
80 U.S.
THE TRS·80 USERS JOURNAL
Vol IV No 6 $3.00 Nov/Dec 1981
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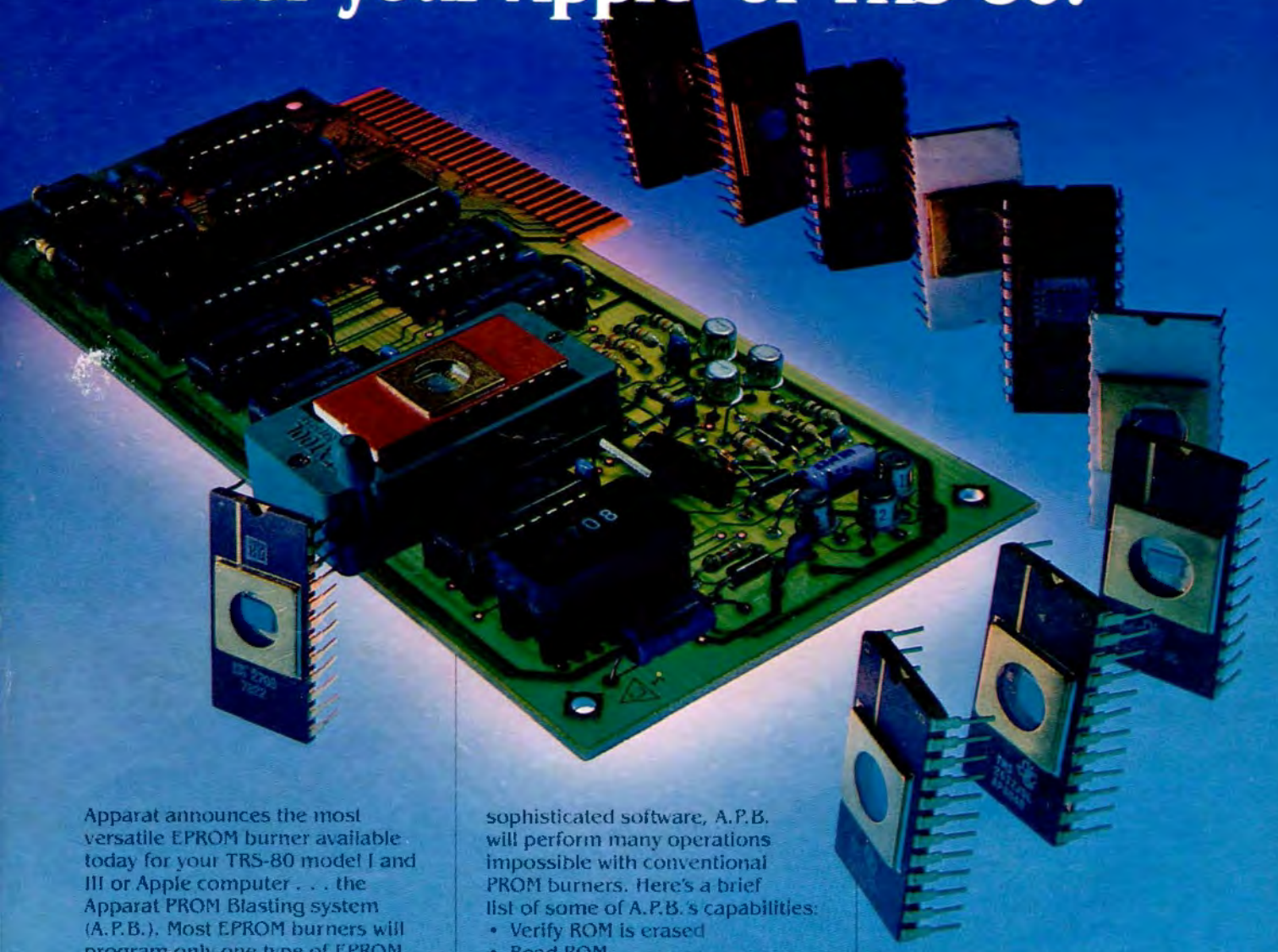

Apparat announces the most versatile EPROM burner available today for your TRS-80 model I and III or Apple computer . . . the Apparat PROM Blasting system (A.P.B.). Most EPROM burners will program only one type of EPROM. The A.P.B. system will program all commonly used 24 pin EPROMs by using special personality modules that adapt the unit to the EPROM. The following EPROMs are programmable: 2704, 2708, 2716, (3-volt) & (5-volt), 2732, 2508, 2516 and 2532.

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Editorial

Fourteen years ago I swore never again to go near a computer. The vow was firm and resolute. I had just failed a college class for the first time. It was a sadistic introduction to computers through the MAP language.

The course was freshman level, and I was a junior year math major. I should have noticed something was amiss when the instructor and half the class walked in with funny green and white paper. As the professor started into error generation in division algorithms, the glaze began to cover my eyes. It took almost a decade for it to lift. In that time, there was very little help in overcoming frustrations and anger.

In that first class, we had to insert large mechanical monsters into the keypunch so that we could type out our programs and have them coded and verified. The room was full of equipment, reams of paper and cards, and huddling students. I wanted to ask which part of the board I inserted at the top, but had the distinct impression that such mundane questions were not allowed within the hallowed halls. After twelve weeks, I took a final exam and on the way out I checked the room number. I was sure that an error had been made.

We were using IBM manuals as a text; a dubious way to begin. Either text writers assume you know how to program (in which case I wonder why they bothered to write the book), or at the very least, that you are totally enthralled and will devote days to deciphering every nuance. The situation is improving, but today's novice has many of the same impressions.

I have seen much of the same attitude pervading the microcomputer industry today. I am sure that those same huddling students are now selling at the local Nibble Store. Six years ago, I noticed a computer shop and for the first time ever, I saw a complete computer system! Imagine having taken three programming classes and never seen a disk? Batch processing did wonders to preserve the mystery.

I walked in and saw a video display of all zeros and ones. Boolean algebra and switching circuits were not new to me so perhaps this was the place for me to catch on. The devices were all uncovered, wires going in, out, above and under everything. The imposing menagerie of electronics filled me with awe.

I turned to the front desk and heard for the first time the language of the 80's. The two men at the front were having a conversation full of bytes, pulsing rates, megahertz and ROMs. The students were still huddling, and I still didn't know how to turn it on. I asked my question, absorbed with a smile the knowing smirk of one of the men, and was pointed to the switch. The salesman went back to his conversation. I was left with a lit video. After about 10 minutes, another customer took pity and showed me that the CPU has its own switch. As I left, the man at the desk asked if I had any questions. If he only knew how many there were!

The attitude in many shops is incredible. I have entered stores and noticed a person thoroughly involved with some major programming effort. Only later did I learn that he was there to help *me* and that the program was Star Trek 4.5.67.333.

As the competition in the microcomputer market grows, I hope that sales quality improves with it. You can still enter a shop, wander around, and never be helped or asked a single question.

The microcomputer has amazing potential, but computer fear is a real emotion, and ignorance abounds. Here are just a few horror stories to illustrate this point:

I was called by a small electrical parts company to see what was wrong with their payroll program. The office manager had just purchased a 48K two-disk Model I computer system from Radio Shack, along with a number of software packages. This company had a policy of granting vacation time on a per-hour basis for the hourly employees. This resulted in them being taxed for hours that they did not work. To overcome the problem, the bookkeeper would run the payroll package, then confirm the work by hand. The net result was 8 hours to do what used to be a 5 hour job. The same shop also wanted to set up a general ledger. Step one of the package asks you if it is accrual or cash accounting, and how many ledger items are to be used. The

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80-U.S. JOURNAL

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Advertisers: The Journal will accept limited relevant commercial advertising which pertains to, or is for use on the Tandy Corporation microcomputers. Write for a current rate schedule.

Authors: We constantly seek material from contributors. Send your material (double spaced, upper/lower case please) and allow approximately 4 weeks for review. Programs must be supplied in machine readable format on diskette or tape. Text files may be on diskette. Media will be returned if return postage is provided. Cartoons and photographs are welcome. Generous compensation will be made for non-trivial works which are accepted for publication. The Journal pays on acceptance rather than on publication.

The Cover

Our cover for this issue shows the computer in use in the home. The model is Cindy Harrison; the photographer was Frederick A. Johnsen. Just in case you can't see it clearly, the recipe on the Color computer is for Orange Tea Cake.

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ISSN Publication #0199-1035

The 80-U.S. Journal is published bimonthly in January, March, May, July, September and November by 80-Northwest Publishing Inc., 3838 South Warner Street, Tacoma, WA 98409

PRINTED IN THE UNITED STATES OF AMERICA

POSTMASTER: Please send change of address form 3579 to 80-U.S. Journal, 3838 South Warner St., Tacoma, WA 98409

Second Class Postage paid at Tacoma, WA and at additional entry point.

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80-U.S.
THE TRS-80 USERS JOURNAL

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Volume IV Number 6 November/December 1981

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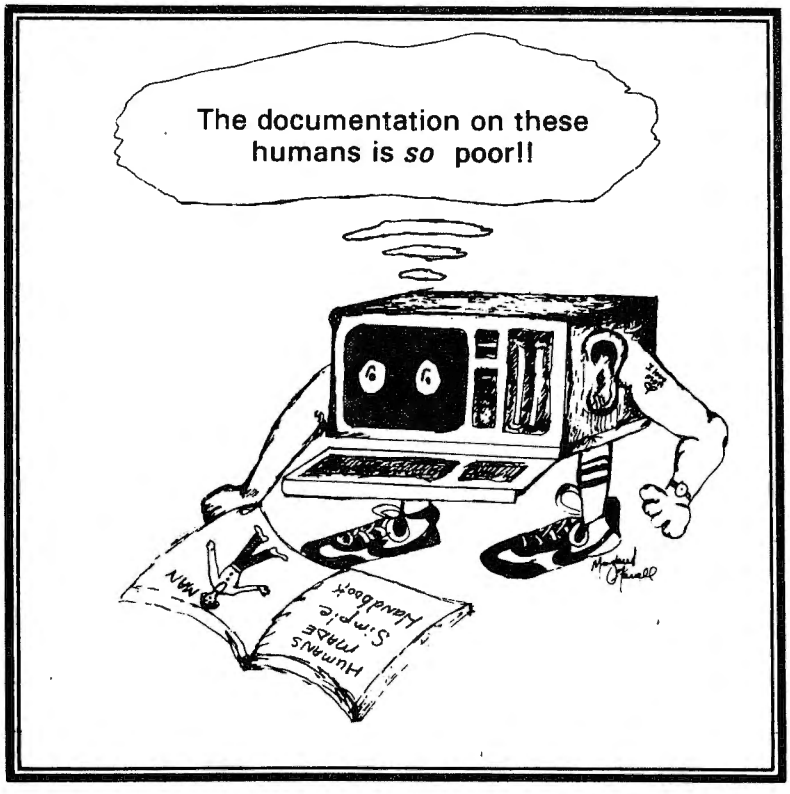

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office staff was not sure of the answer to either question and after some discussion it was clear that it would be necessary to purchase a third disk drive to handle their needs. Their frustration at this point was easy to understand. A computer "expert" had sold them the system and it was not the simple turn-key package they had envisioned.

The mistakes can be quite costly. A while back, a businessman had purchased a TRS-80 Model II and contracted with a programmer for the development of a complete payroll, accounts receivable, accounts payable and general ledger package. The programmer took the machine and spent a year writing the programs. When everything was finished, it was returned to the businessman. Upon power up, there was a slight problem. The businessman called the programmer and was told to go ahead and re-format the operating diskette. After having successfully erased the programs, they still didn't work. So, he asked that the backup copies be sent over. You guessed it, there were no backups!

Problems are not restricted to users. A friend of mine has developed a very specialized inventory control program for a local company. Weeks of discussion preceeded any program writing so that all data needs were clearly outlined. The package was written, debugged and delivered three months later. After a few months use, the company began to request changes and alterations. He is still involved with the program after two years and a major re-write.

To those of you who are just entering the computer market, be careful and go slow. Read as much as you can about hardware and software support. The lessons can be quite expensive.

Cameron Brown

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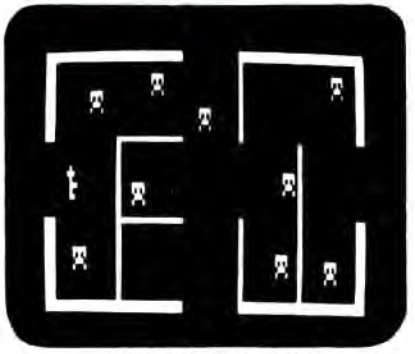
NEW! TALKING ROBOT ATTACK



Actual unretouched photos

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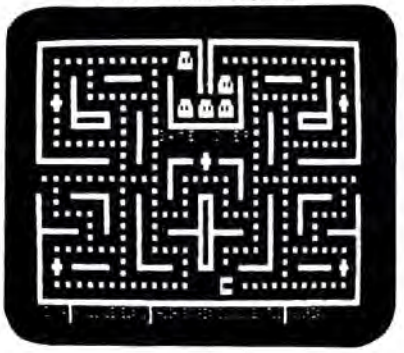
NEW!

NEW! SCARFMAN



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THE LATEST ARCADE CRAZE now runs on your TRS-80.

It's eat or be eaten. You control Scarfman around the maze, gobbing up everything in your path. You attempt to eat it all before the monsters devour you. Difficulty increases as game progresses. Excellent high speed machine language action game. From The Cornsoft Group. With sound.

CAUTION: Played with the Alpha Joystick, Scarfman may become addictive.

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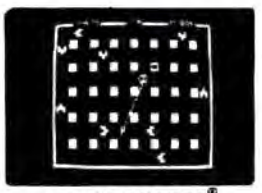

ATTACK FORCE®

As your ship appears on the bottom of the maze, eight alien ships appear on the top, all traveling directly at you! You move toward them and fire missiles. But the more aliens you destroy, the faster the remaining ones become. If you get too good you must endure the Flag ship. With sound effects!

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Letters

Spencer Hall is correct, a volume meter is essential for the operation of a TRS-80 cassette based computer system. An even better volume monitor was presented on page 18 of the Mar/Apr 79 issue of *80-U.S.* by Ray Thompson. Although this monitor is slightly more costly it clamps the tape over-shoot better and allows loading of tapes with reverse polarity. I constructed one of these 2 years ago and included a switch to allow manual control of the recorder without plugging and unplugging plugs. I have had no problems loading any programs with this system unless magnetic coating on the tape itself was faulty. All tapes load if the meter output stays between 10 and 15 microamps.

Robert A Hood
Bremerton, WA

(The Mar/Apr 79 issue is no longer available as a back issue. Mr Hall's article on Tape Without Tears will have a sequel in an upcoming issue. Watch for it. Ed)

In your Jul/Aug 81 issue, I saw a letter from John T Phillipp on page 4. In this letter he asked for a patch on Scripsit in order to utilize the control key of the Electric Pencil Lowercase modification.

When this patch (given here in NEWDOS80 format) is applied the control key will operate in the same way as the @ key. The CAPS LOCK will not be available via the control key.

```
SCRIPSIT/CMD,15,7C
Change
57 3A 01 38 E6
to
57 C3 F3 78 E6
SCRIPSIT/CMD,39,87
Change
47 16 4C 49 4E 45 20 50
52 49 4E 54 45 52 20 4E
4F 54 20 52 45 01 02 00
79 41 44
to
47 06 4C 50 20 4F 46 46
3A 80 38 E6 10 C2 42 61
3A 01 38 C3 40 01 02 00
79 61 44
```

The text "LINE PRINTER NOT READY" now reads "LP OFF".

Ruud Th, van der Ham
Rijswijk, ZH, Holland

In response to Tom Grumbling's letter in the Jul/Aug 81 issue, where he asked for a set of POKEs to speed up the Color computer, I have this piece of information to offer: POKE 65495,0 will double the speed of the processor and POKE 65494,126 will return it to normal. This will only work on Color computers that have double speed processors (some do not). If you try this on a Color computer whose processor can't handle it, the computer will either "freeze up" or display garbage on the screen.

According to our local computer center, operating the Color computer at double speed for more than an hour or two could overheat the processor. I use the double speed only when I need "bursts" of speed, to avoid CPU meltdown.

You *must* be at normal speed to CSAVE, CLOAD, PRINT#-1, INPUT#-1, or any other tape operation or your tapes will be unreadable. Double speed does not affect Extended BASIC TIMER function, but it does make SOUND and PLAY an octave higher. Also, I suspect (but cannot confirm) that double speed could affect communications through the RS-232 port.

Tom A Tuling
Spokane, WA

I have a Stringy Floppy that stopped working. I phoned Exatron's repair department and a man named Mel told me to send in my unit with a note to him. I've had the unit for a while but I don't keep many records so I didn't know if it was under warranty. In my note, I told Mel to fix it and bill me. The enclosed packing slip shows how fast it was fixed, and they said it was under warranty so I wasn't charged (not even return postage - First Class mail).

A company that's this prompt, fair and so thoroughly customer oriented should be openly complimented. I really like the Stringy Floppy. Now I can say that the company is also top grade.

Since your magazine is publishing Exatron's Newsletter, I am pleased to become a subscriber.

Richard Nitzberg
Oakland, CA

(This is only one of several letters received lately about Exatron. Mr Nitzberg experienced a five day turnaround at the repair center. Ed)

Being a new owner of a TRS-80 Color computer, I bought and read with interest your Jul/Aug 81 issue. I typed in and ran the Sundance program by Mr Waples and enjoy it immensely.

There is, however, one item that could be changed. The first time the program is run after being loaded from cassette, the sun is being drawn on a red background with horizontal stripes. After the initial run, the problem disappears. The problem is caused by the order of commands in line 220. Upon initialization, the Color computer defaults to PMODE 2,1. Line 220 reads: PCLS3:PMODE3,1:
SCREEN1,0:COLOR2,3
As you can see, the PCLS is executed first, however it clears only page 1 of PMODE 2. Upon entering PMODE 3, the computer remains in that mode for subsequent runs. The PCLS then clears the pages for PMODE 3.

By reversing the order of PMODE3,1 and PCLS, the proper pages are cleared initially. Use PCLS before the SCREEN command, as the screen command will display the page, and if it is not cleared first, the previously written data will be visible until execution of PCLS.

Thank you for an excellent magazine, and I will be looking for more articles on the Color computer.

John Steiner
Riverside, ND

Yes!!
I want to order the * *Captain 80* * *BASIC Adventure Book* and mystery decoder ring. (You *do* include a mystery decoder ring, don't you?) Thanks,

Don Loveday
(Sorry Don, no boxtop - no ring. Ed)

I was quite intrigued with...(Phil Pilgrim's article)... in the most recent *80-U.S.* on controlling the Sears Vertical Mill. Some years ago I went through Kerney-Trecker's engineering program (Milwaukee Milling Machine).

The idea of controlling a mill or other machine tool with a relatively inexpensive computer would seem to warrant "filling a magazine" with details. If you ever decide to do so, please reserve me a copy.

