF: MOTOR OFF, and press ENTER. The sound and recorder will both stop. This procedure may also be used in a BASIC program.

The method for using this procedure, as described in the article, is a good exercise for dealing with Hex numbers and turning bits on and off, etc. That is why we had you learn the hard way first. Now, aren't you glad we handled it in that manner?

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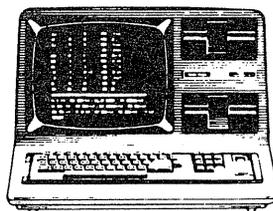
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Circle # 34

Quirks, fixes, tips and tricks

For the Pocket Computer

Pocket Computer

R. Shane Causer, Brunswick, GA

The first rule to observe when buying a new computer: Every computer has a manual, but all manuals are not created equal!

The Pocket Computer is no exception to this. The manual, while being better than some, is not the best it could be. It was written, it seems, for someone already familiar with computer programming, and thus has several omissions. The purpose of this article is to discover these omissions and bring them out into the open.

Since I am primarily a game writer, the first problem I encountered was the absence of a command to produce a random number, such as RND(x). The manual gives a routine that produces a random number (page 112), but it did not satisfy my every need. Another routine had to be written, and here it is:

```
R=((pi=R) ^ 5)-INT((pi+R) ^ 5):RETURN
```

The routine is meant to be used as a subroutine, as can be deduced from the RETURN command at the end (elementary, Watson!). This routine will produce a number from zero to .9999 (the value being contained in the variable R). Notice that "pi" in the routine is actually the symbol (a shifted up-arrow) and the character before the 5s is a shifted square root symbol.

To use the routine, GOSUB nnn where nnn is the line number of the routine. Take the R variable and multiply that with the number that you want the randomly-produced number to be between (huh?).

In other words, to produce a number between zero and 27, you would type the following:

```
GOSUB 999:A=INT(27*R)
```

The integer function is taken to get rid of the digits after the decimal point.

One problem bytes the dust! (Sorry about that rotten pun—I just couldn't resist.)

There is one serious omission in the Pocket Computer's manual. The writer(s) neglected to tell us poor readers that string manipulations are not possible on the Pocket Computer. Concatenation is possible, but only when it (the string) is sent to the display. This routine:

```
1:A$="ABC":B$="DEF":PRINT A$;B$
```

concatenates A\$ and B\$, but it is the only type of concatenation available.

There is a peculiar quirk with the execution time of the Pocket Computer. A tight loop, such as:

```
1:FOR A=1 TO 100:NEXT A
```

takes approximately 24 seconds to execute. If the routine is rewritten to:

```
1:FOR Z=1 TO 100:NEXT Z
```

the execution time is dropped to approximately 20 seconds.

While we're on the subject of loops, the final number must have no more than three digits in it. Thus:

1:FOR A=1 TO 1000:NEXT A

will produce an error. Also, on loops: if added instructions are placed between the initializing of the loop (FOR z = n TO w) and the NEXT statement, execution time increases tremendously.

If you use the INS (insert) feature to add characters to a line, all empty brackets (the symbol representing an empty spot) will be deleted from the line after ENTER is pressed. For example, type this into the Pocket Computer:

1:PRINT"X":END

Now use the INS feature to put a bracket on both sides of the X. Do not put another character into these brackets, just press ENTER. When you LIST line number one, it will look exactly as it did before you inserted the brackets. This is handy if you want to change a message in a PRINT statement, but do not want to retype the entire line of code. Just insert a liberal amount of brackets inside the quotation marks, and type in the new message, pressing ENTER when you are finished. Any extra brackets will be deleted from the line. You have no idea how many brackets I DELETED before I discovered this one!

If you've got a Model I or III, and you have compared that model's BASIC to the BASIC in the Pocket Computer, you will have noticed that both have the PRINT USING command. This is the command that allows printed variables to be formatted in a desired manner. You probably did like I did: assumed that the commands function in the same way. *Wrong!* First, you cannot assign a string variable to a certain format when you

are PRINTing. This is common in the BASIC on the Model I and Model III. In other words:

1:U\$="###.##":N=123.45:PRINT USING U\$;N:END

would generate an error in Pocket Computer BASIC, but would be perfectly "legal" in Level II BASIC.

Second, you must allow for the number's sign when you are printing a variable in a format using PRINT USING. Therefore, to PRINT 123.45, you would have to use something like this:

1:USING"####.##":N=123.45:PRINT N

I wore out the arrow keys trying to find an error in a line where that happened!

The INPUT statement differs between BASICs, too. When I first opened the box and removed my Pocket Computer, I turned it on and typed:

1:INPUT"HELLO";A\$:PRINTA\$:END

After a few minutes, the program was up and running. Two surprises came out. One was the lack of a question mark following the prompt statement "HELLO". The other came out when I read in the manual that if the semicolon was replaced by a comma, the prompt would only be seen on the screen until a key was pressed. Up until that time, I used only a semicolon and watched as I typed in what I wanted and saw the prompt scroll sideways off the screen.

Also on the INPUT statement, remember that you can edit anything on the screen including what you are INPUTing. This included INSerting, DELETing, and changing a character by typing over it with another. Also keep in mind that the backspace key does not actually erase a character from the computer's memory. It simply moves the cursor backward. Any character erasing you want to do must be done using the editing commands.

Whenever you PRINT more than one variable in a row, all variables except the first must be presented alone. Thus:

1:A=123.45:PRINT A*3;A*5:END

would produce an error. The line would have to be rewritten as:

1:A=123.45:B=A*5:PRINT A*3;B:END

Credit should go to Radio Shack for telling us that sometimes the Pocket Computer will "lock up" (ignore any attempt to recognize a key being pressed). I mention it here, because about thirty minutes after I turned on the Pocket Computer, it locked up. Because I had not read the manual thoroughly, I did not expect it. After looking in the manual, I discovered that pressing the reset button on the back would solve the problem. I mention it here as a classic example of why you should read the manual before you dive into programming anything. You will discover things that you may otherwise learn the hard way! ■

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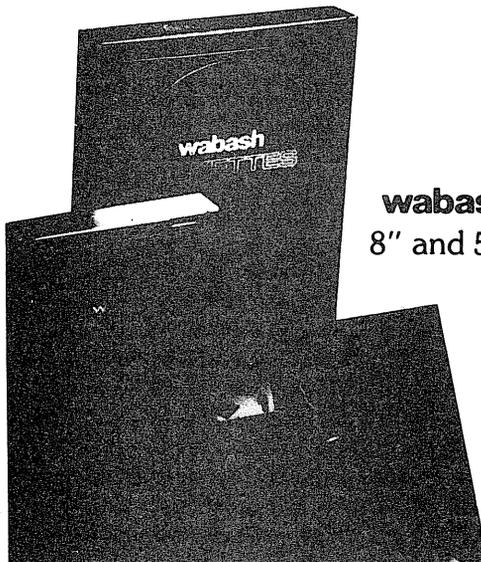
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Checkbook

Part I: Using NEWDOS/80 to write a checkbook program

Model I/III

J. L. Latham, Midwest City, OK

Do you have a Model I or III computer that seems to be short of memory? Does your disk mass storage media seem to think it is a micro storage media? If the answer to either question is yes, then perhaps you ought to continue reading this article to find out how you can help! your computer to serve you better in these areas. Before you are through here, you will know how to more effectively use disk space and RAM memory, and get a nice program as a reward for your time spent.

The ideas presented in this article will work with any home computer. The package is specifically designed for a TRS-80 Model I/III using NEWDOS/80 version 2.0 as the Disk Operating System. All routines used within the programs are compatible with the Model III computer if NEWDOS/80 is used. Rather than take a shotgun approach and touch briefly on all of the commands available through NEWDOS/80 version 2.0, I will focus on the MERGE, DELETE, and CMD"O" commands, touch lightly on the OPEN"E" method of opening disk files, and show how the RUN"filename",V option for running another program, works to save memory.

Before you are through with this series of articles, you should have a good idea of how to use these commands. You will get a couple of generally useful subroutines for use anytime, and will even find where you can get to some reserved memory without having to specify it directly when you go from DOS to BASIC. Eventually, we will put together a compact and versatile checkbook management program.

I said this would be a compact program. Well, for all that it does, I think it is. The program will be modular. That is, different programs will control different areas of checkbook management. It will be made even more compact by the use of the NEWDOS/80 commands I have mentioned. Using them, we will end up saving ten grams (read that as 12.5K) of disk storage, and about 7K of runtime memory! I must warn you again, that even with all that going for it, this program package takes most of a 35-track single density diskette (with the DOS on it), needs at least two disk drives to do its best, and was written with a 48K system in mind. Don't despair if you have a smaller system, there are plenty of tidbits for you to glean from this article.

Before we can really use any command to its fullest, we must understand both its abilities and its limits. The

MERGE command is described fully in the NEWDOS/80 manual on page 7-5. As stated there, you can use MERGE as either a direct statement or from within a program. You may even merge packed text files (that's where disk space savings can be made). You are no longer restricted to only merging ASCII files.

You cannot use the MERGE statement from within a subroutine, or as part of a FOR...NEXT loop, nor as part of a DEFFN statement. The command must be either on a program line by itself, or at the end of a multi-statement line. The next line of the program must be the one that program execution will continue with when the MERGE function is completed, however, the next line can be any legal statement, even another MERGE command.

Finally, the file to be merged cannot contain any line numbers that already exist in the program resident in RAM, and there must be enough memory left to allow the entire file to be merged. Any error encountered will cause a program halt. The use of the MERGE command does not affect any variables that have been defined or used within the program.

The second NEWDOS command we will be using is the DELETE command. This one works from within a program, just as it does in the command mode, but with a little different format. You must tell the system that you intend to use some special functions of the DOS by preceding the command with a CMD"F" statement, and DELETE is one of those. The format really isn't too tough, simply CMD"F",DELETE followed by the line number, or range of line numbers, to be deleted. If you want to delete lines 1000 through 2000, then the format would be CMD"F",DELETE 1000-2000. Yep, that's it. The limits of the DELETE statement are much the same as for the MERGE command, except you can disregard the memory size requirement, and the lines must exist in the program when the command is made.

Before going on, let me tell you a couple of things about DELETE that Apparad didn't mention. It would appear that when the DELETE command is used to get rid of a line with data statements in it, the pointer to the next DATA statement gets lost. This is the reason you will see RESTORE statements in some of the program listings later.

The RENUM command does not change any line

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numbers referenced in DELETE statements. This is understandable, but is something you need to be aware of. When you RENUM a program that will have other programs MERGED, you will have to put in dummy line numbers (i.e. 100 REM DUMMY) if you mention lines that only exist in the other program. Use the RENUM U command to find out what dummy numbers you will need. Be sure to delete these dummy lines before SAVING the program to disk. Also be careful about using RENUM on line numbers that exist in your program that will be DELETED by the program. Do not include line numbers mentioned in DELETE statements unless you are willing to manually change the DELETE statement to agree with the new number sequence.

The next command to look at is CMD"O". Model III owners will probably already be familiar with this one. CMD"O" allows an in-memory sort of up to nine arrays to be performed. There are direct and indirect sorts, but we will only be concerned with the direct sort of single dimension arrays. The format for this operation is CMD"O",n,av1,(av2,...av9).

The CMD"O" function is a very powerful command by itself. Our program will use it to sort five arrays, to allow searching in a variety of ways. The command allows both ascending and descending ordering of the arrays, and even allows a mixture of ascending and descending sorting. You may mix various types of arrays, and sort a specific range of an array, even to the point of picking out a specific number of elements in the middle of a group of arrays to sort.

In the format shown above, the "n" can be either a variable or a numeric constant. Either way, it specifies the *total* number of elements to sort. If you wanted to sort an entire array that was dimensioned with a DIM AR(20) statement, then "n" should equal 21.

The part of the format shown as av1, av2 and so on, refers to the names of the arrays to sort. They are entered in the form AR(s) where "s" may, like the "n", be either a variable or constant value. The "s" determines which element of that array will be first considered in the sort. In the example with AR(20), to sort all 21 items, we would use the number zero, or a variable that evaluated to zero, as "s" to make sure all items of the array were sorted.

If more than one array is listed in the command, then the arrays are used as sorting keys, with priority given from left to right. This routine is reasonably fast and can sort nine single dimension integer arrays (with 1501 random values stored in each array) in about 48 seconds on a standard 1.77 MHz Model I computer.

Next, a few words about OPEN"E" and RUN"filename, V", and we can get on with programming . . . I think. The OPEN"E" method of opening a disk file for output works much the same as the TRSDOS OPEN"O" command. In fact, if the file does not exist when opened, the OPEN"E" works exactly like OPEN"O". If, however, the file exists when the command is executed, the file is opened at its end for sequential output into the file.

The advantage here is that you may make additions to the file without loading the entire file to memory, make the additions, and then PRINT the entire file back to disk. This method will be used to update some of our files in the checkbook program package. Rather than

make use of some of NEWDOS/80s newer file formats, I have elected to stick with a more-or-less standard file format, both because of my general lack of experience with them, and because the standard format really does suit the requirements of this program.

The RUN"filename",V command is used by NEWDOS/80 to allow you to call other disk resident BASIC programs to replace the current program without destroying the value of the variables being used by the RAM resident program. This option will allow our program to pass all variables between program modules without the hassles of reinitializing and loading arrays from disk each time we change from one program option to another. The V option is both a time and space saver for modularized programs.

Keep in mind that this program was written as a way of giving useful examples of these functions, and not as the primary purpose of this series of articles. Because of the size of this program package, it may not look that way later on.

When dealing with a checkbook program, you are going to be concerned with at least three different pieces of information. First, you need to know whether an item is a check, deposit, or bank charge against the account. If it is a check, you need to know the check number. The second thing you need to know is either the date of the transaction or the date the bank cancelled the item. The last mandatory item to keep up with is, of course, the amount of the transaction. These are the three items that the bank usually keeps up with to prepare your monthly statement.

Another item that we can add to our program to make it more useful to us is a description of the transaction. Instead of keeping up with the actual description of these items, we will use an integer array to hold a code that will point us to a much shorter array containing various descriptions of transactions. We will use integers to keep up with all information about our transactions except for the amount. The amount will be kept in double precision form, although occasionally the CVI command will be used to convert it to single precision for specific operations. No big deal here, the program will keep up with all of this for us. After all, isn't that what a computer is supposed to be all about?

Since we will be using several (four, to be exact) different programs to perform maintenance on our checkbooks, I suppose we need some sort of menu program to let us choose which operation to perform. Listing 1 shows just such a menu program. I guess we should save it on disk as MENU. The options it gives us are: (1) create a new file, or make additions to an existing file; (2) correct errors in any given file; (3) search a file for any check, or other item, or even groups of items; (4) cancel checks in a file when a bank statement is received. Option 5 will create a large file containing all items that are in files which only hold cancelled items. Option 6 operates the same as 5, except that the file created will hold all items, both cancelled and outstanding.

The reason for having the last two options is that I plan to set up one short file (OUTSTNDG/DAT) that will hold only outstanding items from it and put them into another short file that will hold data that will look

just like your bank statement. This format is inconvenient when searching your files for all checks written for one purpose or amount, or for finding all of your deposits from a specific source, thus the need to be able to combine all the files into one or two large composite files. The smaller files act like a monthly bank statement, where the larger files act like a check register where you have arranged your transactions by cancelled dates instead of by number or date you *thought* they occurred.

A word of caution is due here. Type all program listings with the line numbers shown and save them on disk with the filename "suggested" in the article. This will save you trouble later. No REM statements are referenced, and all lines are numbered in increments of 10 for programming convenience.

I promised you a couple of routines that you might like to use elsewhere in your programming, and here they come. I said that one of the things we needed to keep up with was the date of the transaction, either its actual date or the date the bank cancelled it. There are several ways of storing dates, but the one that takes the least room is by making an integer out of it. Integers not only take less room, both in memory and on disk, but are quicker to work with in BASIC. Some time back, I worked out the two subroutines that follow, to handle the problem of turning a given date into an integer form and converting it back to a readable form later.

Be warned!! This is *not* a day of the week calculator. As a matter of fact, you may notice that it really assumes 366 days in a year! Don't fear. That 366th day is February 29th, and the program won't allow you to use it unless it exists for the year. As written, the routines will handle any date from January 01, 1972, through December 31, 2059. The input routine allows inputs in the form of MM/DD/YY, M/DD/YY, MM/D/YY, and M/D/YY. This way, if you are inputting the date March 6, 1981, you may enter the date as 03/06/81, or 3/06/81, or 03/6/81, or just as 3/6/81, whichever is most comfortable to you. The only required two-digit number is for the year.

