80-U.S.

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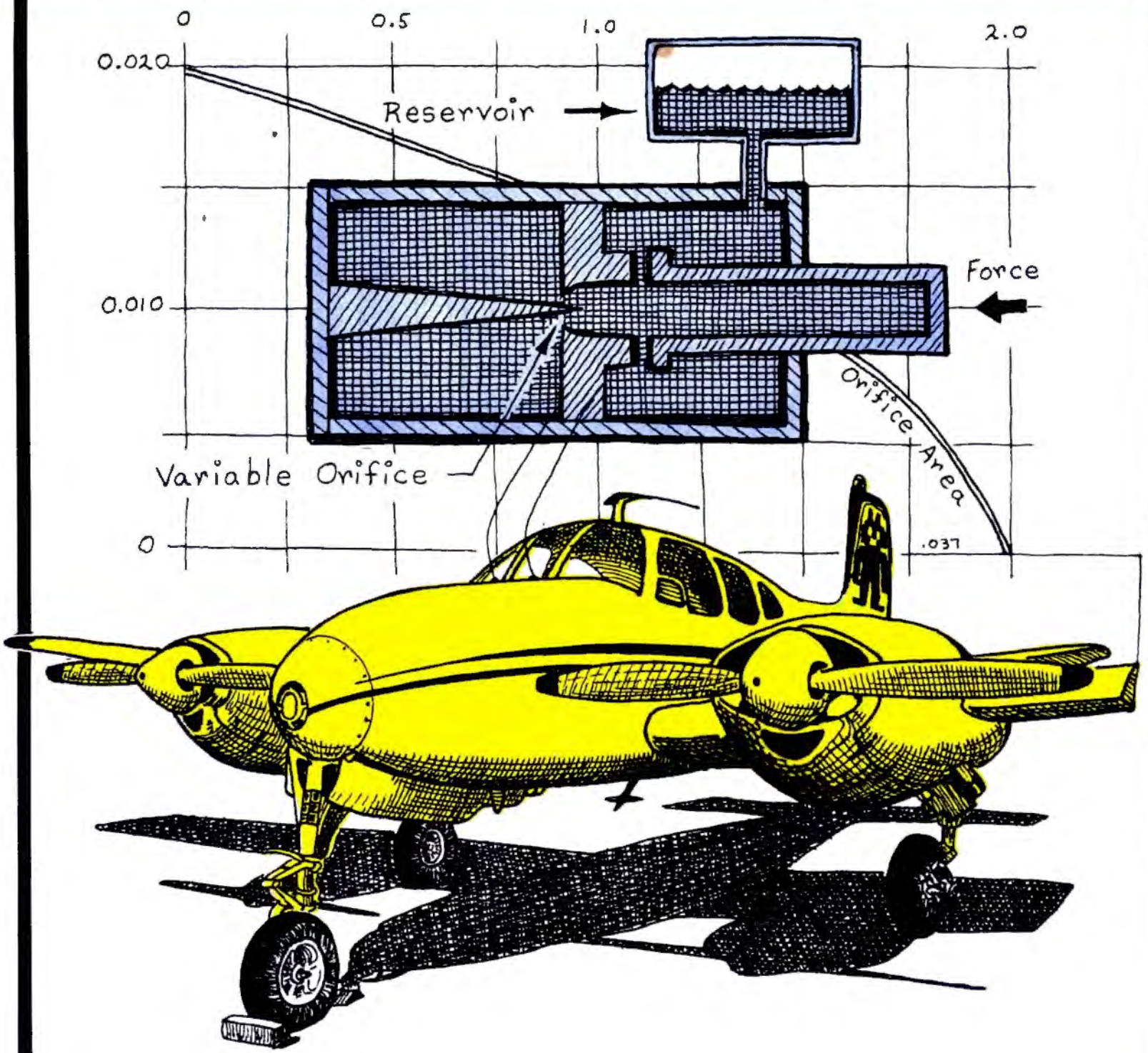
The TRS-80 Users Journal

Volume II, Number 6 Nov/Dec 1979



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Editorial Remarks * *

"If publishers really check out their advertisers in advance, how come so many accepted up to 6 full pages from World Power?"

Where do we stand?

We recently received letters from several persons indicating they had gotten ripped-off by some company or other. One suggested that since we are in the publishing business, we need to become "Ombudsman" for our readers.

Some other magazines might jump at a chance like that, feeling that "Hey, they need us!"

Before September 1978, none of us here at 80-US had anything to do with publishing. In fact, it was some of the publishing going on at that time which prompted us to go into it. Consequently, we are just dumb enough to ask: "Is this really what we are supposed to be?" Ombudsman? Where do we get the qualification to sit in judgement? Is every publisher assumed to have the overhead resources to be able to go out into the field and check every company that has a product for sale?

How do you tell who are the "bad guys"? By the time you can identify them (by getting stung), they have disappeared and resurfaced somewhere else with a new name and a new gimmik. Do the publishers have to be policemen?

Advertisers make magazines possible. Check and see how many truly non-profit magazines make it for any length of time. So now are we supposed to woo the advertiser on the one hand, and protect the consumer against him on the other?

Oh yes, we could put on the "goodie two shoes" and act like we are big brother protector. But we are not equiped to do it, nor do we believe any other publisher is. It may make good editorial copy to say you are, but we aren't and we will say so.

Another problem with this is that for every complaint we have had so far, there has also been someone calling or writing to say that the same company has a good product and excellent service. So who are you going to believe? Also, there are extenuating circumstances. For example, we received a bundle of mail on the 7th of September, all of it postmarked the 26th and 27th of June! Now, what did those people have to think about our turn-around? And what if they could find some sympathatic publisher to put us down for it?

Which dosen't leave much hope, does it?

If we ever find out about a genuine rip-off, we will be more than happy to let you know about it. We are not totally irresponsible, just careful.

There is so much being said these days about Consumer Protection, we wonder sometimes if there ought not be a "Supplier Protection". For some reason, it is not considered a sin to rip off a company. (After all, they can afford it, right?) We still think it is just as bad to rip off a company as it is for a company to rip off an individual. Think of how many companies are being had by individuals who copy software for the rest of the club, or for a friend. Each act in itself is no big deal, you say, but the cummulative total of those individuals sum up to a sizeable chunk for the producer of that software. Think about that.

Our stand is simply this: We sell advertising space. The advertiser can put anything (within the limits of good taste) in that space. If it becomes known that this advertiser is a rip off, we drop him. Other than that, we depend on suppliers to provide products for review. We give as honest a review as possible, never based just on one reviewers opinion. If the product has problems we tell you about them. If that causes us to lose an advertiser, then we lose an advertiser.

Fair enough? Mike

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Vol II Number 6

November-December 1979

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THE CPU SHOP

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Letters to the Editor

Mike

What a compliment! Leo's artwork is great! You obviously have put more time in editing than watching Lou Grant. Your anniversary issue speaks for itself.

Having achieved my degree from Fahrenheit a few years before you, I can relate to the fevered pitch of journalism and the problems of same.

Now, what do I call a party doll with an RS-232 interface?

There once was a party doll,Maude,
Who had trouble with lineprinter,Claude
She expanded her interface
and typed, "Give me a space..."
"I've become a compatible baud!"

Best Wishes,

Pandora Key
Concord, VA

Which brings to mind one sent in by Evan Aresiuk of Spokane, WA
Complained a computer one night
"My craving for data's not slight
But there should be a law
All this input is raw
I refuse to accept one more byte"

Mike

Congratulations to Ted Fisher (Vol II No 4 page 9) for drawing attention to the fact that Microchess 1.5 can be defeated in 5 moves. Nevertheless, as he says, Microchess is a most enjoyable program. With more memory at its disposal, Sargon is not so easily dismissed. Playing at Level 2, the same moves yielded:

Player	Sargon	Microchess 1.5
E2-E4	E7-E5	E7-E5
D1-F3	G8-F6(this settles it)	F8-B4
F1-C4	B8-C6	D7-D5
C4-D5	C6-D4(threat/Queen)	C7-C6
F3-F7		Disaster

Just to see what would happen, the Queen was allowed to go unprotected after the last Sargon move by responding to it with an irrelevant entry. Sargon's Knight could have taken that Queen, and put the King in check at the same time. It didn't probably stunned by my display of incompetence. Instead, it moved D4-C2, evidently content with lesser gains in the short run.

H K Henisch
State College, PA

See also, The Great 80-US Chess Tournament, in this issue. Mike

Dear 80-US

In response to your article in May-Jun 79: As a great fan of Sci-Fi, I'd like to mention that your use of the word "ANDROID" in Android Nim is in error. An Android is a machine in human form, much like the doctor in "Alien". A Robot is totally mechanical and this fact is obvious at first view, like C3PO in Star Wars. But a Cyborg is a Robot like C3PO with a human brain.

So, in truth, the things in Android Nim are actually Robots or maybe Cyborgs. Which one is it Leo?

Adam Sacks
Huntington, NY

In May 79 we didn't know for sure. But by the Sep-Oct 79 issue, we found his address to be in Andromeda. Seems that "Android" is a logical name for someone from Andromeda.
Leo

80-US

I am intersted in knowing if I can obtain your programs on cassette or diskette. I am asking in the general sense, not specifically for an individual program. I feel that it would be nice if you would supply source programs on cassette or disk at a reasonable charge. Perhaps a royalty can go to the programmer. This would greatly reduce the time to get the program into the machine and running correctly.

I enjoyed your newsletter *(!! Ed)* **so much that I just called in a 2 year subscription. Keep up the good work.**

Peter Ansbacher
Iowa City, IA

Some programs (those copyright by the author and given us for first publication only) we cannot copy. See our software ad in this issue for a list of what is available and prices
Mike

Sirs

I have enjoyed the selection of TRS-80 articles, but am still waiting for the Ham Radio related type of programs, being an Extra Class Amateur Radio operator I would like to use the TRS-80 more here in the shack. Thanks again for a fine mag.

Gerald Owens AB3X
Corry, PA

We would like to see some too. There must be someone in Hamdom out there with something to contribute? Mike

Dear Sir

Inclosed is my check for a 3 year renewal. Based on your review of NEWDOS+ with AUTOEDIT, I am sending my order for both programs and will advise them that I made my decision based on your review. In your growth plans I imagine you will be planning on a reader service. Do you have any idea when? Signing off now from Saudi Arabia
Respectfully, Ed Roderick

Our computer has already told us that it would take a minimum of 22 person hours per week to administer a reader service. We just aren't big enough for that yet. We did start putting "Inquiry cards" in though, but we have no idea just how many of them get used.
Mike

Dear Sir

Enclosed find a check for a one-year subscription to your fine magazine. It is refreshing to pick up a publication dedicated to one system and not be deluged with articles concerning other things.

One comment on the game "Lifeboat" in your Jul-Aug 79 issue. I was disappointed in the time spent loading versus what the program does. It seems that every time the captain shoots one of the survivors he is always found guilty immediately and the game ends. Did I miss something?

Ed Empey
Marysville, WA

You must have, Ed. There is a gala dinner for the captain, as well as a trial where he is found not guilty. Check your GOTO's Mike

Mike!

Thanks loads for the Diskette Size Doubled in your last issue. Square 1 sent me their Flippy Disk Kit and indeed, by punching in the mirror image holes and notches, the darn thing will store programs on the opposite side! Great savings!!

Gordon Gibson
San Jose, CA

Dear Sirs

I received my first two copies of 80-US a few days ago and have only one regret: I wish I had subscribed earlier. I notice in the Jul-Aug 79 issue that you have run out of back editions. Is there any chance of reprints or a "Best of 80-US" or obtaining copies of particular articles? Keep up the good work. **K D Koppert**
Mt Roskill, New Zealand

We must admit,(with red faces), that back issues are still available. Someone here forgot to look way in the back of storage, where there were several bundles of back issues hidden. At the rate they are going though, we may be out for real before long. Mike

Dear 80-US Folk -

A word of criticism along with the subscription order: You need to be more thorough in proofreading the lines of code you publish, re: Jul-Aug 79 p.13 "20 X1 PEEK...X2???PEEK etc" I've run across at least one other similar error in a short BASIC program in an earlier issue. If you think I'am nit-picking you obviously don't understand the time and energy lost by an unsuspecting reader!

Alvin Berglund
Glendale, CA

You are right! Trying to keep the code pure all the way from the author through the editor and on to the typesetter is a problem. We have taken to reading the text backwards and out loud, otherwise a crafty brain may fill in missing characters. We read forward for context though, and even then some slip through. One of the most troublesome areas is the greater than and less than symbol. We have to use a capitol "X" and white-out the appropriate side. We now have (starting with this issue) our own typesetting equipment, operated by a "computer oriented person", so hopefully there will be much less of that.
Mike

Sirs
Perhaps, if you attract many international subscribers, you should consider changing the Journal's name to: 80.
R MacQuarrie
White City, Sask,Canada

We went through that once. The first two issues were called "80-NW". We still get some mail addressed that way. No, we like 80-US just as it is. *Mike*

Mike
Just a note to let you and your staff know how much I continue to enjoy 80-US but how appalled I am at some of the suggestions for curing the kkkey bbbounce problem (everything from breaking off parts of one contact to filling the key socket with moly grease!)
The cure is simple and effective. Two tools are needed: (1) a 'lifter' (either one of those L-shaped ones used for removing IC chips from their sockets or a large, bent paper clip) and (2) a burnishing file (available at electronics stores for less than $1 and used to keep relay contacts clean).
Insert the lifter beneath the cap of the offending key, gently rock it back and forth, applying upward pressure, until it pops off. There, inside the square-shaped socket, are two spring-metal contacts. One is solid and the other has four fingers. When the key is depressed these fingers meet the solid contact to make the circuit.
Like most electrical contacts, these not only get dirty but they oxidize. Further, it is possible that the factory did not align them so that the four fingers touch the solid contact AT THE SAME TIME.
The CURE: Insert the burnishing tool between the two contacts and depress the key until the contacts press against the burnishing file. Gently move the file up and down a few times, remove, and check the key action. If the stuttering has disappeared, reposition the key cap and press it firmly back into place.
Covering the keyboard will keep out dust and dirt, and constant usage will help keep down oxidation; but most important, your keys will be EXACTLY aligned.
Hugh Morris
Frankfort, KY

Dear Sir
I am currently serving a 3-9 year sentence at Stateville Correctional Center for aggravated battery. Prior to my incarceration I was attending Western Illinois Univ where I was pursuing a degree in Information Science.
Rather than waste time, I am attempting to read as much computer-related material as possible to assist me in not only reviewing those areas I already covered in college, but also in studying many areas I did not have the opportunity to cover, such as microcomputers.
My problem, however, is that I am only paid $2. a month in here. Consequently, I cannot afford the cost of such material. It is for this reason I am requesting a complimentary subscription to your 80-US. Thank you for your cooperation and benevolence in this matter.

Joliet, IL

You got it, and good luck! *Mike*

Dear Mike
I wrote you some weeks ago about a problem of not being able to transfer SNAKEEGG and ANDROID to disk. You were kind enough to offer all kinds of suggestions, all of which I had already tried, and none of which worked. I had also tried it on a friend's system with no luck. You also offered to work something out to make it right, but it wasn't that important to me so I didn't pursue the matter any further.
However, I recently acquird Apparats NEWDOS, and just for kicks I again tried to transfer subject programs to disk, using NEWDOS. Worked the first time, no problem. Can't explain it, but NEWDOS is the greatest!
Dawson K Hargrove
Orlando, FL

Sirs
Many L2 owners would like the versatility of including sound in their programs, and after reading the System/Command article I thought it to be finally possible. Like many others, however, I do not have an assembler. In addition, it is inconvenient to have to load a system tape and then another one in basic. With the help of Roy Mosley and Rick Jaszkowiak I found the following additions to the basic program on page 31 of the May-Jun 79 issue to complete the music program in basic. In this way both problems are overcome.
Enter 32700 for Memory Size before loading. Add to the program:
15 FOR X=32708 to 32765: READ M: POKE X,M:NEXT
45 POKE 16526,205:POKE 16527,127
120 DATA 33,205,127,34,142,64,195,25, 26,42,254,127,126,183,245,35,94,35,86, 235,241,200,61,200,61,245,86,30,0,35,78, 35
130 DATA 62,1,205,244,127,40,237,62,3, 205,244,127,32,242,24,228,211,255,65, 27,122,179,200,16,250,201
Of course, the recorder can be used for the output by pulling the earphone plug, putting in a blank tape and setting the recorder in the record mode.
Now everyone with Level II can have sound with 15 minutes of programming and no additional expense. I've added sound effects and music to many of my game programs and my kids are thrilled, and I'm delighted.
Karl Jahns
Allyn, WA
PS: May I recommend the following values for P$ and D$:
P$="CHOMLJTOMLJTOMLMJ"
D$="39933399333993339"

Sirs
Being a rank amateur in the field of microcomputers, I am at a loss in reading ads for editor-assemblers vs machine language monitors vs T-Bug etc. The issues of 80-US I have received to date convince me you are the people to ask, as you obviously want to help. Can you tell me in simple terms the difference between monitor and editor-assemblers, and how each is used? I am interested in learning machine lagnuage programming on my TRS-80, as well as learning how the bloody machine works, but cannot afford to buy programs until I am sure of which is which.
John Cranston
Corning, NY

A MONITOR (such as T-BUG) is a program which does what it's name implies, it "monitors" the execution of other programs in memory. Most people in referring to a monitor are speaking specifically about a machine language monitor, which allows you to look at the results of program steps by breaking execution at points you decide on, and then displaying the processor's registers where temporary information is stored. In this way, you can debug a machine language program as it executes, step by step.
An ASSEMBLER, on the other hand, is a "translator" for machine language programs. You know that the computer executes programs by processing binary numbers and interpreting them as commands for the computer. To make programming easier, the task of translating from "assembly language", which uses words to represent each command, and machine language, which is the binary number form of the commands, has been given to the assembler.
We recommend the book "TRS—80 ASSEMBLY LANGUAGE PROGRAMMING" by William Barden Jr, available from Radio Shack for $3.95. It is an excellent book for learning machine language programming.
Terry

Mike
On page 23 of the May-Jun 79 issue, A "note on basic". The test for the Enter key via INKEY$ function. Try as I may, it would not perform. It hung up on line 10 and stayed put. I have input the program a few times trying to follow the format and I can't get results. Is this an indication that my CPU is out of order? Thanks for a fine publication.
Paul Luter

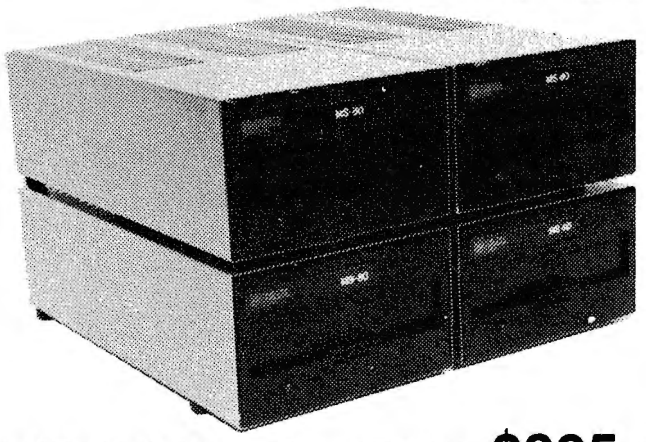
No Paul, that is one of our own mistakes. Line 10 should read:
10C$=INKEY$:IF C$=""THEN10
Sorry, *Mike*

INDEX OF ADVERTISERS

Three great new products for . . . . . .

TRS-80* Owners

MS-80 MINI DISK SYSTEM



Each add-on drive includes one minifloppy disk drive, case, power supply and regulator board.

- More Storage Capacity
- Fastest Access
- Does Not Void TRS-80 Warranty
- Shipped To You Ready To Run

INTRODUCTORY PRICE: $395 PER DRIVE

SUGGESTED RETAIL PRICE $445

MATCHLESS FEATURED PRINTERS

Features:

- Documentation Included
- 80 Columns, 63 Lines Per Minute, Bi-Directional, Nominal Thruput
- High Reliability — Heavy Duty Cycle, 100 Million Characters Print Head Life
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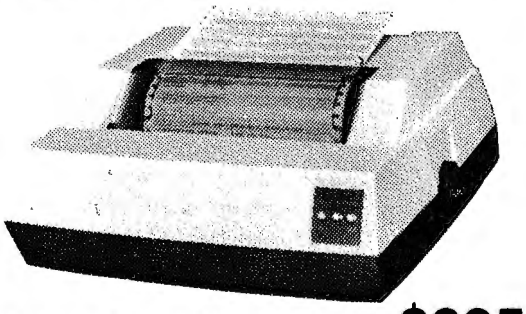

INTRODUCTORY PRICE: $895

SUGGESTED RETAIL PRICE $995

APPARAT NEW DOS+ $99

Features:

- Modified Editor Assembler with Disk I/O and new cross reference feature. User Information is obtained from Radio Shack's Editor Assembler documentation.
- Super-fast machine language Disassembler program, with cross reference feature.
- Apparat's own Superzap, a Hex dump utility to examine or modify disk or memory locations.
- Transfer machine language tapes directly to disk.
- Enhancements including built-in key-debounce (eliminating double entry); option under DOS or BASIC to print the screen to your MATCHLESS featured line printer; execution of a BASIC program.

MATCHLESS SYSTEMS

NOBODY CAN BEAT OUR MS-80 WARRANTY: 90 days on labor, **One Year on parts.**
Dealer Inquiries Welcome
*TRS-80 is a Radio Shack product.
Prices subject to change without notice.

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IS YOUR SUBSCRIPTION DUE?

Please check your mailing label. if the last two digits of your subscription code are -10 then this is your last issue! We have some really great material coming along that you won't want to miss. so peel off the label on the back of this issue. put it on the appropriate card in the centerfold and return it to us.

ITEMS AT RANDOM

RANDOM ACCESS has a new name! Seems another computer mag has been using that title for a much longer time than we. This, after being brought to our attention, conjured up thoughts of "Uncouth borrowing" and other assorted things. So it is now called "Items at Random", which it is.

We heard from Rod Hallen the other day, said he was pleased with his articles in the Sep-Oct 79 issue. However, he did point out a couple of errors in his drawing board article in that issue. In paragraphs 2, 3, and 4 on page 22 the % sign should have been an @ sign, and in the second paragraph on page 23 the reference to lines 840 and 910 should be to lines 860 and 930. This can happen when you write an article and then renumber the program. Rod says he is going to West Africa for the State Department for a couple of years and doesn't expect to be turning out much material for the mags. Good luck, and we await your return and more articles like Drawing Board! While we are on the subject of Drawing Board, a bug in the program was pointed out by Jim Crocker of Tacoma, WA, who took it apart and discovered that the "greater than" in line 1030 should be a "less than". You would probably not notice this until you try to back across the screen while printing characters.

In the Sep-Oct 79 issue, we reviewed the TRS-80 Assembly Language Programing Book sold by Radio Shack (written by William Barden, Jr.). We have since heard from Paul Scott in Viginia, who says the examples in this book will not work with all Level I machines. According to Paul, there are 4 different Level I ROM's and the examples in the book work on all up to and including the D Revision board, i.e., they work on the B, C, and D Revisions but no later.

WE MOVED!!
NEW ADDRESS AND PHONE:

80-U.S. JOURNAL

3838 South Warner Street
Tacoma, Washington

98409

(206) 475-2219

No, we haven't built an edifice. Actually, we are now located in about 4000 square feet of what was once a construction office and shop - across the street no less, from the US Post Office Bulk Mail facility. Kindly use the new address and phone, the old ones will still get here for the time being, but we would like to discontinue the PO Box and old phone number as soon as possible. The old phone number will get you call forwarding to our new number until about 15 Nov 79.

So you finally got Microchess 1.5 on disk, and now you want to run it with NEWDOS. It now flies right through the instructions and the screen acts like it has been bitten by a bug. The answer is to hold down the SHIFT and UP ARROW keys while you boot up NEWDOS. This disables the key de-bounce routine in NEWDOS which just happens to be in the way of Microchess 1.5.

A. Dickey of Ft. Worth, TX called to say that they have a FORUM 80 TRS-80 Bulletin Board System going. The number to call is (817) 923-0009.

Want a quick way to print the arrow keys on the screen? Try holding down the Y and I keys together, then hit K, L, M, or N, and you will get the letter you pushed plus the arrow. Then simply edit out the letter. This was published somewhere earlier this year, but we couldn't find the reference to it anywhere - possibly OCTUG, CHICATRUG, or INSIDERS. At any rate, its worth repeating.

VTOS 3.0 is out, and T. Pepin tells us that his SPOOLER for the TRS-80 (Sep-Oct 79 page 16) will not work with it unless you make a couple of modifications to the basic program listed on page 17. In line 80 change the &H4510 and &H4511 to &H4610 and &H4611. Do the same in line 270. Seems VTOS moved the interrupt table up an even thousand! (What else did they do?)

Bob Hurwitz at 1250 E Hallandale Blvd. Hallandale, FL 33009, would like to start a user group in his area. He can be contacted at (305) 454-7331 days and (305) 893-2274 in the evening

David L. Mays of St. Marys, WV recently sent us a HEATH-GRAM from the HeathKit people. Attached to it was an application note for using the Heath H-14 Line Printer with the TRS-80. It gives all the "skinny" on using the Heath H-14 with the TRS-80 and even includes a basic program driver. If you are in desperate need of this information, call Bill Zurney at the Heath Co (616) 982-3309. If that doesn't work, call us.