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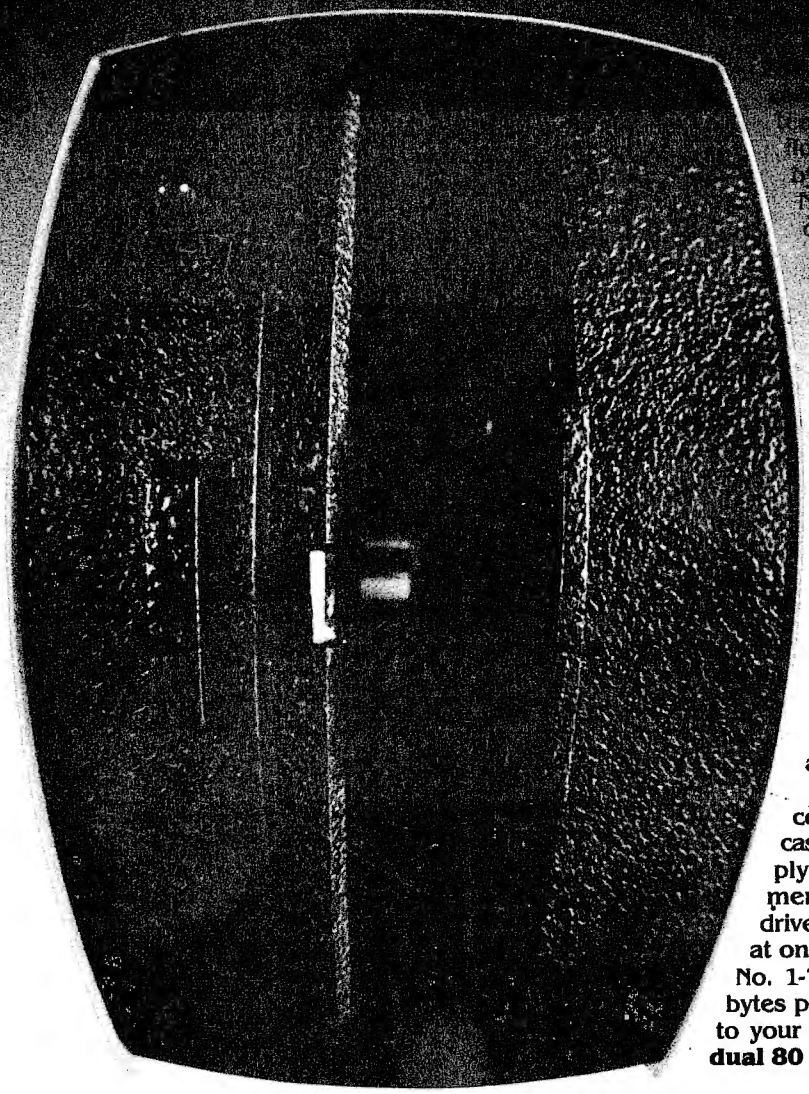
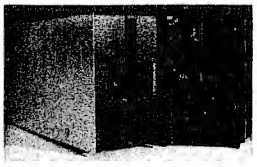
More bytes per buck!



Drives plug directly into an expansion interface (requires installation of a double density controller) or the model III disk bus with our single volume cable so you can now have over 2 megabytes of storage on-line with standard mini-floppy diskettes. Each drive has up to 573 free grans, for a total of 1,719, on a maximum of three 80 track drives, which can be added to a TRS-80 model I. Model III's can have up to 4 dual 80's on-line (almost 3 megabytes).

These drives can "read" standard 35 or 40 track diskettes using Newdos/80 version 2.0 which will allow skipping every other track.



Drives come complete with case, power supply and documentation. The drives are priced at only **$515** (Cat. No. 1-705, specify I or III). Now, at 1424 bytes per buck, it just might be the answer to your storage problems. **Special — Two dual 80 track drives only $999.**

Apparat, Inc.

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VISA

"ON GOING SUPPORT FOR MICROCOMPUTERS"

Continued from page 6

I recently ordered a product featured in your want ad section. I ordered the RS-232 brace for $4.95. I really wasn't expecting much and if it didn't work I figured it would be no great loss. I received the product at my office along with my check which I forgot to sign. This was a change as most mail order vendors wait for your check to clear the bank. Anyway, I was at my office and was thinking that I really got a bad deal as all I got was two little bitty pieces of plastic and four screws. Well, after getting home and installing the pieces and seeing what they did I was really impressed. This is a real case of American ingenuity.

I would recommend this as the ultimate fix for those who are having trouble with a loose RS-232 *(in the Model I expansion interface - Ed)*... I don't know why Radio Shack doesn't offer this fix.

...I enjoy your magazine very much. I have been a subscriber for a year or so and tell everyone who buys or who has a computer that they can't live without it.

Dale C Bennett
Atlanta, GA

I consider your magazine the best of the lot. *Alternate Source* runs a close second, but they are moving so heavily toward disk that a lot of their material is no longer relevant.

Don't forget us Level II users. I have 48K and a Stringy Floppy and have no need for disk in the foreseeable future. The Exatron unit does everything that I need, including word processing.

So keep up the good work, especially a balanced presentation which includes enough Level II material.

Paul F Secord
Houston, TX

The "Keyword" program (Sep/Oct 81 issue) is cute, but I think it needs an extra flag variable to work as it's supposed to. In tape version, if you type in

ONE; (Enter)
TWO. (Enter)
ONE? (Enter)

the program won't be able to find the ONE. The trouble is in lines 170-180. The string "ONE" is found, but it's not printed until the program finds a period. The line containing the period doesn't contain "ONE" so nothing is printed.

The fix I made is:

In line 150 insert F1=0: at the beginning. Change line 160 to read:
160 GOSUB 480: IF A THEN F1=1
In Line 180 change A=0 to F1=0
In line 210 add: F1=0 at the end.

Incidentally, I translated the Pascal version of "Life" in the same issue into Forth for my homemade Forth compiler. 30 generations of the test pattern took 3 minutes 29 seconds. I also translated the BASIC version so my homemade BASIC compiler would compile it. The test pattern took 55 seconds for 30 generations.

Bill Mason
Hornitos, CA

Radio Shack will provide at no cost #700-2220 (A document covering access of VisiCalc data files from BASIC). This was mentioned in the April 1981 *"Microcomputer News"*.

E H McGowan
Houston, TX

First let me thank you for backing me up in response to Brian Wood's letter on Versafile (Jul/Aug 81 *80-U.S.*). However, I must confess after going over my article (Jan/Feb 81 issue) with a "fine tooth comb", I found what I think are these elusive typos.

I will take the blame for not spotting these in the copy as it appeared in the magazine. I had read the article so many times during creation that when it came out in print I didn't bother to read it again (I darn near had it memorized).

It seems that the typesetter (machine or operator?) didn't like the "number sign", the miniature tic-tac-toe board, and inserted a space instead.

So there are three places that need a touch up. On page 43 in the second column about half way down is line 330. This line should read:

330 IF A$=" #" GOTO 700

To spell it out: quote mark, space, number sign, quote mark.

Number two: Page 44 second column, the second to last line is 325. It should read:

325 IF A$=" *#" GOTO 8000

In other words: quote, space, multiplication sign (star), number sign, quote.

Lastly the very first sentence on page 45 reads "Now whenever "*" is entered..." It should say "*#", i.e., star, number sign.

I forgot the importance of proofreading one's own work in final print. I can assure you and your readers this won't happen again and any significant typos will be brought to immediate attention.

As far as problems with 8070 I can only guess that Brian's data lines are improperly set up.

Thank you for the space and to try and clear these typos up.

Mike Zielinski
Rohnert Park, CA

(Don't take all the blame Mike, we share a part of it too. Ed)

I have been reading *80-U.S. Journal* almost from the beginning, and have watched it grow from its humble garage shop beginnings into the beautiful publication it is today.

Like many others, I have complained about the bi-monthly publishing rate, but I've decided that I can't assimilate the information you publish any faster than that. I find myself constantly going back to read and re-read articles, and each time I learn a little more.

I have learned more about the workings of my computer from these pages than from any other single source, and I find something I can use immediately, others I find a use for later.

Now for the complaint. It may seem minor, but it has finally prompted me to write. When I want to key in a program, I make a photo-copy so I can put it on my copy holder. This is a tremendous aid, and I recommend it to everyone. When you print on various colored pages though, as you did in the Sep/Oct 81 issue, it copies badly, and is difficult to read.

As I said, this may seem minor point to many, but not to my aching eyes. Please, print program listings on plain background.

Don Loveday
Littleton, CO

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TOACC/23

Items at random

80-U.S. goes monthly!

The big news around here is that we are going to be a monthly publication starting in January 1982 (the very next issue!). Yes, I have fought it for a long time, it just wasn't the right time, but now it is and we are geared up to do it.

There may be a small decrease in the number of pages, it all depends on our advertisers. It still has to be run like any other business, and the picture looks good - finally. There will be few changes otherwise. The subscription price will remain the same for the U.S. and possessions. Canada and Mexico will increase to $25.00 per year, foreign surface will remain at $30.00 per year but foreign airmail will have to go up to $72.00 per year. Sounds terrible doesn't it?

You may note that we have a whole new bunch of foreign distributors listed on page 2, and we strongly suggest that foreign subscribers look into getting their copies through them. It may be faster and cheaper in the long run.

The way things work out, you can now buy a subscription to 80-U.S., and save $20. over the newsstand price. With that you can buy a subscription to another computer mag and still have a buck or so left over for a Big Mac at *McDonnald's.* How about that?

This page, Items at Random, is always written after the rest of the issue is done and eagerly being blue lined by proofreaders. It just occurred to me that @NEWS and R C Bahn's columns haven't arrived yet. So they are not in this issue, but now they are both a whole issue ahead of the game. It must have been some kind of vacation these guys took! Wherever it was, I want to go there next year...

Mr. Ed Juge is now writing a regular column for us. I had asked him to do that about a year ago, but he had other commitments then. We welcome him now, and hope you will enjoy reading about the happenings in Fort Worth.

Neither Ed nor I liked the name "Tandy Topics". He said we should find a better name, but we couldn't. The only thing we could come up with was "Here come the Juge", which we considered was too trite. Margaret, our advertising director, suggested "Fort (what it's) Worth". For what it is worth, can you think of a better name?

Regular subscriptions to remain at present price.

There have been some people changes too, In case you hadn't noticed, Larry Panattoni has ceased to be a contributor. His regular job at Ma Bell has become more demanding and he has asked to be let off for awhile. Phil Pilgrim has gone whole-hog into the fishing lure business (using his TRS-80 to run the milling machine, see the last issue), and says he will contribute again when the boom is over. We thank both Larry and Phil for their vaulable input, and hope to see more from them when they have the occasion to write.

Old timers leave and new faces take their place. James Williams continues System/Command with this issue. His first installment is rather lengthy, but should excite those who dabble in machine language. Jim Klaproth and Cameron Brown both become Associate Editors. Their efforts in the past have proven to be valuable and we look for more from both of them. In the office, we welcome Eva Jones, who recently joined the staff as typesetter and layout/design person. To all of the above, we hope your stay with us will be long and rewarding.

Corrections

Now we get to that portion of the page which I call the "red face department": corrections. Here they are.

In the Sep/Oct 81 issue, we said that Radio Shack's Tiny Pascal would run on the Model III. It doesn't. The package is scheduled for conversion to the Model III, but there is no release date at this time.

We couldn't read the title on page 56 of the Sep/Oct 81 issue either. It was our first real bout with color, and thought it was a blue page, not a yellow one. Blue would have worked, darn it...

See letters in this issue for a solution to the bug found in Keyword (Sep/Oct 81 issue). Bill Mason tells about it.

We were also corrected on an item about the Color computer. Extended Color BASIC does recognize the INSTR function and LINEINPUT statement. Thanks to Lonnie Falk, publisher of *The Rainbow*, a publication for the Color computer.

The program in last issue's Files & Foibles was written on and for the Model II. The variable name CMD$ should be shortened to CM$ if you attempt this program on a Model I or III. Also, the last letter in line 676 should be T, not P.

Other stuff

It's about that time of the year again when that creep gets on the television and says: "The flu season has been reported in your area". Keep this in mind: The guy is a paid actor, it was probably June or July in New York when the commerical was made, and *you don't have to believe him!* Yes, I hear you say that you don't. But if you aren't listening and *thinking* about it, he might just get into your subconscious. Don't let him! If you want the flu, get it for your own good reason, not because some jerk told you to. OK?

Hang in there, and tell them all you saw it in *80-U.S.* **Mike**

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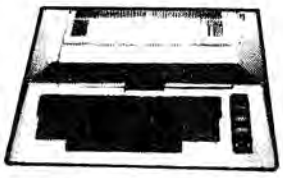

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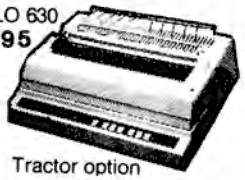

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Circle 9

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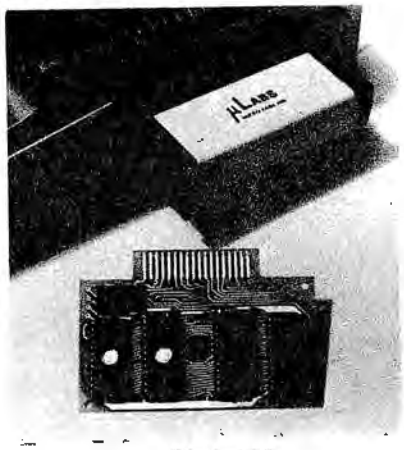
New products

Add memory to Color computer

Micro-Labs, Inc., 902 Pinecrest, Richardson, TX 75080 has announced the CMEMORY plug-in cartridge for the Color computer. This unit gives the user 8K of continuous memory which can be divided into any combination of 2K blocks of RAM and/or 2716 EPROM memory. The CMEMORY occupies the unused address space normally reserved for plug-in game cartridges. The CMEMORY cartridge without memory sells for $24.95. Although you can use your own memory, 2K RAM chips are available for $19.95 each and 2K 2716 EPROMs for $14.



Circle 150

Free catalog

ARCsoft Publishers, PO Box 132, Woodsboro, MD 21798 (301) 845-8856 has announced a new 16-page free catalog of 10 new books for the TRS-80 Color and Pocket computers. The books include dozens of tips, tricks, secrets and shortcuts for programming newcomers as well as hundreds of fresh programs.

Circle 151

Color Text Editor & EDTASM

Cer-Comp, 5566 Ricochet Ave., Las Vegas, NV 89110 (702) 452-0632 has announced two new products for the Color computer. The first is a Text Editor program, selling for $19.95 on tape, which besides normal text editing can be used for writing and editing BASIC programs. About 12K of user memory is available in a 16K system.

The other new product, also written in machine language, is CO-RES9, a co-resident Editor/Assembler. The Editor portion is similar to the Text Editor except it does not support BASIC-format tapes. The assembler outputs object code in CLOADM format or directly to memory for execution. Priced at $39.95 on tape, it is also available with the Text Editor at $49.95 for both products.

Circle 152

New game from Acorn

Acorn Software Products, Inc., 634 N Carolina Ave., SE, Washington, DC 20003 (203) 544-4259 has announced "Tenpins", a machine language bowling game for one to four players. It features realistic action and sounds and has both beginner and advanced levels. Available for Models I and III on cassette for $14.95 and diskette for the Model I (Model III diskette available soon) for $20.95.

Circle 153

FREEDOM 3

Field Engineering Consultants, Ltd., PO Box 2368, Woburn, MA 01888 (617) 944-5329, has announced the FREEDOM 3, a modification which adds CP/M capability to the Model III TRS-80. The FREEDOM 3 is available in three versions from $199 to $490 and includes T80S, an operating system for CP/M.

Circle 154

Color computer products

The Micro Works, PO Box 1110, Del Mar, CA 92014, (714) 942-2400 has announced three new products for the Color computer.

SDS80C is a complete 6809 editor, assembler and monitor package in one color pack program. Price is $89.95.

80C Disassembler is a cassette for a 16K Color computer system. It enables generation of your own source listing of the ROM and documentation includes useful entry points, a complete memory map, I/O details and more. Price is $49.95.

CBUG Monitor includes such features as examine or change memory, save memory to tape, download/upload data or programs to a host system, move the video display page, send or receive through the RS-232 port, use the color computer as an intelligent peripheral, and more. Priced at $29.95 for tape or $39.95 on EPROM which can be plugged into the extended BASIC ROM socket or a modified ROMPACK.

Circle 155

Software Arts Tech Notes

Software Arts, Inc., the creators of VisiCalc, have announced SATN (Software Arts Technical Notes), a publication offering on-going support to VisiCalc. Contact Software Arts, Inc., SATN Subscriptions, PO Box 815, Quincy, MA 02169 (800-257-7850 Operator 737 or 800-322-8650 in New Jersey). Price is $30 for six issues.

Circle 156

SHUFFLEBOARD III

Parasitic Engineering, Inc., 1101 Ninth Ave., Oakland, CA 94606 (415) 839-2636, has announced SHUFFLE-BOARD III, a 64K CP/M 2.2 system for the TRS-80 Model III. It plugs into two sockets inside the computer with no traces to cut, no soldering and no permanent changes to the Model III. It is priced at $495 and includes CP/M 2.2 and manuals, installation instructions and a six month warranty.

Circle 157

Z80 CPU Micro Chart

Micro Logic Corp., Dept EU, PO Box 174, Hackensack, NJ 07602 (201) 342-6518, has announced release of a Z80 CPU Micro Chart, a durable credit card plastic 8½ x 11 inch chart. Tables on the chart include the instruction set, disassembly tables, ASCII, Hex to decimal, compare vs. jump, effect on flags, interrupt structure and more. Price is $5.95 each plus $1 p/h.

Circle 158

CLOAD Color Magazine

CLOAD magazine, a tape-based monthly production for the Model I and III, has announced CHROMASETTE, a similar production for the Color computer. Priced at $25. for six months or $45 for 12 months from Chromasette Magazine, PO Box 1087, Santa Barbara, CA 94102, (805) 963-1066.

Circle 159

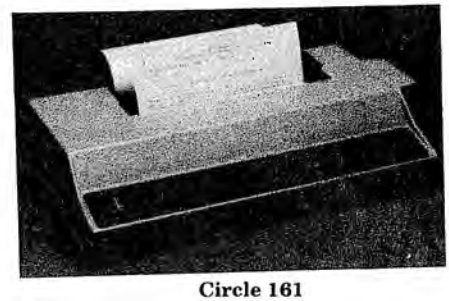
Model III Mail list program

Micro-Architect Inc., 96 Dothan St., Arlington, MA 02174 (617) 643-4713, has announced MAIL-M3, a mailing list system for the Model III. Capacity is about 500 records per diskette.

Circle 160

Low cost impact printer

DIP Inc., 745 Atlantic Ave., Boston, MA 02111 (617) 482-4214 has announced the model DIP-81A, a low cost impact printer priced at $499. It features 7 x 7 or expanded 14 x 7 upper/lower case matrix printing at 100 cps bi-directional, a "finger-clean" ribbon cartridge and single-sheet, roll, or fan-fold capability.