Because of the limits imposed on us when using integers, the largest date we can store is 32767 days past January 1, 1972. Any year code (YY) entered that is between 72 and 99, will be converted to a 19xx year, and year codes from 00 to 59 will be converted to a 20xx year. Year codes from 60 through 71 will be rejected as invalid. The base date of 1972 can be changed, but it must be a leap year.

Listing 2 shows the subroutine for taking the string variable AD containing our MM/DD/YY code, and converting it to an integer variable called ZD. The variable AD is not destroyed.

Listing 3 shows the subroutine that takes the positive integer variable ZD and converts it to the string representation of the date and returns it in variable AD. The variable ZD is destroyed in this routine. The format of AD on return from Listing 3 will be MMMdd, YYYY; i.e. Jan 1, 1982. Leading zeroes on days are not printed, but the space is filled in for even formatting of the output. Remember to type this listing with the line numbers that are shown. This will become important later when we use the MERGE and DELETE commands. Save

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Adventure International		
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Eliminator	24 95/19 00	19 95/15 00
Lunar Lander	20 95/16 00	14 95/11 00
Missile Attack	20 95/16 00	14 95/11 00
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Planetoids	20 95/16 00	19 95/15 00
Scot Adam's Adventure #1 #2 #3	39 95/31 00	n/a
Scot Adam's Adventure #10 #11 #12	39 95/31 00	n/a
Scot Adam's Adventure #4 #5 #6	39 95/31 00	n/a
Scot Adam's Adventure #7 #8 #9	39 95/31 00	n/a
Sky Warrior	20 95/16 00	14 95/11 00
Space Intruders	20 95/16 00	19 95/15 00
Star Fighter	29 95/23 00	24 95/19 00
Star Trek 3.5	19 95/15 00	14 95/11 00
Stone of Sisyphus - Maces and Magic #2 (I)	29 95/23 00	n/a
Big Five		
Attack Force	19 95/15 00	15 95/12 00
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Robot Attack	19 95/15 00	15 95/12 00
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Circle # 37

Tutorial

each of these listings in different files. Save Listing 2 with the filename DATEIN, and Listing 3 as DATEOUT.

These two routines need a little setup before they can be used in other programs. Listing 4 gives the setup and a routine to check the operation of the routines. If you have already saved DATEIN and DATEOUT, just type in Listing 4, then type MERGE DATEIN<ENTER> and MERGE DATEOUT<ENTER>. Save this program with an appropriate name and RUN it to check things out. This program won't be used in the program package, so you may KILL it when you have the two subroutines running properly.

For my next trick before ending the first of this three-part series, I would like to give you a few hundred words of memory. I sincerely thank Lewis Rosenfelder for the following idea on the use of unused disk buffer areas as storage for object code routines. His very good book, *Basic Faster and Better & Other Mysteries*, was a great inspiration in this area.

You probably noticed, in Listing 1, a whole section dealing with reading data statements and POKEing them into a relatively low area of memory usually associated with the sacred ground tread upon only by DOS. This routine is the object code for a routine to take a string variable and convert any lowercase characters to their uppercase form. The program will be looking for uppercase entries most of the time, and this will allow you to use your system as it is normally configured.

The routine will work on both the Model I and Model III computer if you are using NEWDOS/80. Check out Mr. Rosenfelder's book to find out how to use it with other Disk Operating Systems. This routine will reside in the area that would normally be used for disk I/O buffer number two (that's where Mr. Rosenfelder comes in). This memory is automatically reserved when you enter BASIC and select the default values of three disk I/O buffers. Thus, the program takes no more memory than you would probably use anyhow, and you don't have to remember some value to specify to reserve high memory. Mr. Rosenfelder's book lists the memory locations of these buffers for all of the popular TRS-80-compatible operating systems. Just remember that you cannot use that buffer for I/O without destroying the program there.

If you would like to use that routine elsewhere in some of your other programs before the next issue of *80-U.S. Journal*, the DEFUSR statement in line 820 of Listing 1 is set up to point to the routine. The routine can be called with a statement such as P=USR0(VARPTR(ST\$)). The P is a dummy argument, and you pass the location of the string with the VARPTR function. The routine picks up the rest of the information it needs by itself.

One more quick subroutine to give you, and then it will be goodbye until next month. Listing 5 should be typed in and saved as PRINTCK. This routine is written specifically for an Epson MX-80 parallel printer, but, with only minor changes, could work for any parallel printer. The routine needs no changes to work for the Model III, as it too uses memory location 14312 (37E8 Hex) as the I/O route for the printer.

80-U.S. Journal has previously published the how-tos and wherefors of this subroutine, so I won't repeat them

here. This routine will only be MERGED if you indicate during certain program modules that you would like a hardcopy of the results. We'll see how all that works next time. To use this routine between now and next month, simply add the routine to your programs and perform a GOSUB 11000 just before attempting any output to the lineprinter.

This is where I am going to leave you until next time. Then we will see how to actually use the MERGE and DELETE commands to our advantage. In doing so, we will also start building up the program package by coding the routines to create our files and take a look at what kind of data base we need on disk to run the program. We will also add some codes to Listing 1 that will be used later to speed up the operation of the package.

Listing 1 Checkbook

```
5 REM CHECKBOOK 1.0 *MENU* 10/10/81
6 REM JERRY L. LATHAM
7 REM 1409 EVERGREEN CIRCLE
8 REM MIDWEST CITY, OK 73110
9 REM DEVELOPED FOR 80 U.S. JOURNAL
10 ON ERROR GOTO 800: IF AF="" THEN GOT
   O 800 ELSE IF PEEK(&H6818)<>205 THEN
   GOTO 800
20 CLS:PRINT TAB(18)"CHECKBOOK 1.0":PRI
   NTTAB(22)"MENU":PRINT:PRINT"1) CREAT
   E OR EXTEND A MONTHLY FILE":PRINT"2)
   MAKE CORRECTIONS TO ANY FILE":PRINT
   "3) SEARCH FOR ITEMS IN ANY FILE":PRI
   NT"4) CANCEL TRANSACTIONS
30 PRINT"5) CREATE A NEW FILE CONTAINI
   NG ONLY CANCELLED ITEMS":PRINT"6) CR
   EATE A NEW FILE CONTAINING ALL TRANSA
   CTIONS TO DATE":PRINT"7) END RUN (RE
   TURN TO DOS)
40 PRINT:PRINT"ENTER YOUR CHOICE (1-7)
   NOW ";
50 A$=INKEY$: IF A$<"1" OR A$>"7" THEN
   50 ELSE PRINTA$:A%=VAL(A$):ON A% GOTO
   100,200,300,400,500,600,700
100 CLS:PRINT"LOADING PROGRAM TO CREATE
   /EXTEND FILES":RUN"CREATOR",V
200 CLS:PRINT"LOADING CORRECTION PROGRA
   M": RUN"FIXSERCH",V
300 CLS:PRINT"LOADING SEARCH PROGRAM":R
   UN"FIXSERCH",V
400 CLS:PRINT"LOADING CANCELLING PROGRA
   M":RUN"CANCELS",V
500 CLS:PRINT"LOADING FILE TO CREATE FI
   LE CONTAINING ALL CANCELLED ITEMS":RU
   N"BUILDALL",V
600 CLS:PRINT"LOADING FILE TO CREATE FI
   LE CONTAINING ALL ITEMS IN ALL FILES.
   ":RUN"BUILDALL"V
700 CLS:PRINT"RETURNING TO DISK OPERATI
   NG SYSTEM":CMD"S"
```

```

800 RESUME 810
810 CLS:PRINT"INITIATING SYSTEM. STAND
  BY ONE MINUTE.":PRINT"DECLARING TYPES
  ":CLEAR2000:DEFSTR A-C:DEFDBL D:DEFIN
  T P-Z
820 PRINT"READING DATA": FOR X=&H6818 T
  O &H6833: READ Y: POKEX,Y:NEXTX:DEFUS
  R0=&H6818:PRINT"ESTABLISHING VARIABLE
  S"
825 REM
  SAVE LINES 830 TO 980 FOR NEXT ART
  ICLE
  THEY WILL BE USED AT THAT TIME.
990 DATA 205,127,10,70,35,94,35,86,235,
  4,5,200,126,254,97,56,7,254,123,48,3,
  230,95,119,35,16,241,201
10030 AG=RIGHT$(AD,LEN(AD)-WP): XP=INST
  R(AG,"/") +WP: IF XP<>4 AND XP<>5 AND
  XP<>6 THEN 10100
10040 WP=WP+1: XP=XP-WP: WD=VAL(MID$(AD
  ,WP,XP)): IF WD<Z0 OR WD>Z2 THEN 1008
  0
10050 WY=VAL(RIGHT$(AD,2)): IF WY>60 AN
  D WY<72 THEN GOTO 10090
10060 YR=1900: IF WY<72 THEN YR=2000
10070 WY=YR+WY: GOSUB 10110: ZY=(WY-197
  2)*366: ZD=0: FOR X1=0 TO WM-1: ZD=ZD
  +WM(X1): NEXT X1: ZD=ZD+WD+ZY: RETURN
10080 PRINT"DATE CODE"WD"WRONG.": GOTO
  10100
10090 PRINT"YEAR CODE"WY"WRONG."
10100 PRINT"DATE FORMAT WRONG. MUST BE
  M/D/YY OR M/DD/YY OR MM/D/YY OR MM/DD
  /YY. RE-ENTER DATE IN CORRECT FORMAT
  ":INPUT AD: GOTO 10000
10110 IF (WM=4 AND WD>Z3) OR (WM=6 AND
  WD>Z3) OR (WM=9 AND WD>Z3) OR (WM=11
  AND WD>Z3) THEN 10080
10120 IF WM<>2 THEN RETURN
10130 WF=28: IF (WY/4)=INT(WY/4) THEN W
  F=29
10140 IF WD>WF THEN 10080 ELSE RETURN

```

Listing 2 Checkbook

```

10000 IF LEN(AD)<6 OR LEN(AD)>8 THEN 10
  100
10010 WM=VAL(AD): IF WM<Z0 OR WM>Z1 THE
  N 10100
10020 WP=INSTR(AD,"/"): IF WP<>2 AND WP
  <>3 THEN 10100

```

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**Listing 3
Checkbook**

```

10150 ZD=ABS(ZD): YR=ZD/366: IF (ZD/366
) =INT(ZD/366) THEN Y1=12: ZD=31: YR=Y
R+1971: GOTO 10190
10160 IF (YR/4)=INT(YR/4) THEN IF ZD-(Y
R*366)=60 THEN Y1=2: ZD=29: YR=YR+197
2: GOTO 10190
10170 ZD=ZD-(YR*366): FOR Y1=Z0 TO Z1:
IF ZD<=WM(Y1) THEN YR=YR+1972: GOTO 1
0190
10180 ZD=ZD-WM(Y1): NEXT Y1
10190 IF ZD>9 THEN AD=AM(Y1)+STR$(AC)+"
"+STR$(YR): RETURN ELSE AD=AM(Y1)+"
"+STR$(ZD)+" "+STR$(YR): RETURN
    
```

**Listing 4
Checkbook**

```

10 CLEAR 1000: DEFSTR A-C: DEFINT W-Z:
Z0=1: Z1=12: Z2=31: Z3=30: DIM WM(Z1)
, AM(Z1): FOR Z0 TO Z1: READ WM(Y), A
M(Y): NEXT Y
20 DATA 31,JAN,29,FEB,31,MAR,30,APR,31,
MAY,30,JUN,31,JUL,31,AUG,30,SEP,31,OC
T,30,NOV,31,DEC
30 INPUT"ENTER DATE (MM/DD/YY) ";AD: GO
SUB 10000:V1=ZD
    
```

```

40 PRINT"DATE ";AD;" CONVERTS TO INTEGE
R ";ZD
50 GOSUB 10150
60 PRINT"INTEGER";V1;"CONVERTS TO DATE
";AD
70 GOTO 30
    
```

**Listing 5
Checkbook**

```

11000 IF PEEK(&H37E8)=191 THEN 11000
11010 IF PEEK(&H37E8)=63 THEN RETURN
11020 IF PEEK(&H37E8)=143 THEN PRINT"PR
INTER IS IN OFF-LINE MODE.":GOTO11070

11030 IF PEEK(&H37E8)=15 THEN PRINT"PRI
NTER HAS NO POWER.":GOTO11070
11040 IF PEEK(&H37E8)=223 OR PEEK(14312
)=207 THEN PRINT"PRINTER IS OUT OF PA
PER.": GOTO 11070
11050 IF PEEK(&H37E8)=255 THEN PRINT"NO
PRINTER ATTACHED. ALL OUTPUT FORCED
TO VIDEO ONLY. ": A="N": RETURN
11060 GOTO 11000
11070 PRINT"CORRECT PRINTER PROBLEM. TH
EN PRESS <ENTER> TO CONTINUE.";
11080 A1=INKEY$: IF A1<>CHR$(13) THEN 1
1080 ELSE PRINT: GOTO 11000
    
```

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Menus

Cooking up menus on your TRS-80

All models

T. R. Dettmann, Associate editor

A typical problem in programming is to write a program that has several options to it. One such program might be a list handling program that can add items, edit, delete, save to disk or cassette, read from disk or cassette, print, and sort them. In order to have an organized program, it's necessary to provide some easy way for someone using the program to select from several options. The simplest way is a menu.

A menu in a computer program is just a list of options (usually, though not necessarily, numbers) from which to choose. When someone using the program wants to do one thing, that person need only type in the appropriate selection and then go. Let's look at laying out a simple menu and what can make it easy to use.

The first consideration is: Will the selections be numbers, words, letters, or what? Next, how many items should be on the menu? For the moment, we'll deal with a menu that uses numbers for each selection. As to how many things to put on the menu, you will find disagreement as to what is best here.

Some programmers put every option on a single menu. This leads to menus with 10, 15, or 20 items all on the same screen. Personally, I don't like these, because I find them difficult to use rapidly. I read recently that studies have shown that a person can't deal with more than five to seven choices, because he can't grasp them

mentally all at once. Assuming it's true (at least it makes *me* feel good), I try to limit program menus to less than seven items. I try to functionally group items together in menus.

In the list handling program example above, I would group the menus like this:



Basically BASIC

MAIN MENU:

```
ADD/EDIT/DELETE
SAVE LOAD
PRINT
SORT
```

FIRST SUB MENU:

```
ADD
EDIT
DELETE
RETURN TO MAIN MENU
```

SECOND SUB MENU:

```
SAVE
LOAD
RETURN TO MAIN MENU
```

In this way, each menu is as simple as possible. Each can be laid out nicely on the screen and grasped easily by the user.

When dealing with menus that use numbers, I always use option zero to represent the END or RETURN option for that menu. That way, I always know that if I hit zero for a selection, I'll get the previous menu, or the end of the program. Otherwise, since the lengths of menus vary, the END or RETURN option will always be at a different number.

It's also important to lay out your menu cleanly on the screen for the computer you are using. If your program is expected to run on more than one computer, you have to make allowances for that in setting up the screen.

Screen layout is important. A poor layout makes your program harder to use. Some general ideas include: (1) Always start a menu by clearing the screen and printing the title of the menu so the user knows where he or she is. (2) Always align the selections in some manner to make it easy to see what the acceptable selections are. (3) Leave space from one part of the screen to another in order to separate things easily.

The main menu above could be done like this:

```
200 REM MAIN MENU
210 CLS:PRINT"MAIN LIST HANDLING MENU"
220 PRINT:PRINT
230 PRINTTAB(10)"0. END PROGRAM"
240 PRINTTAB(10)"1. ADD/EDIT/DELETE"
250 PRINTTAB(10)"2. SAVE LOAD"
260 PRINTTAB(10)"3. PRINT"
270 PRINTTAB(10)"4. SORT"
```

Assuming that the ADD/EDIT/DELETE routine begins at line 1000, the menu for it might look like this:

```
1000 REM FIRST SUB MENU
1010 CLS:PRINT"ADD/EDIT/DELETE SUB
MENU"
1020 PRINT:PRINT
1030 PRINTTAB(10)"0. RETURN TO MAIN MENU"
1040 PRINTTAB(10)"1. ADD ITEMS"
1050 PRINTTAB(10)"2. EDIT ITEMS"
1060 PRINTTAB(10)"3. DELETE ITEMS"
```

Putting the menu on the screen isn't enough, though. We also have to make our selection and then execute it.

To make a selection, we can simply INPUT the required number, but we also need to error check our input and make sure it's a *legal* selection. Try this for the main menu:

```
300 REM MAKE SELECTION
310 PRINT:PRINT
320 INPUT"SELECTION";S
330 IF S<0 OR S>4 THEN PRINT "WRONG
SELECTION":GOTO320
```

We don't just check for an error in input, we tell the user that it's wrong and give him another chance.