TCS PO Box 10281 Norfolk, VA 23513 is a lively newsletter which, according to their Jun-Jul issue, is published on rainy weekends. That issue had only four pages, but was crammed with good information. Membership is free, but you get the newsletter if you pay the mailing cost. It contains a free bulletin board.

BARDEN THROWN OUT? Bill Barden has stepped out of the Editor position of the Orange Co TRS-80 users Group No, he wasn't thrown out - it was other committments which got him. The new Editor of OCTUG is Ed Faulk 2531 E Commonwealth, Fullerton, CA 92631.

The Microcomputer Investors Association has just published another of its journals. In this journal's 200 pages are 20 articles which deal with utilizing microcomputers to make and manage investments. Practical computer programs accompany half the articles. The Microcomputers Investors Association is a nonprofit, profession association which was formed three years ago to enable members to share data and information. For an information packet send $1.00 to Jack Williams, MCIA 902 Anderson Drive, Fredericksburg, VA 22401.

Now that we have moved to somewhat adequate quarters, 80-US Software is expanding the line. Note our ad this issue. Our aim, as it has been since the start, is to carry items not available everywhere else. We want to keep our software unique (Leo gave us a good start at it!), and are quite careful about what we will offer. We have added some very interesting games written by Richard Taylor, Scott Carpenter and others. Most of them employ the use of sound. We have yet to beat (without cheating) the one by James Talley. For those of you who don't want to type in all the listings we publish, some of them will also be available on cassette. Those on which we have only first publication rights we can't resell of course. Leo is working on yet another, which should be ready about January. Unfortunately, some of Leo's earlier games will not function properly when using DOS 2.2, they used the NAME command, remember? Trying to make that correction to already released programs is impossible. The new ones will work with all DOS as well as 16K Level II. ---AND in the OUR FACE IS RED department, we received 500 each BEEWARY and 500 ANDROID NIM from Microsette with the reverse side blank! We like the added insurance of having both sides recorded, but again its too late to correct that mistake. So if you get one which doesn't play, we will be more than happy to replace it free, which is something we did all along anyway.

From Miller Microcomputer Services comes this. "IMPORTANT!! CTR-80 tape recorders made before Feb. 1979 can ruin tapes! If yours does not have a 10-Microfarad capacitor across the erase-head leads, use the recorder in manual mode until corrected; i.e., remove the front (motor control) plug at all times! The date code may be read on the inspection label in the battery compartment - 2A9 means February 1979. If your CT-80 is earlier, ask your Radio Shack dealer for the free check upgrade for this problem!"

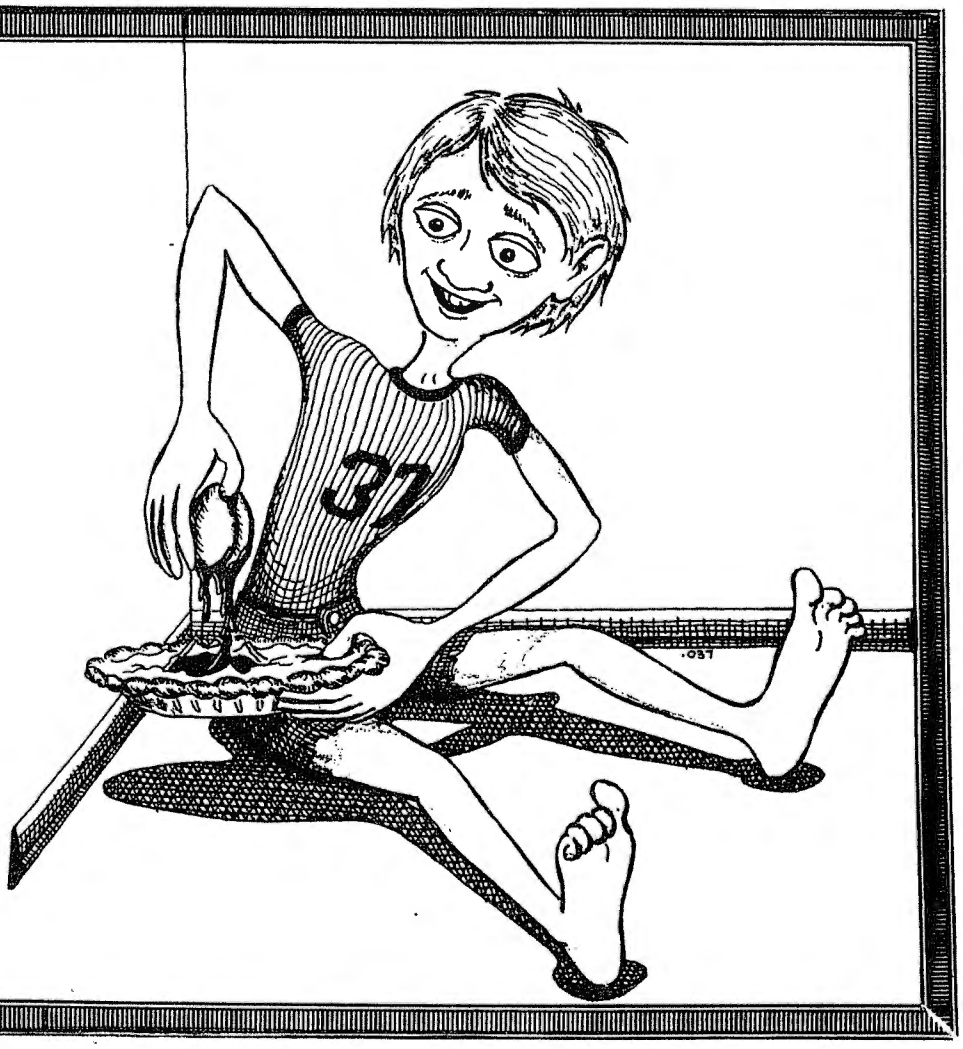
Make a nice day, and tell them you saw it in the JOURNAL.

FOR THE LITTLE NYBBLERS

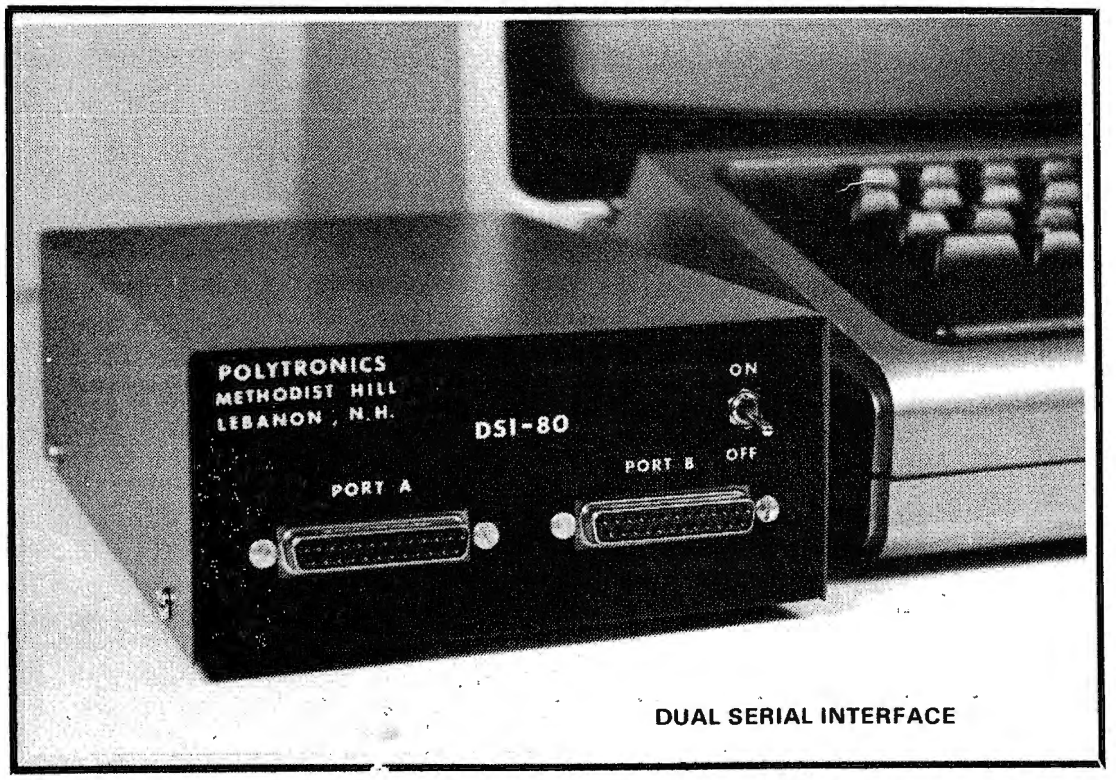
LITTLE JACK HORNER

Little Jack Horner sat in a corner
Eating a 20 pound pie
He Stuck in his thumb,
And pulled out a plum
and said, "This is 15 % of the pastry!"
So, show you're not dumb,
What's the weight of that plum
That little Jack found so tastry?

L B Christopherson



New PRODUCTS



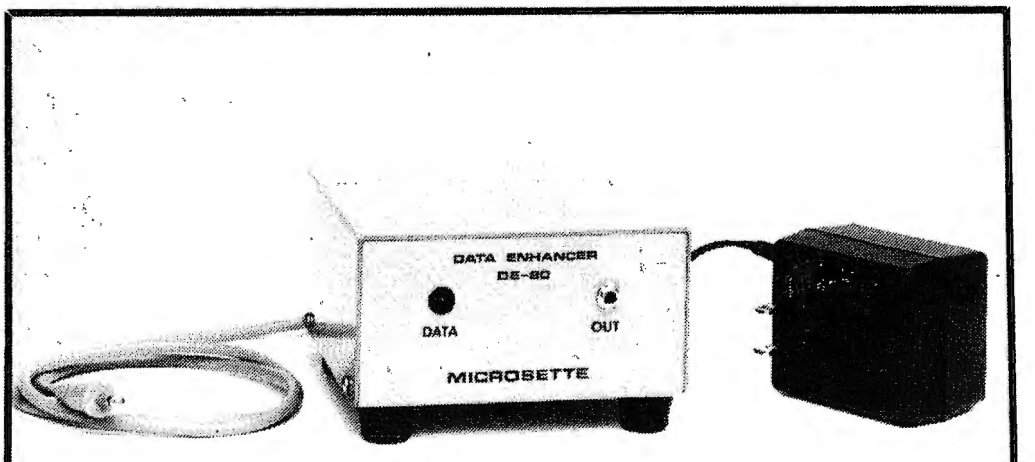
DUAL SERIAL INTERFACE

DUAL SERIAL INTERFACE

POLYTRONICS CORP Methodist Hill Lebanon, NH 03766 (603) 488-1710 announced the availability of the DSI-80, a dual serial interface for use with the TRS-80. The unit, complete with manual cassette tape and six month warranty is available for a limited time only at the introductory price of $199.95. The DSI-80 provides two serial output ports with both current loop and RS 232 interfaces. Baud rates are selectable with jumpers requiring no tools or soldering.

DATA ENHANCER (MODEL 80)

MICROSETTE CO 777 Palomar Ave, Sunnyvale, CA 94086 has announced their DATA ENHANCER (Model 80), an attachment between the TRS-80 and its cassette player to enable reading marginally recorded data over wide ranges of volume settings on the recorder. Works for Level I or II tapes. Price is $45.00 which includes power supply and a 90 day warranty and an unconditional guarantee of satisfaction.



DATA ENHANCER (Model 80)

FORTH-MMSFORTH

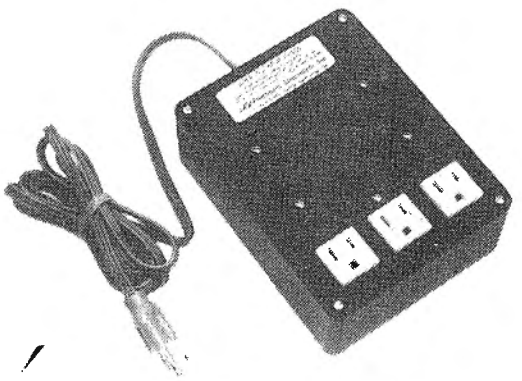
Is a structured language somewhat similar to PASCAL except that in FORTH, the programmer defines additional commands as they are needed. The commands can be immediately compiled into the language and subsequently deleted. Assembler code can be inserted directly in the FORTH program using a function of the language itself. MMSFORTH (Miller Microcomputer Services 61 Lake Shore Road, Natick, MA 01760 (617) 653-6136) has a significant advantage over any FORTH currently available for the TRS-80, and many features not available on other versions. In spite of this it retains high compatability with international FORTH standards. Persons accustomed to BASIC interpreters will gasp at the execution speed of FORTH programs. The MMSFORTH System Diskette costs $64.95 plus $1.00 shipping.

MICROSKETCH II

Microsketch II is written in TRS-80 Basic (16K Level II or 32K Disk). When loaded under Disk Basic, it takes full advantage of Random Access files for rapid screen or command string storage and retrieval. In addition to the Main System, Microsketch contains five subsystems: Auto Pattern Designer, Typewriter, Big Print, Graphic String Creation & Command String creation. Microsketch II includes 10 pages of documentation and it, together with the screen save utilities are available from International Data Services, PO Box 4908, Philadelphia, PA 19119, price is $3.95

HACKERS DELIGHT

ELECTROLABS, PO Box 6721 Stanford, CA 94305 provides Instant Electronics by Mail. Their catalog lists everything from cables, capacitors and CPU's to Wire Wrap, Video Monitors and Z80 systems. Truly a homebrewers delight, write for this catalog.



SUPER ISOLATOR

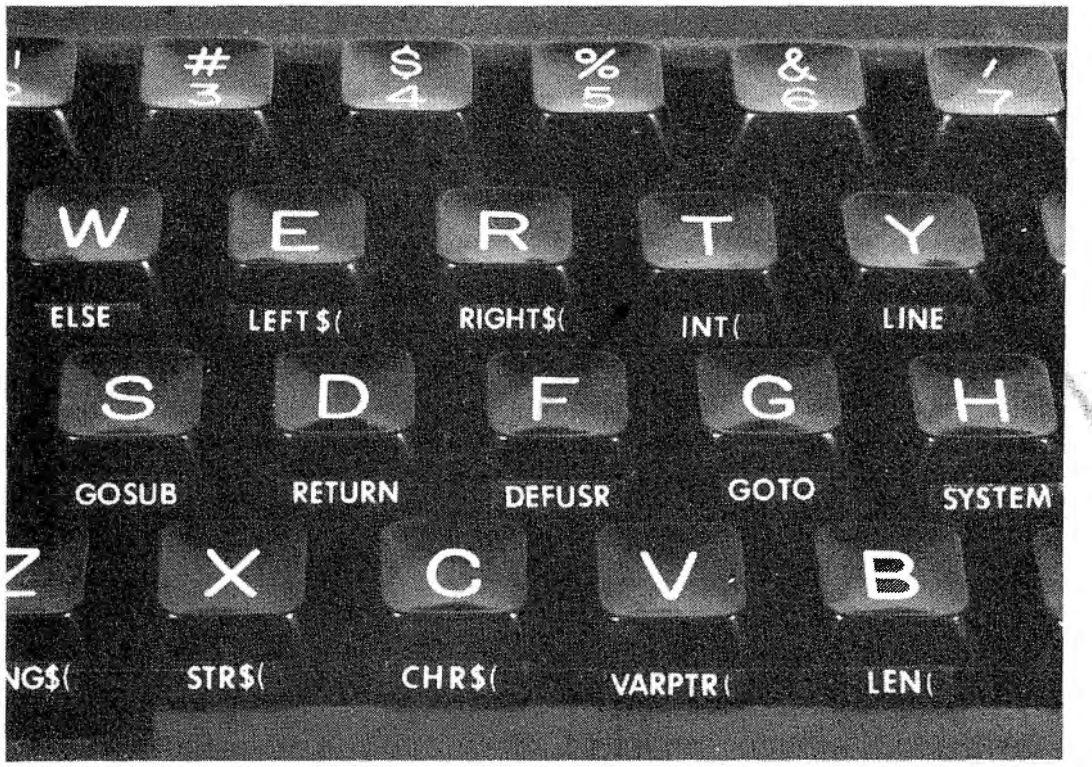
ELECTRONIC SPECIALISTS announced the expansion of its ISOLATOR line. Model ISO-3 comprises individual SUPER FILTERING for each of three 3-prong sockets. Heavy duty spike and surge suppression is also included. Intended for Microprocessor installations in industrial or severe interference prone environments, the SUPER ISOLATOR also provides protection against damage from lightning and electrical machinery spikes and surges. It can isolate and protect an 1875 watt total load, with each socket capable of isolating a 1000 watt load. Cost is $72.95, from Electronic Specialists, Inc 171 South Main St. Natick, Ma 01760 (617) 655-1532

ZCHESS WITH BLITZ MODE

The Software Association PO Box 58365 Houston, TX 77058 (713)482-0883 has announced Z Chess, one of the "Classic Games Series" of machine language programs for the 16K level II TRS-80. Z Chess is one of the fastest most versatile chess opponents available for the TRS-80. It has a BLITZ mode, in which a full 3 ply search takes only 10 seconds. It will solve "mate in two" problems fast. Priced at $17.95, specify Dept 80 when ordering.

GAMMON CHALLENGER

A backgammon playing computer program called "Gammon Challenger 1.0" is available from Computer CableVision Inc 2617 42nd St NW Washington, DC 20007 (202)337-4691. Written by Ray Daly and Tom Throop, the initial version was created for the TRS-80. It has three levels of play and a variety of special features. Provisions are made for saving the board for later recall, changing sides with the program, changing level of play or setting up any position. "Gammon Challenger" sells for $14.95 and is immediately available.



BASIC SHORTHAND

BASIC SHORTHAND

Remember Level I shorthand, how quickly and easily you could wirte BASIC code? Now, WEB ASSOCIATES announces TSHORT® a Level II BASIC shorthand which gives you single single key stroke entry for 32 difficult to type, long and/or repetitive commands. Immediately after each single key stroke entry, the entire command is spelled out in its normal format on the monitor and/or listing. TSHORT features a KUSTOM® key, changeable anytime, for user defined functions up to 64 characters of instruction, as well as a self-executing "GOTO 10" function (line 10 may contain "RUN". TSHORT retails for $9.95 and may be purchased through WEB ASSOCIATES, PO Box 60-C, Monrovia, CA 91016. Check, MO or VISA/MC phone (714) 559-6249 CA residents add 6% tax.

TELEPHONE DIALER

Software Exchange, 2681 Peterboro, W Bloomfield, MI 48033 announces a telephone dialer program for the TRS-80 Level II computer. It allows the TRS-80 to dial the phone and is called the Z80 Telephone dialer program. For example, typing "P" may get you the Police, or "F" the Fire Dept. No internal connections are made to the computer. Up to 20 different numbers may be dialed using the letters A thru T. Both dial and pushbutton phones may be used. The Dialer program is available for $7.95, including a cassette tape with the program and complete instruction, with interface circuit diagram and a parts list.

HEATHKIT PRINTER INTERFACE

Cost Effective Computer Services, 728 S 10th St. Suite 2, Grand Junction, CO 81501 has introduced the CH14 interface. It is designed to interface the HeathKit H14 printer to the Centronics parallel port on the TRS-80 expansion interface. The unit eliminates the need for an RS 232 and requires no software to use. Installation takes 5 minutes and allows use of Level II commands, LPRINT and LLIST. CH14 is available for $99.95

US ECONOMY SIMULATION

Applied Economic Analysis has just released a Quarterly Macro-economic Simulation Model of the US Economy for the TRS-80. This is a professional simulation model constructed using Two Stage Least Squares and utilizing Simultaneous Equations. The model has been developed for use by those whose business operations are affected by government policy actions. With this model, you can check the government's projections on inflation, interest rates and over eight other important economic variables. The package includes two disks, user manual and documentation on a complete simulation run of the US economy for the next six quarters. It costs $179.00 from APPLIED ECONOMIC ANALYSIS, 4005 Locust Ave, Long Beach, CA 90807 (213) 424-3652

COMPUTER SUPPLIES

Alpha Supply Co 9625 Mason Ave, Chatsworth, CA 91311 (213) 882-9818 has a catalog featuring all forms of magnetic media, continuous forms, printer & terminal ribbons, Perforator Tape & Accessories, Data Storage devices and Programmer/Engineer Aids and more. Write or call for their catalog. (They also carry Selectric Print Elements and Diablo Print Wheels).

DUST COVERS

Know what dust does to your system? Imagine dust on the read head of your cassette or disk drive! CompuCover, PO Box 324, Mary Esther, FL 32569 has an attractive computer dust cover, made from liquid and dust repellant vinyl. They are custom fitted for each piece of your TRS-80, and may be wiped with a damp cloth. Cover for keyboard, cassette & video is $19.95. Disk is $3.95, double disk $6.95

MAILING LIST

Is a General Purpose mailing label program for the TRS-80 which enables the user to start and maintain a mail list or similar data base. Operations include Add, Delete, Search, Sort, Modify and Printout. The user can control exact placement of up to five labels across the page as well as the placement of the Zip code on each label. Over 500 names can be stored using one disk drive; over 1500 with two. The program is designed to be easily used without prior knowledge of computers. Written in Disk BASIC for one or two drives, the complete program comes on a diskette and includes instruction manual and hard copy listing for $39.95. Available for immediate first-class delivery from Software Industries, 902 Pinecrest, Richardson, TX 75080 (214) 235-0915

IBM MODEL 50 INTERFACE

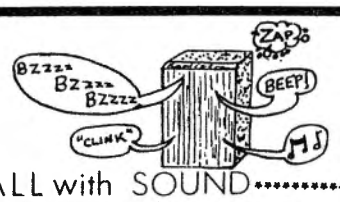
MEDIAMIX introduces a line of products related to interfacing the TRS-80 to the new IBM Model 50 Electronic Typewriter. These products include a hardware interface for connecting the Model 50 to the CPU or expansion interface. Software includes a printer driver program, patches for the Electric Pencil, as well as other special application programs (including a program for typing TV/Movie scripts). The IBM Model 50 when combined with the MEDIAMIX products can type in 10 or 12 pitch regular type, or proportionally spaced type... all with right justification capability. Sentence and word underlining, title centering, indented paragraphs and an array of special codes are available that allow the user to fully utilize the many features of this marvelous typewriter. MEDIAMIX Box 8775, Universal City, CA 91608

realsoft™ THE PROGRAM STORE

(202) 337-4691

4200 Wisconsin Ave. N W Washington D.C. 20016

TRS 80



ALL with SOUND

Sound effects and music are new for the TRS-80. You will find below programs with sound which will entertain both you and your friends. All require Level II and 16k, except Star Warp which only needs 4k.

bee wary
by Leo Christopherson from 80-U.S.
Said the spider to the bee . . . Try to survive as the bee against the spider. By author of Android Nim. $14.95

music
by Tom Stibolt from Acorn
Enter scores to have your TRS-80 play music. Works with both disk and tape. The "Sting" theme provided on the tape. $9.95

morse
by Phil Pilgrim from Discovery Bay
Ever want to learn Morse code? Here's your chance. Interactive program provides more rapid mastering of material. $14.95

yatch race
by John Greenwood from Mad Hatter
Turn-of-the-century board game of skill and strategy. Sail around three buoys avoiding islands and peninsulas. $7.95

life two
by Leo Christopherson from 80-U.S.
Two programs. Battle of Life allows several players and has noisy creatures. Other version is Conway's Life at 100 generations per minute. $14.95

star warp+
by Mike Partain and Ray Daly from Acorn
Star Warp requires real-time positioning of cross-hairs and includes a timer and scoring. Tape includes Graphic Lunar Lander program. Both have sound. $9.95

mind boggle
by John Greenwood from Mad Hatter
New, real-time word game for all ages. Guess hidden word based on "cows" and "bulls" (clues) and sound. $7.95

star trek
by John Christman from Acorn
Non-scrolling display and sound make this version interesting for any Captain. Real time and moving Klingons. $9.95

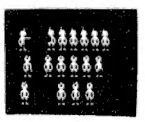
snake eggs
by Leo Christopherson from 80-U.S.
Talking snakes and you play a version of '21'. Animated, songs . . . almost a cartoon. $14.95

bandito
by Doug Prousser from Acorn
Take a gamble. Pull the arm on this graphic slot machine with sound. $9.95

android nim
by Leo Christopherson from 80-U.S.
Animated, squeaking androids play well known game of Nim against you. "It is a classic." "The best demo tape for Level II . . ." - Purser. $14.95


life two


snake eggs


android nim

****

gammon challenger™
by Ray Daly and Tom Throop

This backagammon playing program has three levels of play and a variety of special features. They include saving and recalling board positions, setting up a particular board position, switching sides with the program, letting the program play again, and changing the level of play.

Challenger has played quite well against other programs and dedicated games. In fact, it was the subject of a recent story in Personal Computing. Enjoy playing backgammon today. 16k Level II $14.95

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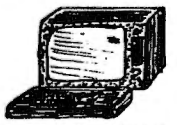

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from Michael Shrayer

Considered the best word processing program available for TRS-80. Extremely easy to use, Pencil lets you produce mailing lists, forms, large numbers of original correspondence, and camera ready copy for printing.