Circle 161

Voyage of the Valkyrie

Advanced Operating Systems, 450 St John Road, Michigan City, IN 46360 (219)879-4693 has announced Leo Christopherson's "Voyage of the Valkyrie". This interactive adventure game involves an exploration of the Island of Fugloy's mountainous terrain with a goal of seeking the proper mountain passes to reach the castles. The castles are protected by birdlike creatures which fly across view screens with the intent of destroying you with laser rays. Available on diskette for $39.95 or cassette for $34.95 for Models I or III. Advanced Operating Systems is the micro-computer software division of Howard W Sams & Co., Inc.

Circle 162

New general business software

Cybernetics, Inc., 8041 Newman Ave., Suite 208, Huntington Beach, CA 92647 (714) 848-1922, has announced a major set of general business applications software written in RM/COBOL (Ryan-McFarland) and available on CP/M for the Model II. For general information use the reader service number, but for detailed product descriptions call or write.

Circle 163

New Krell Software

Krell Software Corp., 21 Millbrook Drive, Stony Brook, NY 11790 (516) 751-5139, has announced four new releases. They are Competency Examination Preparation Series, College Board 81/82 Preparation Series, Isaac Newton: An Introduction to Scientific Logic and Odyssey in Time: A Complex Adventure in History.

Circle 164

Bookkeeper II

Data Train, Inc., 840 NW 6th St., Suite 3, Grants Pass, OR 97526 (503) 476-1467 has announced Bookkeeper II for CP/M, an integrated accounting system written in Microsoft BASIC. The modules include General Ledger, A/R, A/P, Fixed Asset and Payroll and may be purchased at $600 per module or as a complete package at $1500.

Circle 165

Exatron CCI/CCDOS

Exatron Corp., 181 Commercial Street, Sunnyvale, CA 94086 is now shipping the Exatron CCI/CCDOS, an interface with 16K additional memory (for a total of 32K) and disk operating system for the Color computer. The complete system includes everything but the disk drive and the cable. The Exatron CCI is packaged in an attractive case with a short cable which plugs into the ROM cartridge slot of the Color computer. It requires 16K Extended Color BASIC to be fully operational. If the Color computer contains an additional 16K of memory, the extra RAM will be ignored. Standard 35 or 40 track Radio Shack type 5¼ inch disk drives and cables are used with the Exatron CCI. It is priced at $347 plus $5.50 s/h.

Circle 166

Prosoft's RPM

Prosoft, Box 839, North Hollywood, CA (213) 764-3131 has announced RPM, a program to measure rotational speed and variation of disk drives on the Model I and III. The documentation includes an explanation of how to adjust the speeds of the most popular mini-floppy disk drives. RPM is on diskette at $24.95.

Circle 167

Radio Shack Compiler BASIC

Radio Shack has announced Compiler BASIC for the TRS-80 Models I and III. The RSBASIC (26-2204) development system includes full documentation and software to prepare, edit, compile and execute RSBASIC programs. It requires 48K and two disks and is priced at $149. RSBASIC is similar to the Model II version and is not compatible with the Interpreter BASIC. It is file compatible with the new RSCOBOL for the Model I and III and includes sequential, random and single-key ISAM file accessing capabilities. Available through normal Radio Shack outlets.

Circle 168

Joystick interface

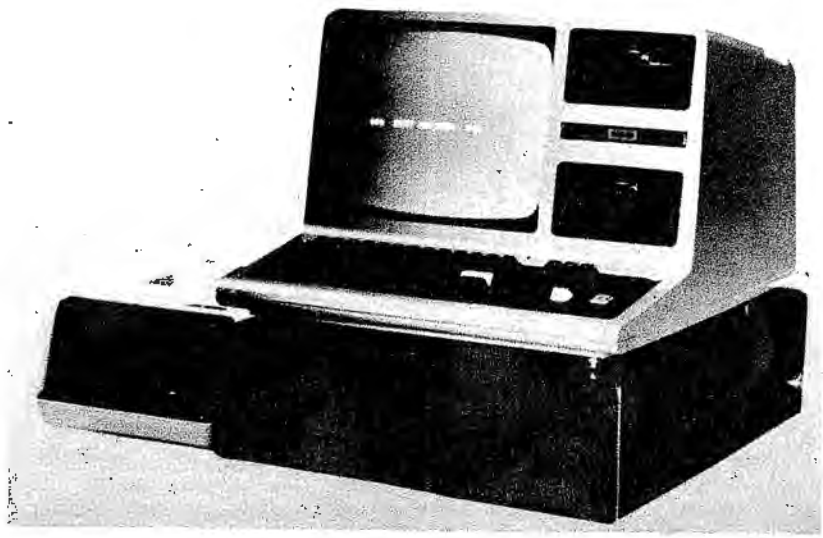
Mega Systems Inc., 262 Park Lane, King of Prussia, PA 19406 has announced Joy-6, a complete joystick interface for the Model I or III, featuring potentiometer type joysticks with pushbuttons, sound effects capability, and simple control software. It can also be used as a general purpose 6-channel analog to digital converter with temperature sensors or other transducers, and can drive an external relay for control applications. The price is $124.95 assembled and tested, or $99.95 for the complete kit.

Circle 169

Model III/Cash Register

Integrated Cash Register, Southern Region, 2301 Park Ave., Suite 203, PO Box 1446, Orange Park, FL 32073 (904) 269-1918, and FutureSoft, have announced the CR-180, a Cash Register/POS (Point of Sale) Expansion System for the Model III. The system includes an Electronic Cash Drawer and Receipt Printer which plug directly into the TRS-80 Model III. (The software will support Radio Shack and other printers). Audio has been added for keystroke confirmation. The CR-180 Software provides the operator with continuous instructions at the point of sale and allows management to rapidly change promotional messages printed on the customer receipts. The CR-180 stores transactions for up to 100 employees (clerks), saves 8 methods of payment and provides inventory control and complete reporting. The reports include daily sales and cash by employee and transaction type, inventory usage, and gross profit computation. Price and shelf labels are also printed. Software for the Cash Register Expansion system was developed by FutureSoft and is available in foreign language versions. Prices range from $900 to $1900.

Circle 170



Pete Carr interviews Micro Systems Software for 80-U.S.

Interview

Micro Systems Software is a fairly new software house in Hollywood, Florida, with a nucleus of three people. Larry Studdard is the president and business manager. Steve is 21 years old and the actual author of DOSPLUS. Mark is 20 years old and does programming as well as a variety of other tasks. We talked about DOSPLUS for the Model I and III, which is what their business is built on. While there, I also had the opportunity to see what they are working on now.

Pete - How and why did the three of you get together and form Micro Systems?

Larry - I bought a TRS-80 and became addicted to it. I have a successful aluminum business; but my love of computers grew to the point of wanting to do business with computers and software. My next step was to find people who were interested in working with me. The local Radio Shack people kept telling me "you've got to meet Steve". Steve was getting into being a building architect before I met him.

Steve - I had started some time before I met Larry. My interest in computers started just as I was getting out of school. I was doing research on the computer and making trips to the local college where they have a big library. After going through many books I got as much information as I could gather and started writing programs in machine language.

Larry - Needless to say my main function was to be business manager and the financier of the project.

Pete - Was your first plan to write an operating system?

Larry - No, it didn't start that way. The first thing we did was to write a business software package to support my aluminum company. About a week after Steve and I got together we met Mark, who helped us put the business package together. In order for us to write the business system Steve had to make patches to the operating system so it would do what we wanted.

Steve - From there I decided to completely rewrite a DOS which was the first version of DOSPLUS. That first version was never released.

Pete - Since DOSPLUS came from your experience of what you needed in a business system, what was the criteria you followed in its development?

Mark - What we think is important is keeping it easy to use with operator convenience, so that non-programmers along with programmers can use the system. We wanted a DOS that had all that without sacrificing power, flexibility and speed. If a system is not dependable, destroys your files, you don't have anything either. So dependability is a must.

Steve - Speed is very important too. We keep DOSPLUS operating fast, even if it means leaving out a command here and there. But I think it is possible to have a system that is packed with features and still keep its speed if it is designed right.

Larry - Speed gives the micro the ability to compete with the mini. If we don't keep the DOS fast then the mini will continue to be more popular in the business market. The business market is what we are after.

Steve - Everything is thoroughly tested. We don't let it out of here until we are sure it is ready. Our other main consideration is compatibility. This is not a big problem with our DOS, but like all other operating systems, there are certain machine language programs that need to be modified to run correctly. BASIC programs are not a problem. We want programs written under other systems to work with ours.

Pete - Micro Systems Software was the first company specializing in operating systems to offer a double density DOS that didn't have to be patched for double density. Yours was also the first to read single or double density diskettes. How did you get into double density?

Larry - Steve and I went to a show in Washington, D. C. and saw the Doubler. We had already heard a rumor about the double density Model III. We wanted to get a jump on everyone for the Model III system. Not so much for the Doubler because we didn't know if it would fly or not. But Steve wrote our Model I double density DOSPLUS. When the Model III was finally released we were ready because we understood double density.

Pete - Given that the Model III is designed quite differently from the Model I, and since you had to dig into it for DOSPLUS, could you tell us what you found out about the Model III?

Steve - We think the Model III is a very nice computer but that anyone who writes disk I/O for it will find that it is not really quite as fast as it should be. Even the Model I has this problem, but being memory-mapped makes it a little different. I did find a way to do it, but you just don't have much leeway on these machines when you get into double density. It's very critical. That is really the only problem we had. The ROM is almost identical to the Model I ROM except for the added code. We were able to make Model III DOSPLUS very compatible with the programs out there. You can run many programs, such as Microsoft's Model I BASIC Compiler just by changing the high memory location

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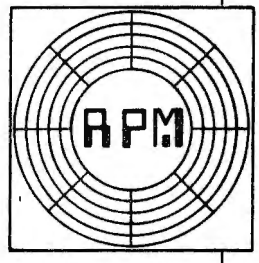

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Circle 10

to be compatible with DOSPLUS. We found that 90% of the time this high memory change is all that is needed if a machine language program doesn't work properly. You can also exchange disks between the Model I and III with our DOS.

Mark - We really like the Model III much more than the Model I. It is a much more reliable machine. The Model III with DOSPLUS can sit up there and run those 80 track drives all day long without error. Steve developed our Model III I/O package on a napkin in Taco Viva. That's true! And he developed our original double density Model I I/O package in Pizza Hut on a napkin.

Steve - A lot of work is done like that. I'll be somewhere off in never-never land and get the ideas. These things bother me and I like to work them out.

Pete - User support after the sale is very important to the customer. What is your policy on this, such as updates and the like?

Mark - If there is a bug found by a registered owner of DOSPLUS, and by a bug I mean if we say that if you type this command in it will do this, and it doesn't, that's a bug. If someone comes up with an actual flaw in the system such as it eats your files, the first thing we do is give the user a hundred dollar reward. Second, the DOS gets fixed immediately and everyone gets a letter informing them of the bug. After reading the letter you can send in your diskette and get a new one free. There is no charge for this. Some people are offended by the reward and our claims of a bug-free system, but that's OK. We want to build confidence in our product and we do stand behind our claims. We were tired of bugs, and that is one of the reasons for DOSPLUS.

Steve - We like to stay away from the zapping and patching technique. Things like that can get very confusing. Nine times out of ten, the system will need to be reassembled to really get it right. I do see the need for a utility like this on occasion. In our next version we will probably have some sort of patch utility similar to TRSDOS so the user can fix programs that don't run correctly with DOSPLUS. There are only a few that will need this; but we do intend to support some easy way of doing it when it's needed. We don't really intend it to be used for patching the system itself.

Mark - Also I would like to point out that if a user has a program that he cannot get to run under DOSPLUS and he can't get help from the people he purchased it from, and we aren't able to help over the telephone, he can send that program to use and we will fix it to work if at all possible. We are not going to steal the program, we understand copyright law, we'll just try to help the user get it to work in his system. Also, that patch will then be made available to other users.

Pete - What about providing information such as addresses and calls for your users?

Larry - Yes, we will give any address or call that a user needs to help him program with DOSPLUS. We will not attempt to explain what the differences are between DOSPLUS and some other system, but if you need DOSPLUS information of this sort, we do make it available.

Steve - There have been a few problems because we don't have a technical manual, but all the addresses that are important to using DOSPLUS will be in our expanded manual with DOSPLUS 3.4. We do listen to suggestions of our users. The new manual should be useful in many ways. It will be hardcovered, full of examples, so the user can take advantage of DOSPLUS to the fullest. And when I say examples, I mean the type that you will find useful in real use, not just to watch the command work for its own sake. It will be full of programming techniques and hints that will be of real help to the users in programming with DOSPLUS. There will be a small charge for updates to 3.4 and the new manual, but we won't be making any money on these updates, just enough to cover the cost of doing it.

Mark - We believe that if you have already bought our product that we shouldn't try to make money on you twice, but we can't afford to lose money either. You will need to have the new manual with 3.4 because we have greatly expanded the system with a lot of changes and enhancements. The degree of flexibility that will be allowed with 3.4 will be tremendous. Users have requested more flexibility such as routing to disk files, linking devices and the like, but, we have decided to take it even further. You will be able to call a friend on the telephone and if you both have modems, send him a program straight to a file on his disk, printer, etc. And you won't have to go out and buy a separate terminal program to do it. We have received a lot of good reaction to our BASIC, such as our Search and Replace feature, but even they will be expanded in this next version. Build and Do are much more flexible also.

Pete - Will you be supporting other hardware, such as hard disk or even the new computers from Japan?

Steve - We do plan to get into hard drives, eight-inch operation, etc. We are not going to stop here. If at all possible, and we think there is anything in it, we will put systems on these new upcoming machines. Also, if the hardware allows it and if possible I will also make them diskette compatible.

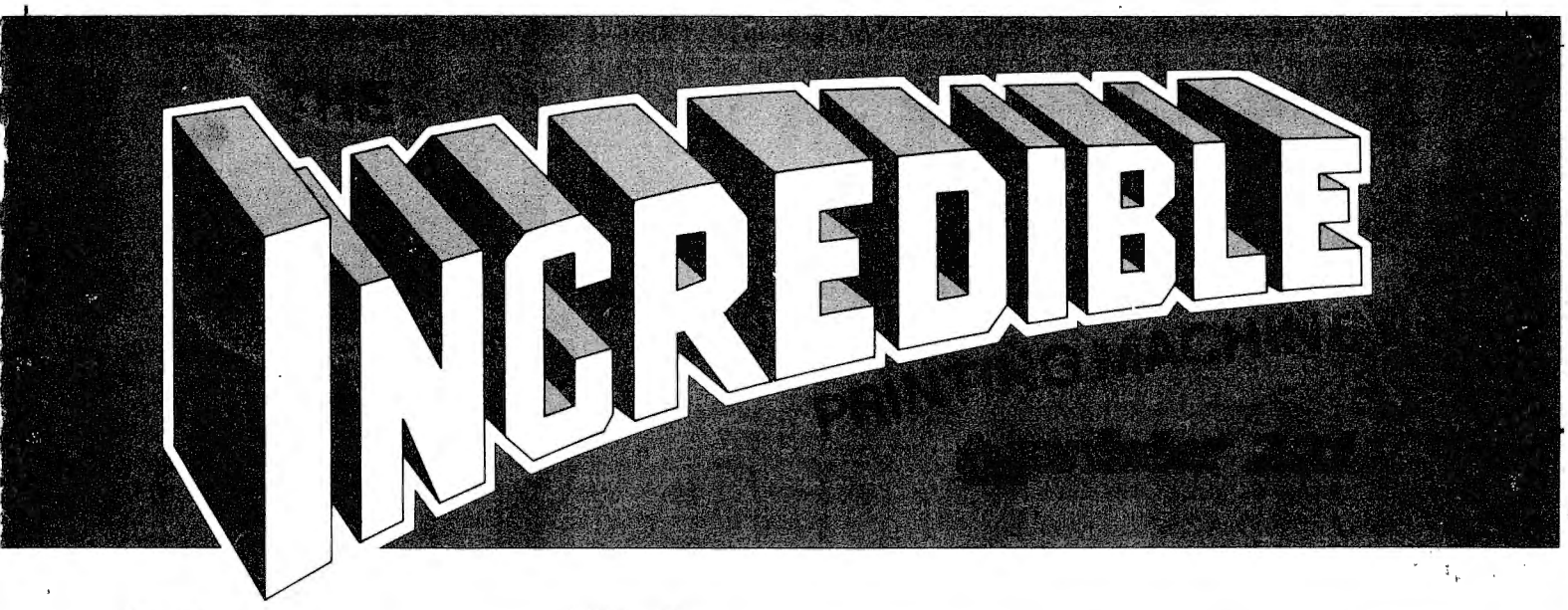
Larry - I've called Osborne. I've called PMC. I think Osborne is committed to CP/M, so I don't think we will be getting into that. I have not heard back from them, but we are interested in doing as much as we can with as many machines as we can. One of our sayings around here is that we would like to be the CP/M of the next generation and with micros being the next generation we think we have a good shot at it.

Pete - Do you think micros are really good enough to take the place of the minis?

Larry - Easily. Micros are where it's at as far as small business goes. Once you put the hard drives and the networking devices that are coming out, along with sophisticated software, you'll be able to have terminals all over the place.

Mark - There are hard drives coming out for the Model III very soon and there will be DOSPLUS available for these hard drives. The transfer rate for hard drives is so high that you can fill 48K in the machine in roughly a second or two, allowing for overhead. That means that you can very quickly change every byte of RAM in your computer if you have a hard drive. I'm not talking a long time into the future. I'm talking about the end of 1981.

Steve - I would like to say that we are not claiming to be the only experts. There are other people and we realize this. We are just trying to solve all these problems that people have had so long with operating systems and build confidence in our product. We are having a lot of fun doing it and as long as we continue to enjoy it, we will keep working. ■



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Circle 11

*Optional at extra cost.

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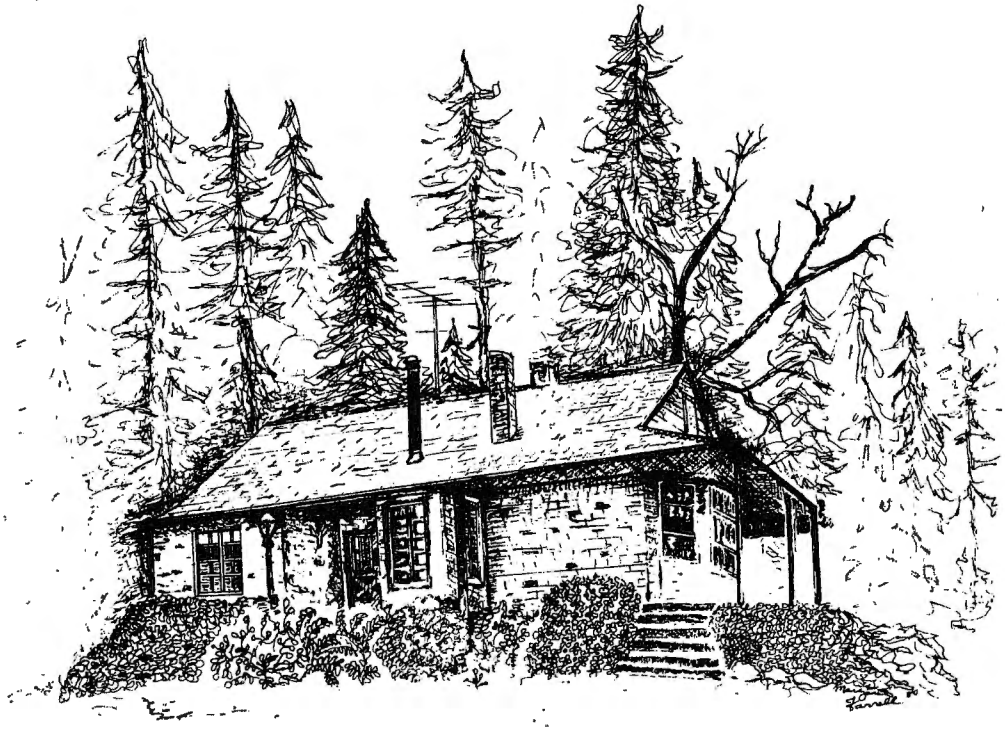


Back in 1979 Mr. Walt Bolden of Federal Way, Washington, decided to build himself a computerized home.

