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The TRS-80 Users Journal

Volume III, Number 4

July-August 1980

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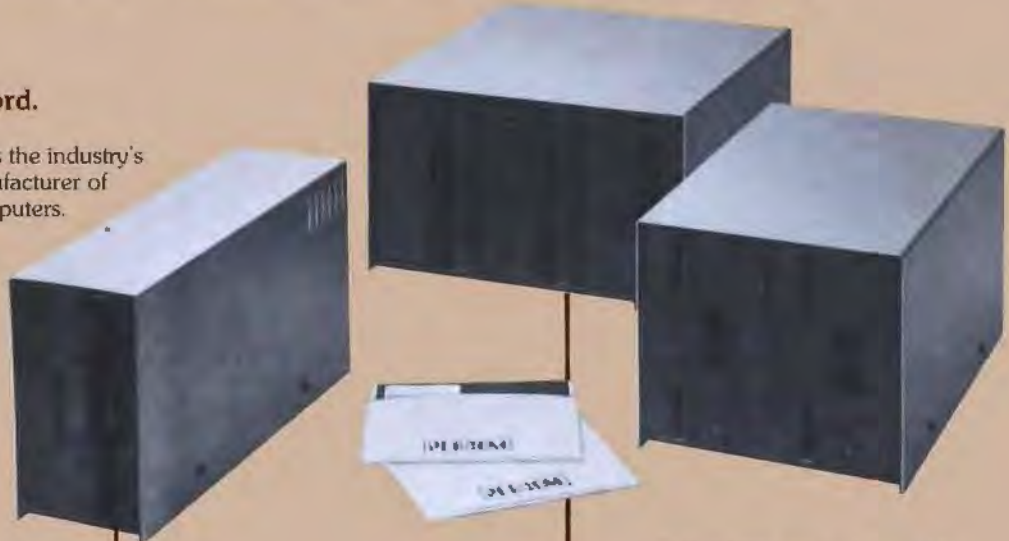


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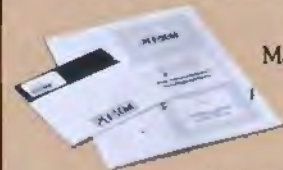
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Editorial

Remarks * *

The definitive program style does not exist. There is no "Proper" way to write a program that suits everyone. We have been asked several times to present the "Right" way to program in BASIC. It seems that one man's meat is another's poison.

Imagine a government decree that would have the whole country eating chicken a la Colonel Sanders (original recipe yet) and no other way. Or that the only bread we could eat was that white mushy stuff that builds bodies several different ways.

Same thing applies to programing. The best way to do it is to do what works best for you. Sure there are neat ways to program, with easily indentifiable modules, profusly remarked, with a clear menu followed by an "ON GOTO".

Or, if you don't want to be that organized, just go ahead and let it grow like topsy. So long as it works and you are the only one who has to use it - who cares? After your knowledge expands and you go back and look again you may find that it was the only way it could be done. Or, you may find that you have come a long way.

If you are writing for hire or for sale it is another story. Someone else is going to have to maintain (or maybe modify) your program. Now it becomes very important to do a straight forward job - something easv to follow and understand. Who knows - after a year or so you may have to make modifications to it yourself. There is nothing worse than cussing out the author of a convoluted program, only to find you did it yourself!

One of the most intriguing aspects of computing and programming is that there are so many different ways to

achieve an end. This is probably due to the fact that there are so many different applications for computers. They seem to reach into every other area of endeavor (and sometimes they even do some good there).

Even if you could come up with "THE" programming style, you can safely bet that there will be someone who will say: "Yes, but, I want it to do ---", or: "I don't need all of that, I just want it to do ----".

Then there is the question: How are you going to do your program? In BASIC, or MACHINE LANGUAGE, or COMPILED CODE, in FORTRAN, or maybe in CBASIC and CP/M? If your program is a huge number cruncher, one that must be run daily, then a COMPILED CODE may be needed for compactness and speed. This type of programming is more difficult to maintain than BASIC. Most of us program in the only language we know, rather than learn a new one that could do the job faster. One of the problems is simply that those of us who have the time to learn new methods have no real use for them; others who need the application have no time, and use whatever is available. There is still room out there for good applications/systems programmers.

It is probably a good thing that there is no "ONE" way to program. It leaves the field open to innovation and very specialized programs that work well for specialized applications. It would be terribly boring to have the art of programming reduced to the monotomy of bricklaying for example, or pouring hot tar on roofs. There would be nothing left for the imagination to work on - and that would take all the fun out of it.

Mike

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Letters to the Editor

Thank you for the complimentary copy of your publication. I enjoyed reading it, but think the subscription price is too high. My thinking is based on the subscription price of other computer magazines with 12 issues.

My main reason for writing is a remark made in your editorial. "Advertisers make magazines possible." Wrong - subscribers make magazines possible. Try getting advertising without subscribers. Your advertising rates are also dependent on the number of paid subscribers so not only is the subscriber necessary to attract advertisers, but his numbers set your rates. Therefore your first loyalty should be to the subscriber.

Leigh L Klotz, Sr
McComb, MS

(How much of those other magazines pertain to your computer? Take a count sometime, and then see what your money is buying. Magazines do not exist on subscriptions alone. You need both advertisers and subscribers. Years ago, the Readers Digest did not carry advertising, and you saw an occasional copy in the Doctor's office. Now they do, you see them in every grocery store and they give away \$100,000 in a sweepstakes. Our first loyalty is to the publication as a whole, including subscribers and advertisers.)

Thanks guys! You finally convinced my creditors (parents) to finance upgrading my existing system to 16K Level II. I think that's a well earned advancement, considering me having to "suffer" banging away on my 4K Level I for over a year. Do you have any suggestions concerning software and/or beginners books on Level II?

Jon Waples
East Greenwich, RI

(Try David Lien's "Learning Level II", it takes over where the Level I manual left off.)

I would like to take this opportunity to tell you how much I've liked your magazine. I've been a subscriber since you sent me issue 2 and you have consistently been my favorite since that time. The occurrence of 80-Microcomputing has provided you with competition for the first time. Speaking personally I feel that there is room for two magazines of such caliber and I plan to continue subscribing to both. Keep up the good work, and thanks again for such a great magazine.

Emil R Bacilla
Sebastopol, CA

For shame! For shame! Here I sit waiting for the US Postal Service to deliver the Mar-Apr 80 issue of 80-U.S. Meanwhile, the local Computerland has had the issue on its shelves for the past week and a half. Me, a loyal subscriber who has all the issues, who finds your magazine the best in print for the '80, who recommends it to all '80 owners who will listen, I have to wait and watch with envy as everyone about me gets the best, first. Why have you forsaken your subscribers. Why must we, who were the first of your readers, be the last now? What advantage is there to being a subscriber? I was there when you needed me. Now that you are rich and famous, you're taking me for granted. It hurts.

A Disgruntled Subscriber
State College, PA

(Famous we don't care about, rich we are not, but we are concerned about your situation. We goofed. We received just enough copies of that issue to send to the dealers. The balance were promised for the following day. So we sent the dealer copies out, and then the Bindery broke down and we didn't see more copies for over a week. Rest assured it will not happen again, we now do not send anything out until we have the whole lot.)

The Keymac program (Jan-Feb 80 issue) was worth the entire cost of the subscription. Keep up the good work. How's about a little program to add a repeat feature similar to that present on VTOS 3.

John P Dow, MD
Pittsfield, ME

(We will turn that over to Phil Pilgrim, and see what happens.)

T R Dettmann's article on Restoring Killed Disk Files (Nov-Dec 79 issue) recently helped me save an entire disk. I also discovered an error in the article and some additional things which may be useful to other readers.

I purchased SUPERZAP and DIRCHECK earlier this year as part of NEWDOS+. After reading your article I used it to browse through a disk directory and some files. Recently however, I was copying a Basic file from one disk to another when something went wrong and the destination disk became completely unusable as a system disk. I loaded SUPERZAP from another disk and tried to read sector 0 of the bad disk's directory (track 11). Even this gave parity errors and would not read. Using the descriptions in your article, I manually reviewed the remaining 9 sectors of the directory and they appeared OK. Using your explanation of the FPDE, I derived on paper a Granule Allocation Table from directory sectors 2-9.

I now attempted to rebuild the disk directory. Using the Zero Disk Sectors command from SUPERZAP, I erased directory sector 0. I then used the explanation in your article to code the GAT and to unlock all the granules, using the SUPERZAP Mod command. Bytes CB through FF were filled in by manual duplication from another disk since, as described in your article, the information in this area seemed to be independent of disk contents.

With great expectations now, I proceeded to try my repaired disk. Not much improvement! Although some DOS commands would now execute, DIR caused the system to hangup in endless disk accesses and even DIRCHECK would terminate with an error message and no listing.

When I had about given up, I decided to once again compare my restored directory with one from a good disk. The only difference I could find on the SUPERZAP output was a numeral 6 near the lower left corner of the listing for the good disk (see pages 34 and 35 of your article). I discovered in the SUPERZAP documentation that this indicated the sector was read protected and then remembered that I had declined the opportunity when I had zeroed my disk sector. I changed this using the SCOPY (sector copy) command in SUPERZAP to copy directory sector 0 back onto itself but accepting the option for read protect status.

I now tried DIRCHECK on the disk and this time it executed but produced a long string of granule error messages. After comparing these with my manually determined Granule Allocation and the Apparat documentation, I discovered that the codes given on page 34 of your article are reversed. The correct GAT coding should be:

FC - neither granule allocated
FD - 1st granule allocated
FE - 2nd granule allocated
FF - both granules allocated

Complete success! The disk is as good as new and I learned a lot in the process. Keep up the good work.

Jim Rushing
State College, PA

(You are right, the first and second granule allocated codes were reversed.)

You have made many references to the fact that "Android Nim" will not work under DOS. Which version of "Andy" are you referring to, and which version of DOS?

Also, even though I would love to receive 80-U.S. every month, I don't think I could stand a drop in quality. So count mine as another vote for staying bi-monthly. I subscribe to three other computer mags., and I'm letting my subscriptions to them go. It seems that 80-U.S. is all I need, and more!

Janice Alexander
Elyria, OH

(You have the Android Nim without sound. It will work with all DOS's. Android Nim with sound required Leo to use almost

(continued on page 6)

(Letters, from Page 4)

everything at his disposal, and this was before DOS 2.2 and 2.3 came out. After they came out, he found that they "implemented" some of the previously unused commands. To redo Andy would have been almost impossible. With sound, it works well with DOS 2.0, 2.1 and NEWDOS.)

Okay, guys, I've only seen the last two issues, but I'm sending off my subscription today, so that should tell you something. I assume you're looking for ideas, so here goes...

I'd like to see more thought given to just what this animal is that we've got our hands on. The real horizon-stretchers are the lunatic fringe types, not the guys writing Accounts Receivable packages in Basic. Look for the weirdo who uses his '80 to run his homemade methane digester, or the kid who gets a quarter a head from the neighbor brats for letting them play Adventure on his Dad's computer...

And let's drag some personalities into this, ferchrissakes. Who are those two guys at Apparat anyway? And just what happened between Cook and Tandy, and Cook and ACS, and who's Randy sleeping with now (while he implements VTOS 3.1999)? Pennington's got the right attitude - check out his new book - and, by the way, who's *he*? And how'd *he* find out all that stuff? You can't ever go wrong with "human interest" (read: *gossip*).

Report on unique installations, non-standard modifications, special applications: "Interfacing Your TRS-80 with a Grain Elevator", "Projection TV Video Monitor", "Faith Healing your RAM", "Five Quick Programs to Distract your Wife when she finds you just spent \$400 on a New Disk Drive", and "The Sexually-Active Programmer: Assessing your Firmware".

Humor, yes, but is humor out of place? After all, Ahl gets away with it...

Unsigned

(Hmmm, a Computer edition of the National Enquirer! Wayne Greene, Roger Robitaille, Howard Gosman and Bill McLaughlin, are you listening?)

I purchased the Jan-Feb 80 issue of 80-U.S. for the first time and enjoyed the magazine immensely. Especially I liked your editorial. I say "Right On!" If the present trend continues, nobody but the manufacturers and Original Equipment Manufacturers will be able to understand the "counterfeit Jargon". It's time the end-users spoke up and helped turn the tide back to layman's language. I understand "white horse", but haven't the slightest idea what a "Multi-drop communications Network" is.

The Basic Text Editor and VARPTR(n) were very timely. I have been staring at the latter for the last 6 months trying to figure out what a VARPTR does and how I can put it to use. Keep on truckin'!!

D D Freeman
Garland, TX

I want to take this opportunity to congratulate you on the excellent job you did in implementing Nine Tac Toe for the Level II TRS-80.

Unfortunately, I discovered a bug in the program that repeatedly reared its head in three different places in the program, after I had RUN the program several times. The bug takes the form of an ILLEGAL FUNCTION CALL in lines 250, 350 and 540 and is due to the value of BD going to -1 in lines 240, 340 and 530, respectively.

I seem to have remedied the bug (at least no errors have cropped up in 40 or so trials) by adding the following statement as lines 245, 345, and 535 in the program: IF BD < 0 THEN BD=8. This probably is an inefficient (possibly even erroneous) solution to the problem, as far as execution time is concerned, but I found it the easiest to implement assuming an ignorance of the inner workings of the program.

Again I thank you for this most enjoyable program and highly encourage you to keep up the good work.

Charles T Baumer
Chicago, IL

(We have run the program from which that listing was made several times without problems. Ideas anyone?)

I am one of your new subscribers through the TPAL connection. I do appreciate the efforts of the owner of TPAL, especially since it has brought your fine magazine to me. I have been very leery of ordering anything through the mail, as I have been bitten by bug-ridden programs and \$24.00 by subscribing to the non-existent Gaddeus.

I have enclosed my questionnaire from your latest issue, and thought perhaps that my ravings on it would not be too coherent without an explanation.

I am a woman, 36 years old, and very, very interested in computers - my husband is not interested at all. I keep reading in the computer magazines, and hearing talk, that they wish their wives and other women were interested. There is good reason why they are not. The majority of men interested in computers seem to have an "old boy" attitude of supremacy and secrecy about the "hobby". They will tell you in 500 words what could be said in 50. I have been to shows, stores and exhibits where I was totally ignored, or asked where my husband was, or once told "We don't have time to explain this to women, sweetie". The original Radio Shack where I bought my Level II 32K with a disk drive and Voice Synthesizer is far away (we moved). There are many Radio Shack stores around here, but, despite personal visits, polite requests for help, etc., I have had nothing but unhappy results. The Radio Shack Computer Center in this area was contacted by phone about a Voice Synthesizer problem. I asked if they could help me and was told "It all depends on what you look like honey". I have also contacted vendors on the phone who have given me very little help. I have no compunctions about spending money for what I want, and since I have no friends in this hobby, buy every piece of software that interests me. I have gotten some real messes - with instructions written for a computer expert. I told one outfit that they were trying to market to people like me - I

said that if I were expert enough to understand their instructions I would have written my own program and not bought theirs. Anyway, I guess I got a little off my chest. Thanks for listening.

M Wilburn
Glendale, CA

(What can we say, except that at the recent Faire in San Francisco I listened as Terry Dettmann explained the meaning of "K" to a woman who had had some FORTRAN in college and wanted to know what 16K, 32K etc., meant. Although we have to agree that what you say is probably true, rest assured we are not all that way.)

The more I see you, the more I want you!!

We have had TRIS for almost a year and we found that you have a great magazine. We are just getting the nerve to plunge into machine language, and in looking over that last magazine from you, you have made the plunge much easier to understand.

Hang in there and as long as you have a good magazine, don't be too concerned with those who want to try to make you into a monthly. That way there are twice as many magazines to keep up with, and the quality might be compromised. We do enjoy your efforts, they are educational and entertaining!

Mrs W Greene (a.k.a. Eleanor)
Kirkville, MO

Reference your Letters to the Editor column in the Mar-Apr 80 issue.

I certainly agree with your thought on how much useful information is exchanged through this column. I also agree with the readers who wrote in praising the Stringy Floppy (*Exatron*). It's the greatest thing since "BASIC".

I would like to contribute something also. This relates to Chuck Doherty's contribution in this column of the same issue. Chuck gives us a relation between SET(X,Y) and PRINT @ but cautions to limit the X values to less than 64 and the Y values to less than 14 to prevent spill-over. If you use the following statement, you can use the full X,Y coordinates of the TRS-80.

A=INT(X/2)+INT(Y/3)*64

I've enclosed a little program to illustrate it's use:

```
10 CLS
20 X=RND(127):Y=RND(47)
30 A=INT(X/2)+INT(Y/3)*64
40 SET(X,Y)
50 FOR T=1 TO 400: NEXT T
60 PRINT@ A, "POW";
70 GOTO 20
```

Thanks for a great publication.

Bill Burnham
Redwood City, CA

I am enclosing a photocopy of a letter that I received a few days ago after reading your comments in Vol III, Number 2 of the JOURNAL. The original of the letter with suitable comments is framed and hangs in a conspicuous position in my office. An experience of this kind renews one's faith in human nature!!

Glenn E Weist
Cape Coral, FL

(The letter was a refund in full from Mr Ed Thorie of the now defunct TPAL.) The Editors.

Take the mystery out of programming

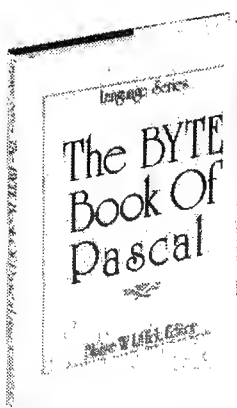
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by Thomas Dwyer and Margot Critchfield

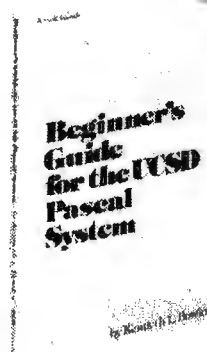
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by Kenneth Bowles

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ITEMS AT RANDOM

Please excuse our mountain for spewing ashes all over you on the 18th of May. We had no idea it would make such a big ash of itself. Hopefully it is done belching now and will go back to sleep for another hundred years or so. We happen to be upwind of it, and so did not get rained upon with fallout.

Volcanos, ash and lava notwithstanding, we are still trying to get our new subscription program into operation. Your label this issue *should* have a control number followed by the actual month and year of expiration in the upper right corner. Please renew early, it cuts down loads of paperwork!

Our cover this issue is devoted to a somewhat local spectacle, although it is getting national coverage. Mount St Helens, about 100 miles down the road, seems to be blowing it's top. The last time it went into such theatrics was back around 1860, and that time they say it rumbled for almost twenty-five years before letting go. Think of it, a TV news camera-man could spend an entire career just waiting for the thing to blow! Andy, of course, has the right idea - if it blows, then run.

We have tied the volcano, somewhat loosley, to one of our feature programs this issue: Forest Ranger. And, in case you have not figured it out by now, if you look at the .037 upsidedown, you will find the name of the artist of many of our covers.

You will also find that this issue is sixteen pages larger than previously. We grow in little jumps like that, and hope to do it again soon. This gets our advertising/editorial ratio back to where we like it. Apparently most readers do too, see the results of our Reader Survey, in this issue.

You will notice a change in our listings this issue. It's not that the Selectric didn't print nice, it just put wrong characters in sometimes and started to miss characters entirely (without even leaving a space!). We now also have full use of the four arrows, but lost the brackets. You just can't win them all.

Also, our listings are automatically set for a sixty line character, with the continuation line being set in a few

spaces so that the line numbers are readily visible. The reason for this is to make the listing fit our pages. You *don't* insert a line feed at the end of our lines! Just keep typing, unless the line feed is obvious. The program that does this for us is called LLIST/CMD, and was written by Jim Crocker, our Technical Editor. If there is any interest in such a thing from you, we will be happy to publish it sometime.

Ted Cromer, 42, died on 27 April 1980. He was in a large way responsible for getting the Model I TRS-80 onto the market. Late of Contract Marketing (OEM Model II), he came to Radio Shack from IBM, and assisted in starting the original 50 Computer Centers.

Wayne Greene has been giving a lot of editorial space to his problems with the Prime Computer and his subscription system. Mostly, it's about how it fails. He now has micro's (including a Model II) doing some of his tasks and says they are working well.

Even though we are not in his league, we too, have had our share of problems with the handling of the subscriber files. Hopefully, you would never notice it, but we have a story that could be entitled: "Another Computing Project Which Failed". Last issue we had suggested that it may just be working, and that your labels would have a control code and the month and year of your subscription expiration on it. It turns out that the entire 9 zip code got a month and year, everyone else was

back to the old PXX code, and nobody had a control code. We are giving it another shot this issue. The problem was not with the software, which was a superb effort on the part of Bill Schroeder of Galactic Software. No, it was the good old Model II TRS-80 that did us in. Bill wrote an excellent program that would span disk files on the Model II, one that would make a file look like one big file on three drives. Additions and deletions were batched in after a session, with several files open at the same time, while the program sorted things into the proper places and kept track of all the things necessary for instant recall. The Model II didn't seem to like handling files that way, and came up with an NF ERROR in a line with no FOR-NEXT loop anywhere in sight. Naturally, at this point the Device Control Block was blown, and trying to close a file resulted in an I/O ERROR. We finally wrote a program to exercise the disk I/O to force the failure, then sent the whole shootin' match to the local repair center. Murphy must have taken a day off, because it failed for them too. They found a zener diode on the FDC board which was the wrong value. This fixed the problem - we thought. Come to find out, *both* the zener diode and something else *both* cause the same NF ERROR. So we still have a hole in DOS someplace, and who is working on it? We donno - isn't computing wonderful?

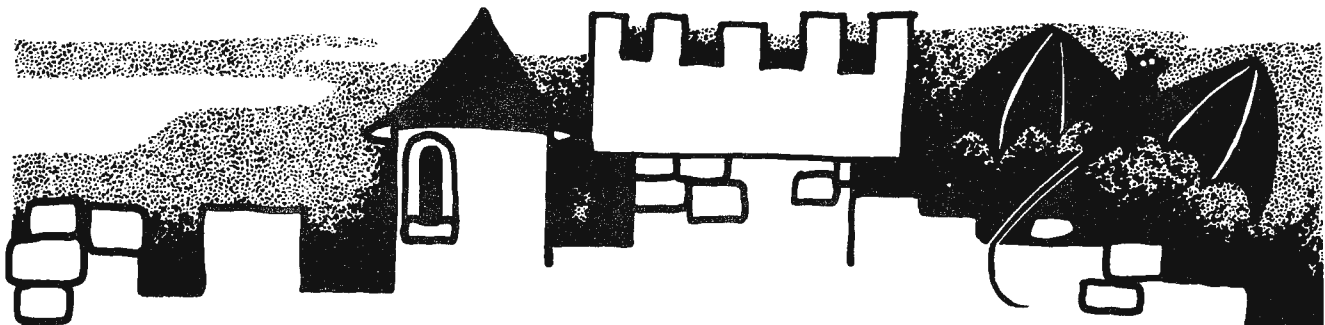
This issue marks the end of our second year. Not bad, considering that another mag just 6 months ago claimed to be the "First publication devoted entirely to the TRS-80". I especially liked the "devoted entirely" part - that was a sub-title on our Nov-Dec 1978 and Jan-Feb 1979 covers!

But it brings us to the time again when we need to thank all of our supporters and contributors. Especially our loyal subscribers, without whom we would be extinct. During the coming months, when gas gets higher priced and you stay home more, we plan to give you even more good things to do with your computer.

We recently got CP/M up and running on the Model II. From the looks of it, it's the way to go. We have a couple of versions of Basic running with it, but are still waiting for a Basic Compiler. We will let you know how it all works out.

Be sure to tell them you saw it in the JOURNAL, and remember that the kind of days you have is up to you.

Mike



Did you read about the Dungeonmaster who became so enchanted playing a real life version of Dungeons and Dragons that he disappeared for a month?

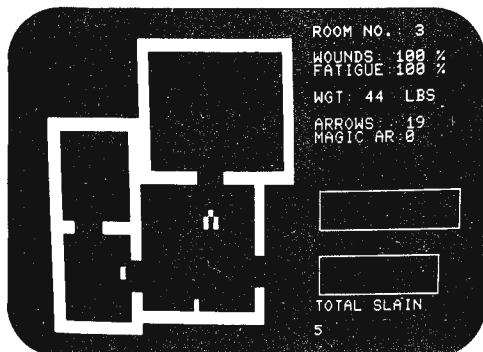
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Actual photo of screen during a Dunjonquest game. In Room 3 in the Temple of Apschai, our hero observes two treasures unattended by dragons, monsters or demons... for the moment. He is completely free of wounds; he is not at all fatigued. He carries 44 pounds of armor and 19 arrows in his quiver. He has already slain five demons. Will he capture the treasures before moving on... or before the forces of darkness intercept him?

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Developed by Macrotronics of Turlock, CA., is an innovative way for customizing animation with your TRS-80. For only \$14.95, this animation and graphics compiler boasts continuous, smooth, fast action with no flicker or jumping. A particularly novel feature of Electra Sketch is the ability to instantly change the speed of the animation from slow to rapid in 10 increments while animation is taking place. For a free copy of a MACROTRONICS catalog which describes Electra Sketch along with more than 29 other innovative, useful and economically priced products write or call Macrotronics, 1125 N Golden State Blvd/Suite G. Turlock, CA 95380 (209) 667-2888

DIRECT-CONNECT MODEM

Emtrol Systems, Inc., has introduced LYNX, a new direct-connect telephone modem designed for the Radio Shack TRS-80 microcomputer. LYNX comprises a total telephone linkage system in one package, eliminating the need for a separate expansion interface, interface board, telephone coupler and communications software. It is priced at \$239.95 (less tax), including "terminal" program on cassette, instruction manual and power pack. Emtrol Systems, Inc., 1262 Loop Road, Lancaster, PA 17604 - Phone (717) 392-2105.



RADIO SHACK COBOL

The new COBOL Development System software package from Radio Shack makes it possible for you to write and use programs in COBOL on your TRS-80 Model II Microcomputer. With a reference manual, user's guide, sample program and disk, it is priced at \$299. at Radio Shack stores and Radio Shack Computer Centers.

ACCOUNTS RECEIVABLE

Radio Shack now has an Accounts Receivable System available for use on the Model I TRS-80. It is a "Balance Forward" system that provides complete end-of-month billing, statements ready for mailing, automatic customer record updating, totals for general ledger posting, optional message lines on statements and full analysis, including activity status. With a two disk system either 300 accounts and 1000 transactions per month, or 100 accounts and 2000 transactions per month can be handled. Reports printed by this system are: Complete transaction file report, general ledger recap report, complete account listing, account listing by activity status, accounts receivable analysis by activity status and posting report. Available from participating Radio Shack stores and dealers and Radio Shack Computer Centers, nationwide. Priced at \$149.95.

DISK KEYPLUS

Disk Keyplus is a powerful collection of utilities that can be enabled directly from the keyboard of the TRS-80. Carefully designed to maximize ease of use, all Disk Keyplus routines may be turned on or off in just two key strokes. Disk Keyplus supports auto-repeat, lowercase video (optional hardware modification required), restoration of lost BASIC programs, single key stroke user definable strings, BASIC shorthand, direct graphic character input, typewriter style input, and more! Disk based utilities include a routine that generates a previously defined string three different ways: At power up, during Keyplus initiation, or at the stroke of just two keys. More flexible than the DOS AUTO command, Disk Keyplus will execute any combination of commands and/or programs. Another routine allows users to initialize Disk Keyplus with any combination of utilities enabled or disabled. Disk Keyplus may be used with either TRSDOS or NEWDOS. A cassette with both the 32K and 48K versions is available for only \$19.95. Non-disk Keyplus (Lv.2 16K) is available for only \$14.95. PA residents add 6% sales tax. SJW, Inc. P.O. Box 438 Huntingdon Valley, PA 19006, (215) 947-2057.

LANGUAGE TEACHER

LANGUAGE TEACHER, introduced by Acorn Software Products, Inc., is a series of language tutorial programs on disk for the Radio Shack Model I TRS-80. Initial programs in FRENCH, SPANISH, GERMAN, and ITALIAN feature a drill learning format, with language-to-English or English-to-language usage options. Each program offers hundreds of word combinations, phrases, and verb conjugation forms to inform and challenge the student. Of special interest to teachers is the feature enabling the user to print out a multiple choice test. Students and teachers will want to run a full quiz

diagnostic routine. More advanced programs are under development for those users who master this first in the LANGUAGE TEACHER series. Each LANGUAGE TEACHER disk program is priced at \$19.95. Dealers should direct their inquiries to: Acorn Software Products, Inc., 634 North Carolina Avenue, S.E., Washington, DC 20003, (202) 544-4259.

CARTRIDGE DISK 10 MEG

The Cameo DC 500 subsystem employs a decade-proven cartridge disk. It's backup capability is built in, and takes four minutes. The ability to switch applications (by exchanging the removable cartridge) means you can use your computer for more kinds of work. A ten megabyte (5 fixed + 5 removable) subsystem costs \$5995, for your TRS-80 Mod I or II. Cameo Data Systems Inc., 1626 Clementine, Anaheim, CA 92802 (714) 535-1682

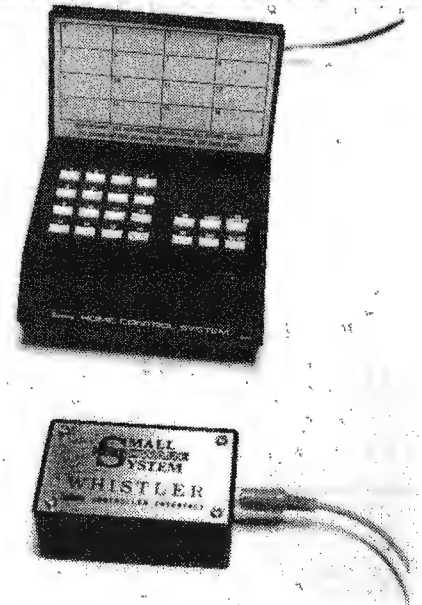
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BASIC COMPILER

Microsoft Consumer Products announces BASIC Compiler for the TRS-80, a powerful tool for BASIC programming that increases program execution an average of 3-10 times. Microsoft BASIC Compiler compiles programs written with the TRS-80 Disk BASIC interpreter, producing Z-80 machine code that is directly executed by the TRS-80. Extensive optimizations performed during compilation maximize the speed of the resulting object code. Speeds up to 30 times faster than the speed of interpreted programs can be obtained if extensive use of integer operations is made. In addition to adding speed, the compiler also has new programming features to make writing BASIC programs easier and more efficient. These include double precision trigonometric functions; full PRINT USING for formatted output; extensive disk file capability; WHILE/WEND conditionals; variable names up to 40 characters; and a CALL statement to assembly language or FORTRAN subroutines. BASIC Compiler is available from Microsoft Consumer Products retail dealers. For the name of the nearest dealer, contact Microsoft Consumer Products, 10800 Northeast Eighth, Suite 507, Bellevue, WA 98004, Telephone (206) 454-1315.



WHISTLER

Small System Software is offering Whistler, a new device to interface the Model I TRS-80 to the BSR home control system. This new unit is less expensive than anything comparable on the market. The BSR unit, marketed by Sears, Radio Shack and other firms must have the ultrasonic remote controller option installed. Whistler contains an ultrasonic oscillator and piezoelectric transducer, and is controlled with signals from the tape recorder output port. Whistler is being introduced at a price of \$34.95, including software and full documentation. Order directly from Small System Software, PO Box 366, Newbury Park, CA 91320 or ask your local dealer.

STRUCTURED BASIC

Acorn Software Products, Inc. announces the release of Structured Basic Translator (SBT), a disk based programming utility for the Radio Shack Model I, Level II TRS-80. STRUCTURED BASIC TRANSLATOR is not a programming language, but it is simply a utility which allows programmers to write structured programs. The elements are PROCEDURE, CALL, CASE-CALL, IF-THEN-ELSE, WHILE and UNTIL. There are no line numbers and no GOTO's. STRUCTURED BASIC TRANSLATOR is priced at \$29.95 on disk. Dealers should direct their inquiries to: Acorn Software, Inc., 634 North Carolina Avenue, S.E., Washington, DC 20003 or phone (202) 544-4259.

PROGRAMMING THE Z80

Is a new book from SYBEX Inc, authored by Mr Rodney Zaks. It has 624 pages, 198 illustrations and costs \$14.95 for the paper edition. Sybex Inc., 2020 Milvia St. Berkeley, CA 94704 (415)848-8233



MUSIC BOX

Newtech Computer Systems, a leading manufacturer of music peripherals and software for S-100 and SS-50 computers, introduces The Music Box. The Music Box is a complete hardware/software tool that enables you to produce music and sound effects on your TRS-80. The Music Box plugs directly into the TRS-80 keyboard or the Expansion Interface Bus Extension. It includes a volume control, a 400 milliwatt power amp, and phono jack for easy connection to an external speaker. Software is supplied on Level II cassette. Requires a 32K Ram or larger Level II computer. \$249 complete with software and users manual. Add \$3 for shipping and \$1 if COD. NEWTECH COMPUTER SYSTEMS, INC. 230 Clinton Street, Brooklyn, NY 11201 (212) 625-6220.



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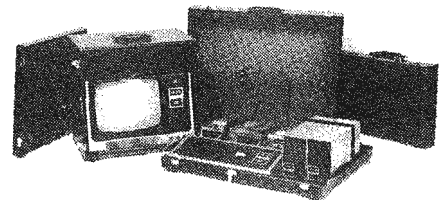
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MODEL II EDITOR ASSEMBLER

EDAS 4.0 has just been released by Galactic Software Ltd. EDAS is a RAM-resident text editor and assembler for the TRS-80 Model II running under TRSDOS. The editor provides text editing facilities for the modification of alphanumeric text files. Command syntax is identical to the Model II's Disk BASIC editor. EDAS also provides text block move, global change, string search, and line scroll capabilities. The assembler portion of EDAS facilitates the translation of Z-80 symbolic language (ZiLOG mnemonics) source code programs into machine executable code. Assemble switches provide the user with options to suppress source and symbol table listings, suppress object code generation, output the assembled code directly to memory or disk, and more. All TRSDOS commands are directly executable from within EDAS. This feature gives you the capability of displaying directories, listing files, setting FORMS, or any other command without exiting the environment of EDAS. Interfacing to DEBUG has been provided to enable a direct approach to debugging user generated code. Great amounts of time and effort were expended to give the user of this Editor Assembler the absolute best in ease of operation and functional efficiency. Optimize assembly programming time, with the Editor Assembler designed with the programmer in mind. EDAS is available NOW for \$229.00. Galactic Software Ltd., 11520 N. Port Washington Road, Mequon, WI 53092, (414) 241-8030.

DELUXE PERSONAL FINANCE

Small Business Systems Group (SBSG) is marketing the Deluxe Personal Finance Package by Lance Micklus. The system includes a conversion procedure and upgrade for tape versions in the field. The new package is now available for use on the Model I 32K two-disk system. The DPF system is a sophisticated and unique financial analysis package which can be readily customized to suit your personal financial situation. For further information contact Ann F Dinneen, Corner Main Street & Lowell Road, Dunstable, MA 01827 (617) 649-9595



COMPUTER CASE

A set of attache style carrying cases for the TRS-80 computer has been introduced by Computer Case Co of Columbus, Ohio. The basic case will hold the keyboard computer, the expansion unit and a tape recorder or up to two disk drives in a fully operational configuration. By using the optional RF modulator any TV set can be used as a monitor, making it unnecessary to transport the monitor. Available from Computer Case Company, 5650 Indian Mound Court, Columbus, OH 43213. (614) 868-9464.

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A whole new way to help pay for a personal stock quotation system using discounted stock brokerage commissions, has been announced by Max Ule & Co, Inc., the distributor for Maxi-Micro™ Tickertec™, the intelligent personal stock market tickerscreen™ without the 15 minute delay of competing systems. Tickertec is a real time stock monitoring system using stock exchange tickertape lines and is available for many microcomputer systems including the TRS-80. A free brochure describing the Tickertec System and Soft Dollar Software Program in detail may be obtained by calling Max Ule & Co., the distributor, toll free at (800) 223-6642, in NY (212) 687-0705

THE BOOK

The BOOK: Accessing the TRS-80 ROM, Volume 1, is now available. The "BOOK" is the first of three volumes on machine and assembly language access to the LEVEL II BASIC ROM in the Radio Shack TRS-80 Model I microcomputer. The first volume details the mathematic subroutines and data formats. These routines include all logarithmic, trigonometric and arithmetic operations. A fully commented listing of these routines is provided. To avoid copyright infringement, a complete disassembly is not included. However, the reader may obtain one by using the disassembly program listed in the book. Also included in volume one is a complete, detailed memory map of the entire machine. This provides descriptions of over 500 memory locations. Volume one of "The BOOK" is available at local computer stores or directly from Insiders Software Consultants; P.O. Box 2441; Springfield, VA 22152 for \$14.95 plus \$1.50 postage and handling. Phone (703) 960-2998.

DISK SORT/MERGE

A new disk sort/merge system "DSM" is now available for both the TRS Mod-I and Mod-II. DSM is a self contained system written entirely in machine language ready for immediate use. This system is perfect for large mailing lists, inventory control, and other business applications. Sort times are very fast. Mod-II times are TWICE AS FAST!! DSM is available from RACET computes, 702 Palmdale, Orange, CA 92665, for \$75 (Mod-I version) or \$150 (Mod-II version), (714) 637-5016.

SOFTWARE CATALOG

Benchmark Computing Services specializes in producing mathematical and scientific software for the TRS-80 computer. They also have available a small number of personal finance, graphics and utility programs. Their catalog is free for the asking. Benchmark Computing Services, PO Box 385, Providence, UT 84332

HI RES GRAPHICS

You can now have High resolution graphics on your Model I for less than \$150.00. The 80-GRAPHIX BOARD from Programma International gives you a high resolution screen capability that is greater than the Commodore CBM/PET or even the revered APPLE III! It gives you an effective screen of 384 X 192 (vs the normal 127 X 47). Installation is simple, programming it is a breeze. Programma International Inc., 3400 Wilshire Blvd. Los Angeles, CA 90010 (213) 384-0579

PROGRAM TRANSLATOR

Convert is a new software package for translating programs in FORTRAN to BASIC and BASIC into FORTRAN, allowing simple conversion of software written for DEC, PRIME and other ANSI standard FORTRAN systems into microcomputer compatible BASIC. Complete with operating instructions, Convert is available for \$115 postpaid from Cognitive Electronics Lab, PO Box 615, New Braunfels, TX 78130 (512) 625-9627



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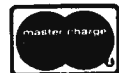
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- Full feature EDITING when adding or changing records:
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- COMPATIBLE with AIDS-II data files and AIDS subsystems.
- Move up from AIDS-II and EXPAND to 20 field capability WITHOUT REENTERING DATA.
- AIDS-II (Model I or II) owners may UPGRADE FOR ONLY \$25.00.

*WARNING! This program is written in BASIC and can be listed in the normal manner. Modification of program code is NOT RECOMMENDED due to its extreme complexity

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Use for report generation involving basic manipulation of numeric data, such as quantity & cost computations, balances carried forward and columnar totals. Expands capabilities with respect to inventory, accounting and other numeric-based information systems.

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An EXTERNAL INTERFACE

A Connecting Terminal to the Outside World

Larry S Panattoni

Projects Editor

In my basement computer room, I had just programmed the TRS-80 to print out some 20 forms on my 779 Centronics printer for my wife. No sooner had I set the program in motion than I received word that I was included in a card game on the main floor. Now those of you with a 779 know that they are a little noisy because the motor runs constantly. Therefore it is best to have the printer on only when it's actually printing. So between Pinochle hands, there I was, running to the computer room to see if the printer had completed it's task.

After that inconvenient episode I concluded the computer should be in control of the printer's on-off function. Photo 1 shows the finished project. The interface box plugs onto the bus and provides control of 110 Volts, a relay output, 8 input data lines and 8 output data lines, all buffered.

Figure 1 shows a block diagram of the unit. It is not necessary to include all of these features in your unit if you decide to construct one of your own.

BLOCK DIAGRAM

The block diagram in figure 1 shows the basic sections of the interface unit. A 40 lead cable connects the interface to the 40 pin connector of the '80 to obtain computer control. An AC cord is provided in order to achieve the internal power supply voltages, as well as provide AC to the computer controlled outlet on the front panel.

The Decoding Circuitry monitors the address, data and signaling leads from the keyboard. When detecting one of the proper codes it signals the corresponding section.

When the "Computer Controlled AC Outlet" section receives a low pulse from the decoder, it activates a solid state switch, providing AC to the outlet on the front panel, and is capable of providing 6 amps of current. The next low pulse will remove AC power from the outlet.

The "Relay" circuit, when keyed on from the decoder, activates a conventional mechanical relay, the contacts of which are brought out to the front panel. The next pulse to this circuit turns it off.

The computer can monitor eight inputs. When the decoder sends a low pulse to the "Eight Input Circuit", the

binary condition of the eight input terminals on the front panel are sent to the computer on the data lines (D0-D7).

Eight outputs are provided for on the front panel. When the "Eight Output Circuit" receives a low pulse from the decoder, it latches up the binary code which the computer is sending out on the data lines (D0-D7), and holds this condition on the eight output terminals indefinitely, or until another output pulse is sent to this section.

Finally, there is the power supply section. Both plus 5 volts and plus 12 volts are used internally and also brought out on the front panel for external use.

DECODER CIRCUITRY

Figure 2 shows a more detailed drawing of the decoder circuit. When the TRS-80 is either first turned on or the reset button is pressed, a low pulse is sent out on the system reset (SYSRES) lead. The interface unit buffers this signal with IC10F and then sends this low pulse on out to the CLEAR (CLR) leads of figure 3, figure 4, and figure 6.

Of the 40 leads from the '80 only eight data lines (D0-D7), eight address lines (A0-A7), system reset (SYSRES), IN, OUT, and the Ground (GND) leads are utilized. The eight data lines are sent to NAND gates IC1 and IC5. Inverters (IC3 and IC4) are used where necessary, so as to cause IC1 to output a low signal when the decimal number 1 is on the data lines. IC5 outputs a low signal only when the data leads contain a decimal number 2. The outputs of IC1 and IC5 are tied to one leg of IC9A and IC9B respectively.

Dropping down to the address lines for a moment, IC2 is connected so as to output a low signal when address 252 in binary form is received. This low from IC2 goes to the OR gate (pin 13), IC9D. The low signal on this pin 13 will not be passed on to the output until a low pulse is also received on the OUT lead from the TRS-80. When this happens, a low signal is output from pin 11 of IC9D to both OR gates IC9A and 9B (pins 2 and 4).