Once we've got a legal selection, then we can execute it by using an ON-GOSUB. ON-GOSUB takes a number, and uses it as an index into a list of subroutines. It picks out the corresponding subroutine, goes there, then returns and picks up as if there were only the single GOSUB on the line. For example:

```
ON S GOSUB 1000,2000,3000,4000
```

will execute subroutine 1000 if S=1, 2000 if S=2, 3000 if S=3 and 4000 if S=4. If S isn't between 1 and 4, it executes none of them and falls through to the next statement (that isn't true for all BASICs, but it is for TRS-80 BASIC).

Our execute selection routine can now look like this:

```
350 REM EXECUTE SELECTION
360 IF S=0 THEN CLS:END
370 ON S GOSUB 1000,2000,3000,4000
380 GO TO 200
```

At the end of the execution routine, we return to the menu and display it for the next selection. Look over the program fragment included here. It shows these menus and their relation to one another. They also represent the first stages in the design of a List Handling program using the techniques we talked about last month, modular programming and GOSUBs.

Notice that each time we create a GOSUB in the top level of the program (a menu), we put a dummy subroutine (a program stub) there to tell us that in testing, we made it to the right place.

Try typing this program fragment into your computer and making it work. Once it works, you can add each feature one at a time, and test it.

Program Listing for Basically BASIC

```
10 REM SIMPLE LIST HANDLING
20 REM INITIALIZATION
21 REM THE LINES BETWEEN 20 AN
D 200 ARE HERE FOR SETTING UP
22 REM PROGRAM PARAMETERS. FOR
EXAMPLE, CLEAR STATEMENTS AND
23 REM DIMENSION STATEMENTS, V
ARIABLE INITIALIZATION, AND SO FORTH
24 REM SHOULD BE PUT HERE
200 REM MAIN MENU
```

```

210 CLS:PRINT"MAIN LIST HANDLING MENU"
220 PRINT:PRINT
230 PRINTTAB(10)"0. END PROGRAM"
240 PRINTTAB(10)"1. ADD/EDIT/DELETE"
250 PRINTTAB(10)"2. SAVE/LOAD"
260 PRINTTAB(10)"3. PRINT"
270 PRINTTAB(10)"4. SORT"
300 REM MAKE SELECTION
310 PRINT:PRINT
320 INPUT"SELECTION";S
330 IF S<0 OR S>4 THEN PRINT"WRONG SELE
CTION":GOTO320
350 REM EXECUTE SELECTION
360 IF S=0 THEN CLS:END
370 ON S GOSUB 1000,2000,3000,4000
375 GOSUB400:' THIS LINE WILL BE DELET
ED IN THE END, IT'S HERE ONLY FOR TESTS
380 GOTO200
400 REM DELAY LOOP
410 FOR TM=1 TO 500:NEXT TM:RETURN
411 REM PUT MORE SUBROUTINES TH
AT ARE GENERALLY USEFUL HERE
412 REM BETWEEN LINES 410 AND 1
000. THINGS LIKE SPECIAL SCREEN
413 REM DISPLAYS, UTILITIES, ET
C.
1000 REM ADD/EDIT/DELETE
1010 CLS:PRINT"ADD/EDIT/DELETE SUB MENU
"
1020 PRINT:PRINT
1030 PRINTTAB(10)"0. RETURN TO MAIN ME
NU"
1040 PRINTTAB(10)"1. ADD ITEMS"
1050 PRINTTAB(10)"2. EDIT ITEMS"
1060 PRINTTAB(10)"3. DELETE ITEMS"
1070 PRINT:PRINT
1080 INPUT"SELECTION";S
1090 IF S<0 OR S>3 THEN PRINT"WRONG SEL
ECTION":GOTO1080
1100 IF S=0 THEN RETURN
1110 ON S GOSUB 1200,1400,1600
1115 GOSUB400:' DELETE AFTER TESTING
1120 GOTO1000
1200 REM ADD ITEMS
1210 PRINT"ADD ITEMS"
1211 REM THIS IS A PROGRAM 'STUB
' IT WAS CREATED TO SERVE THE
1212 REM PURPOSE OF SATISFYING T
HE CORRESPONDING GOSUB FOR A PLACE
1213 REM TO GO SO WE CAN TEST TH
E HIGHEST LEVEL OF THE PROGRAM
1220 RETURN
1400 REM EDIT ITEMS
1410 PRINT"EDIT ITEMS"
1420 RETURN
1600 REM DELETE ITEMS
1610 PRINT"DELETE ITEMS"
1620 RETURN

```

```

2000 REM SAVE/LOAD
2010 CLS:PRINT"SAVE/LOAD SUB MENU"
2020 PRINT:PRINT
2030 PRINTTAB(10)"0. RETURN TO MAIN ME
NU"
2040 PRINTTAB(10)"1. SAVE LIST"
2050 PRINTTAB(10)"2. LOAD LIST"
2060 PRINT:PRINT
2070 INPUT"SELECTION";S
2080 IF S<0 OR S>2 THEN PRINT"WRONG SEL
ECTION":GOTO2070
2090 IF S=0 THEN RETURN
2100 ON S GOSUB 2200,2400
2105 GOSUB400
2110 GOTO2000
2200 REM SAVE LIST
2210 PRINT"SAVE LIST"
2220 RETURN
2400 REM LOAD LIST
2410 PRINT"LOAD LIST"
2420 RETURN
3000 REM PRINT LIST
3010 PRINT"PRINT LIST"
3020 RETURN
4000 REM SORT LIST
4010 PRINT"SORT LIST"
4020 RETURN

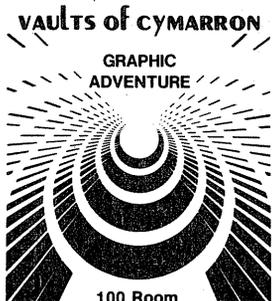
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DEALER INQUIRIES WELCOME

@ News

Spencer Hall, Contributing editor

Hobbies bring people together . . . often people who wouldn't otherwise have been all that much interested in each other. Personal computing has turned out to be one of the greatest of these social catalysts. When a pair of total strangers discover that they both own a TRS-80; they are strangers no longer—each becomes important in the life of the other. This is especially true among Stringy Floppy owners. Sharing the endless lore of the Floppy is a joy for the teller and a fascination for the listener. Hence, there is ESFOA, the Exatron Stringy Floppy Owners Association. Hence, too, my pleasure at being asked to succeed Jim Perry as author of @ News.

Jim's reason for giving up this job is simple enough. As he put it on the phone, during our changing-of-the-guard ceremonies, "I'm going to be up to my eyeballs." Jim was referring to the mountains of documentation he is writing for Exatron's newly-announced products. Most of these were unveiled at the West Coast Personal Computer Fair held in San Francisco's Civic Center March 19-21. If your interest runs to news about other computers, you will be reading elsewhere about Exatron's 192K "solid state disk system" which plugs into the IBM personal computer.

New for TRS-80

Good news for TRS-80 owners, however, is the Stringy Floppy for Model III. In a slick new designer housing, it has room for two drives, but can be purchased with only one.

When you find that you can no longer live without a second drive (and you will), UPS and Exatron can have you back on line with two drives in a week or so. If you're one of the many Model I owners who are slowly working yourself up to a Model III, but don't want to give up your Stringy Floppy—go for it!

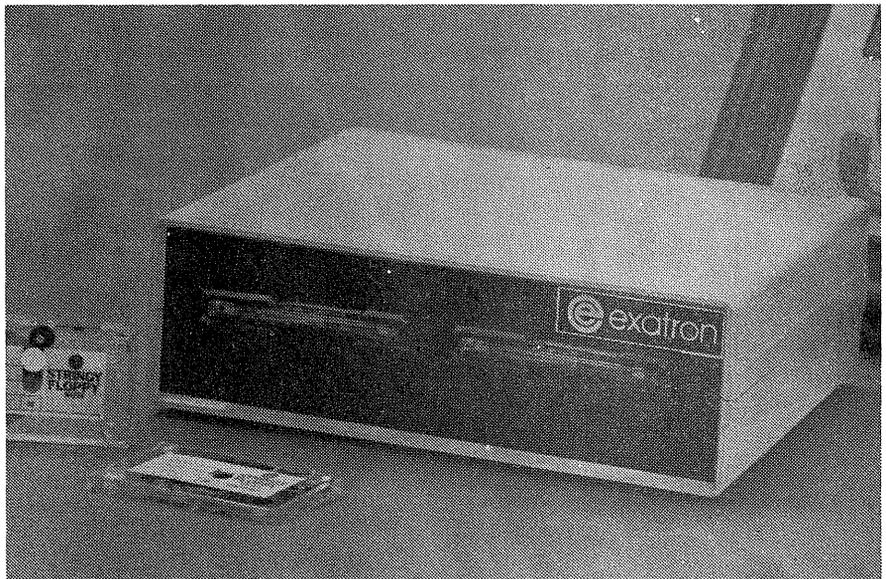
The ESF operating system and I/O routines both reside in nearly 4K of self-protected memory at the top of RAM. No need to load the I/O routine separately! Cold boot takes about ten seconds and from then on, you're in the old familiar ESF environment, with two pleasant surprises.

Tremendous Trifles

Typically, Exatron isn't wasting much time talking about these

surprises, but users will rave. Today's ESF has a virtually noiseless direct drive motor with a polished capstan that doesn't need cleaning nearly as often. Speed variation is minimized, and parity (or checksum) errors are almost nonexistent. There's also a beeper now, so that when your Floppy finds the EOF/BOF sticker, it lets out a little chirp. Have you ever loaded file #1 right after calling file #2? How long does it take? Now you know exactly when @LOAD is beginning, and that twelve second wait no longer seems like a minute.

There's also an adjustable pot (variable resistor, that is) with which you can fine tune wafer speed, and standardize your bit spacing, for optimum reliability and compatibility between drives. These two gadgets are relatively



The new Exatron Stringy Floppy for TRS-80 Model III.

inexpensive, and will be available for retrofit to your older units, which brings us to the following emergency bulletin.

Calling All ESFOA Members with Hardware Skills

On behalf of ESF owners who want beepers, speedup kits and the like, but don't dare risk all by attacking their Floppies with a hot soldering iron: your hardware skills are urgently needed. Call your local ESFOA chairman and volunteer to help those who need help. Whether you do it for love, money or spare wafers, your services will be deeply appreciated and your ego will thrive.

64K for Model I

Stay with the classic Model I Level II for a few years, and you can't help becoming an expert. It's all there in the media. There's more "know how" in print for the TRS-80 Model I than for any other computer ever made: ins and outs of the operating system, machine language, string packing, utilities that do everything but tell you what

kind of a program to write, etc.

If you're still in love with Level II, then "64K for Model I" will make your ears prick up. It's a small board using just eight of the new 64K chips (one for each bit, of course) and it fits inside the Model I keyboard. Switch it in or out under software control. Move your whole ROM and operating system into this new RAM when you feel the urge. Why? Well, as Bob Howell, Sr. puts it, "Now the gurus of the TRS-80 can write revisions to the ROM beyond our wildest dreams."

Exatron is working on a full scale CPM for Model I—not a watered down imitation, but the real thing, complete with PIP, SYSGEN, SUBMIT and all the other utilities, on either wafer or disk. Interpreters for other languages such as PASCAL, COBOL, and FORTH are possible with no addresses left tied up with unused BASIC ROM.

This board also contains the switchable three-speed clock option. Drive yourself crazy! Play Level II Scarfman on a 4 mhz. clock! Better still, get 32K of storage on a twenty-foot wafer and load it in half the

time. This item is available now for your Model I for \$19.95. Make the simple installation yourself (Exatron charges \$30.00) or look up your local ESFOA hardware whiz (see above).

A Character Generator

Exatron now has a character generator board for Model I based on a 2716 EPROM. With a switch, you can select reverse video or underlined ASCII. If you have access to erasing and burning equipment, you can design your own character set on a 2716. It's simple to install, but for many of us, it's another job for the local ESFOA solder slinger.

Apologies

Sorry about all that unanswered mail in Jim Perry's files, but the June deadline is staring us in the face and Mike Schmidt at 80-U.S. Journal is getting impatient. He doesn't believe in keeping his customers waiting. Next month, we'll open the mail bag again. Perhaps we'll find a note from you. ■

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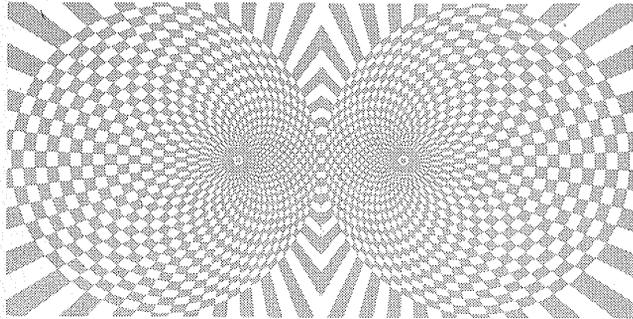
Word game

DAZZLE

continued from page 30

must be set to a one also, to avoid setting and resetting the 32-character display mode during sound operations. This peculiarity is present in the Model I, but not in the Model III.

Dazzle may look like a long program to sit down and type, but if you make the effort, I think you will be pleasantly surprised by one of the best two-player computer games you've seen yet.



Listing 1

Dazzle Assembly Language Program

```
00100 ; MACHINE LANGUAGE SOUND ROUTINE
00110 ;
00120 ; FOR WORD GAME "DAZZLE"
```

```
00130 ; BY DAVE LEUPP JAN 1982
00140 ;
00150 ; ORG 49100
00160 ;
00170 ;
B FCC OE14 00180 START: LD C,20 ; DURATION
BFCE 1E78 00190 LD E,120 ; FREQUENCY
00200 ;
00210 ;
BFDO 43 00220 STRT: LD B,E ; LOAD DELAY COUNTER
BFD1 3E09 00230 LD A,09
BFD3 D3FF 00240 OUT (OFFH),A ; PULSE TO CASS. HIGH
BFD5 10FE 00250 LOOP1: DJNZ LOOP1 ; DELAY WHILE PULSE HIGH
BFD7 43 00260 LD B,E ; LOAD DELAY COUNTER
BFD8 3E0A 00270 LD A,10
BFDA D3FF 00280 OUT (OFFH),A ; PULSE TO CASS. LOW
BFDC 10FE 00290 LOOP2: DJNZ LOOP2 ; DELAY WHILE PULSE LOW
BFDE 0D 00300 DEC C
BFDF 20EE 00310 JR NZ,$-16 ; REPEAT UNTIL C=0
00320 ;
00330 ; RET
00340 ;
00350 ; END START
00000 Total Errors
```

```
START BFCC
```

Listing 2
Dazzle BASIC Program

```
1000 *****
1010 '* *
1020 '* DAZZLE *
1030 '* *
1040 *****
```

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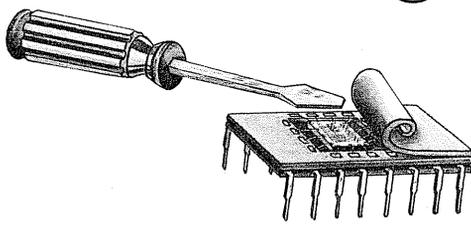
Circle # 42

1050 ' BY DAVE LFUPP
 1060 ' JAN 1982
 1080 '
 1090 ' a fast-paced, two player
 word game for
 1100 ' TRS-80 Models I and III,
 disk (32K & up),
 1110 ' or cassette (level II, 1
 6K & up) based.
 1120 '
 1130 ' *****

 1140 '
 1150 ' M in routine below must be set
 so that at least
 1160 ' 25 bytes of memory are reserved
 for the machine
 1170 ' language sound routine poked in
 later.
 1180 ' Typical values are: 48K system
 - 65500
 1190 ' 36K system
 - 49100
 1200 ' 16K system
 - 32700
 1210 '
 1220 ' AUTO MEMORY SIZE
 1230 '

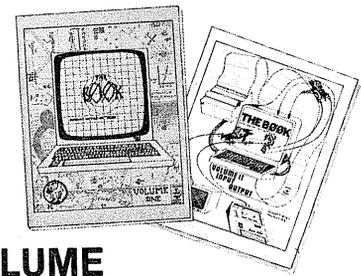
1240 CLEAR
 1250 M = 49100:' WILL BE SIZED TO THIS
 VALUE
 1260 M = M-1
 1270 M1 = INT(M/256)
 1280 M2 = M-M1*256
 1290 POKE 16561, M2
 1300 POKE 16562, M1
 1310 CLEAR 50
 1320 '
 1330 ' LOAD MACHINE LANGUAGE SOUND ROU
 TINE
 1340 '
 1350 ' M in next line must be set equa
 l to the value
 1360 ' of M in the AUTO MEMORY SIZE ro
 utine above.
 1370 '
 1380 M = 49100:' M = SAME AS 'M' ABOVE
 IN AUTO MEM SIZE
 1390 M1 = INT(M/256)
 1400 M2 = M-M1*256
 1410 IF M < 32767 THEN DEFUSR = M ELSE
 DEFUSR = M-65536
 1420 '
 1430 ' For non-disk systems the line a
 bove must be replaced
 1440 ' with the following line:

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Word game

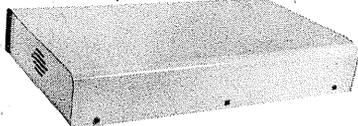
```