It may sound easy, but where do you start? Today's architects and builders know little or nothing about designing and equipping a home controlled by a computer. It is commonplace these days to find all the building materials needed in new home construction. Electrical wiring, plumbing and even the intercom can be ordered as stock items. But how about wiring a new home for computer control?

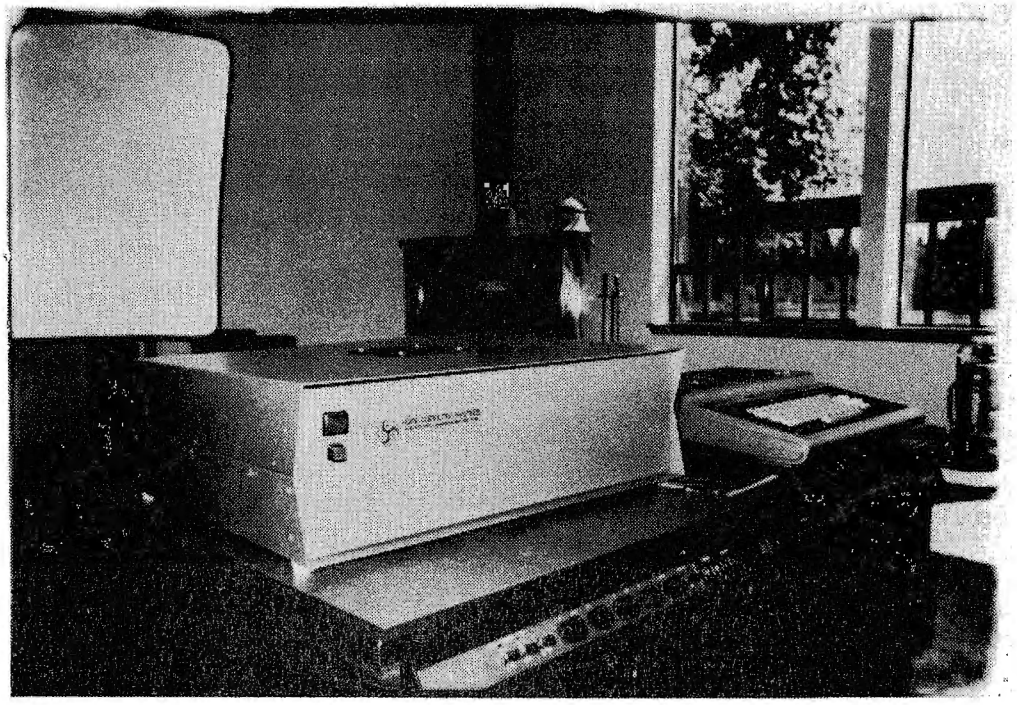
Walt had to play it by ear, and put the whole project together almost by himself. Some of the things he wanted were automatic wake up alarm with a human-sounding voice, lights that came on and turned off again as he walked through a room, and a water overflow alarm system. He also wanted full security against unauthorized entry and an automatic water sprinkling system.

Walt also wanted to install the very latest in solar heating, and this too, was to be computer controlled.

His original system, based around a Model I TRS-80 microcomputer, didn't get too far. After some preliminary work with hand-wired interface boards, it was given up. The Tandy Corporation decision to discontinue this computer model also played a part in the abandonment of the Model I.

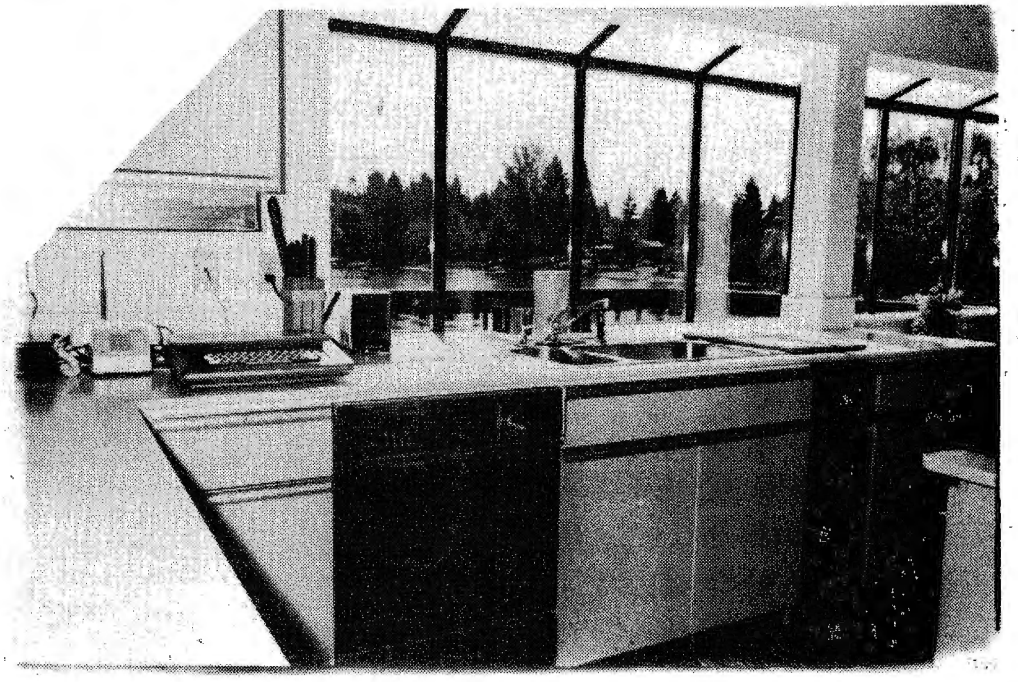
About the time the Model I was being announced as discontinued, the Color computer and several new remote control devices were announced by Tandy.

The Color computer, based upon the 6809 central processing unit from Motorola, was originally designed as a control processor. This made it ideally suitable for the purpose Walt had in mind, and was chosen to do the job.



The control console, with the controller, and color computer. Note the large projection screen at the upper left of the photo.

Structural designer John Parrott of Poulsbo, Washington, designed Bolden's house to work with solar heating and energy efficiency. *Photos above and below were taken at the home of Mr. Walt Bolden.*



The kitchen view, showing the color computer as a remote unit.

Computerized homes: A fad?

Is the computerized home just a passing fad - something for the very rich - the perfect gift for people who already have everything?

At first sight, it seems to be just another "electric bananna", but we must keep in mind that the automobile, airplane and electricity were once considered frivolous fads too.

In fact, electricity is now so ingrained in our society that even the computerized home would be impossible without it. Lately it appears that we are even becoming overdependent upon it.

The heating costs mentioned in the accompanying article would seem to indicate the direction we must go to efficiently utilize our dwindling resources. Solar energy has just began to make inroads to more efficient heating and cooling, and the need for accurate control of such devices is apparent.

It could very well be that in a very few years computer control will be a fact of life. Like the automobile, it may change status from being a gadget to an absolute necessity. The computer, as compared to the automobile though, has several side-benefits. Aside from home control, primarily in climate control, there are entertainment, education and security.

In the same way that electricity opened many new and better ways of living, so might the computer. It is limited only by the ingenuity of man. When new and better ways to use it are needed, they will be implemented.

Eds.

As the construction of the house went on, Walt had various specialists assist him in getting the system integrated into the plans of the builders. Before the dry walls went up, the space between studs looked like the house was going to have a very sophisticated stereo-sound system. Wires went everywhere. Sensing devices were scattered throughout the inside and outside of the house.

A controller had to be designed to interface the computer and the various sensing devices. When finished, it included a number of elements including a power supply with backup, and a multiplexing analog to digital converter for the sensors. It also required a digital to analog controller which was radio-frequency based and compatible with the Radio Shack modules (sensors). When it was finally done, it contained a clock/calendar and a voice synthesizer too. The entire programming for this unit was burned into a read only memory (ROM). The ROM was considered necessary for reliability.

The finished installation includes all the remote input units, sensors, and one large central control station. The central control is built around the 32K Color computer. The regular keyboard has been replaced with a larger detached one. A regular video can be used, but Walt has a large, seven-foot projection screen (see accompanying photo). Central control also has a cassette, MODEM, and floppy disks.

Central control is used for master input to the controller. In its spare time, it can also be used for home management, inventory, mailing lists and word processing. It also operates with VideoTex for entertainment and education.

The software used in this system is a combination of commercially available software with custom modifications, and a strictly "do it yourself" effort.

Options in the system provide for replacement of the Color computer with a Model II with printer and a hard disk. This will permit complete home office environment as well as home control.

Walt's home has attracted some rather widespread interest. There have been inquiries from dozens of individuals, and from several contractors. It began to look like the "Home of the Future" may be here now. One contractor is investigating the installation of computer control in a three-hundred unit complex.

Last year, some of those people who worked with Walt in various capacities decided to form a company that could provide the needs of future construction with computer control. The firm is based in Seattle, Washington, and is called "Home Computer Systems, Incorporated". The company will install program and maintain computerized homes. There are four individuals involved in the corporation: Glen Sayes is in charge of marketing, Terry Dettmann does the system's programming,

and they also use the services of an expert in 6809 technology and another who has a background in construction and business management.

Prior to forming the actual corporation, a complete search in 6 national data banks was performed. As far as can be determined, this group represents the first in the country who do computer subcontracting.

But what does it do?

Walt's monthly heating and cooling costs are computed to be about sixteen dollars per month. He uses a combination of electrical, solar and wood heat.

Solar heat is complex, because there are many valves to control water flow. The computer regulates the circulation of water from reserve tanks and collectors on the roof. When necessary, it will display a message saying that a fire in the wood-burning stove is necessary. When all else fails to hold the temperature to predetermined levels, the electric heat backup is brought into play.

Another function of the computer is home security. The first level is that of exterior intrusion, the break-in through a window or door. Other levels of protection include motion and infrared or proximity detection.

Walt's system also checks for water over-flow. Placed in the kitchen, bathroom or utility room, these floor based sensors can detect the presence of water and shut off the supply.

By using combinations of various sensing devices, it is possible to enter the home late at night and have the system light a path for you from the front door to the bedroom.

Humidity and moisture sensors in the lawn will detect water content in the soil or air and control the garden sprinkling system.

In the morning, the stereo switches on and a custom selected voice from the synthesizer comes on and says, "Wake up, it's time to wake up". The remote input unit next to the bed lights up and displays the time and temperature. A wake up menu is displayed which gives the options for a 5 minute snooze, a 10 minute snooze, music up or off, and coffee on. If the 5 minute snooze is selected, the stereo shuts off, the coffee maker in the kitchen comes on and in 5 minutes, the wake up cycle is repeated.

There is hardly a house built today that does not have electrical wiring installed. Although wiring in a home was at one time quite out of the ordinary, it is today considered commonplace and standard. Perhaps computers in the home will be too. ■

Home Computer Systems, Incorporated, can be contacted at 911 N. E. 148th, Seattle, Washington, 98155 (206) 771-1422

Practical applications for the homemaker...

I refuse to be a computer widow!

For Models I, II and III

Denise Berg,
Kirkland,
Washington

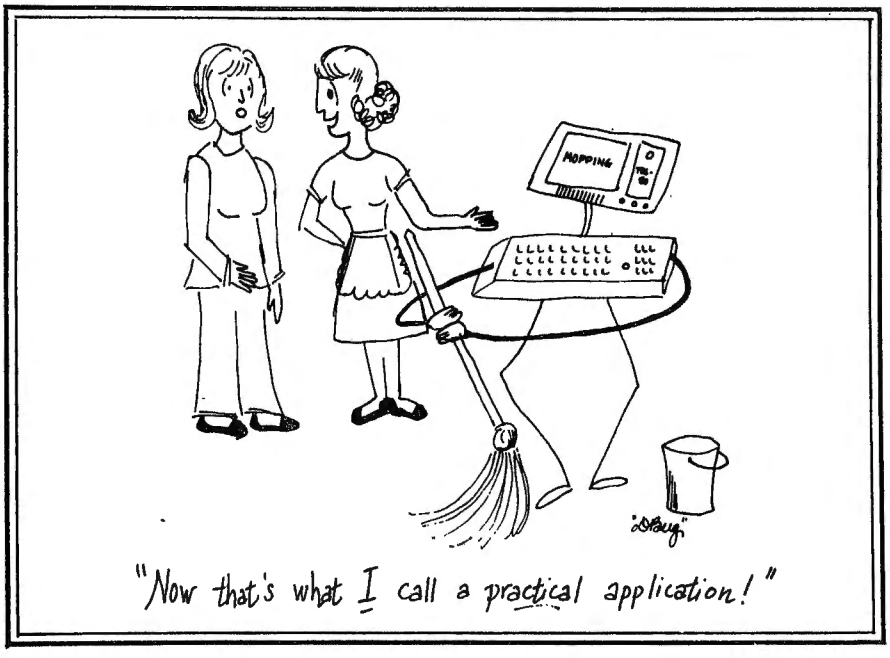
"Don't cry," my husband soothed. "It's going to be all right. You'll love it - I know you will!"

My husband had just informed me that we were going to purchase a microcomputer - a nice little TRS-80 Model I. The shock of that announcement shook me to the core as visions of myself becoming a computer widow flooded my mind. There I was - raising our two little daughters single-handedly. I could just picture them at first asking, "where's Daddy?" and later, "who's that man that sits behind that funny TV thingie all the time?" I wondered if I'd remember what his face looked like. And then I imagined the bills. Oh, the *bills!* That's when I really began to cry.

"But honey," he continued, "think of the practical applications!"

"Practical applications? Like what?" I sobbed.

"Well like, uh...uh...it could help you memorize your grocery list, and uh...give you the total square inches of any sized pizza, or uh...calculate the average weight of all the elephants at the zoo."



"Really?" I began to perk up. "What else?"

"The games! Oh, I know you'll love the games!"

I noticed a dreamy, far-away look in his eyes and decided that my tears were of no avail. And maybe - just maybe - there would be some practical applications for a homemaker.

My husband tried to soften the blow whenever he could. The day he ordered the computer, he brought me a long-stemmed green carnation. And when he brought the marvelous machine home, unpacked it, and powered it up, the first thing he programmed was:

```
10 PRINT"I LOVE YOU, DENISE"
20 GOTO 10
```

"Hey honey", he called. "Look at this."

My heart skipped a beat as I watched the video fill with sweet nothings in an infinite loop. My heart was won.

From then on I became more and more addicted. When my husband decided to purchase disk drives, I didn't cry a bit. In fact, I scoured the magazines to find the best buy. By the time he wanted to get a printer, I was scouring them again to find a printer with the features I wanted.

A couple of years passed, and in

the meantime I had learned how to shoot down pirate ships, become a millionaire in the China sea trade, steal treasures from sleeping dragons, and win a gold medal in the Olympic Decathalon. (I wanted to know all about *Interlude*, but was afraid to ask.) All this was great fun, but where were the practical applications my husband had promised?

I decided that I needed to discover them for myself. But doing things by trial and error frustrated me, and *80-U.S.* didn't have anything for housewives. So I took a beginning programming class at a local community college. Finally things began to fall into place for me. Words that I had read in game programs, magazines, and programs my husband had written, began to have meaning. A whole new realm opened up to me, and I felt like I could conquer the world (or at least my house).

My first project was a children's chore chart lister (program included with this article). This program is fun for the computer orphans as well as their mothers. They love to type in their names, and watch their charts emerge from the printer. The charts also motivate the children to do their chores. Then when children do more housework, their mothers have more time to play with the computer.

Since writing letters is a task I dislike, I now write one letter, then simply change the name each time I print it out. That's great fun - especially when writing to congressmen.

I have no need to memorize grocery lists, but I do like to memorize scripture, so I wrote a program to help me. Later I plan to adapt it to help my children with their homework.

The possibilities are endless, and I have plans for several projects. Like a recipe file that prints a grocery list based on my menu. And a grocery list maker that prints items in the order I come to them in the store. Or a program that answers the question: "How soon till Christmas?" in a meaningful way to preschoolers.

I have plans for a program that does my nagging for me. Just imagine my husband sitting down to the computer and reading: "Have you noticed how long the grass has grown? Don't you think you should cut it?"

And how about a finance program that not only records the check register and balances the checkbook, but also tells me (in a gentle way) that I have exceeded the budget. (I would probably have a not-so-gentle message for my husband when he exceeded his software allowance, however.)

Perhaps I could team-up with my husband to write an adventure game with some romance. Or a soap-opera spoof, "Guiding Byte".

I hope to take more classes. There is so much that can be done - and so much to learn!

The first time I ran the chore chart program for my youngest daughter, she seemed quite disappointed. "You mean *I* have to do all those jobs?" she wailed. "I thought you could push a button and make the computer do the work."

"It doesn't do the chores yet," I admitted, "but never fear, sweetheart, Mommy's working on it!"

Program notes

This program requires a printer. It was written for a TRS-80 line printer IV with 132 columns. You may need to modify certain lines to run it on your printer.

The chores listed can be changed to fit your family. Just be sure that the chores in the video section correspond with the ones in the hardcopy section.

A chore list could be used for adults as well as children. Just substitute appropriate tasks.