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editor
by Dick Bowles from Software Associates

Word processing with upper and lower case without any hardware modifications to the TRS-80. Insert or change lines, search for words or phrases, print whole or partial text, save and retrieve on disk, center lines, right justification. Requires 32k and disk. $39.95

****

SIMULATIONS

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oil tycoon
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pork barrel
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by Andrew Bartorillo from Acorn

Upto four players invest in stocks with buying on margin allowed under current SEC regulations. Random volatility, news flashes, stock splits, and bull and bear markets. 16k Level II $9.95

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 tape on tape or disk, plus offer several features for machine language programmers.

In Computer Cassettes Magazine, Robert Purser said that a tape duplication program "should be in everyone's library." We agree and beleive that System Savers is the perfect answer.

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 orginal. This also protects the valuable copies of your system programs.

Plus you can find the filename on any system tape because it is displayed on the screen. If you ever forget to save a program filename, just use FLEXL to recover it. And at anytime you can stop the reading of the tape by simply pressing BREAK.

For any machine language programmer, FLEXL offers the advantage of producing more efficient tapes than the object files from the assembler. It is also written to interface directly with the Small Systems RSM-1 and other monitor programs. And machine language tapes can be merged following the prompting of the program.

Disk drive owners can use TDISK to save any system format tape onto disk. Sargon, Adventure, Airaid, Editor/Assembler and other programs cannot normally be loaded to disk. 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 Software Products, Inc. also provides complete instructions on how to load MicroChess 1.5 onto disk. A short BASIC program will let you play chess directly from disk.

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

DISASSEMBLER
by Roy Soltoff from Misosys & Acorn

This two pass Z-80 disassembler produces symbolic lables 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. TRS Level II $19.95

QEDIT/AUTOK
by Phil Pilgrim from Discovery Bay

AUTOK adds auto-repeat to any key on your TRS-80. QEDIT is a quick, two-dimensional editor which complements the EDIT function. Both machine language modules include a built-in relocation routine to optimize memory. TRS Level II $14.95
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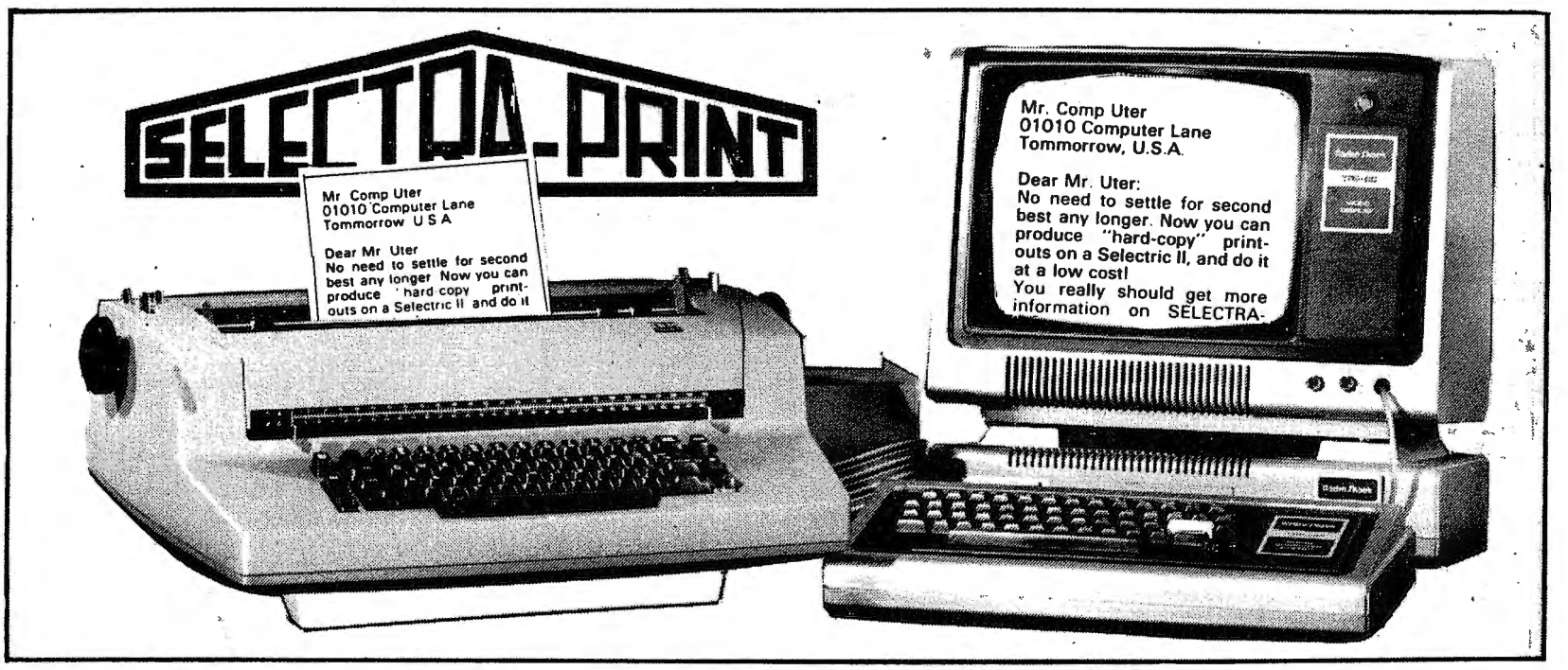

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Function Grapher/Root Finder

A program to graph math functions on your video, with a root finding capability.

Roy Groth, Brookline, MA

This program can graph any function expressible by a BASIC subroutine. It can also find the root of a function by any one of six different methods. The program requires 16K.

To graph a function, you must first insert the function in line 90. This is a two line subroutine with the RETURN statement already placed at line 100. The function may be complex, and up to 255 characters long. The function already placed there in the listing: (FU=SIN(X)+2*COS(2*X), may be changed. Try FU=TAN(X) for example).

The subroutine must return a value FU when given a value X. There is no need to worry about division by zero discontinuities, as these errors are trapped. However, function call errors will crash the program. If this happens, it is no disaster. Just run the program again, and watch the endpoints more carefully. No data is lost by an error.

Variables which must not be modified by the subroutine are FC,FL,FM,FX,X, GL,GM,GR,GX,GN,GS,ES,EL,EM,ER.

Once the subroutine (line 90) has been entered, the program is ready to run. First, you are asked whether you wish graphic or numeric output. Answer G or N (and don't hit enter!). Next, you will be asked for two endpoints. These are the values between which the function will first be displayed (example entry: -10,10).

Numeric output displays a table of values between the endpoints. The endpoints are shown as right arrows, and may be manipulated for various views of the function.

Graphic output graphs the function between the endpoints. Maximum and minimum values are labeled with their function values. Note that these are not actual maximums and minimums, but rather the largest and smallest values graphed. Note that while the computer is preparing the graph, it will count from 0 to 127 to give you something to watch while you wait.

In the lower right corner, the X values corresponding to the left and right sides of the screen are displayed. The endpoints are two graphics segments at the bottom of the graph.

The endpoints are moveable. By moving them, you can display various segments of the function.

When an asterisk appears in the lower left corner, you may enter one of the following commands:

G - display function graphically between current endpoints.

N - display function numerically between current endpoints.

O - display function in current mode between current endpoints.

I - input, numerically, new endpoints, then display function between those endpoints in current mode.

R - move right (or lower) endpoint, with arrow keys. Press enter when finished.

L - move left (or upper) endpoint with arrow keys. Press enter when finished.

RIGHT ARROW - frame right. Move endpoints to contain same distance as they do currently, but with left endpoint positioned where right endpoint is now.

LEFT ARROW - Frame left. Opposite of frame right.

UP ARROW - expand display. Halve distance between endpoints and display function in current mode.

DOWN ARROW - contract display. Double the distance between endpoints and display in current mode.

Using these commands, any function can be analyzed. With practice, functions can be made to divulge their secrets rapidly.

Note that while in graphic mode, an extreme value on the graph can make the rest of the function look horizontal. To see if it really is, move the endpoints to exclude the extreme value.

Another way to check the accuracy of the graphic display is by switching to numeric. This is a handy way to see if the function is horizontal or not.

FINDING THE ROOT

The command to enter the root finding routine is F (find root). You are then given the choice of six different root finding methods. If you are in graphic mode, you will be able to see the method close in on the root graphically.

If you are in numeric mode, you get a table of the approximations. Both views give insight to the actions of the root finding method used.

After you have chosen your method, you will be asked for two tolerance values. The first is the interval error tolerance. This determines how close the root the program finds will be to the actual root. (A typical value to enter here is 1E9). The second value is the function error tolerance. This is the maximum value that the function will have at the root that is returned. (A typical value for single precision is 1E4, for double precision, 1E9).

The reason for these two tolerance values is that with round-off error, the value returned will never be exact. By setting these tolerances, the program knows when to stop, otherwise, it would keep going forever.

The program runs in double precision. All variables starting with X,F,M and E are double precision. However, for this accuracy to be of use, the function subroutine must be double precision. If it is not, only the first six digits will be accurate. Functions which use library functions, or that use exponentation, will only be single precision. If your function uses constants, place a # sign after them to make sure that they are double precision.

BISECTION METHOD

This method requires the two endpoints to be positioned at points where the function values at the two points are of opposite sign. The function is assumed to be continuous, so there must be a root between these two points.

The interval between the endpoints is halved, and the function evaluated at this midpoint. The sign of this value is then compared to the sign of the other two points, to see which side the root is on. The correct endpoint is then moved in, so that the two endpoints surround the root, but the distance between them has been halved. This process can be repeated indefinitly, until the endpoints are both as close as one wishes to the

root. The program only continues until the exit conditions set by the error tolerances have been fulfilled.

This method is very reliable, as you always know that the root is between the two endpoints. The disadvantage is that this method takes a long time to get close to the root.

LINEAR INTERPOLATION

This method also requires the endpoints to be placed around a point where the function changes sign. This method acts like the bisection method, except that the approximation method is changed. Instead of taking the new approximation to be halfway between the old ones, the line connecting the two points on the function corresponding to the endpoints is drawn. The new approximation is taken where this line crosses the X axis.

With this method, the speed of convergence on the root is improved. However, in some cases, one endpoint stays put, while the other moves in towards the root. This stagnation of one endpoint can destroy almost all of the speed advantage of this method.

MODIFIED LINEAR INTERPOLATION

To solve the problem of the stagnant endpoint, we replace the value of f(x) at this position with f(x)/2. This results in getting the stagnant endpoint to move.

Although this seems like a strange solution to the problem, it greatly increases the convergence rate.

SECANT METHOD

Another solution to the stagnant endpoint is to take, for the next two endpoints, the latest approximations; rather than the latest ones on opposite sides of the root. This can result in the endpoints not surrounding the root, but if the endpoints are close enough to the root, this does not matter.

This method is very fast. However, one has no idea of where the root is, because it is not surrounded by the endpoints. There is little assurance of accuracy. Also, sometimes the method will wander away from the root, and never find it's way back. When this method does work, it is very fast.

NEWTON'S METHOD

To use this method, the function f'(x) must be inserted as a subroutine at line 110. This subroutine must return a value FP when given a value X. Restricted variables are the same as before.

Newton's method acts with only one endpoint, the right one. A tangent is drawn to the curve at this point, and the new approximation is the point where this tangent intersects the X axis.

This method is often used because it converges rapidly. However, to use Newton's method, the derivative of a function must be known. For some functions the derivative is almost impossible to evaluate. Note that this method is also not as efficient as it seems, because it requires two function evaluations for each approximation. Also, if this method is not started close enough to the root, it can get lost.

MULLER'S METHOD

This method works with three endpoints. The program starts the third endpoint between the original two.

This method finds the equation for the parabola through the three points on the curve, and finds the root of this parabola that is closest to the middle endpoint. The two endpoints closest to the new approximation, along with the new value, are used for the next approximation.

This method works very well. It converges as fast as Newton's method, and is much more reliable. It also requires only one function evaluation for each approximation, which makes this method much more efficient. •

For 16K Level II & Up

Function Grapher/Root Finder

Program Listing

Developed for 80-US by Roy Groth

```
10 REM * FUNCTION GRAPHER / ROOT FINDER *
20 REM * (C)1979 80-NW PUBLISHING CO *
30 REM * BY ROY GROTH *
40 CLEAR100
50 CLS:ONERRORGOTO1220
60 DEFDBL X,E,F,S,C,M
70 DIMVA(127)
80 GOTO130
90 FU=SIN(X)+2*COS(2*X):REM-HERE IS WHERE YOU PUT THE FUNCTION-
100 RETURN
110 FP=COS(X)-4*SIN(2*X)
120 RETURN
130 PRINT"GRAPHIC OR NUMERIC OUTPUT (G/N)":A$=INKEY$
140 A$=INKEY$:IFA$="G",FG=0:GOTO150:ELSEIFA$<>"N",GOTO140:ELSEFG
=1
150 INPUT"ENDPOINTS (TWO OF THEM)";EL,ER
160 IFER<EL,C=EL:EL=ER:ER=C
170 GOTO320
180 PRINT@960,"*";:A$=INKEY$
190 A$=INKEY$:IFA$=""GOTO190
200 PRINT@960," ";:IFA$="G",FG=0:GOTO320
210 IFA$="N"FG=1:GOTO320
220 IFA$="D"GOTO320
230 IFA$="I"CLS:GOTO150
240 IFA$="L"GOTO470
250 IFA$="R"GOTO490
260 IFASC(A$)=8GOTO600
270 IFASC(A$)=9GOTO610
280 IFA$="↑"GOTO630
290 IFASC(A$)=10GOTO620
300 IFA$="F"GOTO640
310 GOTO180
320 GOSUB330:GOTO180
330 CLS:GL=0:GR=127:IFFG=1GOTO430
340 ES=(ER-EL)/127:MX=-9.999E37:MN=9.999E37
350 PRINTCHR$(23):FORGX=0TO127:PRINT@536,GX;:X=EL+GX*ES:GOSUB90:
VA(GX)=FU:IFFU>MX,MX=FU:GM=GX
360 IFFU<MN,MN=FU:GN=GX
370 NEXTGX:CLS
380 GS=(MX-MN)/37:FORGX=1TO127:FORGY=INT((MX-VA(GX-1))/GS)TOINT(
(MX-VA(GX))/GS)STEPSGN(VA(GX-1)-VA(GX)):SET(GX-1,3+GY):NEXTGY,GX

390 IFGN>83,GN=83
400 IFGM>83,GM=83
820 GOTO750
830 X=(EL+ER)/2:GN=(GL+GR)/2:GOTO720
840 X=ER-FR*(ER-EL)/(FR-FL):GN=GR-FR*(GR-GL)/(FR-FL):GOTO720
850 SV=FL:IFFG=1,GR=0:GL=0
860 X=ER-FR*(ER-EL)/(FR-FL):GN=GR-FR*(GR-GL)/(FR-FL):GOSUB90:
  IFSGN(FU)<>SGN(FL),ER=X:FR=FU:RESET(GR,41):GR=GN:IFSGN(FU)=
  SGN(SV),FL=FL/2
870 IFSGN(FU)<>SGN(FR),EL=X:FL=FU:RESET(GL,41):GL=GN:IFSGN(FU)=
  SGN(SV),FR=FR/2
880 IFFG=0,SET(GN,41):PRINT@0,"FUNCTION VALUE";FU;STRING$(25,
  32);:GOTO910
890 IFINT((FC-1)/8)=(FC-1)/8,PRINT" I       XI";TAB(40);"F(XI)"
900 PRINTFC;X;TAB(32);FU
910 FC=FC+1:SV=FU:IFABS(ER-EL)>E1ORABS(FU)>E2,GOTO860
920 IFFG=0,GOTO770:ELSE150
930 C$=INKEY$:IFPEEK(14591)=0,A$="z":RETURN
940 IFC$<>"",A$=C$
950 RETURN
960 X=ER-FR*(ER-EL)/(FR-FL):GN=GR-FR*(GR-GL)/(FR-FL):GOSUB90:
  IFFG=1GOTO1000
970 RESET(GL,41):SET(GN,41):PRINT@0,"FUNCTION VALUE";FU;"
                    ";
980 FC=FC+1:GL=GR:GR=GN:EL=ER:ER=X:FL=FR:FR=FU:IFABS(ER-EL)>E1
  ORABS(FR-FL)>E2GOTO960
990 IFFG=0,GOTO770:ELSE150
1000 IFINT((FC-1)/8)=(FC-1)/8,PRINT" I","XI","       F(XI)"
1010 PRINTFC;"    ";X;TAB(32);FU:ONA-51GOTO980,1050
1020 RESET(GL,41)
1030 X=ER:GOSUB90:GOSUB110:ER=X-FU/FP:GN=GL+(ER-EL)/ES:IFFG=
  1GOTO1000
1040 RESET(GR,41):SET(GN,41):GR=GN:PRINT@0,"FUNCTION VALUE";FU;
  STRING$(25,32);
1050 FC=FC+1:IFABS(ER-X)>E1ORABS(FU)>E2GOTO1030
1060 IFFG=0,GOTO770:ELSE150
1070 EM=(EL+ER)/2:X=EM:GOSUB90:FM=FU:GM=(GL+GR)/2:IFFG=0SET(GM,41)
1080 H1=ER-EM:H2=EM-EL:GA=H2/H1:FA=(GA*FR-FM*(1+GA)+FL)/
  (GA*H1*H1*(1+GA)):FB=(FR-FM-FA*H1*H1)/H1
1090 IFFB<>0,X=EM-2*FM/(FB+SGN(FB)*SQR(FB*FB-4*FA*FM)):
  ELSEX=EM-2*FM/SQR(-4*FA*FM)
1100 GOSUB90:IFFG=1GOTO1200
1110 PRINT@0,"FUNCTION VALUE";FU;STRING$(25,32);
1120 GX=GL+(X-EL)/ES:SET(GX,41)
1130 IFX>EMGOTO1160
1140 ER=EM:FR=FM:EM=X:FM=FU:IFFG=0,RESET(GR,41):GR=GM:GM=GX
1150 GOTO1170
1160 EL=EM:FL=FM:EM=X:FM=FU:IFFG=0,RESET(GL,41):GL=GM:GM=GX
1170 FC=FC+1:IF(ER-EM>E1ANDEM-EL>E1)ORABS(FM)>E2GOTO1080
1180 IFFG=1GOTO150
1190 GOTO780
1200 IFINT((FC-1)/8)=(FC-1)/8PRINT" I      NEW ROOT";TAB(40);"F"
1210 PRINTFC;X;TAB(32);FU:GOTO1130
1220 IFERL>89ANDERL<100,RESUMENEXT
1230 IFERL=1090ANDFM=0PRINT"ROOT";X;"VALUE 0":RESUME150
1240 PRINT"ERROR IN";ERL
1250 ERROR(ERR/2+1)
```

This program is available on cassette - see page 331

```
410 PRINT@INT(GM/2),MX;:PRINT@896+INT(GN/2),MN;
420 PRINT@962,"LEFT";EL;TAB(32);"RIGHT";ER;:SET(GL,41):SET(GR,41
    ):RETURN
430 ES=(ER-EL)/12:PRINTTAB(10);"X";TAB(39);"F(X)"
440 X=EL
450 GOSUB90:PRINT" ";X;TAB(32);FU:X=X+ES:IFX-ES/2<=ERGOTO450
460 PRINT@64,CHR$(94);:PRINT@832,CHR$(94);:GL=64:GR=832:GOTO180
470 E0=EL:G0=GL:IFFG=1,GOSUB560:ELSEGOSUB510
480 EL=E0:GL=G0:GOTO180
490 E0=ER:G0=GR:IFFG=1,GOSUB560:ELSEGOSUB510
500 ER=E0:GR=G0:GOTO180
510 RESET(G0,41):GOSUB930:IFASC(A$)=9G0=G0+1:IFG0=128,G0=127:ELS
EE0=E0+ES
520 IFASC(A$)=8G0=G0-1:IFG0=-1,G0=0:ELSEE0=E0-ES
530 SET(G0,41)
540 IFASC(A$)=13,RETURN
550 GOTO510
560 PRINT@G0," ";:GOSUB930:IFASC(A$)=10,G0=G0+64:IFG0=896,
G0=832:ELSEE0=E0+ES
570 IFASC(A$)=91,G0=G0-64:IFG0=0,G0=64:ELSEE0=E0-ES
580 PRINT@G0,CHR$(94);:IFASC(A$)=13,RETURN
590 GOTO560
600 ER=EL:EL=ER+(12*(FG=1)+127*(FG=0))*ES:GOTO320
610 EL=ER:ER=EL-(12*(FG=1)+127*(FG=0))*ES:GOTO320
620 EL=EL-(ER-EL)/2:ES=ES*2:ER=EL-(12*(FG=1)+127*(FG=0))*ES:
    GOTO320
630 EL=EL+(ER-EL)/4:ES=ES/2:ER=EL-(12*(FG=1)+127*(FG=0))*ES:
    GOTO320
640 FC=1:CLS:PRINT"CHOOSE YOUR METHOD:
    FOR F(X)=0 FORMS:
(1) BISECTION
(2) LINEAR INTERPOLATION
(3) MODIFIED LINEAR INTERPOLATION
(4) SECANT METHOD
(5) NEWTON'S METHOD
(6) MULLER'S METHOD"
650 A$=INKEY$
660 A$=INKEY$:IFA$=""GOTO660
670 A=ASC(A$):IFA>54ORA<49GOTO660
680 INPUT"INTERVAL ERROR TOLERANCE";E1:INPUT"FUNCTION ERROR
    TOLERANCE";E2
690 CLS:IFFG=0GOSUB380:PRINT@0,STRING$(64,32);
700 X=EL:GOSUB90:FL=FU:X=ER:GOSUB90:FR=FU
710 ONA-48GOTO830,840,850,960,1020,1070
720 GOSUB90:IFFG=1GOTO790
730 SET(GN,41):IFSGN(FU)=SGN(FL),RESET(GL,41):EL=X:GL=GN:
    ELSERESET(GR,41):ER=X:GR=GN
740 PRINT@0,"FUNCTION VALUE";FU;
750 FC=FC+1:IFABS(ER-EL)>E1ORABS(FU)>E2,GOTO710
760 IFFG=1,GOTO150
770 IFFG=0SET(GN,41)
780 PRINT@896,STRING$(64,32);:PRINT@896,"ROOT:";X,"FUNCTION
    CALLS";FC:GOTO150
790 IFINT((FC-1)/8)=(FC-1)/8PRINT" I      XI";TAB(40);"F(XI)"
800 PRINTFC;X;TAB(32);FU
810 IFSGN(FU)=SGN(FL),EL=X:ELSEER=X
```

ANATOMY of FUNCTION GRAPHER

R C Bahn

SUMMARY

This program will either plot or tabulate a segment of a function between designated limits. Options are also presented to find a root of the function in a selected interval. Preferably, the selected interval of the function contains only one zero-crossing of the X-axis. One can compare six different methods to approximate the roots. The rate of convergence and the errors of approximation can be observed.

10-30 Program documentation.
40 Reserve storage space for string variables.
50 Set up error recovery routine.
60 Define double precision variables: Note that TRS-80 BASIC II function routines do not return double precision values.
70 Dimension VA; this is only stored variable.
80 Branch to first selection menu at lines 130-170.
90-100 Routine for computation of designated function. Note: line 90 is changed each time a new function is studied.
110-120 Routine for computation of first derivate of designated function. Note: Changing line 110 is necessary only when Newton's method is used to find the root.
130-170 Routine for selection of graphics or tabular output and selection of interval to be studied.
160 Correct inadvertent interchange of lesser and greater values.
180-310 Routine to interpret keyboard command language. Note loop formed at line 310.
180 Turns on ""*
190 Wait for keyboard entry.
200 Turn off ""; set graphic flag (FG=0)*
210 Set numerical tabulation flag (FG=1)
220 GOTO current display mode.
230 GOTO 150 to redefine interval of X
240 GOTO left shift routine at line 470
250 GOTO right shift routine at line 480
260-290 GOTO routines related to direction arrows in 600 - 630.
300 GOTO menu for selection of root finder.
310 Return to 180, keyboard entry not intrepreted.
320 Either graph (330-420) or tabulate (430-460) and then return to 180 for directions.
330-420 Function graphing routine.
330 Continue to line 430 if tabulation flag (FG=1)
340 Find scale factor for X axis (ES); set up routine to find relative minimum (MN) and maximum (MX); save computed value for subsequent graphing.
350-370 Find and graph 127 values for X axis; first scale X, then compute value of Y (GOSUB 90), finally test for new minimum or maximum.
380 Scale stored value for screen and set up proper screen positions.
390-420 Complete labelling of graph.
430-460 Numerical tabulation routine.
430 Set up column headers.
440-460 Compute and list function.
470-480 Shift function frame left.
490-500 Shift function frame right.
510-520 Expand display.
530-540 Contract display.
550 Protect next subroutine.
560-580 Subroutine for left and right routines from 470 or 490.
590 Protect next subroutine.
600-630 Direction arrow routines.
640-710 Menu for selection of root finding routine and designation of error tolerances.
720 Branch to tabulation routine (790).
730-750 Graph root finding process and results.
760 Branch to select new interval.
770-780 Output results of root finder and number of function calls (FC). Return to select new interval.
790-820 Tabulate root finding process and results. Consult standard textbook of calculus for derivation of methods and discussion of errors and rate of convergence.
830 Bisection method.
840 Linear interpolation method.
850-950 Modified linear interpolation method.
960-1010 Secant method.
1020-1060 Newton's method.
1070-1210 Muller's method. Note: The best strategy, regardless of method selected, is to isolate root in small region of X by graphic or tabulation routines above. The first and probably the second significant figure of the root may be easily obtained. With this strategy all of the above root finding methods will probably converge satisfactorily.
1220-1250 Error recovery routines.
1220 Essentially disregards overflow and underflow at discontinuities of function. Protect against zero division.
1230 Handle special case when root is equal to zero.
1240-1250 List other errors and lines.