Now back to the earlier discussion on the data lines. If a number 1 was received, IC1 will output a low on pin 8, which is connected to IC9A (pin 1). So, with a low on both inputs the OR gate IC9A sends out a low pulse to the CLOCK lead of the relay circuit (figure 4). This in turn will

Photo 1
The Author's Unit,
completed and ready to
go.

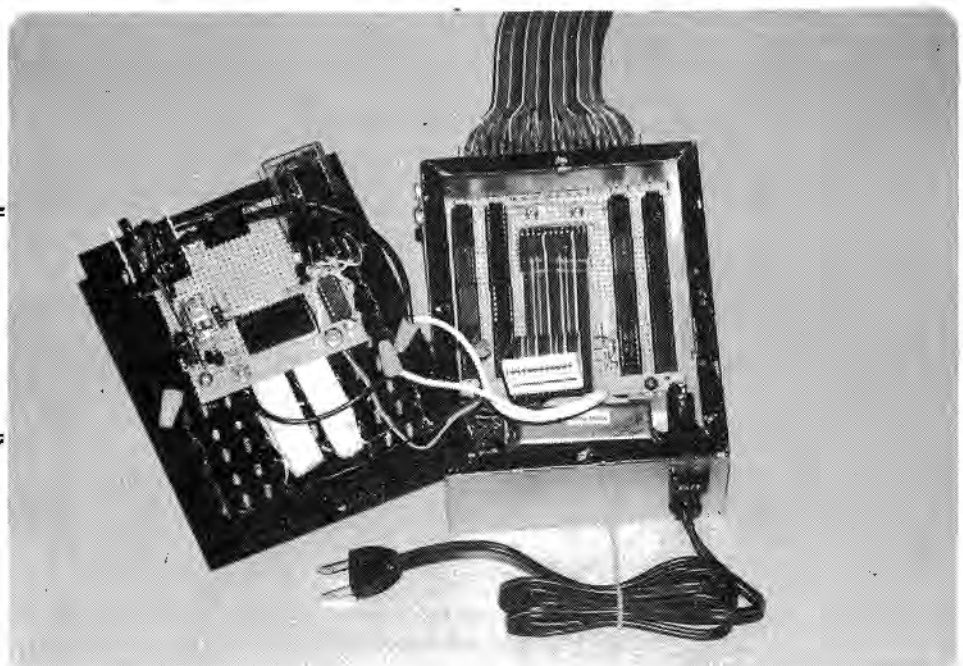


operate relay B, with the first pulse and release it with the next. The command that does this in Basic is: OUT 252,1

If the data lines hold a binary number 2, then IC5 will be outputting the low signal and sending it to pin 5 of IC9B. In this case OR gate IC9B will have the low on both of its inputs, causing its output to send a low pulse to the CLOCK lead of the AC Circuit (figure 3). This first pulse will provide AC to the front panel AC outlet, and the next pulse on this CLOCK lead will terminate it. The Basic command that does this is: OUT 252,2

When the address code 253 is received on the address lines, IC6 responds by outputting a low on its pin 8, which in turn goes to pin 9 of IC9C and also pin 1 of IC10E. If a low is now received on the IN lead from the '80, IC9C outputs a low to the eight input circuitry (READ lead) of figure 5. Or, if a low is received on the OUT lead from the

Photo 2
An inside view, showing
parts placement.



'80, a low pulse is sent to the eight output circuit (WRITE lead) of figure 6. The command to input from the eight input circuitry in Basic is: INP 253. The command to output to the eight output circuits in Basic is: OUT 253,A where A is any number containing the binary configuration desired to be sent to the eight output terminals.

COMPUTER CONTROLLED AC OUTLET

The circuit for the AC controlled outlet is shown in figure 3. It uses a 6 amp solid state TRIAC. At first I had tried to use a relay, thinking it would make the circuit simpler, but when I used it to provide AC power to the printer, the relay contacts arced excessively, due to the inductance in the motor windings.

A small five volt relay (Relay A) which fits into a 16 pin IC DIP socket, is used to control the low gate current necessary for turning on and off the TRIAC. This relay too, could have been replaced with solid state circuitry, but again, this simplifies the circuitry. This circuit can be used in a variety of low voltage controlled AC projects other than just controlling the printer.

COMPUTER CONTROLLED RELAY

Figure 4 shows the circuit for the computer controlled relay (Relay B). This can be used for switching circuits which you wish to have isolated from the computer. The circuit operation is the same as for figure 3, the exception being that the relay "B" is operated with plus 12 volts, while relay "A" of figure 3 is operated with plus 5 volts. The relay contacts are brought out on the face of the interface box and designated NO for Normally Open and NC for Normally Closed. The contact arm is designated COM for Common.

COMPUTER CONTROLLED EIGHT INPUT TERMINALS

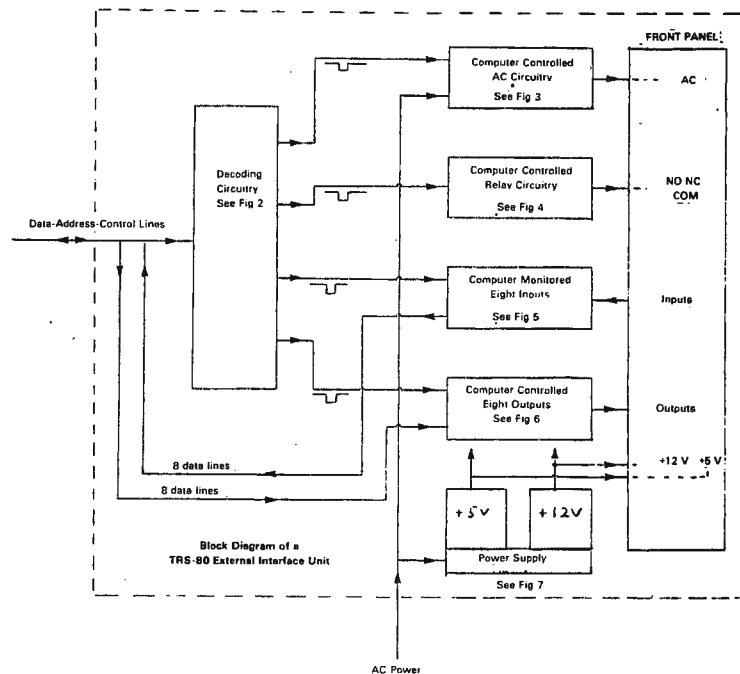
Figure 5 shows the circuit of the controlled eight input terminals. This is a simple arrangement of eight buffers whose inputs are taken directly from the eight input terminals on the front panel. The output of these buffers is high impedance, until a low signal pulse is received on the READ lead from figure 2. This low pulse allows the input to the buffers to be passed through the buffers and onto the data leads, going to the 40 pin connector of the '80. From there the computer processes the data, according to the program in memory.

COMPUTER CONTROLLED EIGHT OUTPUT TERMINALS

In controlling the eight output terminals, the data is output from the 40 pin connector of the '80 and sent to the inputs of eight latches as shown in figure 6. When a low pulse is received at the latches on the WRITE lead (pin 9), the latches transfer their input signals to their output leads, and hold the outputs in that position until another WRITE pulse arrives. Each of the outputs of the latches are buffered with a 74LS367 buffer before being sent to the eight output terminals. The CLEAR lead of pin 1 in figure 6, when low, resets the outputs of all eight latches to a low state. This happens automatically when the computer is turned on or when the RESET button is pressed.

THE POWER SUPPLY

The power supply in figure 7 provides two regulated voltages - plus 5 and plus 12 volts. The plus 5 is used to power all the internal TTL circuitry as well as the small DIP Relay (A) of figure 3. The plus 12 is used to power the larger relay (B) of figure 4.



Block Diagram, Figure 1

The transformer T1 outputs 18 volts AC which is rectified by D3 (a full wave rectifier) and filtered by capacitor C2, before being fed into each of the regulator IC's (IC15 and IC16). The regulated plus 12 volts is output from IC15 while the plus 5 is output from IC16. They are each then filtered additionally by capacitors C3 and C4 respectively. These two voltages are also brought out on the face of the front panel for possible use when connecting external circuits to the IN or OUT terminals.

CONTROL COMMANDS

To use this external interface unit, the following commands can be inserted in your Basic programs:

- ```

10 REM This command is used to provide AC power to
whatever is plugged into the AC outlet on the panel. Or if
power is already there, this command will turn it off.
20 OUT 252,2
30 REM This next command energizes the relay, or if
already energized, this command will cause it to release.
40 OUT 252,1
50 REM The following routine inputs the logical binary
conditions of the eight input terminals on the front panel
and tests to determine if each input is high (1) or low (0)
and prints out the results.
60 A=INP(253)
70 B=1:IF(B AND A)=0THENPRINT"LOGICAL 0":
ELSE PRINT"D0= LOGICAL 1"
80 B=2:IF(B AND A)=0 THEN PRINT"D1=LOGICAL 0:
ELSE PRINT"D1=LOGICAL 1"
90 B=4:IF(B AND A)=0THEN PRINT"D2=LOGICAL 0":
ELSE PRINT"D2= LOGICAL 1"
100 B=8:(IF(B AND A)=0 THEN PRINT"D3= LOGICAL 0":
ELSE PRINT"D3 = LOGICAL 1"
110 B=16: IF(B AND A)=0THEN PRINT"D4= LOGICAL 0":
ELSE PRINT"D4 = LOGICAL 1"
120 B=32:IF(B AND A)= 0 THEN PRINT"D5= LOGICAL 0":
ELSE PRINT"D5= LOGICAL 1"
130 B=64:IF(B AND A)=0 THEN PRINT"D6= LOGICAL 0":
ELSE PRINT"D6 = LOGICAL 1"

```



| DIAGRAM IDENTITY | PARTS TYPE         | ITEM DESCRIPTION   | RADIO SHACK PART NUMBER |                   |
|------------------|--------------------|--------------------|-------------------------|-------------------|
| I.C.#1           | 74LS30             | 8-IN NAND GATE     | R.S. 276-1914           |                   |
| I.C.#2           | 74LS30             | 8-IN NAND GATE     | R.S. 276-1914           |                   |
| I.C.#3           | 74LS04             | HEX INVERTERS      | R.S. 276-1904           |                   |
| I.C.#4           | 74LS04             | HEX INVERTERS      | R.S. 276-1904           |                   |
| I.C.#5           | 74LS30             | 8-IN NAND GATE     | R.S. 276-1914           |                   |
| I.C.#6           | 74LS30             | 8-IN NAND GATE     | R.S. 276-1914           |                   |
| I.C.#14          | 74LS73             | DUAL FLIP FLOP     | R.S. 276-1918           |                   |
| Q1 & Q2          | 2N2222             | TRANSISTORS        | R.S. 276-1617           |                   |
| Q5               |                    | 6 AMP TRIAC        | R.S. 276-1001           |                   |
| RELAY 'A'        |                    | 5 VOLT RELAY       | R.S. 275-215            |                   |
| D1               | 1N4005             | DIODE              | R.S. 276-1104           |                   |
| C1               | .1 uf 200V.        | CAPACITOR          | R.S. 272-1053           |                   |
| R1               | 10 K OHMS          | RESISTOR           | R.S. 271-1335           |                   |
| R2 & R3          | 150 OHMS           | RESISTOR           | R.S. 271-1312           |                   |
|                  |                    |                    |                         |                   |
| I.C.#14          | 47LS73             | DUAL FLIP FLOP     | R.S. 276-1918           | SAME AS IN FIG#3  |
| Q3 & Q4          | 2N2222             | TRANSISTORS        | R.S. 276-1617           |                   |
| D2               | 1N4005             | DIODE              | R.S. 276-1104           |                   |
| RELAY 'B'        |                    | 12 VOLT RELAY      | R.S. 275-206A           |                   |
| R4               | 10 K OHMS          | 1/4 W. RESISTOR    | R.S. 271-1335           |                   |
| I.C.#11          | 74LS367            | HEX BUFFERS        | R.S. 276-1835           |                   |
| I.C.#12          | 74LS367            | HEX BUFFERS        | R.S. 276-1835           | SAME AS IN FIG #6 |
| I.C.#12          | 74LS367            | HEX BUFFERS        | R.S. 276-1835           | SAME AS IN FIG #5 |
| I.C.#13          | 74LS367            | HEX BUFFERS        | R.S. 276-1835           |                   |
| I.C.#7           | 74LS174            | HEX LATCHES        | DIGI-KEY CORP.          |                   |
| I.C.#8           | 74LS174            | HEX LATCHES        | DIGI-KEY CORP.          |                   |
| I.C.#15          | 7812               | +12 VOLT REGULATOR | R.S. 276-1771           |                   |
| I.C.#16          | 7805               | +5 VOLT REGULATOR  | R.S. 276-1770           |                   |
| D3               | FULL-WAVE BRIDGE   | RECTIFIER          | R.S. 276-1146           |                   |
| T1               | 18 VOLT C.T.(2AMP) | TRANSFORMER        | R.S. 273-1515           |                   |
| C2               | 4700 uf 35 VOLT    | CAPACITOR          | R.S. 272-1022           |                   |
| C3 & C4          | 22 uf 35 VOLT      | CAPACITOR          | R.S. 272-1035           |                   |
| F1               |                    | FUSE HOLDER        | R.S. 270-365            |                   |

### PARTS LIST

### MISCELLANEOUS

- (2) HEAT SINKS FOR Q5 AND I.C. #15 & I.C. #16 ..... R.S. 276-1363
- PRE-DRILLED I.C. PERFBOARD (BACK OF FRONT PNL) ..... R.S. 276-1394
- MAIN I.C. BOARD ..... R.S. 276-152
- 40-LEAD CABLE WITH TRS-80 CONNECTOR AT ONE END ..... HOBBYWORLD ELECTRONICS
- 44 PIN SOCKET (TO SOLDER ON 40-LEAD CABLE) ..... R.S. 276-1550
- 24-LEAD SIX INCH CABLE (MALE PLUG AT ONE END) ..... DIGI-KEY CORP.
- (3) 24-PIN DIP SOCKETS ONE FOR EACH I.C. BOARD PLUS ONE SOLDERED ON END OF 24-LEAD CABLE ..... R.S. 276-1989
- A.C. POWER CORD WITH PLUG ..... R.S. 278-1255
- (42) WIRE TERMINALS FOR FRONT PANEL ..... R.S. 64-3029
- ELECTRICAL TWIST CONNECTORS ..... R.S. 64-3026
- LETTERING DESIGNATIONS CIRCUIT SPECIALISTS CO. BOLTS ..... FOR THE TERMINALS ON FRONT PANEL, PLUS CASE CONSTRUCTION
- CASE ..... IF YOU DON'T BUILD YOUR OWN R.S. HAS SEVERAL SIZES.

140 B=128:IF(B AND A)=0 THEN PRINT"D7=LOGICAL 0": ELSE PRINT"D7 = LOGICAL 1"

150 REM This next command will output data to the eight output terminals on the front panel.

160 OUT 253,B: REM The binary status of variable "B" goes to the corresponding eight output terminals.

The above commands for the external interface unit can be speeded up considerably by programming in machine language instead of Basic. However I'll let the study of that be left to those interested.

### PROJECT CONSTRUCTION

This project was completely hand constructed. The case (sides and bottom) were bent into shape out of some sheet metal. A little spray paint can do wonders for you.

Holes were drilled in the plastic front panel and threads tapped in for the terminal bolts. The terminals themselves, including the AC socket are items I retrieved from my junk box. The lettering on the front panel is from a "Datamark Dry Transfer Marking Kit", which just rubs on.

On the back of the front panel I epoxied some spacers and bolted on a PC board, which contains all the components of Figures 3 and 4. Then in the center of the board I placed a 24 pin socket, to which I wired all the eight IN and eight OUT terminals, plus the control leads

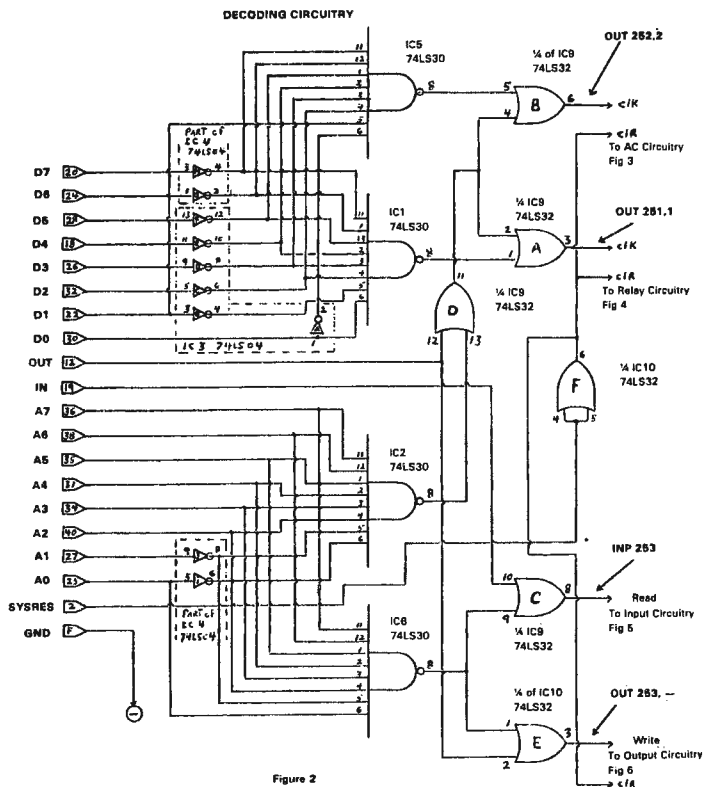


Figure 2

DECODER CIRCUITRY---(FIG.#2)

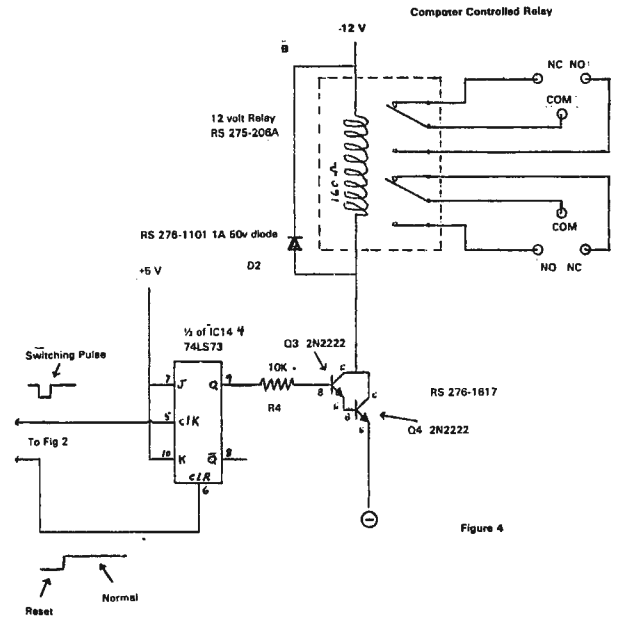


Figure 4

COMPUTER CONTROLLED RELAY---(FIG.#4)

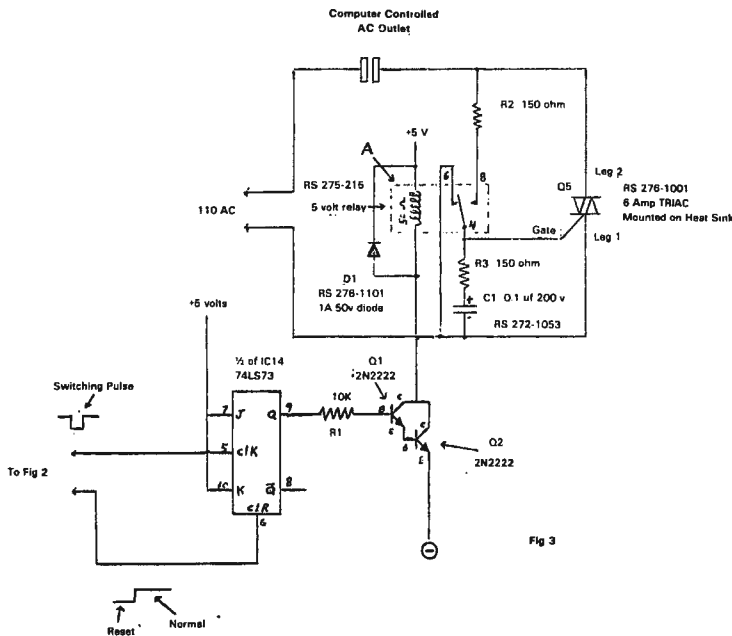


Fig 3

COMPUTER CONTROLLED AC OUTLET--(FIG.#3)

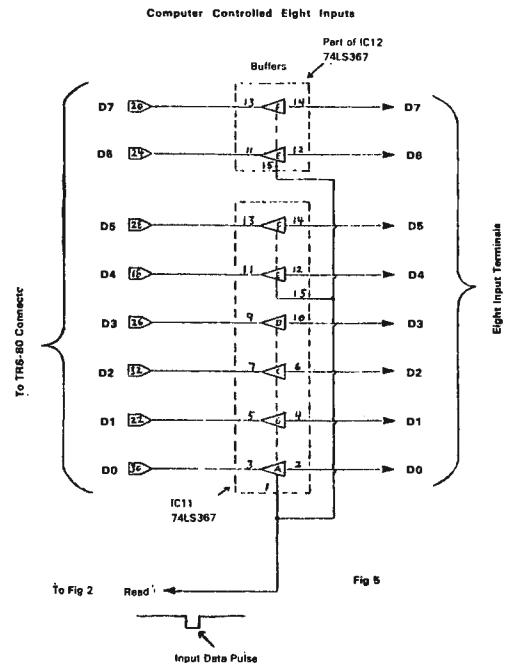
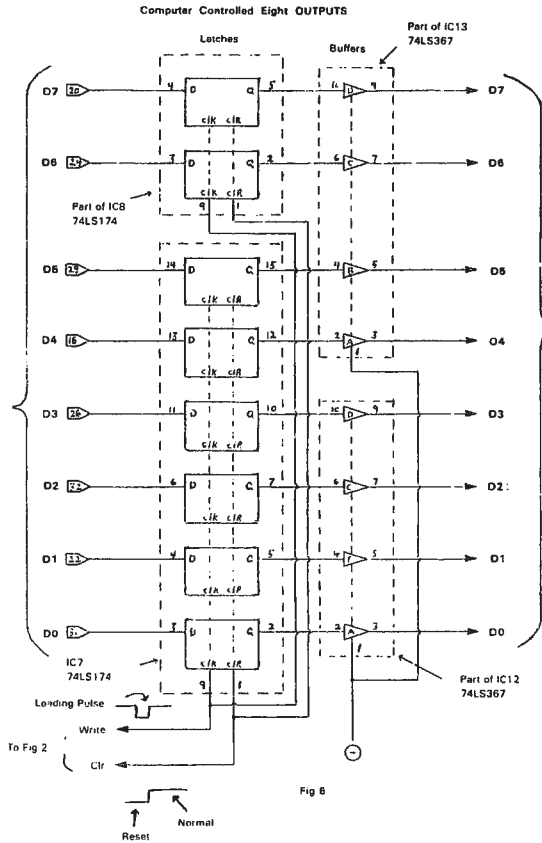


Fig 5

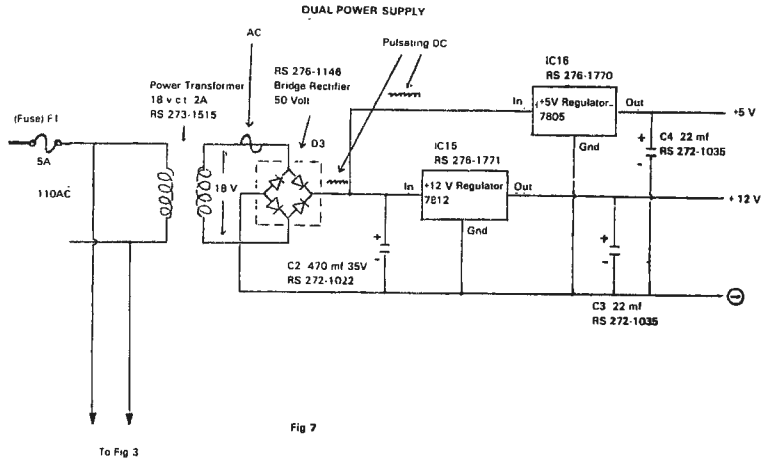
COMPUTER CONTROLLED EIGHT INPUTS-(FIG.#5)

for figure 3 and 4 as well as plus 5 and ground. Then, with a six inch 24 lead jumper cable, I connected this board to the main printed circuit board which contains the many IC's or figures 2, 5 and 6. The 24 lead jumper (with a male plug at both ends) was impossible to locate. I could find none, so I used a jumper with a plug at one end only, and soldered a 24 pin DIP socket to the other end.

The main printed circuit board in the bottom of the case is a 44 pin connector printed circuit board from Radio Shack (RS 267-152). A slot was cut in one end of the case for the PCB connector to extend through. From here, another cable (40 leads) connects it to the TRS-80. This 40 lead connector comes with a female plug on one end only, which fits the TRS-80 output bus connector.



COMP. CONTROLLED EIGHT OUTPUTS-(FIG.#6)



POWER SUPPLY---(FIG.#7)

The power supply is mounted in the lower end of the bottom of the case. All of its associated components are connected closely around it, such as the IC regulators (both on the same heat sink), the bridge rectifiers and capacitors. The output from the regulators is connected directly to the back of the front panel. The AC leads are connected to the back of the front panel with electrical twist connections.

The only precaution is that the TRIAC and all other locations where AC is involved be insulated properly. BE CAREFUL when working with 110 volts AC!

# Omikron transforms TRS-80<sup>+</sup> into a powerful business system.

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★ ★ ★

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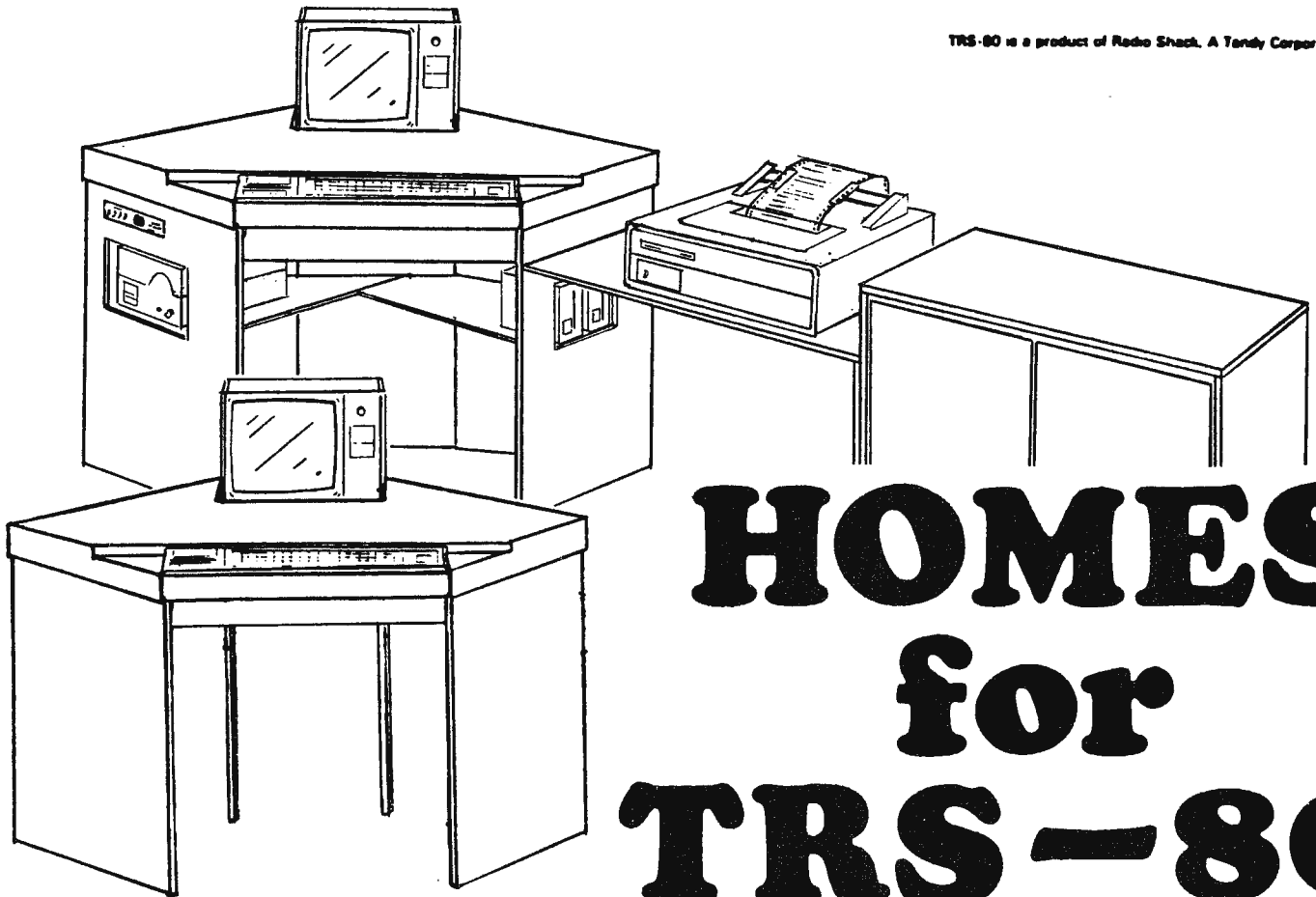
**SYSTEMS**—Omikron's complete systems feature Shugart 8" drives mounted in a dual drive cabinet with heavy duty power supply, MAPPERS I and II, cable and CP/M\* software. Dual drives—\$1795; Single drive \$1195.

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\*CP/M is a TM of Digital Research. TRS-80 is a TM of Tandy Corporation.





Dealer inquiries invited.

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# Fast Array Save & Load

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I Barry Geller  
South Point, OH

---

If you, like I, have any programs which require the use of a large data array that must be saved to tape and re-loaded when the program is again "fired up"; you have probably noticed that this procedure eats vast quantities of time (not to mention tape) when done in the standard way. The usual method (with several variations) that an array is loaded is something like the following:

```
10 DIM A(500,3)
20 FOR B = 0 TO 500
30 INPUT #-1, A(B,0), A(B,1), A(B,2), A(B,3)
40 NEXT B
```

An array of this size will take somewhere around 30+ minutes to load or store in this fashion. Most of this time is taken up by the 4 second leader written onto the tape each time **INPUT #-1** is called. The transfer of the data itself takes only a small fraction of this time. Additionally, the internal relay must cycle each time **INPUT #-1** is called. If many programs are run with large data arrays, the wear on the relay is increased significantly. Both of these problems could be eliminated if there were some means to load the array as a whole, with only one 4 second leader for synchronization.

The program which follows will permit you to do the same job in approximately 2 minutes and 10 seconds for single precision arrays and should be nearly twice as fast for integer arrays. It can be used to load or save integer, single precision, or double precision arrays. The two machine language subroutines take up a total of 64 bytes of memory; and a short BASIC subroutine is used to call the program via the **USR** function. **FIGURE 1** shows the assembly code:

For those without an assembler, the program can be placed into high memory (assuming a 16K system) with the BASIC program in **FIGURE 2**, which may be a part of your main program or may be a separate program to be **CLOADED** and **RUN** before you **CLOAD** the main program.

To utilize the program it is necessary to construct a BASIC subroutine to pass the first and last addresses of the array to the machine language subroutine using the **VARPTR** function. One problem that arises is that the location of the array in absolute memory is not constant.

The TRS-80 stores arrays in memory above the simple variables. If a new (previously undefined) variable is given a value between the time you have obtained the location of the starting or ending addresses of the array and the time the subroutine is run, the location of the array in memory will have changed and will cause faulty results. To avoid this, the BASIC subroutine defines 4 integer variables (**B1%**, **B2%**, **B3%**, **B4%**) before using **VARPTR** for finding the array.

If the array is a single precision array (I will use **A(500,3)** as my example), the first address can be found by setting **B1%=VARPTR(A(0,0))**. The last address is **B3%=VARPTR(A(500,3))+3**. The "+3" is necessary because a single precision variable requires 4 bytes of storage. The location of the first byte is returned by the **VARPTR** statement, thus 3 must be added to this value to get the location of the last byte in the array.

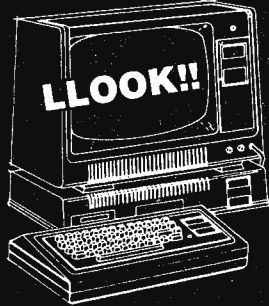
Similarly, if this were an integer array, a "1" would have to be added to the last element's address to find the end address. A double precision array would require a "7" to be added.

Now that **B1%**= the starting address and **B3%**= the ending address; it is necessary to pass the information to the machine language program so it will "know" what area of memory to read to tape or to store from tape. Since addresses each take two bytes of memory, it is necessary to convert these numbers into their separate bytes so they may be **POKED** into the subroutine's address buffer. The BASIC subroutine does just that.

Finally, since there are really 2 machine language subroutines (one to record on tape and the other to read from tape) it is necessary to provide the proper entry points so that the desired half of the machine language program operates. This is done by **POKEing** the **USR** locations of 16526 and 16527 with the appropriate locations for recording or input as needed. See the BASIC program in **FIGURE 3**.

If you have more than one array to store, the BASIC subroutine can be modified for whatever number of arrays you may require. If you have any programs using large arrays, I'm sure you'll find this program very useful.

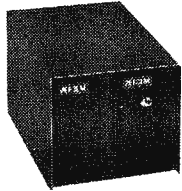
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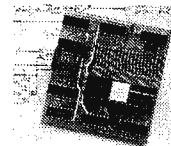
**PATCH PAK™** is supplied free (on disk) with the purchase of a Percom TFD-100™ or TFD-200™. PATCH PAK™ extends TRSDOS\* to accommodate 40- and 77-track drives. It also de-glitches TRSDOS\* 2.1. With the patch applied to TRSDOS\* 2.1, interference with disk operations from the TRS-80\* "heartbeat" pulse is eliminated, as is premature stopping of the drive motor during operation — a problem sometimes referred to as "silent death." PATCH PAK™ is applied to your system disk "on the fly" using two drives. Application instructions are included. Price (if sold separately) \$10.00

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This PC board plug-in adapter for the TRS-80\* virtually eliminates data read errors (CRC error — Track locked out!) which occur on high density inner disk tracks when clock and data bits are not reliably separated during playback. This problem has plagued many TRS-80\* systems. The SEPARATOR™ is installed in the Expansion Interface without modifying the host system. Caution: Opening the TRS-80\* Expansion Interface may void the limited 90-day warranty. Price \$29.95



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```

7FC0 00100 ORG 32704
7FC0 CDE77F 00110 LOAD CALL ADDRESS ;SET ADDRESS LIMITS, DEFINE DRIVE
7FC3 CD9602 00120 CALL 0296H ;FIND SYNCH BYTE
7FC6 CD3502 00130 LOOP CALL 235H ;READ BYTE
F000 00100 ORG 0F000H
F000 CD27F0 00110 LOAD CALL ADDRESS ;SET ADDRESS LIMITS, DEFINE DRIVE
F003 CD9602 00120 CALL 0296H ;FIND SYNCH BYTE
F006 CD3502 00130 LOOP CALL 235H ;READ BYTE
F009 77 00140 LD (HL),A ;STORE IT
F00A CD34F0 00150 CALL POINT ;POINT TO NEXT LOCATION
F00D 20F7 00160 JR NZ,LOOP ;CONT. IF NOT DONE
F00F CDF801 00170 CALL 1F8H ;CASSETTE OFF
F012 C9 00180 RET
F013 CD27F0 00190 SAVE CALL ADDRESS ;SET LIMITS, DEFINE DRIVE
F016 CD8702 00200 CALL 287H ;WRITE LEADER
F019 7E 00210 LOOP2 LD A,(HL) ;GET DATA
F01A CD6402 00220 CALL 264H ;OUTPUT BYTE
F01D CD34F0 00230 CALL POINT ;POINT TO NEXT MEM. LOCATION
F020 C219F0 00240 JP NZ,LOOP2;CONTINUE IF NOT DONE
F023 CDF801 00250 CALL 1F8H ;CASSETTE OFF
F026 C9 00260 RET
F027 2A3DF0 00270 ADDRESS LD HL,(VARBUF+2) ;END ADDRESS
F02A EB 00280 EX DE,HL ;IN DE
F02B 2A3BF0 00290 LD HL,(VARBUF) ;START ADDRESS IN HL
F02E 13 00300 INC DE ;END +1
F02F 3E00 00310 LD A,0
F031 CD1202 00320 CALL 212H ;DEFINE DRIVE
F034 23 00330 POINT INC HL ;POINT NEXT BYTE
F035 B7 00340 OR A ;CLEAR CARRY
F036 E5 00350 PUSH HL ;SAVE
F037 ED52 00360 SBC HL,DE ;END?
F039 E1 00370 POP HL
F03A C9 00380 RET
0004 00390 VARBUF DEFS 4 ;ADDRESS BUFFER
402D 00400 END 402DH ;TO BASIC AFTER LOADED
00000 TOTAL ERRORS
ADDRESS F027 00270 00110 00190
LOAD F000 00110
LOOP F006 00130 00160
LOOP2 F019 00210 00240
POINT F034 00330 00150 00230
SAVE F013 00190
VARBUF F03B 00390 00270 00290

```

```

10 FORX = 32704 TO 32767
20 READ N
30 POKE X, N
40 NEXT X
50 DATA 205, 231, 127, 205, 150, 2, 205, 53, 2, 119, 205, 245, 127
60 DATA 32, 247, 205, 248, 1, 201, 205, 231, 127, 205, 135, 2
70 DATA 126, 205, 100, 2, 205, 245, 127, 194, 217, 127
80 DATA 205, 248, 1, 201, 42, 254, 127, 235, 42, 252, 127, 19
90 DATA 62, 0, 205, 18, 2, 201, 35, 183, 229, 237, 82, 225
100 DATA 201, 0, 0, 0, 0

```