Program numbers are multiples of 10, so AUTO may be used when typing the program. Remark statements that do not need to be typed in are on odd-ending lines. ■

Program listing

```
10 REM * * * * * * * * * * * * * * * * *
20 REM *    CHILDREN'S CHORE CHART    *
30 REM *         BY DENISE BERG       *
40 REM * * * * * * * * * * * * * * * * *
50 CLEAR1000:CLS
60 PRINT"CHILDREN'S CHORE CHART"
70 PRINT
80 PRINT
85 REM * * * YOU MAY NEED TO MODIFY THE
   NEXT FEW LINES TO FIT YOUR PRINTER *
   * *
90 PRINT"WHAT TYPE OF PRINT DO YOU WANT
  ?"
100 INPUT"1=STANDARD  2=PROPORTIONAL
  3=CONDENSED";X
110 IF X=1 THEN LPRINTCHR$(27);CHR$(19)

120 IF X=2 THEN LPRINTCHR$(27);CHR$(17)

130 IF X=3 THEN LPRINTCHR$(27);CHR$(20)

140 PRINT
150 INPUT"WHAT IS YOUR NAME";N$
160 INPUT"DO YOU WANT (1) A DAY'S LIST
  (2) A WEEK'S LIST";L
170 IF L=2THENINPUT"WHAT WEEK SHOULD TH
  ESE CHORES BE DONE";W$:PRINTN$"'S CHO
  RE CHART FOR ";W$
175 REM * * * YOU MAY NEED TO MODIFY TH
  E NEXT THREE LINES TO FIT YOUR PRINTE
  R * * *
180 IF L=2 AND X<3THEN LPRINTCHR$(27);C
  HR$(14);TAB(10)N$"'S CHORE CHART"
190 IF L=2 AND X<3THEN LPRINTCHR$(27);C
  HR$(14);TAB(5)"FOR THE WEEK OF ";W$
200 IF L=2 AND X=3THENLPRINTCHR$(27);CH
  R$(14);TAB(5)N$"'S CHORE CHART FOR TH
  E WEEK OF ";W$
```

```
210 IFL=2THEN GOTO260
220 INPUT"WHAT DAY DO THESE CHORES NEED
   TO BE DONE";D$
230 CLS
240 PRINTN$"'S CHORE LIST FOR ";D$
250 LPRINTCHR$(27);CHR$(14);TAB(5)N$"'S
   CHORE LIST FOR ";D$
260 LPRINTCHR$(138)
265 REM * * * YOU MAY NEED TO MODIFY TH
  E NEXT TWO LINES TO FIT YOUR PRINTER
  * * *
270 IFL=2ANDX>1THENLPRINTTAB(60)"MON
      TUE        WED        THURS
    FRI        SAT"
280 IF L=2 AND X=1THENLPRINTTAB(25)"MON
      TUE     WED     THURS     FRI
    SAT"
290 LPRINTCHR$(138)
295 REM * * * THE NEXT FEW LINES SHOW T
  HE COMPLETE LIST ON THE VIDEO * * *
300 PRINT"COMPLETE CHORE LIST"
310 PRINT
320 PRINT"111.  DAILY CHORES:","222.  W
  EEKLY CHORES:"
330 PRINT
340 PRINT"1. FEED CAT","7. WASH DISHES"
  ,"13. EMPTY WASTEBASKETS"
350 PRINT"2. MAKE BED","8. SET TABLE","
  14. PUT AWAY LAUNDRY"
360 PRINT"3. BEDROOM","9. CLEAR TABLE",
  "15. PRACTICE PIANO"
370 PRINT"4. FAMILY ROOM","10. READ ALO
  UD","16. WEED GARDEN"
380 PRINT"5. LIVING ROOM","11. VACUUM",
  "17. CHANGE SHEETS"
390 PRINT"6. BATHROOM","12. DUST","18.
  (WRITE YOUR OWN)"
400 PRINT
410 PRINT"333. DISPLAY LIST AGAIN"
420 PRINT
430 INPUT"WHICH ONE OF THESE CHORES NEE
  D TO BE DONE  (SELECT ONE NUMBER.  IF
   NONE, ENTER '0')";C
435 REM * * * THE NEXT FEW LINES MAKE A
   HARDCOPY OF THE CHART OR LIST * * *
440 IF C=111THEN LPRINTTAB(10)"MY DAILY
   CHORES ARE:":GOTO610
450 IF C=222THEN LPRINTTAB(10)"MY WEEKL
  Y CHORES ARE:":GOTO610
460 IF C=333THEN GOTO300
470 IF C=18THENINPUTX$:LPRINTTAB(15)X$:
  GOTO580
480 IFC=0THEN640
490 FOR I=1 TO C
500 READ C$
510 NEXT I
520 IF X=1THENLPRINTTAB(5);C$
530 IFX>1THENLPRINTTAB(15);C$
540 RESTORE
550 DATA  FEED THE CAT, MAKE MY BED, TI
  DY MY BEDROOM, TIDY THE FAMILY ROOM,
  TIDY THE LIVING ROOM, TIDY THE BATHRO
  OM
560 DATA WASH THE DISHES,SET THE TABLE,
  CLEAR THE TABLE,READ ALOUD TO MOM OR
  DAD,VACUUM THE CARPET,DUST THE FURNIT
  URE
570 DATA EMPTY THE WASTEBASKETS,PUT AWA
  Y MY LAUNDRY,PRACTICE THE PIANO,WEED
  THE GARDEN,CHANGE THE SHEETS ON MY BE
  D
575 REM * * * YOU MAY NEED TO MODIFY TH
  E NEXT THREE LINES TO FIT YOUR PRINTE
  R * * *
580 IF L=2 AND X=3THEN LPRINTSTRING$(13
  2,"-")
590 IF L=2 AND X=2THEN LPRINTSTRING$(99
  ,"-")
600 IF L=2 AND X=1THEN LPRINTSTRING$(80
  ,"-")
610 INPUT"WHAT ELSE";C
620 LPRINTCHR$(138)
630 GOTO440
635 REM * * * NOW FOR THE POSITIVE REIN
  FORCEMENT! * * *
640 PRINT"WHAT FUN THING WOULD YOU LIKE
   TO DO"
650 INPUT"AFTER YOUR CHORES ARE DONE";X
  $
660 PRINT"AFTER MY WORK IS DONE, I GET
  TO ";X$;"!"
670 LPRINTTAB(10)"AFTER MY WORK IS DONE
  , I GET TO ";X$"!"
680 LPRINTCHR$(138)
690 LPRINTTAB(10)"I'M GOING TO DO MY CH
  ORES CHEERFULLY!"
700 FOR I=1TO5
710 LPRINTCHR$(138)
720 NEXT I
730 LPRINTSTRING$(80,"-")
740 INPUT"DO YOU WISH TO PRINT ANOTHER
  LIST (Y OR N)";B$
750 IF B$="Y"THEN10
760 CLS
770 PRINT"BYE FOR NOW!"
780 PRINT"REMEMBER TO DO YOUR CHORES CH
  EERFULLY!"
9999 END
```

Spelling Errors? Does your **TRS-80*** wordprocessor need help?

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A spelling checker may not be enough! This paragraph contains a number of common errors (indicated by underlining) that will be discovered by Grammatik that would seldom ever be caught by a spelling checker. FOr example, Grammatik checks for improper word usage as identified by a number of writing style manuals (such as "seldom ever). Grammatik will check for the presence of certain words such as jargon or sexist terms. it also checks for consistant punctuation, capitalizAtion, balanced quotation marks and parentheses, and and repeated words. In addition, it will produce a list of all unique words found in your document with the number of times each was used. Grammatik comes with a dictionary of commonly misused phrases and a dictionary of sexist terms. It also includes a complete set of utilities to build,, sort, and merge phrase and jargon dictionaries of your own. Works with Scripsit, Electric Pencil, and other standard TRSDOS text files.

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MODEL II Requires 64K RAM, 1 disk drive, TRSDOS 2.0 (can check 1.2 files using XFERSYS).....	$109.00	N/A	$99.00
MODEL III Requires 32K RAM, 1 disk drive, TRSDOS.....	$64.00	$30.00	$59.00
Manual only, specify model (refundable).....	$3.00	$5.00	$5.00

Aspen Software programs are professional quality software tools developed for the TRS-80 by a Ph.D. in Computer Science. Other tools include:

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— RATFOR, a structured language preprocessor for Fortran developed at Bell Labs. Aspen Software Ratfor provides a number of extensions, including "case" and "string". Includes complete manual with all the information needed to learn and write Ratfor programs. Requires FORTRAN.

— PP-RATFOR, a pretty printer for use with Aspen Software Ratfor. Automatically formats and indents Ratfor source programs.

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MODEL II	$99.00	$49.00	$139.00	$99.00
MODEL III	$59.00	$34.00	$84.00	$75.00
Manual only(refundable)			$12.00	$15.00

MODEL I, III require 48K, 2 drives, TRSDOS
MODEL II requires 64K, 1 drive, TRSDOS 2.0
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From Epyx
It's a monster movie, and you are the monster! This action game is loaded with graphics and sound as you practice your villany. With 6 monsters, 4 cities, and 5 game objectives, you get a choice of more than 100 possible scenarios. A monster's life is not all carnivorous crunching, though: The combined resources of the police, science, and armed forces are bent on your destruction. It's a struggle of might and strategy all the way.

16K tape...$29.95 32K disk...$29.95

Empire of the Over-Mind

By N.M.A. from Avalon Hill
A fantasy adventure where you are summoned by good King Alcazar to defeat the tyrannical Over-Mind and reclaim the kingdoms of the red and blue planets.

Throughout your journey, you are guided by the epic "Rhyme of Over-Mind," with its characterizations and clues. The Over-Mind is part machine, part evil force -- a most devastating opponent, indeed. Good luck!

Tape for 40K Atari,
48K Apple & TRS-80...$30.00

By John Allen from Acorn
More features, thrills, and sound than even John Allen's famous PINBALL. Once you load ASTROBALL into your TRS-80, the arrow keys become flipper buttons, the screen becomes the play board, and you become the "Pinball Wizard!"

A flying saucer, spaceships, meteors, and black holes add to the fun as your ball realistically zings around the board. ASTROBALL will have all your family and friends lining up for the pinball action and challenge. Five skill levels.

16K protected tape...$19.95
32K protected disk...$19.95

GAUNTLET OF DEATH

From Programmer's Guild
You can almost hear the "C-L-A-N-K!" of the doors shutting behind you as you enter the gauntlet. Before you stretch graphically depicted corridors, leading to the rescue of Chief Broton's daughter and safe exit -- or to a hideous death.

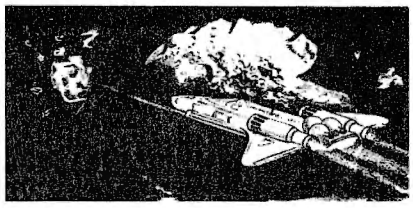
Spiders, poisoned darts, and other surprises haunt the halls, along with magic potions and useful treasures. Skill and strategy will help, but luck and determination are needed to successfully run the gauntlet!

16K tape...$19.95

MIND THRUST

By Sackson & Wazaney from Hayden
Match wits with the computer in this deceptively simple game. Your object is to complete an unbroken chain across a 6 X 8 gameboard grid. On each turn you may either place a new "link" on your chain or remove one from the computer's chain. Sound easy? Just wait until you try it!

16K tape...$16.95



SPACE ROCKS

By Steven Kearns from Acorn
Gigantic antimatter rocks appear on the Tactical Display Screen of your spacecraft. You blast away with lasers and they just explode into smaller chunks for you to destroy. To add to your woes, time bombs appear periodically. If their timers reach zero -- BOOM! And if that's not enough, the aliens will be glad to send out some spaceships loaded with antimatter torpedoes. Fire thrusters to move, shoot laser cannon, jump to hyperspace -- anything to avoid the onslaught. One or two players can compete, with five levels of difficulty.

16K protected tape..$19.95
32K protected disk..$19.95

ROBOT ATTACK

By Hogue & Konyu from Big Five
One of the top names in TRS-80 arcade games adds a new dimension: voice sound effects! You have to be quick to keep your head on straight in this "search and destroy" arcade game. The innovations built into ROBOT ATTACK take your TRS-80 near the limits of its capabilities. You MUST see and hear it!

16K tape...$15.95 32K disk...$19.95

MANAGEMENT DECISIONS

By Robert Montgomery from Hayden
An incredibly detailed and complex simulation of business management. You are given the reins of a large business, controlling every aspect of its operation for 20 quarters (five years) or until you resign.

Many reports, charts, and graphs are available to keep you abreast of happenings both internal and external to your company. Sales, advertising, production, competition, and economic conditions all interrelate as you try to earn profits for yourself -- and your stockholders. This program is so informative that we think it should grant you credits in Business Administration!

16K tape, Model I or III...$49.95
32K disk, Model I only.....$54.95

Honestly...

BASIC COMPILERS

BASIC compilers may interest you because compiled programs may run many times faster than regular BASIC.

The ideal compiler would take any BASIC program and compile it directly to machine language. The difficulty lies in the "trick" features written into many programs, like string packing, sound effects, etc. Other problems include non-standard structures like breaking out of a FOR...NEXT loop or a subroutine. All compilers may require modifications to your BASIC program. We have found ACCEL 2 to require the least. BASIC PROGRAMMING ASSISTANT (model I, $14.95) is useful in finding FOR...NEXT loops and modifying programs; PACKER ($29.95) in some cases will make a program compilable.

	Allen Gelder's ACCEL 2	Simultek's ZBASIC	Microsoft's BASCOM
Minimum Hardware	16K RAM Tape or disk	16K RAM Tape or disk	32K RAM Disk only
Model III compatible	YES	NO	NO
Optimal memory utilization	YES	NO	NO
All BASIC instructions	YES	NO	YES
All variable types & floating point	YES	NO	YES
Support I/O for tape	YES	NO	NO
Unrestricted commercial use	YES	YES	NO

ZBASIC requires too many modifications to your BASIC program in almost every case. Microsoft's BASCOM is the easiest compiler to use if you have disk drives. However, it is more expensive, doesn't support string packing, and requires more memory. We recommend ACCEL 2 because it will work with models I or III, requires a minimum amount of memory, and will work with most BASIC programs.

ZBASIC from Simultek: Tape version.....$79.95
ZBASIC from Simultek: Disk version.....$89.95
BASCOM from Microsoft: Disk only.....$149.95
ACCEL 2 from Allen Gelder: Tape & disk...$88.95
(To save ACCEL-compiled programs to tape you also need TSAVE, $9.95)

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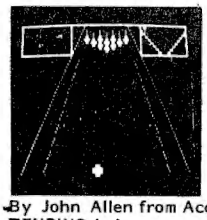
MISSILE ATTACK

By Philip Oliver from Adventure Int.
You must use your twin silos of ABMs to fend off barrage after barrage of enemy missiles that rain down toward your cities. As your skill increases so does the difficulty and speed of this machine language arcade game. Watch the skies and may your aim be true! MISSILE ATTACK has sound and fast-moving graphics galore.

16K tape...$14.95 32K disk...$20.95

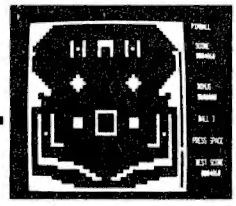


TENPINS

By John Allen from Acorn
TENPINS brings you all the thrills of championship bowling. Up to four players participate, and the program automatically senses the skill of each. Beginners can simply position the ball and "roll" it while more skilled players can vary the force, roll a curve, and cause it to spin as it heads for the pins. All this -- plus 3-D graphics and sound effects -- adds up to a realistic and thoroughly challenging bowling game.

16K protected tape...$14.95
32K protected disk...$20.95

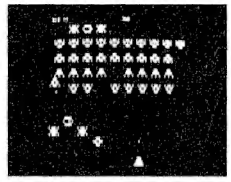
PINBALL



By John Allen from Acorn
Get your flipper fingers ready for action in this real-time, machine language game. Lots of sound and flashing graphics make this fast action game so much like the real thing that you'll have to remind yourself not to shake your TRS-80. Choose from five playing speeds to match your skill. Can you beat your friends' scores? Will you avoid the infamous "Bermuda Square?" Get PINBALL today and find out.

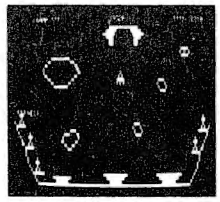
16K protected tape...$14.95
32K protected disk...$20.95

GALAXY INVASION



By Hogue & Konyu from Big-Five
"The rage of the arcades" is now available for TRS-80! Exciting sound effects add to the action as the invaders swoop down to destroy your base. Even while you have your hands full battling the aliens, you have to watch out for the Flagship! Super graphics, super action, super fun!

16K tape...$15.95 32K disk...$19.95



METEOR MISSION 2

By Hogue & Konyu from Big Five
Six astronauts are stranded on a desolate planet. You must undock from your command module and maneuver your rescue shuttle through the asteroid field to save them. You can only save one at a time, and each landing burns away parts of your landing sites. Order this realtime action game now or live with the astronauts' pitiful screams forever.

16K tape...$15.95 32K disk...$19.95

LABYRINTH

From Med Systems
A nightmare of an adventure in graphically depicted three dimensions. Corridors stretch toward infinity right on your TRS-80 screen as you search this maze for treasures. If you get the feeling you're not alone, it's because you're not! You use the arrow keys, plus two-word commands to move, manipulate objects and avoid the many pitfalls (pun intended) that await you in Labyrinth.

16K Tape (May be tranferred to 32K disk)
$14.95

THE PROGRAM STORE
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By W. Godwin & D. Knowlton from Acorn
Not for everyone. One reviewer said "...don't bother with Everest Explorer." Another commented, "It holds your attention for quite a while and I have yet to get bored with it."

Most people here love it. This is a game of logistics in which you try to lead a team up Mount Everest. If your skill, the weather, and luck are right, you'll make it. But remember, you also have to get back down safely.

16K protected tape..$19.95
32K protected disk..$19.95

PACKER

From Cottage Software
Packer's five commands allow tremendous control over the readability and efficiency of your BASIC programs. Specify "PACK" and the program will compress text into multiple statement lines. This really speeds up storage, load, and execution time. It can reduce the memory requirement by as much as 33% while saving disk or tape space, too.

Also included are four handy utilities: "MOVE" lets you relocate program lines, "RENUMB" allows program renumbering, "SHORT" deletes unnecessary words and REMarks, and "UNPACK" separates multi-statement lines to ease editing.

16K, 32K & 48K tape...$29.95

ATERM 1.4

By Tom Stibolt from Acorn
Allows your modem-equipped TRS-80 I/III to be used as a full duplex, ASCII terminal. Fully compatible with both the Radio Shack RS-232-C board and the Lynx Modem. Supports lowercase (if installed) and parallel lineprinters.

With ATERM 1.4, you have access to the entire 128 ASCII codes as well as several local control sequences. And as a true duplex system, you can type at the same time material is being received. Order ATERM and start communicating with the world.

16K tape (disk compatible)...$19.95

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Tandy topics

Ed Juge, Director Computer Merchandising, Tandy Corp.
1500 One Tandy Center, Fort Worth, Texas 76102

This column is the first of what I hope will be a continuing monthly dialog in *80-U.S. Journal* designed to improve communications between Tandy Center and you, our TRS-80 owners. I'm excited about writing it, (but it's your column too) since I'll try to answer some questions, and keep you posted on Tandy headquarters' thoughts, actions and new happenings. I'll try to make it as timely as copy deadlines allow. Mike approached me a year ago, but I was committed to writing in another publication, and my other duties simply don't permit two such efforts. I have called an end to the other commitment, and I'm very happy to be working with *80-U.S.* The atmosphere is refreshingly positive and constructive... great for helping you get the most out of your computer, and for helping us understand your needs and desires.

We'd like your input, too.

The staff responsible for new TRS-80 products and support activities appreciate your suggestions and your compliments. Sure we like to see our products reviewed favorably, but we also appreciate objective criticism. Feedback from users (that's you) is our best tool for continued improvement.

When you ask us for a product, or a product change, please bear one thing in mind... our size! For all the great sales bucks it puts into our annual report, it also imposes some not-so-great limitations. It says, for example, that our products must appeal to a very large market, no matter how exciting or revolutionary they may be. It says, too, that with an installed base of machines in the six-figure numbers, we can't make product changes at the drop of a hat that could affect those folks. And those "I'll bet you could do it for only $5.00 per unit" changes have to make sense for the majority of our buyers... we can't ask everybody to pay for a change which will benefit a few.