1450 '
1460 ' POKE 16526, M2: POKE 16527, M1
1470 '
1480 FOR SO = M TO M+21
1490 READ SV
1500 CS = CS+SV: CHECKSUM, SHOULD
= 2417 AFTER READ
1510 IF SO < 32767 THEN POKE SO, SV:
GOTO 1530
1520 POKE(SO-65536), SV
1530 NEXT SO
1540 '
1550 DATA 14
1560 DATA 20: SETS DURATION OF BASIC
TONE (IN M+1)
1570 DATA 30
1580 DATA 120: SETS FREQUENCY OF BASIC
TONE (IN M+3)
1590 DATA 67, 62, 09, 211, 255, 16, 254
, 67, 62, 10, 211, 255
1600 DATA 16, 254, 13, 32, 238, 201
1610 '
1620 '
1630 CLS
1640 PRINT CHR$(23): 32 CHARACTER MOD
E
1650 FOR I = 1 TO 20
1660 PRINT @ 474, "DAZZLE";
1670 FOR N = 1 TO 30: NEXT N: DELA
Y
1680 PRINT @ 474, " ";
1690 FOR N = 1 TO 30: NEXT N: DELA
Y
1700 NEXT I
1710 '
1720 CLS
1730 FOR N = 1 TO 30: NEXT N: DELAY
1740 PRINT @ 464, "Do you want instruct
ions";
1750 INPUT I$
1760 IF LEFT$(I$,1) <> "N" GOSUB 4230 :
INSTRUCTIONS
1770 CLS
1780 TS = 10: DEFAULT FOR POINTS FOR
GAME
1790 PRINT @ 460, "How many points for
game (1 TO 10)";
1800 INPUT TS
1810 CLS
1820 PRINT @ 468, "THANK YOU, PLEASE WA
IT."
1830 '
1840 ' READ LETTER ARRAY
1850 '
1860 DS = 7: # OF COLUMNS IN LETTER A
RRAY

```

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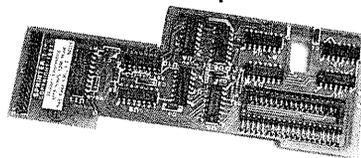


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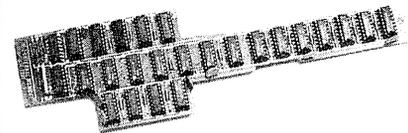


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```

1870 ND = 6: ' # OF ROWS IN LETTER ARR
Y
1880 '
1890 FOR X = 1 TO ND
1900   FOR Y = 1 TO DS
1910     READ A$(X,Y)
1920     NEXT Y
1930 NEXT X
1940 '
1950 ' LETTER ARRAY:
1960 '
1970 DATA I,I,A,A,O,U,E
1980 DATA E,Y,O,G,P,D,S
1990 DATA A,E,V,C,B,M,S
2000 DATA U,C,F,H,T,T,P
2010 DATA B,L,L,H,R,N,W
2020 DATA E,I,R,R,J,K,L
2030 '
2040 ' INITIALIZE VARIABLES
2050 '
2060 SC = 3: ' INITIALIZE BOTTOM SCORE
R
2070 RS = 0: ' INITIALIZE RIGHT PLAYER
S SCORE
2080 LS = 0: ' INITIALIZE LEFT PLAYERS
SCORE
2090 RA = 926: ' POSITION OF INITIAL ARR
OW FOR BOTTOM SCORER

```

```

2100 RA = 890: ' POSITION OF INITIAL RIG
HT ARROW
2110 LA = 834: ' POSITION OF INITIAL LEE
T ARROW
2120 LF = 91: ' LEFT PLAYER WINS POINT,
PUSH UP ARROW (ASCII 91)
2130 RT = 9: ' RIGHT PLAYER WINS PT.,
PUSH LFT ARROW (ASCII 9)
2140 BP = 194: ' ASSIGN VALUE TO BOTTOM
POINTER CHAR. (MOD III)
2150 IF PEEK(03) = 116 THEN BP = 92: '
(MOD I)
2160 '
2170 CLS
2180 PRINT CHR$(23): ' PUT IN 32 CHAR.
PER LINE MODE
2190 GOSUB 3110 : ' DRAW SCREEN ROU
TINE
2200 '
2210 PRINT @ BA, CHR$(BP);: ' INITIALIZE
BOTTOM SCORE POINTER
2220 PRINT @ 776, "Press any key to sta
rt.";
2230 GOSUB 3560 : ' INKEY$ ROUTINE
2240 PRINT @ 776, STRING$(23," ");
2250 '
2260 ' GET RANDOM LETTERS TO DISPLAY
2270 '

```

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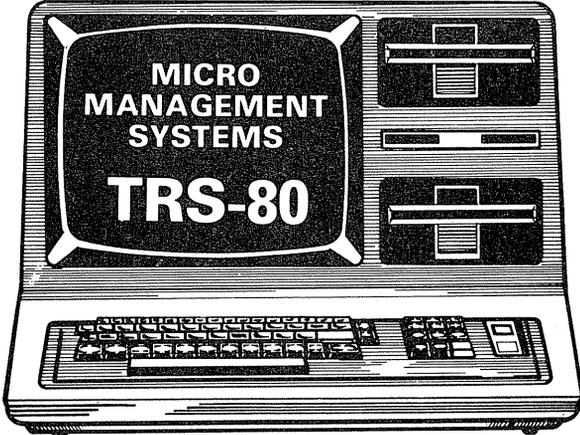
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Circle # 46

Word game

```

2280 FOR D = 1 TO ND
2290   D$(D) = A$(D,RND(DS))
2300 NEXT D
2310 '
2320 '   SCRAMBLE ORDER OF LETTERS
2330 '
2340 RD = RND(ND)
2350 FOR I = 1 TO INT(ND/2)
2360   D$(I) = D$(RD)
2370   D$(RD) = D$(I)
2380   D$(RD) = D$(T)
2390   RD = RD+1
2400   IF RD = ND+1 THEN RD = 1
2410 NEXT I
2420 '
2430 '   PRINT LETTERS ON THE SCREEN
2440 '
2450 P = 480-2*ND: '   SCREEN POSITION F
OR PRINT
2460 FOR L = 1 TO ND
2470   PRINT @ P, D$(L);
2480   P = P+4
2490   Z = USR(0): '   SOUND ROUTINE
2500 NEXT L
2510 '
2520 '   DETECT & DISPLAY FIRST PLAYER T
O RESPOND
2530 '
2540 GOSUB 3550 : ' INKEY$ ROUTINE
2550 IF I$="1" AND BP=194 OR I$="2" THE
N GOSUB 2940 : GOTO 2620
2560 IF I$ = "Z" OR I$ = "/" THEN GOSUB
2940 : GOTO 2620
2570 IF I$ = "" GOTO 2600
2580 IF ASC(I$)=10 THEN PRINT @ 964,"v"
;: GOTO 2620
2590 IF ASC(I$)=31 THEN PRINT @1018,"v"
;: GOTO 2620
2600 GOTO 2540
2610 '
2620 '   MOVE POINTERS, ADVANCE SCORE
2630 '
2640 PRINT @ 780, "Who wins the point?"
;
2650 GOSUB 3550 : ' INKEY$ ROUTINE
2660 IF I$ = "" GOTO 2650
2670 IF ASC(I$) = LF THEN SC = SC-1: ' L
FT WINS,PUSH UP ARROW
2680 IF ASC(I$) = RT THEN SC = SC+1: ' R
T WINS, PUSH LEFT ARROW
2690 IF ASC(I$) <> RT AND ASC(I$) <> LF
THEN GOTO 2650
2700 PRINT @ 780, STRING$(19," ");
2710 GOSUB 3920 : ' GO MOVE BOTTOM POIN
TER
2720 IF SC = 0 THEN LS = LS+1 : ' ADD 1
TO LEFT PLAYERS SCORE
2730 IF SC = 6 THEN RS = RS+1 : ' ADD 1

```

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Circle # 47

Word game

```

TO RIGHT PLAYER'S SCORE
2740 IF SC = 0 OR SC = 6 THEN GOSUB 365
0 : ' SET SCORE POINTERS
2750 IF LS = TS OR RS = TS THEN GOTO 40
40 : ' DECLARE WINNER
2760 '
2770 ' CLEAN UP SCREEN
2780 '
2790 P = 448+32-2*ND
2800 FOR L = 1 TO ND
2810 PRINT @ P, " ";
2820 P = P+4
2830 NEXT L
2840 PRINT @ 964, " "; : ' CLEAR LEFT P
LAYER POINTER
2850 PRINT @1018, " "; : ' CLEAR RIGHT
PLAYER POINTER
2860 PRINT @ 276, STRING$(12, " "); : ' CLE
AR CLOCK DIGIT
2870 '
2880 ' TIMER
2890 '
2900 TM = RND(300)
2910 TM = 25+TM
2920 FOR TI=1 TO TM: NEXT TI: 'RND TIME
BEFORE NEXT DISPLAY
2930 GOTO 2280 : ' GO SCRAMB
LE LETTERS & START AGAIN
2940 '
2950 ' CHALLENGE TIMER
2960 '
2970 IF I$ = "1" OR I$ = "Z" THEN CP =
296
2980 IF I$ = "2" OR I$ = "/" THEN CP =
274
2990 FOR C = 50 TO 0 STEP -1
3000 IF C < 10 THEN PRINT @ CP, C; :
GOTO 3020
3010 PRINT @ CP-2, C;
3020 FOR I = 1 TO 20
3030 NEXT I
3040 IF C < 10 THEN Z = USR(0): GOTO
3060
3050 IF C/3-INT(C/3) = 0 THEN Z = US
R(0): ' SOUND ROUTINE
3060 NEXT C
3070 FOR I = 1 TO 10
3080 Z = USR(0): ' SOUND END OF 'TIME'
3090 NEXT I
3100 RETURN
3110 '
3120 ' DRAW SCORE LINES
3130 '
3140 PRINT @ 26, "DAZZLE"
3150 PRINT @ 130, "0": ' DISLAY START S
CORE FOR LEFT
3160 PRINT @ 188, "0": ' DISPLAY START
SCORE FOR RIGHT

```

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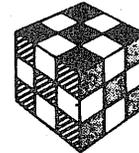
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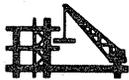
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Word game

```

3170 '
3180 ' MIDDLE LETTER LINES
3190 '
3200 PRINT @ 594, STRING$(13,131);
3210 PRINT @ 338, STRING$(13,176);
3220 '
3230 ' SIDE SCORE LINES
3240 '
3250 POKE 16420,1: ACTIVATE SPECIAL C
HAR. SET (MOD III)
3260 ST = 192
3270 FOR N = 1 TO 10
3280 PRINT @ ST, CHR$(159);
3290 PRINT @ ST+62, CHR$(175);
3300 ST = ST+64
3310 NEXT N
3320 PRINT @ ST, CHR$(143);
3330 PRINT @ ST+62, CHR$(143);
3340 '
3350 ' BOTTOM SCORE LINE
3360 '
3370 P = 968
3380 PRINT @ P-2, CHR$(170);
3390 PRINT @ P, CHR$(181);
3400 FOR N = 1 TO 5
3410 IF N = 1 GOTO 3430
3420 PRINT @ P, CHR$(176);
3430 PRINT @ P+2, CHR$(176);
3440 PRINT @ P+4, CHR$(176);
3450 PRINT @ P+6, CHR$(191);
3460 P = P+8
3470 NEXT N
3480 PRINT @ P, CHR$(176);
3490 PRINT @ P+2, CHR$(176);
3500 PRINT @ P+4, CHR$(186);
3510 PRINT @ P+6, CHR$(149);
3520 PRINT @ RA, "->";
3530 PRINT @ LA, "<-";
3540 RETURN
3550 '
3560 ' INKEY$ ROUTINE
3570 '
3580 J$ = INKEY$
3590 I$ = INKEY$
3600 IF I$ = "" AND PEEK(14464) = 0 GOT
O 3590
3610 IF PEEK(14464) = 1 THEN I$ = "1"
3620 IF PEEK(14464) = 2 THEN I$ = "2"
3630 RETURN
3640 '
3650 ' SET SCORES
3660 '
3670 IF LS = TS OR RS = TS GOTO 3740
3680 FOR N = 1 TO 3
3690 FOR I = 1 TO 5
3700 Z = USR(0)
3710 NEXT I
3720 FOR I = 1 TO 5: NEXT I: DELAY

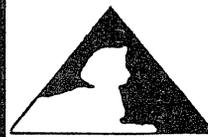
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Word game

```

3730 NEXT N
3740 IF SC = 6 THEN GOTO 3810 : ' GO MOV
E RIGHT POINTER
3750 PRINT @ LA, " "; : ' CLEAR PRESENT
LEFT POINTER
3760 LA = LA-64 : ' MOVE LEFT POIN
TER POSITION UP
3770 PRINT @ LA, "<-"; : ' PRINT POINTER
AT NEW POSITION
3780 PRINT @ 128, LS;
3790 GOTO 3850
3800 '
3810 PRINT @ RA, " ";
3820 RA = RA-64
3830 PRINT @ RA, "->";
3840 PRINT @ 186, RS;
3850 IF LS = TS OR RS = TS GOTO 3910
3860 SC = 3 : ' RESET BOTTOM SCORE
3870 PRINT @ 776, "Push space to contin
ue.";
3880 GOSUB 3560 : ' INKEY$ ROUTINE
3890 IF ASC(I$) <> 32 GOTO 3880 : ' WAI
T FOR SPACE BAR TO CONT.
3900 PRINT @ 776, STRING$(23, " ");
3910 RETURN
3920 '
3930 ' MOVE BOTTOM POINTER
3940 '
3950 PRINT @ BA, " ";
3960 IF ASC(I$) = LF THEN BA = BA-8 ELS
E BA = BA+8
3970 PRINT @ BA, CHR$(BP);
3980 IF SC <> 0 AND SC <> 6 THEN GOTO 4
030
3990 FOR N = 1 TO 350 : NEXT N : ' DELAY
4000 PRINT @ BA, " ";
4010 BA = 926
4020 PRINT @ BA, CHR$(BP);
4030 RETURN
4040 '
4050 ' DECLARE WINNER
4060 '
4070 IF LS = TS THEN WP = 128 ELSE WP =
180
4080 FOR N = 1 TO 10
4090 PRINT @ WP, STRING$(6, " ");
4100 FOR I = 1 TO 15 : NEXT I : ' DELA
Y
4110 PRINT @ WP, "WINNER";
4120 FOR I = 1 TO 5 : Z = USR(0) : NEX
T I
4130 FOR I = 1 TO 5 : NEXT I
4140 FOR I = 1 TO 5 : Z = USR(0) : NEX
T I
4150 NEXT N
4160 PRINT @ 776, "Push space to play a
gain.";
4170 GOSUB 3560 : ' INKEY$ ROUTINE

```



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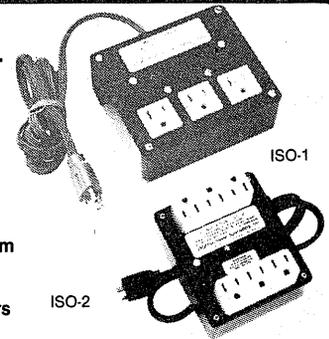
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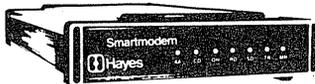
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Word game

```

4180 IF ASC(I$) = 32 THEN GOTO 2040 : '
      INITIALIZE & PLAY AGAIN
4190 CLS
4200 PRINT @ 352, "BYE!";
4210 END
4220 '
4230 ' INSTRUCTION ROUTINE
4240 '
4250 CLS
4260 PRINT "DAZZLE is a fast-paced word
      game for two players."
4270 PRINT "A randomly selected group o
      f six letters is dis-"
4280 PRINT "played in the middle of the
      screen. The first"
4290 PRINT "player to recognize a word
      using four or more of"
4300 PRINT "the displayed letters press
      es his 'WORD' button -"
4310 PRINT "<CLEAR> for the righthand p
      layer, the down arrow"
4320 PRINT "key for the player on the l
      eft. The computer sig-"
4330 PRINT "nifies which player has pus
      hed first by displaying"
4340 PRINT "a 'v' in the lower corner o
      n the side of that "
4350 PRINT "player."
4360 GOSUB 4770 : ' PAGER ROUTINE
4370 PRINT "Since the player may have m
      istakenly pushed"
4380 PRINT "the button, the computer as
      ks which player"
4390 PRINT "won the point. Press the r
      ight arrow key if the"
4400 PRINT "point goes to the player on
      the right, the up
4410 PRINT "arrow for the player on the
      left. While looking"
4420 PRINT "at the letters displayed on
      the screen either"
4430 PRINT "player may decide that no w
      ords are possible."
4440 PRINT "In that case the player may
      'CHALLENGE' by "
4450 PRINT "pressing the appropriate bu
      tton. The righthand"
4460 PRINT "player must push the <?> ke
      y (or the righthand"
4470 PRINT "shift key on the Model III)
      , the lefthand player"
4480 PRINT "the <Z> key (or lefthand sh
      ift on a Model III)."
4490 GOSUB 4770 : ' PAGER ROUTINE
4500 PRINT "When a challenge key is pre
      ssed a countdown timer"
4510 PRINT "is displayed on the side of
      the player who is"
  
```

Word game