NOTES ON BASIC

T R Dettmann, Associate Editor

It looks bad when programs run from one line into the next in the middle of a word or statement. The best way to correct this is NOT to add more lines, since this slows down the processing. But how can you get the program to be readable?

The answer is to use the down arrow key when you are typing the program. The down arrow key will insert one character on the line which sends the cursor to the start of the next line. If we use the [down-arrow] to symbolize its use, then we could write a program line as follows:

```
10 PRINT"USE OF DOWN-ARROW":[down-arrow]
   PRINT"THIS IS NOW THE SECOND STATEMENT"
```

Don't use this in the middle of strings to be printed because it will cause the line shift to occur when the string is printed (unless you WANT it that way!).

You can also use the right arrow (the TAB character) to dress up the text by shifting the text to the next TAB stop and still only using 1 of the 256 allowed characters on a line.

An easy way to cause a line feed on your printer is to LPRINT CHR$(138). The printer thinks this is a control character when it sees it and so it line feeds and does a carriage return.

Using STRING$(n,138) will cause the printer to line feed n times (i.e., it will skip n lines).

An old trick in BASIC is to put an input statement at some point where we want a pause. The standard form is:

```
150 INPUT"PRESS ENTER WHEN READY TO CONTINUE";
```

This will display the message and then continue when enter is pressed.

This is a good way to put a program pause in, but it is slow. A much more impressive rsponse comes from the following:

```
150 PRINT"PRESS ANY KEY TO CONTINUE";
160 IF INKEY$ = "" THEN 160
```

This will loop continuously at statement 160 until a key is pressed and then the program will continue with the next statement.

To make an eye catching display, you need something changing. A static screen draws no interest. To make an eye-catching error trap, you might use the following:

```
1000 CLS:PRINT CHR$(23)
1010 FOR I = 1 TO 20:PRINT @460,""ERROR";:
   FOR J=1TO10:NEXTJ:PRINT@460,"       ";:
   FOR J=1TO10:NEXTJ:NEXTI
```

PRINT CHR$(23) shifts the screen to double size letters and then statement 1010 puts the word "ERROR" in the center of the screen and blanks it out 20 times. This flashing is sure to draw attention.

Have you ever wanted to dress up your output by putting a blank line every fifth (or tenth, or whatever)? If so, you might have gone through some contortions to get it done right, but a very simple way to do it is to include an IF statement, as follows:

```
IF X - INT(X/5)*5 = THEN PRINT
```

where X is an integer line counter (such as the counter for a FOR NEXT loop). This is INTEGER arithmetic and it works like this:

1. Whenever X/5 is not an integer, then the INT function truncates the number to the next lower number as in INT(7/5) = 1

2. Multiplying this result by 5 and subtracting from the original number will give zero only when X is a multiple of 5. In this way, a blank line will be printed every fifth line.

This function is called the "MODULUS" and can be a very useful way to count. (Note: If X is defined as an integer, then the INT function is strictly not necessary, but it is clearer in the coding if it is included).

Disk BASIC users can code the function as:

```
DEF FNMOD(X,N) = X - INT(X/N)*N
```

Want to speed up your routines (such as INKEY$ routines to get in strings)? Then put as much as possible on single lines. In many cases, a whole subroutine can be written on a single 255 byte line.

Need a BUZZER? A possible choice for a buzzer is your cassette relay in the expansion interface if you have one (but DON'T use it too often, or you will wear it out).

To use the relay as a buzzer, alternately POKE 1 and 2 into location 14308, this will cause it to buzz (put a small timing loop in betweeen changes to allow the relay to respond. A routine that works is:

```
1000 FORI=1TO20:POKE14308,2:FORJ=1TO5:
   NEXTJ:POKE14308,1:FORJ=1TO5:NEXTJ:NEXTI
```

Want to make your "yes" and "no" responses quicker and more impressive in your programs? Then do it with one letter response with the following routine as a sub-routine:

```
5000 REM *****Y/N INPUT*****
5010 CH$ = INKEY$:IFC$ = ""THEN 5010
5020 IF CH$="N" OR CH$="Y" THEN PRINT CH$:
       RETURN ELSE 5010
```

This routine will return only for a Y or N response and will ignore all others. When it does find a Y or N, it will print the character and return control to the calling program.

A call to the program could go like this:

```
120 PRINT "DO YOU WANT TO CONTINUE (Y/N)?";
130 GOSUB 5000
140 IF CH$="N"THEN STOP
```

Try it, you will like the response you get!

CRT Support

Dr H F Sturgis, Turlock, CA

Two weeks ago, I came home with my new expansion interface and disk drive. In no time I had them connected up, and they operated flawlessly.

That night I got far enough into it to make a backup disk of the TRSDOS and Disk Basic, "just in case". Got off to bed around midnight - - just couldn't quit!

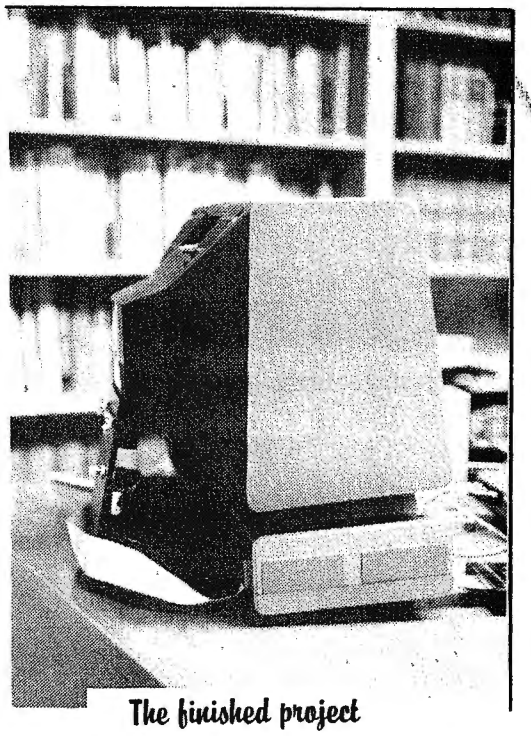
Next morning, viewing my desk from a different angle, I noted an alarming backward tilt of the CRT-Expansion interface assembly. It would take just a little push, and no imagination at all, to see it all on the floor in pieces. And with little kids running around the house? There had to be a better way, and here is what I came up with:

MATERIAL LIST

1 Pine board 1X2X6"
1 Plywood ¼X6X8"
3 Bolts 10/32 X 1¼"
3 Wing nuts
6 Washers
Epoxy Glue (5 minute)
Black paint (small bottle model airplane dope works well)
Fine Sandpaper (#150)
Triple outlet extension outlets for two prong plugs (2)
3 outlets for three prong plugs
1 Archer illuminated SPST push-button switch
1 Extension cord, 3 wire appliance type
Short lengths of #12 insulated wire

CONSTRUCTION

Fortunately, the rear housing of the CRT presents a flat surface for the attachment of the support. Take the pine 1 X 2 and file the long edge. Continue filing the 1 X 2 until it fits against the CRT housing with a slight backward tilt. Sand all surfaces flat and smooth. Drill three holes for the bolts.



The finished project

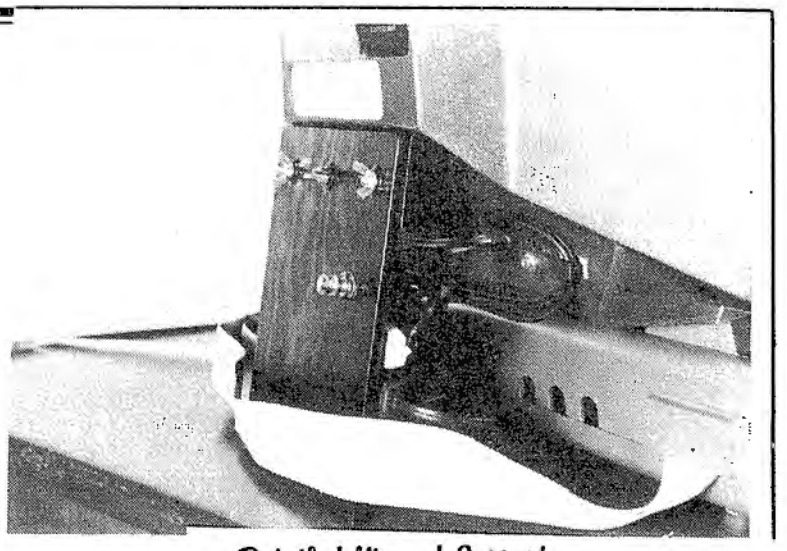
Place small pads of folded waste paper under the rear feet of the expansion interface. Carefully holding

the plywood and pine 1 X 2 together, fit these against the rear housing of the CRT in the expected final position. Make a cross mark from the plywood to the 1 X 2 on each side. Return to the workbench and match up the cross marks, then drill from the previous holes in the 1 X 2 through the plywood.

Mix a small portion of the Epoxy glue. Attach washers on inner side of the 1 X 2, and outer side of the plywood.

Carefully roughen an area on the back of the CRT housing where the support will fit, using a file or sandpaper. Mix more glue and apply to the shaped edge of the 1 X 2, and to the roughened area on the CRT housing. Bolt the plywood and 1 X 2 together. Carefully position support against CRT housing so that surfaces are flat with no gaps, and the support on the table. No pressure is needed. Hold in postion until glue sets.

Final sanding, painting and assembly are now done. When glue is set firm remove paper pads from the rear feet of the expansion interface. This will allow the CRT to settle back onto the support and give a firm "feel" to the whole assembly.



Detailed View of Support

The project can now be considered completed. However, after stumbling over a mass of wires on the floor, it seemed natural to attach outlets to the back of the support, with just one main cord to a wall outlet. Wiring is done following standard electrical techniques, but I soldered my connections.

The triple outlets for two prong plugs are controlled by the push-button switch and then plugged into the three prong outlet which allows you to switch up to six accessories and/or power supplies. The three prong outlet is necessary to provide the special plug-in for the CRT. A small dab of "liquid paper" marks the side of the two prong outlets which correspond with the "wide prong" of the three prong outlets. How is this put together? With 5 minute Epoxy!

The electrical cord for each power supply and accessory can now be neatly coiled, taped, and placed behind the CRT with just enough free cord to reach an outlet in the back of the support.

Everything except the CRT can now be switched off with the one push-button switch. The finished assembly with its support looks neat, is safe, and feels solid. ●

ENGINEERING CALCULATIONS

(Hydraulics)

In case you are wondering what the diagram on the cover this month is, it is a "variable orifice shock absorber", such as may be used on the landing gear of aircraft. The idea is that as the piston travels, the orifice becomes smaller, changing the response of the shock absorber from soft initially, to firm.

This article concerns itself primarily with programming the TRS-80 to calculate that response curve, then displaying the actual figures per increment of piston travel. As an added feature, it also graphs the curve. Since the graph uses no graphics characters, it may be output to a line printer.

Using the values in the sample run will result in the graph which accompanies it. Changing the values, even in small increments in some cases will cause the trace to be displaced so far that it will not appear on the graph. No allowance has been made for this, since in most cases the changed values would represent running the piston through the end of the cylinder, for example. In other words, the range of values you can use is limited to a narrow area, which presumably represent the real operating conditions.

The initial idea for this program came from Albert C Saurwein ***(of High Technology Products & Engineering, Kent, WA)***, who asked us if the TRS-80 could do this type of calculation. Mr Saurwein was the author of an article in the magazine ***MACHINE DESIGN, July 1971***, in which he describes the math required to design your own shock absorbers.

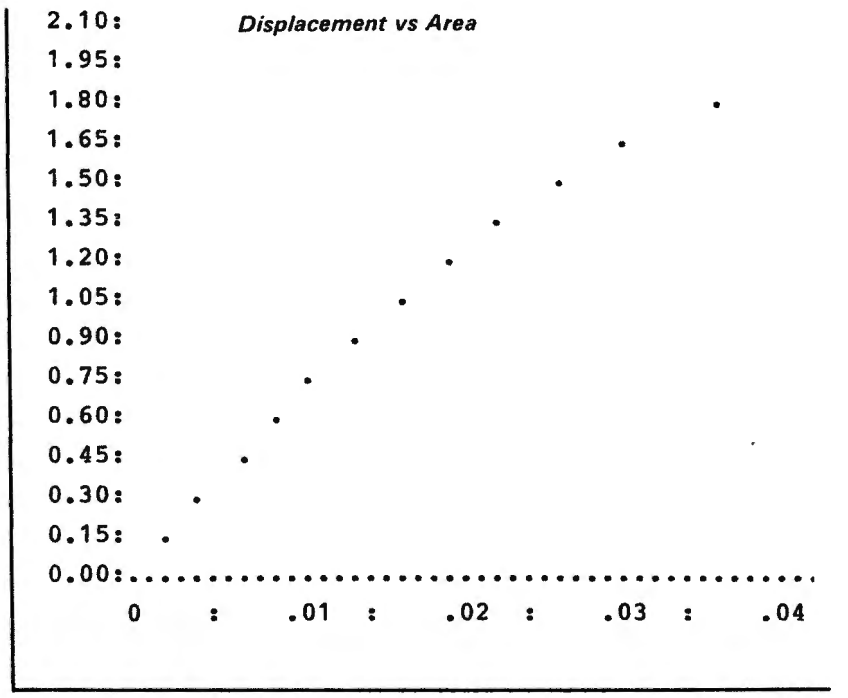
After going through several involved equations, he says: "at this point, construct a table of values for ¼inch intervals of x and plot the values". The equation for orifice area as a function of piston travel is:

$$A_{o,x} = J \sqrt{V_1^2 - \frac{2F_x}{m}}$$

Where A_o is the orifice area in square inches, x is instantaneous position past point of initial deceleration, J is a constant inch/sec, V_1 is velocity in inch/sec at initial condition, F is force in pounds and m is the mass of the decelerating body in lb-sec²/in.

As you can see from the program listing (written by Leo Christopherson and Steve Smith), programming complex equations on the TRS-80 is not as difficult as it may seem, and plotting the curve and experimenting with various values is actually fun, when the computer does all of the work!

To answer Mr Saurwein's question: Yes, it can! ●




```
RUN
ENTER MASS OF DECELERATING BODY, (LB-(SEC*SEC)/IN): ? 600
ENTER INITIAL VELOCITY OF BODY, (IN/SEC): ? 50
ENTER DISTANCE PISTON WILL MOVE, (IN): ? 2
ENTER MAXIMUM SYSTEM PRESSURE, (PSI): ? 700
ENTER FLUID DENSITY, (LBS/IN*IN*IN): ? .04
ENTER DISCHARGE COEFFICIENT: ? .7
ENTER INTERVAL DISPLACEMENT FOR TABLE: ? .15
```

Sample RUN

```
TABLE SHOWING ORFICE AREA (SQ.IN.)AT PISTON
DISPLACEMENTS OF  0 TO 2  WITH AN INCREMENT OF .15
 DISP  AREA
 0.00  0.030
 0.15  0.029
 0.30  0.028
 0.45  0.026
 0.60  0.025
 0.75  0.024
 0.90  0.022
 1.05  0.021
 1.20  0.019
 1.35  0.017
 1.50  0.015
 1.65  0.013
 1.80  0.010
 1.95  0.005
ENTER FOR GRAPHIC DISPLAY?
```

```
10 REM * (C)1979 80-NW PUBLISHING CO TACOMA WA 98409 *
20 CLS:DEFDBLA-Z:DEFINTI:DIMB(500)
30 A$="##.##":B$="###.###"
40 REM  ENTER THE VARIABLES:
50 INPUT"ENTER MASS OF DECELERATING BODY, (LB-(SEC*SEC)/IN): ";M1
60 INPUT"ENTER INITIAL VELOCITY OF BODY, (IN/SEC): ";V0
70 INPUT"ENTER DISTANCE PISTON WILL MOVE, (IN): ";XF
80 INPUT"ENTER MAXIMUM SYSTEM PRESSURE, (PSI): ";P
90 REM  CALCULATE SAFETY FACTOR:
100 P=P*.93
110 INPUT"ENTER FLUID DENSITY, (LBS/IN*IN*IN): ";W
120 INPUT"ENTER DISCHARGE COEFFICIENT: ";CD
130 INPUT"ENTER INTERVAL DISPLACEMENT FOR TABLE: ";X!
140 REM  CALCULATE DEACELERATION:
150 DA=(V0*V0)/(2*XF)
160 REM  CALCULATE REACTIVE FORCE:
170 FR=(M1*DA)/386
180 AP=FR/P
190 REM  CALCULATE "J":
200 J=SQR((W*(AP)↑3)/(772*FR*CD*CD))
210 CLS:PRINT:PRINT"TABLE SHOWING ORFICE AREA (SQ.IN.)AT PISTON"
220 PRINT"DISPLACEMENTS OF  0 TO";XF;" WITH AN INCREMENT OF";X!
230 PRINT" DISP  AREA"
240 FORN!=0TOXFSTEPX!:AX!=J*SQR(V0*V0-((2*FR*386)/M1)*N!):PRINT
USINGA$;N!;:PRINTUSINGB$;AX!:NEXTN!
250 INPUT"ENTER FOR GRAPHIC DISPLAY";ZS1
260 CLS:PRINT:PRINT"GRAPH SHOWING ORIFICE AREA (SQ. IN.) AT PISTON"
270 B2=0
280 FORN!=0TOXFSTEPX!:AX!=J*SQR(V0*V0-((2*FR*386)/M1)*N!):
   B(B2)=AX!:B2=B2+1:NEXT
290 CLS:K=900
300 FOR I=1TO59:PRINT@K+I,".";:NEXTI
310 K=964
320 C$="#.##:"
330 PRINT@20,"DISPLACEMENT VS AREA"
340 Y1=0
350 FORI=14 TO0STEP-1:PRINT@I*64,USINGC$;Y1;:Y1=Y1+X!:NEXTI
360 Y1=XF
370 G=127*B(0):IFG<116THENG=G*10
380 IFG<116THENG=G*100:GOTO380
390 GOSUB490
400 FORI=0TO5:PRINT@K+10*I,INT((I/(J9*100))*100)/100;:NEXTI
410 FORI=6TO56STEP10:PRINT@K+I,":";:NEXTI
420 FORI=0TOB2-2
430 E=(127-G*B(I))*J9
440 IFE<=12ORE=>127THEN470
450 H=43-(I*3):IFH>45ORH<1THEN470
460 SET(E,H)
470 NEXT
480 GOTO480
490 M9=0:FORI=0TOB2-2
500 H=43-(I*3):IFH>45ORH<1THEN530
510 E=127-G*B(I)
520 IFE>M9THENM9=E
530 NEXT
540 J9=M9/127*1.3
550 RETURN
```

Super Sorting

(A sorted affair)

T R Dettmann, Associate Editor

The next time you sort a list of items in your computer, try this experiment. Put an AM radio next to the computer, tuned away from any station. With this, you can actually hear the computer 'think'.

If you try this, you will find that during the sort, a large amount of time will be spent doing something which changes the pattern of the sound completely. This change is the bane of most sorting techniques on the TRS-80, and it is called "Memory Management".

Memory Management

To understand memory management, we have to look at how the computer stores information. For numbers this is simple since each variable is assigned space in memory for its value, resetting it doesn't change where it is.

However, strings are handled differently. When we read in strings, the computer stores them starting at the top of free string memory (remember CLEAR N, it sets aside N bites for strings, RUN automatically does a CLEAR 50). The beginning of each string is recorded along with the length of the string in a location in memory provided for this. The VARPTR function gives you that location.

If you have a string in memory called A$, its location is given by:

```
PEEK(VARPTR(A$)+1) + PEEK(VARPTR(A$)+2)*256
```

(see the Level II Reference Manual, p8/9).
The length of the string is:

```
PEEK(VARPTR(A$))
```

As you add strings into string space, they are added one after another as shown in the diagram.

When you reset the value of a string, the pointers to the string in memory are reset to their new values by the interpreter. But this is not all, since the string is treated as a new string and the old location of the string is not recovered.

A typical statement in a sorting program which changes one string for another is:

```
T$=A$(I):A$(I)=A$(J):A$(J)=T$
```

Even though the strings are already occupying space in memory, this statement generates THREE NEW STRINGS and adds them into the string space at the bottom.

When you fill up the string space (which will happen very quickly), the computer pauses to reorganize the memory and compact the string space by getting rid of unused space. During this time, your program just waits.

Even with the best sorting algorithm, as much as 90% of the computing time for the sort will be in memory management. In order to get efficient sorts we have to get rid of this wasted time.

Sorting with VARPTR

A significant improvement in sorting time (from 4 hrs to 8½ minutes, for 450 items), is gained by redoing the program statement above that swaps strings as follows:

```
I1=PEEK(VARPTR(A$(I))):
  I2=PEEK(VARPTR(A$(I))+1):
    I3=PEEK(VARPTR(A$(I))+2)
J1=PEEK(VARPTR(A$(J))):
  J2=PEEK(VARPTR(A$(J))+1):
    J3=PEEK(VARPTR(A$(J))+2)
POKE(VARPTR(A$(I))),J1:
  POKE(VARPTR(A$(I))+1),J2:
    POKE(VARPTR(A$(I))+2),J3
POKE(VARPTR(A$(J))),I1:
  POKE(VARPTR(A$(J))+1),I2:
    POKE(VARPTR(A$(J))+2),I3
```

This set of statements creates no new strings in memory. It only changes the pointers to the strings.

On large sorts, the improvement by using this technique is phenomenal. On a sort of 450 items in a mailing list, we had an improvement from 4 hours without this technique, to 8½ minutes with it. This sort has now been included in our own mailing list program as well as Peripheral People's Mailroom+.

As this is being typed up for publication, we have seen an article elsewhere giving essentially the same sorting technique. We discovered only one minor problem with the way that it accomplishes the switch.

It uses the following statements to switch the pointers:

```
T1=VARPTR(A$(I))
T2=VARPTR(A$(J))
  FOR Z=0TO2
    A1=PEEK(T1+Z)
    A2=PEEK(T2+Z)
      POKE(T1+Z),A2
      POKE(T2+Z),A1
  NEXT Z
```

I found that the technique works well on long sorts,

(continued on page 62)

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TRS-80

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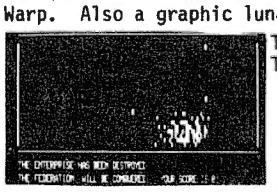

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NUMBERING
by Tom Stibolt from Acorn

Several commands found in other BASICs are left out of the Radio Shack versions. This machine language package will add several commands to your system. And they are available directly from BASIC using the NAME command.

Normally loading more than one BASIC program into memory is a problem. With the append feature of this package you can load another program without losing the program in memory. In either Level II or DOS, you can create one combined program with a menu to access other appended programs. The thorough documentation supplied by Acorn shows you how to do this and more.

This package adds to your system a complete BASIC renumbering command, written in machine language. Whether you want to renumber an entire program, or only one section, it is the fastest renumbering routine we have seen. Optional arguments to the command allow you to specify the new starting line number and the increment. Also, for renumbering only a section of your program, you can specify the first and last line number.

Renumbering improves BASIC programs in many ways. Renumbering a program before printing it makes it easier for others to type into their machines. It also makes it easier to follow the structure of programs, especially if the blocks of the program are seperately renumbered. As a debugging aid, renumbering of an entire program will detect any undefined line errors faster than running the program itself. And, the memory requirements of programs can be reduced by simply renumbering with a small increment and a small starting number.

Another command allows you to fix or recover NEWed programs or those lost by a DOS reboot.

> Paul Bump of Warsaw, Indiana wrote us about Numbering to say that he "can't imagine anyone being without it. This is a must for everyone."

The 16k, 32k and 48k versions are all on the same tape for 14.95.

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For instance, I've learned that the new microcomputers like the TRS-80 are really elegant pieces of hardware. The price is deceiving. Given the right programs, they can jump through hoops.

But finding the right programs isn't all that easy. You can flip through the pages of this magazine and find 50 ads for TRS-80 programs. Granted, a good many of them are for fun and games, but you can still find quite a few offering business programs.

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These programs are marvels of efficiency. They're fully-documented, and you can buy the books locally or from me. On the Osborne programs, my contribution was simply this: I made them work on the TRS-80, and if you buy them from me, I'll make them work for you.

If you're skeptical on that point, call the number below and we'll give you the names of some of the people who've already bought all over the world. Then you can call them up and hear what they have to say.

These programs only cost $99.95 each. (The Cash Journal option on the General Ledger adds another $50.) For that you get the disk, all the instructions you need, and my telephone number. If you call, we answer all your questions and make sure everything's working smoothly. If your question's tough enough, I'll talk to you personally.