```

100 REM INPUT DATA FROM TAPE
110 POKE 16526,192: POKE 16527,127
120 GOSUB 30000
130 REM (NEXT PROGRAM STATEMENT)
200 REM RECORD DATA TO TAPE
210 POKE 16526,211: POKE 16527,127
220 GOSUB 30000
230 REM (NEXT PROGRAM STATEMENT)
29990 REM FOR SINGLE PRECISION ARRAY DIM'ED A(500,3)
30000 B1%=0:B2%=0:B3%=0:B4%=0:B1%=VARPTR(A(0,0)):
 B3%=VARPTR(A(500,3))+3 :REM (SEE TEXT)
30010 B2%=B1%/256: B1%=B1%-(B2%*256)
30020 B4%=B3%/256: B3%=B3%-(B2%*256)
30030 POKE 32764,B1%: POKE 32765,B2%: POKE 32766, B3%: POKE 32767,B4%
30040 B1%=USR(B2%): RETURN

```

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### Board Games-1, CS-3001 (16K)

- **Mugwump** \$7.95

Mugwump is a board game which uses a 10x10 grid on which four friendly Mugwumps are hiding. Your mission is to locate these mysterious animals and capture them.

- **Flip Disc**

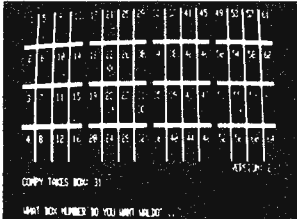
Are you an Othello freak? Flip Disc is a program which will turn your computer into an excellent opponent. Three different skill levels, (good, expert, and genius), provide an introduction for the novice and continuing interest for the experienced player.

- **Wumpus**

In game 1, you scour a network of underground caves in search of the prized Wumpus. Bagging a Wumpus wins the game, but if you accidentally stumble into his cave, the Wumpus will enjoy a tasty dinner of sauteed computer freak.

- **Wumpus 2**

If you master the dodecahedron cave network in Wumpus 1, you may proceed to Wumpus 2 which allows you to choose from five different caves, or you can design your own.



- **Qubic**

Qubic is a three dimensional Tic Tac Toe game. The game is played in a 3 dimensional cube (4x4x4). The object is to outwit the computer and place four pieces in any straight line.

- **Backgammon**

This is the TRS-80 adaptation of the popular board game. Backgammon uses graphics and all the standard backgammon rules, not a strange computer variation. The computer is your opponent in this version, written by Scott Adams of "Adventure" fame.

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### Strategy Games, CS-3005 (16K)

- **Tunnel Vision** \$7.95

You are transported into a massive labyrinth and must find the exit or be lost forever. This is an excellent example of three dimensional perspective using TRS-80 graphics.

- **Evasion**

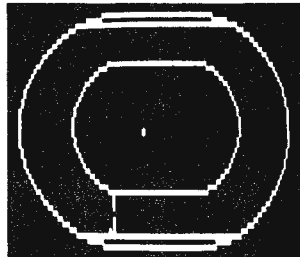
In this real time game, you are pursued around the game board by an evil-looking snake. Variations of play include two different speeds and hyper-jumps which randomly relocate you on the board. Looking for an escape? Try Evasion.

- **Jigsaw**

Jigsaw is a computer-age puzzle game making extensive use of TRS-80 graphics. The computer generates a random puzzle and puzzle board. Using a combination of deductive reasoning and luck you must fit the graphically represented puzzle piece into place.

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Are you a wandering pro or just a Sunday golfer who would like to keep in practice? Once you're on the green, a worm's-eye view is displayed for putting.



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Motor Racing combines real time racing action with advanced graphics functions. The graphics and animation make Motor Racing fun to watch as well as play.

### Space Games-3, CS-3002 (16K)

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Ultra-Trek is a fast-paced version of Star Trek, complete with "real time" action graphics, lasers, Nilon space mines, high energy photon torpedoes, enemy ships that move, and an experimental ray which does something different each time you use it. You must act quickly to save yourself and the Federation.

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- **Romulan**

Your mission is to destroy an invading Romulan space craft. Maneuver through space and around stars looking for the deadly enemy, but be careful! The nasty Romulans fire back.

### Air Traffic Controller, CS-3006 (16K) \$7.95

This real time machine language program puts you in the chair of an air traffic controller. There are 27 airplanes — jets and prop planes — which must be controlled as they land, take off and fly over your air space. You give the orders to change altitude, turn, maintain a holding pattern, clear for approach, and land at your two airports. This realistic simulation includes navigational beacons, and requires planes to take off and land into the wind. Air Traffic Controller was written by an air traffic controller and is a favorite of the Creative Computing staff!

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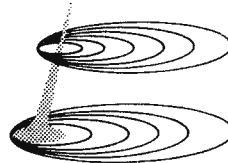
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M Schmidt, Editor

# A Printer Primer

Serial, Parallel, RS232 and all that....

What can you use as a printer for your computer? Are you confused about all the terms - Serial, Parallel, RS 232 and all that? Shortly, we will tell you about first hand experience with several printers, but first we should talk about printers in general.

You probably know by now that your keyboard on the '80 is coded in ASCII (American Standard Code for Information Interchange). This is a "standard" code, and is used on most computers and teletype equipment. The notable exception is IBM, who until recently have used what they call "correspondence code".

If the printer you intend to use has ASCII coding, you have already solved a problem because you will not have to make the conversion from ASCII to whatever other code. All you need then is a means to interface (connect together) your computer and the printer.

On the other hand, if the printer you intend to use does not have ASCII coding, you have two problems. First you will have to provide an interface, and then you will need to provide some software code conversion from ASCII to the code your printer requires.

## SERIAL vs PARALLEL

The next question we need to consider is that of a parallel versus a serial connection between the printer and the computer. There are advantages and disadvantages to both. Naturally, the one that will connect the easiest costs the most! Let's look at the serial printer interface first.

## SERIAL INTERFACES

In a serial interface the ASCII characters (bytes) are output as a string of pulses, one after the other. The computer has to wait until each character is printed before it can output another character.

If you have a Level II 16K machine, this is usually what you would be using to drive a printer. There are exceptions, wherein you can connect an interface directly to the output bus of your keyboard, but for now, we will consider serial interfaces, such as the

TRS 232 from Small Systems Software. The Small Systems interface connects to the auxiliary output of your cassette port. Software (on cassette) comes with the TRS 232 which will rearrange the device control blocks to output to the auxiliary port. The TRS 232 (a small black box) has a DB-25 connector on it into which your printer cable will fit.

The software which comes with the TRS 232 will drive most ASCII printers, such as the ASR 33 Teletype, Texas Instruments Silent 700 series, ASR 38 and others. The software will ask you to input the baud rate and number of nulls after a carriage return (to give the carriage time to return before sending another character). The software is in the form of a BASIC program that will stuff code into high memory, which then must be MEMORY SIZE protected.

If the printer you are using does not accept ASCII code, you must modify this driver (software) program to make the necessary code conversion. This would be necessary for example, if you tried to drive a Selectric, such as the TRENDATA 1000. In that case, you would have to convert from ASCII to the IBM correspondence code. This code would have to be included with the code already in high memory, and would make the conversion from ASCII to the appropriate correspondence code.

Also, if you have a lower case modification in your machine, it too, will need to be up there in high memory. This results in quite a bunch of things to have up there, but a machine language program can be written to include all these features in one chunk, which can then be loaded as a single SYSTEM tape program.

If you have an expansion interface with the RS 232 (*don't confuse this with the TRS 232 mentioned earlier*) board installed, you will need a different serial driver. The RS 232 operates out of a different output port than the TRS 232, aside from being accessed differently.

In general, all serial type printers will require a piece of hardware and a

software program (driver) to operate a printer. Serial is probably the cheapest way to go, but costs memory (to hold the driver routines). Of the serial interfaces available, the TRS 232 from Small Systems is probably the most economical. It comes with the software for around \$50, and does not require the expansion interface to be present. Serial driven printers are generally slow. We have used the TRS 232 to interface to the ASR 33 and ASR 38 Teletypes, as well as the TRENDATA 1000 Selectric. These all run at 110 baud (about 10 characters per second).

## PARALLEL INTERFACES

In general, a parallel interface will accept some number of bytes at one time and store them in a buffer in the printer. When the buffer is full (or when a carriage return is received), the buffer will empty and print an entire line on the printer. This type of transfer of data is much faster than that in a serial printer. The so called "standard" parallel interface connection is called the "Centronics" port.

If you have an expansion interface, it already includes a Centronics port. Simply plug your parallel printer into it and go - no driver or memory protected software is required.

Parallel printers have much more electronic control circuitry, and are more expensive than most serial printers. They make up for it though, in their simple hook-up and speed of operation.

**If you do not have the expansion interface there is still hope. Radio Shack markets a parallel converter cable which connects directly to the output bus of your keyboard. It sells for about \$60, and provides you with a standard Centronics port, directly connected to your keyboard bus.**

If you already have something connected to that bus, the Exatron (Stringy Floppy) people have a "Y" connector for around \$15, so you can connect more than one device at a time.

Just two years ago, parallel printers were still quite expensive. The Radio Shack Centronics 779 for example, was in the \$1300. price range, without a tractor feed. Now, you can purchase any of several parallel printers in the \$600. to \$900. price bracket and - they have more features, such as software controlled line length, full upper/lower case and quiet operation.

## A LOOK AT SOME PRINTERS

### ASR 33 and 38 Teletypes

One of the cheapest ways to go is to



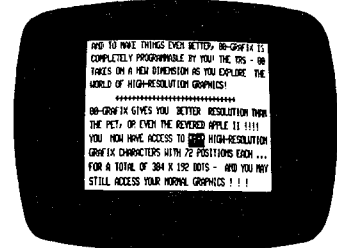
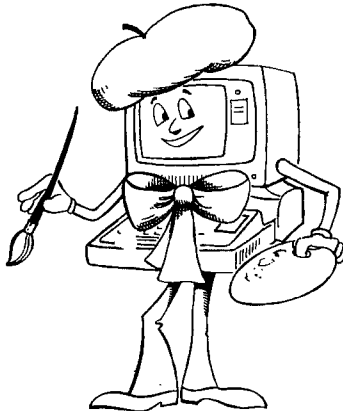
# FROM PROGRAMMA

## HI-RESOLUTION GRAPHICS FOR THE TRS-80®



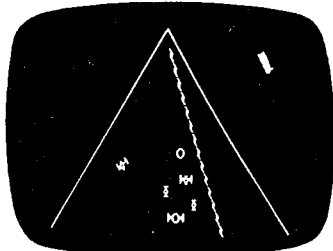
### LOWER CASE

The 80-GRAFIX board includes two sets of lower case characters at no additional cost.



### INVERSE VIDEO

The 80-GRAFIX board allows you to do inverse video to high-light your screen displays



### DEMONSTRATION PROGRAMS

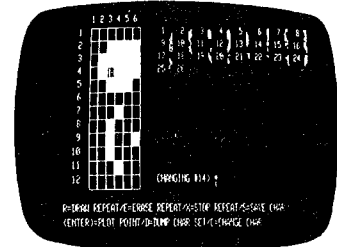
The 80-GRAFIX board is supplied with a Character Generator software and several demonstration programs.

### FINALLY, AT LAST...

HI-RESOLUTION GRAPHICS is available for your TRS-80 computer system. The 80-GRAFIX board from PROGRAMMA International, Inc. gives your TRS-80 high resolution capability that is greater than the Commodore CBM/PET or even the revered APPLE II.

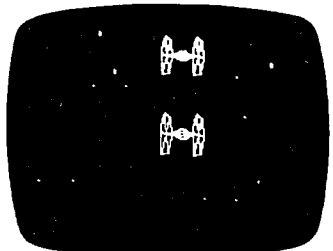
80-GRAFIX gives the TRS-80 an effective screen of 384X192 pixels, versus the normal 127X192 for the TRS-80, 80X50 for the CBM/PET, or the 280X192 of an APPLE II. As an added feature, 80-GRAFIX offers you lower case characters at no additional cost. Of course, you can also create your own set of up to 64 original characters using the supplied Character Generator software.

The 80-GRAFIX board is simple to install (note that this voids your Radio Shack warranty), and programming is done through BASIC. 80-GRAFIX opens up a whole new realm of software development and excitement never dreamed of for the TRS-80!



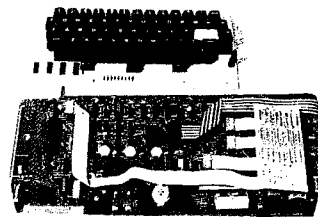
### CHARACTER GENERATOR

The supplied character generator software allows you to create your own character set of up to 64 original characters.



### REAL-TIME GRAPHIC GAMES

With the 80-GRAFIX board you can write exciting real-time games using BASIC.



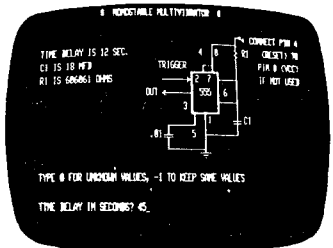
### EASY INSTALLATION

The 80-GRAFIX board is simple to install and fits inside the TRS-80 case.



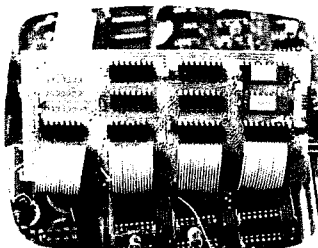
### GRAPHICS GALORE

The 80-GRAFIX board and the supplied Character Generator allow you to become an artist



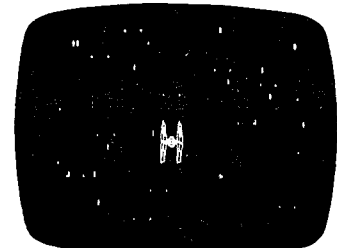
### ELECTRONIC DESIGN

The 80-GRAFIX board has unlimited application in Electronic design and Education



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find an ASR 33 Teletype. These can be obtained with a stand or as a table model. They take 8" roll paper, are pressure fed, and usually have a keyboard from which you can type directly to the paper. The ASR 33 a serial interface, such as the TRS 232. It also requires a software driver to be in memory. No code conversion is required, since the ASR 33 is an ASCII device. Good used ASR 33's can be found in various state of repair from about \$300. to \$600. The TRS 232 will cost another \$50.

Some of the disadvantages to the ASR 33 are: It is serial and requires a driver in memory. It is slow (about 10 characters per second). The print element does not always strike the paper squarely, causing the "O" to look like a "C", for example. They are big, heavy and somewhat noisy. They are sturdy though, and will give years of service.

The ASR 38 is almost identical to the ASR 33. The big exception is that the 38 has upper and lower case. In addition, it has a 15" carriage, and will take standard computer line printer paper. The problem with this is that it accepts *only* that paper and no other! It is not pressure fed, but rather is pin fed. The same problem which applied to the 33 with character definition also applies to the 38. Like the 33, it is serial driven and requires software in memory. The price is about the same as the 33. The only real advantages are that it has upper/lower case and also seems to be less noisy.

#### **Trendata 1000**

Staying with serial printers a while longer, let's take a look at the TRENDATA 1000. This is another serial driven IBM Selectric printer. Again it can be driven with the TRS 232 interface - but now there is also code conversion to take into consideration, since it uses the IBM correspondence code.

The TRENDATA 1000 comes in a nice little desk unit, the side of which is crammed full of electronics. It is necessary when first powering up this unit, to issue an "LPRINT 9" command to get things going (else it will do absolutely nothing!). The print quality of the TRENDATA is what you would expect from a Selectric - nice. One advantage of this device as a printer is that you can use it off-line as a standard office typewriter. The price is between \$800. and \$1000.

If you intend to use the TRENDATA for TRS-80 line listings, you will need to find a print element that has the "greater than", "less than" and "up arrow". It would also be nice to have a

cancelled zero. (See: *Letter to the Editor, 80-U.S. Mar-Apr 80, page 4, for more information on this element*). Changing the print elements in a Selectric is a snap, if you will pardon the pun.

The TRENDATA is a solid unit which seems to be built better than the standard office Selectric. The ribbon cartridge in the TRENDATA is rather short, and invariably runs into the leader in the middle of a long listing before reversing itself. For light work though, this may be an excellent choice of printer.

#### **Selectra-Print**

Here is another Selectric - this time the Selectra-Print. This one currently costs slightly over \$2000. It is a parallel printer and the code conversion from ASCII to IBM correspondence is done with hardware. The hardware consists of a blue box which connects between the printer and the expansion interface parallel port. It contains an on-off switch, and another switch to select all upper case (for listings) or upper/lower case.

The Selectra-Print has excellent print quality, and a large ribbon which seems to last for months. It comes with the "greater than" and "less than" in the proper places, but prints a bracket in place of the "up arrow".

The typewriter mechanism itself is not as sturdy as that of the TRENDATA. It is a constant problem keeping it in adjustment to prevent printing underscores or dashes in place of the correct character. Although IBM will service this typewriter, they have a policy not to touch things not theirs, which includes the solenoids under the typewriter which are generally what get out of whack. Again, you have the advantage of an office typewriter when used off-line.

#### **Centronics 779**

We have had the Radio Shack Centronics 779 for well over two years. It is a dot-matrix printer and has variable pitch (up to 132 characters per line). With a tractor feed, it costs about \$1500. It is upper case only, produces an irritating grinding noise, and is built to withstand a beating. It prints several thousand labels for us every other month and has not failed in the whole time we have had it. It will print up to 120 characters per second, depending on the setting of the variable pitch control.

#### **Microline 80**

We recently acquired the Microline 80. This printer looks like a toy compared to the others. But it has

some features that are very impressive.

It occupies just a little over a square foot of desk space (yes, it is that small!). It is a parallel, dot-matrix printer and prints at 80 characters per second. It has three software selectable pitches: 5, 10 and 16 characters per inch horizontally. It is also software selectable at 6 or 8 lines per inch vertically. It will print 132 characters per line at 16 characters per inch. It has upper and lower case - and if you use NEWDOS+ you can use the JKL feature to print out a screen full of graphics (but POKE 17360,255 first). Yes, it prints TRS-80 graphics with very little distortion.

It has a pressure platten, 9" pin feed and an optional snap-on tractor which is adjustable. When the tractor is attached, it relieves the pressure from the platten. It is quiet, the only sound you hear is the pins striking the paper. It takes a standard Underwood spool ribbon (with eyelets). Although we have only had it for a few months, there have been no problems. The cost is about \$800., with the tractor costing another \$130 or so. We brought ours from Level IV Products in Livonia, MI., since they seem to have the best price on it currently.

#### **OTHERS**

There are many other printers available. Although we have no first hand experience with them, we have heard many good things about the Integral Data series, especially the "Paper Tiger".

Then there are the NEC Spinwriter, the Qume and the Diablo. These use the "Daisywheel" principle, but NEC calls theirs the "print thimble". They produce outstanding impact formed characters that equal or better the Selectrics. They are available with parallel or serial interfaces and cost roughly from \$2800. to \$3400. depending on options. Very nice, if your pocketbook can stand the pinch.

#### **CONCLUSIONS**

The price of reasonable quality printers is coming down. More of them are available to choose from. Dot-matrix printers are becoming more acceptable (although the lower case "g" still irritates many people because it looks like the "s"). As stated earlier, two years ago the best buy was probably the Radio Shack 779. Now, for about half the price, there are printers which are smaller, and have all the features the 779 lacks - in just two years. Don't look for another 50% reduction in price in the next two years. But do expect more features for the same price. ●

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For the serious computerist, side two of People's Pascal II (tape 6) contains a larger compiler and complete source to the compiler, written in Pascal! This means you can re-compile the compiler, making changes, adding features, etc. (but this will take at least 36K RAM and a solid knowledge of programming).

With the complete People's Pascal operating system, you can save and load both source (Pascal) programs, and compiled programs, to or from cassette tape. This means that once you have de-bugged a program, you can save the P-code (compiled program) and thereafter, to run the program, you need only load the super-fast P-code.

Here is a partial list of People's Pascal features: recursive procedure/functions • for (loop) • case if/then/else • one-dimensional arrays • write • read constant • repeat/until (loop) • "peek & poke" • plot (graphics for TRS-80)

### DEALER INQUIRIES INVITED

People's Pascal 1 (tape 3) is written in Basic, implemented for TRS-80 by John Alexander of Berwick Australia. It compiles P codes more slowly and is harder to use than Pascal 2, but its P codes can be translated into Z80 native code and saved as System tapes. Pascal 2 requires that Pascal be resident at run time—Pascal 1 does not. Other People's Software tapes \$8.

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## TAPE 1 LEVEL 2

Mortgage calculations, Dow Jones Industrial, cash flow, inventory-change, California income tax, journal ledger (8K), loan amortization, perpetual calendar, bio rhythm, payroll, diet planning, speed reading, touch typing, sales receipt tally, decision maker, mail addressing, straight depreciation, double-declining depreciation, and revolving charge account

Also, math problems, queen, Star Trek I, number guessing, wheel of fortune, World War II bomber, rock-scissors-paper, seek, Star Trek II, Red Baron, mini-Trek, strategy, pilot, battleship, "On A Snowy Evening", mastermind, tic-tac-toe, grand prix auto race, capitals, etch sketch, hangman. Total programs: 34; Level 1 version available: 24 programs. \$8.

## TAPE 2 Some Common Basic Programs (lev. 2)

Fully documented in Some Common Basic Programs by Lon Poole & Mary Borchers (Osborne & Associates, 630 Bancroft way, Berkeley CA 94710—or from CIE—\$12.50 postpaid from CIE, via UPS, CA residents add tax to \$13.25):

Investment, future value regular deposits, regular deposits; regular withdrawals, initial, minim (for withdrawals); nominal interest, effective & earned-interest; depreciation rate, amount depreciation; salvage value; discount com'l paper; loan principal, regular & last payment, remaining balance, term-loan; mortgage amortization; greatest common denom. integer prime factors; polygon area, triangle parts; analysis, operations two vectors; radian-degree, degree-radian conversion; coordinate, polar equation, functions plot; linear, curvilinear interpolation; Simpson's & trapezoidal rules, Gaussian quadrature integration; derivative.

Side 2—quadratic equation, polynomial (Newton) & half-interval-search roots; trig polynomial; simultaneous equations; linear programming; matrix addition, subtraction; scalar multiplication, inversion; permutations & combinations; Mann-Whitney U test; mean, variance, standard deviation; geometric mean & deviation; binomial, Poisson, normal, Chi-square distribution; Chi-sq., student's T-distribution test; F-distribution; linear correlation coefficient; linear, multiple-linear, Nth order, geometric, exponential regression; system reliability; future projections; Federal withholding taxes; tax depreciation schedule; check writer; recipe cost; map check; day of week; days between two dates; anglo to metric; alphabetize. \$8

## TAPE 3 People's Pascal Development System 1

Pascal 1 compiler-program development system. \$15.50.

## TAPE 4 LEVEL 1

Election returns, business percentage, ups and downs of business, index, inventory control, sales receipt tally, gas mileage, driving distance, mixed monthly sales report, payroll, annual earnings, speech recording aid, and double-declining depreciation

Also, math problems, cash register, chase, snoopy, commander-in-chief, Christmas graphic, air raid, balance scale, stock market, tic-tac-toe and On A Snowy Evening. \$8.

## TAPE 5 LEVEL 2

Memory test, mortgage payments, tension breaker, lineprinter-screen & vice-versa utilities, Federal income tax, election returns, business percentage, vacation planner, car pool(disk), diet planning 2, mailing list(disk) and first aid

Also spellingbee, Star Trek 3, mind bender, tachistoscope, chase, common factor, klingon capture, spelling practice, Hamurati, animals, Snoopy, cryptogram, starship, ants, Yesterday, and Pilot(disk). Pilot is the language of computer-aided instruction (CAI).

## TAPE 6 People's Pascal 2

Pascal 2 compiler-program development system. \$23.50.

## TAPE 7 LEVEL 2

Disassembler, Pilot, roster, dropout, memory loader, memory sort, inventory control, graph, land surveying, mixed monthly sales report, shopping list, diet planning 3, loan progress chart, hex-decimal conversion.

Also Star Trek 4, states and capitals, battleships 2, spelling practice 2, number guessing, hangman 2, snark, slot machine, cipher, target, surround, adder, termites, lunar lander, multiplication exercise, five-in-a-row, Bastem, and write. A number after a program indicates there are other similar People's Software programs. Pilot is the same as the disk pilot on tape 5, except runs on 16K tape systems. \$8.

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# Passing Variables

Save your variables while swapping from one program to another...

Since getting my disk system about a year ago, I have been perplexed by one of Disk Basic's short comings. Actually this short coming is shared with Level II and other versions of Microsoft Basic. While Microsoft has allowed for program chaining (even in Level II), they did not allow for the passing of variables between programs. Of course you can save the variables on a disk or tape file, but this takes up precious space on your disk and is intolerably slow on tape.

Fortunately there is an alternative. During a phone conversation with Jim Crocker (Technical Editor, 80-US), Jim gave me a few "pointers". I worked with them for awhile, and here is what I came up with.

A quick look at a Level II memory map will reveal an area of RAM between 4080H (16512D) and 41E6H (16870D) that is labeled "reserved". This same area in Disk Basic is labeled "Basic Vectors". It is here that we find the solution to our problem.

Starting at about 40A0H (who said this is an exact science) there are a number of pointers which establish boundaries within RAM. The three pointers we are concerned with are at

40F9H, 40FBH, and 40FDH (16633D, 16635D, and 16637D). These pointers point to the beginning of simple variables, beginning of array variables, and beginning of free memory respectively. Of course, as is usual with the Z-80, the locations pointed to are stored with the least significant byte first and the most significant byte second, so that the location 6A26H is stored as 266A.

Now, let's see how this thing works. If we look at these pointers with T-Bug or De-Bug just after power up, and before running a program (Figure 1), we see that these pointers all contain the same numbers. However, if we look again after running a program (Figure 2), we see that this has all changed. They all three point to different locations: The current locations of the variables and beginning of free memory. If we now run a different program and check the pointers, we will see that they have changed again. Any variable that was defined in the first program has now been lost.

Herein lies the remedy to our problem. If we could just keep the pointers from being changed, we

could pass variables from one program to another.

Programs "TESTA" and "TESTB" demonstrate how this can be done. Lines 80 through 120 of "TESTA" assign values to various variables. Lines 130 through 150 POKE the contents of the pointers into high memory and line 160 loads and runs "TESTB". Of course, in Level II it will be necessary to change all hexadecimal numbers to decimal, line 160 should read "CLOAD 'TESTB'", and the RUN command must be entered.

The first thing that "TESTB" does is PEEK into high memory and POKE the saved values located there back into the pointers. This is done in lines 20 through 40. Lines 50 through 70 then print the values that were assigned to the variables in "TESTA". Line 80 then chains back to "TESTA" to start over.

So that's it. It's as easy as 1,2,3. Well at least almost that easy. There are a couple of gotchas.

Look at lines 20 through 40 of "TESTA". These lines are not necessary if the first program is longer than the second program. However this is not always the case.

When you run a basic program, the variables are stored on top of the program (check your memory map). It is easy to see that if your second program is longer than the first, it will over-write the area where the variables are stored.

Lines 20 through 40 of "TESTA" are used to initialize your own area for storing the variables. You simply chose some area in memory that is above your longest program and POKE that location into the pointers. By using these lines at the beginning of your first program, you guarantee that your variables will not be over-written by other programs.

Now the other gotcha. And there's no easy answer to this one.

String variables that are defined within the program are stored within the program. For example, in "TESTA" the strings are defined by a DATA statement in line 120. Wherever line 120 is stored in RAM is where the string variables are stored. If the next program uses the same space that line 120 uses, then the string values will be lost. Two ways to avoid this would be to either define the strings in a DATA statement at the end of the longest program, or else define them with INPUT statements.

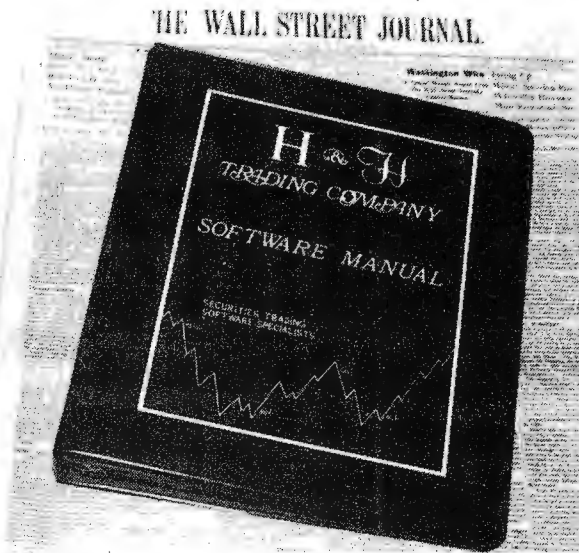
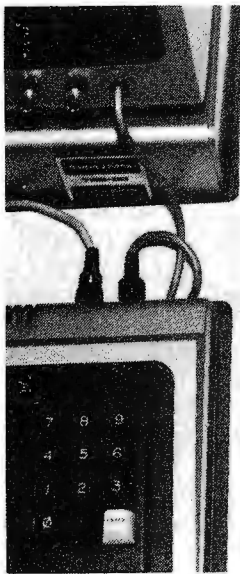
Well, that's it. It might be a little tricky at first, but once you get use to it, it should make programming a whole lot easier.

```
10 REM *** THIS IS "TESTA" ***
20 POKE(&H40F9), (&H00): POKE(&H40FA), (&H70)
30 POKE(&H40FB), (&H00): POKE(&H40FC), (&H70)
40 POKE(&H40FD), (&H00): POKE(&H40FE), (&H70)
50 CLEAR 40
60 DIM A(12)
70 PRINT
80 READ A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P
90 READ A$, B$, C$, D$
100 FORX=1TO12:A(X)=X:NEXT
110 DATA 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80
120 DATA "THIS IS A$", "THIS IS B$", "THIS IS C$", "THIS IS D$"
130 POKE(&HF000), PEEK(&H40F9): POKE(&HF001), PEEK(&H40FA)
140 POKE(&HF002), PEEK(&H40FB): POKE(&HF003), PEEK(&H40FC)
150 POKE(&HF004), PEEK(&H40FD): POKE(&HF005), PEEK(&H40FE)
160 LOAD"TESTB", R

10 REM *** THIS IS "TESTB" ***
20 POKE(&H40F9), PEEK(&HF000): POKE(&H40FA), PEEK(&HF001)
30 POKE(&H40FB), PEEK(&HF002): POKE(&H40FC), PEEK(&HF003)
40 POKE(&H40FD), PEEK(&HF004): POKE(&H40FE), PEEK(&HF005)
50 PRINTA, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P
60 PRINTA$, B$, C$, D$
70 FORX=1TO12:PRINTA(X), :NEXT
80 LOAD"TESTA", R
```



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```

AF = CF 8C S---1P--
BC = 09 C7 => 23 46 23 C9 11 21 41 06 04 18 05 EB 3A AF 40 47
DE = 01 04 => 1A 4D 45 4D 4F 52 59 20 53 49 5A 45 00 52 41 44
HL = 00 54 => 01 01 5B 1B 0A 1A 08 18 09 19 20 20 0B 78 B1 20
AF' = 00 44 -Z---P--
BC' = 4D 5C => 00 00 00 00 00 00 D7 00 00 00 00 51 00 00 00 00
DE' = 01 08 => 4F 52 59 20 53 49 5A 45 00 52 41 44 49 4F 20 53
HL' = 4D 00 => A2 2C 00 00 00 00 00 00 00 00 00 00 00 00 00
IX = 40 15 => 01 78 43 00 00 00 00 4B 49 07 58 04 31 3E 00 44 4F
IY = FF FF => F8 F3 AF C3 74 06 C3 00 40 C3 00 40 E1 E9 C3 9F
SP = ED 84 => 52 04 9B 43 10 04 40 38 B4 43 DD 03 15 40 33 64
PC = 00 60 => 0B 78 B1 20 FB C9 31 00 06 3A EC 37 3C FE 02 D2
 40D0 => 00 00 00 51 24 A1 37 EE 86 A1 78 00 00 00 00 8A
 40E0 => A1 00 5A 00 0A 00 86 A1 A1 ED FF FF FF FF AA 5B
 40F0 => 00 00 00 8E A1 40 01 00 00 94 A1 4F A2 7A A3 89
 4100 => 68 04 02 02 02 02 02 02 02 02 02 02 02 02 04 02

```

```

AF = 44 42 -Z----N-
BC = 5B 01 => 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
DE = 5B AD => 44 00 00 00 44 00 31 00 00 00 52 31 00 00 45 45
HL = 40 B7 => 5B 07 33 41 FF FF FF FF FF 00 00 00 00 00 00
AF' = 00 44 -Z---P--
BC' = 4D 5C => 00 00 00 00 00 00 D7 00 00 00 00 51 00 00 00 00
DE' = 01 08 => 4F 52 59 20 53 49 5A 45 00 52 41 44 49 4F 20 53
HL' = 4D 00 => A2 2C 00 00 00 00 00 00 00 00 00 00 00 00 00
IX = 64 33 => 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
IY = FF FF => F8 F3 AF C3 74 06 C3 00 40 C3 00 40 E1 E9 C3 9F
SP = ED AB => AE 5B 1E 1D 00 00 FF FF FF FF FF FF FF A3 45 A3 45
PC = 57 08 => E1 C9 3A 29 5B FE C0 CD 09 44 E1 C9 D7 E5 3E 11
 40D0 => 00 00 00 01 AD 5B 47 EE AE 5B 78 00 00 00 00 89
 40E0 => 68 00 5A 00 0A 00 AA 5B AF ED FF FF FF FF AA 5B
 40F0 => 00 00 00 AE 5B 40 01 00 00 94 A1 94 A1 94 A1 89
 4100 => 68 04 04 04 04 04 04 04 04 04 04 04 04 04 04 04

```

# Survey Results

Here are the results of our March 1980 Reader Survey. It is followed by comments from Mr Ed Juge at Radio Shack. Incidentally, all the figures in this article were produced on our new Microline 80 printer, using the Graph Program by Rod Hallen from our March-April 1980 issue.

The results are in. There were a couple of little surprises, and here they are. The first was the fantastic response to this questionnaire. Almost 1100 were returned (1062 to be exact). That represents about 15% of our total circulation, and is even more interesting since you had to provide the return postage. By the way, only one person even mentioned that fact on the questionnaire. Ok, so we're cheap, but there are three winners of free subscriptions. Cathy Shappee drew three at random, the first was a one year subscription and went to Mr D L Morrow, of Albuquerque, New Mexico. Mr Morrow was already a subscriber, and so gets a one year extension instead. Second was a two year subscription and it went to Mr Meade Gryder, of Orlando, Florida. Mr Gryder bought 80-U.S. on the newsstand, and now has a two year subscription. Third was Mr Lewis Cohen, of Flushing, New York. Mr Cohen was also a subscriber and now has a three year extension to his subscription. Congratulations!

The average age of our readers is slightly over 40 years. See figure 1. This is considerably higher than we had anticipated.

All numbers on the graphs represent a percentage of the total number of respondents.

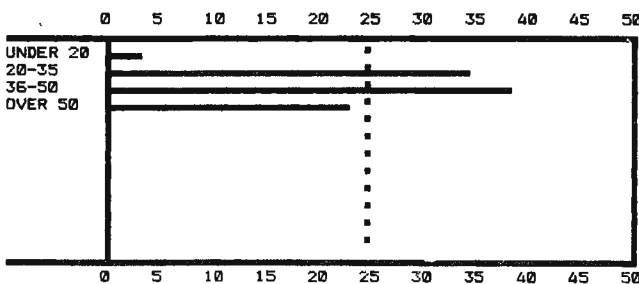


Fig 1

The education level, see figure 2, averages out to somewhere around a BA/BS degree. Only 13% have high school only or less.

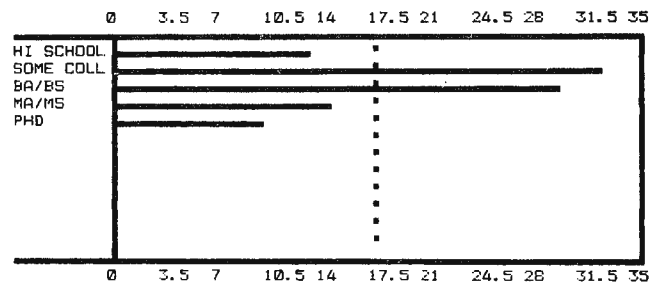


Fig 2

In the profession analysis, see figure 3, we were rather surprised at the number in business. R SALES stands for Retail Sales (there wasn't enough space on the graph). We found that there could have been at least 3 other categories: Engineering, Clergy and Retired. These were the largest write-in's in the "other" category.

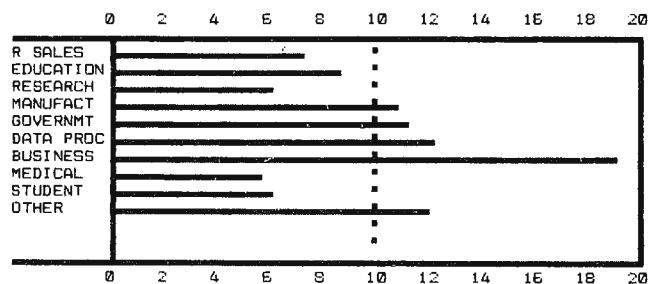


Fig 3

In figure 4 we can see the distribution of current system. Slightly over 50% have disk systems, 41.2% have Level II, 16K and 3% have Model II. Only 1.7% have Level I, 4/16K, while the others are all less than 1%. All Level II, 32/48K without disks were added to the Level II 16K response. The issue was: Did they have disk access or not? Those who selected more than one option were added to the most complete system named.

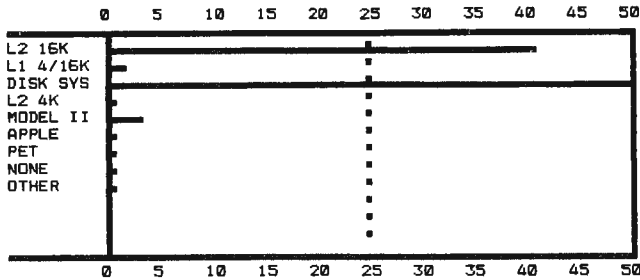


Fig 4

Figure 5 tells us that the most wanted expansion is to disk systems, followed closely by added memory, printer, and a modem. 3.7% want to get a different system and 7.8% have no plans for expansion of their system.

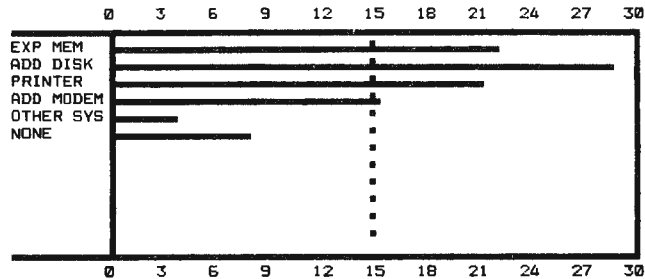


Fig 5

Slightly over 32% of those answering this question belong to a club, while 67% do not.

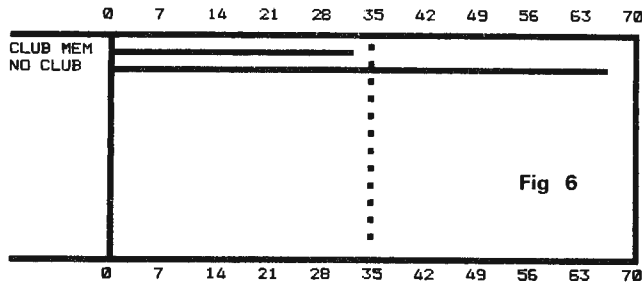


Fig 6

Figure 7 tells us that Basic is the preferred programming language (not really news, is it?). One of the most frequent write-in's in "other" was COBOL.

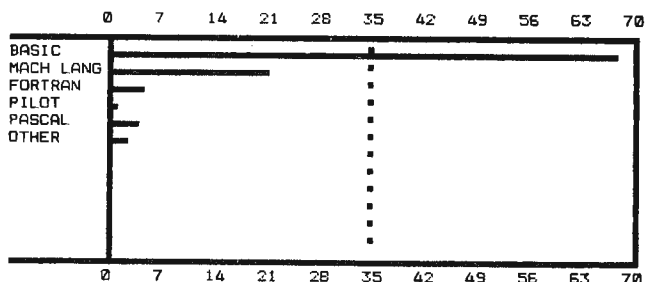


Fig 7

Figures 8, 9 and 10 show what our readers spent on games, business software, utilities, educational software, and home/personal software in the past year.

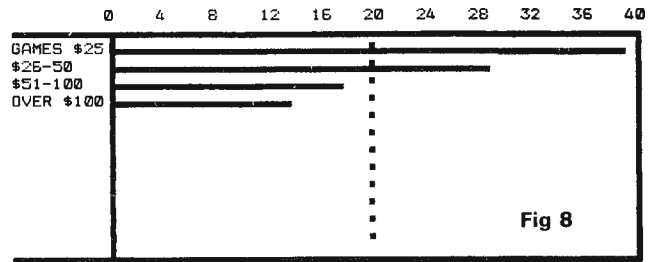


Fig 8

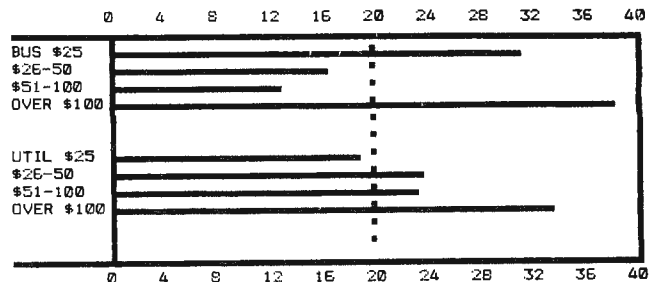


Fig 9

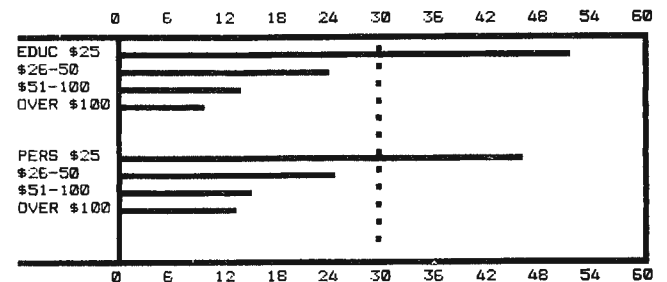


Fig 10

Figures 11, 12, 13 and 14 indicate how you feel about the features we carry. Feature program listings got the highest response in the "favorite" department, with System/Command following closely. It is interesting to note that those who said "Drop it" to System/Command and View, also said that they program only in Basic.

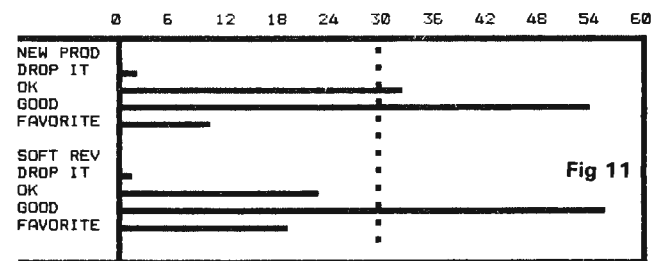


Fig 11

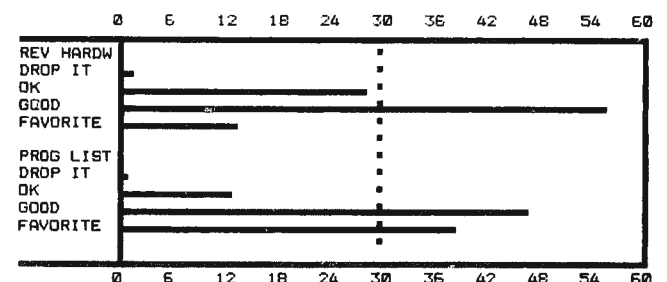


Fig 12

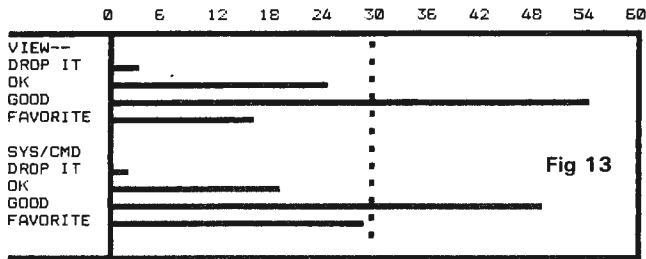


Fig 13

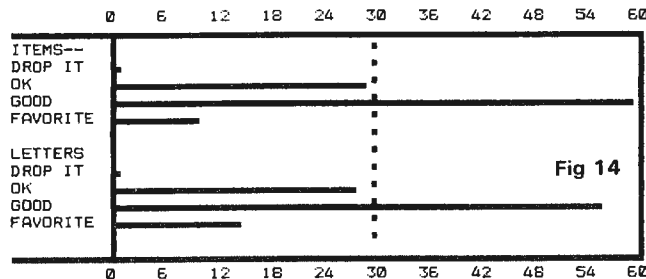


Fig 14

Figure 15 was a surprise to us. The fact that we are dedicated to only one system probably accounts for the lack of cries about "too much advertising", since all ads

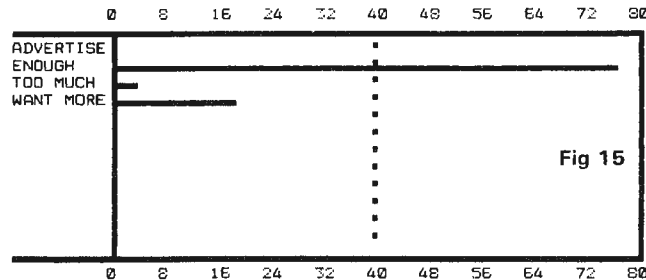


Fig 15

apply (potentially at least) to your system. Although we went slightly overboard in May-Jun 80, we have increased the size of the mag to keep the advertising content in the 35-40% range.

What else do 80-U.S. readers read? See figure 16. Far and away more read 80-Microcomputing than any other.

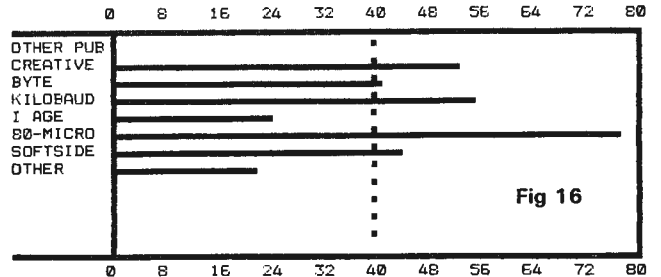


Fig 16

The question: "Assuming someone would listen to you, what would you like to tell 80-U.S.", brought about a 98% positive response and we appreciate that. There is still a fellow out there who wants to see Cathy in a wet Tee-shirt, and one person said that 80-U.S. looked like it was produced in the basement of a porno shop - he did allow though, that it was improving! We are not treating your suggestions lightly. Although it looks like we were pretty much on the right track, some minor modifications will be made as a result of this survey. Your suggestions and comments were very much appreciated.