And as we've said all along, we can't furnish "custom" software or hardware engineering, nor can we furnish a "fix" to a problem until we are *really* sure the problem is well understood, and the fix won't upset any other applecarts (no trademark violation intended).

Non-Radio Shack products.

Specialized products and custom software is the special province of the hundreds of software and add-on hardware providers who support the TRS-80 from outside Radio Shack. Many of them are great, with dynamite products. There are a few "ripoff artists", but that is true in any field. We are often asked why we don't support the good outside vendors by recommending or selling their products. Did you know that sixty percent of our products do come from outside vendors? Our name is on them to let you know that they have met our rigorous standards, and we stand behind them. To recommend the others (and some are really great), would be to obligate ourselves to guarantee and support products we simply don't have the facilities to check out. We will not accept for repair, for example, a Model III with someone else's disk drive installed in it, so how could we possibly recommend the other vendor. We appreciate our "cottage industry" friends. They have helped make the TRS-80 a real success. Today, there is no small computer in the world as well supported with hardware and software. I hope we've been able to reciprocate a bit, since the TRS-80 has made many of their businesses possible... and profitable.

We can't always promise answers you will like...

We're always open to suggestions on new or improved products or services, so if you have any, pass them on to me, and I will see that they are delivered to the proper person. We are responsible for keeping a lot of people happy, and the majority (tempered with practicality) must rule. You'll probably get some answers you won't like, but we will tell it like it is. Also please realize that you may not get an instant action since our staff is limited. We may look from the outside like a bunch of slow-movin' Texans... inside, I guarantee, we're pedalin' as fast as we can!

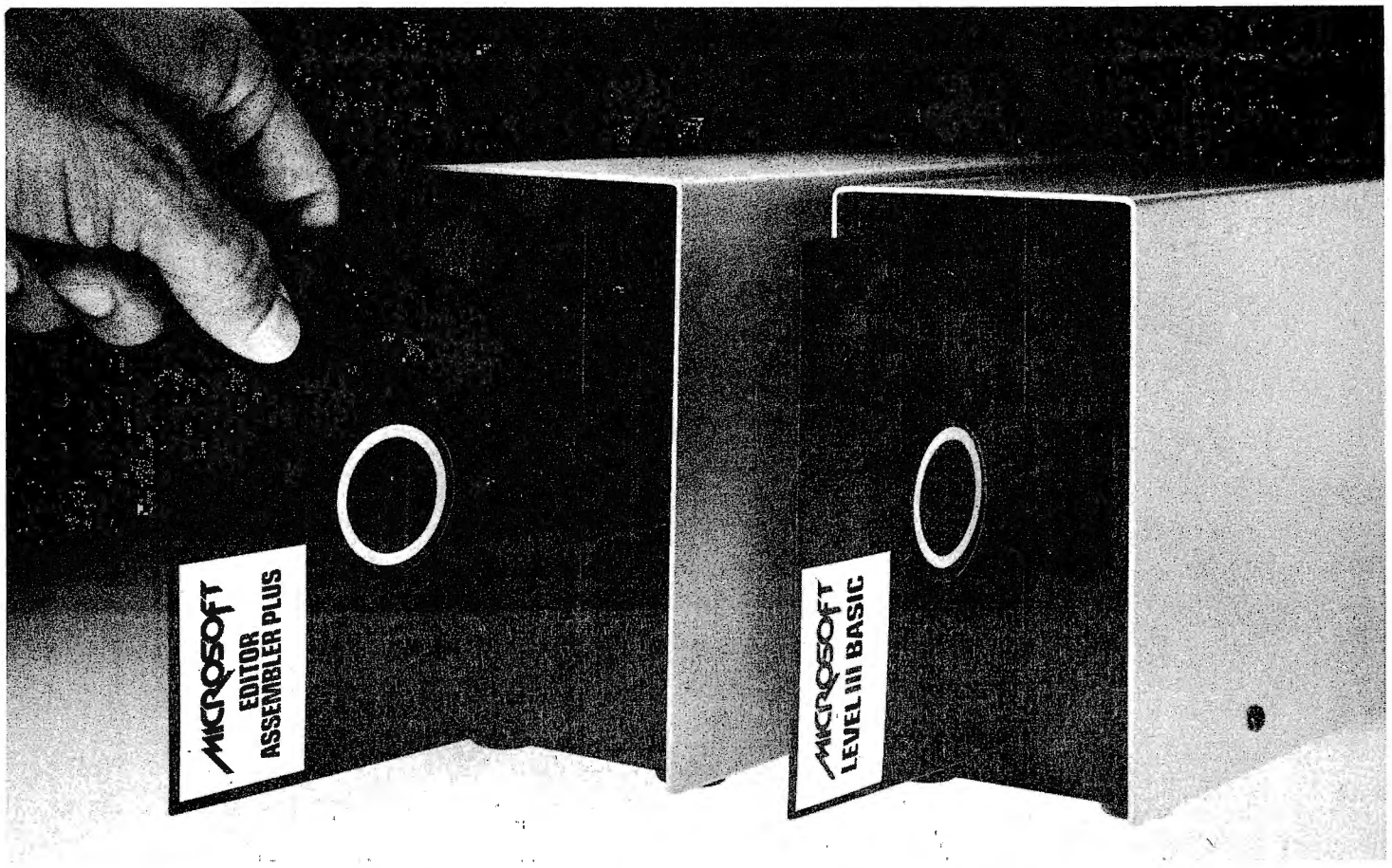
Well, enough of that "get acquainted" stuff. For this issue, I thought I'd tell you a little about the operation that builds our Number One system, the TRS-80 Model II.

A look into our Model II plant.

The Model II is built right here in Fort Worth. The boards are stuffed and thoroughly tested by our Tandy Instruments facility. They're sent from there to the main Model II plant, Tandy Business Products.

"Business Products" occupies about 114,000 square feet of space, and currently employs roughly 350 people. Since I haven't had a chance to get out there lately, I took a tour last week in preparation for this story. Trying to look at it from your perspective, I was struck by one immediate and interesting fact... the large "manufacturing area" where the production lines are, appeared to have about 60% of its total space devoted to testing. Upon receipt, major assemblies receive a 100% inspection and test. They are then sent down the production lines for assembly. At the end of the line, off rolls a Model II assembled in its bottom cabinet half.

As a long-time ham radio operator, I referred to the next station on the line as the "smoke test" area. The Production Manager



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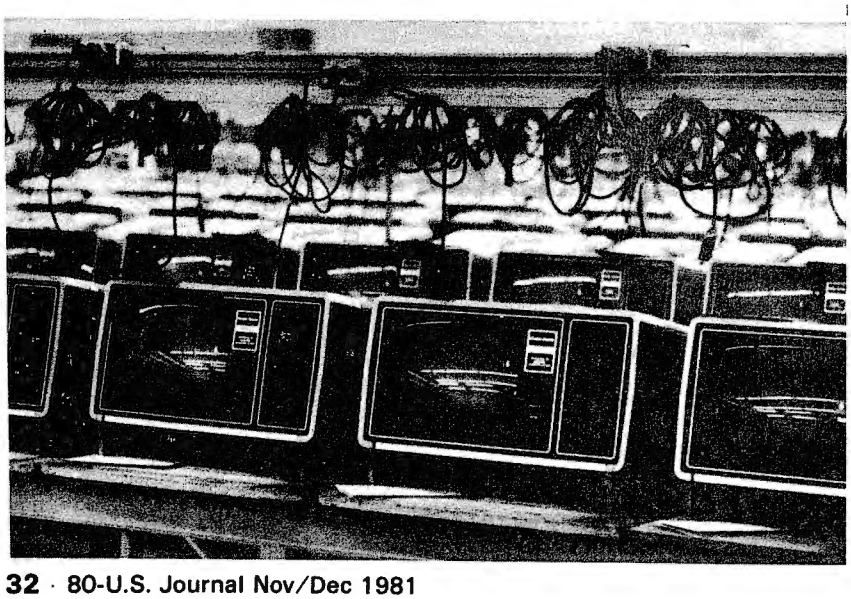
Lisa Lindquist on the Model II assembly line bolts it all together.

First power-up test being performed here by Anita Rebman.



Model II computers patiently sitting through their final 24-hour burn in.

Photos courtesy the Tandy Corp.

(and our tour guide) assures me that my definition very rarely fits! Once in a great while, a renegade capacitor or power supply... oh, well! As an old electronics "home-brewer", I still admit to being just a little awed at seeing a complex product like a computer plugged in for the very first time - come up working 100%!

Testing and more testing.

The first test lasts only a few minutes, but from there every Model II, still only partially dressed, goes into a "hotbox" for 24-hour burn-in at between 110 and 115 degrees. Most of the "infant mortality" of component parts is caught during this period. Following burn-in, the computer, still hot, is run through a very thorough test of all functions... virtually everything it knows how to do.

Next comes alignment of the video circuit, and final tightening of all the mechanical elements to specified torques. The top section of the case is assembled, and the finished product is passed into the Quality Control testing area.

Again, every computer undergoes a 15 minute functional test, followed by another 24 hour automatic test... this time in full dress, as you will receive it. But, that's not all, our Quality Assurance department sample-tests functionality, and does a 100% visual inspection for cosmetic defects.

Of course all Model II's go from Business Products to our Tandy Electronics Warehouse, which is our only exclusively-computer warehouse. And, as you may have guessed, they get a 100% incoming quality assurance inspection at the warehouse.

We're working to make it better.

Sounds like we're covering about all the bases, doesn't it? Well, we're covering even more than you might think. Of course you would expect us to be watching all the time for problem areas which might crop up in reports from our service center folks. But we're also working all the time to see how we can improve testing, packing, shipping and more. The Business Products folks are very serious about their "Zero Defects" program. Just recently, for example, they began sample testing of about 40 units (new ones come and go daily), for increased testing time of 96 hours. Objective... to see if an increase in current burn-in time would catch any significant increase in infant mortality. All the results aren't in yet, but if more burn-in time will help get you a better, more reliable product, we'll do it!

Quite recently, there were another 97 Model II's that spent about eighteen hours riding the worst roads our quality assurance group could find, in the back of a Tandy Transportation truck, at about 100 degrees. They had been tested prior to the trip, and were checked again at the end to see how they would hold up under the worst possible shipping conditions we could conjure up. The resulting data will help us determine whether we need changes in construction, mechanical design, or packing.

Do we still have equipment getting to the field which will fail? Sure we do, but a lot less than we had six months ago, and more than we'll have a few months from now. If you add up the number of hours of testing in our recently extended burn-in, and the number of failures, we experienced approximately one failure per two-thousand operating hours! That's one failure in just about one year of 40-hour weeks... not a bad infant mortality rate. We're highly encouraged, but not satisfied.

Well, I hope you're not asking "So what..." Well, I hope it will make you feel like giving your Model II a little extra pat on the head next time you walk by, knowing that your money was well spent. And I thought you would like to have a little insight into what goes on down here in Texas.

New 1982 Computer Catalog.

On the off chance you might not have seen it yet, our 1982 Computer Catalog is available. It's a big 48 pages this time. Some of the rumor mongers with their "inside information sources" will note, please, that there is no Model IV or V which I believe I started hearing were imminent just about a year ago this month. What it does contain is a lot of exciting new items, including the long-rumored Hard Disk system and short-rumored color computer disk system (which lets you own the lowest-cost color computer disk system available). There is one unfortunate error in pricing in the Color Computer section... the 32K Color Computer price is $699.00, not $749.00 as listed.

There is a super new programmable originate/answer, auto-dial, autoanswer direct connect modem which is scheduled for availability this month, priced at only $249.00. We have a new graphics / DP / WP-capable printer with dot-addressable graphics, and a high-density proportionally spaced character set. It takes 9½ inch pin-fed, roll or single sheet paper, and contains both parallel and serial interfaces... at only $799. Of course for less demanding users, our other dot-addressable graphics printer, the Line Printer VII is still one of the lowest-cost impact printers you can buy. By the way... very important fact about the VII is that it uses standard 9½ inch wide fanfold paper you can buy anywhere. There is a "lookalike" printer on the market which uses a very unusual 9-inch fanfold, available only from Japan as far as we can determine.

We have a really exciting 6-pen intelligent plotter in the new catalog, for 6-color graphics on 8½ x 11 inch paper or acetate foils for overhead projectors.

For our Daisy Wheel II owners, there is a really great acoustic cover, which renders the printer as close to silent as you will ever get. It's really effective. For Daisy Wheel II owners, there is also a new automatic sheet feeder, which will feed stacks of letterhead through your printer for unattended continuous printing. Of course, it is quickly and easily removable for other modes of printing.

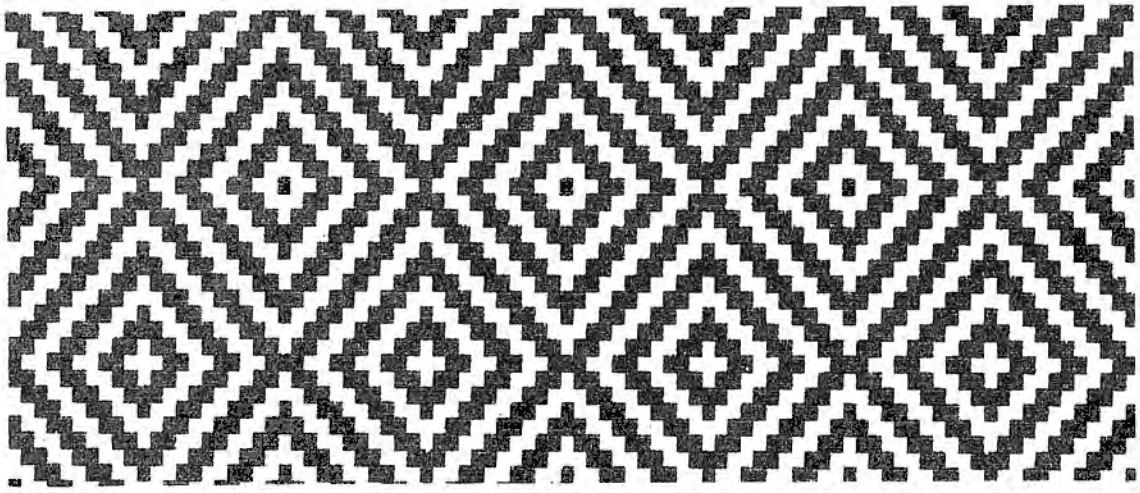
There is lots of new software, including about 23 color computer packages... a really impressive array that's growing monthly. We have software now for Model II to allow it to transfer files between TRSDOS and IBM 3741 single-density disks, and Bisync communications packages for 3270 and 3780 formats. Correct me if I'm wrong, but I think Model II may be the only 8-bit microcomputer currently capable of bisynchronous communications - but then, if you already have a copy of this new catalog, this won't interest you, and if you don't, I'll let you find out for yourself. Drop by your nearest Radio Shack outlet and ask for your free copy of Catalog RSC-6.

There are a lot of very exciting goings on I wish I could tell you about, but it's not quite time yet. So stay tuned from month to month, and we'll have some fun, while trying to help you get the most out of your TRS-80 investment through more and better communications. ■

Design weaving projects on your TRS-80

Robert L Ziegler & William J Buckingham
Madison, Wisconsin

For Model I with disk and line printer V or VI



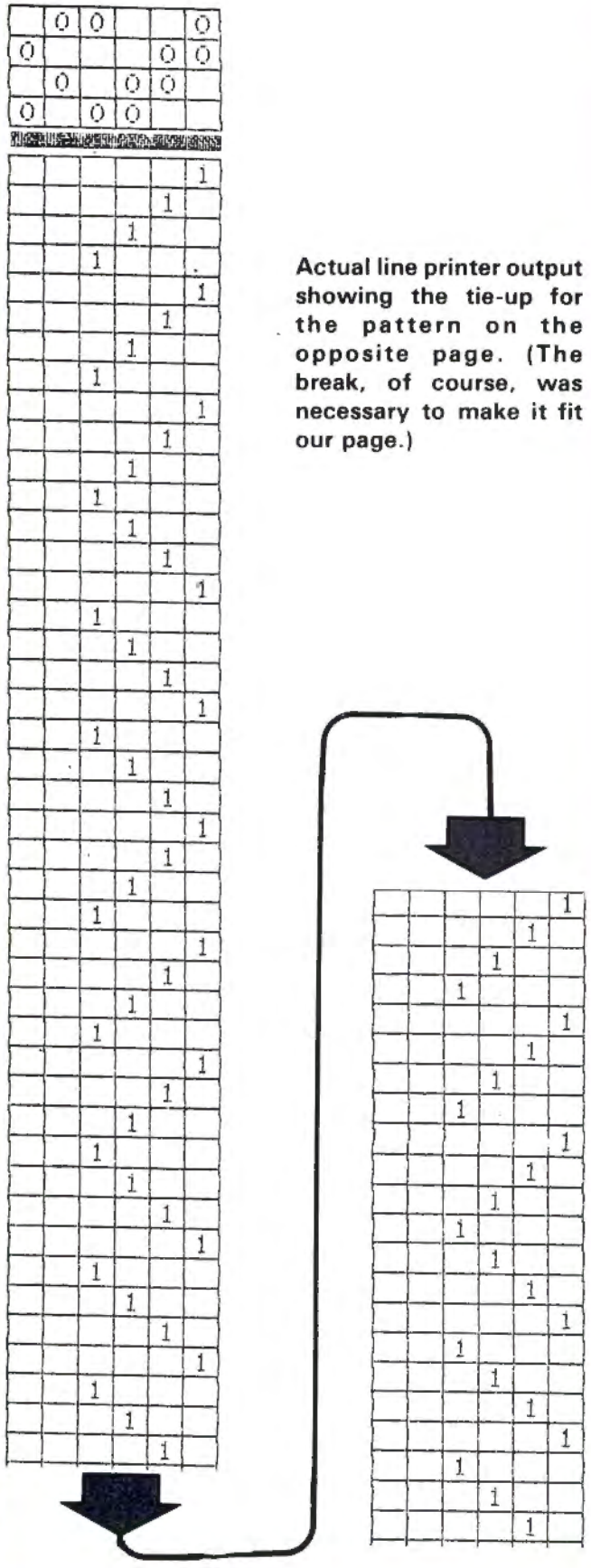
```
HARNESS THREADING SEQUENCE AT 22 ENDS PER UNIT:
TOTAL ENDS =  88
HARNESS 1  =  20
HARNESS 2  =  24
HARNESS 3  =  24
HARNESS 4  =  20
```

This threading sequence will produce the pattern above. The program produces this chart and the treadle tie-up shown on the opposite page.

		4		4			4	4	4		4	4			4	4	4		4	4	4
3		3		3	3		3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
	2		2		2	2		2		2		2		2	2		2		2	2		2	
		1		1		1		1		1		1		1		1		1		1		1	

	4		4			4	4	4	
3		3		3	3		3	3	3
	2		2		2	2		2	
		1		1		1		1	

Treadle Tie-up



Actual line printer output showing the tie-up for the pattern on the opposite page. (The break, of course, was necessary to make it fit our page.)