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View from the Top of the Stack

The 7th in a series

Tom Rosenbaum, Technical Editor

In the following text the parameter s will be referred to in the operand field of an op code, such as ADD A,s. The use of s is shorthand to indicate that s may be any of the following:

1. r - any of the registers A,B,C,D,E,H,L
2. n - one hex byte.
3. (HL) - the contents of the memory location whose address is contained in the HL register pair.
4. (IX+d) - the contents of the memory location whose address is the value of the IX register plus d(-126 ≤ d ≤ +129)
5. (IY+d) - similar to 4.

The shorthand notation ss will refer to any of the register pairs BC,DE,HL,SP.

A moment must be taken now to explain the operation of the two index registers IX & IY. These two registers are most often used as a memory pointer of the form (IX+d) or (IY+d) where d is a one byte signed 2's complement number. This feature makes these registers very useful for working with tables of data.

A few examples should clarify the issue. Assume the contents of the IX register are 8000H, and the instruction LD (IX+d),A is to be executed for various values of d. The following table shows the absolute location in RAM where the accumulator will be stored for the corresponding value of d (all values in hex).

+ 0	8000
+ 1	8001
+ 40	8040
+ 7F	807F
+ 80	7F80
+ 81	7F81
+ C0	7FC0
+ FE	7FFE
+ FF	7FFF

The (IX+d) type instruction can address RAM from 128 bytes less than IX to 127 bytes above IX. As such, when a table which will be addressed by IX is set up, the IX register must be loaded with the address of the *MIDDLE* of the table if you intend to use all 256 bytes of the addressing capability of the (IX+d) instruction.

ARITHMETIC INSTRUCTIONS

8 BIT

1. ADD A,s — Add s to the accumulator and store the result in the accumulator.
2. ADC A,s — Same as ADD A,s except the carry flag is added to the result also. ADC A,s has exactly the same effect as ADD A,s if the carry flag =0.
3. SUB A,s — Subtract s from the accumulator and store the result in the accumulator.
4. SBC A,s — Same as SUB A,s except the carry flag is also subtracted.

16 BIT

1. ADD HL,ss — Add ss to HL and store the result in HL.
2. ADC HL,ss — Add ss and the carry flag to HL and store result in HL.
3. ADD IX,pp — Add pp (BC,DE,IX,SP) and store the result in HL.
4. ADD IY,rr — Add rr (BC,DE,IY,SP) and store the result in HL.
5. SBC HL,ss — Subtract ss and the carry flag from HL and store result in HL.

Again, some examples will be helpful. For the examples below, the initial value of the registers are:
A : 50H BC : 2000H DE : 8000H HL : C000
IX : F000 IY : 4000H (C000H)=44H
(F004H)=55H CF=Carry Flag

CARRY FLAG = 0

	OP CODE		RESULT	
1)	ADD	A,B	A = 70H	CF= 0
2)	ADD	A,D	A = D0H	CF= 0
3)	ADD	A,(HL)	A = 94H	CF= 0
4)	ADD	A,H	A = 10H	CF= 1
5)	SUB	A,B	A = 30H	CF= 0
6)	SUB	A,D	A = C0H	CF= 1
7)	SUB	A,(HL)	A = 0CH	CF= 0
8)	SUB	A,(IX+4H)	A = FBH	CF= 1
9)	SBC	A,B	A = 30H	CF= 0
10)	ADD	HL,DE	HL = 4000H	CF= 1
11)	ADD	HL,BC	HL = E000H	CF= 0
12)	SBC	HL,DE	HL = 4000H	CF= 0
13)	ADD	IX,BC	IX = 1000H	CF= 0

CARRY FLAG = 1

1)	ADD	A,B	A = 71H	CF= 0
2)	ADD	A,(HL)	A = 95H	CF= 0
3)	ADD	A,H	A = 11H	CF= 1
4)	SUB	A,D	A = BFH	CF= 1
5)	ADD	HL,DE	HL = 4001H	CF= 1
6)	SBC	HL,DE	HL = 3FFFH	CF= 0

A few words of caution are in order when it comes to using the aritmetic instructions.

1.There is no SUB HL,ss instruction. If you want to subtract two 16 bit registers you must use the SBC HL,ss instruction.

2.Not all of the 16 bit arithmetic instructions set the zero flag if the result is zero.

3.If you add two positive numbers together whose sum is greater than 127 the result will be negative. As an example consider 80H+40H =COH. The sum should be C0H or 192 but the Z80 will recognize C0H as a signed 2's complement number. This situation is detected by the Z80 which will set the P/V flag to indicate an overflow. No effort will be made to explain this situation in any more detail, but it is something of which the prog-

(continued on page 62)

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From 80-US in May 79, Psych is the program which tells you if you are Analytical or Intuitive, and to what degree. Provides for screen or printer output. LIFEBOAT, from the Jul 79 issue, is a game of survival.

Please order by number using the order form in the centerfold. All programs are on cassette and run in 16K Level II or above. Note: Beewary, Android w/sound, Snake Egg w/sound and Lifetwo w/sound do not run reliably when transferred to disk using DOS 2.2, they do function OK with 2.0, 2.1 and NEWDOS. All others work with most current DOS, including 2.2.

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RESTORING *KILLED* DISK FILES

T R Dettmann, Associate Editor

Murphy's Law: If anything can go wrong, it will.
O'Tooles's Observation: Murphy was an optimist.
Mike's Moan: Damn!

Murphy's Law for disk files can be stated simply as: The file you accidentally kill will be large, hard to replace, and not backed up. For those of you who have had occasion to prove this, there is now a way to get back that file without retyping it.

Radio Shack has provided no instructions in their disk manual describing the way files are created and how the directory keeps track of where they are and which ones are active. There is (I think) a good reason for this, that is: that you can easily destroy ALL of the information on a disk by playing with the directory. You can foul it up so much that you will never be able to recover it.

To recover a disk file, you will need to have the following tools:

Some type of program that will read the directory directly and change it (I recommend SUPERZAP from Apparat, but RSM2D will work also)

Useful but not essential is the Apparat utility program DIRCHECK

Before working on a good disk, play with the directory of a blank disk until you are confident that you can handle the procedure.

Before you can work on anything, you have to understand what it is first, so let's look at a typical directory to see what it has to tell us (in ASCII and HEX). Note: All of the figures for the directory were generated with SUPERZAP from a blank formatted disk (called TEST), on which we have written a small test program (called FILES).

The Directory

The directory takes up a whole 10 sector track (normally track 11 HEX - 17 Decimal). A disk is made up of 35 tracks, each divided into 10 sectors. A sector contains 256 bytes.

A Granule is equal to 5 sectors and there are two Granules per track. The first two sectors of the directory track have system information about the disk, and the last eight have 32-byte directory entries for each file (and extensions if necessary).

Let's look at the first two sectors (Figures 1 and 2). The first sector is called the Granule Allocation Table (GAT for short). It occupies sector 0, which is the first sector. In this sector one byte for each available track on the disk is coded as follows:

FC - neither granule is allocated
FD - 2nd granule is allocated
FE - 1st granule is allocated
FF - Both granules are allocated

For a normal 5" disk, there are 35 tracks, and so 35 entries. Extra space is left over for larger systems.

Starting with byte 60 HEX on the track, (we are still in sector 0), one byte is assigned for each track to indicate whether the track is locked out. It is coded as follows:

FC - not locked out
FF - locked out (track unusable)

Bytes CE-CF HEX on sector 0, track 11 HEX have the disk password encoded. Bytes D0-D7 HEX have the disk name in ASCII. The remainder of the track has the information for the AUTO command for this disk (if it is a system disk).

The second directory sector (sector 1 the Hash Index Table, also called the HIT sector) has only one table called the Hash Index Table. It is used to code the location of each directory entry for rapid access. Each non-zero entry is the coded filename for a directory entry and its location gives the location of the File Primary Directory Entry (FPDE), in the directory.

```
111000  FFFC FCFC FCFC FCFC FCFC FCFC FCFC FCFC ................
111010  FCFF FCFC FCFC FCFC FCFC FCFC FCFC FCFC ................
111020  FCFC FCFF FFFF FFFF FFFF FFFF FFFF FFFF ................
111030  FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF ................
111040  FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF ................
111050  FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF ................
111060  FCFC FCFC FCFC FCFC FCFC FCFC FCFC FCFC ................
111070  FCFC FCFC FCFC FCFC FCFC FCFC FCFC FCFC ................
111080  FCFC FCFF FFFF FFFF FFFF FFFF FFFF FFFF ................
111090  FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF ................
1110A0  FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF ................
1110B0  FFFF FFFF FFFF FFFF FFFF FFFF FFFF FFFF ................
1110C0  FFFF FFFF FFFF FFFF FFFF FF21 0000 E042 ...........!...B
1110D0  5445 5354 2020 2020 3038 2F31 352F 3739 TEST....08/15/79
1110E0  0D20 2020 2020 2020 2020 2020 2020 2020 ................
1110F06 2020 2020 2020 2020 2020 2020 2020 2020 ................
```

Directory Track, Sector 0 showing disk name "TEST"

Figure 1

```
111100  A22C 0000 0000 0000 0000 0000 0000 0000 .,..............
111110  0000 0000 0000 0000 0000 0000 0000 0000 ................
111120  0000 0000 0000 0000 0000 0000 0000 0000 ................
111130  0000 0000 0000 0000 0000 0000 0000 0000 ................
111140  0000 0000 0000 0000 0000 0000 0000 0000 ................
111150  0000 0000 0000 0000 0000 0000 0000 0000 ................
111160  0000 0000 0000 0000 0000 0000 0000 0000 ................
111170  0000 0000 0000 0000 0000 0000 0000 0000 ................
111180  0000 0000 0000 0000 0000 0000 0000 0000 ................
111190  0000 0000 0000 0000 0000 0000 0000 0000 ................
1111A0  0000 0000 0000 AC00 0000 0000 0000 0000 ................
1111B0  0000 0000 0000 0000 0000 0000 0000 0000 ................
1111C0  0000 0000 0000 0000 0000 0000 0000 0000 ................
1111D0  0000 0000 0000 0000 0000 0000 0000 0000 ................
1111E0  0000 0000 0000 0000 0000 0000 0000 0000 ................
1111F06 0000 0000 0000 0000 0000 0000 0000 0000 ................
```

Directory Track, Sector 1 showing HIT code AC for "FILES" at location A6

Figure 2

```
111800  0000 0000 0000 0000 0000 0000 0000 0000 ................
111810  0000 0000 0000 0000 0000 0000 0000 0000 ................
111820  0000 0000 0000 0000 0000 0000 0000 0000 ................
111830  0000 0000 0000 0000 0000 0000 0000 0000 ................
111840  0000 0000 0000 0000 0000 0000 0000 0000 ................
111850  0000 0000 0000 0000 0000 0000 0000 0000 ................
111860  0000 0000 0000 0000 0000 0000 0000 0000 ................
111870  0000 0000 0000 0000 0000 0000 0000 0000 ................
111880  0000 0000 0000 0000 0000 0000 0000 0000 ................
111890  0000 0000 0000 0000 0000 0000 0000 0000 ................
1118A0  1000 0045 0046 494C 4553 2020 2020 2020 ...E.FILES......
1118B0  9642 9642 0100 1800 FFFF FFFF FFFF FFFF .B.B............
1118C0  0000 0000 0000 0000 0000 0000 0000 0000 ................
1118D0  0000 0000 0000 0000 0000 0000 0000 0000 ................
1118E0  0000 0000 0000 0000 0000 0000 0000 0000 ................
1118F06 0000 0000 0000 0000 0000 0000 0000 0000 ................
```

Directory Track, Sector 8 showing file "FILES"

Figure 3

```
TEST          08/15/79
FILES    A6    PRIMARY ENTRY HAS BAD CODE IN "HIT" SECTOR
30    ***** GRANULE FREE, BUT ASSIGNED TO FILE(S)
            A6    FILES
BOOT/SYS        SIP=6   EOF = 5/0          1 EXTS    5 SECTORS
DIR/SYS         SIP=5   EOF = 10/0         1 EXTS    10 SECTORS
FILES                   EOF = 0/69         1 EXTS    5 SECTORS

67 FREE GRANULES.       0 LOCKED-OUT GRANULES.

TEST        DIRECTORY CHECK & LIST COMPLETED.
```

Figure 4

Figure 5

Code Conversion

HEX	ASCII	Character
20	32	space
21	33	!
22	34	"
23	35	#
24	36	$
25	37	%
26	38	&
27	39	'
28	40	(
29	41	)
2A	42	*
2B	43	+
2C	44	,
2D	45	-
2E	46	.
2F	47	/
30	48	0
31	49	1
32	50	2
33	51	3
34	52	4
35	53	5
36	54	6
37	55	7
38	56	8
39	57	9
3A	58	:
3B	59	;
3C	60	<
3D	61	=
3E	62	>
3F	63	?
40	64	@
41	65	A
42	66	B
43	67	C
44	68	D
45	69	E
46	70	F
47	71	G
48	72	H
49	73	I
4A	74	J
4B	75	K
4C	76	L
4D	77	M
4E	78	N
4F	79	O
50	80	P
51	81	Q
52	82	R
53	83	S
54	84	T
55	85	U
56	86	V
57	87	W
58	88	X
59	89	Y
5A	90	Z
5B	91	Up Arrow
5C	92	Down Arrow
5D	93	Left Arrow
5E	94	Right Arrow
5F	95	Cursor

To decode the location of an entry from the HIT sector, we have to break down the entry as follows:

```
0 1 2 3 4 5 6 7
[ -a- ]   [ -b- ]
```

a. the number of the 32 byte FPDE within its sector.
b. the sector the FPDE is in, minus 2

For example, a HIT sector entry of AC at location A6 in the table is in figure 2 from file "FILES". It is located by decoding the HIT location as follows:

```
A6 = 1 1 0 0 0 1 1 0
     [ -6- ]     [ -6- ] + 2 = 8
```

So the directory entry for FILES is on directory sector 8 and is the 6th entry in the sector.

Now let's look at the FPDE itself. The 32 bytes of the FPDE tell us a lot of information about the file. Let's look at the one for FILES in sector 8. It looks like this:

```
1000 0045 0046 494C 4553 2020 2020 2020
9642 9642 0100 1800 FFFF FFFF FFFF FFFF
```

Let's take just the first group (1000), and for review, in case we have forgotten, remind ourselves that each digit is four bits, so that 1000 would be made up of 16 bits. If we break down the first eight bit byte (10), we see the following coding:

```
10 = 0 0 0 1 0 0 0 0
     a b   c d [ -e- ]
```

a. 0 means this is a primary directory entry
b. this would be 1 if this were a system file
c. this is 1 for active files, 0 otherwise
d. this bit is 1 if the file is invisible
e. this 3 bit number is the protection level of the file, 000 = unrestricted access, 111 = no access.

Therefore, 1000 tells us this is an active file, while 0000 would indicate an inactive (killed) file, and 1800 would be an active, invisible file.

The 4th byte gives the position of the end of file in the 'end of file' sector and the 5th byte gives the logical record length of the file records (00 = 256 bytes). Bytes 6 thru 13 give the filename in ASCII, padded with blanks (20 HEX) if necessary to fill the field. Bytes 14 - 16 give the file extension is used (also filled with blanks if necessary). Bytes 17 and 18 are the encoded update password and bytes 19 and 20 are the encoded access password. The 21st and 22nd bytes give the sector in the file where the end of file occurs. Bytes 23 thru 30 tell us where the file is on the disk. The location is coded in two byte pairs as follows:

1st byte
FF = end of the directory entry
FE = the 2nd byte gives the directory entry code for an entension to the directory entry because 32 bytes were not enough
FE = the track on the disk where the file is located

2nd byte
this byte has the following coding:

```
bit  0 1 2 3 4 5 6 7
     [ -a- ]   [ -b- ]
```

a. # of granules from the start of the track to the start of the file area
b. # of granules minus 1 assinged to the file in this area

We can see from the entry above for "FILES" that the file location is given by the figures 1800 as follows:

```
18 = located on track 18 HEX
00 = 0 0 0 0 0 0 0 0
     [ -0- ]   [ -0- ] + 1 = 1 granule assigned, first
                               granule on track
```

Now, the Meat!

Now that we know something about directory entries, we can fix them if necessary. Once again though, a warning, always try out your fixes on a blank, formatted disk first. That way if you make a mistake, you can experiment until you figure it out without losing an important file, perhaps forever!

With that said, let's kill the file "FILES". Once we type in KILL FILES the FPDE now looks like this:

```
0000 0045 0046 494C 4553 2020 2020 2020
9642 9642 0100 1800 FFFF FFFF FFFF FFFF
```

The only change here is that the first 1 was changed to a 0 (bit 4 of the first byte was reset to 0). Change it back to a 1 with SUPERZAP or RSM2D and we have it back, right? WRONG! When a file is killed, it's HIT sector entry is set to 00 and the granules allocated to that file are released.

To recover the file completely, we must repair the GAT in sector 0 and the HIT in sector 1. In our case, we know that the HIT entry for FILES is AC and that it goes in byte A6 in

(continued on page 62)

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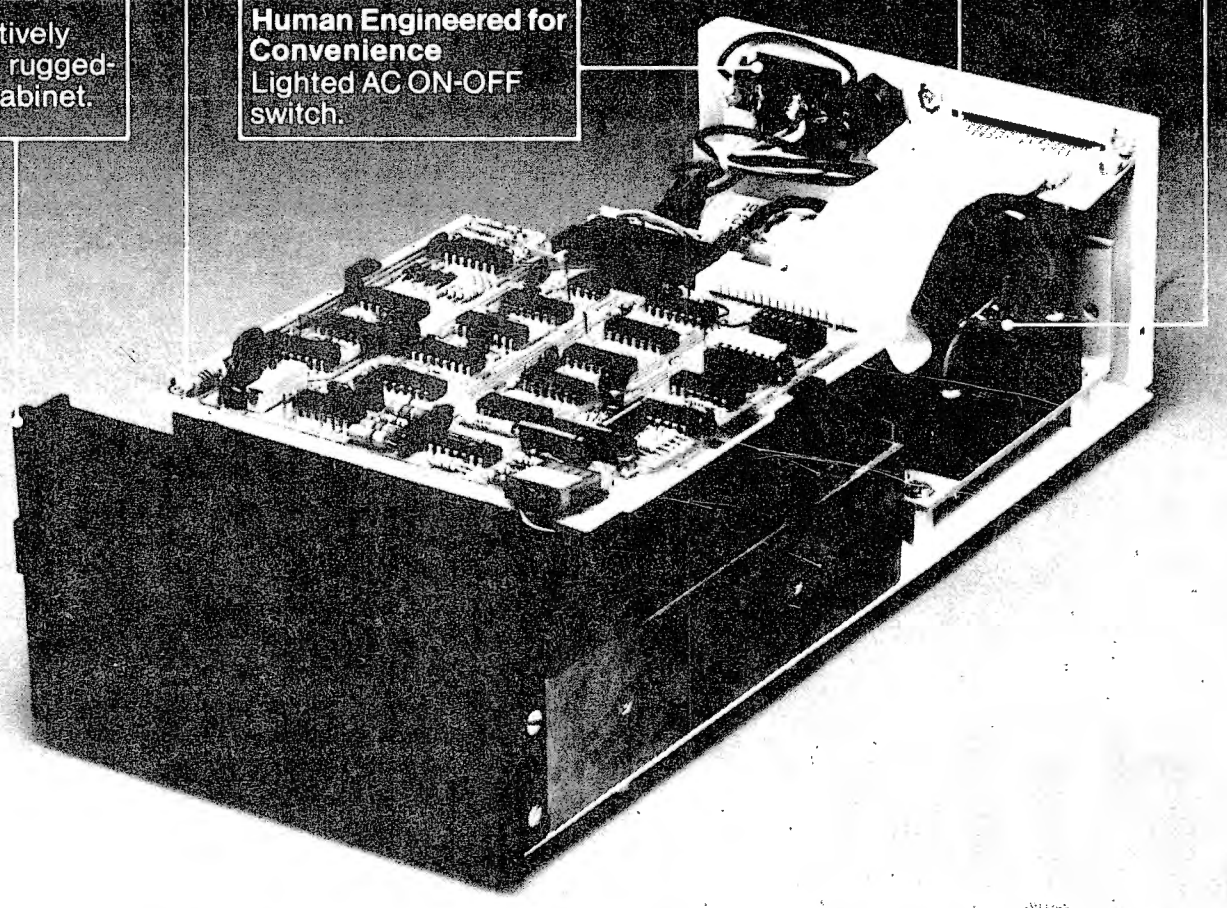

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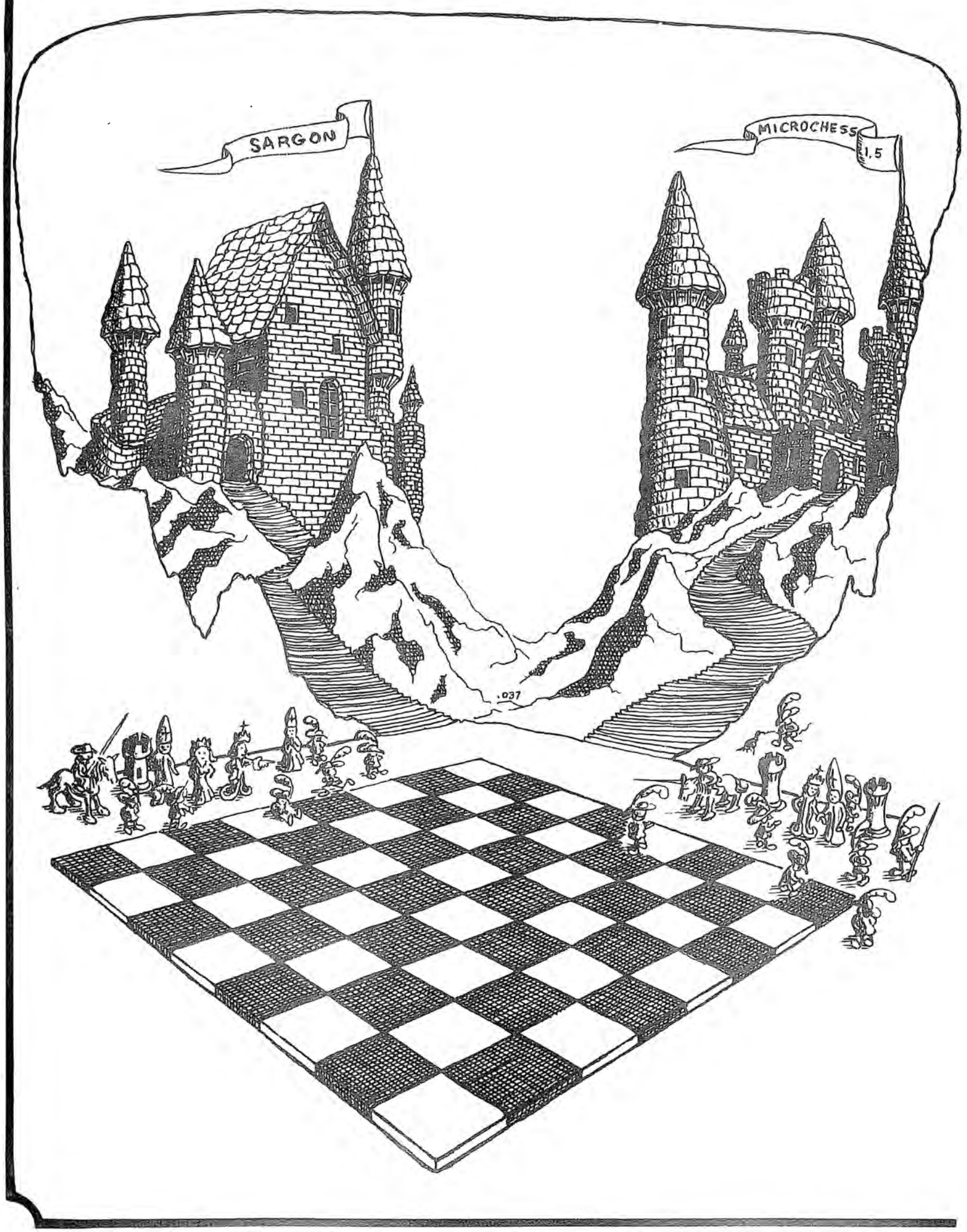
SARGON
MICROCHESS
1.5
.037

The Great 80-U.S CHESS Tournament

"On the scene" report, by M Schmidt

One rainy afternoon this fall we played Microchess 1.5 against Sargon on two TRS-80's. Even though the two teams are not well matched, it made interesting play. We sent our reporter in for play by play coverage, but this is all we ever got ---

THE DAY FINALLY ARRIVED!! The portals of both the strongholds of SARGON and MICROCHESS 1.5 opened, and with much clammoring and clinking, both sides came down from their respective mountains to the place of battle.

They took adjacent sides of the field to assemble, then began to argue with each other across the corner of the field. Microchess knew the odds were against them (Boris the Russ was giving 5 to 1), and were trying to convince the Sargon crowd there should be some sort of handicap.

While the Microchess Bishops were praying for guidance, a Sargon Bishop was chastising two pawns for fraternizing with the enemy.

There was restless commotion among the troops, while Knights from both sides repeatedly rode to the center of the arena to confer, then reported back to their Kings.

After several rounds of negotiations it was finally agreed that Sargon would fight at "look ahead 2", while Microchess would fight at "IQ=3".