Your comments regarding Radio Shack were not as positive. We felt you should have an answer from them, not from us, so we copied all the remarks, verbatim, and sent them to Radio Shack. Mr Ed Juge has replied, and his letter follows. We thank him for the speedy reply, as well as for taking time to digest and answer all those comments.

## Radio Shack

A Division of Tandy Corporation

COMPUTER MERCHANDISING 817.390.3011  
700 ONE TANDY CENTER, FORT WORTH, TEXAS 76102

May 5, 1980

Mr. Mike Schmidt  
Page 2

May 5, 1980

Mr. Mike Schmidt  
80 - U. S. Journal  
3838 South Warner St.  
Tacoma, WA 98409

Dear Mike:

Before addressing the questions your readers raised, I'd like to correct a common misconception. Radio Shack does listen to TRS-80 owners! The prime example has to be TRS-80 Model II. Listening, however, does not mean we can respond to every need of 150,000+ individual owners. It means that when a significant number of people request something which is feasible, can be done at a reasonable price, and won't interfere with the needs of other users... we'll sure try to do it. Your question, which began "Assuming someone would listen..." implies a situation which simply is not true.

Now to the questions... Software! We agree there is a crying need. In the past 2 years, we've increased our software staff by a factor of about 15. We'd at least double it again if enough qualified people appeared tomorrow, but we want more than just "warm bodies". So "why don't we sell other people's software?" We do! About 60% of our current Model I programs were written outside. But we will only sell a package if we can answer your calls and letters about it. And we have to know it doesn't use "trick" programming which might not be compatible with our lower case system or later DOS releases... or other Radio Shack hardware or software. If a bug shows up (and they will, in spite of our best efforts), we're going to spend big dollars sending free revisions to a lot of people. So up front, we'll do hundreds of hours of testing, revising, testing again. We rewrite the instructions into our format so you'll feel at home with each new manual. Since we're doing all of this, we sell the program under our own label, so you'll know at a glance that it carries Radio Shack support.

System software source code - An often-raised question. BASIC, FORTRAN, Model I DOS, and other system software - though much has been highly modified in-house - was originally contracted from outside sources. Every vendor contractually prohibits us from releasing source code. Good machine level programmers will

find what they want without help. But releasing source code (even if we could) would encourage programmers to use addresses which might move in future releases of BASIC or DOS. Then we'd either have to live with current system software forever, or give you enhanced versions which might not work with your "Non-Radio Shack" software.

Sell peripherals cheaper! Nobody complains about our computer prices. We price them on the basis of costs plus a reasonable profit, rather than "what we think the market will bear". Peripherals are priced the same way. Unquestionably, some smaller companies can operate on less profit than we can. Most of them are bringing you existing technology designed and often built by others. Most are isolated from their customers by dealers (who have to do the support), or by a lot of miles (they won't have to deal with you face-to-face). We aren't. Sure things like 40-track drives are nice, but we were buying mechanisms from the largest drive builder in the world, and they fell more than 5 months behind our demand. You can imagine what the delays would be if we tried ordering 40-track drives from much smaller vendors. Yet the people who sell all of these nice items (and many of them are great) try to make it sound like we're just being arbitrary in our decisions. I always have to wonder where they were when Radio Shack and a few others were designing, building, learning, making huge capital investments and betting on a market that didn't exist, to build an affordable personal computer? If you'd waited on them, you wouldn't own a computer today, much less their "less expensive" peripherals... but they sure make good armchair quarterbacks!

"You need better informed sales people." Let me use an example, though... a professional interior decorator is more knowledgeable (and expensive) than most department store furniture sales clerks. Radio Shack has 6,500+ "department stores", selling a lot of different products. But we've also added 150 specialized computer sales locations where you can get the more professional information (not more expensive). We keep ALL locations informed to the greatest possible degree. Deliveries of parts or finished goods from outside vendors are not predictable, so we tell our field people only what we





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# A Model II Editor-Assembler

Terry Dettmann, Associate Editor

## A look at a new Editor-Assembler produced especially for the Model II Computer.

The Model II computer, aimed as it is at the business market, has had a large amount of software developed already for the end user. However, the programmer has essentially been left behind.

BASIC is completely adequate for most jobs, but there are still jobs which require Assembly Language for its speed and versatility. Only within the last few months has development software begun to appear to meet the needs of the programmer who must work in assembly language on the Model II.

First, Small System Software brought out their excellent RSM monitor tailored to the Model II. In fact, they more than brought it out, they extended and improved it compared to the Model I release. But RSM is still a hard way to program in assembly language.

Just recently, Model II assemblers have started to appear. Galactic Software Ltd, the people who brought us the first truly random access mailing list, have entered the market with a real winner.

The Galactic Editor-Assembler meets several objectives for the Model II user:

1. It allows the user who moved up from the Model I system to use basically the same commands to write in assembly language. It even uses the same pseudo-operations.

2. It gives the new user without previous experience a well tested and recognizable system to work in.

3. The manual explains in detail how to use each facet of the program. (It is still a *reference* manual, so

beginners will need some extra help. It does not teach you how to program.) Of more importance to many users, it provides a Model II assembly language software development system aimed at the critical jobs: the small ones.

Most assembly language routines on the TRS-80 can be classed as supporting routines for programs in BASIC. For this kind of programming, you need an assembler that will let you work like you do with the BASIC interpreter. The Galactic Editor-Assembler is as near to that kind of assembler as it can be.

### A User's Reaction

When I first looked at the Editor-Assembler, my reaction was: "They took it lock, stock and barrel from the Radio Shack Editor-Assembler, with some of the nicer features of Ed-Asm plus from Microsoft and the NEWDOS Ed-Asm from Apparat". How wrong I was!

It turns out that this is more than an uploaded Model I assembler. This is a new package, designed for the Model II with the idea that the commands should resemble those of the Model I to make it easier for people who already know that one. But there is more!

This Editor-Assembler was designed to be co-resident with the RSM monitor from Small System Software! The two packages will work together since the entry points are specified for the Editor Assembler in the package and a new JUMP command has been added to let you go to another machine language routine in memory. This way, you not only have an Assembler, you also have a debugging monitor.

It doesn't stop there though. You can also select assembly directly into memory or onto disk. Imagine being able to assemble a program, jump into the monitor, set break points, test the program, and then jump back into the assembler with the source code intact!

Instructions are also included for doing the same with Radio Shack's DEBUG package instead of the RSM monitor. I have to point out though that DEBUG is more restricted and less capable than the RSM monitor.

You can also provide for an automatic return to the assembler from your program at the end of testing if you want. The assembler, given a JUMP command, puts the entry point to the Editor-Assembler on the stack in the machine. If your program has handled the stack carefully and preserved the stack's integrity, then at its end the address will be back at the top of the stack. Placing a return (RET) at this point will POP it off the stack and return you to the Editor-Assembler. As one of my more perceptive friends says: "Neat, huh?"

This system gives you an amazing amount of flexibility without the rather unnecessary waste of programmer time in shifting from one program to another. This alone can cut your development time in half by reducing the frustration of trying to run incompatible programs against one another to write and debug a basically simple program.

There are still more other useful features:

1. Pressing ENTER without having a command on the input line displays a summary of all the Editor-Assembler commands.

2. A command is provided to MOVE a block of text from one place to another.

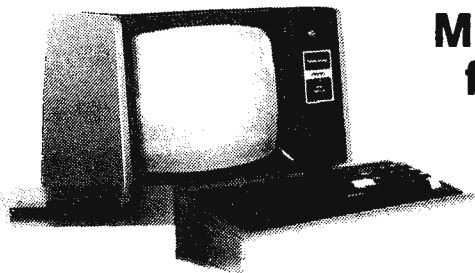
3. There are "Global" search and replace instructions which allow you to quickly locate and/or change any given string in a text.

4. A SYSTEM command has been added to allow the user to access DOS functions from within the Editor-Assembler.

5. A USAGE function has been provided to let you know how much memory you are using and how much you have left.

6. An instant "paging" feature allows you to look at the text in your program in 23 line "pages" by pressing one key.

7. It even works with both UPPER and lower case commands.



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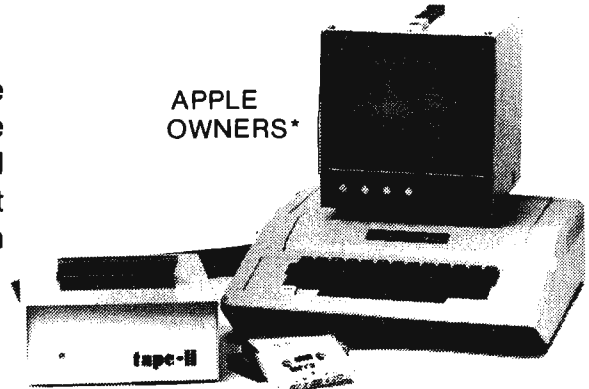
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### What it is not..

This program is not the end all for systems development. It was designed for a specific task; namely that of solving what is now the most common problem - developing and testing small routines quickly.

Although the program does have the capability to do multiple source file concatenation, it does not have the capability to assemble from a subroutine library, or handle MACRO's either internally or from a MACRO library.

The Galactic package was designed for a specific programmer audience and it meets that need admirably. It can produce code at Warp Seven, and never blink an eye. It can make testing far simpler and more enjoyable (was tearing hair ever enjoyable?). But it is not for massive projects.

Still another problem for the amateur programmer is that the system, set up as it is with RSM, will be difficult for a rank beginner to use. Unlike Microsoft's recent entry in the Model I assembler race, the Galactic package requires a separate debugger and some care from the programmer to get to the right place at the right time.

Admittedly, anyone playing with assembly language really ought to learn these things, and it's the programmer's fault if he cannot. However, people who are starting with a Model II as their first system and just starting to learn assembly language will have a difficult time until they are familiar with the concepts involved.

But all of that is nit-picking! The package is right now the best I have seen for the Model II. I found the editor easy to work with since it uses exactly the same editing commands as BASIC. There is a policy at Galactic that ALL computer responses to the user are in reverse video. This goes for error messages as well. Any error in an assembly stands out on the screen, making it just a little easier to use.

### Conclusion

In the final analysis, the utility of any program depends on the sophistication of the user as well as his need. For many Model II owners, an Editor-Assembler is an unnecessary luxury. The average businessman doesn't need it and probably hasn't the time to learn to use it.

By the same token, the average programmer doesn't need it because he has no programs which really must have assembly language routines to make them work. If he hopes to become more than a hobbyist though, or if he just wants to learn to expand his horizons, then such a package will be a good investment.

Anyone who is programming the Model II professionally ought to have this package. A professional makes money with the best programs in his area of specialization. More often than not, the best programs are characterized by the adept use of small machine language routines in critical areas.

To date, I have seen no better assembler than the Galactic Software Editor-Assembler for the Model II. It gets my vote.

The Galactic Editor-Assembler is available now, from: Acorn Software Products Inc. 634 North Carolina Ave SE. Washington, DC 20003, or from: Galactic Software Ltd, 11520 North Port Washington Road. Mequon, WI 53092, or from: 80-US Software, 3838 South Warner St. Tacoma, WA 98409. The price is \$229.00. ●

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# Mapping the TRS-80 into the **BIG TIME**

## **A User Report on the OMIKRON Mapper 1 and 2...**

John Marler, San Jose, CA

The time for all TRS-80 MODEL I owners (who feel rejected from Radio Shack's apparent overlooking our needs for more disk storage) to be in the Big Time with 8" disk drives has finally arrived! OMIKRON Systems of Berkeley, California has developed a modification system for the Model I that allows the use of *normal* CP/M. Nearly everyone knows about CP/M and that it is an (almost) universal operating system for Z80 and 8080 microprocessor systems. One of the *key* features of CP/M is the fact that it is "debugged" and is operating in many types and brands of computers throughout the world and the amount of software written for CP/M system operation would probably fill many catalogs. CP/M version 2.0 is fast becoming the most acceptable operating system for the MODEL II. Two newsletters that I subscribe to that are dedicated to the TRS-80 have published the "rumor" that Radio Shack will soon announce CP/M instead of TRSDOS for the MODEL II. The running of CP/M really protects the investment one can develop in software due to the upward compatibility of CP/M to other computers.

I purchased a system containing Mapper I and Mapper II with Two 8 inch Shugart disk drives which gives my Model I the same storage as the Model II with more than a \$1,000.00 savings! I have also found that double disk operation is the only way to go in operation to permit back-up and other utility without the hassle of inserting and removing disk (if you have ever made the mistake of inserting the source disk in when the disk write part of a backup is in progress and find you have erased your source disk then you will understand the need for two or more drives) I received delivery after only three weeks (they ask for six, but I got delivery in three). The Hardware

(that is one word most of us are afraid of - *hardware*) consists of the electronic boards called MAPPER I to utilize the Random Access Memory as low memory and not located above the ROM where any machine activity begins under normal TRS-80 operation. This permits the use of "normal" CP/M to be used and makes the world of "real" CP/M available for us Model I owners for the first time. MAPPER II consists of a board that, coupled with the disk controller chip, provides true data separation and eliminates the cause for most disk I/O errors - that of poorly separated data reading from the mini disk. MAPPER I also provides a way of using the graphics capability of the TRS-80 and adds cursor control in a manner similar to the Soroc 120 CRT Terminal which uses a very simple and easy to understand X,Y addressing of the cursor. No, there isn't a PRINT @ statement, but with X,Y addressing, we have the next best thing to it.

Installing the system is simplicity itself. I have the uncanny ability to blow lightbulbs when I change them - hardware is a jungle full of Greek that they call HEX and other traps that scare me when it comes to going inside the computer. The OMIKRON instructions are so easy to read and understand that I was able to install the system without (knock on wood) one problem. The first step is to open the Keyboard casing and locate the Z80 chip. The instructions carefully outline which chip this is. Removal of this chip is by simply pulling it out of its socket. MAPPER I's board is inserted into the now vacant socket and the Z80 is inserted into a similar socket on MAPPER I. Two "pinch" connectors then "wire" the board with surprisingly strong connection. This eliminates the need to solder anything!!! Pull a connector wire through the opening where the interface cable is connected, close the keyboard case and MAPPER I is ready.



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\*\*\*\*\*  
These programs, unless otherwise indicated, are for the 16k, Level II TRS-80.



## Galactic Trilogy

by Douglas Carlston

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Also available are "Datestones of Ryn," the microquest which is the introduction to the Dunjonquest series and "Morloc's Tower," the deadliest of the series. \$14.95 on tape, \$19.95 on disk, each.



## PACKER

by Cottage Software

This is the ultimate editing tool for BASIC program lines. There are five commands which allow easier reading of BASIC programs and more efficient execution by the computer.

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So if your programs need more memory, or you need more time, order your 'packer'! 16k, 32k and 48k versions supplied on two cassettes for \$29.95.

## SYSTEM SAVERS

by Tom Stibolt from Acorn

If you ever use the SYSTEM command, you should buy this two program package. These programs allow you to save any system format tape on tape or disk, plus offer several features for machine language programmers. Many two part, protected system tapes like Sargon II are not system format.

With FLEXL, which is one of the two programs, you can make back-up copies of any system format tape. Most often a cassette that you make will load easier than an original. Plus you can find the filename on any system tape because it is displayed on the screen. And at any time you can stop the reading of the tape by pressing <BREAK>.

For any machine language programmer, FLEXL offers the advantage of producing more efficient tapes than the assembler. Also, it is written to interface directly with monitor programs. And you can merge machine language tapes into one file.

Disk drive owners can use TDISK to save any system format tape onto disk. Adventure, Airaid, Ting-Tong, Editor/Assembler and other programs cannot normally be loaded to disk using TRSDOS. Now, TDISK allows you to save these programs onto disk. After DOS READY you will be able to simply type the filename and be up and running. It even loads non-contiguous tapes. TDISK will greatly increase the benefit of owning a disk drive.

And as a FREE BONUS, Acorn provides instructions on how to load MicroChess 1.5 onto disk.

Complete your system with the routines not found in either Level II or DOS for only \$14.95. Order your System Savers, today!



## TRS-80 DISK & OTHER MYSTERIES

by H.C. Pennington

We don't usually list books, but this one is so unique that we thought you would want to know about it. There are over 100 pages about how DOS works, how a disk is organized, and how to recover from errors. This is THE technical backup for NEWDOS+ with great illustrations. \$22.50.

## DISK\*MOD

by Roy Soltoff from Misosys

This machine language program modifies your copy of the Radio Shack Editor/Assembler for use with your minidisk and any disk operating system. You can save and load both text source and assembled object files. Unlike the NEWDOS+ version you can read the directory and the allocation of granules while in the EDTASM. You can also kill files. It is a complete disk modification for one or more drives.

Other capabilities are also added which are not found on NEWDOS+. The block move command relocates a section of text to any other area. The global change command permits, for example, changing a label throughout the text. The pagination feature provides hardcopy on 8 1/2 by 11 pages on either single sheets or continuous paper. In addition, high memory can be reserved, like in BASIC, for machine language routines like printer drivers. You can also display the amount of memory remaining.

The <CLEAR> key is functional, the symbol table is sorted alphanumerically and output 5-across, the scroll up/down allows 15 lines on the screen, and the 'DEFM' assembly is improved. Lower case input is now permitted and you can branch to any address. Plus, it also corrects the errors in the Radio Shack tape version. \$19.95

Also available for \$229.95 for the TRS-80 Model II is a similar Editor Assembler from Galactic Software. Write for a complete list of Model II software.

## DISASSEMBLER

by Roy Soltoff from Misosys & Acorn

This two-pass Z-80 disassembler produces symbolic labels with output to either the video monitor, printer or tape. Radio Shack's Editor/Assembler can load the tapes. If you own the Editor/Assembler, complete the package with this program. Program on tape for two different memory locations. Cassette version NOW only \$14.95

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MAPPER II is like MAPPER I, but is installed in the expansion interface. When the expansion interface is opened, the OMIKRON instructions clearly show where the DISK CONTROLLER chip is located. This chip is removed; MAPPER II inserted; the disk controller chip placed on the MAPPER II; two "pinch" connections; pull the other end of the connector through the opening where the interface cable is connected, close the expansion interface, connect the MAPPER connection wire, connect the interface cable and you are READY to connect the disk drives.

In the system I purchased, I requested OMIKRON to designate drives A and B to be mini drives and drives C and D to be 8 inch drives. OMIKRON will sell the hardware (which I found out long ago that it's best to buy from the guy who makes the product) or will sell the boards alone. The configuration I purchased was the MAPPER boards and TWO 8" SHUGART drives in a two drive enclosure. The enclosure allows for the mini drives to be placed on top of the 8 inch drives and makes for a surprisingly beautiful configuration. This system sells for \$1800.00, but, to me, is worth far more in convenience. Connecting the drives is as simple as making the connections.

Now, we are ready to run the modified MODEL I TRS-80. On power up the screen displays:

```
OMIKRON
C= CP/M
T= TRS80 —
```

Inserting the CP/M disk provided by OMIKRON in drive A, I depress the letter C and CP/M boots up with the sign-on:

```
OMIKRON CP/M VER 1.4
48K MEMORY
A>
```

This indicates that a 48K version of CP/M is up and running and waiting for the next command.

The CP/M disk is delivered configured to your specified memory size and drive configuration. Additional memory size or drive configurations are optionally priced at \$10.00 and CP/M version 2.0 is available for an additional \$100.00. Mini drives are not required for this modification, a system of four 8 inch drives can be ordered. OMIKRON recommends that an immediate backup be made through the use of OMCOPY.COM. This is invoked by the command "OMCOPY ALL". The selection of "A" as source disk and "B" as destination disk sets up the screen to read:

```
SOURCE ON A:
DESTINATION ON B:
PRESS 5 for 35 track, 0 for 40 track
```

I press 0 (I have MPI 40 track mini drives) and the copy process proceeds.

OMIKRON has provided several utilities to help the customer. These are:

1. SETUP.COM This allows for customer selection of the following options:

A. Permits a deleted character to be echoed to the screen instead of being removed. This is for certain word processors and programs that were written for CP/M which does not delete the character.

B. Incorporates automatic line feeds with carriage returns. This is, again, not in the regular CP/M version and is required by some software packages - especially machine language programs.

C. Provides for lower case screen printing on units that have this modification already installed. A reprint of

an article in COMPUTRONICS and 80-U.S. JOURNAL provided all the details for this modification (which cost less than \$20.) and documentation for this modification is provided free from OMIKRON.

D. By enabling the lower case, the graphic characters of the unit are also enabled and are used in the same manner as LEVEL II.

E. Allows for printers that do not have form feed control to utilize the form feed character in the same manner as DISK BASIC allows. This is by keeping an internal counter of lines used and sending out line feeds to equal the value for the size page being used.

2. LFORMAT.COM This formats the 8" disk. All disks must be formatted prior to use in any program.

3. MFORMAT.COM This formats the 5 1/4" disk. All disks must be formatted prior to use in any program.

4. SERIAL.COM If the customer has installed the Radio Shack RS232 board, this program reads the switch setting of the board, prints the setting on the screen and sets all printer output to the RS232 board for serial printers. This utility allows for two types of printers to be in use, one for fast copy and one for letter quality. Pretty nice feature.

5. XDIR.COM This is the XDIR utility from the CP/M users library modified to read both size disks and show the number of sectors allocated to each program and shows the number of extensions a large file has in the directory. This prints a directory in three columns across the screen.

6. MEMTEST This is one of the most extensive memory tests I have ever used. The minimum time (unless a defective chip is discovered) is 15 minutes for each bank of 16K. In this time frame, MEMTEST will not only write patterns to the memory chips but will check the relationship and interaction of the memory locations next to each location. This program has found a chip that all other memory tests did not find (one that was not consistent in its malfunction but would ruin data and programs without me ever knowing why). This utility alone, can save someone some pulled hairs and frustration.

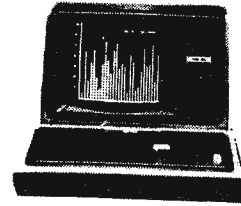
It should be mentioned that OMIKRON is NOT connected or part of another firm operating in Berkeley that claims to have a system such as OMIKRON'S. OMIKRON is manufacturer of its own design boards and has no connection with the other firm. In almost a year I have been told by the other firm that they are shipping their units, yet I cannot get the name or phone number of anyone or any dealer that has been able to run their system. Several dealers for the other firm that I spoke with have partial shipments but have not been able to run the system. The other firm requires that the order be paid in advance - prior to delivery. If I had done this when they were taking orders they would have been holding my money for nearly a FULL YEAR and I would not have the system running. California does have provisions in law for a refund if delivery is not effected within six weeks, but this would not have provided the system, and this is what I set out to obtain - not a refund. I find that I am not ready to do business with such a firm. OMIKRON accepted my order on a C.O.D. Basis, was less expensive, and far more interested in me - the customer.

I now have my OMIKRON modified TRS-80 MODEL I working. Due to the data separator that is on MAPPER II and is used even in the TRSDOS mode, I have eliminated my disk I/O errors and have found the disk work much,





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much easier and smoother. I have modified WORDSTAR from MICROPRO to operate on this system and have just completed modification to WORDMASTER to work as a replacement for CP/M's ED.COM to allow full screen editing without the printing features of WORDSTAR. I have been able to run the Osborne accounting systems in addition to other software programs that I have written. Conversion was not difficult. My company has its own business accounting software and, due to this modification, have markets in THREE areas - (1) TRS-80 and (2) CP/M "normal" for both 8" and 5 1/4" drives and (3) TRS-80 CP/M such as sold by FMG Corporation and LIFEBOAT Associates. This CP/M is NOT compatible with the "normal" programs on the market and can only work with machine language programs modified to work above the ROM in the Radio Shack unit. I have found that the disks formatted by my system are readable by a MODEL II that is using CP/M 2.0. An additional utility program now released by OMIKRON is a program to take any program off a TRSDOS formatted disk and transfer to a CP/M disk. This program, alone, will open more utility to MODEL I owners.

I have been very pleased with the smooth flow from the beginning of my quest for the OMIKRON system. I was told that a system could take 6 weeks from receipt of order but I got delivery in three. (OMIKRON told me that any delay is in delivery of the disk drives - familiar ring to that comment, isn't there?). Installation was very easy, instructions written in a manner that a non-hardware guy like me could understand, and phone backup for ANY problems I had, which were simply software conversion related. My problems with that "other" firm have been

noted above. OMIKRON's utilization of the graphics of the TRS-80 and the addressable cursor shows that OMIKRON's heart is in the right place. The customer of the Radio Shack TRS-80 MODEL I does not, willingly, give up his graphics or screen addressing; so with the OMIKRON the customer has the best of *both* worlds - FULL CP/M capability *and* Graphics. If you have done any shopping, you would know that a system this capable would be very costly, indeed. I know of no other computer on the market that provides the capability of using *three different* operating systems or using *both* mini and 8 inch drives AT THE SAME TIME! With the CP/M PIP.COM Program, programs can be transferred from Mini to 8 inch and vice-versa. If such a system does exist, I am certain that the cost would be in excess of twice the total cost of the modified TRS-80.

APPARAT, INC of Colorado, Designers of NEWDOS and NEWDOS+ have been advertising that they plan to produce SUPERDOS to allow TRSDOS compatible operation with this disk configuration. APPARAT will have more about that on their own. The only "downer" I have with the OMIKRON is that NEWDOS or TRSDOS does not allow use of the 8 inch drives, leaving you with only two mini drives until SUPERDOS comes out. OMIKRON intends to produce a patch for NEWDOS that will provide 195K storage on the 8 inch drives while the advertised SUPERDOS will provide 295K. OMIKRON plans to have the "patch" for NEWDOS available by the middle of February, 1980.

There's the Great news that *yes*, Radio Shack Mod I owners, *there is a way to get into the BIG TIME* - With OMIKRON'S MAPPER I and MAPPER II.

The Tenth in a Series on Machine Language Applications.

## SYSTEM/COMMAND

by Phil Pilgrim

Phil's Guest Editor this issue is:

Robert Labenski, West Hartford, CT

---

"Make 'AUTO' what it should be...and have a MULTI-Command capability as well!"

---

This program is for Model I DOS Systems

Most of us are pretty excited when we first bring home our disk drive. Dreams of infinite flexibility, ease, speed and reliability dance in our heads. There are great plans to set up simple procedures to assist the rest of our family to easily use the system and get as much joy from it as we do. The first plans I had was to use the "AUTO" command to do just as the name implies.

The "AUTO" command of TRSDOS has a great deal of potential for making start-up procedures (boot) simple for beginners. The disappointment is that it is just potential, since it is only good for a single command.

Well, don't despair. Here is a simple program which extends this ability to as many commands as you can cram into 32 characters including multiple "ENTERS".

The program is based on the design of the "AUTO" command which already exists. First the "AUTO" command will store on disk 32 characters of data you key in. Second, the data contained in the command is presented to DOS as if it had been keyed in by the operator. This means any program written to execute via the command has access to the full line at location X'4318 (see the supplementary info of the technical info section of the TRSDOS manual, page 6-11). Combining these two design features of TRSDOS you have the ability to write a program which if executed via the "AUTO" command can have all its parameters passed to it automatically.

Referring to the program listing, these functions can be done in less than 164 bytes. The program functions as follows:

Lines 100-240 is where the setup occurs. The data parameters entered along with the "AUTO" command are saved. The address in the keyboard Device Control Block are saved to be restored later. By saving these fields

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the "Fixes" for keyboard debounce will be restored and DOS 2.2 will perform as advertised. Control then returns to DOS.

Note that the keyboard has been seized by this program. Any attempt to key in data will be totally ignored until the end of the execution of MULTI.

Lines 250-380 now will be executed every time TRSDOS looks for input from the keyboard. It should be noted this occurs at times when you would least expect it. Because of this, a check had to be added to look at the screen to see if any "Prompts" were outstanding requiring a reply. To do this I added code to check for a cursor only, a question mark or the Basic prompt. If none of these are present control is returned to TRSDOS.

The rest of the program simply returns the parameters passed by "AUTO" one character at a time. When the terminating character [ENTER] key is reached, the saved data for the Device Control Block is restored and whatever program which is executing now has control of the keyboard.

Any restrictions? Yes, - whatever program or programs you load or execute should never overlay MULTI or you will lose the keyboard forever, or at least until you reload TRSDOS. This has never happened to me since I located the program 4K lower than the top of my memory, while allowing 28K for TRSDOS and Basic below it. This allows Basic to load any program and begin it's initiation in high memory before "MULTI" ends.

Any other benefits? Sure, - "MULTI" can also be used directly to execute multiple commands with a single entry. Simply follow the syntax omitting the "AUTO". Hence the name "MULTI" for multiple.

There is some additional information which you tinkers will find of interest about this program. It can be made to provide a single command to enter multiple for you with a few simple modifications. By removing statements 200-230 (the instructions which retrieve the data stored with "Auto") and placing your command sequence in the area labeled "TXT" (following the syntax rules) "MULTI" can become a vehicle to provide any predetermined procedures you need.

#### "MULTI" SYNTAX INSTRUCTIONS

The rules for use are quite simple. If you want to simulate the enter key, use the colon (:), and to end the sequence simply press the enter key. For example, to automatically execute a Basic program on power up, enter the auto command as follows:

AUTO MULTI BASIC:::RUN"STARTREK/BAS (press enter key here)

Each entry functions as follows:

MULTI - execute the MULTI program

BASIC - cause Basic to be executed

: - simulate the enter key for the Basic entry

: - Answer how many files with an enter (may be preceded with the number you really need)

: - Answer the memory size question with enter (may be preceded by any value you wish to have reserved)

RUN"STARTREK/BAS - enters the command for Basic to run our selected program (if your Basic program does not overlay MULTI you can even enter a few parameters the program needs to get initialized)

(ENTER) - simulate the enter key for the "RUN" request to terminate the command sequence.

I hope this simple utility will provide the convenience and simplicity for using TRSDOS as it has for me ●

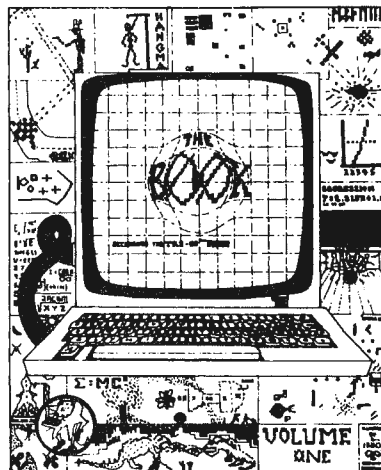
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A fully commented listing provides the details on the step-by-step execution of these ROM routines. Although a complete disassembly is not provided in order to avoid copyright infringement, you can obtain a complete disassembly using the disassembler program listed in "THE BOOK." Volume I also includes a complete, detailed memory map of the entire machine and a symbol table noting over 500 addresses.

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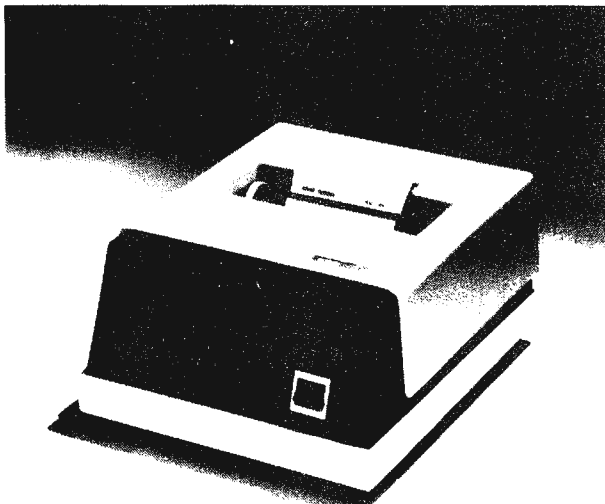
00010 ; (> MULTI <<
00020 ; -- A PROGRAM TO EXTEND THE AUTO COMMAND
00030 ; AND PROVIDE A MEANS OF ENTERING MULTIPLE
00040 ; COMMANDS WITH A SINGLE STATEMENT
00050 ;
00060 ; WRITTEN FOR THE FAMILY AND FRIENDS OF
00070 ; ROBERT LABENSKI
00080 ; WEST HARTFORD, CONN 06119
00090 ;PGM TO INPUT TXT FOR SET UP
402D 00100 RETURN EQU 402DH
4318 00110 MSG EQU 4318H
F000 00120 ORG 0F000H ;0B00H FOR 32K
00130 ;SET UP INITIAL LINKAGE
F000 2A1640 00140 START LD HL,(4016H) ;SAVE
F003 2252F0 00150 LD (END+1),HL ;RETURN ADDRESS
F006 2238F0 00160 LD (NOREP+1),HL ;SET NO REPLY EXIT
F009 211DF0 00170 LD HL,BEGIN ;SET
F00C 221640 00180 LD (4016H),HL ;LINKAGE
F00F 211843 00190 LD HL,MSG
F012 014000 00200 LD BC,64
F015 1163F0 00210 LD DE,TXT
F018 EDB0 00220 LDIR ;SAVE TEXT FOR REPLY
F01A C32D40 00230 JP RETURN ;LINKAGE ESTABLISHED
00240 ;EST LINKAGE FOR MSG RETURN
F01D 2A2040 00250 BEGIN LD HL,(4020H) ;GET CURSOR ADDRESS
F020 3236F0 00260 LD (SAVE+1),A ;SAVE ACCUM
F023 3E5F 00270 LD A,5FH ;CHECK FOR CURSOR
F025 EDA9 00280 CPD
F027 2811 00290 JR Z,OK
F029 3E3E 00300 LD A,3EH ;CHECK FOR <
F02B EDA9 00310 CPD
F02D 280B 00320 JR Z,OK
F02F 3E3F 00330 LD A,3FH ;CHECK FOR QUESTION MARK
F031 EDA9 00340 CPD
F033 2805 00350 JR Z,OK
F035 3E00 00360 SAVE LD A,00H ;NO
F037 C337F0 00370 NOREP JP NOREP ;RETURN WITHOUT CHANGE
F03A 2140F0 00380 OK LD HL,REPLY
F03D 221640 00390 LD (4016H),HL ;SET LINKAGE FOR REPLY
F040 2168F0 00400 REPLY LD HL,TXT+5 ;GET REPLY
F043 23 00410 INC HL
F044 2241F0 00420 LD (REPLY+1),HL ;SAVE NEXT START
F047 7E 00430 LD A,(HL) ;GET NEXT CHARACTER
F048 FE3A 00440 CP 3AH ;IS IT A : FOR CR?
F04A 280E 00450 JR Z,CR ;YES
F04C FE0D 00460 CP 0DH ;IS IT ENTER FOR END
F04E 2801 00470 JR Z,END
F050 C9 00480 RET ;DON'T END YET GIVE BACK THE CHARACTER
F051 210000 00490 END LD HL,0 ;RESET ORG
F054 221640 00500 LD (4016H),HL ;LINKAGE
F057 3E0D 00510 LD A,0DH ;SET CR
F059 C9 00520 RET ;END REPLY
F05A 211DF0 00530 CR LD HL,BEGIN ;RESET TO WAIT FOR
F05D 221640 00540 LD (4016H),HL ;PROMPT
F060 3E0D 00550 LD A,0DH ;SET CR
F062 C9 00560 RET ;END THIS SEGMENT
0040 00570 TXT DEFS 64
F0A3 0D 00580 DEFB 0DH ;MAKE SURE WE END
F000 00590 END START
00000 TOTAL ERRORS
BEGIN F01D 00250 00170 00530
CR F05A 00530 00450
END F051 00490 00150 00470
MSG 4318 00110 00190
NOREP F037 00370 00160 00370
OK F03A 00380 00290 00320 00350
REPLY F040 00400 00380 00420
RETURN 402D 00100 00230
SAVE F035 00360 00260
START F000 00140 00590
TXT F063 00570 00210 00400

```









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# DRILL PERIOD

T R Dettmann, Kirkland, WA

Our ANATOMY is on this program, see page 54.

The program "DRILL PERIOD" is designed to be a memory improvement device which works by forcing you to drill on short words or phrases. The program remembers your mistakes and after a particular word has come up at least five times, it will come up more or less often depending on your answers.

Questions you fail to answer correctly will come up more often than those you get right every time so that you will be forced to drill more on those questions you don't know well. After a target percentage of correct answers is reached in each question, you will automatically be shown your score.

You may stop the drill at any time and see your score by typing ".STOP" (the period at the beginning is important to the program). You can also have the correct answer displayed by typing ".HELP", but be careful, asking for ".HELP" counts as a wrong answer!

To use the program, first select option 1 to create a drill. The program will ask for a drill name. This will be used to identify the drill on tape later. Then it will ask for the questions and the correct responses. When you are done, type "END" and you will be returned to the menu. A maximum of 40 questions and answers may be input. Depending on your memory availability, you may not get all 40 in before you run out of memory.

Before using the drill, it is best to save it on tape. The program uses a standard format which stores the drill name and number of questions at the beginning of a tape file. When you call in a file later, you may indicate a specific drill, in which case the program will search for it. Or, you can choose the default name (hit[ENTER]) and the next drill on tape will be loaded.

When you are ready with a new drill, or one you have loaded, select 4 to commence the drill session. After some basic instructions, the program will ask if you want the questions and answers mixed? Answer Y or N. If you answer Y, then you will be given the questions sometimes and the answers others. You must give the correct answer (or question).

GOOD LUCK!