Several years ago, my roommate and I were considering buying looms. We took a short course in weaving together and within a month we had bought a loom and a computer. Our house has been divided into two camps, occassionally armed for battle, ever since.

Was there some way to whittle down the wall between art and technology? Yes! The inspiration came from an article by Margaret and Thomas Windeknecht in the winter 1980 edition of *onComputing*. They didn't provide a program, but they did provide the stimulus.

Computers operate on the basis of binary patterns, yes or no, on or off. Weaving operates on the same principle, yes or no, up or down, warp or weft. Looms were one of the first devices to be mechanized in the industrial age. One of these early looms, the Jacquard loom, is considered to be one of the first computers. (*See accompanying boxed article*). It operates by "reading" a series of punched cards which contain information on the movement of each individual thread.

The computer has invaded the inner sanctum of the weaving room at last! Today you can find computer printout taped to the loom, as well as hand-weaving tacked over the computer. It's a satisfying sight indeed to see two weavers (i.e., avid computer haters) pouring over a computer generated weaving design together!

This program is a design and documentation aid for hand-weavers. A weaver can enter the harnessing, tie-up, and treadling for a weaving project and get both a printed graphic display of the pattern design and fast, painless documentation for the pattern. Especially helpful is the capability to enter a pattern, experiment with it, and quickly see the resulting design.

The program follows the process of setting up the loom. First, (Option 1. Thread the Harnesses) vertical warp strings are individually threaded through harnesses which raise or lower selected warps to create the design. The harnesses are numbered from one to four. The user inputs these numbers in sequence for each warp string, and graphics blocks appear on the video within a corresponding four-row framework. The program allows for automatically (R)epeating the threading from the beginning or from a pre-(S)et point, and for re(V)ersing the entire threading. Both of these steps are common in weaving patterns. The warp string identified by pressing (S)et will appear on the video as an asterisk instead of as a graphics block. If you make a mistake, press the backspace. If the video fills up, press (ENTER) to go on to the next video page. At any other time, pressing (ENTER) will return you to the main menu.

The second step (Option 2. Tie-Up the Treadles) is tying up the foot treadles to the harnesses. One

See **LOOM**, page 38

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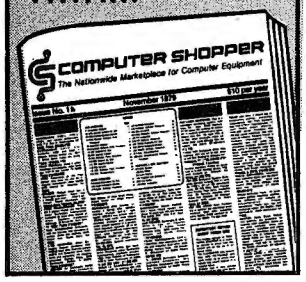

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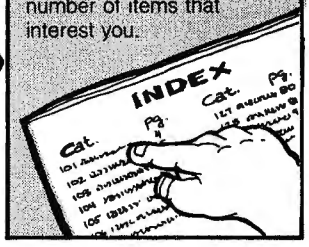

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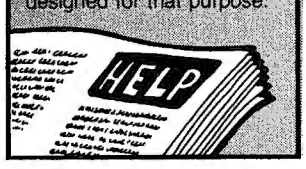

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†Microcomputers for Business, Applications, 1979.

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Full circle: Loom to computer to loom.

It is interesting to note that the loom was probably one of the first machines to be programmed. Early sketches by Leonardo da Vinci give evidence that men were constantly working on the problem. Some of his drawings show attempts to carry the shuttle through the shed by mechanical arms working from either side of the loom.

Around 1800, Joseph Marie Jacquard invented a machine for manufacturing fishnets. This secured for him a post at the Conservatory of Arts and Crafts in Paris. He later caused a sensation at the Paris Industrial Exhibition by demonstrating an improved drawloom, and later (in 1805) he introduced the invention which ties his name to the loom - the Jacquard loom.

Using the technology from his fishnet machine, he invented a loom which could be programmed with a perforated card (punch card). By adding several Jacquard attachments to one loom, intricate patterns could be produced. There is even evidence that fine pictures were woven with this method.

In the 1890 census, Herman Hollerith, an employee of the Census Bureau, used the punched card again. This time it was used to help tabulate the 1890 census. The job would have taken till the next census in 1900 had it not been for his invention. The 1890 census count was 63 million, and took about a month to tabulate. His first punch cards had round holes, but he later changed them to oblong so that more could occupy the same space on the card.

Hollerith called his machine the Electric Accounting Machine (EAM) and in 1896 he started a company called the Tabulating Machine Company. Sometime later he merged this company with another which made time clocks, and it was called the Computer-Tabulating-Recording Company. In 1924 this company became International Business Machines (IBM).

You cannot say "punched card" without thinking "IBM card". It has invaded our entire society; even government checks are thinly disguised punched cards. The idea of the punched card has a simple elegance, it has been around so long simply because it works.

We have now come full circle. The card, in many ways, begat the computer. Now the computer (see accompanying article) is being used to define the card. A classic case of pulling oneself up by the bootstraps!

or more of the harnesses can be raised simultaneously by pressing on the treadle. This raises some of the warp strings, creating a shed, or a space, for the horizontal weft thread to pass through and interweave with the warp, thus creating the fabric. You are first given the option of selecting the standard six-treadle tie-up. The numbers of the harnesses will appear on the video with a six-treadle framework. If you have something else in mind, enter the numbers of the harnesses (1 to 4) to be tied to treadle one. Press (ENTER) to advance to treadle two, etc. Press the backspace to go back to an earlier treadle. To change a harness that is already entered, press the number again and it will be erased. Pressing (ENTER) at treadle six will return you to the main menu.

The third step is sequencing the treadling (Option 3.). The design is created by the order in which the treadles are pressed, which in turn control which harnesses are raised, which in turn control which individual warp strings are raised. Just press the number of the treadle. Both the treadle number (1 to 6) and the total number of treadlings entered will be displayed. The treadling can be (R)epeated automatically from the beginning or from a pre-(S)et point. Pressing (E) gives the option to review and/or edit the treadle sequence entered thus far. In the review and edit section, pressing (ENTER) will advance the video page of treadlings, and return to the input section when finished. Pressing (E) will result in prompts for the treadling number and value to edit.

Each of these steps can be printed on the printer. This program assumes a Radio Shack Line Printer VI, and makes heavy use of the printer's graphics capabilities. For a printer without graphics, the output can be simplified by eliminating the bar graphics, and a non-graphics character can be used to generate the fabric design.

The harness threading (Option 4. Print the Harness Threading) will ask for a number of warp ends per unit. This simply prints a line through the chart after so many warps to make it easier to read. If a name for the pattern has been entered (Option 8.), this will be printed, along with the total number of warp strings and the number of warps going through each separate harness, including un-harnessed warps, if any. Then the threading is charted out, much as in any weaving book. As many complete units of the charting as will fit in 80 columns will be printed across the page. If the charting is too long to fit in 80 columns, the remainder will be continued on succeeding lines.

The treadle tie-up (Option 5.) is printed according to standard weaving format, a line of graphics blocks is printed at the end for emphasis, and the treadling sequence (Option 6.) follows underneath. If, for example, treadle six were

pressed three times, then treadle five were pressed twice, a three would be printed in row one, column six, and a two would be printed in row two, column five.

Finally, you might want to print the pattern itself (Option 7.). This section initializes by asking for paper size, character size, and black or white warp. The option to select the color of warp allows the weaver to reverse the design and see the underside of the design. This accommodates for differences between counter-balance and jack looms. The program examines which warp strings will be raised or lowered as each treadle is pressed to pass the weft through the shed. Either a graphics block or a blank will be printed accordingly, showing the design in much the same way as in many weaving book examples. If the number of warp strings exceeds the number of printer columns available based on the paper size and character size, the full design will be printed to the maximum number of columns. A few blank lines will be printed, and the rest of the design will be continued.

The program saves hours of pencil and paper drafting time. We get type-set style documentation instead of pages of hand-drawn figures on graph paper. We can also experiment with different threadings, tie-ups, and treadlings to see what the resulting pattern will be.

This program is written for a four-harness loom. Changing the program for a larger loom will mean reformatting the video output, redimensioning the H(500) and TR(6,4) arrays, and basically adding more of the same to the printer routines. The H(500) and PA(500) arrays allow for 500 warp strings and 500 treadlings, respectively.

A note to weavers: As in any design drawdown, an alternating tabby weave to provide strength should not be entered when printing out the fabric design.

Program peculiarities

If the repeat function is (S)et in the harness threading section and the user erases the warp string (i.e., the asterisk), a fatal error will occur if the (R)epeat is called without first re-(S)etting.

When identifying the treadling number and entering a new value in the review and edit section of the treadling sequence, the numbers entered from the keyboard are entered into strings via INKEY$, but will not appear on the video until you press (ENTER).

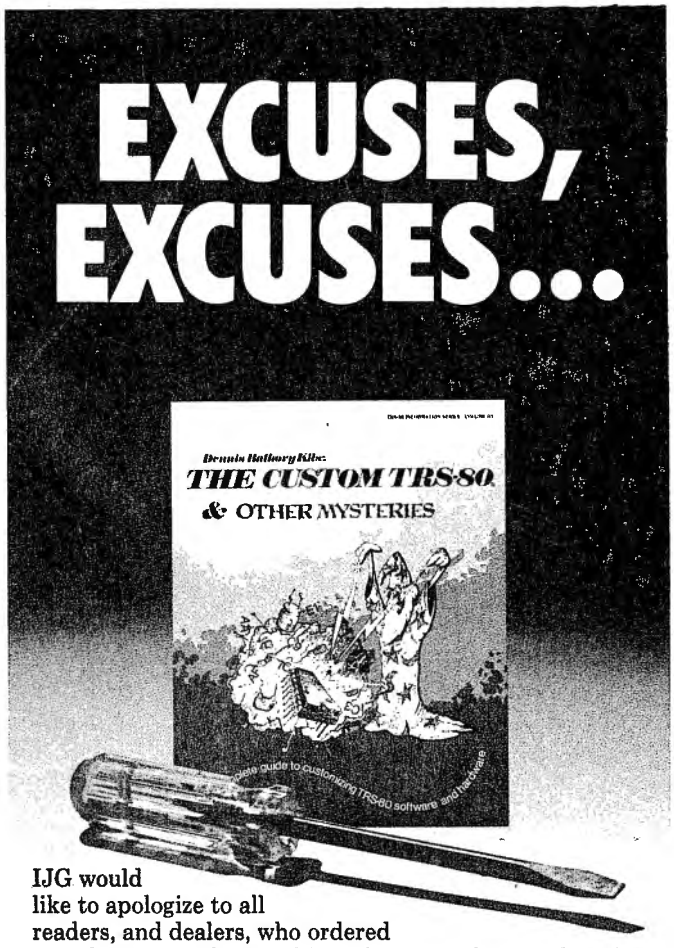
Returning to the treadling sequence section from the main menu after treadling data has been entered will erase anything already entered. Information is not erased by returning from the main menu in any other section.

The printer routine for the treadling sequence cannot handle more than nine treadles repeated in succession. More will mess up the spacing for the chart grid. ■

```
10 CLEAR 5000 : DEFINT A - Z : DIM H(50
   0), TR(6, 4), PA(500)
20 LPRINT CHR$(27); CHR$(15) : LPRINT C
   HR$(27); CHR$(28) : CLS : COUNT = 1 :
    TR = 1 : P$ = "" : BL$ = CHR$(170) :
    BR$ = CHR$(149) : TF = 0 : RF = 0 :
   FOR X = 1 TO 6 : FOR Y = 1 TO 4 : TR(
   X, Y) = 0 : NEXT Y, X : GOTO 470
30 '   HARNESS THREADING SEQUENCE
40 PRINT "<S> = SET,  <R> = REPEAT,  <V
   > = REVERSE,  <ENTER> = EXIT"; : DIS
   = 131 : AT = 128 : HS = 1 : CH = 191
   : HF = 0 : SF = 0 : GOSUB 510 : IF CO
   UNT = 1 THEN 70
50 FOR X = 1 TO COUNT - 1 : I = H(X) :
   IF I = 5 THEN CH = 32
60 GOSUB 580 : NEXT
70 I$ = INKEY$ : IF I$ = "" THEN 70 ELS
   E IF I$ = "V" THEN 150 ELSE IF I$ = "
   S" THEN 120 ELSE IF I$ = "R" THEN 130
    ELSE IF I$ = CHR$(8) THEN 530 ELSE I
   F I$ = CHR$(13) THEN 470 ELSE IF (I$
   < "0") OR (I$ > "4") THEN 70
80 IF HF = 1 THEN HF = 0 : HS = COUNT
90 I = VAL(I$) : IF I = 0 THEN I = 5 :
   CH = 32
100 H(COUNT) = I : COUNT = COUNT + 1 :
   IF SF = 1 THEN SF = 0 : CH = 42
110 GOSUB 580 : GOTO 70
120 HS = COUNT : HF = 0 : SF = 1 : GOTO
    70
130 HR = COUNT - 1 : FOR X = HS TO HR :
    H(COUNT + X - HS) = H(X) : I = H(X)
   : IF I = 5 THEN CH = 32
140 GOSUB 580 : NEXT : COUNT = COUNT +
   HR - HS + 1 : HS = HR + 1 : HF = 1 :
   GOTO 70
150 HS = 1 : HR = COUNT - 2 : FOR X = C
   OUNT TO HR + HR + 1 : H(X) = H(HR -(X
    - COUNT)) : I = H(X) : IF I = 5 THEN
    CH = 32
160 GOSUB 580 : NEXT : COUNT = COUNT +
   HR : HR = COUNT - 1 : GOTO 70
170 '  TREADLE TIE-UP SEQUENCE
180 PRINT "<ENTER> = ADVANCE TREADLE &
   EXIT,  <"; CHR$(93); "> = DECREMENT T
   READLE" : GOSUB 440 : TD = 453 : X =
   1 : IF TF = 0 THEN 210
190 FOR Y = 1 TO 6 : FOR Z = 1 TO 4 : I
   F TR(Y, Z) = 1 THEN U2 = TD +(4 - Z)
   * 64 : PRINT@ U2 - 1, Z;
200 NEXT Z : TD = TD + 2 : NEXT Y : TD
   = 453 : IF TF = 1 THEN 230
210 PRINT@ 128, "STANDARD TREADLE TIE-U
   P (Y/N)"; : INPUT I$ : PRINT@ 128, CH
   R$(30); : IF I$ = "N" THEN 230
```

```
220 TR(1, 1) = 1 : TR(1, 3) = 1 : TR(2,
   2) = 1 : TR(2, 4) = 1 : TR(3, 1) = 1
   : TR(3, 4) = 1 : TR(4, 1) = 1 : TR(4
  , 2) = 1 : TR(5, 2) = 1 : TR(5, 3) =
  1 : TR(6, 3) = 1 : TR(6, 4) = 1 : TF
  = 1 : X = 6 : GOTO 190
230 PRINT@ 128, "TREADLE #";
240 PRINT@ 136, X;
250 I$ = INKEY$ : IF I$ = "" THEN 250 E
  LSE IF I$ = CHR$(8) THEN 290 ELSE IF
  I$ = CHR$(13) THEN 280 ELSE IF I$ < "
  1" OR I$ > "4" THEN 250
260 I = VAL(I$) : IF TR(X, I) = 0 THEN
  TR(X, I) = 1 ELSE TR(X, I) = 0 : I$ =
   " "
270 U2 = TD +(4 - I) * 64 : PRINT@ U2,
  I$; : GOTO 250
280 X = X + 1 : TD = TD + 2 : IF X > 6
  THEN TF = 1 : GOTO 470 : ELSE 240
290 X = X - 1 : TD = TD - 2 : IF X < 1
  THEN X = 1 : TD = 453
300 GOTO 240
310 '  TREADLING PATTERN
320 PRINT "PRESS <E> TO REVIEW AND/OR E
  DIT TREADLING" : PRINT "PRESS <ENTER>
   TO EXIT TO MENU." : PRINT : PRINT "P
  RESS <S> TO MARK BEGINNING OF NEW REP
  EAT PATTERN."
330 PRINT "PRESS <R> TO REPEAT THE PATT
  ERN FROM THE BEGINNING, FROM" : PRINT
   TAB(10)"THE LAST 'REPEAT', OR FROM T
  HE LAST 'SET'," : PRINT TAB(10)"WHICH
  EVER IS MOST RECENT." : RETURN
340 TR = 1 : ZR = 1 : GOSUB 320
350 PRINT@ 640, "INPUT #" : PRINT "TREA
  DLE #"
360 I$ = INKEY$ : IF I$ = "" THEN 360 E
  LSE IF I$ = "E" THEN 390 ELSE IF I$ =
   CHR$(13) THEN 410 ELSE IF I$ = "S" T
  HEN 420 ELSE IF I$ = "R" THEN 400 ELS
  E IF (I$ < "1" OR I$ > "6") THEN 360

370 IF RF = 1 THEN RF = 0 : ZR = TR
380 I = VAL(I$) : PA(TR) = I : PRINT@ 6
  49, TR; : PRINT@ 713, I; : TR = TR +
  1 : GOTO 360
390 T2 = TR - 1 : PRINT : PRINT : INPUT
   "DO YOU WANT TO REVIEW OR EDIT THE T
  READLING (Y/N)"; I$ : PRINT@ 768, CHR
  $(30) : IF LEFT$(I$, 1) = "Y" THEN 11
  40 ELSE 360
400 T2 = TR - 1 : FOR X = ZR TO T2 : PA
  (TR + X - ZR) = PA(X) : NEXT : TR = T
  R + T2 - ZR + 1 : ZR = T2 + 1 : RF =
  1 : PRINT@ 649, TR - 1; : GOTO 360
410 T2 = TR - 1 : RF = 0 : GOTO 470
420 ZR = TR : RF = 0 : GOTO 360
430 ' DISPLAY BORDER FOR VIDEO TREADLE
  TIE-UP SEQUENCE
440 PRINT@ 325, "1 2 3 4 5 6" : PRINT@
  386, STRING$(15, 140) : PRINT "4" : P
  RINT "3" : PRINT "2" : PRINT "1"
450 FOR Y = 20 TO 33 : SET(4, Y) : SET(
  6, Y) : NEXT : RETURN
460 ' MENU
470 CLS : PRINT " 1. THREAD THE HARNESS
  ES." : PRINT " 2. TIE UP THE TREADLES
  ." : PRINT " 3. SEQUENCE THE TREADLIN
  G." : PRINT : PRINT " 4. PRINT THE HA
  RNESS THREADING."
480 PRINT " 5. PRINT THE TIE-UP." : PRI
  NT " 6. PRINT THE TREADLING SEQUENCE.
  " : PRINT " 7. PRINT THE PATTERN." :
  PRINT : PRINT " 8. ENTER PATTERN TITL
  E" : PRINT : PRINT " 9. CLEAR MEMORY
  & START OVER." : PRINT "10. END."
490 PRINT : LINEINPUT "...:"; I$ : CLS
  : ON VAL(I$) GOTO 40, 180, 340, 630,
  950, 1060, 1260, 1390, 20, 1370 : GOT
  O 490
500 ' DISPLAY BORDER FOR VIDEO HARNESS
  THREADING SEQUENCE
510 PRINT@ AT, "4"; BL$; TAB(61)BR$; "4
  " : PRINT "3"; BL$; TAB(61)BR$; "3" :
   PRINT "2"; BL$; TAB(61)BR$; "2" : PR
  INT "1"; BL$; TAB(61)BR$; "1"; : RETU
  RN
520 ' ERASE HARNESS THREADING INPUT
530 COUNT = COUNT - 1 : IF COUNT = 0 TH
  EN COUNT = 1 ELSE H(COUNT) = 0
540 IF DIS = 451 OR DIS = 771 THEN PRIN
  T@ DIS - 4, CHR$(31); : DIS = DIS - 2
  64 : AT = AT - 320
550 DIS = DIS - 1 : IF DIS < 131 THEN D
  IS = 131
560 D2 = 0 : FOR X = 1 TO 4 : PRINT@ DI
  S + D2, " "; : D2 = D2 + 64 : NEXT :
  GOTO 70
570 ' DISPLAY HARNESS THREADING INPUT O
  N VIDEO
580 D2 = DIS +(4 - I) * 64 : PRINT@ D2,
   CHR$(CH); : DIS = DIS + 1 : CH = 191

590 IF DIS = 187 OR DIS = 507 OR DIS =
  827 THEN DIS = DIS + 264 : AT = AT +
  320 : IF AT > 768 THEN 600 ELSE GOSUB
   510 : GOTO 610 : ELSE 610
600 LINEINPUT I$ : AT = 128 : DIS = 131
   : PRINT@ 64, CHR$(31); : GOSUB 510
610 RETURN
```

```
620 ' SHOW HARNESS THREADING SEQUENCE O
  N PRINTER
630 IF CO = 1 THEN 470 ELSE START = 1 :
   INPUT "ENTER NUMBER OF ENDS PER UNIT
  "; INCH : MAX = INT(79/(IN + 1)) : LP
  RINT CHR$(27); "6" : LPRINT CHR$(138)
   : H0 = 0 : H1 = 0 : H2 = 0 : H3 = 0
  : H4 = 0
640 FOR X = START TO COUNT - 1 : IF H(X
  ) = 0 THEN H0 = H0 + 1 ELSE IF H(X) =
   1 THEN H1 = H1 + 1 ELSE IF H(X) = 2
  THEN H2 = H2 + 1 ELSE IF H(X) = 3 THE
  N H3 = H3 + 1 ELSE IF H(X) = 4 THEN H
  4 = H4 + 1
650 NEXT
660 IF P$ <> "" THEN LPRINT TAB((79 - L
  EN(P$))/2)P$ : LPRINT CHR$(138)
670 LPRINT "HARNESS THREADING SEQUENCE
  AT"INCH"ENDS PER UNIT:" : LPRINT "TOT
  AL ENDS = "; : LPRINT USING "###"; CO
   - 1 : LPRINT "HARNESS 1  = "; : LPRI
  NT USING "###"; H1 : LPRINT "HARNESS
  2  = "; : LPRINT USING "###"; H2
680 LPRINT "HARNESS 3  = "; : LPRINT US
  ING "###"; H3 : LPRINT "HARNESS 4  =
  "; : LPRINT USING "###"; H4 : IF H0 >
   0 LPRINT "FREE ENDS  = "; : LPRINT U
  SING "###"; H0
690 LPRINT CHR$(27); CHR$(28) : LPRINT
  CHR$(138)
700 LPRINT CHR$(240); : MC = 0 : FOR X
  = START TO COUNT - 1 : LPRINT CHR$(24
  1); : IF X <> COUNT - 1 AND (INT(X/IN
  ) = X/IN) THEN MC = MC + 1 : IF MC <
  MAX THEN LPRINT CHR$(243); ELSE SX =
  X + 1 : SC = CO : CO = X + 1 : X = SC
   + 1
710 NEXT : IF X >= COUNT - 1 THEN LPRIN
  T CHR$(242)
720 LPRINT CHR$(245); : FOR X = START T
  O COUNT - 1 : IF H(X) = 4 THEN LPRINT
   "4"; ELSE  IF H(X) = 5 THEN LPRINT "
  0"; ELSE LPRINT CHR$(32);
730 IF X <> COUNT - 1 AND INT(X/IN) = X
  /IN LPRINT CHR$(245);
740 NEXT
750 LPRINT CHR$(245) : LPRINT CHR$(244)
  ; : FOR X = START TO COUNT - 1 : LPRI
  NT CHR$(241); :  IF X <> COUNT - 1 AN
  D INT(X/IN) = X/IN LPRINT CHR$(250);

760 NEXT : LPRINT CHR$(249)

770 LPRINT CHR$(245); : FOR X = START T
  O COUNT - 1 : IF H(X) = 3 THEN LPRINT
   "3"; ELSE IF H(X) = 5 THEN LPRINT "0
  "; ELSE LPRINT CHR$(32);
780 IF X <> COUNT - 1 AND INT(X/IN) = X
  /IN LPRINT CHR$(245);
790 NEXT
800 LPRINT CHR$(245) : LPRINT CHR$(244)
  ; : FOR X = START TO COUNT - 1 : LPRI
  NT CHR$(241); : IF X <> CO - 1 AND IN
  T(X/IN) = X/IN LPRINT CHR$(250);
810 NEXT : LPRINT CHR$(249)
820 LPRINT CHR$(245); : FOR X = START T
  O COUNT - 1 : IF H(X) = 2 THEN LPRINT
   "2"; ELSE IF H(X) = 5 THEN LPRINT "0
  "; ELSE LPRINT CHR$(32);
830 IF X <> COUNT - 1 AND INT(X/IN) = X
  /IN LPRINT CHR$(245);
840 NEXT
850 LPRINT CHR$(245) : LPRINT CHR$(244)
  ; : FOR X = START TO COUNT - 1 : LPRI
  NT CHR$(241); : IF X <> COUNT - 1 AND
   INT(X/IN) = X/IN LPRINT CHR$(250);
860 NEXT : LPRINT CHR$(249)
870 LPRINT CHR$(245); : FOR X = START T
  O COUNT - 1 : IF H(X) = 1 THEN LPRINT
   "1"; ELSE IF H(X) = 5 THEN LPRINT "0
  "; ELSE LPRINT CHR$(32);
880 IF X <> COUNT - 1 AND INT(X/IN) = X
  /IN LPRINT CHR$(245);
890 NEXT : LPRINT CHR$(245)
900 LPRINT CHR$(246); : FOR X = START T
  O COUNT - 1 : LPRINT CHR$(241);
910 IF X <> COUNT - 1 AND INT(X/IN) = X
  /IN LPRINT CHR$(248);
920 NEXT : LPRINT CHR$(247) : IF MC >=
  MAX THEN START = SX : COUNT = SC : LP
  RINT CHR$(138) : GOTO 700
930 GOTO 470
940 ' SHOW TREADLE TIE-UP ON PRINTER
950 IF TF = 0 THEN 470 ELSE LPRINT CHR$
  (27); "8"; : LPRINT STRING$(2, 138) :
   LPRINT "TREADLE TIE-UP:" : LPRINT CH
  R$(138) : LPRINT CHR$(27); CHR$(28)
960 LPRINT CHR$(240); : FOR X = 1 TO 5
  : LPRINT CHR$(241); CHR$(243); : NEXT
   : LPRINT CHR$(241); CHR$(242)
970 FOR X = 4 TO 2 STEP - 1 : LPRINT CH
  R$(245); : FOR Y = 1 TO 6 : IF TR(Y,
  X) = 1 THEN LPRINT "0";  ELSE LPRINT
  " ";
980 LPRINT CHR$(245); : NEXT Y : LPRINT
   " " : LPRINT CHR$(244); : FOR Y = 1
  TO 5
990 LPRINT CHR$(241); CHR$(250); : NEXT
   Y : LPRINT CHR$(241); CHR$(249) : NE
  XT X
```