The local reporters however, didn't like this arrangement, and one of them whispered discreetly into the ear of the Sargon Queen, after which the Knights once more rode out to confer. After some time, it was settled at Sargon with a look ahead of 1, and Microchess at IQ=3. (What the reporter whispered to the Queen never was revealed).

With these new developments, Boris the Russ quickly changed the odds to 3 to 1, the reporters were delighted, and the Sargon King was giving his Queen some very questioning looks.

They took their places on the battlefield, trumpets blared and the fight was on! Microchess rode in with style and drew first blood by capturing a Sargon Bishop. There was a furious scuffle, dust and horsedung covered the field, and at the end of the battle (on the 36th move), Microchess had forced Sargon into a stalemate.

The first day of the tournament ended with both sides slowly climbing up their mountains to lick wounds and replenish troops. The Sargon King was overheard asking his Queen: "Who the hells side are you on, anyway?". The Queen just smiled, like a Mona Lisa.

The second day of the tournament dawned bright and clear, (an achievement, even in Medieval Seattle, though it did rain later).

Sargon, with a vengence unequaled, wiped out Microchess in 27 moves without even waiting for a decent end-game. They then proceeded to haul the Microchess King up their mountain, where presumeably, they roasted him on a spit. (The Press was not admitted, this being Kingly stuff, where commoners and reporters are not allowed).

The Microchess crowd spent the whole night gathered in their courtyard, waiting for the puff of white smoke which would signify which of their Bishops would be elevated to Kingdom. A whole series of promotions took place that night, and at 6 AM they sent out a Press Gang, to recruit a new pawn.

The third and last day of the tournament started much like the second. In spite of being up all night, Microchess fought bitterly. By move 4 they had the Sargon King in Check. They did it again in move 7 and in move 13. They took pawns, then a Bishop and a Rook. Sargon finally got a Check in move 30. The fight was long and bitter. It went into extra innings, it rained and the sun came out again, and yet the fight went on. Both sides suffered severe losses. Finally, on move 61, with only the Microchess King left on the field, Sargon dealt the final blow.

They climbed their mountain after dark, using torches, and left the mess to be cleaned up by us reporters.

Somewhere from within the Microchess fortress came the sound of a thin voice, crying: "Wait till next year!"●

Phil Pilgrim, Discovery Bay
Software Co. Port Townsend, WA

SYSTEM/COMMAND

The 6th in a series on Machine Language applications

Machine Language Program Relocation

The programmer who writes machine language programs using Radio Shack's Editor/Assembler must decide before assembly where his programs are to be located in memory. This is done with the ORG pseudo-op. As long as one or a fixed collection of programs will be loaded at one time, there are no problems: the programmer simply assigns his programs non-conflicting addresses near the end of memory and sets MEMORY SIZE before loading to protect them. But what if the collection of assembly programs to be loaded is variable, or even worse, if the user adds more memory to his machine? Normally, he will have either to reassemble each program with a different starting address or be content with the wasted space in protected memory left by un-loaded programs. In this article, a third alternative is presented: namely, program relocation at load time.

Why is program relocation such a big deal? Why not simply copy a program from one location in memory to another? With some processors and with some Z80 programs this is possible. Such programs are said to be *self-relocating*. But most Z80 programs contain some instructions with pointers to absolute addresses elsewhere in the program. The JP instruction is a familiar example. When the assembler encounters a JP ADDR, it calculates the absolute address of ADDR, from its displacement in the program, plus the address given in the ORG pseudo-op, and assembles this address into the second and third bytes of the JP instruction. Thus the JP instruction will work only if ADDR is where the programmer told the assembler it was going to be. Even if the entire program is later moved in memory, the JP will transfer execution of ADDR's originally specified location. And this problem is not just confined to JP instructions, but extends to all Z80 instructions containing absolute addresses in their operands (e.g., LD HL,(ADDR); LD DE, ADDR; etc.). Hence, any program containing one or more such instructions will not be self-relocating, and extra measures must be taken to move it around in memory.

What's the solution? One possibility is to avoid all absolute memory references. This is possible in some Z80 programs by using such instructions as JR and by clever use of the index registers and the stack. It can be very awkward, however, and leads to virtually unreadable programs in extreme cases. The other possibility is to assemble the program at a fixed location and to include enough information about the absolute address references in it that they can be modified later when the program is moved. This is the approach we shall use.

Suppose a program is assembled starting at address ADDR1 but later moved to ADDR2 for execution. When this is done, all absolute memory

references *to locations within the program* will have to be incremented by ADDR2-ADDR1, the difference between the starting addresses. This can be done at load time if we include a *relocation program* in our assembly of the original program. After loading, the relocation program will be executed and will move the original program where we want it, making the necessary changes in out address references. Given such a relocation program, all we have to do is tell it where those references are.

We can specify the locations of those references by using a *relocation table.* This is just a list, assembled with the program, of all those locations containing such references. Some assemblers will automatically provide such a list in their output. Such assemblers are frequently included with computers having a *relocating loader* which performs the functions of a relocation program while loading a program from storage into memory. Since the TRS-80 has neither, we have to write the relocation table ourselves. This is a time-consuming operation requiring careful attention so as not to leave out anything. But once done, it never has to be done again unless changes are made in the program. The procedure is as follows:

1) Enter and edit your program in the usual manner. You will probably want to assemble and run it several times to get the bugs out.

2) When your program is completely debugged, list each line on the screen one at a time (using the down arrow key).

3) Whenever an instruction is encountered which contains an absolute memory reference to a location elsewhere in the program, write down on a piece of paper the label of that instruction and the displacement within the instruction of the reference (usually +1). If the instruction has no label, give it one using the editor. You can use such labels as R01, R02... etc., as you see fit.

4) When done, you will have your entire relocation table on paper. Now you must enter it into the machine as a sequence of DEFW pseudo-ops of the form:

DEFW[label]+[displacement]

5) Finally, you must enter the relocation program provided here along with the labels for the relocation table you just entered, and assemble the whole mess together.

The example in Figure 1 illustrates these last two steps. Included are the relocation program, a sample relocation table, and the program from which it was derived. The relocation program provided will work in any non-disk Level II system. *It finds the beginning of protected memory, expands protected memory to contain the user program, alters the address references in the user program, and moves it into protected memory.* Finally it jumps into BASIC, where MEMORY SIZE is automatically updated and BASIC is restarted. In cases where BASIC is not involved, the user may want to substitute his own memory protection and post-relocation startup sequences.

A couple items in Figure 1 may be worth noting. First, the JP Z,002BH is not referred to in the relocation table. That is because it refers to a fixed location in BASIC ROM - not to an instruction being relocated. Also note that the relocation reference to PTR does not have a +1 added. That is because the memory reference at PTR begins right there and not one byte later, as it would in some three byte instructions.

Once assembled and saved on cassette, the program may be loaded in the usual manner via the SYSTEM command. When loaded, just type / followed by *ENTER*. The relocation program will do its thing and return to BASIC, which will display:

```
RADIO SHACK LEVEL II BASIC
READY
>_
```

You can find the new starting address of USR by typing:

```
?PEEK(16561)+256*PEEK(16562)+1
```

BASIC will display the result in decimal.(16561, by the way is 40B1H in decimal).

There are other ways to accomplish relocation, but the method just presented is one of the simplest. One thing not covered by this technique is what to do when one relocated program calls another, separately loaded one. This kind of problem is solved on some machines with a *linking loader* which can indeed be a complex program and is beyond the scope of a single article to explain in detail. But straight relocation, as demonstrated here, should be adequate in most applications. ●

```
        ORG     43ØØH
        ;RELOCATION PROGRAM
START   LD      HL,(4ØB1H) ; Get protected memory address-1.
        LD      DE,USRE-1  ; Get current end of user program.
        XOR     A          ; Reset carry.
        SBC     HL,DE      ; Calculate difference.
        EX      DE,HL      ; Get result in DE.
        LD      IX,RELOC   ; Get addr. of relocation table.
        LD      B,RELOCE-RELOC<-1  ; Get size of table in words.
RLOOP   LD      L,(IX)     ; Get next table entry.
        LD      H,(IX+1)   ;          .
        LD      A,(HL)     ; Get LSB of memory reference.
        ADD     A,E        ; Add LSB of displacement.
        LD      (HL),A     ; Redeposit.
        INC     HL         ; Point to MSB of memory reference.
        LD      A,(HL)     ; Get it.
        ADC     A,D        ; Add MSB of displacement + carry.
        LD      (HL),A     ; Redeposit.
        INC     IX         ; Point to next table entry.
        INC     IX         ;          .
        DJNZ    RLOOP      ; Go back for another one.
        LD      HL,USRE-1  ; Move the program.
        LD      DE,(4ØB1H) ;          .
        LD      BC,USRE-USR;          .
        LDDR               ;          .
        INC     DE         ; New protection boundary.
        EX      DE,HL      ; BASIC wants it in HL
        JP      ØØE7H      ; Back to BASIC.
        ;RELOCATION TABLE
RELOC   DEFS    Ø
        DEFW    USR+1
        DEFW    RØ1+1
        DEFW    PTR
RELOCE  DEFS    Ø
        ;USER PROGRAM (Sample)
USR     LD      HL,(PTR)
        LD      A,(HL)
        OR      A
        JP      Z,ØØ2BH
        INC     HL
RØ1     LD      (PTR),HL
        RET
PTR     DEFW    LBUF
LBUF    DEFB    Ø
        DEFS    63
USRE    DEFS    Ø
        END     START      ; Necessary for autostart.
```

Figure 1: The relocation program as used with a sample user program.

"The heart of the development system is the assembler. At the present time, this is the most powerful assembler available for the TRS-80"

AN ASSEMBLY LANGUAGE DEVELOPMENT SYSTEM

T R Dettmann, Associate Editor

Assembly Language programming has always been looked upon as a very obscure art, something like magic. Programmers who are capable of handling it are pictured as intellectual types who are incapable of relating to normal human beings and only find love and affection with their computers.

In some cases this might be true (my wife has always thought me to be a little strange), but in general it is not. People are driven to take up Assembly Language programming by the desire to make the most of the capabilities of the computer they are using.

Higher level languages like BASIC (really, it IS a high level language) are designed to run on many computers with many different abilities. Because of this, such languages cannot take advantage of the inherent abilities of a particular processor.

The game ANDROID NIM is a good example of what can be done by a Basic programmer who dips into Assembly Language for special effects. It is also possible with the Z80 chip at the heart of the TRS-80 to program the system so that it can output to a relatively slow printer only when the printer is ready to accept a new character while doing calculations in the memory cycles when it would otherwise be doing nothing. (See 80-US, Sep-Oct 79 "A Spooler for the TRS-80", page 16, by A F Pepin)

Because there are people who are capable of handling Assembly Language programming (anyone who can think in a logical sequence can do it), and there are those who need the additional capabilities, there is need for an Assembly Language Development System.

MICROSOFT'S programmers have designed the MACRO80 Assembly Language development system and for the price of $175.00 you can have it for your very own. This system was originally designed for 8080 microprocessor systems, but MICROSOFT adapted it to the Z80 and the TRS-80 in particular.

The System

The Assembly Language Development system comes with four major packages which are essential to system development:

EDIT80 - A random access editor with commands similar to those in Level II BASIC for editing, but far more powerful.
MACRO80 - A Z80 assembler
LINK80 - A relocating, linking loader
CREF80 - A program cross reference utility

These packages give you capabilities normally found only on larger systems.

All of these are included with the MICROSOFT FORTRAN package for the TRS-80. So if you are interested in FORTRAN as well as assembly language, you might as well get the whole package. But if you want to do assembly language programming on the TRS-80, you should have MACRO80.

We have previously covered the EDIT80 package and the linking loader (see 80-US, May-Jun 79 "TRS-80 FORTRAN"), so we won't discuss them in any great detail here. We will concentrate on the assembler instead.

The MACRO80 Assembler

The heart of the development system is the assembler. At the present time, this is the most powerful assembler available for the TRS-80. MICROSOFT'S ads for the system call it the best Z80 assembler available anywhere. After using the package I believe their claim.

The MACRO80 has features which are standard on larger systems. It can easily provide almost any capability that you have the knowledge to apply. Some of these are:

1 - a complete INTEL standard MACRO facility
2 - COMMENT block instructions
3 - OCTAL or HEX listings
4 - Titles, subtitles, or paging
5 - Variable base input (from 2 to 16)
6 - Relocatable or Absolute assembly
7 - Full compatibility with the FORTRAN compiler
8 - Conditional assembly instructions
9 - COMMON block capability
10 - The ability to assemble 8080 source codes

The last feature alone makes available a large number of programs written for the 8080 systems. All that is necessary to use them with

the TRS-80 is some adaptation to our Input/Output system, and relocation to RAM at addresses above ROM.

With all of these added features, it takes some time to learn how to use the system, but the time spent is well worth it. Let's look at the system in action now to see what it is like.

What's a MACRO anyway?

To understand one of the most powerful advantages of the MACRO80 assembler, we have to know just what a MACRO is. In simple terms, it is a way to insert a sequence of assembly language statements into the source program by calling them from a predefined sequence.

To illustrate how this works, we might consider the sequence of instructions necessary to increment a counter by one:

```
        LD      HL,COUNTER
        LD      A,(HL)
        INC     A
        LD      (HL),A
```

If this set of instructions were going to be repeated many times over, it would be a waste of time to have to type it in each time. By defining a MACRO for this sequence called "BUMP", we can cause this sequence of instructions to be inserted in our program wherever we use the key-word BUMP.

What's more, the MACRO can be defined with arguments so that the names in the body of the MACRO can be changed as necessary in the MACRO call. We could define the sequence above as a MACRO with the ability to increment any counter as follows:

```
BUMP    MACRO   COUNTER
        LD      HL,COUNTER
        LD      A,(HL)
        INC     A
        LD      (HL),A
        ENDM
```

Now it is possible to use the command BUMP to increment any counter by one. For example, we could use the BUMP command to increment a counter at 7320H:

```
        BUMP 7320H
```

will generate:

```
        LD      HL,7320H
        LD      A,(HL)
        INC     A
        LD      (HL),A
```

in the assembled code.

Most people unfamiliar with MACRO's confuse this with a subroutine. However, a subroutine is never put into the source code at the point where it is called. A subroutine occupies its own area of memory and jumps are made to it, back from the program in order to execute its instructions.

So why have both subroutines and MACRO's? They do the same thing, don't they? No, MACRO's and subroutines each have complementary advantages and disadvantages. MACRO's create fast, in-line code while subroutines require jumps and returns, which can eat up time.

Generating MACRO's for complex tasks will make the code very long, since each time the MACRO is invoked, the body is assembled in the code stream. Subroutines exist only in one place, so a complex task can be put into a subroutine and invoked without making the code too long.

The choice then, comes down to speed versus complexity.

Evaluation

Working with the Assembly Language Development system poses the same problems which working with the FORTRAN compiler did, i.e., there is a large time overhead for running programs in and out of the computer. To type in and run a program, you will have to do the following:

1 - run EDIT80 to create the source file with the assembly language instructions

2 - run the MACRO80 assembler to create the machine language file

3 - if there was an error, go back to EDIT80 to correct it and then assemble it again

4 - run LINK80 to load the machine language routine, run it, and creat a CMD or OBJ file

For many people, this will seem to be too great a burden and they will reject the idea ot the MAC80 assembler in favor of a package like the Radio Shack Editor Assembler, which has everything integrated into one package.

These people should realize however, that the power of the assembler is only possible because of its size. Any smaller package such as the Radio Shack one will lack the features of this package. It is short sighted to give it up on this basis. On the largest computers, programming is normally done by going from one program to the next. Integrated packages with everything in them are uncommon.

In order to properly test the MAC80, I chose to run some simple programs that involved very little effort to make run correctly, as well as a larger project that I have been at for some time.

The first program I worked with is the screen white-out routine from the Radio Shack Editor Assembler manual. This routine is trivial, but since it is a well known standard routine that many people have run, I felt it would be a good standard.

The routine as compiled by the MAC80 assembler is listed below:

```
                00100           ORG     700H
3C00            00200   VIDEO   EQU     3C00H
7000  21 3C00   0300            LD      HL,VIDEO
7003  11 3C01   0400            LD      DE,VIDEO+1
7006  01 0400   00500           LD      BC,400H
7009  36 BF     00600           LD      (HL),0BFH
700B  ED B0     00700           LDIR
700D  06 05     00800           LD      B,5
700F  21 FFFF   00900   LP1:    LD      HL,0FFFFH
7012  2B        01000   LP2:    DEC     HL
7013  7C        01100           LD      A,H
7014  B5        01200           OR      L
7015  C? 7012   01300           JP      NZ,LP2
7018  10 F5     01400           DJNZ    LP1
701A  C3 0000   01500           JP      0H
                01600           END     7000H
```

By comparing this with the assembled routine in the manual you can see that there is no essential

difference between the MAC80 assembly and the Editor Assembler assembly. This is only to be expected if these assemblers are doing the same thing.

Another routine, similar to the first, was tested to blank out the screen and write a message there. In the same manner as before, the routine worked well.

The larger project used to test the MAC80 was the translation of a LISP interpreter for the 8080 from Dr DOBB's JOURNAL for the TRS-80. Though the project is not done yet, the MAC80 assembler is making progress much simpler since the assembler can work with the 8080 codes.

After typing in the first half of the program directly from the magazine, I assembled the code with the MAC80 to see where I had made syntax errors, etc. At first, I had an error on nearly every line out of about 300 lines. It took only five minutes to trace this down to improper use of the MAC80 .COMMENT statement to enter block comments.

To correct the error, I had to replace a single character in 6 lines. The EDIT80 Editor allowed me to do that by executing a single substitution command:

```
S  ,0[BREAK] $ [BREAK] / [BREAK]
```

This command caused the improperly used delimiter ($) to be replaced by a slash(/).

Assembling after this substitution left me with only 19 errors in 300 lines, and most of these were undefined symbols from the part of the program that had not been entered yet.

Another question I considered important was whether the files generated by the disk based version of the Radio Shack Editor Assembler (specifically the Apparat version) were compatible with the MAC80.

To test the compatibility, I tried to read a disk file created by the Apparat Editor Assembler. I found that I could read it in with the EDIT80, but couldn't read in the line numbers. The line number format is incompatible between the two assemblers.

This can be compensated for with EDIT80 since you can read in the file, eliminate the old line numbers which will appear as graphics blocks on the screen, and store the file with the new MAC80 line numbers. You can't go the other way however, since the Radio Shack Editor Assembler has no provision for handling formats not the same as those stored by the assembler itself.

Overall

In the final analysis, the MAC80 is the most capable assembler presently available for the TRS-80. In some respects it has more power than many assembly language programmers will use. But if you need the capability of a full development system and you want the backup power to accomplish nearly any task that can be accomplished with assembly language programming, then there is no package more suited to your needs than the MACRO80. ●

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```
10 REM     FILENAME  SELL/TAX
20 REM    HOW MUCH TAXES WILL I HAVE TO PAY
30 REM    IF I REINVEST,  WHAT RETURN WILL I NEED
               TO MAINTAIN CURRENT INCOME
40 REM      BASED ON 1979 TAXES (NOT 1978)
50 PRINT:PRINT
60 LINE INPUT"TYPE IN THE DATE TODAY -";A$
70 INPUT "ENTER THE NAME OF THE STOCK -";N$
80 INPUT "NUMBER OF SHARES TO BE SOLD IS -";N
90 INPUT "THE UNIT COST OF THE STOCK WAS -";U
100 INPUT "THE CURRENT MARKET PRICE IS -";M
110 INPUT "THE YEARLY DIVIDEND PER SHARE NOW IS -";D
120 TD=N*D
130 INPUT "BROKER'S COMMISSION PER 100 SHARES IS --";BC
140 INPUT "ENTER YOUR TAX BRACKET -";TB
150 PRINT
160 TC=N*(BC/100):AR=(N*M)-TC:PR=(M*N)-TC-(U*N)
170 TX=(PR*.4)*TB:AT=((M*N)-(BC/100*N))-TX
180 CY=100*D/U:X=INT(CY*100)/100
190 NY=100*TD/AT:Y=INT(NY*100)/100
200 CLS:LPRINT"DATE OF REPORT IS -";A$:LPRINT" ":LPRINT" ":LPRIN
T"NAME OF THE STOCK IS -";TAB(45);N$:LPRINT" "
210 LPRINT"NO. OF SHARES TO BE SOLD IS -";TAB(50);N:LPRINT"UNIT
COST PER SHARE WAS -";TAB(45);:LPRINTUSING"$###,####.##";U:LPRIN
T"THE CURRENT MARKET PRICE IS -";TAB(45);:LPRINTUSING"$###,####.
##";M:LPRINT" "
220 LPRINT"THE BROKER'S COMMISSION WILL BE -";TAB(45);:LPRINTUSI
NG"$###,####.##";TC:LPRINT"NET AMOUNT FROM THE BROKER WILL BE -"
;TAB(45);:LPRINTUSING"$###,####.##";AR:LPRINT"THE GROSS PROFIT W
ILL BE -";TAB(45);:LPRINTUSING"$###,####.##";PR:LPRINT" "
230 LPRINT"THE TAX (BEFORE MINIMUM TAX) WILL BE -";TAB(45);:LPRI
NTUSING"$###,####.##";TX:LPRINT" "
240 LPRINT"THE NET AFTER TAX WILL BE -";TAB(45);:LPRINTUSING"$##
#,####.##";AT:LPRINT" ":LPRINT"THE YIELD ON COST NOW IS -";TAB(5
0);X;"%"
250 LPRINT "THE YEARLY DIVIDENDS
             NOW TOTAL -";TAB(45);:LPRINTUSING"$###,####.##";TD
260 LPRINT"A NEW INVESTMENT WOULD HAVE TO YIELD
          TO MAINTAIN CURRENT INCOME -";TAB(50);Y;"%"
270 FORI=1TO12:LPRINT" ":NEXT:GOTO50
280 END
```

```
READY
>RUN

TYPE IN THE DATE TODAY -AUG 20, 1979
ENTER THE NAME OF THE STOCK -? AM BRANDS
NUMBER OF SHARES TO BE SOLD IS -? 250
THE UNIT COST OF THE STOCK WAS -? 12.50
THE CURRENT MARKET PRICE IS -? 24.75
THE YEARLY DIVIDEND PER SHARE NOW IS -? 0.85
BROKER'S COMMISSION PER 100 SHARES IS --? 1.70
ENTER YOUR TAX BRACKET -? .38

DATE OF REPORT IS -AUG 20, 1979


NAME OF THE STOCK IS -                          AM BRANDS

NO. OF SHARES TO BE SOLD IS -                       250
UNIT COST PER SHARE WAS -                     $      12.50
THE CURRENT MARKET PRICE IS -                 $      24.75

THE BROKER'S COMMISSION WILL BE -             $       4.25
NET AMOUNT FROM THE BROKER WILL BE -          $   6,183.25
THE GROSS PROFIT WILL BE -                    $   3,058.25