```

10 REM*****
20 REM
30 REM DRILL PERIOD
40 REM VERSION 1.0 11/26/79
50 REM TERRY R. DETTMANN
60 REM
70 REM*****
80 CLEAR 2*MEM/3:DEFINT A-Z:MX=50:DIM A$(MX,2),ANS(MX,3):CMD" T"
90 STAR$=STRING$(63,42):S1$=STRING$(31,42):
 F1$=" ### WRONG OUT OF ### ":
 F2$=" SCORE: ###% ":
 F3$="%"+STRING$(28,32)+"% "+STRING$(28,32)+"%"
100 F4$="QUESTION ### OF ###"
110 TITLE$="DRILL PERIOD":GOSUB500
120 PRINT:PRINT
130 PRINTTAB(10)"1. ENTER OR EDIT A DRILL"
140 PRINTTAB(10)"2. SAVE A DRILL TO TAPE"
150 PRINTTAB(10)"3. INPUT A DRILL FROM TAPE"
160 PRINTTAB(10)"4. RUN A DRILL"
170 PRINT@896,"SELECTION: ";:GOSUB420
180 IF(C(1)OR(C)4)THENPRINT@896,STRING$(60,32):GOTO170
190 ON C GOSUB 1000,2000,2500,3000
200 GOTO110
210 END
300 REM - - - - - SCORING - - - - -
310 W=0:R=0
320 FORI=1TON:W=W+ANS(I,1):R=R+ANS(I,2):NEXTI
330 SC=(R/(R+W))*100+.5
340 RETURN
350 REM - - - - - INKEY$ ROUTINE - - - - -
360 IN$=""
370 C$=INKEY$:IFC$=""THEN370
380 IFASC(C$)=13THENRETURN
 ELSEIFASC(C$)=8THEN410
390 IFASC(C$)<32ORASC(C$)>127THEN370
400 IN$=IN$+C$:PRINTC$:GOTO370
410 IFLEN(IN$)<1THEN370ELSEIN$=LEFT$(IN$,LEN(IN$)-1):PRINTC$:
 GOTO370
420 REM - - - - - SINGLE KEY NUMBER INPUT - - - - -
430 C$=INKEY$:IFC$=""THEN430ELSEC=VAL(C$):PRINTC$:RETURN
440 REM - - - - - SKIP A TAPE FILE - - - - -
450 FLAG=0
460 FORI=1TON:INPUT#-1,Z1$,Z2$
470 IFINKEY$="Q"THENFLAG=1:RETURN
480 NEXTI
490 RETURN
500 REM - - - - - HEADING TYPE I - - - - -
510 CLS:PRINTSTAR$:CHR$(13):TAB(20)TITLE$:CHR$(13):STAR$
 :STRING$(2,13):RETURN
520 REM - - - - - HEADING TYPE II - - - - -
530 CLS:PRINTCHR$(23):S1$:CHR$(13):TAB(10)TITLE$:CHR$(13):S1$:
 STRING$(2,13):RETURN
540 REM - - - - - SINGLE KEY Y/N - - - - -
550 C$=INKEY$:IF(C$="N")OR(C$="Y")THENPRINTC$:RETURNELSE550
560 REM - - - - - CASSETTE READY? - - - - -
570 GOSUB500
580 PRINT"CHECK YOUR RECORDER"
590 PRINTTAB(5)"IS THE VOLUME CONTROL CORRECT?"
600 PRINTTAB(5)"IS IT PLUGGED IN?"
610 PRINTTAB(5)"IS THE TAPE POSITIONED CORRECTLY?"

```

```

620 PRINTTAB(5)"ARE THE RIGHT CONTROL KEYS PRESSED?"
630 PRINT@896,"PRESS ANY KEY WHEN THE ANSWER TO ALL THE QUESTIO
NS IS YES"
640 IFINKEY$=""THEN640ELSEReturn
650 REM - - - - - SELECT QUESTION - - - - -
660 I=RND(N):IF(ANS(I,1)+ANS(I,2))<=5THEN680
670 IF(RND(150)/100)<(ANS(I,1)/ANS(I,2))THEN660
680 IF(MIX=1)THENJ1=RND(2):J2=INT((1/J1)+1)ELSEJ1=1:J2=2
690 RETURN
700 REM - - - - - DELAY LOOP - - - - -
710 FORTM=1TO300:NEXTTM:RETURN
720 REM - - - - - INITIALIZE THE ANSWERS - - - - -
730 CR=0:FORI=1TON:ANS(I,1)=1:ANS(I,2)=1:NEXTI:RETURN
740 REM - - - - - PREPARE FOR SCORES - - - - -
750 FORI=1TON:ANS(I,1)=ANS(I,1)-1:ANS(I,2)=ANS(I,2)-1:NEXTI
:RETURN
1000 REM - - - - - ENTER OR EDIT A DRILL - - - - -
1010 TITLE$="ENTER OR EDIT":GOSUB500
:IFH$()""THENPRINT"THE CURRENT TITLE IS: ";H$
1020 PRINTTAB(5)"TITLE FOR THE EXERCISE: ";:GOSUB350:A$=IN$
1030 IFA$()""THENH$=A$
1040 FORI=1TOMX
1050 GOSUB500
1060 PRINTTAB(5)"PRESS ENTER TO KEEP THE SAME KEYWORD"
1070 PRINTTAB(5)"OR RESPONSE":PRINT:PRINT
1080 A$="":IFA$(I,1)()""THENPRINT"PRESENT KEYWORD IS: ";A$(I,1)
1090 PRINT"ENTER KEYWORD FOR DRILL OR END: ";:GOSUB350:A$=IN$
:PRINT
1100 IFA$()""THENA$(I,1)=A$
1110 IFA$(I,1)="END"THEN1160
1120 A$="":IFA$(I,2)()""THENPRINT"PRESENT RESPONSE IS: ";A$(I,2)
1130 PRINT"ENTER CORRECT RESPONSE: ";:GOSUB350:A$=IN$:PRINT
1140 IFA$()""THENA$(I,2)=A$
1150 NEXTI
1160 IFA$(I,1)="END"THENI=I-1
1170 N=I:RETURN
2000 REM - - - - - SAVE A DRILL TO TAPE - - - - -
2010 TITLE$="SAVE TO TAPE":GOSUB560:GOSUB500
2020 PRINT#-1,CHR$(34)+H$+CHR$(34);", ";N
:PRINT"TITLE: ";H$;" QUESTIONS: ";N
2030 FORI=1TON
2040 PRINT#-1,CHR$(34);A$(I,1);CHR$(34);", ";CHR$(34);A$(I,2);
CHR$(34):PRINTUSINGF3$;A$(I,1);A$(I,2)
2050 NEXTI
2060 GOSUB700:RETURN
2500 REM - - - - - INPUT A DRILL FROM TAPE - - - - -
2510 TITLE$="INPUT A DRILL":GOSUB500
2520 PRINTTAB(5)"ENTER THE TITLE OF THE DRILL YOU WANT"
2530 PRINTTAB(5)"AND THE PROGRAM WILL SEARCH FOR IT"
2540 PRINTTAB(5)"IF YOU JUST WANT THE NEXT DRILL ON TAPE"
2550 PRINTTAB(5)"THEN JUST PRESS ENTER"
2560 PRINT:PRINTTAB(5)"TITLE: ";:GOSUB350:A$=IN$
:PRINT:PRINTTAB(5)"A TAPE READ CAN BE ABORTED BY PRESSING"
:PRINTTAB(5)"'Q' WHILE SKIPPING A FILE":GOSUB700:GOSUB700
2570 GOSUB560:GOSUB500
2580 INPUT#-1,H$,N:PRINT"TITLE: ";H$;" QUESTIONS: ";N
2590 IF(A$()""")THEN IFA$()H$THEN
GOSUB440:IFFLAG=0THEN2580ELSEReturn
2600 PRINT"FILE ";H$;" FOUND"
2610 FORI=1TON:INPUT#-1,A$(I,1),A$(I,2)
:PRINT@896,USINGF4$;I,N:NEXTI
2620 RETURN
3000 REM - - - - - RUN DRILL - - - - -
3010 TITLE$="DRILL PERIOD":GOSUB500:GOSUB720
3020 PRINTTAB(5)"DURING THE DRILL PERIOD, YOU WILL BE SHOWN"
3030 PRINTTAB(5)"A WORD OR PHRASE FROM THE DRILL FILE AT"
3040 PRINTTAB(5)"RANDOM. YOU SHOULD GIVE THE CORRECT ANSWER,"
3050 PRINTTAB(5)"BUT IF YOU CAN'T, YOU CAN ASK FOR HELP BY"
3060 PRINTTAB(5)"ANSWERING '.HELP'. THE PERIOD IS IMPORTANT!"
3070 PRINTTAB(5)"(BEWARE - ASKING FOR HELP COUNTS AS A WRONG AN
SWER)"
3080 PRINTTAB(5)"IF YOU WANT TO END THE DRILL, ANSWER '.STOP'"
3090 PRINTTAB(5)"AND YOUR SCORE WILL BE SHOWN."
3100 PRINT@896,"PRESS ANY KEY TO CONTINUE";
3110 IFINKEY$=""THEN3110
3120 GOSUB500
3130 PRINTTAB(5)"YOU CAN HAVE THE PROGRAM ASK ONLY THE"
3140 PRINTTAB(5)"QUESTIONS, OR YOU CAN HAVE IT MIX QUESTIONS"
3150 PRINTTAB(5)"AND ANSWERS.":PRINT:PRINT
3160 PRINTTAB(5)"DO YOU WANT THE DRILL TO MIX QUESTIONS AND"
3170 PRINTTAB(5)"ANSWERS (Y/N)? ";:GOSUB540
3180 IFC$="Y"THENMIX=1ELSEMIX=0
3190 TITLE$=H$
3200 GOSUB650:GOSUB520
3210 PRINT"WHAT IS: ";A$(I,J1);" ?"
3220 PRINT:GOSUB350:A$=IN$:PRINT
3230 IF(A$=".HELP")THENPRINT"THE ANSWER IS: ";A$(I,J2)
:ANS(I,1)=ANS(I,1)+1:GOSUB700:GOTO3200
3240 IF(A$=".STOP")THEN3280
3250 IF(A$=A$(I,J2))THENPRINT:PRINT"THAT IS CORRECT"
:ANS(I,2)=ANS(I,2)+1:GOSUB700:GOTO3260
ELSEPRINT:PRINT"NOT CORRECT":ANS(I,1)=ANS(I,1)+1:GOSUB700
:GOTO3200
3260 IF((ANS(I,1)/(ANS(I,1)+ANS(I,2)))<(0.3)
AND((ANS(I,1)+ANS(I,2)))>5)
AND(ANS(I,3)()1)THENCN=CN+1:ANS(I,3)=1
3270 IFCR)=NTHEN3280ELSE3200
3280 REM - - - - - DISPLAY RESULTS - - - - -
3290 TITLE$="SCORE BOARD":GOSUB500:GOSUB740:GOSUB300
3300 PRINTTAB(5)USINGF1$;W;R+W
3310 PRINT:PRINTTAB(5)USINGF2$;SC
3320 PRINT:PRINT"DO YOU WANT TO SEE A COMPLETE BREAKDOWN (Y/N)?"
":GOSUB540
3330 IFC$="N"THENRETURN
3340 FORI=1TON
3350 GOSUB500
3360 PRINTTAB(5)"PROMPT: ";A$(I,1)
3370 PRINTTAB(5)"REPLY: ";A$(I,2)
3380 PRINT:PRINT:PRINTTAB(5)USINGF1$;ANS(I,1);ANS(I,1)+ANS(I,2)
3390 IF(ANS(I,1)+ANS(I,2))=0THEN3420
3400 SC=(ANS(I,2)/(ANS(I,1)+ANS(I,2)))*100+0.5
3410 PRINTTAB(5)USINGF2$;SC
3420 PRINT@896,"PRESS ANY KEY TO CONTINUE";
3430 IFINKEY$=""THEN3430
3440 NEXTI
3450 RETURN

```

---

# ANATOMY of the Program (Drill Period)

R C Bahn

## I. SUMMARY

This is a computer-aided instruction (CAI) application. This interactive program enables the user to enter, edit and run a drill. Files of individual drills are maintained on cassette tapes.

The program demonstrates particularly well: The use of subroutines, dimensioned string and integer variables, the INKEY\$ statement, and the organization of tape files. The interactive displays illustrate numerous mechanisms for formatting the video screen and organizing the keyboard input.

## II. PROGRAM ORGANIZATION

The program can be divided into nineteen subdivisions

or modules. Module #1 initializes the program. Module #2 is the main or driver program and functions as the master traffic director. The remaining sixteen modules are subroutines, each of which are called by the GOSUB statement to perform specific tasks. Upon completion of the task the subroutine returns ultimately to the driver program.

Subroutines allow one to divide a program into a series of small independent tasks which may be developed and debugged independently. When properly constructed the number of GOTO statements is minimized. To facilitate clarity ideally there should be only one entrance and one exit from a subroutine.

## III VARIABLE USAGE

| VARIABLE NAME | FUNCTION                                                                                                                                                                                                                                                                                                        |
|---------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| A             | Used to define range of integers in line 80.                                                                                                                                                                                                                                                                    |
| A\$           | A string variable which functions as the string currently needed for processing; appears in lines 1020, 1030, 1080, 1090, 1100, 1120, 1130, 1140, 2560, 2590, 3220, 3230, 3240, 3250.                                                                                                                           |
| A\$(MX,2)     | A two dimensional string variable in which is stored questions (A\$(MX,1)) and answers (A\$(MX,2)); appears in lines 80, 1080, 1110, 1120, 1140, 1160, 2040, 2610, 3210, 3230, 3250, 3360, 3370.                                                                                                                |
| ANS(MX,3)     | A two demensional interger array. ANS(MX,1) stores the number of incorrect responses. ANS(MX,2) stores the number of correct responses. ANS(MX,3) is the completed response flag and assumes values of zero or one. The array appears in lines 80, 320, 660, 670, 730, 750, 3230, 3250, 3260, 3380, 3390, 3400. |
| C             | The value of C\$ acquired in line 430 and tested in lines 180 and 190.                                                                                                                                                                                                                                          |
| C\$           | The keyboard input single key variable. Appears in lines 370, 380, 390, 400, 410, 430, 550, 3180, 3330.                                                                                                                                                                                                         |
| CR            | Correct answer counter, used in 730, 3260, 3270.                                                                                                                                                                                                                                                                |
| F1\$          | Format for PRINT USING statement. Appears in lines 90, 3300, 3380.                                                                                                                                                                                                                                              |
| F2\$          | Format for PRINT USING statement. Appears in lines 90, 3310, 3410.                                                                                                                                                                                                                                              |
| F3\$          | Format for PRINT USING statement. Appears in lines 90, 2040.                                                                                                                                                                                                                                                    |
| F4\$          | Format for PRINT USING statement. Appears in lines 100, 2610.                                                                                                                                                                                                                                                   |
| FLAG          | Tape handling flag. Assumes value of zero or one. Appears in lines 450, 470, 2590.                                                                                                                                                                                                                              |
| H\$           | String variable used for title of drill. Appears in lines 1010, 1030, 2020, 2580, 2590, 2600, 3190.                                                                                                                                                                                                             |
| I             | General index for loops and subscripts. Appears in lines 320, 460, 480, 660, 670, 730, 750, 1040, 1080, 1100, 1110, 1120, 1140, 1150, 1160, 1170, 2030, 2040, 2050, 2610, 3210, 3230, 3250, 3260, 3340, 3360, 3370, 3380, 3390, 3400, 3440.                                                                     |
| IN\$          | The concatenated keyboard input string variable. Used in lines 360, 400, 410, 1020, 1090, 1130, 2560, 3220.                                                                                                                                                                                                     |
| J1            | Question flag; assumes value of 1 or 2; appears in lines 680, 3210.                                                                                                                                                                                                                                             |
| J2            | Answer flag; assumes value of 1 or 2; appears in lines 680, 3230, 3250.                                                                                                                                                                                                                                         |
| MIX           | Mixture flag; assumes values of 0 or 1; appears in lines 680, 3180.                                                                                                                                                                                                                                             |
| MX            | Maximum dimensioned number of questions and answers; appears in lines 80, 1040.                                                                                                                                                                                                                                 |



|         |                                                                                                                                                |
|---------|------------------------------------------------------------------------------------------------------------------------------------------------|
| N       | Actual number of questions in drill; defined in line 1170; appears in lines 320, 460, 660, 730, 750, 1170, 2020, 2030, 2580, 2610, 3270, 3340. |
| R       | Number of right answers; appears in lines 310, 320, 330, 3300.                                                                                 |
| S1\$    | Output string defined in line 90 and used in line 530.                                                                                         |
| SC      | The final score in percent. Computed in line 330 and used in lines 3310, 3400, 3410.                                                           |
| STAR\$  | Output string defined in line 90 and used in line 570.                                                                                         |
| TITLE\$ | Output string for title of displays. Appears in lines 110, 510, 530, 1010, 2010, 2510, 3010, 3190, 3290.                                       |
| TM      | Index of timer loop in line 710.                                                                                                               |
| W       | Number of wrong answers; appears in lines 310, 320, 330, 3300.                                                                                 |
| Z       | Used to define range of integers in line 80.                                                                                                   |
| Z1\$    | Dummy variable for tape read in line 460.                                                                                                      |
| Z2\$    | Dummy variable for tape read in line 460.                                                                                                      |

#### IV LINE BY LINE COMMENTARY

| LINE    | COMMENT                                                                                                                                                                                                                                                                                                                                                                                   |
|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 10-100  | Module #1, initialization.                                                                                                                                                                                                                                                                                                                                                                |
| 10-70   | REM statements are ignored in the execution of a program but are listed. This is an excellent example of simple graphic titling of a program.                                                                                                                                                                                                                                             |
| 80:1    | Clear variable space of core and reserve a region for string variables equivalent to 2/3 of available memory.                                                                                                                                                                                                                                                                             |
| 80:2    | Define as integers all variables beginning with the letters A through Z.                                                                                                                                                                                                                                                                                                                  |
| 80:3    | Set MX, the maximum number of questions, equal to 50. This number may be changed. In executing the program the actual number of questions should be one less than MX.                                                                                                                                                                                                                     |
| 80:4    | Dimension A\$(MX,3); see list of variables.                                                                                                                                                                                                                                                                                                                                               |
| 80:5    | BASIC II users should delete CMD"T." In DISK BASIC this statement turns clock "OFF."                                                                                                                                                                                                                                                                                                      |
| 90-100  | Define string variables to be used later in program. Note use of STRING\$ statement in lines 90:1, 90:2, 90:5. See line 100 for use of #.                                                                                                                                                                                                                                                 |
| 90:1    | STAR\$ is composed of 63 characters all of which are "*" (ASCII character 42).                                                                                                                                                                                                                                                                                                            |
| 90:5    | F3\$ is formed by concatenating (adding) five smaller string variables.                                                                                                                                                                                                                                                                                                                   |
| 100     | F4\$ is a format which will be used later in a PRINT USING statement. The "#" designates the placement of integers. F4\$ used in line 2610. See list of variables.                                                                                                                                                                                                                        |
| 110-210 | Module #2, the program driver.                                                                                                                                                                                                                                                                                                                                                            |
| 110:2   | Call subroutine at line 500 and then return to this program.                                                                                                                                                                                                                                                                                                                              |
| 120     | Skip two lines.                                                                                                                                                                                                                                                                                                                                                                           |
| 130-160 | Skip 10 spaces from left margin and print indicated message.                                                                                                                                                                                                                                                                                                                              |
| 170:1   | Print message at screen position number 896. The entire screen has 1024 positions (128*48) numbered serially beginning with zero. The zero position is in the upper left corner of the screen.                                                                                                                                                                                            |
| 170:2   | Call subroutine at line 420. The variable C is found.                                                                                                                                                                                                                                                                                                                                     |
| 180     | If C is outside the range of 1-4 the program returns to line 170.                                                                                                                                                                                                                                                                                                                         |
| 190     | Calls subroutines at lines 1000, 2000, 3000, 4000 depending on the value of C.                                                                                                                                                                                                                                                                                                            |
| 200     | Upon return from one of the major subroutines go to the beginning of the module.                                                                                                                                                                                                                                                                                                          |
| 210     | Safety termination of the program.                                                                                                                                                                                                                                                                                                                                                        |
| 300-340 | Module #3, the scoring subroutine.                                                                                                                                                                                                                                                                                                                                                        |
| 310     | Initialize W and R. See list of variables.                                                                                                                                                                                                                                                                                                                                                |
| 320     | This is a loop composed of 4 statements. In 320:1 the program counts from 1 to N, the number of questions. In 320:2 and 320:3 W and R are each increased by the values stored in ANS(I,1) and ANS(I,2) respectively. The loop ends at statement 320:4. When the loop is completed, R and W will indicate the total number of correct and incorrect responses.                             |
| 330     | The final score (SC) is the number of correct responses (R) divided by the total number of responses (R+W), multiplied by 100. Note the placement of parenthesis. These determine the sequence of arithmetic operations and are very important. SC is an integer. It is rounded by adding .5. The fractional (decimal) portion of this computation however will be discarded (truncated). |
| 340     | RETURN is the required termination of a subroutine.                                                                                                                                                                                                                                                                                                                                       |
| 350-410 | Module #4, the INKEY\$ subroutine. This subroutine is used to acquire alpha-numeric characters from the keyboard. Each character is collected as C\$ and added (concatenated) to form the string, IN\$. An example of the use of this subroutine can be found in line 1020 where the title of the exercise is acquired.                                                                   |
| 360     | Initialize IN\$ as the "null" string. There is no space between the double quote marks.                                                                                                                                                                                                                                                                                                   |
| 370     | C\$ is the current keyboard entry. If no key is depressed C\$ will be the "null" string. The program is instructed to continue the keyboard scan.                                                                                                                                                                                                                                         |
| 380     | The subroutine is terminated when the ENTER key is depressed (ASCII character 13); otherwise if a screen erasure occurs by use of left arrow (ASCII character 8) go to 410.                                                                                                                                                                                                               |
| 390     | If ASCII character is less than 32 or greater than 127, go to 370. This statement ignores all characters except the alphabet.                                                                                                                                                                                                                                                             |
| 400     | If a valid alphabetical character is entered concatenate C\$ with IN\$ and return to line 370.                                                                                                                                                                                                                                                                                            |
| 410     | This is an ingenious statement to allow the user to erase mistakes on the screen. IN\$ is corrected to correspond to screen editing and reprinted. The deleted character is removed by the LEFT\$ statement and the length of IN\$ is reduced by one.                                                                                                                                     |
| 420-430 | Module #5, single key numeric subroutine. The usual INKEY\$ routine is set up. The value of C\$ is stored in C.                                                                                                                                                                                                                                                                           |

440-490 Module #6, the skip tape file subroutine.  
450 Initialize FLAG. If FLAG=1 program flow is altered in line 2590.  
460 The tape file is read by the INPUT#-1 statement but Z1\$ and Z2\$ are dummy variables.  
470 "Q" is the signal to abort tape read. See line 2560.  
500-510 Module #7, the heading type I subroutine.  
510 Note that expressions within the line are separated by semicolons. This indicates that no space should separate individual expressions.

520-530 Module #8, the heading type II subroutine.  
540-550 Module #19, the single key Y/N subroutine.  
550 Note use of "N" and "Y". No other entry except "N" or "Y" is accepted. C\$ is tested in line 3180.  
560-640 Module #9, the Cassette Ready subroutine.  
640 The appropriate messages have been printed on the video screen. Any keyboard entry will return program to lines 2010 or 2510.

650-690 Module #10, the select question subroutine.  
660:1 A random number is selected in the range 1-N.  
660:2 If the total number of responses is greater is less than or equal to 5 then I is selected.  
670 If the number of responses is greater than 5 but the number of incorrect responses is too great the question is repeated.

680:1 If questions and answers are to be mixed (MIX=1) then J1 is set at random to 1 or 2.  
680:2 If J1=1 then J2 becomes 2 vice versa. The INT statement truncates  $\frac{1}{2}+1$  to 1 but preserves  $1+1=2$ .  
680:3,4 If MIX=0 then J1=1 and J2=2.

700-710 Module #11, the delay loop subroutine.  
710 Simple loop runs for 300 iterations and returns. Used in lines 3230 and 3250.  
720-730 Module #12, the initialization of answers subroutine.  
730 It is good practice to make sure that the initial values of all variables are precisely the values you expect. Failure to properly initialize variables is a common programming error which may not become apparent until the results of a computation are examined. Used in line 3010.

740-750 Module #13, the prepare for scores subroutine.  
750 Since ANS(I,1) and ANS(I,2) were initialized for convenience at +1, this amount must be subtracted in order to compute scores. Used in line 3290.

1000-1170 Module +14, the enter or edit a drill subroutine.  
1010:1 Define TITLE\$.  
1010:2 Print type I heading (GOSUB500).  
1010:3 If a title is already known and stored in \$H, then print the title.  
1020:1,2 If there is no current title, acquire it in the subroutine at line 350.  
1030 If title of exercise was just acquired and is stored in \$A then transfer it to \$H.  
1040 Set up loop over the range of MX.  
1050-1070 Print type I header (GOSUB500) and messages.  
1080:1 Initialize A\$ to null string ("").  
1080:2-3 If a keyword is present in A\$(I,1), print it.  
1090 If there is no keyword or the keyword is to be changed, call subroutine at line 350. Note in line 380 that the "ENTER" key returns the program to line 1090:4 where the acquired information is placed in A\$.

1100 If new material is present in A\$, transfer it to A\$(I,1). Note that A\$ and A\$(I,J) are different variables.  
1110 If A\$(I,1) is the "end" signal, prepare to exit at line 1160.  
1120-1140 Acquire A\$(I,2) in a similar manner.  
1150 Terminate loop.  
1160 Decrease number of stored questions in A\$(I,1) by 1. This in effect deletes the "end" message.  
1170 Store the current number of questions in N and return.

2000-2060 Module +15, the save a drill to tape subroutine.  
2010 Define TITLE\$, print cassette messages and type 1 heading.  
2020 This is probably the most important statement in the subroutine. PRINT+-1, is the write-to-tape statement. The information which follows constitutes the tape label. Tape labels are essential for the orderly operation of a computer and for the interchange of data and programs. The TRS-80 has standard tape labels for BASIC and SYSTEM programs. You should adopt a standard method of labelling your own data tapes. The label in this program consists of a concatenation string containing the name of the drill followed by the number of questions (N).  
2020:1 The quotation marks (ASCII character 34) are necessary so that when reading the taped title, the program will recognize the data as a string variable.

2030 Set up loop to write to tape N questions and answers.  
2040:1 Write questions and answers to tape.  
2040:2 Print questions and answers on video screen using format F3\$. (See line 90:4).  
2060 Call the delay subroutine to allow time for final computer book-keeping and switching and return.

2500-2620 Module #16, the input a drill from tape subroutine.  
2500-2550 Print instructions.  
2560-2570 Print additional directions and call subroutines.  
2580 Read tape label from tape and print the contents (H\$,N) on the screen.  
2590:1,2 This is a nested IF statement to check if title of tape (H\$) is the same as the one stored in A\$. Note that the desired title was acquired as IN\$ in line 2560:3 (GOSUB350) and transferred to A\$ in line 2560:4.  
2590:3 If the titles do not match, skip the e GOSUB440).  
2590:4 If FLAG=0 continue

2600 If A\$=H\$ the program will "fall through" the logic statements (2590) and the file name will be printed.  
 2610 Set up loop to read N questions and answers; read them and for each, print at screen position 896, I and N embedded in format F4\$. See line 100. Note carefully all punctuations!!

3000-3270 Module #17, the run drill subroutine.  
 3000-3110 Print instructions and hold screen at end of first page.  
 3120-3190 Continue directions, test for mix option (3170-3180).  
 3200:1 Select a question (GOSUB650).  
 3200: Print question.  
 2-3210

3220 Obtain response by calling INKEY\$ subroutine (GOSUB350).  
 3230 Test for .HELP message, respond and continue drill.  
 3240 Test for .STOP message and respond by branch to next module (GOTO3280).  
 3250 Test for correct or incorrect answer, update records in ANS(I,J) and continue drill. Delays (GOSUB700) were used in lines 3230 and 3250 to allow user to completely scan the screen.  
 3260 If the answer was correct a check made to determine whether a sufficient number of questions have been asked and answered correctly.  
 3270 If sufficient numbers of questions have been asked the program branches to line 3280, otherwise the drill continues.

3280-3450 Module #18, the display results module. This is not a true subroutine but a continuation of module #17. Linkage with module #17 is established in line 3240 or line 3270.

3290-3310 Print results. W, R and SC were computed in module #3 (GOSUB300).  
 3320 Print option for complete breakdown and call single Y/N subroutine (GOSUB540).  
 3350 Return to beginning of program if C\$="N".  
 3340 Set up loop.  
 3350-3440 For each question print prompt, reply, and results of drill.  
 3430 Hold screen until any key is depressed.  
 3450 Return to driver module. To have arrived at line 3450 the user must have entered a "4" from the keyboard at line 170 via GOSUB420. In line 190, the program branched to line 3000. The program progressed to either line 3240 or line 3270 where upon the flow continued to line 3280. RETURN from the subroutine subsequent to line 3280, occurs either at line 3330 or line 3450.



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## A LOOK AT LIGHT PENS by T R Dettmann

What use is a light pen?? That's a question we have asked ourselves for some time. Finally, we've had a chance to see how they operate, and our answer is still the same question, what use is a light pen???

The expectation from many people is that a light pen will let them do complicated drawings like they've seen on TV commercials for the big auto makers. They expect that by hooking up a light pen, they can design complicated screen displays or control displays, or answer menu requests, etc. Well, can they? More often than not, the answer is not as efficiently as with the keyboard.

Light pens for the TRS80 fall into one group, they connect to the tape recorder at the input connection with a small battery and they send a signal to the input port on the system if they see a light patch. Seems pretty straight forward doesn't it? Well, it's just too simple.

High resolution graphics terminals with light pens, the kind you see FORD and GM designing cars with cost thousand of dollars for the terminal and require a room size computer to run them. The TRS80 can't compete with that kind of power. The graphics definition on the screen is too low, and

the Rube Goldberg connection lacks the necessary capability to do really fine work.

So what can it do? Is it worth buying one? The answer to the second question is "Decide for yourself based on the answer to the first."

### So what CAN a light pen do?

After having given all of the bad points for the crop of light pens available, let me say before any of the makers come hunting for me that they aren't all bad. If your expectations are not at the level of high resolution graphics or design, then you may find that a light pen is an interesting novelty to impress your friends and neighbors with.

Micro-Matrix (P.O. Box 938, Pacifica, CA 94404) kindly gave us a light pen to try and Quality Software provided some software that uses the Micro-Matrix light pen. We had the following games to play:

TIC-TAC-TOE  
WORD SAMPLER  
LOWBALL POKER  
POKER PETE  
SKETCH 80

Each of the games were fun to play and the light pen added something unique to them that made them fun for show.

## LIGHT PATCHES

The light pen can only sense that it has seen a bright area or a dark area. In order to identify a particular selection on the screen, it is necessary to flash a small graphics block on the screen in each appropriate place until the light pen senses the patch and the program takes its appropriate branch.

Because of this, only one patch can be lit up at a time, and to be sure the game proceeds smoothly, the patches have to move rapidly from one to another patch location. This isn't so bad but it places a premium on contrast.

Sketch 80 becomes even more frustrating since the patch has to revolve around the last pen location looking for movement of the pen. If it loses it, the program moves on to scanning the whole screen until it locates the pen. It's easy to outrun the computer with the light pen since the program just can't go fast enough.

### Is it worth having?

Not if you plan to do really serious work with it. Some of the suggested uses for menu selection and so forth can be done far more quickly and reliably with standard techniques.

If your plans are to use it just for fun and showing off, then this could be just the thing to impress your friends with. In looking for games to play, Quality Software had the largest selection of games for light pens. Each worked without difficulty when we loaded them and drew admiration from people who tried them.

---

## RACET UTILITIES PACKAGE

Racet Computes, 702 Palmdale, Orange, CA 92665

By now, most of us are familiar with the great utilities provided by Appar in the NEWDOS+ package. Oh, but if only we could get them for the Model III!

But hark! What light shines from the west? It is Racet Computes to the rescue. These knights in shining armor have taken the most popular and most frequently used of the NEWDOS+ programs and implemented them on the Model II for us! These fantastic programs work just like their Model I counterparts, so we don't have to learn new coding or wierd symbolism. It's just like never having left the old, familiar Model I.

Here is a listing of the programs, along with a short description of what each one does:

**DIS2:** Machine language disassembler. Provides source-like listing from memory or disk. Has options to allow hardcopy, and a complete listing of all references to memory addresses encountered within the program. Disassemble the TRSDOS, BASIC, or any of the programs lurking about on your TRSDOS disk. Maybe you will be the one to find out what they are up to!

**SZAP2:** Machine language routine to allow DIRECT access to the disk. Examine and modify Directory entries, delete passwords, change programs or data on the disk without TRSDOS ever having to know. This is the machine language version of the Model I's SUPERZAP. The directory entries on the Model II are remarkably similar to those on the Model I, so it will take no time at all before you are in there, restoring killed programs, fixing HIT entries and generally playing around just like the pros.

**EDT:** Model II EDITOR/ASSEMBLER. Just like the Radio Shack EDTASM, but with disk I/O. Save source and object to disk, without having to learn a whole new assembler.

**PLIST & LLIST:** Print any ASCII file (such as an uploaded PENCIL file) to the printer or screen. This will give you a READABLE output (not like the TRSDOS 'Print'). Use this to read the /COM files included on the disk that tells you how to use it.

All this is on an 8" disk for \$100. Also, Racet has made their very popular GSF package available for the Model II. GSF is a machine language sorting routines designed to be used with Basic's USR command. You simply tell it what you want sorted and how, and it does it. This has become the standard against which Model I sort routines are measured, and is available for \$50.00.

J Crocker

## BUSINESS SOFTWARE

### FROM COMPUTER SYSTEMS DESIGN INC FOR MODEL I AND MODEL II

#### OPEN ITEM ACCOUNTS RECEIVABLE \$240.00

Edit - flags customer number errors, gives correction option. Sales Distribution - Distributes each department total. Customer Journal - Lists each invoice for each customer. Statements - Pre-printed or blank statements may be used.

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Edit - Flags vendor number errors, gives correction option. Cash Requirements (Journal) - Lists all payable vendors. Suspended Journal (Unpaid Journal) - Lists unpaid vendors. General Ledger Distribution - Distributes General Ledger totals. Check Register - You just key the first check number. Checks - Check stub includes information on invoice date, gross and discount amounts. Complete with check protection and aged payables.

#### PAYROLL \$240.00

Edit - Flags employee number errors, gives correction option. Journal - Year-to-date totals for gross, W/H, FICA and vacation. Deduction Summary - Totals of individual deductions. Deduction Register - By employee deduction type. Check Register - Check stub includes year-to-date information for employee W-2 forms. 941 Quarterly Reports - Federal \$, State \$, FICA \$, Quarter \$, Hours.

#### GENERAL LEDGER (interactive with A/P) \$240.00

Edit - Flags account number errors, gives correction option. Summary Ledger - Month's debits and credits. General Ledger - Complete detail list. Income statement - Up to four levels of totals. Balance Sheet - 1 or 2 page control, print control. Department Statements - Maximum of 99 departments. Schedules - Supporting lists of any detail accounts. Input Sheet - Working trial balance.

### FROM GALACTIC SOFTWARE LTD

#### MAIL/FILE SYSTEM for Model I \$99.00

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## GAMES SOFTWARE

### NEW!

#### @119 REPEAT AFTER ME by James Talley \$9.95

Challenge your memory with this unique new game! Based on the games "Simon" and "Einstein", this new game has superb animation and SOUND. Five levels of difficulty make this game for all ages.

#### #118 CAT2/XFR by Don Fielding \$24.95

A disk directory program that will read and organize your directories on an index disk. Available on disk only, with documentation, requires 32K 2 drives and NEWDOS.

#### #107 Owl Tree by James Talley \$9.95

Can you fill the Owl tree with Owls by shooting out the Bats? Easy? Careful, when you shoot a bat it scares away owls! With animated graphics and Sound.

#### #109 The Great Race by Scott Carpenter \$9.95

Try to finish this 600 mile race before your opponents, or before they stop you with flats, wrecks etc. The computer plays too. With sound.

#### #111 Lying Chimps by Roy Groth \$9.95

The old game of "I doubt it" or "Liar", only you play with four cheating chimps. Animated graphics and sound.

#### #113 Concentration by Richard Taylor \$9.95

The game of concentration. Prizes change places every game. With excellent sound effects!

#### #110 Scramble by Richard Taylor \$9.95

A word game for two players. Use your words or the computers words. With sound and an excellent scoring routine.

#### #103 Snake Eggs by Leo Christopherson \$14.95

This version of 21 has talking snakes who argue with each other. Try to avoid scrambled eggs, they lose!

#### #108 TRS-80 Opera by Richard Taylor \$9.95

A sound extravaganza! Hear the William Tell overture in intricate detail and clear sound. Contains four other operatic selections.

#### #112 Challenge by Richard Taylor \$9.95

Guess the hidden phrase, but if you guess vowels wrong you lose 10 points. With sound, for 2 players, use your own phrases or the computers.

#### #106 Beewary by Leo Christopherson \$14.95

Brilliant graphics and fantastic sound enhance this challenging game matching a persistent bee with a cunning spider in a duel to the death!

#### #104 Lifetwo by Leo Christopherson \$14.95

Conway's game of Life at an astounding 100 generations per minute! Plus Leo's "talking" animated creatures playing the Battle of Life in one 16K L2 program.

#### #105 Cubes by Leo Christopherson \$9.95

Gives the solution to "Instant Insanity" or numbered blocks. Watch the computer try all the possible combinations.

#### #102 Android Nim by Leo Christopherson \$14.95

The TRS-80's first animated, and most popular, graphics game with sound.

All game software except CAT1/XFR is on 16K L2 cassette. Orders filled within week of receipt and sent postpaid, first class. Any malfunctioning program will be replaced free - no cash refunds. BEEWARY will not function properly when placed on disk using DOS 2.2 or 2.3. It will work with 2.0, 2.1 or NEWDOS.

*Dealer Inquires Invited*

# RANGER

**Rudolf M Salinger, Midland, MI**

In this program, you are in charge of a half-million acres of forest. If you accept that job, you have to keep it under control from the 1st of August through Labor Day. You have some good people working for you, but one or two like to stop for a beer when you send them out. Keep your eye on the weather, and watch who you send out on trouble calls! Good luck....

```

10 CLEAR 150:CLS:RANDOM:PRINT"FOREST RANGER":PRINT:PRINT"BY RUD
 OLF M. SALINGER":PRINT
20 PRINT"COPYRIGHT 1979":FOR N=1 TO 500:NEXT N:CLS
30 PRINT"WELCOME TO THE CRESCENT RANGER DISTRICT!
 TODAY IS AUGUST 1.
 YOUR ASSIGNMENT IS TO MANAGE THE CRESCENT RANGER DISTRICT
 UNTIL LABOR DAY (SEPT. 5).
 FOREST FIRES WILL PROBABLY BE YOUR BIGGEST PROBLEM."
40 PRINT"YOU ARE ALSO RESPONSIBLE FOR SEVERAL RECREATIONAL AREA
 S.
"
50 INPUT"PRESS ENTER TO GO ON":Z:CLS:PRINT"YOUR HEADQUARTERS IS
 EQUIPPED WITH A PHONE AND A RADIO.
 YOU HAVE A CREW OF 18 PEOPLE (BESIDES YOURSELF).
 THERE ARE 4 MEDIUM TRUCKS, EACH WITH A RADIO.
 THERE ARE 6 LOOKOUT TOWERS, EACH WITH A RADIO.
60 PRINT"THE DISTRICT HAS 500,000 ACRES OF PONDEROSA PINE FORES
 T.
 YOU WILL GET A STATUS REPORT AND A WEATHER REPORT EACH DAY.
 YOU CAN ESTIMATE FIRE DANGER FROM THE WEATHER REPORT.
 PRESS ENTER TO GO ON":INPUTZ:CLS
70 DEFINT B-Z:DEFNSG N:DIM W(42):A$="AUGUST":T$="FULL":AC=50000
 Q:D=6
80 W(D-4)=2+W(D-3)=2+W(D-2)=2+W(D-1)=2:W=10
85 PRINT"REMEMBER THAT THERE IS ALSO AN OLD VOLCANO, MOUNT ST.
 HELENS, NEARBY WHICH THREATENS TO GO ACTIVE AT ANY TIME.
 IT IS RUMBLING AND SMOKING."
90 PRINT"HOW MANY OF THE SIX LOOKOUT TOWERS DO YOU WANT TO MAN,
 REMEMBER THAT LOOKOUTS STAY IN THEIR TOWERS ALL SUMMER AND
 CAN'T BE USED TO FIGHT FIRES, ETC.":INPUTT:IFT>6CLS:PRINT"
 THERE ARE ONLY 6 TOWERS!
" :GOTO90
100 IF D>36 A$="SEPTEMBER"
110 IF D>36 THEN DA=D-36 ELSE DA=D-5
120 RE=0:GOTO 240
130 IF D=41 GOTO 3100
140 CLS:PRINT"DAILY STATUS REPORT: ";A$:" ";DA:PRINT:PRINT"LEFT
 AT BASE:" :PRINT" MEN: ";18-K-M1-M2-T-H:PRINT" TRUCKS: ";4
 -T1-T2-B
150 PRINT:PRINT"ACRES OF TIMBER LEFT: ";USING"###,###";AC-A
160 IF F1=0 AND F2=0PRINT "NO FIRES BURNING TODAY":PRINT:PRINT:
 GOTO 320
170 PRINT@512,"FIRE NO. ":PRINT@576,"DAY":PRINT@640,"MEN":PRINT@
 704,"TRUCKS"
180 IF F1=0 GOTO 210
190 PRINT@523,"1":PRINT@586,D1:PRINT@650,M1:PRINT@714,T1
200 IF F2=0 GOTO 320
210 PRINT@533,"2":PRINT@596,D2:PRINT@660,M2:PRINT@724,T2:
220 PRINT@ 832,""
230 GOTO 320
240 DH=D1
250 DC=DC+1:IF DC=3 THEN DC=0:GOTO 130
260 ON W-4 GOTO 270,270,280,280,290,290,300,300,300,300,300
270 A=A+200*DH+3:GOTO 310
280 A=A+50*DH+3:GOTO 310
290 A=A+20*DH+3:GOTO 310
300 A=A+5*DH+3:GOTO 310
310 DH=D2:GOTO 250

```



```

320 INPUT"PRESS ENTER TO GO ON";Z
330 IF D1=5 THEN CLS:FF=1:GOTO 3310
340 IF D2=5 THEN CLS:FF=2:GOTO 3310
350 CLS:R=RND(8):IF R=8 THEN W(D)=5
360 IF R<6 THEN W(D)=1
370 IF R=6 OR R=7 THEN W(D)=2
380 W=W(D-4)+W(D-3)+W(D-2)+W(D-1)+W(D)
390 FOR N=0 TO 4:IF W(D-N)=1 THEN W$(N)="SUNNY"
400 IF W(D-N)=2 THEN W$(N)="CLOUDY"
410 IF W(D-N)=5 THEN W$(N)="RAIN"
420 NEXT N
430 PRINT "TODAY'S WEATHER: ";W$(0)
440 PRINT:PRINT"YESTERDAY","2 DAYS AGO","3 DAYS AGO","4 DAYS AGO"
450 PRINT W$(1),W$(2),W$(3),W$(4):IF W(D)=5 GOTO 470 ELSE GOTO 460
460 PRINT:INPUT "PRESS ENTER TO GO ON";Z:GOTO 550
470 PRINT:PRINT"IT IS RAINING HARD ENOUGH TO PUT OUT ANY FIRES.
":PRINT:IF F1=1 AND F2=2 GOTO 510
480 IF F1=1 OR F2=2 GOTO 490 ELSE GOTO 520
490 IF M1=0 AND M2=0 GOTO 530 ELSE GOTO 500
500 PRINT"THE FIRE IS NOW OUT- YOUR FIREFIGHTERS ARE COMING BACK TO
HEADQUARTERS.":GOTO 540
510 PRINT "BOTH FIRES ARE OUT- YOUR FIREFIGHTERS ARE COMING BACK TO
HEADQUARTERS.":GOTO 540
520 INPUT"NO FIRES IN THE DISTRICT TODAY. PRESS ENTER TO SEE WHAT YOUR
PEOPLE ARE UP TO";Z:GOTO 2130
530 PRINT "THE FIRE IS NOW OUT.":GOTO 540
540 F1=0:F2=0:D1=0:D2=0:M1=0:M2=0:T1=0:T2=0:D=D+1:PRINT:PRINT:INPUT"PRESS ENTER TO GO ON";Z:GOTO 100
550 CLS:IF W(D)=5 GOTO 2130
560 R=RND(6):IF RE=1 R=RND(5)
570 ON R GOTO 1320,1620,1980,2130,2180,580
580 P=D:RE=1
590 IF P<5 GOTO 610
600 P=P-5:GOTO 590
610 P$(0)="DIAMOND LAKE":P$(1)="ODELL LAKE":P$(2)="DAVIS LAKE":P$(3)="CRESCENT LAKE":P$(4)="WICKIUP RESERVOIR"
620 P$=P$(P)
630 PRINT "PHONE IS RINGING":FOR N=1 TO 300:NEXT N
640 CLS:PRINT "REPORT OF TROUBLE AT ";P$:".":PRINT
650 R=RND(8)
660 ON R GOTO 710,720,730,740,750,760,770,780
670 IF Q1=2 GOTO 680 ELSE 890
680 CLS:PRINT"HARRY MISSED A TURN SOMEWHERE."
690 PRINT:PRINT"PLEASE RADIO INSTRUCTIONS ON HOW TO GET TO ";P$;" AGAIN."
700 PRINT:INPUT"WHEN DONE GIVING DIRECTIONS, PRESS ENTER";Z:GOTO 890
710 PRINT "THERE IS A CHILD LOST.":GOTO 790
720 PRINT "THERE IS A FIGHT GOING ON.":GOTO 790
730 PRINT "THE CAMPGROUND IS FULL -- LOOKS LIKE A RIOT STARTING AT THE
ENTRANCE STATION.":GOTO 790
740 PRINT "A BEAR WAS SPOTTED IN THE CAMPGROUND.":GOTO 790
750 PRINT "A BOAT IS IN TROUBLE.":GOTO 790
760 PRINT "A CAMPFIRE IS GETTING OUT OF CONTROL.":GOTO 790
770 PRINT "THEY HUNG UP WITHOUT SAYING WHAT'S WRONG!":GOTO 790
780 PRINT "THERE WAS AN AUTO ACCIDENT.":GOTO 790