```
4520 PRINT "challenged. If that player
does not find a word"
4530 PRINT "before the timer runs out t
he challenging player"
4540 PRINT "wins the point. If the cha
llenged player does"
4550 PRINT "find a word, he wins the po
int. Each point won"
4560 PRINT "results in movement of the
score pointer at the"
4570 PRINT "bottom of the screen toward
the side of the point"
4580 PRINT "winner. When the pointer r
eaches either end, the"
4590 PRINT "corresponding player is rew
arded by an upward "
4600 PRINT "movement of his score point
er on the side of the"
4610 PRINT "screen."
4620 GOSUB 4770 :' PAGER ROUTINE
4630 PRINT "The first player to score t
en points reaches"
4640 PRINT "the top of his side scorer,
and wins the game."
4650 PRINT "The game includes sound eff
ects for the timer and"
4660 PRINT "other appropriate activitie
s. Sound is output"
4670 PRINT "through the cassette port,
by a machine language"
4680 PRINT "subroutine poked to high me
mory at the beginning"
4690 PRINT "of this program. Memory is
sized automatically"
4700 PRINT "by this program, but the va
lue of M in both the"
4710 PRINT "AUTO MEMORY SIZE and LOAD M
ACHINE LANGUAGE SOUND"
4720 PRINT "routines must be set to a v
alue at least 25 bytes"
4730 PRINT "below the normal top of mem
ory when typing in"
4740 PRINT "the program."
4750 GOSUB 4770 :' PAGER ROUTINE
4760 RETURN
4770 '
4780 ' INSTRUCTION PAGER ROUTINE
4790 '
4800 PRINT "*****"
*****"
4810 PRINT
4820 PRINT TAB(10);"Push any key to con
tinue."
4830 GOSUB 3560 :' INKEY$ ROUTINE
4840 CLS
4850 RETURN
4860 '
```

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Files and foibles

Binary trees

T. R. Dettmann, Associate editor

In the last installment, we covered one possible use for list linking techniques. A still better use for linking technique is establishing what is called a "binary tree". Binary trees are well known to professional programmers since they can often be used to simplify access (and speed it up) in a file. A binary tree is more than just a linked list. In fact, it is related to it only by the fact that both use pointers. A binary tree cuts down the number of times we have to access a file while searching for an item. For example, with less than (or equal to) 1024 items in a file, we can find any one (or tell that the one we want isn't there) in less than 10 accesses. If we put 1024 items in a simple linked list, then the *average* search time for an item would be 512 accesses to the list! Obviously, a binary tree becomes a very efficient technique for dealing with large random access files. As always in life, nothing is free. Getting a binary tree requires extra space because instead of one pointer, we must keep two. It also requires different techniques for accessing the tree. We have to use new methods for putting things in and taking them out. In some cases, the programming overhead is unwarranted. Still, if your application requires a large file which you have to frequently get information from to keep it ordered, and if you want information fast, then a binary tree structure may be for you. Let's look and see how a binary tree works. Figure 1 shows conceptually how a binary tree may be viewed. It looks like an upside down version of a genealogical chart. At the top of the binary tree is the "root". This is the starting point for all accesses to the list. If we're looking for something in the file, say the name "Terry", we start looking at the root. As we look at each data item, we ask: "Is what we want greater than or less than what we found?" If the answer is greater, we follow the right side path from the data item into the tree below. If the answer is less, we go down the left. If the data item equals the item we're looking for, then we've found it. If we decide to move down left (or right, for that matter) and find that there's no place to go (no link), then what we want isn't in the list. As long as the tree is "balanced" (equal numbers of items on each side of any one data item), then we never need go very far to get anything. As it turns out, the critical thing for practical applications involving trees that you construct as you go (say, for a mailing list) is how the tree grows. If it grows in a balanced fashion, then getting anything in the tree will be fast. In the worst case, if things are added to the tree in just exactly the wrong way, it breaks down to a linked list and we lose the advantage we sought. **Adding to a Tree** To add to a binary tree, we follow the basic procedure:
IF ITEM IS THE ROOT



[513]
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File handling

THEN WE'RE DONE OTHERWISE START AT THE ROOT
 IF THE NEW ITEM IS LESS THAN THE PRESENT ITEM THEN GO LEFT ELSE GO RIGHT
 CONTINUE DOWN THE TREE UNTIL THERE IS NO LINK TO CONTINUE WITH, PUT THE NEW ITEM THERE

To search through a binary tree, we have the procedure:

```

START AT ROOT
A  IF ITEM DESIRED = ITEM LOOKING AT THEN DONE
    IF ITEM DESIRED < ITEM LOOKING AT THEN GO LEFT
    IF ITEM DESIRED > ITEM LOOKING AT THEN GO RIGHT
    IF CAN'T GO DOWN IN THE LIST THEN THE ITEM ISN'T IN THE LIST
    REPEAT FROM A FOR EACH ITEM ENCOUNTERED.
  
```

While these procedures are conceptually simple, they do take some work to make them useable.

If we really want to use a binary tree, we have to work out simple BASIC subroutines to do these functions and the exact structure for our data to make it possible.

Binary Trees in BASIC

To lay out a binary tree in a real file, first we have to provide two links for each record. Then we need to lay out our data record itself. Consider, for example, this FIELD:

FIELD #1, 2 AS LL, 2 AS RL, 56 AS DA\$

We're using LL for the "left link", RL for the "right link", and DA\$ for the data.

Now, to add items to the list, assume, for the moment, that we'll always use record 1 as the root and always add to the end of the file. We'll assume that X\$ is the data to be added to the file.

We then have:

```

1000 REM ADD TO TREE
1010 LC=LOF(1)+1
1020 IF LC=1 THEN 1110
1030 LK=1
1040 GET1,LK
1050 IF X$<DA$ THEN 1090
1060 IF X$=DA$ THEN PRINT"ALREADY THERE":RETURN
1070 IF RL=0 THEN LSET RL=LC:PUT1,LK:GO TO1110
1080 LK=RL:GOTO1040
1090 IF LL=0 THEN LSET LL=LC:PUT1,LK:GO TO1110
  
```

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```

1100 LK=LL:GOTO1040
1110 LSET DA$=X$:LSET LL=0:LSET RL=0
1120 PUT1,LC:RETURN
    
```

To find an item in the file, we have to start at the root and look down through the tree until we find what we want. One procedure goes like this:

```

1200 REM SEARCH THROUGH TREE
1210 IF LOF(1)=0 THEN PRINT"FILE EMPTY"
      :RETURN ELSE LK=1
1220 GET1,LK
1230 IF DA$=X$ THEN PRINT"FOUND":RETURN
1240 IF X$<DA$ THEN LK=LL ELSE LK=RL
1250 IF LK=0 THEN PRINT"NOT FOUND":RETU
      RN
1260 GOTO 1220
    
```

Neither of these treats the problems such as what to do if the tree gets unbalanced, how to follow through the tree to print it in alphabetical order, etc. But they will get you started with the concept of a binary tree.

Figure 1— Entering the names Mike, Terry, Nancy, Jerry and Victor (in that order) gives the tree structure shown here:

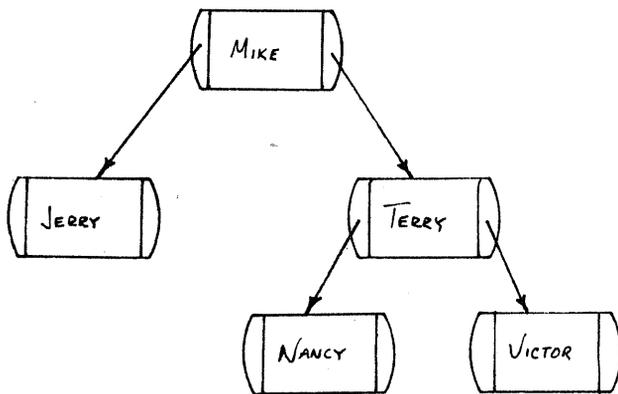


Figure 2— The names from Figure 1 would be stored on disk like this:

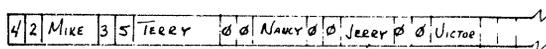
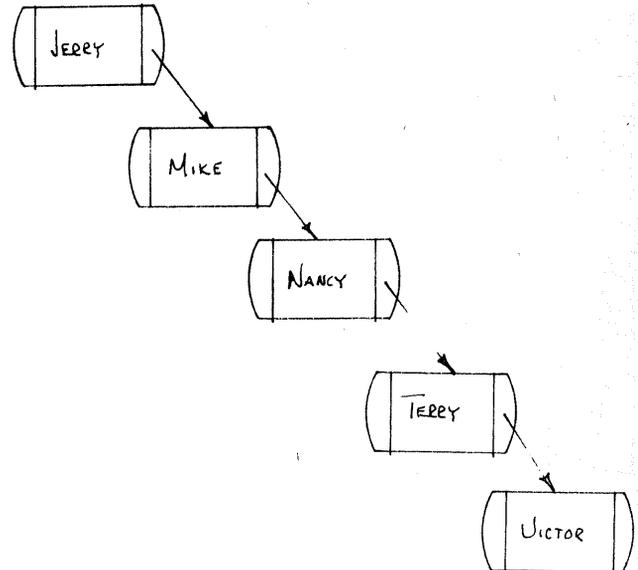


Figure 3— Entering the names from Figure 1 in alphabetical order gives the following configuration. A binary tree works best with a random order of entry.



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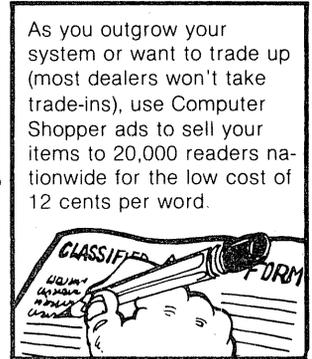
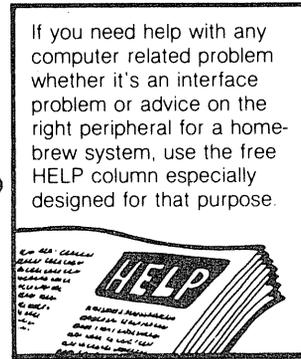
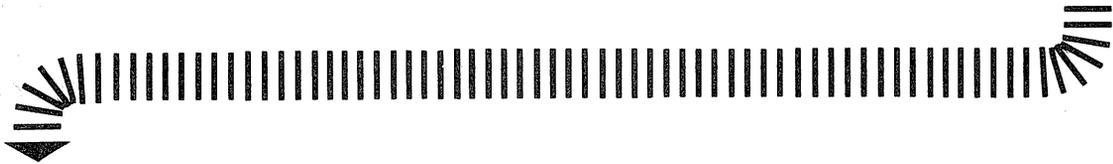
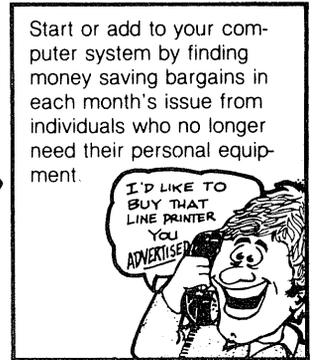
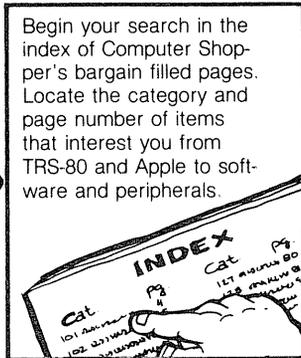
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Captain 80

The adventures of a software secret agent

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I had just put away my Software Secret Agent disguise for the evening and settled down for a rousing half hour of Mork and Mindy when the tea kettle rang. It was for me.

"This is your fearless leader," snapped the voice on the other end of the line. Immediately, I stood at attention. Mustering my most dutiful voice, I responded calmly.

"Hi, Chief, what can I do for you?" I said smoothly in my best Bogie voice.

"This is an important assignment, so pay attention," he growled, "Professor Henton Megabyte has disappeared!"

I knew of this Professor Megabyte. He was the hardware genius who'd worked out the interface between the TRS-80 and the U.S. Air Force's top secret spy plane a few years ago. Now he was living in self-imposed exile right here in my home town of Peterborough, New Hampshire. As a matter of fact, his house had been rented back a few months ago by an H&E Computronics Software reviewer, who also had disappeared.

"I'll get right on it, Chief," I said, and hung up the tea pot lid.

Next morning, I drove by the ominous three-story Victorian structure belonging to the Professor. There was a "For Rent" sign in the window, so I stopped.

I was greeted at the door by a hawk-faced lady of sinister origins, who, after giving me a thorough scrutiny, accepted my first and last month's rent. When I asked about the Professor, she sighed and said simply that he was away. I got the same response when I asked about the journalist. She shrugged, saying she was only a twice-a-week housekeeper, and how would she

know about such comings and goings.

I moved in on Friday. It would be Monday before Mrs. Hawkface would return . . . more than enough time to discover the secret of the old house.

I explored the entire lower two floors. The decor was nothing to brag about. Then I found a big brass key. Obviously, this was the way to get past the huge oak door entranced the third floor. I made my way up the creaky old stairs and tried the lock. Sure enough, it opened. I reached for the light switch, but before I could flip it, the room exploded into light.

"Welcome home, Bob," came a voice. "It's good to see you again."

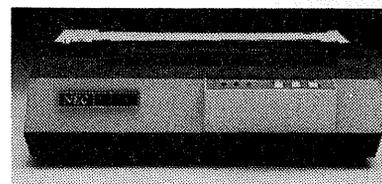
The voice was mechanical, votrax based, and seemed to be coming from a huge aluminum expansion interface that stretched from floor to ceiling, terminating in a Model I 48K four-drive TRS-80.

"Do I know you?" I asked tentatively, still not certain who I was dealing with.

"Of course you do!" came the response. "Put on the helmet you see on the accessory table and I will make everything clear."

Now the life of a Software Secret Agent is a strenuous one, and there are bound to be little gaps in one's memory. The REM-pak, which I had been instructed to wear, was a device designed by Professor Megabyte to restore such lapses. Placing it on my head, I relived an instant replay of three months last year when I had lived in this house and searched for the Professor. It all came back to me.

The machine's name was MAX. He was a sentient electronic entity created accidentally from a power surge while Professor Megabyte was experimenting with a device



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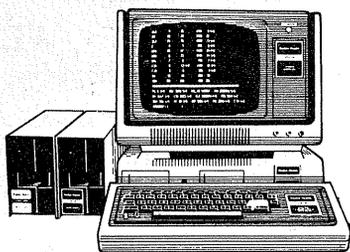
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Captain 80

that allowed him to enter the actual world of the computer program he had on line. Max's original function had been to serve as a sort of lifeguard program, to keep the professor from delving too deeply into the software. An unexpected glitch in the electrical lines had caused Max to download the luckless Professor to "The Source", where he would be safe.

Alas, Max had reckoned without the "sideslip effect". So, while Max was collecting himself, the Professor had shipped out for parts unknown on the U.S.S. Enterprise, courtesy of a Star-Trek program resident in the Source's main library bank.

I had been disguised as myself, hard working software reviewer, when I picked up the Professor's trail accidentally after being unceremoniously dumped (body and mind) into the middle of a Space Invaders program. I almost had him! But when I was retrieved, I had lost not only the Professor, but all recollection of that three months of my life. The assignment had been shelved until Max could, with the help of some new mechanical arms, build the REM-pak.

"Now, let me get this straight," I said. "Your name is MAX, and you have the ability to interface me *physically* into a piece of software, which is what *already happened* to

Professor Megabyte, but he got lost accidentally and I have to find him by searching individual units of software *personally*?"

"That's about the size of it." agreed Max.

My ball point pen rang. It was a recording of the Chief.