THE TAX (BEFORE MINIMUM TAX) WILL BE -        $     464.85

THE NET AFTER TAX WILL BE -                   $   5,718.40

THE YIELD ON COST NOW IS -                          6.8 %
THE YEARLY DIVIDENDS
            NOW TOTAL -                       $     212.50
A NEW INVESTMENT WOULD HAVE TO YIELD
          TO MAINTAIN CURRENT INCOME -              3.71 %
```

This is the third and last installment of a series of programs designed to keep track of your stocks. The first, called STOCK PRO, was presented in the Jul-Aug 79 issue. The second, called STOCK YIELD, was presented in the last issue.

This final program is called SELL/TAX, and is the crucial one in the determination as to sell or to hold. Sometimes, taxes are so high that it is hardly worth selling, and this program can give you that last "push" towards a decision.

The preceeding programs in this series gave a practical cataloging method whereby all your stocks are listed on one page, with unit costs, total costs for each stock, unit and total market values, and the individual and total gains and losses. Then, in the second of the series, the program listed and calculated, again on one page, the percent of return for each stock, based both on costs and on markets.

With all this information on your very own situation, and with a "feel" of the current market, you are now faced with decisions whether to sell one or more issues. This program can give you insight into that decision.

What it does, is to tell just what you will receive, and what you will have to pay in taxes. Also, if you should reinvest, it will tell you what to look for in the way of returns in order to maintain your current income.

Inputs are as shown in the sample run. The date may be entered as Aug 27, 1979 or as 08/27/79. Watch the Broker commission, as it is entered as a dollar value per 100 shares. Enter your income tax bracket as a decimal value i.e., .38 for 38 percent.

After you have entered your tax bracket, the printer will start printing as shown in the bottom half of the sample run. After the run is complete, the program will return to the beginning and prompt you to enter another day and stock. Break to quit the program. There are no disk files to be retrieved or stored during this program.

With these tools, STOCK PRO, STOCK YIELD and SELL TAX, you can keep on top of your stock investments more than before. Use them to check periodically, you should find you are more willing to watch the market now, because it is much easier than with pencil and paper. •

BUSINESS COMPUTING

John Strader, CPA, Business Editor

Prior articles in this series have given you a brief explanation of what will be available in the future and some of the features that are desireable in good business software. This article will give a brief explanation of some accounting software which is currently available.

There are currently three types of accounting systems that are available. Listed after each of the three types of systems is an example of that system which will be discussed in this article: (1) An income statement system (The Miller Microcomputer Services-Dome Bookeeping System), (2) A general ledger system (Radio Shack General System), and (3) An integrated accounting package (Adam Osborne & Associates). Each one of these packages is good for a certain type of business operation.

I am sure there are also other packages which are very good; however, I am familiar with these systems. There are also TRS-80 versions of the Osborne package; the names of the dealers and versions can be obtained from Adam Osborne & Associates. Each version of the Osborne & Associates will be slightly different and have different sort routines, data entry routines, etc. which may make some versions better than others. I haven't compared all of the versions so I don't know which is best. I will not try to compare the Miller Microcomputing Services-Dome Bookeeping System with the Radio Shack and Osborne packages because it is for an individual who wants a statement from a check register. Generally, this system should be usable by anyone.

The first type of system, The Miller Software-Dome Bookeeping System, should be used by a smaller businessman who does not need a balance sheet, and doesn't have a fulltime bookeeper. This system is especially adaptable to a service business that is on a cash basis of accounting and does not need cost centers or departmental income statements.

The second type of system, The Radio Shack General Ledger System, should be used by a small business that needs an income statement and a balance sheet. This business will probably need a bookeeper or a public accountant-bookeeper who can help with the procedures necessary to obtain an accrual basis of accounting. Once the accounting procedures are understood he should be able to use the system with a minimum of additional help from his accountant.

The third type of system is The Osborne & Associates Integrated General Ledger System, which consists of a general ledger system, accounts receivable system, accounts payable system and a payroll system. The complete system has the following capabilities: It will print checks to suppliers and payroll checks; prepare invoices and keep track of receivables and payables; and keep track of payroll-withholding, FICA, and prepare W-2's. It will then post all of these transactions into the general ledger system of accounts. The general ledger system will print a general ledger, income statement and a balance sheet. The Osborne System will also let you departmentalize your income and balance sheets which will allow you to obtain separate income statements for each profit center. This type of system is ideally suited to a small to medium size business that has a fulltime bookeeper. Of course you can also just buy various parts of the system. An individual with little accounting background or experience could use the accounts receivable, payable and payroll with little trouble. However, to get the maximum benefits out of the entire system you will probably have to understand accrual accounting.

Regardless of which system you decide to use you should be aware of the necessity to retain supporting documentation for you computer entries, to maintain audit trails and be able to explain all entries to auditors, IRS agents and any other parties that have a right to examine your records. Generally, the taxing statutes place the burden on the businessman to provide a complete and accurate set of records. To give you an example, don't make payments to suppliers and then destroy invoices. Also make certain an entry can be traced from a check into a specific general ledger account. Label all deposits so you can tell where the receipts came from. Use sequentially numbered invoices, checks and other documents. Generally, computer posting reports should also be sequentially numbered. I was a tax auditor and have examined many businesses; it can be very costly if the records are in a shambles.

Try to set up a routine and post from similar documents, journals, check registers or invoices each month, This simplifies the posting procedures. The interfacing of manual procedures and computerized procedures is the greatest weakness in the majority of computerized accounting systems.

I have used and modified the Radio Shack and the Taranto version of the Osborne & Associates General Ledger System. Both systems have strengths and weaknesses. I will list the features of each system and comment on them.

Printout of Reports

Radio Shack: The general ledger printouts, transaction reports and the trial balance are good. However, in my opinion, the balance sheet and income statements are not very good. They have stars around the headings and don't appear very professional. This can be fixed very easily.

The balance sheet will not allow beginning capital or equity accounts or a classified balance sheet - dividing the balance sheet into current assets, fixed assets, other assets, current liabilities, other liabilities, and stockholder's or owner's equity.

The income statement catagories are set up so that you must have a cost of goods sold statement; many service businesses have no cost of goods sold.

Osborne & Associates: In my opinion, the Osborne printouts of the general ledger, income statement and balance sheet are better than Radio Shack. However, I was not completely satisfied with these statements either. I deleted the dollar signs and added commas after thousand,hundred thousand, etc. This is easy to change. The balance sheet and income statements are very flexible and can be set up to fill your needs.

Security

Radio Shack: Of the two packages,

Radio Shack is probably more secure, because once the files have been set up and daily transactions are entered, it is harder to change or delete the accounts without printing out a statement. The posting reports also have report sequence numbers on them. However, anyone with programming expertise would have little trouble avoiding these controls. Radio Shack has no security controls over entry to the system.

Osborne: The accounts can be changed at will in the file maintenance portion of the general ledger system and no paper report is generated. Accounts should not be changed in this method (see prior explanation of audit trails). There are no sequential numbers on the reports to control report printout sequence. The Osborne system does have password protection to the general ledger system.

Documentation

Radio Shack: The system has an operating manual which generally explains how to operate the system. The manual also contains program listings; however, there are no file layouts, explanations of code or program variables.

Osborne: The Osborne & Associates have very well documented file layouts, code explanations, and variable explanations. This makes for relatively easy modification of the programs. The Taranto & Associates version of Osborne is written in TRS-80 basic while the Osborne books are in Wang basic. There are minor problems because of different language statements. However, the Taranto code sequence follows the books almost exactly and I had very little problem modifying the programs.

Operation

Both the Radio Shack and Taranto version of the Osborne & Associates package have operated for me with minor problems using my two disk drive system and the NEWDOS operating system.

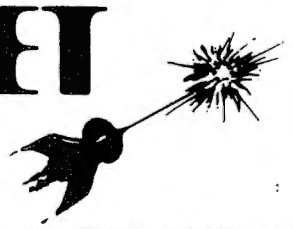
While none of these programs have met all the features listed in my software article, they do provide a workable system. I have not used the complete Taranto package, only the general ledger system. I hope this has given you some helpful information for selecting an accounting system for your business.

Certain modifications to the Radio Shack general ledger system have been prepared; the modifications provide for a balance sheet with current assets, fixed assets, other assets, current liabilities, other liabilities and stockholder's equity sections, including beginning capital accounts. All of the income statement category headings can be set to operator specifications. The printout of cost of goods sold can be deleted or changed as desired. The programs will give you a more professional looking income statement and balance sheet to present to your banker, suppliers and for internal use.

These changes and modifications can be obtained from 80-US by sending in a disk with a copy of the Radio Shack general ledger system on it. We do not sell Radio Shack general ledger systems. You must purchase these from Radio Shack. We will merge the program modifications into the Radio Shack programs and send you a sample set of accounting records set up on the Radio Shack disk and an accounting manual explaining how to keep records, set up manual procedures and audit trails. When sending in the disk, specify whether you are using the tractor feed or roll paper type printer. Also specify whether you want your sample accounting records to be a service, retail, or manufacturing accounting system.

The complete cost will be $30.00 for program modifications and the manual. The manual, which can be used for other general ledger systems, may be purchased separately for $15.00. Program modifications will not be sold without the manual.●

STARFLEET ORION



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HOME HEAT LOSS CALCULATION PROGRAM

Ralph White, Columbus, KS

The time when we bought houses because of the unique bay window are as much history now as buying a car because of the stylish fins on the rear fenders. It if is too expensive to drive the car, you can park it and stay at home. But what do you do if it is too expensive to heat your home? Present and future homeowners will have to be at least as concerned about the energy efficiency of their homes as they are their cars.

The program listed with this article performs a heating requirement audit. The aim of the audit is to provide a projected average monthly heat cost for each month of the heating season. The only concern of the audit is fuel consumed by the heating unit; energy for cooking, lighting, and other appliances are not considered.

Before running the program you will need to have at hand some specific information about the house. The total surface area of each exterior wall, the area of each window and door on each exterior wall, and the amount of insulation in each wall is needed. The program will subtract the window and door area as needed.

Consider, for the purpose of heat-loss, sliding glass doors as windows. Keep the infomation for each exterior wall separately.

Calculate the floor area and note if it is over a basement, crawl space, concrete slab, and any insulation. If parts of the floor fit into different catagories, enter each part separately, the program will combine them appropriately. The ceiling should be treated like the floor. If insulation amounts vary, enter the area of each part separately.

The program computes the rate of BTU loss for a particular house. It allows for user input of the information and data gathered earlier. Using this information, the program generates two tables and a straight line graph. The first table displays the percent of heat loss through walls, doors, floor, ceiling and windows. The second table displays the number of BTU's lost per hour for temperatures ranging from +50 to -30 degrees Farenheit. The graph pictures the information in the second table. The final piece of information given by the program is the rate of BTU loss per hour per degree below 65° F.

This program could be used to determine the feasability of installing additional insulation where it could be most beneficial. The program is written in Level II BASIC. The graph is not essential to the program, and may be deleted without loss of information to the user. The program requires 16K of memory.

For more information regarding temperature data for various cities, obtain the Federal Energy Administration publication, "BUYING SOLAR", (FEA/g-76/154).

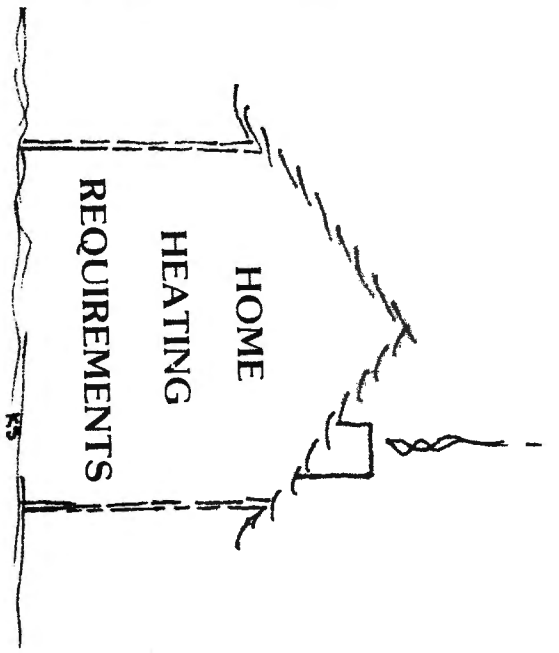
Finally, if unpleasantly high fuel costs are projected, remember that beating on the computer has no effect on the results. ●

(Please turn page for program listing)

HOME HEAT LOSS CALCULATION PROGRAM

By Ralph G White

For 16K Level II & Up




```
10 REM * HOME HEAT  * RALPH G WHITE COLUMBUS, KS 66725 *
20 CLS:PRINT@93,"H O M E":PRINT@154,"H E A T I N G":PRINT@220,"N
 E E D S"
30 PRINT@539,"PROGRAM FOR":PRINT@604,"HEAT LOSS":PRINT@667,"CALC
ULATION"
40 FORI=40TO89:SET(I,35):NEXT
50 FORI=35TO26STEP-1:SET(40,I):SET(41,I):SET(88,I):SET(89,I):NEX
T
60 FORJ=0TO6:FORI=0TO3:SET(36+(4*J)+I,25-J):SET(93-(4*J)-I,25-J)
:NEXT:NEXT
70 SET(64,18):SET(65,18)
80 FORI=23TO19STEP-1:SET(86,I):NEXT
90 FORI=21TO19STEP-1:SET(81,I):NEXT
100 FORI=81TO86:SET(I,18):NEXT
110 FORI=1TO6
120 FORH=4TO1STEP-1:FORK=0TO3:RESET(82+K,H):NEXT:NEXT
130 FORJ=17TO1STEP-1
140 FORK=0TO3:SET(82+K,J):NEXTK
150 IFJ>14GOTO170
160 FORK=0TO3:RESET(82+K,J+3):NEXTK
170 Z=0
180 NEXTJ
190 NEXTI
200 CLS
210 PRINT"THIS PROGRAM CALCULATES THE HEAT LOSS OF A SINGLE FAMI
LY":PRINT"HOME FOR ANY TEMPERATURE.":PRINT"THE PROGRAM WILL:"
220 PRINT"   1 -- GIVE TWO SUMMARY TABLES"
230 PRINT "   2 -- GRAPH THE HEAT LOSS FOR TEMP. RANGE -30 TO +6
5"
240 PRINT"   3 -- GIVE THE BTU LOSS FOR ANY GIVEN TEMPERATURE"
250 PRINT:PRINT"THERE ARE MANY OTHER FACTORS THAT AFFECT HEAT LO
SS IN A HOME":PRINT"THAT ARE NOT CONSIDERED.  SO THE DERIVED FIG
URES ARE CLOSE":PRINT"ESTIMATES RATHER THAN EXACT FIGURES."
260 PRINT:PRINT:INPUT"PRESS 'ENTER' TO CONTINUE";Z$
740 PRINT"  TYPE '3' -- INSULATED ENTRANCE DOOR"
750 INPUT"TYPE OF DOOR";I
760 IFI=1THENL3=34
770 IFI=2THENL3=23
780 IFI=3THENL3=17
790 IFI<1ORI>3GOTO710
800 HD=AD*L3:TD=TD+AD:LD=LD+HD
810 INPUT"ANY MORE DOORS (YES OR NO) ";C$
820 IFC$="NO"GOTO840
830 CLS:GOTO690
840 HS=AS*L1:TS=TS+AS:LS=LS+HS
850 PRINT:INPUT"ANY MORE WALLS (YES OR NO) ";C$
860 IFC$="NO"GOTO880
870 CLS:GOTO360
880 WL=LS+LW+LD
890 CLS:PRINT"                          F L O O R":PRINT
900 PRINT"IF DIFFERENT PARTS OF THE FLOOR HAVE DIFFERENT INSULAT
ION":PRINT"AMOUNTS, ENTER THE AREA OF EACH PART SEPARATELY."
910 PRINT:INPUT"ENTER THE AREA OF THE FLOOR ";AF
920 PRINT:PRINT"WHICH TYPE OF FLOOR INSULATION:"
930 PRINT"  TYPE '1' -- OVER CONCRETE SLAB"
940 PRINT"  TYPE '2' -- OVER CRAWL SPACE WITH NO INSULATION"
950 PRINT"  TYPE '3' -- OVER CRAWL SPACE WITH 4 IN. INSULATION"
960 PRINT"  TYPE '4' -- OVER HEATED BASEMENT"
970 PRINT:INPUT"FLOOR TYPE ";I
980 IFI=1THENL4=7
990 IFI=2THENL4=10
1000 IFI=3THENL4=4
1010 IFI=4THENL4=0
1020 IFI<1ORI>4GOTO920
1030 HF=AF*L4:TF=TF+AF:LF=LF+HF
1040 PRINT:INPUT"ANOTHER PART OF THE FLOOR (YES OR NO)";C$
1050 IFC$="NO"GOTO1070
1060 CLS:GOTO910
1070 CLS:PRINT"                          C E I L I N G":PRINT
1080 PRINT"IF DIFFERENT PARTS OF THE CEILING HAVE DIFFERENT INSU
LATION":PRINT"AMOUNTS, ENTER THE AREA OF EACH PART SEPARATELY."
1090 PRINT:INPUT"ENTER THE AREA OF THE CEILING ";AC
1100 PRINT:PRINT"TYPE OF INSULATION:"
1110 PRINT"  TYPE '1' -- NO INSULATION"
1120 PRINT"  TYPE '2' -- 3 1/2 IN. INSULATION"
1130 PRINT"  TYPE '3' -- 6 IN. INSULATION"
1140 PRINT"  TYPE '4' -- 10 IN. INSULATION"
1150 PRINT"  TYPE '5' -- 14 IN. INSULATION"
1160 PRINT:INPUT"INSULATION AMOUNT ";I
1170 IFI=1THENL5=22
1180 IFI=2THENL5=6
1190 IFI=3THENL5=4
1200 IFI=4THENL5=3
1210 IFI=5THENL5=2
1220 IFI<1ORI>5GOTO1100
1230 HC=AC*L5:TC=TC+AC: LC=LC+AC
1240 PRINT:INPUT"ANOTHER PART OF THE CEILING ";C$
1250 IFC$="NO"GOTO1270
1260 CLS:GOTO1090
```

```
270 CLS
280 PRINT"THE WALLS WILL BE CONSIDERED FIRST.  ONE WALL AT A TIM
E WILL":PRINT"BE COMPUTED.  ALL WINDOWS AND DOORS ON THAT WALL W
ILL BE":PRINT"CONSIDERED BEFORE DOING ANOTHER WALL."
290 PRINT"THE FLOOR WILL BE CONSIDERED AFTER THE WALLS."
300 PRINT"THE CEILING WILL BE FIGURED AFTER THE FLOOR."
310 PRINT:PRINT"IF INSULATION AMOUNTS SHOWN DO NOT MATCH YOUR CO
NDITIONS":PRINT"EXACTLY, CHOOSE THAT WHICH IS THE CLOSEST APPPRO
XIMATION.":PRINT"CONSIDER SLIDING GLASS DOORS AS WINDOWS."
320 PRINT"   AIR INFILTRATION LOSSES ARE BUILT INTO THE PROGRAM"
:PRINT"   FOR WINDOWS AND DOORS."
330 PRINT:INPUT"PRESS 'ENTER' TO BEGIN CALCULATIONS ";Z$
340 S=0:D=0:W=0:TW=0:LW=0:TD=0:LD=0:TS=0:LS=0:TC=0:TF=0:LC=0:LF=
0
350 CLS:PRINT"E X T E R I O R    W A L L S":PRINT
360 S=S+1
370 PRINT "ENTER THE AREA OF WALL ";S
380 INPUT "WALL AREA = ";AS
390 PRINT:PRINT"HOW MUCH INSULATION IN THIS WALL :"
400 PRINT"  TYPE '1' -- NO INSULATION"
410 PRINT"  TYPE '2' -- 2 IN. INSULATION"
420 PRINT"  TYPE '3' -- 3 5/8 IN. INSULATION"
430 PRINT"  TYPE '4' -- 6 IN. INSULATION"
440 INPUT"AMOUNT OF INSULATION ";I
450 IFI=1THENL1=18
460 IFI=2THENL1=9
470 IFI=3THENL1=5
480 IFI=4THENL1=3
490 IFI<1ORI>4GOTO390
500 CLS:PRINT"     ARE THERE ANY WINDOWS?"
510 INPUT "'YES' OR 'NO' ";C$
520 IFC$="NO"GOTO660
530 PRINT:INPUT"WHAT IS THE AREA OF THE WINDOW ";AW
540 AS=AS-AW:W=W+1
550 PRINT:PRINT"WHICH TYPE OF WINDOW:"
560 PRINT"  TYPE '1' -- SINGLE GLAZED--NO STORM WINDOW"
570 PRINT"  TYPE '2' -- DOUBLE GLAZED--OR SINGLE GLAZED W/STORM"

580 INPUT"WHICH TYPE ";I
590 IFI=1THENL2=79
600 IFI=2THENL2=48
610 IFI<1ORI>2GOTO550
620 HW=AW*L2:TW=TW+AW:LW=LW+HW
630 INPUT"ANY MORE WINDOWS (YES OR NO)";C$
640 IFC$="NO"GOTO660
650 CLS:GOTO530
660 CLS:PRINT"     ANY DOORS?"
670 INPUT"'YES' OR 'NO' ";C$
680 IFC$="NO"GOTO840
690 PRINT:INPUT"WHAT IS THE AREA OF THE DOOR ";AD
700 AS=AS-AD:D=D+1
710 PRINT:PRINT"WHICH TYPE OF DOOR:"
720 PRINT"  TYPE '1' -- ORDINARY ENTRANCE DOOR"
730 PRINT"  TYPE '2' -- ORDINARY ENTRANCE DOOR WITH STORM DOOR"
```

```
1270 TL=LF+LC+LW+LD+LS
1280 PW=(LW/TL)*100:PD=(LD/TL)*100:PS=(LS/TL)*100:PF=(LF/TL)*100
:PC=(LC/TL)*100:PE=(WL/TL)*100
1290 CLS:PRINT"                    T A B L E   1":PRINT
1300 PRINT"SURFACE";TAB(30);"AREA";TAB(45);"% OF HEAT LOSS":PRIN
T
1310 PRINT"EXTERIOR WALLS";TAB(45);PE
1320 PRINT"  WALL SURFACE";TAB(30);TS;TAB(50);PS
1330 PRINT"  WINDOWS";TAB(30);TW;TAB(50);PW
1340 PRINT"  DOORS";TAB(30);TD;TAB(50);PD
1350 PRINT"FLOORS";TAB(30);TF;TAB(45);PF
1360 PRINT"CEILING";TAB(30);TC;TAB(45);PC
1370 PRINT:INPUT"PRESS 'ENTER' TO CONTINUE";Z$
1380 M=TL/(0-75)
1390 CLS:PRINT"          T A B L E   2   (PART 1)
1400 PRINT"TEMPERATURE";TAB(40);"BTU'S LOST PER HOUR"
1410 FORI=65TO25STEP-5
1420 B=(M*I)+TL
1430 PRINTTAB(5);I;TAB (45);B
1440 NEXTI
1450 INPUT"PRESS 'ENTER' FOR PART 2 OF THE TABLE ";Z$
1460 CLS:PRINT"          T A B L E   2   (PART 2)"
1470 PRINT"TEMPERATURE";TAB(40);"BTU'S LOST PER HOUR"
1480 FORI=50TO0STEP-5
1490 T=I-30:B=(M*T)+TL
1500 PRINTTAB(5);T;TAB(45);B
1510 NEXTI
1520 INPUT"PRESS 'ENTER' FOR HEAT-LOSS GRAPH";Z$
1530 CLS:PRINT@20,"B T U 'S   L O S T   P E R   H O U R"
1540 PRINT@64,"B":PRINT@128,"T   70":PRINT@192,"U   60":PRINT@32
4,"50":PRINT@384,"X":PRINT@452,"40":PRINT@516,"30":PRINT@576 ,"1"
:PRINT@640,"0   20":PRINT@704,"0":PRINT@768,"0   10"
1550 PRINT@822,"65"
1560 FORI=3TO41:SET(14,I):SET(15,I):NEXT
1570 FORI=16TO110:SET(I,41):NEXT
1580 FORI=6TO36STEP5:SET(13,I):RESET(14,I):NEXT
1590 FORI=25TO105STEP10:SET(I,40):NEXT:SET(110,40)
1600 FORI=0TO95
1610 T=I-30
1620 B=INT((((M*T)+TL)/2000)+.5)
1630 G1=I+15:G2=41-B
1640 SET(G1,G2):SET(G1+1,G2)
1650 NEXTI
1660 PRINT@902,"-30  -20  -10   0    10   20   30   40   50   60
  TEMP."
1670 INPUT"PRESS 'ENTER' WHEN FINISHED WITH THE GRAPH";Z$
1680 CLS:PRINT"ENTER A TEMPERATURE THAT YOU WISH TO SEE HOW MANY
 BTU'S ARE":PRINT"BEING LOST AT THAT TEMPERATURE."
1690 PRINT:INPUT"WHAT TEMPERATURE ";T
1700 B=(M*T)+TL:D=B*24
1710 PRINT"BTU'S LOST PER HOUR ";B
1720 PRINT"BTU'S LOST PER DAY ";D
1730 PRINT:INPUT"ANOTHER TEMPERATURE (YES OR NO) ";C$
1740 IFC$="YES"THEN1680
1750 END
```

SOFTWARE REVIEW

TDISK, FLEXL & ATERM

Review by Roy Groth

Since this is really three reviews in one, I shall cover the common points first, and then go on to the individual programs.

The documentation for each of the programs is excellent. Each includes all the data needed to put the program on disk using TAPEDISK. They then take about half a page to describe exactly what the program will do, then give explicit instructions for loading the program, both in Level II and DOS. These are machine language programs, loaded via the SYSTEM command, which allows them to play a small trick to save a little memory. The name of the program and all the copyright data is loaded directly from the tape into the video RAM, so all the data gets displayed without taking up any space in user RAM. It also gives you something to look at while the program is loading.

The ATERM program, along with an RS 232C and a MODEM, will turn your TRS-80 into a full duplex ASCII terminal. Full duplex, for those of you not familiar with the term, means that you can type one thing, while the screen (or printer) is printing something completely different. In other words, what gets printed has nothing to do with what you are typing.

The program is fully ASCII compatable, and will handle lowercase if installed, and unshifted characters are transmitted that way unless SHIFT LOCK is invoked. The down arrow is used as the CONTROL KEY, and several control characters have been added. Control ENTER, for example, signals return to BASIC, and a SHIFT UP ARROW is used for lineprinter on/off.

The Baud rate is selectable from 110 to 9600, the parity (odd, even or none), word size (in bits), and number of stop bits are all selected at the beginning of the program, and you can change settings with CONTROL BREAK.

TDISK and FLEXL are sold together in a package called SYSTEM SAVERS. The TDISK utility will relocate machine language programs that would normally overload the DOS area. Basically, this is done by loading the offending program into the unused RAM, and then putting a header on it that will move it into the DOS overload area after the DOS no longer needs it.

As an extra added attraction, TDISK includes instructions for loading Microchess 1.5 onto disk.

Of the three programs, FLEXL is my favorite. It is a utility program designed for those of us who do machine language on tape. FLEXL allows you to load a SYSTEM format tape anywhere in RAM, and then dump a copy of it back out to tape in SYSTEM FORMAT. (At last, a program that allows you make copies of those precious machine language tapes!). It also provides the ending address of the program loaded, with the message "To merge with this program load at XXXX". Very handy for batch assembly work. The program also has provisions to make a SYSTEM format tape of a block of memory.

After working with these tapes, I can say these are very well-written, well thought-out programs, without an ounce of fat, and will make a worthwhile addition to your software library.

TDISK costs $19.95, and SYSTEM SAVERS costs $14.95. Both are available from Computer CableVision, 2617 42nd Street, Washington, DC 20007 ●

Disco Tech Disc Drive Timer

Review by M Schmidt

DDT (Disc Drive Timer) Disco-Tech/Morton Technologies Inc. PO Box 11129 Santa Rosa, CA 95406

If you have ever wondered about the speed of your disc drives you need wonder no longer. Disco-Tech's DDT (Disc Drive Timer) is an easy to use versatile tool to keep your drives running at the proper speed. Ours came on disc, it is also available on cassette for transfer to disc.

DDT displays disc drive motor speed in two ways. First, it gives you an extremely accurate motor speed analysis of all the drives on your system; then it provides you with a real time graphic display of any selected drive.

The motor speed analysis gives you both the motor speed in RPM, and the percentage of error from the correct speed of 300 RPM.

The graphic display lets you adjust motor speed simply and quickly. It is easier than using the strobes on the Shugart and MPI drives, and is the only way to adjust the Pertec and similar drives which do not have the strobe feature.

Also important is the fact that using this timer does not require you to void any warranties.

Here is how it worked: The disc was placed in the system drive and the system booted up. It chains through and loads itself. A menu is displayed, from which you can select an analysis

of all the drives on your system. (A disc must be in each of the drives to be checked).

It then starts with drive 0 and identifies it on the screen, along with TOO FAST, TOO SLOW, or CORRECT SPEED.It gives the speed in RPM, and the error from 300 RPM as a percentage. It then goes on to the other drive(s) and puts the information for them on the screen too.

The really neat feature is the "G" option. This one lets you select a particular drive. It then asks for a scale factor, which can be from 12 to 1 RPM. It then draws a scale across the bottom of your screen, marked with divisions for whatever scale factor you selected, and with 300 RPM in the middle. A small graphics blip then appears under the scale and indicates the speed of that drive. The blip is updated once per second, and you can actually see the variation in speed of the drive motor.

At this point the drive runs continuously, the display indicates where the RPM's are, and you can then adjust the trim pot in the rear of the drive for the proper speed. If need be, you can (after getting close to 300 RPM), re-select the "G" option with a smaller scale factor, and get the drive motor to within one-tenth(!) of an RPM. We found that the drive will not stay within one-tenth of an RPM, but that it will vary a few tenths one way or the other. Also it seems that the drive speeds up slightly after it has run for a short time.

There was one problem, which was explained in the 26 page manual which comes with the DDT. Some of the drives have their speed adjustment trim-pot pointing straight down, so that the adjustment screw is about ⅛ inch above the base of the drive. The manual suggests you drill a hole in the base, so you can get at it. A slight bother at first, but after that you can adjust it without ever taking the cover off again.

Having worked with electo-mechanical devices for some years, it is hard not to appreciate so fool proof and positive a device such as this. I found one of my drives to be 3 RPM over and another was 3 RPM under speed. Adjusting them was simple and took only a few minutes. The disc version sells for $19.95 and the cassette version for $14.95. The manual also includes two good selections on Tape Problems and Care of Magnetic Media. As you have probably gathered by now, I am delighted with this utility, and recommend it highly. Mike

SECURITY

What with the coming of telephone modems and the like, it was sure to happen. Cryptext Corp, PO Box 425, Northgate Station, Seattle, WA 98125 is offering TRS-80 users an encryption device designed to plug directly into the back of the TRS-80 or into the expansion interface via an optional cable.

The Cryptext device reportedly allows business users and hobbyists to secure almost any type of data quickly.

Used with a modem, it allows data or messages to be transmitted in privacy via telephone or other comm channels.

The unit has 2^{80} possible keys, and can modify the code sequence so that 2^{350} codes are possible.

The unit, which is small enough to fit in a pocket or briefcase, is supplied with demonstration software and user-oriented documentation and costs less than $300.