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790 GOTO 1180
800 CLS:PRINT "THAT'S NOT MUCH HELP!":PRINT:INPUT "PRESS ENTER TO CONTINUE";Z
810 NO=NO+1:IF R=6 CLS:GOTO 1320
820 GOTO 550
830 IF (4-B-T1-T2)=0 GOTO 860
840 PRINT:PRINT"THESE ARE NO TRUCKS LEFT AT HEADQUARTERS.":FOR N=1 TO 300:NEXT N
850 PRINT:PRINTR$;" WILL HAVE TO TAKE YOUR CAR TO GET TO ";P$;".":FOR N=1 TO 300: NEXT N
860 PRINT:PRINTR$;" IS ON THE WAY TO ";P$;" NOW."
870 PRINT:INPUT"PRESS ENTER TO CONTINUE";Z
880 CLS:IF R$="HARRY" Q1=RND(3):GOTO 670
890 CLS:PRINT:ON R GOTO 900,920,930,950,970,1010,1040,1090
900 PRINTR$;" ORGANIZED A SEARCH PARTY AT ";P$
910 PRINT:PRINT"THEY FOUND THE CHILD ALRIGHT.":GOTO 1110
920 PRINTR$;" BROKE UP THE FIGHT.":GOTO 1110
930 PRINT R$;" OPENED UP AN OVERFLOW AREA IN AN OPEN FIELD."
940 PRINT:PRINT"THAT WILL QUIET THINGS DOWN FOR A WHILE.":GOTO 1110
950 PRINTR$;" CHASED THE BEAR AWAY."
960 PRINT:PRINT"IT IS QUIET AT ";P$;" FOR A WHILE.":GOTO 1110
970 Q2=RND(2):IF Q2=1 GOTO 990
980 PRINT"SOMEONE ALREADY WENT TO HELP.":GOTO 1110
990 PRINT"THE BOAT CAPSIZED.":PRINT:PRINT"LUCKILY THE OCCUPANTS WERE ALL WEARING LIFE JACKETS."
1000 PRINT:PRINTR$;" HELPED GET THEM ASHORE.":GOTO 1110
1010 PRINT"GOOD THING YOU SENT SOMEONE."
1020 PRINT:PRINT"IF ";R$;" HADN'T GONE IT COULD HAVE BECOME A REAL"
1030 PRINT" FOREST FIRE.":GOTO 1110
1040 Q3=RND(3):ON Q3 GOTO 1050,1060,1070
1050 PRINT"IT TURNED OUT THERE WAS NOTHING WRONG.":GOTO 1110
1060 PRINT"THERE WAS A SMALL FIRE AT ";P$;".":PRINT:GOTO 1010
1070 PRINT"SOMEONE SAW SMOKE IN THE WOODS BUT IT WAS ONLY"
1080 PRINT"A CAMPFIRE.":GOTO 1110
1090 PRINT"NO ONE WAS SERIOUSLY HURT."
1100 PRINT:PRINTR$;" TOOK CARE OF EVERYTHING.":GOTO 1110
1110 PRINT:INPUT "PRESS ENTER TO CONTINUE";Z
1120 CLS:PRINT R$;" IS RETURNING FROM ";P$;". "
1130 IF R$="MARV" GOTO 1140 ELSE 1160
1140 FOR N=1 TO 500:NEXT N:PRINT:PRINT"MARV STOPPED AT THE CREST CAFE FOR A BEER.":FOR N=1 TO 500:NEXT N
1150 PRINT:PRINT"HE'LL BE A LITTLE LATE."
1160 PRINT:IF R$="ELLEN" INPUT "PRESS ENTER WHEN SHE ARRIVES";Z:GOTO 550
1170 PRINT:INPUT "PRESS ENTER WHEN HE GETS HERE";Z:GOTO 550
1180 P=18-T-K-H-M1-M2:IF P>6 P=6
1190 IF (18-T-K-H-M1-M2)=0 PRINT:PRINT"TOO BAD THERE'S NOBODY LEFT TO SEND.":PRINT:NO=NO+1:INPUT"PRESS ENTER TO CONTINUE";Z:GOTO 550
1200 R$(1)="ELLEN":R$(2)="MARV":R$(3)="HARRY":R$(4)="JIM":R$(5)="BILLY":R$(6)="BRIAN"
1210 PRINT:PRINT"WHOM DO YOU WANT TO SEND:"
1220 FOR N=1 TO P:PRINT R$(N):PRINT", ";:NEXT N:PRINT"OR NOBODY";
1230 INPUT R$
1240 IF R$="NOBODY" GOTO 800

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1250 FOR N=1 TO P
1260 IF R#=R$(N) GOTO 830
1270 NEXT N
1280 GOTO 1210
1290 IF F2=2 GOTO 2420
1300 IF F1=1 GOTO 2750
1310 D=D+1:GOTO 100
1320 IF F2=2 GOTO 2420
1330 PRINT"PHONE IS RINGING":P=RND(5):FOR N=1 TO 500:NEXT N
1340 L$(1)="CENTER":L$(2)="NORTH END":L$(3)="SOUTH END":L$(4)="
EAST SIDE":L$(5)="WEST SIDE"
1350 PRINT"THERE IS A FIRE IN THE ";L$(P);" OF THE DISTRICT!"
1360 PRINT:IF F1=0 GOTO 1500
1370 INPUT "HOW MANY MEN DO YOU WANT TO SEND OUT":M2
1380 IF (4-B-T1)=0 THEN 1390 ELSE 1410
1390 PRINT:PRINT"SORRY, YOU HAVE NO TRUCKS TO TAKE THEM!"
1400 F2=2:D2=2:PRINT:GOTO 1590
1410 IF M2=0 THEN F2=2:D2=2:GOTO 2750
1420 IF (18-K-T-H-M1-M2)<0 GOTO 1440
1430 T2=1:D2=2:F2=2:GOTO 1470
1440 PRINT:PRINT"YOU DON'T HAVE THAT MANY!":GOTO 1370
1450 T2=1:D2=2:F2=2
1460 GOTO 1580
1470 PRINT:PRINT"THE CREW IS ON ITS WAY NOW!"
1480 PRINT:PRINT:INPUT "PRESS ENTER TO GO ON":Z
1490 GOTO 2750
1500 INPUT "HOW MANY MEN DO YOU WANT TO SEND OUT":M1
1510 IF (4-B-T2)=0 GOTO 1570
1520 IF M1=0 GOTO 1560
1530 IF (18-K-T-H-M1-M2)<0 GOTO 1550
1540 D1=2:T1=1:F1=1:GOTO 1580
1550 PRINT:PRINT"YOU DON'T HAVE THAT MANY MEN!":GOTO 1500
1560 D1=2:F1=1:GOTO 1590
1570 PRINT:PRINT"SORRY, THERE ARE NO TRUCKS LEFT!":F1=1:D1=2:GO
TO 1590
1580 PRINT:PRINT:PRINT:PRINT"YOUR CREW IS ON THE WAY NOW!"
1590 PRINT:PRINT:PRINT:INPUT"PRESS ENTER TO GO ON":Z
1600 IF F2=2 THEN D1=1:GOTO 2420
1610 D=D+1:GOTO 100
1620 IF E1=1 AND E2=2 AND E3=1 GOTO 550
1630 E=RND(3):CLS:PRINT
1640 ON E GOTO 1650,1770,1860
1650 IF E1=1 GOTO 1620
1660 E1=1
1670 PRINT"FOREST SERVICE SPOTTER PLANE FLEW OVER YOUR AREA.":P
RINT
1680 FOR N=1 TO 500:NEXT N
1690 IF F1=1 OR F2=2 GOTO 1760
1700 R=RND(2):IF R=1 GOTO 1720
1710 PRINT"PLANE REPORTS FIRE HAS BEEN OBSERVED!":FOR N=1 TO 50
0:NEXT N:PRINT:GOTO 1500
1720 PRINT"NO FIRES WERE OBSERVED.":FOR N=1 TO 500:NEXT N
1730 PRINT:PRINT"THIS IS A GOOD CHANCE TO CATCH UP ON YOUR PAPER
WORK.":PRINT
1740 INPUT "PRESS ENTER WHEN DONE WITH PAPERWORK":Z
1750 D=D+1:GOTO 100
1760 PRINT"TOO MUCH SMOKE IN THE WAY TO SEE ANYTHING MEANINGFUL
":FOR N=1 TO 500:NEXT N:GOTO 550

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2220 KE=1:KF=1:CLS:PRINT"THE VOLCANO, MT ST. HELENS HAS ERUPTED
":PRINT:PRINT"WHICH IS ENDANGERING THE CRESCENT DISTRICT!":P
RINT:PRINT"THEY ARE IN DESPERATE NEED OF MANPOWER TO CONTAIN
THE FIRE!":PRINT
2230 INPUT "CAN YOU SEND THEM A FIVE-MAN CREW":D$
2240 IF LEFT$(D$,1)="Y" GOTO 2310
2250 IF LEFT$(D$,1)="N" GOTO 2270
2260 GOTO 2230
2270 R=RND(2):PRINT:IF R=1 GOTO 2290
2280 PRINT"TOO BAD....":PRINT:PRINT"THE FIRE IS SPREADING...":G
OTO 3590
2290 PRINT"LET'S HOPE THEY CAN GET HELP FROM SOMEWHERE ELSE!"
2300 FOR N=1 TO 500:NEXT N:HE=1:GOTO 550
2310 IF (18-T-H-M1-M2)<5 GOTO 2410
2320 PRINT:PRINT"A CONVOY WILL BE ALONG TO PICK THEM UP IN ABOU
T AN HOUR.":K=5
2330 PRINT:INPUT "PRESS ENTER WHEN THE CONVOY ARRIVES":Z:GOTO 2
350
2340 PRINT:INPUT"PRESS ENTER TO GO ON":Z
2350 IF F2=2 GOTO 2420
2360 IF F1=1 GOTO 2750 ELSE D=D+1:GOTO 100
2370 IF RP=1 OR HE=1 GOTO 550
2380 RP=1:CLS:PRINT
2390 PRINT"FIRE AT ST. HELENES IS OUT. YOUR CREW WILL BE BACK T
ONIGHT.":K=0
2400 PRINT:INPUT"PRESS ENTER TO GO ON":Z:D=D+1:GOTO 100
2410 PRINT:PRINT"BETTER COUNT AGAIN...":GOTO 2230
2420 IF D2=5 THEN FF=2:GOTO 3310
2430 CLS:PRINT"FIRE NO. 2 IS NOW IN DAY ":D2
2440 PRINT"YOU HAVE ";M2;" MEN AND ";T2;" TRUCK(S) THERE"
2450 ON W-4 GOTO 2460,2460,2500,2500,2540,2540,2580,2580,2
580,2580,2580
2460 IF D2=2 AND M2>8 GOTO 2730
2470 IF D2=3 AND M2>13 GOTO 2730
2480 IF D2=4 FF=2:GOTO 3310
2490 GOTO 2620
2500 IF D2=2 AND M2>7 GOTO 2730
2510 IF D2=3 AND M2>11 GOTO 2730
2520 IF D2=4 AND M2>15 GOTO 2730
2530 GOTO 2620
2540 IF D2=2 AND M2>5 GOTO 2730
2550 IF D2=3 AND M2>8 GOTO 2730
2560 IF D2=4 AND M2>12 GOTO 2730
2570 GOTO 2620
2580 IF D2=2 AND M2>2 GOTO 2730
2590 IF D2=3 AND M2>4 GOTO 2730
2600 IF D2=4 AND M2>7 GOTO 2730
2610 GOTO 2620
2620 PRINT"THIS FIRE IS STILL BURNING.":PRINT"THERE ARE ";18-M1
-M2-K-T-H;" MEN LEFT AT HEADQUARTERS.":IF 18-M1-M2-T-H-K=0 T
HEN 2720
2630 D$="":INPUT "DO YOU WANT TO SEND MORE MEN":D$
2640 IF LEFT$(D$,1)="N" GOTO 2720
2650 IF LEFT$(D$,1)="Y" GOTO 2660 ELSE GOTO 2630
2660 INPUT "HOW MANY":M4
2670 IF M4=0 GOTO 2720
2680 IF M4) (18-K-T-H-M1-M2)PRINT"THEY AREN'T THAT MANY AT THE
BASE":GOTO 2660

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1770 IF E2=2 GOTO 1620
1780 IF D1<2 OR M1=0 GOTO 550
1790 E2=E2+1
1800 PRINT"ONE OF YOUR MEN AT FIRE NO. 1 IS INJURED":FOR N=1 TO
500:NEXT N:PRINT
1810 PRINT"HE WILL HAVE TO BE HOSPITALIZED":FOR N=1 TO 500:NEXT
N:PRINT:M1=M1-1:H=H+1
1820 PRINT"YOU NOW HAVE ";M1;" MEN AT FIRE NO. 1":PRINT
1830 INPUT"PRESS ENTER TO GO ON":Z
1840 IF F2=2 GOTO 2420
1850 GOTO 2750
1860 IF E3=1 GOTO 1620
1870 IF D1<2 OR T1=0 GOTO 550
1880 E3=1
1890 PRINT"SUDDEN WINDSHIFT AT FIRE NO.1":FOR N=1 TO 500:NEXT N
:PRINT
1900 PRINT"ONE OF YOUR TRUCKS WAS CAUGHT IN THE FIRE AND EXPLOD
ED"
1910 FOR N=1 TO 500:NEXT N:PRINT
1920 T1=T1-1:B=B+1
1930 IF T1=0 PRINT"YOU WILL HAVE TO ARRANGE TRANSPORTATION BACK
FOR YOUR CREW":GOTO 1950
1940 PRINT"YOU NOW HAVE ";T1;" TRUCK(S) AT FIRE NO. 1.":PRINT
1950 INPUT "PRESS ENTER TO GO ON":Z
1960 IF F2=2 GOTO 2420
1970 GOTO 2750
1980 CLS:IF F2=2 GOTO 550
1990 IF T=0 GOTO 1320
2000 P=RND(4):IF T)4 P=RND(2)
2010 IF P=2 GOTO 2090
2020 PRINT"NO NEW FIRES REPORTED FROM ANY OF YOUR ";T;" OCCUPIE
D TOWERS.":FOR N=1 TO 700:NEXT N
2030 IF P=3 GOTO 2060
2040 IF F1=1 GOTO 2750
2050 D=D+1:GOTO 100
2060 PRINT:PRINT:PRINT"BUT THERE WAS ONE THAT WASN'T SPOTTED!":
FOR N=1 TO 700:NEXT N
2070 IF F1=1 F2=2:D2=2:GOTO 2750
2080 F1=1:D1=2:D=D+1:GOTO 100
2090 P=RND(T)
2100 P$(1)="JOHN":P$(2)="ERNIE":P$(3)="SANDY":P$(4)="MARK":P$(5
)="LOUISE":P$(6)="JAY"
2110 PRINT"TOWER MANNED BY ";P$(P);" REPORTS A FIRE!"
2120 GOTO 1340
2130 CLS:PRINT:IF F2=0 AND F1=0 GOTO 2150
2140 GOTO 550
2150 G=RND(6):G$(1)="SHARPEN AXES":G$(2)="DO NOTHING":G$(3)="GO
SWIMMING":G$(4)="STUDY UP ON FIRE FIGHTING":G$(5)="SCOUT AR
OUND TOWN":G$(6)="FIX UP THE TRUCKS"
2160 PRINT"QUIET DAY TODAY.":PRINT"SOME OF THE CREW ARE USING T
HE DAY TO ";G$(G);".":PRINT:PRINT:INPUT"PRESS ENTER TO GO O
N":Z
2170 D=D+1:GOTO 100
2180 IF KF=0 AND KE=1 GOTO 550
2190 IF D<15 GOTO 550
2200 IF KF=1 GOTO 2370
2210 R=RND(5):ON R GOTO 550,550,550,2220,550

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2690 IF (B+T1+T2)3PRINT"HERE ARE NO TRUCKS TO TAKE THEM!":PRI
NT:PRINT:INPUT"PRESS ENTER TO GO ON":Z:GOTO 2660
2700 M2=M2+M4:T2=T2+1
2710 PRINT:PRINT"THEY ARE ON THEIR WAY!":PRINT:PRINT
2720 D2=D2+1:GOTO 2740
2730 PRINT:PRINT"FIRE NO. 2 IS NOW OUT!":PRINT:PRINT"EVERYONE W
ILL BE BACK BY TOMORROW MORNING":M2=0:T2=0:D2=0:F2=0
2740 PRINT:PRINT:INPUT "PRESS ENTER TO GO ON":Z:IF F1=1 THEN 27
50 ELSE D=D+1:GOTO 100
2750 IFF1=0THEND=D+1:GOTO100
2760 IF D1=5 THEN FF=1:GOTO 3310
2770 CLS:PRINT"FIRE NO. 1 IS NOW IN DAY ";D1
2780 PRINT"YOU HAVE ";M1;" MEN AND ";T1;" TRUCK(S) THERE"
2790 ON W-4 GOTO 2800,2800,2840,2840,2880,2880,2920,2920,2920,2
920
2800 IF D1=2 AND M1)8 GOTO 3080
2810 IF D1=3 AND M1)13 GOTO 3080
2820 IF D1=4 FF=1:GOTO 3310
2830 GOTO 2950
2840 IF D1=2 AND M1)7 GOTO 3080
2850 IF D1=3 AND M1)11 GOTO 3080
2860 IF D1=4 AND M1)15 GOTO 3080
2870 GOTO 2950
2880 IF D1=2 AND M1)5 GOTO 3080
2890 IF D1=3 AND M1)9 GOTO 3080
2900 IF D1=4 AND M1)12 GOTO 3080
2910 GOTO 2950
2920 IF D1=2 AND M1)2 GOTO 3080
2930 IF D1=3 AND M1)4 GOTO 3080
2940 IF D1=4 AND M1)7 GOTO 3080
2950 PRINT:PRINT"THIS FIRE IS STILL BURNING.
THERE ARE ";18-T-H-K-M1-M2;" MEN LEFT AT HEADQUARTERS.":IF 18-M
1-M2-T-H-K=0 THEN 3050
2960 D$="":INPUT"DO YOU WANT TO SEND MORE MEN":D$
2970 IF LEFT$(D$,1)="N" GOTO 3050
2980 IF LEFT$(D$,1)="Y" GOTO 2990 ELSE GOTO 2960
2990 INPUT "HOW MANY":M3
3000 IF M3=0 GOTO 3050
3010 IF M3(18-K-T-M1-M2-H)PRINT"THEY AREN'T THAT MANY AT THE
BASE":GOTO 2990
3020 IF (B+T1+T2)3PRINT"HERE ARE NO TRUCKS TO TAKE THEM!":GOT
03050
3030 M1=M1+M3:T1=T1+1
3040 PRINT:PRINT"THEY ARE GOING NOW!":PRINT
3050 PRINT:PRINT:INPUT"PRESS ENTER TO GO ON":Z
3060 D=D+1:D1=D1+1
3070 GOTO 100
3080 PRINT:PRINT"FIRE NO. 1 IS NOW OUT!":PRINT:PRINT"EVERYONE W
ILL BE BACK BY MORNING":M1=0:T1=0:D1=0:F1=0:PRINT:INPUT"PRE
S ENTER TO GO ON":Z
3090 D=D+1:GOTO 100
3100 CLS:PRINT"FINAL STATUS REPORT"
3110 IF F2=0 AND F1=0 GOTO 3190
3120 IF F2=2 AND F1=1 GOTO 3150
3130 PRINT"THEY ARE A FIRE STILL BURNING."

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3140 GOTO 3160
3150 PRINT"THESE ARE TWO FIRES STILL BURNING."
3160 PRINT"THE FUTURE OF THE CRESCENT RANGER DISTRICT DEPENDS"
3170 PRINT"ON YOUR REPLACEMENT NOW."
3180 GOTO 3200
3190 PRINT"NO FIRES BURNING!!"
3200 PRINT:PRINT(18-H);" OF YOUR CREW ARE STILL IN GOOD SHAPE"
3210 PRINT" (18 STARTED WITH YOU IN AUGUST)"
3220 PRINT:PRINT(4-B);" OF YOUR TRUCKS ARE STILL OPERABLE"
3230 PRINT:PRINT" YOU IGNORED";NO;" TROUBLE CALLS"
3240 IF NO>1 PRINT " ...THAT'S NOT TOO GOOD"
3250 IF NO=0 PRINT " - GOOD WORK!"
3260 PRINT:PRINT USING"###,###";AC-A;:PRINT" ACRES OF TIMBER AR
E LEFT":PRINT
3270 INPUT "DO YOU WANT THE JOB AGAIN NEXT YEAR";J$
3280 IF LEFT$(J$,1) ="Y" GOTO 3300
3290 END
3300 CLS:RUN70
3310 FOR N=1 TO 500:NEXT N:CLS:PRINT"FIRE NO. ";FF;" IS OUT OF
CONTROL..."
3320 FOR N=1 TO 500:NEXT N:R=RND(2):DU=0
3330 PRINT:INPUT"ANY IDEAS";I$
3340 IF LEFT$(I$,1)="N" GOTO 3620
3350 FOR I=1 TO LEN(I$)-3
3360 IF "HELP"=MID$(I$,I,4) GOTO 3460
3370 NEXT I
3380 FOR I=1 TO LEN(I$)-12
3390 IF "SMOKE JUMPERS" =MID$(I$,I,13) GOTO 3540
3400 NEXT I
3410 FOR I=1 TO LEN(I$)-3
3420 IF "RAIN"=MID$(I$,I,4) GOTO 3580
3430 NEXT I
3440 IF DU=2 GOTO 3620
3450 PRINT:PRINT"SORRY, I DIDN'T UNDERSTAND THAT REPLY. PLEASE
TRY AGAIN.":DU=DU+1:GOTO 3330
3460 FOR I=1 TO LEN(I$)-6
3470 IF "KLAMATH"=MID$(I$,I,7) GOTO 3490
3480 NEXT I:GOTO 3500
3490 PRINT:PRINT"ALL FIRE FIGHTERS IN THE ST. HELENS AREA ARE O
UT":PRINT
3500 PRINT:PRINT"THE UMPQUA FOREST HAS BEEN ASKED TO SEND HELP.
"
3510 PRINT:INPUT"PRESS ENTER FOR REPORT";Z
3520 IF R=1 GOTO 3570
3530 PRINT:PRINT"SORRY, THEY HAVE NOBODY TO SEND.":GOTO 3590
3540 PRINT:PRINT"SMOKE JUMPERS HAVE BEEN CALLED FROM MISSOULA."
:PRINT:INPUT"PRESS ENTER FOR REPORT";Z
3550 IF R=1 GOTO 3570
3560 PRINT:PRINT"SORRY, NONE AVAILABLE NOW.":GOTO 3590
3570 PRINT:PRINT"GOOD NEWS! THEY PUT THE FIRE OUT!":GOTO 3600
3580 PRINT:PRINT"SORRY, NO RAIN!":GOTO 3330
3590 FOR N=1 TO 500:NEXT N:CLS:PRINT:PRINT"THE ENTIRE DISTRICT
IS DESTROYED!":FOR N=1 TO 500:NEXT N:PRINT:PRINT"SO IS YOUR
JOB THIS YEAR!":FOR N=1 TO 500:NEXT N:GOTO 3270
3600 IF FF=1 THEN FF=0:A=A+5000:GOTO 3080
3610 IF FF=2 THEN FF=0:A=A+5000:GOTO 2730
3620 PRINT:PRINT"YOU MIGHT ASK FOR HELP (FROM ANOTHER FOREST) O
R REQUEST A TEAM OF SMOKE JUMPERS."
3630 FOR N=1 TO 500:NEXT N:GOTO 3330

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**The END**

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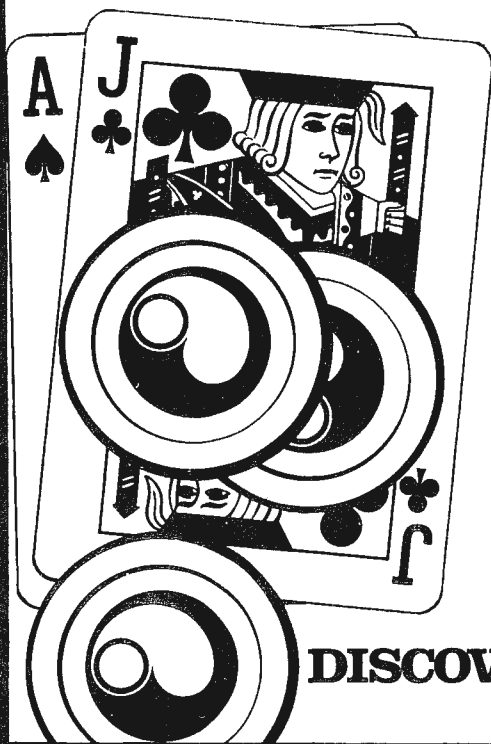
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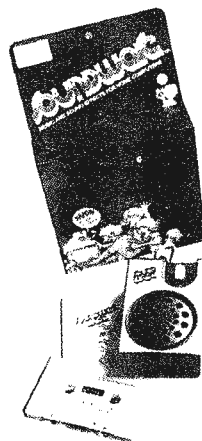
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---

# QUESTAIR

Cameron C Brown,  
Tacoma, WA

---

*Evaluate your own survey data with this program. Options include saving on disk or tape, reading response data from disk or tape, computation of means, frequencies, standard deviations, percent breakdowns and confidence intervals.*

*This program was used to evaluate the 80-U.S. Reader Survey.....*

---

For 16K Level II and UP

QUESTAIR is a multiple option questionnaire analysis program. It is written for use with 16K Level II up to 48K DOS Systems. The routine allows you to enter the questions into the program as DATA lines and then key in the responses whenever it is convenient. Options for the user include saving on disk or tape, reading response data from disk or tape, computation of means, frequencies, standard deviations, percent breakdowns and confidence intervals. Output can be either via the video or printer. 16K users should remove all remark statements from the program, lower the CLEAR command in line 40, and remove all options that do not apply to their system.

Before going into the program and it's use, it might be worthwhile to review some terms:

1. Frequency: The number of times an option is chosen.
2. Mean: The average value.
3. Standard Deviation: The average difference of all the scores from the mean. The lower the standard deviation, the better the mean reflects the data. A high standard deviation indicates that the data is dispersed over a wide range.

FOR  
TRS-80 DISK

A new approach  
for easier programming!

```
%PROC SBT
```

```
%CALL INITSBT
```

```
%CALL XALL
```

```
%CALL FINISH
```

```
END
```

```
%END-PROC
```

## STRUCTURED BASIC TRANSLATOR

by  
Gene  
Bellinger

Tired of attempting to make program modifications without being foiled by line numbers and GOTO's? Have you managed to forget how portions of your programs work because you left out the REMARK to conserve memory and speed up execution? If these and other drawbacks of BASIC keep you from getting things done, then *Structured BASIC Translator* can provide some relief!

This is not a programming language but rather a utility which runs from disk. It allows you to write structured programs using PROCEDURES, CALLS, CASE-CALLS, IF-THEN-ELSE, WHILE and UNTIL structures with no line numbers and no GOTO's. You write a structured program using the provided editor, or use most any other editor. The *Structured BASIC Translator* will then convert the file created by the editor into an efficient, executable BASIC program.

The strength of this package is its small size and fast translation. For example, the source code for the program itself, which is provided on the disk, will translate in less than 4 minutes. This is important because with this speed you will not hesitate to alter or modify a source listing.

Acorn produces several other utility programs for the TRS-80\*. These include *Aterm*, *Term-80*, and *Numbering* by Tom Stibolt; *Disassembler*, *Tape Utility*, and *Disk Utility* by Roy Soltoff. Ask for these and other quality Acorn programs at your local computer store.

\*TRS-80 is a trademark of Tandy Corp



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4. Confidence Interval: An estimation of the accuracy of the sample data in relation to the population. This program is set for a 95% confidence interval. The analysis of continuous data will display the range in which the true population mean will fall 95% of the time.

5. Discrete Data: This is often referred to as nominal data. For data of this type, the numbers of the options are used to identify categories and do not represent a continuum. For discrete data, it would be wrong to compute means, standard deviations and confidence intervals. Some examples of discrete data are profession, languages spoken, etc.

6. Continuous Data: This is often called ordinal data. When questions involve options that can be ranked from low to high, or put into some order, then means, standard deviations and confidence intervals should be computed. Questionnaire responses such as age, amount invested, years of study, etc., are continuous.

7. Population: All members of the group under study.

8. Sample: A subset of the population. Those who give responses to the questionnaire.

### ENTERING A QUESTIONNAIRE

You can run the program as listed and see how the 80-U.S. reader survey was analysed. To write your own questionnaire, just change the DATA lines which start at line 5000 to fit your needs. The routine does require that the data be entered in a specific manner. The DATA must be in this order: Question (a string variable), the number of options for this question (a numeric value), the options for this question (more string variables). The very start of the DATA section must have two numbers. The first number tells the total number of questions in the survey, and the second number is the maximum number of options possible for any of the questions. It is important that these numbers be correct; they set the size of the arrays used to store and analyse the data.

Once the questions have been entered as DATA lines, save the program again under whatever name is appropriate. The NO RESPONSE option is automatically added to the question array and you should not include it in your DATA lines.

When you run the program, it will ask if any questions are entered. The program will stop if you answer "no", otherwise it will go to the menu section.

### ENTERING RESPONSES (Option 5)

Once you have responses to your survey and you wish to start tallying the results, select option 5 from the menu. Be sure to read in any old data from tape or disk first. Under this option, scores entered are added to the arrays and if you do not read in old data, all entries at this session will not be combined with your previous work.

The input routines are under an INKEY command. All you have to do is depress the number of the option chosen. If the question has more than 9 options, the INKEY routine is skipped and you have to ENTER the response number. If a respondent chooses more than one option to a question, depress the letter "A", for again. The program will then ask for how many responses and go back to the INKEY routine. The "A" option only works with questions of 9 options or less. Note that when multiple responses are given, each response adds to the total

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**dutil** All features of TUTIL plus read & write disk sectors, even to the DIRECTORY! Read entire tracks including address marks. Scroll through the disk sector by sector. (16K, 32K, & 48K; all three for \$20)

**diskmod** Turn your Editor/Assembler into a DISK package. This patch modifies EDTASM 1.1 & 1.2 under DOS, NEWDOS, or VTOS. Capabilities? You couldn't ask for more! Add full disk I/O (source and object code), block move, global change, pagination with optional end-of-page prompting, sorted symbol table, print text buffer utilization, corrected DEPM expansion, protect memory, and recover after boot. From within the modified EDTASM, you will have DIR, FREE, and KILL. This package is a must for assembler programmers. A 32K system is required to run this patch. (\$20)

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number of responses. You will find that the percent calculations are based upon the total number of responses and that the percent breakdowns will reflect the distribution in relation to the sample.

After the display of the last question, the operator is asked to either continue (ENTER) or return to the menu (X).

#### ANALYSIS OF DATA (Option 6)

Before computing, you are asked if the questionnaire has discrete or continuous data. Only continuous data analysis will yield means, standard deviations and confidence intervals. Both types of analysis will show frequency and percent distributions. If your questionnaire involves both types of data, as did the 80-U.S. survey, then run this section of the program twice, once under the "D" option and once under the "C" option.

If you select a printed output (P), note that the output is done by poking the video output to the printer port. Be sure that the printer is on-line and that the program is error free. A system hang-up here will be hard to notice since all video messages are sent to the printer. On many systems tested, the output results in 132 character lines. To get the output to align in columns when printed, a tabbing that is determined by the length of the question printed was needed (variable TL). If you have trouble with the printer output, delete lines 810-840, lines 1370-1420 and change all PRINTS to LPRINTS.

#### SAVING OF DATA (Options 3,4)

After entering response data, you can save the results of your survey on either tape (option 3) or on disk (option 4). If you select the tape option, be sure that you have a long playing cassette. The data takes much time to store. If you select the disk option, the routine asks for a filename and stores it on the first non-write protected disk. If you wish to specify a drive number, just change the OPEN commands in lines 310 and 620. Note that an extension, /DAT, is added to your filename. The data is stored in sequential form, and many of the numbers are zero. It was much more efficient to set up one array for the responses, called R(I,J), than to assign a different array to each question. This results in some waste of memory, but simplifies the subroutines.

#### INPUT OF OLD DATA (Options 1,2)

Under tape input of data, just use the cassette normally. The display will flash upon each data entry to keep you informed that all is well. Under disk input of data, the program again asks for a filename. As before, the extension /DAT is added automatically.

#### SOME FINAL COMMENTS

We have found the program to be quite adaptable. It has been used on the 80-U.S. Reader Survey, on student attitudes to a new curricula, and on a long range planning questionnaire for a school.

Just be very careful when setting up the questionnaire. The statistics you obtain can be very useful or very misleading. Common pitfalls include such errors as:

- a. Too many or too few questions.
- b. Too long a questionnaire.
- c. Failure to include all possible or desirable options.
- d. Failure to get a sample that represents the population.
- e. Ambiguity of the questions.
- f. Lack of division between options.
- g. Bias in the questions or options.
- h. Too small a sample taken.
- i. Failure to account for changes in the population due to time passing since the data was collected.

# Z80ZAP/CMD

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 Z80ZAP... Will PAGE forward or backward one Sector at a time.  
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 Z80ZAP... Will Move FLASHING CURSOR with arrow keys.

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*BPILOT is totally compatible with BASIC. BPILOT allows you to use both BPILOT and BASIC instructions in your programs. This adds the power of BASIC to the power and ease of PILOT. It also makes it easy to learn PILOT if you know BASIC, and easy to teach your children BASIC once they know PILOT.*

BPILOT is a concise assembly language program. The Level II version will run on a 4K system and leave over 2K for programs. The Disk version leaves over 4K for programs in a 16K system. At \$24.95 for either version, including a reference manual and 3 demonstration programs, BPILOT is a true bargain!

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```

10 'VERSION 2.0 AS OF 4/05/80
 FILENAME IS QUESTAIR
20 'VARIABLE TABLE:
 N=NUMBER OF QUESTIONS M=MAXIMUM # OF OPTIONS
 Q$(I)=QUESTION #I OP(I)=NUMBER OF OPTIONS FOR Q$(I)
 OP$(I)=OPTIONS FOR QUESTION #I
30 ' T(I)=TOTAL NUMBER OF RESPONSES FOR QUESTION #I
 R(I,J)=NUMBER OF RESPONSES FOR QUESTION #I, OPTION #J
40 CLS: CLEAR 5000
50 PRINTTAB(15): "QUESTIONNAIRE ANALYSIS"
60 PRINTTAB(10): "(C) BROWN COMPUTER SERVICES
 1901 NORTH JUNETT TACOMA WA 98406"
70 PRINT: PRINT "THIS PROGRAM WILL ENABLE YOU TO TABULATE THE RES
 ULTS OF"
80 PRINT "ANY MULTIPLE OPTION QUESTIONNAIRE. IT IS ** NOT ** REQU
 IRED"
90 PRINT "THAT EACH QUESTION HAVE THE SAME NUMBER OF OPTIONS."
100 PRINT: PRINT "LIST QUESTIONS FOLLOWED BY NUMBER OF OPTIONS, F
 OLLOWED BY
110 PRINT "OPTION TITLES IN DATA STATEMENTS BEGINNING ON LINE 50
 00"
120 PRINT "A SAMPLE DATA LINE LOOKS LIKE:
 5000 DATA AGE GROUP, 4, UNDER 20, 21-35, 36-50, OVER 50
130 PRINT: PRINTTAB(20)STRING$(15, "*")
140 PRINT "HAVE YOU ENTERED THE QUESTIONS, # OF OPTIONS, OPTIONS
 (Y/N)"
150 Q$=INKEY$: IF Q$="" THEN 150 ELSE IF Q$="Y" THEN 170 ELSE STOP
160 IF Q$="N" THEN STOP
170 CLS: PRINT @ 400, "READING QUESTIONNAIRE ...": GOSUB 350: GOTO
 1430
180 ' TAPE INPUT
190 CLS: PRINT@192, CHR$(23): "PREPARE CASSETTE FOR INPUT"
200 CMD"T"
210 INPUT "PRESS ENTER WHEN READY": X$
220 CLS: PRINTCHR$(23): PRINT@192, "LOADING DATA"
230 FOR I=1 TO N
240 FOR J=1 TO M+1
250 PRINT@230, "X X": INPUT #-1, R(I, J): PRINT@230, " **** "
260 NEXT J
270 CMD"R": RETURN
280 ' DISK INPUT
290 CLS: PRINT@650, "": INPUT "FILENAME FOR INPUT IS": FF$
300 FF$=FF$+"/DAT"
310 OPEN "I", 1, FF$
320 FOR I=1 TO N: FOR J=1 TO M+1: INPUT#1, R(I, J): NEXT J
330 CLOSE: RETURN
340 ' READING QUESTIONNAIRE ARRAY FROM DATA LINES
350 READ N, M: DIM R(N, M+1)
360 DIM Q$(N), OP(N), OP$(N, M+1), T(N)
370 FOR I=1 TO N
380 READ Q$(I), OP(I)
390 FOR J=1 TO OP(I): READ OP$(I, J): NEXT J
400 OP$(I, J)="NO RESPONSE"
410 NEXT I
420 RETURN
430 ' INPUT RESPONSE ROUTINE
440 FOR I=1 TO N
450 CLS
460 PRINT "RESPONSE FOR "; Q$(I): PRINT
470 FOR J=1 TO OP(I)+1: PRINTJ: OP$(I, J): NEXT J: PRINT

```

```

 TO PRINTER THAT RESULTS FROM POKING THE VIDEO.
960 TL=30: IF Q$="P" THEN TL=30-LEN(OP$(I, J))
970 PRINTOP$(I, J): TAB(TL) "FREQ =" : R(I, J), "% =" : INT(1000+R(I, J)
 /T(I))/10
980 NEXT J
990 PRINTOP$(I, J), "FREQ =" : R(I, J)
1000 PRINTSTRING$(32, "*"): PRINT
1010 IF Q$="V" THEN INPUT "PRESS ENTER TO CONTINUE": V$
1020 CLS
1030 NEXT I
1040 IF Q$="P" THEN GOSUB1400
1050 GOTO 1430
1060 ' CONTINUOUS ANALYSIS
1070 FOR I=1 TO N: T(I)=0: NEXT
1080 CLS
1090 FOR I=1 TO N
1100 T=0
1110 FOR J=1 TO OP(I)
1120 T(I)=T(I)+R(I, J)
1130 T=T+R(I, J)*J
1140 NEXT J
1150 PRINTQ$(I): " ANALYSIS -# RESP=" : T(I)
1160 IF T(I)=0 THEN PRINT:
 PRINT "NO ANALYSIS POSSIBLE FOR THIS QUESTION": GOTO1310
1170 FOR J=1 TO OP(I)
1180 TL=30: IF Q$="P" THEN TL=30-LEN(OP$(I, J))
1190 PRINTJ: OP$(I, J): TAB(TL) "FREQ =" : R(I, J): " % =" : INT(1000
 *R(I, J)/T(I))/10
1200 NEXT J
1210 PRINTOP$(I, J), "FREQ =" : R(I, J)
1220 ME=INT(T/T(I)*100+.5)/100
1230 PRINT "MEAN (AVERAGE RESPONSE) = " : ME
1240 S=0
1250 FOR J=1 TO OP(I)+1: S=S+R(I, J)*(J+2): NEXT J
1260 SD=INT(SQR(S/T(I)-(T/T(I))^2)*100+.5)/100
1270 ' ASSUMING A NORMAL DISTRIBUTION, 95% CONFIDENCE INTERVAL
 IS EQUIVALENT TO 1.96 STANDARD DEVIATIONS. FOR 99%
 CONFIDENCE ADJUST FACTOR FROM 1.96 TO 2.58
1280 ER=1.96+SD/SQR(T(I)): ER=INT(ER*100+.5)/100
1290 PRINT "STANDARD DEVIATION = " : SD
1300 PRINT "FOR THIS QUESTION YOU CAN BE 95% SURE THAT THE
 TRUE POPULATION AVERAGE RANGES FROM " : ME-ER: " TO " : ME+ER
1310 PRINTSTRING$(32, "*"): PRINT
1320 IF Q$="V" THEN INPUT "PRESS ENTER TO CONTINUE": V$
1330 CLS
1340 NEXT I
1350 IF Q$="P" THEN GOSUB1400
1360 GOTO 1430
1370 ' POKE TO LINE PRINTER
1380 POKE 16414, PEEK(16422): POKE 16415, PEEK(16423)
1390 RETURN
1400 ' POKE VIDEO TO NORMAL
1410 POKE 16414, 88: POKE 16415, 4
1420 RETURN
1430 CLS: PRINTTAB(15) "**** M E N U ****"
1440 PRINT: PRINTTAB(10) "1. READ RESPONSE DATA FROM TAPE": PRINT
1450 PRINTTAB(10) "2. READ RESPONSE DATA FROM DISK": PRINT
1460 PRINTTAB(10) "3. OUTPUT RESPONSE DATA TO TAPE": PRINT
1470 PRINTTAB(10) "4. OUTPUT RESPONSE DATA TO DISK": PRINT
1480 PRINTTAB(10) "5. ENTER RESPONSE DATA FROM QUESTIONNAIRES"

```