"By now, the REM-pak has done its job and you know the true nature of your assignment. You are to remain in the Professor's house and review software just as you have been doing, but secretly you will be searching for the missing professor. You must find him at all costs. Report to me once a month. This message will self destruct in five seconds.

Quickly, I tossed the pen out the window and down into the parking lot of the motel next door where it rolled under the wheels of a white Jaguar. I hope the owner had "a piece of the rock", because that Jaguar was gone three seconds later.

So now I'm all set. I've got a powerful new assistant, a one-of-a-kind computer and junior Software Super Hero all rolled up in one magic software machine named Max. I've also acquired a new assignment fraught with danger and suspense, namely to find Professor Megabyte.

Now, what more could a fellow ask for? ■



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Tandy topics

**Ed Juge, Director
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My day is made! Thanks to Phil Smith of St. Petersburg, Florida for sending me a copy of his very nice letter to *80-U.S. Journal*. He applauds this magazine's "personality", saying it is a delight to read. *80-U.S.* gives Phil a "feeling of kinship" with other TRS-80 users, the magazine, and with Radio Shack. I won't go into details, in the hope Mike will publish it in full as a letter to the editor. I'll just say, Phil, that your perceptions are right on. And it is absolutely a matter of attitude. From a reader's viewpoint, you'd be hard-pressed to find a better attitude than here in *80-U.S.*. Keep up the great work, guys and gals! And Phil, thanks for sending me a copy. . . you might be interested to know that at least 75% of the TRS-80 owners I talk to voice the same feelings. Not until now, has it been so eloquently committed to paper!

Back to work. We suspect some of you are hearing about a "new

version" 2.0B of Model II TRSDOS. Before anybody calls us, let me tell you. . . don't! This version does exist, but only for Model 16 owners. It's just like 2.0A, which is the current version, except that it contains several patches necessary for it to work with Model 16's double-sided drives. 2.0B isn't for a standard Model II.

A Model 16 owner who wants to run in the "Model II mode", needs 2.0B. If he wants to run existing Model II software, the 2.0B disk contains a "Do File" which will allow modification of his Model II software to operate in the double-sided drives, but still in single-sided mode.

Some confusion still surrounds Model 16, the "Model II mode", multi-user and Arcnet. I suspect most readers of *80-U.S.* aren't having a problem with all this terminology, but for those who are, I'd like to see if I can clear the fog.

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TRSDOS	Model II	Model 16
Version		Z-80 Mode 68000 Mode
2.0A	1S drives	1S drives
2.0B	-----	2S drives 1S mode only
4.0	Hard Disk	Hard Disk 1S drives
4.1	Hard Disk 1S	Hard Disk Hard Disk 1S or 2S 1S or 2S
4.1 Init.	-----	Initialization disk for HD. Supplied in 2.0 format. 64K owners will do a COPY from TRSDOS-16 to use HD.

First, a Model 16 is really two computers in one box. It's a Model II (Z-80 processor with 64K of memory). . . and it's a Model 16 (MC68000 processor with up to 512K of memory), which uses the Z-80 and its memory for input/output and housekeeping. Yes, there really is a total of 576K on board in a "full blown" Model 16. We don't advertise it that way, since the Z-80 memory is not accessible to the 68000 user, and vice versa.

Now, modes — the computer can be booted to run under the Z-80 or the 68000 processor. The more you hear, the more TRSDOS version numbers you will run across. So, here's a list of versions, and what they do for Model II, and for Model 16's two modes. Obviously, 1S = "one-sided floppy" and so on. (We don't talk one and two-sided hard disks. See table on previous page.)

Now that you're thoroughly confused, let me say that the 2.0 versions are to allow Z-80 mode operation with Model II programs, in the single-sided mode.

TRSDOS 4.0 is the current hard disk operating system. It recognizes single-sided floppies, and Z-80 mode only. Version 4.1 is the floppy/Hard disk operating system which includes two things. . . "TRSDOS II" (Z-80) and "TRSDOS-16" (68000) to run on either single or double-sided drives (Model 16's or converted Model II's).

There will be a 4.1 initialization disk (supplied on 2.0 disks, so it's useable by 16s and converted II's to initialize the hard disk.

I've tried to tell you more than I know, in one very short exercise. The good news is that what a user needs to know is explained, hopefully more clearly than I've done it here, with his system manuals. But when you hear strange TRSDOS version numbers, you'll know a little more about what they are.

Judging from my phone calls, there is confusion between Model 16's coming multi-user capability and Arcnet. So, let's look at them. In multi-user mode, Model 16 supports a user on the built-in keyboard, plus two terminals such as our DT-1s. The terminals do no computing. In effect, they are additional keyboards and screens hooked to the computer. All the work is done by the Model 16's 68000 processor.

Model 16's memory is divided, with sections assigned to each user, plus a section for the multi-user operating system. If two users are both working on payroll, the payroll program is resident in each of their memory sections. They may access the same disk files (access for each user can be limited to any desired level for security), but if one user has opened John Jones' record with the intention to write to it, the multi-user system won't allow anyone else in while it is open.

You could describe multi-user as each user sharing the central processor, disk and a portion of the central computer's memory. It's a way to let three people do computer jobs concurrently with a minimum hardware investment. Multi-user will *not* function in the Model II mode.

On the other hand, Arcnet is a "shared resource" system. Each work station must be an actual computer. Programs are transferred into the user's work station, where all processing is done. Files accessed look to each user as if he were accessing a remote hard disk (again within established security limits), and of course, the commonality of the hard disk provides a common link, ideal for electronic mail or memos. One computer must be dedicated to managing files, and is called the "file processor". Each work station (called an "applications processor") can talk only to the file processor. . . not directly to another user's work station. There can be up to 255 computers in the network. Arcnet allows sharing of large hard disk storage, peripherals (such as printers) and easy transfer of files between users (via the file processor). Terminals will not operate on this system.

The advantage of multi-user is the ability to have three people doing computer jobs at one time, with minimal hardware expense. Arcnet, on the other hand, allows a large number of computers, networked to form a very powerful overall system, with information and peripheral sharing. The only place users "compete" for time in an Arcnet system is when asking for programs or data from the file processor. In a multi-user system, this competition exists with any CPU operation, since all users share the CPU.

That's a long explanation. Apologies to those who didn't need it. Next month, I'll try for more varied subjects. ■

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Reviews

Polaris
TRS-80 Color Computer
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As in the early days of the Model I computer, there is not a lot of software available yet for the TRS Color Computer to choose from. I believe that in a short while, we will see more entertainment-oriented software available for it than for any other TRS computer. I have bought some of the earlier ROM game packs from Radio Shack, and have not really been that impressed, until Polaris.

I was looking around in my neighborhood Radio Shack the other day, and spotted the new game ROM pack, Polaris. Travis, my nephew, was with me, and of course was interested in seeing the new game. (Not me! I use my computer for more *important* things.) We talked the salesman into showing it to us. It is a game with a close likeness to Missile Command. We didn't have time to play it very much in the store, but what we did see, we liked. So, with Polaris under Travis's arm, we drove home.

On the way home, I thought back again to early TRS-80 Model I days, when *any* game was great. Just to have a game that drew a line across the screen was exciting to us. (I admit it. It still can be exciting to me). Then came people like Leo Christopherson. I was just starting to get a new, small magazine called *80-U.S. Journal*. Reading through one of the issues, I saw an ad for a game called Android Nim. The ad looked good, so I talked my wife Jo Ann into putting a check into the mailbox. When I received the game, I CLOADed it into my machine and typed RUN. Man, the graphics and sound of this game were so good that it set a standard that is still being followed today.

At that time, I had never seen a program use sound effects on a TRS-80. This was a *giant* step in TRS-80 programming history. I feel the

Color Computer will probably follow a similar route. At first, there will be a lot of mediocre software; then people like Leo Christopherson will step in and really show us what the Color Computer is capable of doing, and at the same time, spoil us forever. (I hope Leo is reading this, because I would love to have his games in a Color Computer version.) If he did so well within the Model I's graphic limitations, I can only imagine what he would do with the powerful Color Computer in his hands. (How about it Leo?) I would love to see Color Computer versions of arcade games available from the greats such as Big Five Software also.

We finally made it home. I started reading through the game instructions as Travis inserted the ROM pack into the side of the computer. After a few minutes of learning to control the game, we were suddenly involved in complete and total WAR! Clouds were bursting all over the screen with explosive sound effects. We screamed as we lost one of our subs to an enemy missile or bomb. Each time we thought we had destroyed all of the enemy, another wave would start attacking twice as fast and mean as the last.

We were really there! The movements were in complete real time. When you fire a missile from a sub, you can immediately move your cross hairs to another enemy position and fire again. There is no waiting for anything.

After about an hour of fighting, we were called back from the front lines to eat. We refueled our bodies at the dinner table, and headed back to the computer control room to continue our war. After a while, it was time for Travis to get to bed for school the next day. I would be going to bed after a little reading and studying on the latest TRS-80 developments, techniques and products.

About thirty minutes later, my

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Reviews

wife came into the computer room and said, "The kids can't sleep!" I said, "Why not?" "Could you, with all these bombs and missiles exploding in the next room?"

Pete Carr

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Adventure International has hit another winner with a new title called Eliminator. It is patterned very closely after William's popular arcade game, Defender. In this fast-paced real-time simulation, you are the pilot of the Eliminator, an extremely fast combat-class starship. Your mission is to prevent alien spacecraft from capturing 10 energizers that sit atop the gantry towers scattered across the planetscape. The aliens materialize from hyperspace in several waves, and as each wave is destroyed, a new wave appears until all of your Eliminator craft are destroyed or all the energizers are captured.

There are four types of alien vessels, each with its own function and point value. The Disruptoids hover over the energizers and then attempt to pick them up. As they slowly ascend, you may destroy them; but, be careful not to destroy the energizer in the process. If the Disruptoid is destroyed, the energizer will free fall back to its gantry tower safely, provided it falls no further than half the screen distance. If you can intercept the energizer by maneuvering your ship into physical contact with it, you will be given extra points, and by safely replacing it on its pad, an additional bonus is accumulated. Drones are small craft that zig-zag and discharge aerial mines which are deadly if touched by your ship. TDUs, or Tracer Dispersal Units, are harmless until touched, whereupon they release five small Tracer ships which will destroy the Eliminators upon contact.

The screen layout consists of a split screen arrangement with the top serving as a wide screen monitor

which shows approaching enemy craft in both directions. The bottom half of the screen shows the planetscape, the energizers on their gantries, your ship, and the enemy craft. Using the four arrow keys, you move forward or reverse (actually, your ship appears stationary and the planetscape and aliens appear to move) and up and down. The space bar fires the plasma bursts one at a time. To escape sure destruction, you can escape into hyperspace by pressing CLEAR. The ENTER key releases the disruptor charges which destroy only the alien ships in the immediate vicinity. The fire power is really awesome!

The disk version saves the high scores to a disk file, and if the player achieves a score in the top ten, a short fanfare signals the achievement. The player is then entitled to enter any name up to 18 letters on the high score board for posterity. Your reviewer remembers when arcade games used to award a winner with additional free plays. Today, all they give is recognition.

Anyway, Eliminator is truly a must for anyone who enjoys arcade simulations. Great sound, mind-blowing graphics, fast action, and a challenging motif, add up to another winner for Adventure International. Has anyone figured out how to put a coin operated mechanism on their TRS-80? This is one game that people would pay to play.

Jim Klaproth

**Quick Quiz: A
Mini-Authoring System
Model I/III with Disk
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Participating Dealers
\$29.95**

Give Radio Shack credit!

I have found most educational software that purports to help me, to be of little use or too expensive to consider. Here is a program that does not force me to adopt their system. Rather, it allows me to do what I want, in the way I want.

Quick Quiz allows any teacher to turn the TRS-80 into a test writer, test grader, test giver, and recorder. The only restriction is that the test

must be in a multiple choice format. Before you say "My subject can't be tested that way", consider this: Only a well written multiple choice exam has reliability and validity that can be measured. I still remember my educational tests and measurements instructor drumming that into me every day for 18 weeks.

Quick Quiz does not give item analysis or other fancy statistical measures, but it is slick, simple to use, and appears to be a real time saver for any teacher.

You begin by creating a test. Tell the computer the number of questions and number of options per question (keep it the same for each question. Four or five options are best.). Now, off you go, creating the questions that will probe the depths of your students' minds. Entering is easy and is much like a text editor. Options and questions are automatically numbered for you. If you mistype, or call the wrong option correct, an editing feature is available. Even the BREAK key is defaulted to make sure you can't mess up. Finally, give the test a name and SAVE it.

You can now have students take the test, have it printed out, erase it off the disk, or review student results.

Taking the test is easy. Only about one minute is needed to show students how the arrows are used to

pick the option to a question. One small flaw lies here. Students are not given the next question until they get it right. When they are done, their responses are recorded to disk. At the end of the test, the student is shown each question and the number of tries it took, but this information is not recorded. Only if the question is answered correctly on the first try is it counted right.

When printing the test, you can title it, tell how many copies are wanted, and it even prints the answer key! Be sure you are using standard paper. You can't alter printout from the program.

When looking at test results, you are given the student's name, which test, and the percentage score. If a student retakes a test, this data is stored apart from the other, so you can monitor progress.

At most only 50 results can be recorded for a given test, but that should be no problem in most classrooms. For those of you with more students, the school should at least pay for the added diskettes.

I believe that this is a winner. It is straight forward, applicable to every classroom, and priced right. Buy one! If nothing else, a binder, two diskettes, plastic holder, and two copies of TRSDOS should cost \$30.00

Cameron Brown

Cave Hunter
Color Computer with 16K
Mark Data Products
23802 Barquilla
Mission Viejo, CA 92691
(714) 768-1551
\$24.95

For all Pac-Man wizards out there, Mark Data Products has come up with a challenge for you. "Cave Hunter" is more than just another pretty maze; it's an addicting exercise in greed.

The object of Cave Hunter is to direct your robot, with joysticks, through a complex maze, to the bottom of a cave. Waiting at the bottom are four blocks of gold which you must carry, one at a time, back to the mine entrance. The only problem lies in the fact that there are three Cave Creatures waiting to make you their midnight snack.

Your protection from the creatures lies in four power deposits situated throughout the maze. If you should be so fortunate as to capture and return all of the gold to the mine entrance, you will receive a new game. The level of play increases as your skill level increases.

In a few ways, this game offers more to the player than does Pac-Man. The Cave Creatures are more intelligent than Blinky, Inky, Pinky and Clyde. The Cave Creatures *know* where you are going and why. As far as I can tell, you cannot use a

OMNITERM

What is OMNITERM?

OMNITERM is a professional communications package for the TRS-80 that allows you to easily communicate and transfer files or programs with almost any other computer. We've never found a computer that OMNITERM can't work with. It's a complete package because it includes not only the terminal program itself, but also conversion utilities, a text editor, special configuration files, serious documentation and serious support.

Why do I need it?

You need OMNITERM if you need to communicate efficiently with many different computers, or if you want to customize your TRS-80 for use with one particular computer. You need OMNITERM to SOLVE your communications problems once and for all.

What do I get?

The OMNITERM package includes the OMNITERM terminal program, four conversion utilities, a text editor, and setting files for use with popular computers such as CompuServe, the Source, and Dow Jones — just as samples of what you can

The ULTIMATE TRS-80 Terminal Package

do for the computer you want to work with. The package includes six programs, seven data files, and real documentation: a 76-page manual that has been called "the best in the industry." And OMNITERM comes with real user support. We can be reached via CompuServe, Source, phone, or mail to promptly answer your questions about using OMNITERM.

What do I need to use OMNITERM?

A Model I or Model III TRS-80, at least 32K of memory, one disk, and the RS-232 interface, or Microconnection modem. OMNITERM works with all ROMs and DOSes, and will work with your special keyboard drivers.

What will it do?

OMNITERM allows you to translate any character going to any device: printer, screen, disk, keyboard, or communications line, giving you complete control and allowing you to redefine the character sets of all devices. It will let you transfer data, and run your printer while connected for a record of everything that happens. OMNITERM can reformat your screen so that 80, 32, or 40 column lines are easy to read and look neat on your TRS-80 screen. It even lets you get on remote computers with just one keystroke! The program lets you send special characters, echo characters, count UART errors, configure your UART, send True Breaks and use lower case. It accepts VIDEOTEX codes, giving you full cursor control. It will even let you review text that has scrolled off the screen! Best of all, OMNITERM will save a special file with all your changes so you

can quickly use OMNITERM for any one of many different computers by loading the proper file. It's easy to use since it's menu driven, and gives you a full status display so you can examine and change everything.

"OMNITERM has my vote as the top TRS-80 terminal program available today" KiloBaud Microcomputing, June 1981, pages 16-19.