```
10 'BY JOHN STEDEFORD, TWIN FALLS, IDAHO - 1979'
20 'B$ THROUGH H$ MAY BE MODIFIED TO INCLUDE LOCAL FIGURES,
 NEW NEWSMAKERS, ETC.'
30 'THE MAXIMUM LENGTHS OF THESE STRINGS ARE: B$-17; C$-44;
   D$-24; E$-25; F$-18; G$-25; H$-35'
40 DEFINTA-Z
50 CLS:PRINTCHR$(23):PRINT@470,"THE MAZE"
60 FORT=1TO2000:NEXTT
70 CLS:PRINT@402,"CONCEIVED AND PROGRAMMED BY"
80 PRINT@536,"JOHN STEDEFORD"
90 FORT=1TO2000:NEXTT
100 CLS:B=RND(10):ONBGOSUB1230,1240,1250,1260,1270,1280,1290,
  1300,1310,1320
110 C=RND(10):ONCGOSUB1330,1340,1350,1360,1370,1380,1390,1400,
   1410,1420
120 D=RND(10):ONDGOSUB1430,1440,1450,1460,1470,1480,1490,1500,
   1510,1520
130 E=RND(10):ONEGOSUB1530,1540,1550,1560,1570,1580,1590,1600,
   1610,1620
140 F=RND(10):ONFGOSUB1630,1640,1650,1660,1670,1680,1690,1700,
   1710,1720
150 G=RND(10):ONGGOSUB1730,1740,1750,1760,1770,1780,1790,1800,
   1810,1820
160 H=RND(10):ONHGOSUB1830,1840,1850,1860,1870,1880,1890,1900,
   1910,1920
170 PRINT"   CONGRATULATIONS!  YOU HAVE BEEN HIRED AS A "B$
180 PRINT"FOR THE "C$".
190 PRINT"  BEFORE YOU START YOUR NEW JOB, YOU MUST COMPLETE A S
PECIAL
200 PRINT"ASSIGNMENT TO PROVE YOUR VALUE TO THE COMPANY.
210 PRINT"   YOUR SPECIAL ASSIGNMENT IS TO RECOVER A VALUABLE
220 PRINTD$" WHICH WAS STOLEN LAST WEEK BY THE
230 PRINTE$", "F$".
240 PRINT"   YOUR ASSISTANT HAS TRACED "F$" TO A HIDEOUT,
250 PRINT"AND YOU HAVE GONE THERE PERSONALLY TO COMPLETE YOUR
260 PRINT"ASSIGNMENT.
270 PRINT"   THINGS WENT SOUR FROM THE START.  FIRST, YOU HAD TR
OUBLE
280 PRINT"STARTING YOUR "G$", YOUR USUAL MODE OF
290 PRINT"TRAVEL.  WHEN YOU FINALLY GOT TO "F$"'S
300 PRINT"LAIR, YOUR QUARRY WAS WAITING FOR YOU, AND TRAPPED YOU
 IN A
310 PRINT"MAZE WITHOUT WATER OR "H$"."
320 FORT=1TO20000:NEXTT
330 CLS:PRINT"   "F$"'S DIABOLICAL MAZE HAS WALLS FROM FLOOR TO
340 PRINT"CEILING.  YOU CAN GO RIGHT UP TO A WALL AND SLIDE";:
   PRINT" ALONG IT, BUT
350 PRINT"IF YOU RUN INTO A WALL YOU GET A BROKEN AND BLOODY NOS
E AND"
360 PRINTF$" MAKES YOU START OVER.
370 PRINT"   HOWEVER, IF YOU GET THROUGH TO THE OUTSIDE YOU GET
THE"
380 PRINTD$", A RAISE, A PROMOTION, AND, BEST
390 PRINT"OF ALL, "H$".
400 PRINT:PRINT"                          GOOD LUCK!
930 GOTO670
940 T=X:IFPOINT(X+1,Y)THENZ=1ELSEZ=0
950 FORX=XTOX-ASTEP-1:SET(X,Y):IFZ=0THENRESET(X+1,Y)
960 Z=0:IFPOINT(X-1,Y)THEN1030
970 NEXTX
980 X=X+1
990 GOTO670
1000 PRINT@1000,"     ";:IFY=T-ATHEN670ELSE1040
1010 PRINT@1000,"     ";:IFY=T+ATHEN670ELSE1040
1020 PRINT@1000,"     ";:IFX=T+ATHEN670ELSE1040
1030 PRINT@1000,"     ";:IFX=T-ATHEN670ELSE1040
1040 PRINT@396,""
1050 PRINT@460,"    YOU RAN INTO THE WALL, DUMMY! "
1060 INPUT"                PRESS ENTER.                ";"
1070 GOTO440
1080 CLS:PRINTCHR$(23):PRINT@460,"YOU MADE IT ! ! !
1090 FORT=1TO750:NEXTT
1100 CLS:PRINT"   UNFORTUNATELY, WHILE YOU WERE TRAPPED IN THE M
AZE,
1110 PRINTF$" ABSCONDED WITH THE "D$
1120 PRINT"AND DIDN'T EVEN LEAVE YOU "H$".
1130 PRINT"   EVEN WORSE, THE "C$
1140 PRINT"HAS GONE BROKE, AND IS UNABLE TO GIVE YOU THE RAISE O
R THE
1150 PRINT"PROMOTION.
1160 PRINT"   HOWEVER, YOUR EXPERIENCE HAS HELPED YOU LAND A NEW
 JOB WITH
1170 PRINT"A NEW COMPANY.  ALL YOU HAVE TO DO IS TYPE IN YOUR SO
CIAL
1180 PRINT"SECURITY NUMBER, PRESS ENTER, AND YOUR NEW JOB WILL B
E
1190 PRINT"EXPLAINED TO YOU.":PRINT:PRINT
1200 INPUTQ$
1210 GOTO100
1220 END
1230 B$="SECRET AGENT":RETURN
1240 B$="STREET WALKER":RETURN
1250 B$="TRASH COLLECTOR":RETURN
1260 B$="MATTRESS TESTER":RETURN
1270 B$="CHILD MOLESTER":RETURN
1280 B$="CHICKEN PLUCKER":RETURN
1290 B$="GENERAL FLUNKY":RETURN
1300 B$="MANURE SPREADER":RETURN
1310 B$="LINT TASTER":RETURN
1320 B$="DITCH DIGGER":RETURN
1330 C$="AJAX WORM FARM":RETURN
1340 C$="SUPERSTUD ESCORT SERVICE":RETURN
1350 C$="DAILY DOUBLE BOOKMAKING PARLOR":RETURN
1360 C$="ONE-A-DAY WIDGET FACTORY":RETURN
1370 C$="LAST NATIONAL BANK & SALAMI FACTORY":RETURN
1380 C$="FEDERAL BUREAU OF INVESTIGATION":RETURN
1390 C$="LOCAL GARBAGE DUMP":RETURN
1400 C$="UNITED STATES CONGRESS":RETURN
1410 C$="VELVET TOUCH MASSAGE PARLOR":RETURN
1420 C$="TASTY-TANGY MOONSHINE DISTILLERY":RETURN
1430 D$="CHOCOLATE CREAM PIZZA":RETURN
```

```
410 PRINT:PRINT:PRINT
420 PRINT"      THESE INSTRUCTIONS WILL SELF DESTRUCT IN 10 SECO
NDS"
430 FORT=1TO12000:NEXTT
440 CLS:FORX=0TO127:SET(X,1):NEXTX
450 FORY=1TO40:SET(127,Y):SET(126,Y):NEXTY
460 FORX=127TO1STEP-1:SET(X,40):NEXTX
470 FORY=40TO1STEP-1:SET(0,Y):SET(1,Y):NEXTY
480 EX=RND(121):IFEX<2GOTO480
490 FORX=EXTOEX+5:RESET(X,1):NEXTX
500 EN=RND(119):IFEN<6GOTO500
510 FORX=ENTOEN+5:RESET(X,40):NEXTX
520 X=7
530 N=1:R=15
540 B=RND(R):IFB<NTHEN540
550 FORY=BTOB+5:SET(X,Y):SET(X+1,Y):NEXTY
560 N=B+5:R=R+10
570 IFR<36THEN540
580 X=X+6:IFX<119THEN530
590 Y=4
600 N=1:R=17
610 E=RND(R):IFE<NTHEN610
620 FORX=ETOE+10:SET(X,Y):NEXTX
630 N=E+11:R=R+14
640 IFR<116THEN610
650 Y=Y+4:IFY<40THEN600
660 X=EN+3:Y=41:PRINT@(893+INT(EN/2)),"IN>     <":SET(X,Y)
670 PRINT@960,"ENTER DIRECTION (U, D, R OR L):";
680 FORP=0TO50:NEXTP:RESET(X,Y):FORP=0TO50:NEXTP:SET(X,Y):A$=INK
EY$:IFA$=""THEN680ELSEPRINT@1000,A$;
690 PRINT@960,"ENTER NUMBER OF STEPS (9 OR LESS):";
700 FORP=0TO50:NEXTP:RESET(X,Y):FORP=0TO50:NEXTP:SET(X,Y):B$=INK
EY$:IFB$=""THEN700ELSEPRINT@1003,B$;
710 A=VAL(B$)
720 PRINT@960,"                                                  ";
730 PRINT@(893+INT(EN/2)),"        ";
740 IFA$="U"THEN750ELSEIFA$="D"THEN820ELSEIFA$="R"THEN880ELSEIFA
$="L"THEN940ELSE670
750 T=Y:IFPOINT(X,Y+1)THENZ=1ELSEZ=0
760 FORY=YTOY-ASTEP-1:SET(X,Y):IFZ=0THENRESET(X,Y+1)
770 Z=0:IFY=0THEN1080
780 IFPOINT(X,Y-1)THEN1000
790 NEXTY
800 Y=Y+1
810 GOTO670
820 T=Y:IFPOINT(X,Y-1)THENZ=1ELSEZ=0
830 FORY=YTOY+A:SET(X,Y):IFZ=0THENRESET(X,Y-1)
840 Z=0:IFPOINT(X,Y+1)THEN1010
850 NEXTY
860 Y=Y-1
870 GOTO670
880 T=X:IFPOINT(X-1,Y)THENZ=1ELSEZ=0
890 FORX=XTOX+A:SET(X,Y):IFZ=0THENRESET(X-1,Y)
900 Z=0:IFPOINT(X+1,Y)THEN1020
910 NEXTX
920 X=X-1
```


A MAZE PROGRAM

For 16K Level II & Up

By John Stedeford, Twin Falls, ID

This program may easily be modified to include friends, local persons or recent newsmakers. All these random entries are from lines 1440 through 1920. Line 30 gives the maximum lengths of these strings.

```
1440 D$="SACK OF USED KLEENEX":RETURN
1450 D$="PORNOGRAPHIC BIBLE":RETURN
1460 D$="18TH CENTURY FINGERNAIL":RETURN
1470 D$="ANTIQUE TOOTH SCRAPER":RETURN
1480 D$="COMPUTERIZED POCKET COMB":RETURN
1490 D$="ONE LEGGED HORSE":RETURN
1500 D$="EMBALMED COCKROACH":RETURN
1510 D$="MINK-LINED NOSE WARMER":RETURN
1520 D$="DIRTY SOCK":RETURN
1530 E$="EVIL GENIUS":RETURN
1540 E$="INSANE FUNERAL DIRECTOR":RETURN
1550 E$="DEPRAVED PSYCHIATRIST":RETURN
1560 E$="WIERD TREE SURGEON":RETURN
1570 E$="ESCAPED CONVICT":RETURN
1580 E$="CONGENITAL DOLT":RETURN
1590 E$="DEFROCKED PROFESSOR":RETURN
1600 E$="UNEMPLOYED HIT MAN":RETURN
1610 E$="DEMENTED FARO DEALER":RETURN
1620 E$="UNCLEAN MANICURIST":RETURN
1630 F$="JIMMY CARTER":RETURN
1640 F$="FARRAH FAWCETT":RETURN
1650 F$="CHARLEY BROWN":RETURN
1660 F$="JOHNNY CARSON":RETURN
1670 F$="MICKEY MOUSE":RETURN
1680 F$="IDI AMIN":RETURN
1690 F$="MRS. OLSEN":RETURN
1700 F$="COLONEL SAUNDERS":RETURN
1710 F$="RONALD MC DONALD":RETURN
1720 F$="EARL BUTZ":RETURN
1730 G$="BICYCLE":RETURN
1740 G$="GARBAGE TRUCK":RETURN
1750 G$="DONKEY":RETURN
1760 G$="GAS-POWERED SKATEBOARD":RETURN
1770 G$="HORSE-DRAWN FIRE TRUCK":RETURN
1780 G$="16-SEAT MOTOR SCOOTER":RETURN
1790 G$="MOTORIZED HOCKEY PUCK":RETURN
1800 G$="COAL-FIRED MOPED":RETURN
1810 G$="VELVET TENNIS SHOES":RETURN
1820 G$="PEDAL-POWER SUBMARINE":RETURN
1830 H$="YOUR FAVORITE SCOTCH":RETURN
1840 H$="SEX":RETURN
1850 H$="BARBEQUED HERSHEY BARS":RETURN
1860 H$="YOUR RIGHT GUARD":RETURN
1870 H$="PENCIL SHAVINGS":RETURN
1880 H$="DEAR ABBY":RETURN
1890 H$="A SPONGE MOP":RETURN
1900 H$="YOUR LEFT SHOE":RETURN
1910 H$="YOUR PET MOSQUITO":RETURN
1920 H$="YOUR STRAWBERRY BEER":RETURN
```

Software Review by T R Dettmann

G2's LEVEL III BASIC

Level III BASIC was written by Bill Gates, of Microsoft (the people who gave us Level II Basic and TRS-80 FORTRAN)

Have you looked with longing on powerful BASIC's that have capabilities which Level II dosen't have, such as the ability to define functions? Have you thought of selling your soul to get the money to have a disk system so that you can use functions like LINE INPUT?

If any of these thoughts are on your mind, you can save yourself money. For $49.95 you can buy G2's LEVEL III BASIC and have some of these powerful features on your system.

LEVEL III Basic was written by Bill Gates, the president of Microsoft Inc in Bellevue, Washington (the people who gave us Level II Basic and TRS-80 FORTRAN). It is only available through the G2 Program Library.

At first sight, LEVEL III BASIC looks like an attempt to give the Level II system owner some of the enhancements which are a part of DISK BASIC. The ones included are:

1 - Spelled out error messages (no cryptic codes)

2 - An internal clock and calendar, callable from a BASIC program if you have an expansion interface

3 - The ability to use Octal or Hexadecimal constants

4 - A MID$ function which returns a substring of a given string

5 - An INSTR function which returns the location of a given string within another

6 - The ability to define functions with DEF FN

7 - Ten USR calls for machine language subroutines

8 - A LINE INPUT command in BASIC to let the Level III user input a whole line of text with embedded special characters

Level III BASIC dosen't stop here though. It's not just a poor man's DISK BASIC. It goes on to put in some new features that will make Disk system users drool with envy (but they can't use it with Disk BASIC, since it loads into the Disk Operating System area and has some commands in ways that would conflict with their use in DISK BASIC).

LEVEL III includes enhancements to introduce whole new areas to programming the Level II machine. They include:

1 - The ability to enter BASIC command words by hitting the shift key and a single letter. You can even define your own codes

2 - The NAME command has been activated to provide renumbering for BASIC programs in LEVEL III machines

3 - A system lockout recovery is built in so that when a program causes the computer to just sit and stare at you, you can reset using the BREAK key and still have your program intact

4 - A new Line Graphics capability has been added to allow you to draw a line on the screen simply by specifying the starting and ending points

5 - The ability to store blocks of graphics in an array with a single command and to call them out again

6 - A new function, INPUT#LEN has been added that allows you to call for input with a time limit

7 - New cassette program commands SAVE and LOAD are provided which are insensitive to the normal problems with recorder volume settings

8 - The PRINT#-command has been expanded to include a new device 3, the RS 232C serial interface

Evaluation

Anyone who has a Level II system without disk drives should add this package to their software library. G2's LEVEL III BASIC is an important extension to the system. There are latent possibilities in every addition made to the system with this package. For example:

The LINE INPUT can be used to create a really good text editor which will input ALL special characters as well as the text.

The Line renumbering function using the NAME command will make your programming a lot simpler and allow you to dress up your program listings

The ability to use HEX constants will make programming USR functions much easier since you can refer to them by their memory locations in HEX

Having 10 USR functions available will make it possible to have multiple machine language functions for your program

The LINE statement gives you ultra high speed graphics capability

The GET@ and PUT@ statements give you the ability to program figures on the screen and then save the whole figure and recall it with one BASIC statement for almost unmatched ability to control graphics on the display

The new MID$ capability allows you to replace a portion of one string by another so you can use it to insert corrections in a line of text

The new INPUT#LEN can be used to generate timed games that force the player to react quickly to a situation

The suggestions above are only a small start to what can be done with this package.

It is only fair to mention the fact that there are drawbacks to the use of LEVEL III. First and foremost, the package eats up memory. To check to see just how much it take, I did a PRINT MEM before and after loading the package. After loading, my value was down by 9194 bytes when I used the version designated as the "Disk" version (that means it can run from disk but is still not able to access the disks). When I loaded the "Cassette" version into my 16K Level II, the value for MEM was down by 5079 bytes (to 10493). This limits the programs you can put in the system unless you have an expansion interface with extra memory.

I should also point out that the real time clock in the system is only available if you have the expansion interface. This is pointed out in a footnote on the page that describes the use of the system.

These are minor problems for most users. The 10K still available to the 16K LEVEL II user is enough for most programming.

My feeling in using the program is that disk system owners will get very little from LEVEL III BASIC since they already have most of the commands available and all they will gain are a few graphics capabilities at the expense of their disk capability.

Owners of systems without disks will find this package extremely useful. In particular, using capabilities such as the LINE INPUT and the DEF FN will more than compensate for the time needed to load the program and use the memory.

Summary

I feel I can recommend this package highly to anyone limited by their lack of a disk system. In particular, anyone who wants to have an extended BASIC with the ability to define functions or handle high speed graphics in a convienient way must have this package. ●

VIEW contd from page 32

rammer must be aware. An analogous situation occurs for subtraction, i.e., 80H-C0H=C0H. The answer you expect is +192 but the Z80 recognizes the answer, C0H, as negative 64.

PROJECTS FOR NEXT ISSUE

1. Develop a routine which will add or subtract n, where n is greater than zero but less than 255, to all video display locations. Assume you enter the routine with the value of n in the A register and if B=0 you add n, if B does not equal 0 you subtract n.

2. Develop a routine to add the data stored in n, where n is greater than 0 and less than 65535, consecutive memory locations. Pass n to the routine in BC, the starting memory location in DE and return the sum in HL. Ignore any overflow.

3. Use the IX register to develop a method to set up a table to convert ASCII code to any other code. Pass the ASCII code to the routine in C and return the corresponding code in A. ●

KILLED FILES contd from page 36

the HIT table, but this isn't the normal case (unless you keep copies of the HIT tables on all your disks).

Since the entry in the HIT table is unknown (we don't know how to get the entry from the file name, at least not yet), we have to be sneaky. Experimenting on a blank disk will show you that the HIT table entry for a file with the file name 'A' is always 35 HEX

In order to reactivate the HIT table entry, we rename the file to 'A' using SUPERZAP to get the first 16 bytes of the FPDE to be:

1000 0045 0041 2020 2020 2020 2020 2020

(ASCII code 41 is A).

If you have the DIRCHECK utility now, the simplest way to proceed is to do a DIRCHECK on the disk It will tell you what is wrong with the HIT table and the GAT table by giving you the location of the GAT and HIT table entries that are incorrect for the reactivated FPDE The DIRCHECK for this disk is in Figure 4.

If the DIRCHECK program is not available, then you can still complete the repair by using the information we have about the GAT and HIT table entries. To fix the GAT table, we figure out where the file is (track 18, sector 0, granule 1) and so we allocate granule 1 in track 18 (GAT table byte 11 HEX). If the entry is FC, we change it to FE (1st granule). If the entry is FD, we change it to FF.

If the file is long enough to be on several tracks and more than one granule on a track, we must be very careful to do the correct one.

To correct the HIT table, we compute the location of the entry by reversing the coding earlier.

The Directory Entry Code (DEC) of the FPDE is formed from the sector the directory entry is on (8) and the location within the sector (6th entry)

```
6   1 1 0
8 - 2 - 6   1 1 0
loc     sec   1 1 0 0 0 1 1 0
                A6 HEX
```

So we put HEX code 35 at location A6 in the HIT table We now have the file back.

A HEX to ASCII conversion table is include here in figure 5 to help make conversions easier

Once the file has been restored, you can rename it to any filename you care to use with the RENAME command The system will alter the now correct entries as needed. Attempting to RENAME the file before it is fully recovered will not work. ●

SORT contd from page 28

but that the pointers were dynamically allocated (a 25 cent buzzword for saying that they can move) on short sorts, say less than 10 items..

For short sorts, setting the values T1 and T2 resulted in not getting the pointer correctly. This has disastrous results since the pointers become random and you soon find that your strings begin to take on a funny look.

On one sort, some of the pointers actually wound up saying that the strings they referred to were in Level II ROM! In order to prevent this, the statements can be changed to be equivalent with mine:

```
FOR Z=0TO2
  A1=PEEK(VARPTR(A$(I))+Z)
  A2=PEEK(VARPTR(A$(J))+Z)
    POKE(VARPTR(A$(I))+Z),A2
    POKE(VARPTR(A$(J))+Z),A1
NEXT Z
```

Further Improvements

Still another improvement comes from changing all of the variables in the program to integers, except those that must be real or string variables. ●

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