```

480 PRINT CHR$(29);"TYPE THE # CHOSEN - HIT 'A' FOR MULTIPLE AN
SWER";CHR$(30);
490 IF OP(I))=9 THEN INPUT " # IS ";X:GOTO 530
500 A$=INKEY$:IF A$=""THEN 500
510 PRINT CHR$(30);
 :IF A$="A" THEN PRINT CHR$(29);CHR$(30)
 :INPUT" # OF RESPONSES IS ";Q :GOTO 480
520 X=VAL(A$): PRINT " ";X
530 IF X(10RX)OP(I)+1THEN480ELSE R(I,X)=R(I,X)+1
540 Q=Q-1:IF Q=0 THEN 480
550 NEXT I
560 X$=""
570 PRINT
 :INPUT"HIT ENTER TO CONTINUE TYPE IN X TO TERMINATE";X$
580 IF X$="X"THEN RETURN ELSE GOTO 440
590 ' DISK OUTPUT
600 CLS:PRINT@590,"";:INPUT"FILENAME FOR OUTPUT IS";FF$
610 FF$=FF$+"/DAT"
620 OPEN "O",1,FF$
630 FOR I=1TON:FOR J=1TOM+1:PRINT#1,R(I,J):NEXT: NEXT
640 CLOSE
650 RETURN
660 ' OUTPUT TO TAPE
670 CLS:PRINT@192, CHR$(23);"PREPARE CASSETTE FOR OUTPUT"
680 CMD"T"
690 INPUT"PRESS ENTER WHEN READY";X$
700 FOR I=1TON:FOR J=1TOM+1:PRINT #-1,R(I,J):NEXT: NEXT
710 CMD"R":RETURN
720 CLS:PRINT"DOES THE QUESTIONNAIRE HAVE DISCRETE OR CONTINUOU
S OPTIONS?"
730 PRINT:PRINT"DISCRETE OPTIONS CAN ONLY GIVE % BREAKDOWNS BUT
CONTINUOUS OPTIONS WILL GIVE %, MEAN, STANDARD DEVIATION
FOR EACH QUESTION GROUP"
740 PRINT:PRINT"A DISCRETE EXAMPLE IS:
COMPUTER LANGUAGE:
 1)BASIC 2)PASCAL 3)APL 4)COBOL"
750 PRINT
760 PRINT"A CONTINUOUS EXAMPLE IS:
I WATCH TV:
 1)ALWAYS 2)USUALLY 3)SOMETIMES 4)RARELY
770 PRINT
780 PRINT"DISCRETE (D) OR CONTINUOUS OPTIONS (C) ?"
790 I$=INKEY$:IF I$=""THEN790
800 IF I$="D"OR I$="C"THEN X$=I$ ELSE 780
810 PRINT"VIDEOD (V) OR PRINTER (P) OUTPUT ?"
820 I$=INKEY$:IF I$=""THEN820
830 IF I$="V"OR I$="P"THENQ$=I$ ELSE 810
840 IF Q$="P"THENGOSUB1370
850 IF X$="D"THENB60ELSEIFX$="C"THEN1060ELSE720
860 FOR I=1TON:T(I)=0:NEXT
870 CLS
880 FOR I=1 TO N
890 FOR J=1 TO OP(I)
900 T(I)=T(I)+R(I,J)
910 NEXT J
920 PRINTQ$(I);" ANALYSIS -# RESP =";T(I):PRINT
930 IF T(I)=0 THEN PRINT:
 PRINT"NO ANALYSIS FOR THIS QUESTION ":PRINT:GOTO1000
940 FORJ=1TO OP(I)
950 'TL IS A VARIABLE FOR TAB-LENGTH. IT IS TO ADJUST OUTPUT
1490 PRINTTAB(2)"*** READ OLD RESPONSE DATA IN BEFORE ENTERING
NEW DATA ***":PRINT
1500 PRINTTAB(10)"6. ANALYSIS OF DATA":PRINT
1510 PRINTTAB(10)"7. END OF SESSION ";
1520 PRINT"(YOUR CHOICE IS)";
1530 A$=INKEY$:IF A$=""THEN1530 ELSE X=VAL(A$)
1540 IFX(0 OR X)7THEN 1430
1550 ON X GOSUB 180,280,660,600,430,720,1570
1560 GOTO 1430
1570 CLS:PRINT"SESSION ENDED":END
5000 REM *** MUST ENTER DATA LINES HERE ***
5010 ' FIRST LINE IS # OF QUESTIONS (N)
 MAXIMUM NUMBER OF OPTIONS FOR ANY QUESTION (M)"
5020 DATA 24,10
5030 'QUESTION CATAGORY,NUMBER OF OPTIONS,OPTIONS IN ORDER
5040 DATA AGE GROUP,4, UNDER 20,20-35,36-50,OVER 50
5050 DATA EDUC LEVEL,5,HIGH SCHOOL,SOME COLLEGE, BA/BS,
 MA/MS, PHD
5060 DATA PROFESION,10,RETAIL SALES,EDUCATION,RESEARCH,
 MANUFACTURING,GOVERNMENT,DATA PROCESSING,BUSINESS,
 MEDICAL, STUDENT, OTHER
5070 DATA CURRENT SYSTEM,9,LEVEL II 16K, LEVEL I 4/16K,
 TRS-80 + DISKS,LEVEL II 4K,MODEL II,APPLE,PET,
 NONE,OTHER
5080 DATA PLANS FOR EXPANSION,6,EXPAND MEMORY,ADD DISKS,
 ADD PRINTER,ADD MODEM,GET DIFFERENT SYSTEM,NONE
5090 DATA MEMBER OF A COMPUTER CLUB,2,YES,NO
5100 DATA 80-US SUSCRIBER,2,YES,NO (BUY ON NEWSSTAND)
5110 DATA 1ST LEARN OF 80-US,6,FRIEND,NEWSSTAND,READER SERVICE,
 RADIO-SHACK STORE,AD/FLYER,OTHER
5120 DATA PREFERRED LANGUAGE,6,BASIC,MACHINE LANGUAGE,FORTRAN,
 PILOT,PASCAL,OTHER
5130 DATA OTHER PUBLICATIONS READ,7,CREATIVE COMPUTING,BYTE,
 KILOBAUD,INTERFACE AGE,80-MICROCOMPUTING,SOFTSIDE,OTHER
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 $51-100,OVER $100
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5170 DATA SOFTWARE EXPENSES (SYSTEM UTILITIES),4,UNDER $25,
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5180 DATA SOFTWARE EXPENSES (HOME/PERSONAL APPLIC),4,UNDER $25,
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5190 DATA FEATURE RATING (VIEW FROM ...),4,DROP IT,OK,GOOD,
 MY FAVORITE
5200 DATA FEATURE RATING (SYS/COMMAND),4,DROP IT,OK,GOOD,
 MY FAVORITE
5210 DATA FEATURE RATING (ITEMS AT RND),4,DROP IT,OK,GOOD,
 MY FAVORITE
5220 DATA FEATURE RATING (LETTERS),4,DROP IT,OK, GOOD,
 MY FAVORITE
5230 DATA FEATURE RATING (NEW PRODUCTS),4,DROP IT,OK,GOOD,
 MY FAVORITE
5240 DATA FEATURE RATING (REVIEWS-SOFTWARE),4,DROP IT,OK,GOOD,
 MY FAVORITE
5250 DATA FEATURE RATING (REVIEWS-HARDWARE),4,DROP IT,OK,GOOD,
 MY FAVORITE
5260 DATA FEATURE RATING (MAJOR PROGRAM LISTINGS),4,DROP IT,OK,
 GOOD,MY FAVORITE
5270 DATA ADVERTISING,3,ENOUGH,TOO MUCH,NOT ENOUGH

```

The 11th in a series of tutorials on  
Machine Language Programming.....

# View (from the Top of the Stack)

Jim Crocker,  
Technical Editor

Last episode, we left you with a machine language program and a promise that we would try to explain how it works. This is the first chapter of the attempt to keep that promise.

Rather than trying to start at the top of the program and working our way down, we are going to take groups of instructions that seem to fit together and explain them together. In this issue, we will discuss the LOAD group.

"LOAD" seems pretty simple. We load a truck, or a wagon, or carry a load. The hard part is visualizing WHAT we are loading.

What we are loading in the Z-80 is either a REGISTER, or MEMORY. The word REGISTER has it's roots way back in the wayback when computers took up whole rooms. The dictionary defines a register as a "device for the temporary storage of one or more words to facilitate arithmetical,

logical, or transferral operations". In english, however, it simply means "a place to put things". One can look at a register as a box separated into smaller boxes. When we LD into a register, we are simply putting something into one of our boxes. The Z-80 has 22 registers, called A, B, C, D, E, F, H, L, A', B', C', D', E', F', H', L', I, R, IX, IY, SP, and PC. Figure 1 is a diagram which shows the Z-80 registers.

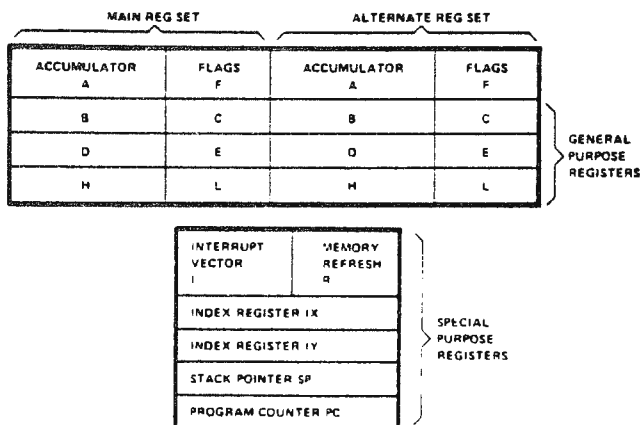
Of these, all but the IX, IY, PC, and SP are 8 bit registers. If we go back to thinking of our registers as boxes subdivided into smaller boxes, then 18 of our 22 boxes have 8 sections, and the other 4 have 16.

Still thinking of our analogy, we will call each of the subdivisions of our boxes as a *bit*. This stands for *BINARY DIGIT*. The binary numbering system

is what all computers "think" with. In the DECIMAL numbering system with which we all are used to dealing with, we have ten symbols from which we make up a number. These symbols are: 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. In the *BINARY* numbering system, we have only two: 0 and 1. Just as we use the ten symbols of the decimal system to represent any number, we can use the two symbols of the binary system to represent any number.

Remember back in grade school when the teachers were trying to convince you that the number "100" really means "zero in the one's ( $10^0$ ) place, zero in the ten's ( $10^1$ ) place, and one in the hundred's ( $10^2$ ) place"? It turned out they were right, and we can apply the same principal to computing numbers with the binary system. If the decimal numbering system has ten symbols and we say it is the *BASE TEN* numbering system, then binary with it's two symbols must be the *BASE TWO* numbering system. This means, therefore, that we compute the values of our places based on powers of two. The binary or base two number "100" means "zero in the one's ( $2^0$ ) place, zero in the two's ( $2^1$ ) place, and one in the four's ( $2^2$ ) place". Therefore, the binary number "100<sub>2</sub>" would equal 4 in decimal. As you might have guessed, binary numbers tend to get rather long in a hurry, so we don't use it very much.

Since the binary representation of the decimal number "255<sub>10</sub>" comes out to "11111111<sub>2</sub>" in binary, we take the 8 bits, split them into 2 groups of four bits each, and come out with "1111 1111<sub>2</sub>". Breaking the number down in this manner makes it a little



Z80-CPU REGISTER CONFIGURATION



```

7FB8 00100 ORG 7FB8H ;16K MEM SIZE = 32696
7FB8 2A1640 00110 START LD HL,(4016H) ;LINK INTO KEYBOARD DRIVER
7FBB 22C87F 00120 LD (DRIVER+1),HL ;
7FBE 21C77F 00130 LD HL,DRIVER ;
7FC1 221640 00140 LD (4016H),HL ;
7FC4 C3191A 00150 JP 1A19H ;RETURN TO LII READY
7FC7 CD0000 00160 DRIVER CALL $-$;GET KEY PRESSED
7FCA FE0D 00170 CP 0DH ;ENTER?
7FCC 282D 00180 JR Z,CLRMDE ;YES, FORCE MODE=1
7FCE FE01 00190 CP 01H ;BREAK?
7FD0 2829 00200 JR Z,CLRMDE ;YES, SAME AS ENTER
7FD2 FE67 00210 CP 67H ;SHIFT G?
7FD4 281A 00220 JR Z,CNGMDE ;YES, CHANGE MODE
7FD6 F5 00230 PUSH AF ;SAVE A & FLAGS
7FD7 3AFF7F 00240 LD A,(MODE) ;IN GRAPHICS MODE?
7FDA CB47 00250 BIT 0,A ;BIT 0=0 IF SO
7FDC 2802 00260 JR Z,GRAPH ;
7FDE F1 00270 POP AF ;OTHERWISE RESTORE AF
7FDF C9 00280 RET ;AND RETURN
7FE0 F1 00290 GRAPH POP AF ;GET CHARACTER BACK
7FE1 FE19 00300 CP 19H ;CONTROL CHARACTER?
7FE3 D8 00310 RET C ;YES, LEAVE IT ALONE!
7FE4 C660 00320 ADD A,60H ;CONVERT TO GRAPHICS CHAR
7FE6 FEC0 00330 CP 0C0H ;TOO BIG?
7FE8 D8 00340 RET C ;NO, RETURN
7FE9 D605 00350 SUB 5 ;COMPENSATION
7FEB FEC0 00360 CP 0C0H ;STILL TOO BIG?
7FED D8 00370 RET C ;NO, RETURN
7FEE AF 00380 XOR A ;ELSE RETURN NULL
7FEF C9 00390 RET ;
7FF0 3AFF7F 00400 CNGMDE LD A,(MODE) ;GET MODE INDICATOR
7FF3 EE01 00410 XOR 1 ;CHANGE IT,
7FF5 32FF7F 00420 LD (MODE),A ;PUT IT BACK, AND
7FF8 3E22 00430 LD A,'"'' ;RETURN WITH A QUOTE MARK
7FFA C9 00440 RET ;
7FFB 32FF7F 00450 CLRMDE LD (MODE),A ;FORCE BIT 0=1
7FFE C9 00460 RET ;AND RETURN
7FFF 01 00470 MODE DEFB 1 ;MODE INDICATOR
7FB8 00480 END START ;AUTOSTART
00000 TOTAL ERRORS

```

Figure 1

| BINARY | DECIMAL | HEXIDECIMAL |
|--------|---------|-------------|
| 0000   | 0       | 0           |
| 0001   | 1       | 1           |
| 0010   | 2       | 2           |
| 0011   | 3       | 3           |
| 0100   | 4       | 4           |
| 0101   | 5       | 5           |
| 0110   | 6       | 6           |
| 0111   | 7       | 7           |
| 1000   | 8       | 8           |
| 1001   | 9       | 9           |
| 1010   | 10      | A           |
| 1011   | 11      | B           |
| 1100   | 12      | C           |
| 1101   | 13      | D           |
| 1110   | 14      | E           |
| 1111   | 15      | F           |

easier to work with, but it is still too long. Imagine trying to tell someone over the phone that you just won "\$111 1110 1000" on a quiz show (that's \$1000<sub>10</sub>). It would tend to get just a little hairy trying to tell everyone about winning the Irish Sweepstakes!

You will also notice that although it takes 4 bits to represent the ten decimal symbols 0-9, that will leave us with 5 bit settings unused. It just so happens that 2<sup>5</sup> represents 16 in decimal, so the base 16 numbering system was invented. This leaves us with a problem. For as long as we can remember, we have had 10 symbols to represent our numbers with. Now, we have to invent new symbols. Fortunately, someone has already done this for us, and we don't have to throw away our typewriters. To represent the *HEXIDECIMAL* numbering system, we use the ten symbols we are already familiar with,

and just add the letters A, B, C, D, E, and F.

Looking at Figure 2, we can see that now we are using all 16 of the possible combinations of bits. Also, telling Mom that you won "\$3E8<sub>16</sub>" isn't as impressive as the original thousand, or the binary, but it sure takes less time and space. Of course, the computer is still thinking ones and zeros (see *Know Your Computer, March-April 80-US*), but the way we perceive the data has changed immensely.

Okay, so let's get back to our boxes. Now we are calling them registers, and we are calling the subdivisions bits, but they are still more or less just places to put things. The bits in a Z-80 register are numbered, so we can tell which one is which. Specifically, they are numbered backwards, with the bit on the far right called "bit 7", and the bit on the far left called "bit 0". Knowing this doesn't help much now, but it will become very helpful in the future. The important thing to remember for now is that the largest number you can get to fit into an 8-bit register is FF<sub>16</sub> or 255<sub>10</sub>. The largest number you can get into a 16-bit register is FFFF<sub>16</sub> or 65,535<sub>10</sub>.

We now return you to our program, already in progress. Specifically, the GRAPH program in Figure 3. The very first instruction you run into (after the *ORG* statement) seems to contradict everything I have just said. Here we are, loading a register that we didn't even mention (HL) with a number greater than 255!

The secret is in the way that the Z-80 treats those registers. By simply taking the *PAIR* of registers, H and L, I can simulate a 16-bit register. Thus, the annotation "HL" treats the *REGISTER PAIR* H and L as though they were a single 16-bit register instead of two 8-bit registers. I can do the same thing with the B and C, and the D and E. (In fact, it will work with H' and L', B' and C', and D' and E' as well, but they are a special set which will be discussed later).

This very same instruction also shows another interesting feature of the Z-80, *INDIRECT ADDRESSING*. In the case of the instruction on line 110 of our side-by-side, we don't want the HL register pair loaded with the number 4016H (the "H" stands for Hexidecimal, remember?), but with

the data located in memory address 4016H. In order for the assembler to be able to tell the difference between loading a number (called *IMMEDIATE* addressing) and loading the value found at a specific address, we use parenthesis to specify the indirect mode.

Incidentally, the Z-80 uses 8-bit memory. The way it handles a 16-bit number in memory is to use two consecutive memory addresses, and store the number low-order byte (a byte is 8 bits) first, then high-order byte. Therefore if the number 1234H were to be loaded into address 4000H, then address 4000H would have the number 34 in it, and address 4001 would have the number 12. This takes a little getting used to, but once you get a handle on it, it isn't that difficult. An 8-bit number is simply stored in the address specified, with no hanky-panky.

Back to our problem, you can see that the LD instruction is used quite a lot. More, in fact, than any other instruction. This is the case with just about any computer. So, next time, we will continue our discussion of the LD instruction and express the various forms it can take.

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# BUSINESS COMPUTING

## *Selecting Business Computing Software*

*T R Dettmann, Associate Editor*

Since you are reading this, I'll assume you have already purchased or are intending to purchase a TRS-80 computer, either Model I or Model II, to run in your business application. In looking around, you have at least noticed that Radio Shack offers business software for your use. In reading magazines like this one, you have also learned that other people are offering software to do the same job. Which is best? In an earlier column, some general rules were given for picking the best application software, but how do you choose the system to run this application software?

Now that you have entered the world of the computer, it will pay you to become familiar with the terms "operating system" or "disk operating system", and "programming languages". Why bother? Because no matter what software you buy, be it a General Ledger, Payroll or Mail Program, that program will be designed to run in a specific environment (a DOS or Disk Operating System) and with a specific language (Basic, Cobol, Pascal, Fortran, etc.)

Why not just use the system that comes with the TRS-80? Most people do use it and most people will continue to use it because it is there when they buy the machine. But a lot of businesses have special needs, and the best software for the job may not be available to run under TRSDOS.

How do you go about choosing a system then? The overall solution will be to first locate the software that you want and only then buy such additional supporting hardware as you will need to run that software. Let's take an example. A local insurance office was looking for a package to handle optimizing a customer's insurance program by rapidly making estimates based on the answers to a few standard questions. After looking and

trying packages in the local area, the agent finally was shown a package by a consultant written in Basic and executing in CP/M.

Should this package be passed by because it was in CP/M? Not if it provides the best fit to the application. In fact, the agent bought the system and has not regretted it one bit.

Let's look at Disk Operating Systems and see what you should know about them when looking for software.

### **Disk Operating Systems**

Disk Operating Systems (DOS's) are generally a mystery to the small computer user. They are incredibly complex programs that control all of the disk file handling for a program that is running in memory.

When you buy a TRS-80 Disk System, you are provided with a generally good operating system called "TRSDOS". There is a lot of complaining about the system, but by and large, it is capable of handling most jobs that you would care to do.

The advantages of TRSDOS are that it is available and in use by practically all TRS-80 disk systems. That means a lot of people are working at solving problems with programs that run under TRSDOS. But it also has some very real problems that have been identified, and it is limited in what it can do without special programming.

There are two extensions to TRSDOS that are commonly available on the Model I, NEWDOS and VTOS. Both have the very distinct advantage that they are generally upward compatible with TRSDOS on the Model I. In addition, each system in its own way is a distinct improvement over Radio Shack's TRSDOS. I will admit that I am frankly partial to NEWDOS, but VTOS has its followers as well.

NEWDOS has the advantage in that it corrects errors in the original TRSDOS (Radio Shack has corrected most in their later versions) and it extends the ability of the programmer to do things he could not do under TRSDOS. It is upward compatible with TRSDOS (which means that programs written for TRSDOS will generally run under NEWDOS) but there are often small differences which will prevent software from running properly.

As an example, the editor supplied by Microsoft will not function under NEWDOS because the system handles the disk information differently from that expected by the editor.

VTOS also has some very distinct advantages. It can handle complex operations that can allow a programmer to set a system up for automatic operation. This is very useful to the businessman who isn't interested in playing the programmer's games and only wants to jump into entering income in his general ledger. But VTOS also has its drawbacks. It makes backups much harder and prevents making systems except from the master disk. Model II users can perform the automatic setup functions under TRSDOS, but they have other problems.

The disk operating system known as CP/M from digital research is still another possibility to consider. CP/M is generally faster and far more standardized than TRSDOS. It is the disk operating system for non-TRS80 systems. For this reason, there is a large amount of software available from these other machines for business application. In fact, you might say that most every application that has been programmed for a microcomputer has been programmed at least once under CP/M.

I have been told (without any substantiation), that Radio Shack even has the rights to distribute CP/M. If that is so, why do they hold off? CP/M has all of the most convenient features of NEWDOS and VTOS, and it executes much faster. But for the TRS80 owner it has one substantial drawback, it is not in any way compatible with TRSDOS. If you buy CP/M software to run under CP/M, you cannot use files that you generated with TRSDOS, NEWDOS, or VTOS without a special conversion program which will simulate TRSDOS.

Model I users have an even greater problem with TRSDOS since they have ROM in the lower part of the memory. CP/M normally uses this for part of the operating system. This means that Model I users must have a special CP/M! Generally, this is just not very practical.

Model II users don't have this problem. CP/M for the Model II can execute in much the same way that CP/M does on any other system. Further, since the Model II is a relatively new machine, very few people have Model II's in heavy use yet so rebuilding files under CP/M is less of a problem.

Which operating system to get? CP/M is my general choice for really good software, but always look before you leap. Mail order software generally comes without warranty and with no return possible. Buy only what you can see and then buy only what matches your application. Then choose the operating system that the software is designed for.

### Programming Languages

Programming languages are still another choice that must be made. For most users, BASIC will be the choice because it is there when you buy the computer and a lot of software is already available in BASIC. But you should

know that there are varieties of BASIC that you may need to know about.

For example, under TRSDOS, you can use BASIC or BASICR, both supplied by Radio Shack. Both are generally compatible, but BASICR takes more space because it has renumbering routines for BASIC programs. Under CP/M, you can get a large variety of BASIC's, including Microsoft Basic (the same as you already have but for CP/M) and CBASIC which is a more flexible, non-line number oriented system. A program in CBASIC will not run under Microsoft Basic without extensive changes.

TRSDOS, NEWDOS, and VTOS also allow you to run programs written in FORTRAN. FORTRAN is a formula oriented language which allows very complicated algebraic expressions to be written as in their original algebraic form. For business uses such as forecasting and statistics where there is a lot done with mathematics, programs in FORTRAN are the best choice since they can be put together more simply. BASIC can handle the job though.

The Model II user will soon have at least FORTRAN and possibly COBOL available for TRSDOS and he already has them available for CP/M. COBOL (common business oriented language) is in use in a large number of large computer systems for business data processing. This means that a large amount of software has already been developed for use under COBOL. Businesses that already have programs in COBOL running on another computer might find it to their advantage to adapt those programs to their TRS80 system under TRS80 COBOL.

COBOL has the distinct advantage over FORTRAN or BASIC in that it is very readable if done right. By adding words above and beyond the defined symbols, a COBOL programmer can make a program read almost like a series of sentences in English. In fact, COBOL is naturally divided into paragraphs and sentences. This is also its disadvantage since all of the extra space taken up by words and spaces represents space lost in the computer. Good, readable COBOL programs tend to be very large.

To be useful, COBOL must be compiled (translated) into a machine language or pseudo-machine language that gets rid of all the extra words that make it readable. This forms a module then that can be easily executed by the computer.

There are other languages available as well. PASCAL for example is another alternate for your system, but the only real PASCAL available for the TRS80 is not compatible with either CP/M or TRSDOS. In fact, it has its own operating system that is compatible with no other! There is very little available to run in this system and I don't expect to see much in the future because of its limitations, but if the package you need is designed for PASCAL, by all means buy the package and the PASCAL.

No other language comes close to offering what the ones mentioned above can offer. Most implementations to run on TRS80 of other languages are only for special purposes, mostly fun for the programmer, but of no real use to the businessman. I'll be happy to change that opinion if and when someone comes up with significant business software written to run in another language on TRS80.

### Summary

So where should you go? Let me restate the fundamental position: Find the program that does the job the way you want it done, then buy the supporting software (DOS and language) to run it! ●

# Data Base Management

M Schmidt, Editor

## A User Report on actual day to day use of a DBM system at 80-U.S.

Although 80-U.S. is no where near being the "Potentate of Publications", or the "Poobah of the Press", we do have our share of data management problems. Here is how we solved one of them --- and it may work for you too.

A couple of years ago the business was small and the mail was no problem. We simply separated the mail into stacks, noted on the outside of the envelope what was to be done with it, and then did it. It was no big deal.

It didn't take long however, till the mail increased. It soon became apparent that a whole lot of time was being spent, just on the mail. And as it increased, it became more difficult to go back and find any particular item.

Our CPA wondered how in the world we ever kept track of things. A very good question, actually. With only one or two people working the mail it was easy to remember things, but after more persons became involved it was apparent the situation could turn into a nightmare. And it started to...

Then came time to go from Third Class bulk mail to Second Class. The Postal Inspector walked in one day and asked for a list of subscribers. He then picked three names at random, and asked us to prove that these were indeed bona fide subscriptions. It took

some scrambling, and a whole lot of searching. We did it, but it was a bad way to run a business.

We started work on a mail log system for our Model II, and would probably have worked it out, given enough time.

Then we obtained a copy of IDM-M2 from Tony Pow (Micro Architect). This is an interactive data base manager program for the Model II, and it looked like it would fit our needs.

We tried the program several times, several different ways, to get the feel of it. Although there is a good bit of documentation with it, it isn't all that clear in many places. (Tony has since told us he is working up new and more complete documentation.)

Here is what is in the programs:

There are three main parts to the program. The first is the Initialization (DINIT) portion. Second is the actual data base (IDM), the third portion is called DREPORT, the report generator section.

The Initialization section is generally used only once to set up the format of the records. It asks you to tell it how many string and numeric fields you want to use. It then asks you to name the string fields and indicate the length of each in bytes. You may also name the numeric fields. Note that

you do not have to mess around with PUT, GET, LSET, RSET, FIELD and the like, it does all that for you.

After you name your file, it asks how many records you want in the file, and then goes out and creates them on disk. It gives you a chance to review what you have.

Next you go to the IDM (data base) program, but instead of filling the base with your information, you first create your report formats. The report formats (you can have as many as ten), are filed in the data base itself, as one of the base records.

During report formatting, you can specify which fields will appear in the report, whether or not they need be justified columns, how they will be sorted (almost any sort key can be used), and whether or not column totals are desired. Columns may be added, subtracted, multiplied or divided in the report.

After the reports are formatted, you can enter data into the base, and run reports against that data at any time. You may also create a report to print mailing labels from the names and addresses in the base.

We set up our data base to log in all incoming mail. It creates a "work order" for each piece of mail which includes complete name and address,



transaction, date, day of week, money amounts received (broken down into several categories), whether or not a label is required and complete credit card information when applicable. The work orders are created on the line printer as the information is entered into the data base. Although the file is updated daily until the end of the week, work orders and labels are run each day and go to the mail room. The work orders are then signed off by the mail room person, accounts receivable person, advertising person, etc. No more grubbing through envelopes to find some item or other. Our mail is back on an average 48 hour turn-around.

At the end of the week we run another report against the data in the base. We call this report the "Weekly Summary". It sorts all the data from that week into zip code order, and prints out a summary tabular list of all transactions for that week. It contains all the information from each work order. This report then becomes the input to the subscriber file, which is another program entirely (from Galactic Software Ltd).

We modified the weekly summary to print one last page of management information. This includes a complete breakdown of income amounts. It takes apart (by using the state field), amounts received from within Washington state and outside the state (for the tax people, naturally). It also breaks down subscription amounts, back issue amounts, dealer, advertising and software amounts. It also breaks down amounts for the different authors of software we sell, so that royalty payments can be determined quickly. It then gives totals and total of totals. It is an accurate way to keep a finger on what's happening, and it works.

The same data base manager may be used to set up an inventory file, or any other information over which you need to have control. It can be used to keep track of articles in various publications, or political contributions, or books in a library - you name it, it can probably be used for it.

What is there about the package we would like to see changed? It sorts rather slowly. We have already talked to Tony about this and he is changing the sort routines. Since we re-arrange and print out almost all the information in our data base, it takes considerable time to print out the weekly summary (about 20 minutes per 100 entries). Since this is done only once per week, it is no problem for us, but could be under other

\*A trademark of the Tandy Corporation



**A year ago, when nobody had ever heard of me, I said these disks could turn a TRS-80\* into a serious computer.**

**Now they tell me I'm "the standard of the industry."**

I'm Irwin Taranto, and times have changed.

In the first twelve months, almost a thousand businesses put me to the test.

You can buy my TRS-80 systems all over the country — dozens of companies sell them. Some are my dealers, some aren't. And this creates a new set of problems.

You see, learning to use a computer — any computer — is like learning anything else. It takes some getting used to. If you sit down with a computer program and the manual and try to figure it out all by yourself, you'll probably just give up and feel you've been had.

You have to hang in there for a month, make a few phone calls, and have somebody who really understands the system help you work it out.

That's why I still answer the phone. And why, I guess, people say all those nice things.

#### **The Model I systems**

So far, I have six systems for the Model I, at \$99.95 each, plus \$20 each for the books where required. For the Cash Journal option on the General Ledger, add another \$50.

- Accounts Payable
- Accounts Receivable
- Invoicing
- General Ledger (Cash Journal optional)
- Payroll
- Inventory Control

conditions.

We feel the program is well written and has more possibilities built into it than the documentation indicates. It has been in daily operation since the first of February 1980, with no problems. It is written in BASIC, and we are still making little refinements and adding "nice touches" to our report formats.

#### **And the Model II programs**

Some brand new, highly-sophisticated programs for the TRS-80 Model II, at \$249.95 each, plus \$20 for the book where required.

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For the Model I programs, you can tell us what you need in a letter or by phone. You get the disk and all the instructions you need. Any problems, just call me.

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That way, I make sure you get a system that works. If you have any doubts about that, I'll give you the names of some people in your area who've already been through the process.

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There are many Data Base Managers available these days, some may do a job for you, others may not. This one is doing a very good job for us.

●  
(IDM-M2 for the Model II is available for \$199., IDM-IV for the Model I is available for \$69. - from Micro Architect, 96 Dothan St., Arlington, MA 02174)

# Investment Portfolio System

## by C S Perkins

### A Business Software Review

This program's aim is to aid the private investor and help in his management of a stock portfolio. The program is carefully developed and allows for a number of operator options. The routines are available for either disk or tape users. This reviewer was using the disk version.

The routine begins by having you create a file of data concerning your

current investment portfolio. The data file contains the following information: Stock symbol, date of acquisition, number of shares, market index at purchase date, P/E ratio at purchase date, price/share at purchase date, current yield/share, current price/share and current price/earnings ratio. The operator has available all normal file maintenance routines such as add to file, delete

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from file, update records, and save to tape or disk. The features of this program allow for specialized file maintenance that an investor will need. You are given the ability to record stock dividends and stock splits. Price per share and dividend per share amounts are automatically adjusted as needed.

One of the outstanding features of the program is its report generation.

**DISK GENERAL LEDGER** maintains complete financial information on diskette. Utilizes printer and generates Trial Balance, Profit/Loss Statement, Balance Sheet and Journal. Enables user to edit data, close out year end accounts and debit-credit verification.

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| ACCT SUB                       | ACCOUNT TITLE      | REF # | DATE | CURRENT AMOUNT |
| 302 00                         | JOURNAL ENTRY      | 000   | 1/78 | 361.50CR       |
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INTERNATIONAL ENTERPRISES INC.  
 STATEMENT OF PROFIT/LOSS  
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|                      | CURRENT PERIOD | YEAR TO DATE |
|----------------------|----------------|--------------|
| LABOR                |                |              |
| PARTS SALLES         | 1.57CR         | 16.97        |
| LABOR SALLES         | 59.36CR        | 641.30CR     |
| GAS & OIL & GREASE   | 46.53CR        | 526.58CR     |
| ACCESSORIES          | 0.00           | 0.00         |
| OUTSIDE WORK         | 0.00           | 0.00         |
| HANDLER FEES         | 17.57CR        | 190.00CR     |
| AIRPLANE FEES        | 23.95CR        | 258.69       |
| RENTAL INCOME        | 0.00           | 0.00         |
| OTHER INCOME         | .46CR          | 5.33CR       |
| TOTAL INCOME         | 100.00CR       | 1080.88CR    |
| DEBIT OF SALES       |                |              |
| MERCHANDISE PURCHASE | 119.91CR       | 1296.09      |
| CONTRACT LABOR       | 8.00           | 0.00         |
| GAS & OIL PURCHASES  | 186.36CR       | 2036.25      |
| TOTAL DEBIT OF SALES | 306.27CR       | 3332.34      |
| GROSS PROFIT         | 208.29CR       | 2251.46      |
| EXPENSES             |                |              |
| SALARIES             | 0.00           | 5.12CR       |
| RENT                 | 26.83CR        | 290.00       |
| ADVERTISING          | 0.00           | .27CR        |

INTERNATIONAL ENTERPRISES INC.  
 BALANCE SHEET  
 JANUARY 1978

| ASSETS                   | LIABILITIES |
|--------------------------|-------------|
| CASH ON HAND             | 740.11CR    |
| CASH IN BANK             | 2190.53     |
| INVENTORY OF PARTS       | 1119.00     |
| DEBTORS                  | 4114.50     |
| ACCUMULATED DEPRECIATION | .00         |
| BUSINESS VEHICLES        | .00         |
| BUSINESS AIRCRAFT        | 20000.00    |
| ACCUMULATED DEPRECIATION | 642.07CR    |
| NET DEPOSITS             | .00         |
| TOTAL ASSETS             | 26041.85    |

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 FREQ 1-W 2-BW 3-M 4-M 1 3  
 DEP #1: 2  
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|----------------|------------|------|------|----------|--------|---------|--------|--------|----------|
| 1              | JOHN SMITH | 0.00 | 0.00 | 422.51   | 25.92  | 20.82   | 2.99   | 0.00   | 372.75   |
| 2              | JAMES MARR | 0.00 | 0.00 | 145.25   | 8.93   | 11.15   | .40    | 0.00   | 122.60   |
| QTR            |            | 0.00 | 0.00 | 171.50   | 10.51  | 17.88   | 1.03   | 0.00   | 142.08   |
| YTD            |            | 0.00 | 0.00 | 121.50   | 10.51  | 17.88   | 1.03   | 0.00   | 142.08   |
| CURRENT TOTALS |            |      |      |          |        |         |        |        |          |
| 594.50         | 0.00       | 0.00 | 0.00 | 2438.75  | 149.49 | 281.45  | 25.58  | 0.00   | 1994.55  |
| YTD TOTALS     |            |      |      |          |        |         |        |        |          |
| 3018.00        | 0.00       | 0.00 | 0.00 | 16096.53 | 994.72 | 1516.31 | 170.47 | 188.39 | 12930.58 |

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| ACCOUNT NO                      | REG    | O.T. | GROSS   | FICA   | FEDERAL | STATE | MISC | NET     |
|---------------------------------|--------|------|---------|--------|---------|-------|------|---------|
| 100                             | 41.50  | 0.00 | 600.25  | 36.79  | 56.80   | 6.84  | 0.00 | 499.82  |
| 550                             | 32.00  | 0.00 | 152.00  | 9.32   | 7.80    | 1.34  | 0.00 | 133.54  |
| 555                             | 164.00 | 0.00 | 555.00  | 34.02  | 59.75   | 4.93  | 0.00 | 465.30  |
| 600                             | 231.50 | 0.00 | 832.45  | 51.02  | 106.74  | 8.73  | 3.84 | 663.92  |
| 575                             | 85.50  | 0.00 | 299.25  | 18.34  | 41.36   | 3.74  | 3.84 | 231.97  |
| COMPANY TOTALS                  |        |      |         |        |         |       |      |         |
| 594.50                          | 0.00   | 0.00 | 2438.75 | 149.49 | 281.45  | 25.58 | 7.68 | 1994.55 |
| RECOMMENDED TAX DEPOSIT \$60.43 |        |      |         |        |         |       |      |         |

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|---------------------------------|-----------|----------|
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| FICA TAX                        | 149.49    | 986.72   |
| FED. TAX                        | 281.45    | 1816.31  |
| STATE TAX                       | 25.58     | 174.47   |
| MISC DEB.                       | 7.68      | 188.39   |
| R.D. HRS                        | 554.50    | 3618.50  |
| D.T. HRS                        | 0.00      | 0.00     |
| NET PAY                         | 1994.55   | 12930.58 |
| RECOMMENDED TAX DEPOSIT \$60.43 |           |          |

Don Scarberry, Tacoma, WA

# BUDGET

*What can you expect this year, based on what you did last year? This program can tell you....*

The program assumes that you are using an 80 chr/in printer with 8.5x11 inch paper. The report can be sorted using any one of the following attributes: Alphabetic by ticker symbol, by price, by earnings, by % yield, by % earnings increase or decrease, total market value, by gain or loss, by % annual return on investment. Once data is sorted according to your choice, you may select any one of four report formats. The first is called the Portfolio Data Report. It is a simple display of all the data entered concerning each stock. The portfolio Values Report computes total values for each security, its % of your total investment, total purchase value, and total dollar yield. The Portfolio Gain Report shows long and short term gains, comparing purchase data to the current date and values. Also shown are the number of days needed to convert from short to long term, % gain, and % change in market index. The last report format is the Earnings-Return On Investment Report. It shows annualized earnings, gains, yields, and % return on investment.

The authors have taken much care in this program. The documentation is reasonable and clear to follow. The routines are error-trapped and you are told how to correct from unforeseen errors without losing data. The authors do make use of an INKEY and ENTER system that takes getting used to. Once a number is typed, it displays on the screen (INKEYed) and then you depress ENTER to confirm your typing or depress CLEAR to erase it. The response time is slow, and decimal entry is somewhat confusing when using this style. Under this approach, you do not enter decimals, the fields are already set to use 2 or 3 decimal places. To enter 3, you must type 300, with a decimal added automatically. The video format is very clean and easy to follow.

This program is an excellent example of what can be done with a 'home computer'. For those of you with an investment portfolio (stocks, bonds, notes, real estate) that needs management, this package is what you need. It is not recommended to mix investments with the same file, but you can keep each one separately. The tape version keeps track of 36 items, the disk version stores a minimum of 72 items in 32K.

At the low price of \$49.95 it is an excellent value.

C Brown

As an expression of my sympathy for all business men who must suffer the agony of weekly budgeting, I am dedicating a listing of my program so that all may enjoy a few extra hours of leisure time, made available only by the marvelous micro-computer. For those of you without a computer, give the program to your secretary and tell her she'll have to compete or you're going to get one.

The program will request three pieces of information: Sales for each day of the week (Sun-Sat) for the previous year, the percentage of sales increase you are planning on, and finally, your average hourly rate of pay for all your employees. If you keep a good set of books then locating last years sales will be no problem. Determining what your sales increase will be for this year is a bit more difficult, but since you are a business man you already have a method so no further comment is necessary. For those of you who don't know what your sales increase will be, a little research is in order. In order for a company to show any growth sales *must* increase at a rate greater than that of inflation. So if the rate of inflation is 10%, you will want a sales increase greater than this figure. This rule is meant to be a guide only, but it can be a starting point. The average hourly rate of pay is determined by dividing your last accounting periods' total wage expenditure by the total number of hours worked by your employees. Management salaries and hours should be included in this calculation. With these three types of data at hand you are ready to use the program.

Output will be given in terms of sales, scheduled working hours to be used for the week, wage expense, percentage wage cost with respect to sales, and finally, sales per man hour (SPMH).

Interpretation of the output is simple enough. Sales will be increased over last years' by whatever percentage you have supplied at the request of the computer. The hours will be the maximum number you can use in order to maintain the desired wage cost percentage. Percentage wage cost is merely that which you have entered during the run of the program. Sales per man hour (SPMH) is a measure of the productivity of your total number of employees (including management). Generally speaking, the higher this figure, the more output you're getting from your employees.

The program is arranged to allow the user to determine a tentative budget. If the first run is not suitable, one can rerun it over and over again until a suitable budget is achieved.

A special note is due at this point. The program, as written, is designed for a business which operates for seven days a week. *You say you don't want to work for seven days?* Then quickly change the program to accommodate your personal needs.

For those businesses closed on Sunday, simply delete lines 130 through 200 and line 830. If your business is closed on both Saturday and Sunday then delete the above mentioned line numbers in addition to line numbers 710 through 800 and 890.

To delete any other day or combination of days, simply delete the line numbers that correspond to the input statement for that day(s) through and including the next CLS statement. Also delete the line number corresponding to that day in the print tab statements which begin at line number 830 and end at line number 890. Happy Budgeting!

*The program assumes a business doing at least \$100. or more a day. Otherwise a "Div by zero" error occurs.*

```

10 REM BUDGET
20 REM COPYRIGHT 1979 BY DON SCARBERRY
30 CLS
40 CLEAR 500
50 PRINT "WEEKLY BUSINESS BUDGET"
60 PRINT STRING$(25, "-")
70 INPUT "ENTER YOUR ANTICIPATED SALES INCREASE (%)":S0
80 IF S0=0 THEN PRINT "REDO PLEASE":GOTO 70
90 S0=S0/100
100 INPUT "ENTER AVERAGE HOURLY WAGE RATE":HW
110 IF HW<=0 THEN PRINT "REDO PLEASE":GOTO100
120 CLS
130 INPUT "ENTER SUNDAY SALES LAST YEAR":S1
140 IF S1<=0 THEN PRINT "REDO PLEASE":GOTO 130
150 INPUT "ENTER YOUR EXPECTED WAGE COST (%)":P1
160 IF P1<=0 THEN PRINT "REDO PLEASE":GOTO 150
170 P1=P1/100
180 SA=INT(S1+(S1*S0))
190 W1=INT(P1*SA)
195 H1=INT(W1/HW)
197 F1=INT(SA/H1)
200 CLS
210 INPUT "ENTER MONDAY SALES LAST YEAR":S2
220 IF S2<=0 THEN PRINT "REDO PLEASE":GOTO 210
230 INPUT "ENTER EXPECTED WAGE COST (%)":P2
240 IF P2<=0 THEN PRINT "REDO PLEASE":GOTO 230
250 P2=P2/100
260 SB=INT(S2+(S2*S0))
270 W2=INT(P2*SB)
280 H2=INT(W2/HW)
290 F2=INT(SB/H2)
300 CLS
310 INPUT "ENTER TUESDAY SALES LAST YEAR":S3
320 IF S3<=0 THEN PRINT "REDO PLEASE":GOTO 310
330 INPUT "ENTER EXPECTED WAGE COST (%)":P3
340 IF P3<=0 THEN PRINT "REDO PLEASE":GOTO 330
350 P3=P3/100
360 SC=INT(S3+(S3*S0))
370 W3=INT(P3*SC)
380 H3=INT(W3/HW)
390 F3=INT(SC/H3)
400 CLS
410 INPUT "ENTER WEDNESDAY SALES LAST YEAR":S4
420 IF S4<=0 THEN PRINT "REDO PLEASE":GOTO 410
430 INPUT "ENTER EXPECTED WAGE COST":P4
440 IF P4<=0 THEN PRINT "REDO PLEASE":GOTO 430
450 P4=P4/100
460 SD=INT(S4+(S4*S0))
470 W4=INT(P4*SD)
480 H4=INT(W4/HW)
490 F4=INT(SD/H4)
500 CLS
510 INPUT "ENTER THURSDAY SALES LAST YEAR":S5
520 IF S5<=0 THEN PRINT "REDO PLEASE":GOTO 510
530 INPUT "ENTER EXPECTED WAGE COST":P5
540 IF P5<=0 THEN PRINT "REDO PLEASE":GOTO 530
550 P5=P5/100
560 SE=INT(S5+(S5*S0))
570 W5=INT(P5*SE)

```