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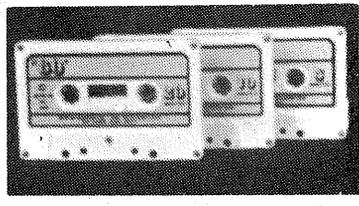
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Circle # 66

Reviews

set pattern to win at this game. The side tunnel in this game is a safer escape route than its counterpart in Pac-Man; the Cave Creatures don't enter it.

Points are scored in Cave Hunter for returning the gold to the entrance of the mine and for destroying the creatures. When "double points" flashes on the screen, points are doubled for eating the Cave Creatures.

I must confess, as a retired Pac-Man wizard, that the points are secondary in this game. Any wizard will tell you that the thrill is in the chase. Cave Hunter gives you a chase which makes "Smokey and the Bandit" look tame.

Bob Perez

**Telewriter
TRS-80 Color Computer
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Cognitec
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Del Mar, CA 92014
(714) 755-1258
\$49.95**

Have you ever wanted to write a book or magazine article, but couldn't bear the thought of doing it with just a typewriter (especially if you type as bad as I do)? Would you like to use your Color Computer for something besides playing games?

If you fit one of these situations, and own a Color Computer, a firm named Cognitec has the answer for you. They sell a cassette-based word processor program, called Telewriter, that removes the drudgery from almost any writing task.

The Program

Telewriter turns the Color Computer into a powerful cassette-based word processor. It makes the cassette recorder easy to use. If you indicate that a cassette file should be loaded, the program searches in the forward direction until it finds the desired file name, then it loads the contents of the file into a text buffer. You can save all, or any part of, the text you're currently working on, or append a preexisting cassette file to the current contents of the text buffer.

Telewriter requires at least 16K (and preferably 32K) of RAM to operate. The program and its

buffers use approximately 14K of RAM. Thus, a 16K computer can hold about one full page of text (about 2000 characters) in its memory, while a 32K version can hold approximately nine full pages of text.

The screen is turned into a 51 by 24 character workpad that displays upper and lower case characters. The characters are displayed in a 5 x 7 dot matrix. This format does not permit true lower case descenders (q, y, p, g, j), but still produces a very readable display.

The program is controlled from a master menu. You can create a new file, load a pre-existing file from cassette, edit a file already in the text buffer or cassette, or obtain a word and line count of the file currently in the buffer. If you choose to create a new file, or edit a file in the text buffer, the program transfers control to the editor.

The editor contains a wealth of commands that permit almost any text handling operation to be performed. You can delete, copy, or move lines, paragraphs, or entire pages of material. To delete material, set an end mark following the last character to be deleted, then move the cursor to the first character, and enter a control X. The program then deletes all material between the cursor and the end mark.

To copy material from one location to another, set an end mark following the last character to be copied, move the cursor to the first character and set a beginning mark. Then move the cursor to the location you want to copy the material to, and enter a control C. The program copies all of the material between the begin and end marks to the new location and deletes both marks.

To move material from one location to another requires a combination of the copy and delete operations. You begin by copying the material to the new location, then deleting the material from the old location. The combination of the two operations neatly moves the desired block of material to the new location.

The program has a wordwrap feature that handles carriage

returns and prevents split words at the end of lines. All you do is type. The program takes care of the rest. If a word at the end of a line exceeds the screen line length, the program moves the entire word to the beginning of the next screen line.

Occasionally, when new material is added to the middle of a line, or sections are deleted, a line becomes fragmented. Part of it is displayed on one screen line, and the balance on the next. The alignment command automatically readjusts the entire display so no fragmented lines exist, and all lines fit neatly within the screen lines. It's really a nice feature!

The editor contains a powerful search and replace command. If you specify a search string and a replacement string, the editor conditionally replaces each occurrence of the string. When it locates an occurrence of the search string, you are given two choices:

1. Replace the occurrence with the new string and continue searching.
2. Skip the occurrence and continue searching.

When you're ready to print a text file, you select the format menu from the main menu. The format menu controls how the file is printed. You can specify the number of lines for the upper and lower margins, number of spaces for the left and right margins, number of characters per line, number of lines per page, and whether the printed pages should be numbered. You can also specify the margin, spacing, and page-related commands within the text via embedded commands. Thus, you can set up special tables and banners very easily. In addition, you can create page headers and center a block of text within a line.

You can specify up to 10 user-definable control codes that execute from within the text when it is printed. These codes might be control codes for specific printers or ASCII text strings to be printed. In addition, you can print all of the current text buffer, part of it, or chain print multiple cassette files. The program can print at 120, 300, 600, 1200, 2400, or 4800 baud.

For people who have an Epson

MX-80 printer, Telewriter contains resident routines to control its printing. The format menu contains an Epson font table that provides normal, emphasized, double, condensed, or enlarged fonts.

Documentation

Cognitec provides two manuals with the program: a 27-page tutorial manual, and a 33-page reference manual. The tutorial manual is designed to get the initial user quickly involved with word processing. Within minutes, the manual has you entering text, moving it around within the file, deleting portions of text, and various other operations. In addition, the Telewriter cassette contains a demonstration program that you can load and try out the various word processor commands.

The reference manual contains complete instructions on using each of Telewriter's commands. It begins by describing how to load the program from cassette, then describes the conventions used in the balance of the manual. The remainder of the manual describes Telewriter's commands, beginning with the editor and ending with the print-related commands. Each command receives a thorough discussion on how it is used, what it does, and any limitations it might have.

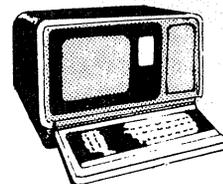
In addition, the reference manual has three appendices that contain useful information. This information includes command reference charts, hints to speed up various operations, split screens, retrieving part of a damaged cassette file, and much more.

Conclusions

My overall impression is that the program is excellent. The program is easy to use and very difficult to crash. After heavy use, I still haven't found any major problems related to word processing.

If you need an economical word processor for the Color Computer that does a super job, then you should investigate Telewriter! Now, if Cognitec would only generate a dictionary program to go with Telewriter...

Darrel Wright



If you have anything to do with the TRS-80* System you should be reading the **EIGHTY SYSTEM NEWSLETTER** every week!

Don't miss a single issue of the new Eighty System Newsletter... published weekly and mailed every Friday by First Class Mail. This is the only publication designed for personnel in the TRS-80* industry, including manufacturers, distributors, dealers and computer users. The Eighty System Newsletter is compiled and edited by Ken Gordon, producer of the National TRS-80* Show, the Eighty/Apple Show, the NJ Microcomputer Show, and publisher of the Amateur Radio Equipment Directory. Here is valuable information in professionally prepared format about TRS-80* hardware, software, peripherals, trends in the industry, and latest news. In addition, each weekly issue contains brief digests of articles related to the TRS-80* system appearing in over 100 computer related and general interest publications. This bibliography will save you both time and money in keeping up with articles in print on the TRS-80* computer system. The Eighty System Newsletter is a must for all active TRS-80* users, plus anyone involved in any way with the manufacturing, distributing or retailing of TRS-80* products.

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ZBASIC 2.0 Compiler

Model I/III

Jim Klapproth, Associate editor

BASIC compilers seem to be a popular project of many software houses of late, Microsoft introduced theirs first, followed by several others, including Radio Shack's version. ZBASIC 2.0 is the latest offering from Simutek Computer Products. It has many features not found in any of the other compilers; however, it also lacks many features that make a compiler such a useful programming tool.

The main advantage of any compiler over the interpreter BASIC, is its ability to generate code that executes several times faster. While some compilers generate a pseudo-code (p-code) that requires a runtime program, ZBASIC generates pure Z-80 machine code that can be executed as a SYSTEM tape file or a CMD disk file. Chalk up one plus for ZBASIC.

One of my first ideas was to load ZBASIC, then load and compile some of my existing programs. Unlike Radio Shack's compiler, you can load an existing BASIC program into memory and then compile it. However, due to the many syntax differences between Level II BASIC and ZBASIC, only one of my existing programs would compile without substantial modification. Even some of the simple programs would not work because there is no TAB function, which is used in most programs for screen formatting.

ZBASIC substitutes the STRING\$ function for TAB in Level II. I did convert some programs by changing all TABS to the STRING\$ function. Chalk up one plus and one minus.

Ease of use must rate high in program development. ZBASIC really shines in this area. From DOS, simply load the proper version of ZBASIC, enter BASIC, set memory size, type in or load a BASIC program, run and debug it using the Level II interpreter, then press "+", "+"/" simultaneously to compile the program. Most programs compile as fast as you can press the keys—it is truly amazing!

After compilation, a menu allows you to run the program, save the program, or return to BASIC. To run the program, simply hit "R" and the program immediately begins execution. To save the program, hit "S" and then respond to the query with the file name. In the disk version, which was the one being evaluated, using the /CMD extension will automatically load and execute the program from DOS. To return to Level II BASIC, hit the "B" key and you will be back in the interpreter. Chalk up another plus for ZBASIC.

Speed is probably the most easily quantifiable attribute of any compiler. ZBASIC claims an increase of 10 to 100 times in operating speed. The one program that did compile

successfully, was an animated graphics program that would draw the Space Needle and other prominent Seattle skyline features, run an elevator up and down the Space Needle, and a monorail train back and forth across the skyline.

In BASIC, the scene would take 3.25 minutes to complete five cycles. After compiling, the same five cycles took 3.8 seconds, and several loops had to be added to slow down the action. This represents an increase of 51 times the normal speed.

To give the reader another indication of the tremendous speed of ZBASIC, a simple pong game was entered from the ZBASIC manual. In normal BASIC, the ball took forever to travel across the screen. After compiling, the game was as fast as any machine language program. The compiler is not fast enough, however, to draw a complete screen instantaneously, as machine language can. Speed of compilation and execution get another plus.

There are six disk versions, and six cassette versions, of ZBASIC. The cassette versions are for 16K, 32K, and 48K memory sizes, each with the option of having high precision @ math or not. The disk versions are for 32K or 48K memory sizes, with the options being disk

I/O, no disk I/O, or disk I/O and high precision @ math. "@ math" allows up to 62 digits of precision in all calculations.

There are some limitations to using @ math—namely, all variables are stored as a string variable, and only one operation per statement is allowed. For example, the statement @ A\$ = A\$/B\$+C\$ is not allowed. The "@" sign must precede each @ math operation. Integer math can be converted to @ math, and vice versa, using the STR\$ and VAL functions. High precision math is a definite plus for ZBASIC.

The only disk I/O allowed is sequential; no random access is supported. Only one file can be opened at any particular time and end-of-file indicators are handled a little differently. There are several special functions that are not implemented in BASIC. However, keep in mind that the normal functions in BASIC are lost in ZBASIC, although there are substitute routines for the math functions.

The SIN and COS functions are now block move commands that move memory at the rate of 100000 bytes per second. CINT and CDBL are high speed memory searches that can find a single character anywhere in memory. FIX inverts memory for special effects, such as reversing the video display. Tone generation is done using the CVD command. ATN is a high speed multiply and LOG is a high speed divide, while EXP accomplishes high speed multiply by 10. Cassette I/O is done using CVS and CVI, and PUT and GET allow single byte disk I/O. TAN calls a machine language subroutine. LOC reads the stack

pointer or disables interrupts. CSNG is a 16-bit PEEK or enable interrupts, while MKI\$, and MKD\$ all pass arguments to a machine language routine.

In addition to the above functions that are lost, the following commands are not implemented: CMD, DEF, FN, ERR, ERROR, ERL, RESUME, USING, FRE, INSTR, TAB, and TIME\$. One of the biggest limitations is the memory space limitation. Because the BASIC program, the ZBASIC compiler, and the compiled ZBASIC program all reside in memory at the same time, space is at a premium. Using NEWDOS/80 version 2.0 in a 48K system, yields a memory size of 13976 after clearing all variables. This severely limits the overall size of the compiled program; although, programs can be chained together to create a larger one.

ZBASIC is useful mostly for developing new programs that need the speed of machine language, or for protecting a program from tampering. We suspect that several new programs are going to surface that have been built using this compiler. That is another plus, since Simutek does not require any royalties, as do Microsoft and Radio Shack. ■

ZBASIC 2.0 Compiler is available from Simutek Computer Products, 4877 E. Speedway Blvd., Tucson, AZ 85712, (800) 528-1149, cassette (16K, 32K, 48K) \$79.95, disk (32K, 48K) \$89.95.

Ed. Note— Simutek has informed us that they have released a newer version of ZBASIC, entitled ZBASIC 2.2. This newer release contains many features and enhance-

ments that were missing from the earlier version. As thrilled as he was with ZBASIC 2.0, I'm sure Mr. Klapproth would be delighted with the new options. I'm also told that there will be absolutely no difference in price between the earlier 2.0, and newer 2.2, versions. If you have purchased the 2.0 version and wish to upgrade, Simutek will provide the service for the cost of shipping and handling. Now, there's a company who supports their software!

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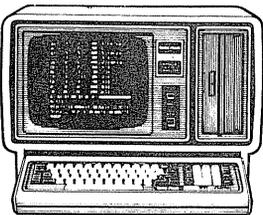
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Bisplan

Bisplan is a program for making business plans and projections. It allows input information on all phases of business operations and then does an analysis to predict earnings, cash flow, balance sheets, how much investment is required and how much financing is needed. Projections are made for up to five years. It is available for TRS-80 Models I and III on 16K cassette (\$19.95) and 32/48K cassette (\$24.95) plus \$2 for shipping and handling from Mariah Computing, PO Box 513, Columbia, MO 65205-0513.

Circle #125

Vaults of Cymarron

Compu Things has announced the availability of The Vaults of Cymarron for TRS-80 Models I and III, 16K cassette. The Vaults of Cymarron is an all action graphic adventure featuring 100 rooms, 15 treasures, 15 useful objects, magic spells, bartering with a graphic "pawnkeeper" and real time pursuit by a variety of animated monsters. It is available from Compu Things, 270 Broadway, Revere, MA 02151 (617) 289-8866 or your local dealer.

Circle #126

Electronic Mail

Ace Computer Products, Inc., announced Electronic Mail for the TRS-80 Model I and III. This intelligent datacomm system analyzes and executes commands and in response sends information to the host computer which, at the users discretion, can transmit or receive ASCII files to and from disk. The ACE software has both host and terminal capabilities to support the auto dial and auto answer features of the Hayes Stack Smartmodem. A special design feature is that both uploading and

downloading are supported from host and terminal modes. This eliminates the need for any alien terminal programs and makes the ACE program a stand-alone datacomm system. Written exclusively for the Hayes Stack Smartmodem and the TRS-80 Model I/III 48K with disk. The ACE smartmodem software retails for \$79.00. The Hayes Stack Smartmodem sells for \$249.00 from ACE Computer Products, Inc. For a limited time, when purchased together, the ACE software may be purchased for \$39.00. ACE Computer Products 1640 N.W. 3rd Street, Deerfield Beach, FL 33441 (305) 427-1257.

Circle #127

Educational software

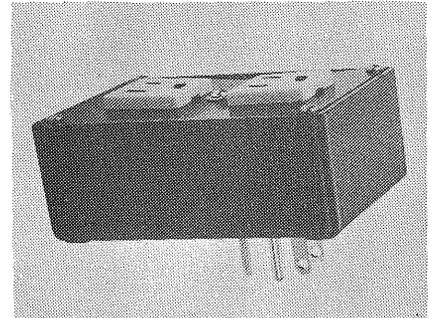
Marck's third catalogue lists a wide variety of tested educational software programs and related products for the TRS-80. It is considerably updated and expanded from earlier editions. Titles are listed by computer and indexed by subject area. Programs cover all age levels, include all the traditional subject areas and more (e.g., business applications, many utilities, electronics, simulations, etc.). Order direct, \$4.50 per copy in the U.S. (\$8.95 foreign). Marck, 280 Linden Avenue, Branford, CT 06405.

Circle #128

Software contest

Krell Software Corp is sponsoring a \$30,000 educational software contest. There are 30 each 1st, 2nd and 3rd prizes being offered for authors of original software in several categories. Contact Krell Software Corp. Dept 44, 21 Millbrook Drive, Stony Brook, NY 11790 or circle the number below for contest information.

Circle #129



Direct plug isolators

Electronic Specialists expanded their patented isolator line to include units that plug directly into the wall socket. Designed for installations that do not require extension cords, the direct plug isolators provide the same equipment interaction isolation and power line protection as their popular line cord isolator series. A convenient retention screw prevents accidental withdrawal from the wall socket. Direct plug isolators can accommodate a total of 1875 watts load, with up to 1000 watts per socket. A high capacity spike/surge suppressor is designed into each unit. Direct plug super isolator (Model DP-SIS032) provides 2 super-isolated channels for \$96.95. Electronic Specialists, Inc., 171 S. Main Street, Natick, MA 01760 (617) 655-1532.