```

580 H5=INT(W5/HW)
590 F5=INT(SE/H5)
600 CLS
610 INPUT "ENTER FRIDAY SALES LAST YEAR":S6
620 IF S6<=0 THEN PRINT"REDO PLEASE":GOTO 610
630 INPUT "ENTER EXPECTED WAGE COST":P6
640 IF P6<=0 THEN PRINT "REDO PLEASE":GOTO 630
650 P6=P6/100
660 SF=INT(S6+(S6*S0))
670 W6=INT(P6*SF)
680 H6=INT(W6/HW)
690 F6=INT(SF/H6)
700 CLS
710 INPUT "ENTER SATURDAY SALES LAST YEAR":S7
720 IF S7<=0 THEN PRINT "REDO PLEASE":GOTO 710
730 INPUT "ENTER EXPECTED WAGE COST":P7
740 IF P7<=0 THEN PRINT "REDO PLEASE":GOTO 730
750 P7=P7/100
760 SG=INT(S7+(S7*S0))
770 W7=INT(P7*SG)
780 H7=INT(W7/HW)
790 F7=INT(SG/H7)
800 CLS
810 PRINT TAB(0)"DAY";TAB(10)"SALES";TAB(20)"HOURS";TAB(27)"WAG
ES";TAB(35)"WG COST";TAB(47)"SPMH"
820 PRINT STRING$(63, "-")
830 PRINT TAB(0)"SUN";TAB(10)SA;TAB(20)H1;TAB(27)W1;TAB(35)P1*1
00;TAB(47)F1
840 PRINT TAB(0)"MON";TAB(10)SB;TAB(20)H2;TAB(27)W2;TAB(35)P2*1
00;TAB(47)F2
850 PRINT TAB(0)"TUE";TAB(10)SC;TAB(20)H3;TAB(27)W3;TAB(35)P3*1
00;TAB(47)F3
860 PRINT TAB(0)"WED";TAB(10)SD;TAB(20)H4;TAB(27)W4;TAB(35)P4*1
00;TAB(47)F4
870 PRINT TAB(0)"THU";TAB(10)SE;TAB(20)H5;TAB(27)W5;TAB(35)P5*1
00;TAB(47)F5
880 PRINT TAB(0)"FRI";TAB(10)SF;TAB(20)H6;TAB(27)W6;TAB(35)P6*1
00;TAB(47)F6
890 PRINT TAB(0)"SAT";TAB(10)SG;TAB(20)H7;TAB(27)W7;TAB(35)P7*1
00;TAB(47)F7
900 T1=SA+SB+SC+SD+SE+SF+SG
910 T2=H1+H2+H3+H4+H5+H6+H7
920 T3=W1+W2+W3+W4+W5+W6+W7
930 T4=(T3/T1)
940 T5=INT(T1/T2)
945 PRINT STRING$(63, "-")
950 PRINT TAB(0)"TOTAL";TAB(10)T1;TAB(20)T2;TAB(27)T3;TAB(35)T4
*100;TAB(47)T5
960 PRINT STRING$(63, "-")
965 PRINT"SALES INCREASED BY ";S0*100;" %","AVG. HOURLY WAGE =
$";HW
990 PRINT "WOULD YOU LIKE TO RE-RUN IT (YES OR NO)":A$
1000 INPUT A$
1010 IF A$="YES" THEN 10 ELSE 1020
1020 CLS
1030 PRINT "BYE-BYE":FORZ=1 TO 2000:NEXT
1040 CLS
1050 END

```

# PRINT MONEY WITH YOUR TRS-80!

If you have a TRS-80 disk system, you already own "Money Machine". It can "print money" for you and your family... and do it legally.

Virtually every business in your community has customer and prospect lists... people and companies that they should send mailings to on a regular basis. But, they seldom do. In a typical business, these names and addresses are totally disorganized and seldom used...even though they represent a valuable sales tool.

## PUT YOUR TRS-80 TO WORK

Your TRS-80 has the ability to totally organize mailing lists for these companies. It also has the ability to supply them with tabular listings and mailing labels upon request. All it takes is a little bit of your time. Any progressive business would be happy to pay you a nominal fee to keep their lists organized and up to date. What's a nominal fee? You can charge 10 cents a name to enter, store and maintain each record in your computer. It's also worth 3 cents to supply this name on a gummed mailing label. Think of it. The label costs three-tenths of a cent going into the printer and, with the value you add, is worth 3 cents when it comes out the other end. That's 1000% profit. That's a "Money Machine".

## HOW DO I GET STARTED?

As a minimum, you'll need a 32K TRS-80 with at least one disk drive and a good line printer. You'll also need a copy of "LABELMAKER", available on diskette from The Peripheral People. This program will allow you to input names and addresses, plus optional data such as company, phone number and so on. "LABELMAKER" also features a unique method of coding each record. You can selectively print labels by using these codes and bypass all others. The records can be sorted by zip code or alphabetically by company or name. In other words, you can provide mailing labels or tabular listings any way your customers want them.

## ANY FRINGE BENEFITS?

You bet! Providing this service is a great way to get the family involved with your TRS-80. Teenagers can easily input and output records during the day. Most women are latent business persons and your wife can easily sell the service, particularly if it means some new clothes, furniture or other "fringe benefits" for her. You can probably promote discounts or trade services with your customers. Once you've established a business in your home you can legally write off a portion of the

rent and utilities...even your TRS-80 to your business. This can reduce your taxes substantially. The possibilities for making money with your TRS-80 are endless.

## YOU RISK NOTHING

If you don't agree that our LABEL-MAKER program does everything that we say, then return the diskette along with a letter telling us why and we will immediately refund your full purchase price, plus the postage.

## TURN THE SWITCH TODAY

Are you willing to invest \$99.50 to turn the switch on your "Money Machine"? Then call The Peripheral People today and order your copy of "LABELMAKER". You can charge it to your Mastercharge or VISA card.

**START YOUR MONEY  
MACHINE TODAY  
BY CALLING  
THE  
PERIPHERAL PEOPLE**

**(206) 232-4505**

**The PERIPHERAL PEOPLE Box 524 MERCER ISLAND, WA 98040**

\*TRS-80 is a trademark of the Tandy Corporation.

# H.O.R.K.S

*Business Computing*

## (A Home Office Record Keeping System)

HORKS stands for Home Office Record Keeping System. It is a Disk based system which will store entries, sort by user assigned codes, print various reports and in general, maintain financial records for home or small business use.

HORKS will work with a 32 or 48K Model I system with one to four drives, with or without a printer.

The program allows an unlimited number of file sets, up to 33 account codes per credit or debit file, and up to 2000 audit entries. It provides three summaries: Total, monthly and account. It allows changing or deleting with automatic entry of such changes in an audit file. It also provides for a profit/loss statement and includes a "search with totals" capability.

HORKS is a single program which creates several files during its

operation. The first file is called a "parameter" file, used to set and name the other files in the system. The audit file is created automatically (you can't cheat), and all changes or deletes are automatically kept track of in this file.

The system also has the ability to link files. This is a very good feature, since loading and handling large files can be time consuming. It allows one to work with smaller files, and then link them only once, later.

The Search feature allows you to do several tasks with the credit, debit or both files. You may search for a particular item by description or by only a part of the description. You may also elect to totalize the particular entries or not. Depending on how you set up the files, this function will allow you to do a general ledger function.

The functions available are:  
Debit Summary

Credit Summary  
Debit or Credit Change  
Delete or Change Entry  
Profit/Loss Statement  
Audit file Read/Print  
Parameter File  
Search

The program is quite easy to run and to get accustomed to. There was only one place where a little more clarity would be helpful (until you get used to it). This is a display on the screen, after which the program asks; CORRECT (Y/N)? Does this mean "is it correct?" or "do you want to correct?". In this program it means: "is it correct?".

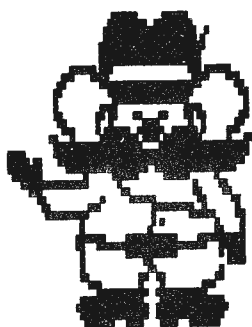
All in all, a nice program to work with. It runs clean, reasonably fast, and the documentation which accompanies it is well thought out and adequate.

HORKS is available from EDU-WARE PO Box 336, Maynard, MA 01754 for \$24.95 on cassette, or \$29.95 on diskette.

# Game Reviews

## REPEAT AFTER ME

by James Talley



"Repeat After Me" is the latest addition to the fine programs that James Talley has written. Based on the popular game called "Simon", Repeat After Me is basically a little bit of a memory teaser. Now, I personally don't care for these types of games as I have found my memory to be less than perfect, and it tends to be a little frustrating. Nevertheless, I continued playing the game and found the graphics display and the sound to be superb and definitely worth the frustration.

A charming character who resembles the famed "Yosemite Sam" enters the screen and whistles his rendition of "Dixie", then informs you that he will whistle a number which is displayed on the screen. It is up to you to repeat those numbers in the proper sequence.

There are five levels of play, 1 being the slowest and 5 the fastest. The object, of course, is to repeat as many of the numbers in a sequence as your memory will allow.

The pacing is good, the game itself is fair and the graphics and sound are great.

Repeat After Me is available on cassette for \$9.95 from 80-U.S. Software, 3838 South Warner St., Tacoma, WA 98409

C Shappee

INVADER L2 16K cassette \$14.95  
ANIMATED HANGMAN L2 16K \$9.50  
CREATURE TIC TAC TOE L2 16K \$9.50

Level IV Products 32238 Schoolcraft,  
Livonia, MI 48154

Reviews by T R Dettmann

When the TRS-80 first was introduced, there was very little software, most of the users of the system were very unsophisticated, and all there was to do was play games. Over the past two years this has all changed.

Because of the popularity of the TRS-80 Model I, there is probably more software available than for any other machine, and much of it is for very serious applications.

Users have improved also. No longer are we a bunch of Hicks in from the farm, dazzled by the pretty lights and hanging on every word of the Radio Shack salesman with their plaid jackets and smooth tongues (only owned by a little old lady from Pasadena who used it on Sundays, indeed!!!!). Users are now asking better questions from their dealers and looking for more from their software.

Two years ago, almost any kind of software would sell, and in fact nearly everything did. I can't begin to say how many versions of the same old games we saw here at 80-U.S., but it was WAY too many! As users have become more critical, most of the games have fallen by the wayside.

Now, only the best games survive in the market place. That's why I expect that these three games will be around for awhile. Each game provides the kind of graphic and sound effects pioneered by our own Leo Christofferson.

### INVADER

My son's favorite (and mine as well) is the TRS-80 version of the electronic game SPACE-INVADERS. For those of you who don't frequent bars where this game is played, the object of the

game is to knock out the invading armies from your moveable gun position.

As the defender, you have something to hide behind, but you have to come out in the open to shoot and each hit on the defenses weakens them. Also, the invaders are coming down and moving back and forth at the same time making them harder targets to hit.

The program, which includes sound output through the cassette port, is written in machine language and so must be loaded with the SYSTEM command (or from disk as a CMD file). Even in machine language though, it doesn't have the speed of arcade games, but then I didn't expect it to. Relatively speaking, it's slow but fun.

### ANIMATED HANGMAN

Game number 2 on the list is still another version of the old hangman type. For the few of you out there who have never played hangman, the object of the game is to guess a word before you hang the man on the screen.

You guess by typing in letters. If the letter is in the word, it is displayed in its proper place and the man is OK. If the letter is wrong however, the man has a part of the scaffolding or rope built. If you can't get the word before all of the parts are put together, the man is hung and you lose.

It's an old game and there have been many versions before this, but none quite so nice as this. The animation makes the game fun and captures the younger crowd before they realize that they're learning something.

### CREATURE TIC-TAC-TOE

Creature TIC-TAC-TOE's one claim to fame is the application of animated graphics figures to the TIC-TAC-TOE game. Every move you make is carried out by a little monster figure who moves across the board and places creature markers in the appropriate spaces.

The game is interesting once for anyone but becomes boring because the action is very slow. It takes a long time for the markers to get placed, and I don't know about you, but I can only watch an animated creature walking across the screen in the same way for a few minutes. That's all you'll need to catch all the moves.

Still, it is interesting to show off to your guests, particularly because someone ALWAYS wants to play TIC-TAC-TOE (you might consider challenging him to play NINE-TAC-TOE from 80-U.S. Journal's May issue).





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# NOTES

It has been called to our attention that the 'CALL 28A7H' described in the Sep-Oct 79 issue simply doesn't work from DOS READY. This is because one of the jump vectors gets wiped out when DOS is loaded. If you want to use a machine language program that executes directly from DOS READY, a CALL to address 44CFH will print anything up to a ODH or a O3H. The ODH (CR/LF) character will print, while the O3H will not.

To all of you who have been PEEKing around those reserved areas of RAM: Have you ever wondered what that long string of 04's from 4101H to 411BH are? They are used so the ROM can tell what type of variable is being used when no type identifier is used (like A%, BI, C@ and D\$). Try this: DEFINT A-Z and PEEK at addresses 16641 through 16667. They should all be 2! DEFSNG A-Z results in 4's, DEFSTR nets 3's and DEFDBL gets you 8's. See, there is a reason!

Need some more ways to get in and out of Basic? You can get out of the ROM by using the jump vectors for LIST and LLIST (41DFH), SYSTEM (41E2H), RUN (41C7H) or the '&' symbol (4194H).

Or, to be even a little more tricky, try building your own 'Jump table' using the INP(n) command. INP pokes the port number (the number in the parenthesis) into address 4094H, and then calls 4093H. With just a little experimentation, you can have a genuine vectored USR function by selecting the port number according to the routine you wish to select. Of course, you must first POKE your own JP instruction and addresses into addresses 4093H-4095H.

Are you troubled by the OUT OF MEMORY error you get when returning to Basic after loading a machine language program? Try jumping to address 6CCH instead of 1A19H. This is the route taken by the panic (RESET) button when disk is not present.

How about a new way to keep people from BREAKing into the middle of your programs and stealing your secrets? Here's a technique that is simple, effective and works just as well on Disk Basic as Level II. With this in your program, the machine is locked up so tight that anytime the BREAK key is pressed, the program RUNS itself all over again! In fact, in Level II, even the RESET button is disabled in this same fashion so that the only way the Level II user can escape from your program is to *completely power down!*

Step 1: Pack a string (see String Packing Techniques Exposed, May-Jun 79) in line 20 (I chose QQ\$) with the following bytes:

42,164,64,43,195,30,29

Step 2: Add the following code:

```
30 Q1=PEEK(VARPTR(QQ$)+1):
 Q2=PEEK(VARPTR(QQ$)+2)
40 POKE 16812,195:POKE 16813,Q1:POKE 16814,Q2
```

Step 3: RUN the program. This is an excellent way to prevent students from getting into your educational software, as well as a good general purpose program protection feature. One final note though. Be sure your program is *completely* debugged before adding the code, as this will keep you out as well as everyone else!

✓ We have received several comments about the lack of a comma on the numeric keypad provided on the newer 16K Level II's. Charles Quante offers his solution to the dilemma in the form of the following modifications to the "Software Numeric Keypad" (SYSTEM/COMMAND, May-Jun 80):

```
130 BASIC EQU 0072H
180 CP 24
270 LD HL,BUFF
280 CP (HL)
290 RET NZ
300 INC HL
360 BUFF DEFM ','
```

Also, he tells us to delete lines 310, 320 and 370. The change to line 130 eliminates the possible OM ERROR that can occur when entering Basic after loading a machine language program (this is another method, apart from the one mentioned earlier in this column). Also, the change to line 180 allows the use of shift left-arrow instead of shift down-arrow, since the left arrow is closer to the keypad.

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## MODEL II NOTES

The following information comes from Bill Schroeder of Galactic Software Ltd.

If you are trying to get into the Model II DOS and need a password, try ".F36". It works just fine and opens all levels of password protection up to and including level 6.

The Model II DEBUG will not allow you to go beyond certain limits in RAM. By using the PATCH function in TRSDOS 1.2 and adding the following PATCHes, you can have complete access to *all* of memory:

```
PATCH SYS15B/SYS.F36 A=F6A2, F=E511, C=1808
PATCH SYS15B/SYS.F36 A=F930, F=21FF, C=1811
PATCH SYS15B/SYS.F36 A=FA00, F=21FF,
C=180D
```

✓ As you probably know, the Model II is fully port-based, as opposed to the Model I which is memory mapped. The I/O ports for the printer port is E0 for input, and E1 for output. We hope to have the entire I/O scheme figured out soon, and when we do you will be the first to know.

# ASPTCH

A couple of months ago, a fellow identifying himself as James F Williams called and asked if he could send me a tape for review. I said no, I don't write reviews, but asked him to tell me about it anyway. What he told me changed my mind. Mr Williams has written a program called ASPTCH, and I'd like to tell you about it.

Simply put, ASPTCH opens up the world of interactive programming to users of Radio Shack's EDTASM. It not only allows the assembly of programs directly into memory and their execution therefrom, but it also lets the user bounce back and forth between EDTASM and Level II Basic. Additionally included is a combined decimal-to-hex-to-decimal converter and memory dump command, plus built-in keyboard debouncing. "Must use a lot of memory", you groan, recalling your last BUFFER FULL. Wrong. Combined with ASPTCH, EDTASM actually occupies *less* memory than it does without it! Magic? Not at all. Here is how it works.

To use ASPTCH you have to have a Level II machine and EDTASM, version 1.2. Load EDTASM from SYSTEM as usual, but do not type /ENTER to start it. Next load ASPTCH in the same way. (My copy loaded perfectly the first time.) Now type /ENTER, and EDTASM/ASPTCH will be activated. When ASPTCH is loaded thus, it overlays some routines in EDTASM which were duplicated from Level II ROM (so EDTASM could be used in Level I machines). ASPTCH changes calls to these overlaid routines to refer to their ROM counterparts. Hence the decrease in memory required.

When ASPTCH is activated, you are asked to reserve memory for your object code, or just hit ENTER - just as

in MEMORY SIZE?, except that the number entered can be in decimal or hex, and you can alter it later if you change your mind. From there EDTASM takes over, and it's just like the good ol' days, less the keybounce, until you try entering an illegal command. That's how you call up ASPTCH - - by typing X ENTER, or something equally illegitimate. Then you get the ASPTCH heading:

```
ASPTCH> RESERVED AREA: 7F00H
32512. RE-ENTRY 40CCH 16588.
DUMP TO CASSETTE. T-BUFFER
BYTES LEFT 08607. (AEDCSRMB)?
```

It tells you how much room you've reserved for object code, how to get back to Basic, whether you're dumping to cassette or memory, and how much space you've got left for source text. It then gives you a choice of seven one-letter commands, which I will briefly describe:

A: Change reserved memory boundary.

D: Change dump toggle from DUMP TO CASSETTE to DUMP TO MEMORY or vice versa.

When dumping object code to memory, you hit ENTER when EDTASM says READY CASSETTE, and your assembled program is put wherever your ORG specifies (usually in reserved memory). This dumping, to my surprise, was not instantaneous, and I discovered signals still emanating from my cassette port. In talking to Mr Williams, I learned that ASPTCH intercepts the object code in the cassette output routine. Most of the cassette output, including the leader is inhibited, but certain addresses to get past, slowing down the dump a bit - - not objectionably, but noticeably.

E: Execute the object code you've dumped into memory.

C: Convert hex to decimal or vice-versa and dump contents of address entered to screen. A sub-command here allows a temporary escape to Basic for more involved calculations, if you don't have a calculator handy, or for using POKE to modify memory.

S: Escape to SYSTEM mode in Level II Basic. On return to EDTASM your source text and object code will be intact.

R: Escape to READY in Level II Basic. This is just for doing computations not involving variables or an actual program. Again, your source and object codes are preserved.

M: Escape to MEMORY SIZE? in Level II Basic. This is the biggie. It allows you to initialize Basic and do whatever you want therein, while still preserving EDTASM/ASPTCH in protected memory, along with your object code, but not your source. Entering /16588 under SYSTEM gets it all back (and destroys any Basic program in memory), without having to reload.

The commands are easy to use and are beginning to feel natural to me now. With ASPTCH I can type in and edit source text, assemble it, execute it, go back and modify the source, assemble again, *ad infinitum*, all without having to touch a cassette. A cover letter accompanying the tape explained that ASPTCH had gone through ten versions and required ten months work to bring it to its current state. I believe it. It's a highly polished and usable utility. The documentation, on the other hand, while complete and full of examples, doesn't reflect quite the same degree of refinement. Mine is a 17 page photocopy of typewritten text, and the letters are a little light. The extra money and effort required to print it, add some boldface section headings perhaps, and clean up the drafting a bit would make it an eminently more readable (and marketable) document. But everything you need to know is there, and I don't think the average assembly language programmer will find it hard to understand.

ASPTCH is available from Micropute Software, PO Box 1943, Rocky Mount, NC 27801, and includes source code on tape for a breakpoint routine plus a system tape dumping program. The price, \$19.95 for the whole package, seems a little low. Though I'm convinced of Mr Williams' sincerity in supporting his product and helping his customers, I hope he can do it at that price and still turn a profit. I say this because I'd like to see him produce more software as good as ASPTCH.

Phil Pilgrim

by Pat Perez

## SOFTWARE REVIEWS

### Courtball

Maranatha Software 74 Park Ave.,  
Chalfont, PA 18914. L2 16K \$9.95

Courtball is a one or two player game, which is a very good replica of the 'Pong' games of a few years ago. In fact, in many respects it is as if Pong underwent some Darwinian changes through a few generations of micro computer software developments.

The program incorporates a large cross of the Pong, Hockey, and Handball games, but this also has provision for practice games, or tournaments, both for one or two players. Another feature is the option to choose goals, from five available. In addition to choosing the goals, the players may choose an obstacle from eight existing, or as a ninth option, a user defined obstacle may be created. Other options include: One player against the computer (who plays a mean game); Single Games, or Tournament play of three games; and also ball speed is constantly under player control. Paddle speed is in direct proportion to ball speed, the faster the ball, the faster the reaction time of the paddles.

Instead of one point per ball, as on most old 'Pong' games, one point is added for each time that the ball hits an obstacle. The longer the ball is in play, the higher the score gets. The winner of the game is the player who has the highest cumulative score for five balls. The player who has the highest cumulative score for three, five ball games, is the winner of a tournament.

...So you are losing in a game, on the fourth ball, and suddenly, 'WILDBALL!!' flashes on the screen. Your pulse jumps, and the score is set to 500 points, and the ball enters the field. It is moving fairly slow, but the speed controls have locked, and the ball begins slowly accelerating. If you last two minutes, the ball has reached top speed, and is a blur. The person who takes this ball wins the game. Suddenly, 'GAME OVER' flashes on the screen, and some player has about 700 more points.

These high speed graphics are made possible by a very extensive machine language subroutine, stored as basic 'Data' lines in the program. In addition to graphics, there is a very good sound routine, which adds much to the game.

If you are looking for a very good one or two player action game, 'COURTBALL' certainly fills the bill, taking very little time to learn.

### RATINGS

**INSTRUCTIONS:** Very thorough, complete with operating flow chart

**CHALLENGE:** Varying, from little challenge to 'HELP!!'

**PACING:** Very Good.

**RECOMMENDATION:** If you're looking for an action game, this is it. Also, Maranatha Software includes a nifty FREE offer - it's each cassette.

### TAIPAN

Cybernautics, PO Box 40132, San Francisco, CA 94140 L2 16K \$9.98

For Sale: 1 Vintage 1860 junk, equiped with 1 gun, with room for 4 more guns, or 40 units of cargo. Just \$1586.00. Also For Sale: Any Quantity: Opium - \$16800; Silk - \$850; Arms - \$65; General Cargo - \$24.

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If any or all of the above ads interest you, then TAIPAN, by Cybernautics, is probably the trading game for you. TAIPAN is a one player game in which one attempts to amass \$1,000,000 in cash and cargo, by traveling from port to port in 19th century China.

Through skillfully buying and selling import and exportable goods, one may quickly earn his or her goal of a cool million, but with the constant option to purchase a larger ship, or another ship's gun, most players will begin to want to plunder passing pirates.

The program, coming in just under the wire of a 16K machine, is a very well written basic program. The program has a very good layout of information, including how much room is left in the ship, how many ships guns are operational, the amount and type of cargo on board, and in a warehouse in Hong Kong, selling prices of merchandise, the amount of cash on hand, and best of all, the amount of money stuffed away in the Bank of Hong Kong. All this information on the screen at once may seem frightening, but the programmer, Art Canfil, very carefully and orderly set everything on the screen in an easy to find manner.

The program has many wild cards that may spring up at just about any time. Some of the surprises help, but all of them keep the game interesting. There is nothing more annoying than to dump a full load of opium for \$18,000 only to find in the next port that because of hospital use, the cost

of opium has left to \$240,000. Other surprises may not be so mundane, though. Several times, when I had a million, I encountered a TAI-FUNG STORM that I could not brave, and went down with the ship. Gilligan was at least lucky enough to find a tropical paradise, where is Hawaii when I really need it?

Other terrors of the high seas are pirate ships that want more booty to add to their wallets. Fighting is an option, provided that one has ships guns present, but the choice of running always exists. Keep in mind that if the pirates are defeated, their booty goes to the lucky surviving Captain.

If you sit down to play TAIPAN, make sure that you have a few hours to spare. The game is highly addictive. Although fairly simple, it has the ability to absolutely mesmerize it's victims.

I was caught off guard a few times, particularly the first time I encountered the Pirates. The program displayed every ship that I was battling. (I once died at the hands of 138 of Li Yuens Insurance Company.) The display, also shook when I was damaged, through the use of the 'OUT 255' command.

During play, the program asks questions, such as whether to 'Buy, Sell, or Quit Trading?', and these are answered by one letter replies, noted by INKEY\$. The only time the 'ENTER' key need be depressed, is when a multi lettered answer is expected.

The goal of \$1,000,000 is fairly easy to reach, (I got there on my first try.) Although the real fun comes from reaching astronomical scores, because the program will give a competitive rating based on the date, and the amount of money earned. I have seen the score range anywhere from 203, to 5.1E+10. Being rated a perfect '10' is not going to cut it in this game. (Bo Derek watch out!)

If you can't tell by now, I am crazy about TAIPAN. It is simple, but very intriguing. If you aren't going to run out and buy it, at least find someone who owns it and run it once. I have yet to find anyone who hasn't also gone crazy about it.

#### RATINGS

GRAPHICS: Good, Especially information table.

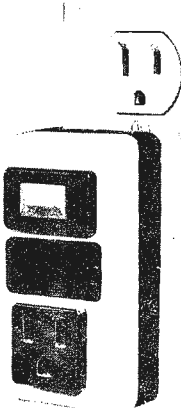
PACING: As Fast or as Slow as desired, very good.

INSTRUCTIONS: Unnecessary, but very good.

CHALLENGE: Excellent!!

P Perez

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DON'T USE INTEGER VARIABLES (TWO BYTES) IF  
ALL YOU NEED TO STORE IS 0 OR 1.  
THE TECHNIQUE DESCRIBED IN THIS ARTICLE  
SHOWS HOW TO CUT MEMORY REQUIREMENTS  
IN THIS SITUATION BY 15/16!

J N Davis, Sunnyvale, CA

# BITS vs BYTES

Computer programs for many different applications require maintaining tables wherein the values to be entered in the tables can only take on the values zero or one. Maze games are an example where the program may need to keep track of whether a wall segment is "open" or "closed". In a business application, it may be required to store data such as exempt vs. non-exempt, full time vs. part time, etc.

The most straightforward approach to storing this type of data is to set up integer arrays. In the business example cited, and array of integers dimensioned for the number of employees could be used for storing a zero or a one to indicate full time or part time status. Since each element of the integer array consumes two bytes of memory, it doesn't take many employees or a very large maze to quickly exhaust the addressable memory in a TRS-80 or other Micro. In addition, reading or writing this data to tape or disk can also be time and space consuming.

However, since these integers can only take on the values of zero or one, one bit is all that is required for storing this data instead of the 16 required for an integer variable or integer array element. In order to make use of this possible data compacting, methods are required for testing whether a specific bit is zero or one and for setting a bit to zero or one. GOSUB 1 and GOSUB 2 perform these functions using a technique called bit masking and the logical operators available in TRS-80 Basic.

PROGRAM 1 demonstrates the conventional approach to storing and manipulating all of these zeros and ones. Lines 100-110 set an array element to zero; lines 200-210 set an element to one; and, lines 300-310 test an array element. PROGRAM 2 is PROGRAM 1 modified to make use of the bit-by-bit data storage technique. Note that in PROGRAM 1 the array NX has 3001 elements (numbered from 0 to 3000) at two bytes each for a total requirement of 6002 bytes. In PROGRAM 2, the NX array consumes only 376 bytes for a saving of 5626 bytes. Of course, the total memory saving is not quite this great because of the "overhead" which has to be paid in the form of including the two GOSUBs in the main program and the calculations which must be done before the GOSUBs can be called. However, if only one array needs to be manipulated in this way in a given program, the calculation of such variables as JK, NN, and J in PROGRAM 2 can be included as part of the GOSUBs and this will help to reduce the overhead. To determine the proper array dimension, divide the total number of desired locations by 16 and round upward. In the example, 3001 locations were desired, and  $3001/16 = 187+$  so 188 locations were necessary in PROGRAM 2, numbered zero through 187.

This technique can be expanded to simulate having large, multi-dimensional arrays as might be required for the hypothetical maze game. In addition, variables having values other than zero or one can be "packed" into a single integer using a variation of this technique and this may be covered in a future article.

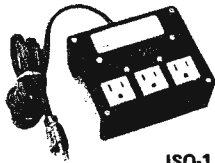
```
8000 REM CHANGE BIT 'J' (0-15) OF INTEGER 'NN'
8010 REM TO CONDITION 'II' (0-1)
8020 IF J = 15 THEN JJ = -32768 ELSE JJ = INT(2^J + .5)
8030 IF II = 1 THEN NN = NN OR JJ ELSE NN = NN AND (NOT JJ)
8040 RETURN
```

GOSUB 1

```
9000 REM TEST BIT 'J' (0-15) OF INTEGER 'NN'
9010 IF J = 15 THEN JJ = -32768 ELSE JJ = INT(2^J + .5)
9020 IF NN = (JJ OR NN) THEN II = 1 ELSE II = 0
9030 RETURN
```

GOSUB 2

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```

10 DEFINT I-N
20 DIM NX(3000)
.
.
.
100 IJ = 412
110 NX(IJ) = 0
.
.
.
200 IJ = 1017
210 NX(IJ) = 1
.
.
.
300 IJ = 2460
310 IF NX(IJ) = 0 THEN . . . ELSE . . .
.
.
.
PROGRAM 1

```

```

10 DEFINT I-N
20 DIM NX(187)
.
100 IJ = 412

```

```

110 JK = INT(IJ/16)
120 NN = NX(JK)
130 J = IJ - JK*16
140 II = 0
150 GOSUB 8000
160 NX(JK) = NN
.
.
.
200 IJ = 1017
210 JK = INT(IJ/16)
220 NN = NX(JK)
230 J = IJ - JK*16
240 II = 1
250 GOSUB 8000
260 NX(JK) = NN
.
.
.
300 IJ = 2460
310 JK = INT(IJ/16)
320 NN = NX(JK)
330 J = IJ - JK*16
340 GOSUB 9000
350 IF II = 0 THEN . . . ELSE . . .

```

PROGRAM 2



---

# Level II Cross Reference Index

Roger Amidon, Arlington, VA

NEWDOS owners have the handy REF \* or REF \$ feature, which will list all references in a program and show how they were used. Here is a Level II version which although not as fast or complete, will still give you a sorted cross reference of all the variables and line numbers referenced in the text of a Basic program.

---

This program will produce a sorted cross-reference index of all the variables and line numbers referenced in the text of a Level II BASIC program. It is designed to be temporarily appended to the subject program, run to produce the index, and then deleted. It is not fast, but not bad for a program that actually does something.

The listing produced either on the screen or printer is simply the referenced variable symbol or line number followed by the line number it appears in. If the variable or line number is referenced more than once within a line it will only be listed once with that line number.

The instructions for use are;

- 1) CLOAD subject program.
- 2) Append this program. See Radio Shack Microcomputer Newsletter, July 1979 for a simple technique, or the Sept/Oct 1979 issue of 80-US for Phil Pilgrim's elegant solution to appending BASIC statements in Level II.
- 3) Enter "RUN 65000".
- 4) Go out to lunch. (I told you it wasn't fast)
- 5) Progress can be observed as the Z-80 address and BASIC line number are printed for each BASIC statement scanned.
- 6) When done, the index is listed on the CRT, and then a request for hardcopy is made. As long as you say NO to the printer option, the listing will be repeated on the CRT. If the hardcopy option is taken the listing is printed and the program quits.
- 7) When satisfied with the results then remove the program by DELETE 65000-65440.

The best way to understand the operation of this

program is to first read the articles by Dick Straw on "How LEVEL II Interpreter Sees It" and Phil Pilgrim on appending statements using CLOAD. Both these articles are in the Sep/Oct '79 issue of 80-US, and were the basis for the development of this program.

The program logic is simply a scan from beginning to end of the BASIC statements found in core at execution time with each variable symbol or line number found tabled in an array in ascending sequence. When the end of the subject program is reached, the array is listed. The trick is to separate the variables from the commands, and recognize the beginning and end of the variables.

One of the interesting aspects of this program is that it uses itself to test itself. Type in the program and run. As long as line #65045 is left in, it will scan itself and produce output. Once debugged, delete line #65045, and the program will stop the scan when reaching line #65000. You don't want to see all those ZZZZ's every time you run it.

There are improvements that you could make, but you must consider that it may not be worth it, since once a program is debugged, you rarely need an index again. I realize that the sequence will place line #101 after #1001, because of the left justified data, but how often do you have programs spanning line number ranges like that.

Once you get used to debugging a program with a cross reference index, you are going to wonder how you did it before. This is a tool that normally comes with every assembler or compiler, but there is a limit to what you can cram into a 12K ROM chip, and I guess this tool was beyond the limits.

```

65000 CLEAR 5000: DIM ZZ$(500): CLS
65010 Z=17129
65020 ZN=PEEK(Z)+PEEK(Z+1)*256
65030 IF ZN=0 THEN 65380
65040 Z$="": Z=Z+2: ZL=PEEK(Z)+PEEK(Z+1)*256: Z=Z+2: Z1$="N": Z3$
="N"
65045 GOTO 65060: REM DELETE THIS LINE AFTER GOOD TEST
65050 IF ZL >=65000 THEN 65380
65060 PRINT Z;ZL
65070 IF PEEK(Z)>=65 AND PEEK(Z)<=90 THEN 65360
65080 IF PEEK(Z)>=48 AND PEEK(Z)<=57 AND (Z1$="Y" OR Z2$="Y") T
HEN 65360
65090 IF PEEK(Z)=33 OR PEEK(Z)=35 OR PEEK(Z)=36 OR PEEK(Z)=37 T
HEN 65360
65100 IF PEEK(Z)=141 OR PEEK(Z)=145 OR PEEK(Z)=149 OR PEEK(Z)=1
59 OR PEEK(Z)=202 THEN Z2$="Y"
65110 IF PEEK(Z)=34 AND Z3$="Y" THEN Z3$="N": GOTO 65150
65120 IF PEEK(Z)=34 THEN Z3$="Y"
65130 IF PEEK(Z)=147 THEN Z3$="Y"
65140 IF PEEK(Z)=58 THEN Z3$="N"
65150 IF Z1$="N" THEN 65370
65160 ZL$=" "+STR$(ZL): ZL$=RIGHT$(ZL$,5)
65170 Z#=Z#+"" : Z#=LEFT$(Z$,6)
65180 Z#=Z#+"" +ZL$: ZX%=0: Z1$="N":
65190 IF Z# = ZZ$(Z%) THEN 65350
65200 IF Z# > ZZ$(Z%) THEN Z%=Z%+1: ZZ$(Z%) = Z#: GOTO 65350
65210 FOR ZU% = 0 TO Z%
65220 IF Z# = ZZ$(ZU%) THEN 65350
65230 IF Z# < ZZ$(ZU%) THEN 65260
65240 NEXT ZU%
65250 STOP
65260 Z%=Z%+1: FOR ZD% = Z% TO ZU%+1 STEP -1
65270 FOR ZI%=0 TO 2
65280 ZJ%=PEEK(VARPTR(ZZ$(ZD%))+ZI%)
65290 ZK%=PEEK(VARPTR(ZZ$(ZD%-1))+ZI%)
65300 POKE(VARPTR(ZZ$(ZD%))+ZI%), ZK%
65310 POKE(VARPTR(ZZ$(ZD%-1))+ZI%), ZJ%
65320 NEXT ZI%
65330 NEXT ZD%
65340 ZZ$(ZU%) = Z#
65350 Z$="": GOTO 65370
65360 IF Z3$="Y" THEN 65370 ELSE Z#=Z#+CHR$(PEEK(Z)): Z1$="Y":
Z2$="N"
65370 Z=Z+1: IF Z=ZN THEN 65020 ELSE 65070
65380 FOR Z2%=1 TO Z%: PRINT ZZ$(Z2%): NEXT Z2%
65390 INPUT "HARD COPY? Y OR N": Z$
65400 IF Z$(0)"Y" THEN 65380
65410 INPUT "READY PRINTER THEN ENTER PROGRAM NAME": Z$: LPRINT C
HR$(30) Z$: LPRINT " ": LPRINT "LINE OR REFERENCE": LPRINT "VAR
TABLE IN LINE ": LPRINT " "
65420 FOR Z2%=1 TO Z%: LPRINT ZZ$(Z2%): NEXT Z2%
65430 LPRINT " ": LPRINT "* END OF INDEX *" CHR$(29)
65440 LPRINT " ": LPRINT " ": LPRINT " ": LPRINT " ": END

```

# TRS-80 Morse Code Transmit & Receive System

Software Review by Dr Richard Robertson, Washington, DC

**TRS-80 Morse Code Transmit & Receive System**  
**Richcraft Engineering Ltd**  
**Drawer 1065**  
**Chautaugua Lake, NY 14722**  
**Price: \$11.95 cassette, \$14.95 disk**

Here is a unique program written by W4UCH/2 that offers something to everyone from the aspiring future ham who wishes to learn Morse code (random 5 letter groups from 5 to 35 words per minute), up to the experienced high speed CW contester who will undoubtedly use the 20 prepared messages and auto logbook functions. The program is written in Basic which allows even the neophyte programmer to follow the flow and logic, and most important, it allows the user to easily insert his/her own QTH (address), call letters, ARRL section, handle (name), etc. The program is written in Level II Basic and though rather lengthy (18000 bytes), is broken down into 2 parts: Initial instructions and main program, which allow it to run on any TRS-80 with 16K memory. The most unique aspect of the program is its ability to both receive and transmit Morse code with no ancillary devices whatsoever, though a buffer/keying relay is recommended between the TRS-80 and the amateur radio transmitter.

For receiving Morse code it is only necessary to connect the cassette recorder EAR plug across a ham receiver's speaker terminals and adjust the receiver's volume control so that approximately 1 volt AC of Morse code audio signal is input to the TRS-80. An ingenious software program allows the TRS-80 to actually decode the Morse signal with automatic speed adjustment after the first few Morse characters are received.

I am an aspiring radio amateur in the process of learning Morse code and studying the ARRL License manual before taking my test for an FCC Novice Class License. By using this program's excellent Code 1 (alphabet only), Code 2 (alphabet plus

numbers), and Code 3 (alphanumerics plus punctuation) code practice functions, I was able to reach 10 words per minute in about 2 weeks of spare time practice. The TRS-80's AUX cassette plug was simply plugged into an inexpensive Radio Shack Code practice oscillator which generated the audio tone via the TRS-80 cassette on-off control relay which serves as this program's Morse keying relay.

Let me describe the system beginning when I opened the shipping package. There are 12 pages of double spaced printed instructions which even my 14 year old son can understand. These instructions lead the user through the program flow and logic. What a real pleasure it was to not be misled by mysterious GOSUB's, RETURNS and totally illogical programming that is so typical of most amateur programmers. After a bit of research, I found out that the author was a professional engineer and programmer specializing in microwave communications; i.e., he just finished writing "The Gunnplexer Handbook - A Microwave Primer for 10 GHz." He has also been a ham radio operator the last 35 years so had a bit of practical experience with Morse. I never believed I could follow an 18000 byte program so easily, but clear and lucid programming is what surely separates the men from the boys and their toys.

Following instructions, I soldered a mini-phone jack across my ancient NC-300 receiver's speaker terminals, loaded the program from cassette, plugged in the TRS-80's EAR plug, and tuned in W1AW's code practice session on 20 meters. The program first asks you whether you wish 'A' = alphanumerics on video or 'M' = Morse on video (1 = dot and 2 = dash). The 'M' function is only for Cub Scouts first few lessons. I chose 'A'. The program then asks for Code Speed

input of 5, 10, 15, 20, 25, 30 or 35 words per minute. This is for TRANSMIT speed only, as RECEIVE is automatic and good up to about 20+ words per minute, which is far faster than I can copy. The program then reminds you that left arrow will give you a 5 page instruction summary and the CLEAR key is your transmit and receive switch. After ENTER, the video is cleared and the upper left corner displays TRANSMIT. Any character on the keyboard that is pressed and has a Morse equivalent is then output via the cassette on-off relay. If you press 'up arrow' in the TRANSMIT mode the transmit subcommand mode is called and presents a video display menu. If you key in QRX 'ENTER' the program transmits: "PLEASE STANDBY THE PHONE". If you key in QSY+ 'ENTER' the program transmits: "PSE MOVE UP 3 KHZ UP 3 KHZ DE W3ABC K."

When in the TRANSMIT mode, pressing the CLEAR key instantly displays in the upper left corner, following any transmitted data, RECEIVE. Now we were ready for the ultimate test of this program. We had W1AW, the ARRL Headquarters station, tuned in which broadcasts code practice 3 times nightly at most all speeds, and ZAP...all the dah-di-dah-dits were displayed in *living* alphanumerics, so that even my 11 year old daughter could read the ARRL bulletins and code practice sessions.

Being able to enjoy the many delights and pleasures that ham radio can offer is considered only an extra dividend that this excellent program affords the TRS-80 owner.

CONSUMER RATING: Excellent, but grossly under-priced for an 18K byte program that does so much for so little investment. Highly recommended to both Novice and advanced radio amateurs. Copying the AP and UP wire service news bulletins hours before release can be funsville indeed. ●

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