Circle #130

Low cost word processor

Word processor hardware and software (less printer) for under \$1000. has been introduced by Personal Micro Computers, Inc. PMC's Electric Pencil System (Model EPS-80) offers everyone a surprisingly complete and simple to use system for only \$999 (without printer). As a bonus, the EPS-80 can also be used as a personal



microcomputer with thousands of useful programs readily available. The EPS-80 contains a PMC-80 "work-alike" computer with a standard typewriter keyboard, a green phosphor TV monitor for viewing sharp, crisp characters, a text memory of over 45,000 characters (about 20 pages) and a built-in high speed cassette deck for storage and retrieval of text files at 5000 words per minute. They also have a choice of two (under \$600) printers available. Complete details on the system and PMC printers is available from the manufacturer at 475 Ellis Street, Mountain View, CA 94043 (415) 962-0220.

Circle #131

Stack Rack

The skilfully crafted Stack Rack from Remtron has been manufactured to precisely fit and securely hold the Epson MX-80 printer. It stores up to 2 inches (over 600 sheets) of paper conveniently tucked away beneath the printer to give more desk top space and less clutter around work areas. The paper compartment accurately aligns the paper with the sprocket drives for jam-free operation. In addition the bale guide prevents the paper from snagging on the bottom of the printer for smooth, even paper flow. Ideal for bottom-feed line printers. It costs \$14.95 plus \$2 shipping/handling from Remtron, PO Box 2280 Santa Clara, CA 95055

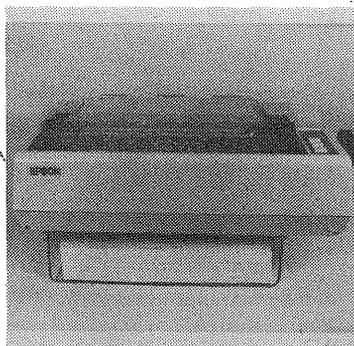
Circle #132

Computer Discovery course

Radio Shack has entered an agreement with Science Research Associates, Inc., a subsidiary of IBM Corp. Under this agreement, Radio Shack will sell Computer Discovery, a popular and proven computer literacy courseware package, for use with the TRS-80 Model III computer. Computer Discovery was developed by this Chicago-based educational publishing company to introduce secondary students (junior and



senior high school) to computers. Lesson topics include computer history, the impact and applications of computers (both at home and in business); and BASIC programming concepts including the use of algorithms, flowcharts and various computer languages. Computer Discovery includes software, student workbooks and an instructor's guide covering educational objectives, references, individual class activities and answers for the workbooks.



Money manager

Acorn Software Products, Inc., announces the release of Money Manager for the TRS-80 Model I and III, minimum 32K. Money Manager is a menu-driven personal finance management program which helps keep track of your income and expenditures and provides an easy method of budget allocation. Money Manager has the ability to store information for up to 100 checkbook entries for a given month. Each check-writing year has its own diskette. You can create as many as 99 expense categories, reconcile the checkbook with the bank statement and track taxable expenses. Available on Model I diskette (Model III owners use the CONVERT utility and 2 disk drives) for \$39.95 from Acorn Software Products, Inc., 634 North Carolina Ave., S.E. Washington, DC 20003 (202) 544-4259

Circle #134

Match Box Cabling system

ICO Rally Corporation, the Palo-Alto-based rack merchandiser, has announced the Match-Box Programmable computer cable system, a two-component cabling system the company says can be used to fulfill up to 1,000 computer cable needs. With the Match-box, the user can pick up two applicable components, connect them, and simply program the cable to the printer, computer or whatever. The system is built around two components, A and B. Component A is a connector with a one-foot-long section of cable attached to a Match-box unit. Component B has a complementary Match-box unit attached to a cable that can be up to 100 feet long. The components are mated and the system is programmed by moving the pins within the Match-box into the correct sockets. Depending on the number of conductors used in the cable, Match-box prices range from \$19 to \$53. For more information, contact Bill O'Brien, National Sales Manager, ICO-Rally Corporation, 2578 East Bayshore Road, Palo Alto, CA 94303 (415) 856-9900.

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Operation



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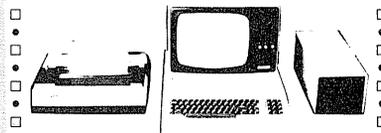
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Circle # 75

Dental Computer Newsletter

E. J. Neiburger, D.D.S., Editor
1000 North Avenue
Waukegan, IL 60085

The D.C.N. is an international group of dentists, physicians and office management people who have interests in office computers. Though the emphasis is on micro-computers, many members use minis. We cater to all makes and brand names.

Annual membership dues \$15.00. Membership runs from January to January. If you join mid-year, we will supply you with the year's back issues.

Circle # 76

FOR THE NO-DISK S-80 MOD I/III



THE REASONABLE ALTERNATIVE TO DISK
NOT JUST A SIMPLE SPEED-UP BUT THE EASY-TO-USE AND RELIABLE KWIK CASSETTE OPERATING SYSTEM THAT UPGRADES YOUR CRT USING KWIKOS TO SAVE AND LOAD YOUR PROGRAMS GIVES YOU THESE ADVANTAGES

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- No "lock-up" or garbage-loads from a bad tape.
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- You can password-protect any KWIKOS program.
- Motor on by keyboard command, off with BREAK.
- Built-in BACKUP feature lets you copy KWIKOS.
- Adjustable debounce and BASIC execution speed.
- Display of program length on each save or load.
- Mod-I: Fully compatible with LemonAid Loader.*
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Cassette for \$4.95
Level II unit \$24.95
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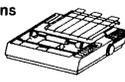
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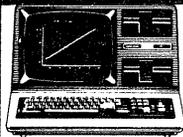
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These notices are free of charge and will be printed one time only on a space available basis. Notices will be accepted from individuals or bona fide computer user clubs only. All these unclassified announcements must be typed, contain 75 words or less and include complete name and address information.

FOR SALE: TRS-80 Computer Games. 1) "Proball-80". Action-packed, excellent graphics, and all the options of a real football game. Easy instructions (1 or 2 players). Only \$10 ppd. 2) Action Package 2 with "Indy 500"—An arcade-like game testing your driving skills, and "Starfighter"—chase and gundown death star fighters. Two games having graphics and sound for one price. Only \$7 ppd. ALL games require Model I/III, Level 2, 16K. Buy all three for \$15.00 ppd. Send to R. Calaman, 80 Wedgewood Drive, Carlisle, PA 17013.

SMARTMODEM from Hayes list \$279, best offer over \$209. It's effectively new; my MDX-2 has on-board modem which I now use instead. Ron Carpenter, 15 Lighthouse Rd., Half Moon Bay, CA 94019.

LEARN CP/M! Disk (flippy) will run on any Model I (not III). Includes several CPMUG public domain interesting utilities, some source code. Send \$11 (for media, handling) to Y. Sutton, 159 Oregon Ave., Palo Alto, CA 94301.

WANTED: Used Expansion Interface—OK (zero K) RAM. Call Kenny, 1 (206) 838-2116.

TRADE MY LNW-80 (Model I equivalent with high-res. color and 80 x 24 ability) with LNW E/I (includes RS-232), no case, plus 40 track bare BASF drive and partial modem kit **FOR a Model III** with only Level II BASIC. Ron Carpenter, 15 Lighthouse Rd., Half Moon Bay, CA 94019, (415) 726-3487.

NEWSLETTER EXCHANGES WANTED! Northern Bytes is the monthly newsletter of Microcomputer Users International, the microcomputer user club serving the Sault Ste. Marie, Michigan/Ontario area. We actively seek to exchange newsletters with other microcomputer clubs or user groups around the world. To participate in the exchange, send a copy of your newsletter to Microcomputer Users International, c/o Jack Decker, newsletter editor, 1804 West 18th Street Lot 155, Sault Ste. Marie, Michigan 49783.

ATTEMPTING TO INTERFACE an IBM 1230 Optical Reader to a TRS Model II. I would appreciate hearing from anyone who has, or intends to, do the same. Louis M. Ferrari, 3919 Octave Dr., Jacksonville, FL 32211.

DIGITAL EQUIPMENT CORP. LA36/LA35 Decewriter II Interactive Data Communications Terminal. Can be used as a typewriter, printer or input terminal \$700.00 plus shipping. I also have a teletype model ASR 33 with tape punch \$500.00 plus shipping. Ralph E. Thomas, 114 Northcross, Georgetown, TX 78626, (512) 863-6762.

RSN	Advertiser Index	Page		
10	Aardvark-80.....	23	38	I ² Interface.....
83	ABS Suppliers.....	109	43	Insider's Software.....
25	Access Unlimited.....	48, 49	79	J/C Enterprises.....
53	Ace Computer Prod., Inc.....	88	68	Jimscott, Inc.....
6	Acorn Software Prod., Inc. ..	10, 11	★	Kengore Corporation.....
107	Advanced Operating Sys. Back Cover		77	Kwik Software.....
28	Adventure Internat'l.....	C-1	5	Laredo Systems, Inc.....
24	Algorix.....	47	66	Lawyer's Microcomputer, The ..
105	Alpha Products.....	Cover 6	90	Lemons Tech Services.....
49	Alpha Queue Systems.....	85	64	Lindberg Systems.....
31	Alphanetics.....	59	3	Lobo Drives.....
86	AMRAD.....	109	17	Logical Sys. Software, Inc.....
1	Apparat, Inc.....	Cover 2	93	Lowner Enterprises, Inc.....
12	Apparat, Inc.....	28, 29	98	Maine Data & Fin. Sys., Inc.....
20	Apparat, Inc.....	41	103	Mariah Computing.....
55	ARCsoft Publishers.....	89	57	Mark Data Products.....
4	Arlington Micro.....	7	88	Martin Consulting.....
★	Aspen Software.....	99	34	Marymac Industries, Inc.....
59	B. T. Enterprises.....	42	50	Micro Architect, Inc.....
61	Bellanger, R. R.....	97	97	Micro Design.....
60	Bottom Line, The.....	95	54	Micro Images.....
70	Bottom Line, The.....	108	45	Micro Management Sys., Inc.....
62	Business Computers.....	98	100	Micro Moonlighter Newsletter ..
19	Chromasette Magazine.....	40	65	Micro-80, Inc.....
18	CLOAD Magazine, Inc.....	40	82	Micro-Grip.....
84	Clough, Eric.....	109	26	Microperipheral Corp.....
87	Color Products Unlike.....	110	78	Microsette.....
94	Complete Computer Serv.....	110	16	Microsystems Software.....
40	Compu-Things.....	77	9	Mikee Electronics Corp.....
42	CompuKids.....	80	22	Miller Microcomputer Services ..
23	CompuSoft Publishing.....	45	11	Misosys.....
36	Computer Applications Unltd.....	69	81	Optimum Integrated Sys., Inc. ..
32	Computer House.....	60	96	P. Tree Enterprises.....
95	Computer Plus.....	111	★	Percom Data Co., Inc.....
46	Computer Services.....	84	33	Perry Oil & Gas.....
21	Computer Shopper.....	94	37	PMC Software.....
47	Computers N Stuff.....	84	27	Programmer's Guild, The.....
15	Cornucopia Software.....	35	14	Prosoft.....
76	Dental Computer Newsletter ..	108	101	Publisher's Exchange.....
69	Disk 'n Data.....	108	29	Radio Shack.....
67	E-Z Software.....	105	106	Radio Shack.....
75	E.A.P. Company.....	108	35	Rainbow, The.....
★	Edu-Ware East.....	61	92	Randall, Jim.....
58	Eigen Systems.....	93	102	Realty Software Co.....
★	80-U.S.....	90, 96, 110	39	REMarkable Software.....
52	Electronic Specialists.....	87	71	Scientific Engineering Labs.....
8	Epson America, Inc.....	14, 15	80	Skeberdis, Pete.....
74	Excellonix.....	108	2	Soft Sector Marketing.....
72	Fielding, Donald M.....	108	56	Softcore Software.....
51	Fink, William A.....	87	99	SoftHart Enterprises.....
7	Freedom Tech. Internat'l.....	13	91	Software Galore.....
104	Galactic Software, Ltd.....	Cover 5	13	Software Plantation.....
★	Gosub International, Inc.....	86	30	Software Support.....
★	H. W. Electronics.....	5	85	Tape-Tronics.....
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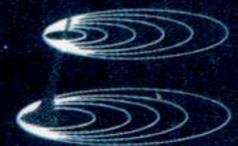
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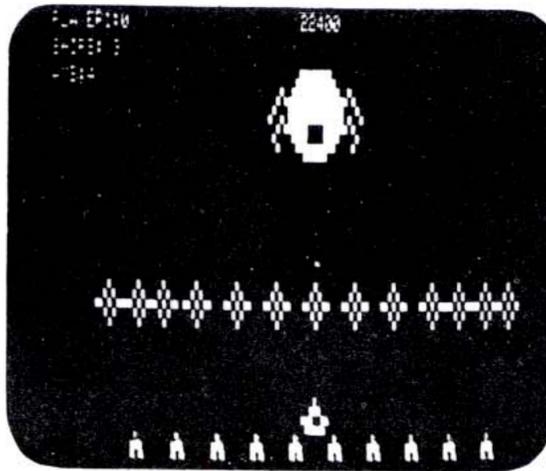
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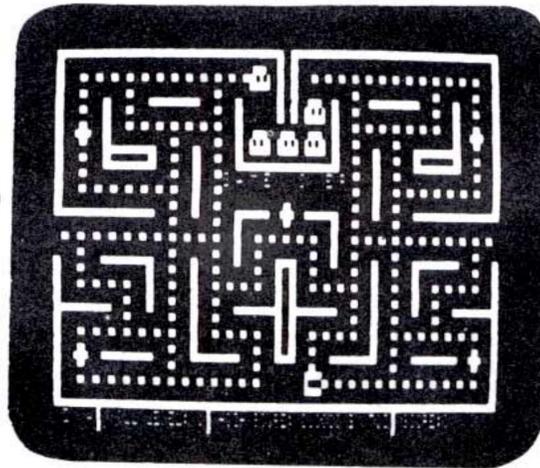
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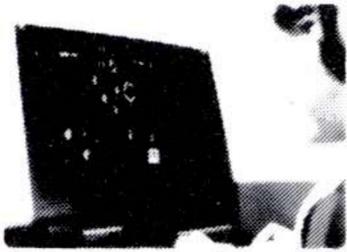
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CAUTION: Played with the Alpha Joystick, Scarfman may become addictive.



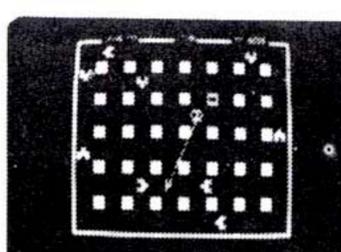
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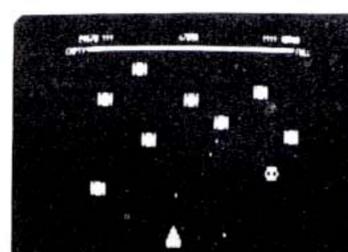
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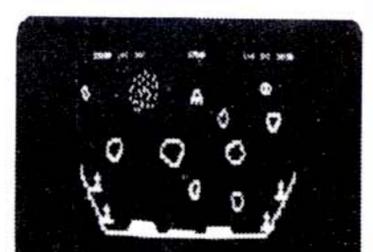
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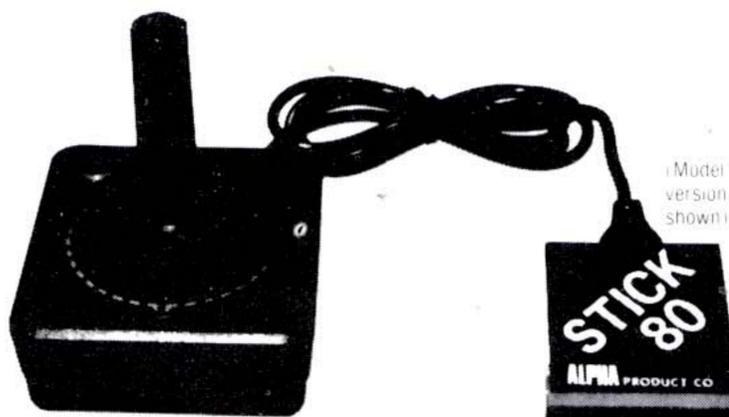
As you look down on your view, astronauts cry out for rescue. You must maneuver through the asteroids & meteors. (Can you get back to the space station?) Fire lasers, to destroy the asteroids, but watch out, there could be an alien FLAGSHIP lurking. Includes sound effects!

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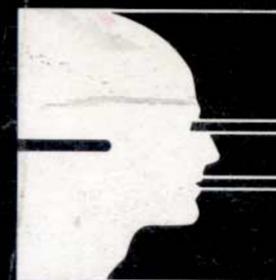
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