IJG would like to apologize to all readers, and dealers, who ordered *The Custom TRS-80* and have been wondering where it is.

Magazine advertisements have to be prepared 2 to 3 months before they actually appear in print. Originally the book was scheduled for printing in early May, just as the first advertisements were to appear, but the Editor must have been in a time-warp when he made the original production estimates!

He completely under-estimated the time needed to prepare and process the dozens of photographs, circuit diagrams, printed circuit layouts, assembly language programs and reams of information that Dennis Kitsz had provided.

The book has now been scheduled for printing in early November, and should be available before the end of the month. It will be worth the wait, it's one heck of a book!

Credit card orders are not being processed until the book is back from the printers. If you prepaid by check, and would prefer not to wait, then you can obtain a full refund prior to shipment – or use your credit towards other IJG products.

Sorry about this, thank you for waiting,

Jim Perry

Jim (*'What year is it?'*) Perry, Editor

IJG

1260 West Foothill Blvd.,
Upland, California 91786
(714) 946-5805

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Circle 35

```
1000 LPRINT CHR$(245); : FOR X = 1 TO 6
   : IF TR(X, 1) = 1 THEN LPRINT "0"; E
  LSE LPRINT " ";
1010 LPRINT CHR$(245); : NEXT : LPRINT
  " " : LPRINT CHR$(246); : FOR X = 1 T
  O 5 : LPRINT CHR$(241); CHR$(248); :
  NEXT
1020 LPRINT CHR$(241); CHR$(247)
1030 LPRINT CHR$(234); : FOR X = 1 TO 1
  1 : LPRINT CHR$(239); : NEXT : LPRINT
   CHR$(233)
1040 GOTO 470
1050 ' SHOW TREADLING SEQUENCE ON PRINT
  ER
1060 IF TR = 1 THEN 470 ELSE LPRINT CHR
  $(240); : TC = 1 : Y = 1 : FOR X = 1
  TO 5 : LPRINT CHR$(241); CHR$(243); :
   NEXT : LPRINT CHR$(241); CHR$(242)
1070 LPRINT CHR$(245); : FOR X = 1 TO 6
   : IF PA(Y) <> X THEN LPRINT CHR$(32)
  ; : GOTO 1100

1080 IF PA(Y + 1) = X THEN TC = TC + 1
  : Y = Y + 1 : IF Y <= T2 THEN 1080
1090 LPRINT USING "#"; TC; : TC = 1
1100 LPRINT CHR$(245); : NEXT X : LPRIN
  T CHR$(32) : LPRINT CHR$(244);
1110 FOR X = 1 TO 5 : LPRINT CHR$(241);
   CHR$(250); : NEXT X : LPRINT CHR$(24
  1); CHR$(249)
1120 Y = Y + 1 : IF Y <= T2 THEN 1070 E
  LSE 470
1130 ' REVIEW AND EDIT THE TREADLING SE
  QUENCE
1140 CLS : PRINT "NUMBER   1 2 3 4 5 6"
  ; TAB(50)"<E> = EDIT" : PRINT TAB(8)
  STRING$(13, 140) : PRINT : X = 1
1150 PRINT TAB(2)X; TAB(PA(X) * 2 + 6)P
  A(X) : IF X >= T2 THEN PRINT TAB(30)"
  *** END ***"; : GOTO 1170
1160 IF INT(X/11) = X/11 THEN 1170 ELSE
   X = X + 1 : GOTO 1150
1170 I$ = INKEY$ : IF I$ = "" THEN 1170
   ELSE IF I$ = "E" THEN 1200
1180 IF X >= T2 THEN CLS : GOSUB 320 :
  GOTO 350
1190 PRINT@ 192, CHR$(31); : PRINT@ 192
  , ""; : X = X + 1 : GOTO 1150
1200 PRINT@ 222, "<ENTER> THE NUMBER TO
   EDIT"; : DE$ = "" : GOSUB 1240 : I =
   VAL(DE$) : PRINT@ 249, I;
1210 PRINT@ 350, "ENTER NEW VALUE"; : D
  E$ = "" : GOSUB 1240 : Z = VAL(DE$) :
   PRINT@ 366, Z; : PRINT@ 478, "MORE T
  READLES TO EDIT (Y/N)?"; : PA(I) = Z
```

CRYSTALWARE

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THE FINEST IN FANTASY GAME SOFTWARE

"Having previewed over fifty of your competitors' games, I can assure you that your use of scrolling far exceeds anything I've seen for the Atari and, of course, for the Apple. I'm very impressed by the dedication and quality that your company exhibits by virtue of this demo." **David Sosna** — Associate Producer, Universal Pictures

Crystal has done its best to become the Porsche of the computer game industry. New scrolling techniques, video disk games, a real-life fantasyland — our mad programmers toil onward with little food or sleep to produce some incredible firsts in the microcomputer world. If you are an unappreciated genius and want to join our staff to help create the world of tomorrow today, give me a call. Our magazine *Crystal Vison* will within the next month have a circulation of 80,000 and we look forward very soon to producing our first full length motion picture. I'd like to thank my friends at Votrax and Axlon for giving us the tools (128K RAM for Atari and a vocal text synthesizer) to truly produce some programming miracles.

★ ★ ★ NEW RELEASES ★ ★ ★

THE CRYPT — One evening you awake at sunset to find yourself in what appears to be an endless cemetery. Although defenseless, you must somehow find your way out or perish from the hideous assaults of flesh-eating zombies, rats, vampires, werewolves, and other repulsive monstrosities. To escape you may have to descend into the catacombs beneath the cemetery. This game is a little different from the others of our series because we use a lot of static graphics to set the mood. It is similar in some respects (without any copying intended) to those of our friends at On-Line who produce excellent static graphic adventures. You must use all your common sense and a great deal of courage to escape from this perilous adventure alive. We have made it so nearly impossible that the first player to do it successfully will receive a $200.00 prize. **$49.95 2 disks**

QUEST FOR POWER by Mark Benioff — An extraordinary game with the adventure and magic of Arthurian legend. Join Galahad as he leaves Camelot in search of the Scroll of Truth. Explore the treacherous depths of the Caves of Somerset, visit the medieval city of Essex. Along the way you will meet powerful wizards and great prophets. The villages of Sunderland and Leeds dot your path. Somewhere in an evil castle called Skenfirth, lurks the devil himself, while the Evil Giant Gogmogo, hungry for human prey, roams the forests. In Fantasyland tradition we include 64 full screens of hires scrolling and some sensational graphic and animation sequences. Well worth the **$39.95 1 disk**, enjoyable to all ages.

★ ★ ★ GALATIC EXPEDITION ★ ★ ★

The year is 3021, almost 100 years since the expedition to the Sands of Mars has returned. The Starship Herman now rests quietly in the Zikon Museum in New Brisbane. It's nearly 80 years since World War III, the Ames Research Center celebrates its 150th anniversary, and you stand at the unveiling of a truly technological wonder — the first ion-propelled vessel, saucer-shaped Lady Joanne, its viewport of pure diamond, its hull of synthetic emeralds. The Martian glyphs of the Meshim and those of Lemuria have now been deciphered and it appears that a much greater mystery is about to unravel. 7 planes and 7 doors — 7 guardians and 7 candles. 7 strange new worlds await the ultimate adventurer to unlock a timeless secret. The starship may seem strange and unfamiliar to our veteran adventurers, faced with its marvelous new technology; this craft must be flown by constant monitoring of ion stabilizers. During your galactic expedition you are surrounded by the flickering heavens, beset by meteor showers and time-warps. Each unique world holds one of the 7 keys to unlock the Great Mystery. The games all run off the Main Module which also is a game unto itself.

From Earth to Moon — On the Moon's dark side lie entrances to caverns extending to the moon's hollow core which contains a timeless secret. Here live a race of burrowing creatures, who have built vast earthen cities with storehouses full of precious stones. Gravity is extremely critical and you must use all your skills to manually land your craft. This first Master Disk contains the dos needed to run additional scenarios. Its price is **$39.95** and includes 64 screens of Hires graphics.

Mists of Venus — On Venus' ever hot surface are endless jungles and swamps. The air is unbreathable and spacesuits and oxygen must be carried. This world is especially treacherous with all sorts of loathsome creatures and hardly any place dry enough to land your ship. Beneath the green seas our adventurer may find the second key to solving the Mystery. **$29.95** (must have Master Disk to run)

Planet Herman — It is hard to tell where Herman's atmosphere ends and the surface begins. Much of this adventure will have the feeling of a starship submarine. Navigating around Herman is very dangerous but with a computer on board Lady Joanne it may be just possible. This senario costs **$29.95** and needs the Master to run.

The Asteroid Belt — Every play something oids. A combination of the best machine language sub-routines of our new Crystaloids with a fast moving adventure game. Penal colonies, lurking pirates, and some unusual forms of scavenger life exist here. It's difficult to travel in the Asteroid Belt without getting blown up. Perhaps you should find some expert help by rescuing a pilot, who is also a sentenced thief or murderer, from one of the penal colonies. There are places for trading and you may wish to indulge yourself with a visit to the sensual Pleasure Planet. **$29.95** (needs Master Disk)

Uranus - World of Ice — A freezing place with nights of —200° F. Bring along Thermasuits, as well as some Laars with which to battle the Grungik, a 12 foot tall relative of Big Foot, fond of human flesh. Uranus also has a secret inner labyrinth with tropical flora and fauna. However, the King of the Ice Planet, Norion may have his own idea about your trespassing. Without proper clothing, weapons and supplies, your stay here may be very exciting and very short. **$29.95** (needs Master Disk to run)

Jupiter - World of Dwarfs — How would it feel to weigh 300 or so lbs.? A trip to Jupiter should fill you in fast. There is a particularly interesting red spot on Jupiter and a curious set of moons. Picking up some antigravs will help. Landing should really tax your energies. In the Jupiterian atmosphere, you fall fast! Be prepared to use 10 times the normal amount of fuel. Better find the 6th key quickly before your fuel and food are exhausted. **$29.95** (needs Master Disk)

The Crystal Planet - You will have to embark on this final portion of your expedition ignorant of what you may encounter here on this mysterious planet, excepting that the 7th world holds the ultimate key to winning the contest. **$29.95** (needs Master Disk)

The Contest — To the Winner with the highest score, who solves the mystery by November of 1982 will go $5000.00 in cash. Good Luck!

★ ★ ★ ★ ★ ★

GLAMIS CASTLE — According to ancient legend and records this castle is one of the most haunted sites in Great Britain. One Lady Glamis, known to be in league with the devil, liked to send out a destructive demon to harrass the townspeople. She finally was burnt at the stake on Castle Hill, cursing as she died all future generations of the Lyon family. Her demon still seems to haunt that spot, murdering the curious who stray up to Castle Hill after dark. The curse stipulated that each succeeding generation would have at least one child, often female, who would be a vampire. When an heir comes of age, there is a secret ceremony in which the heir, his father, and the steward take crowbars and chip away plaster concealing a hidden chamber, known only to them, that Earl Patie used when he gambled with the devil. Another tradition says that a creature, half-man, half-beast stalks the passages in the walls of Glamis to insure the fulfilling of the curse. The mystery, of course, is to determine the location of this secret chamber. Our game, occupying 2 disks, will have as exact a replica of the castle as possible. It's definitely one of a kind! And we will be offering a $500 prize to the first person daring enough to solve the centuries-old mystery of Glamis Castle. **$49.95 2 disks.**

Crystal has many other fine fantasy and space games. For a copy of CRYSTAL VISION which includes a complete catalog please send $3.00 to the address below.

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Trucker and Streets of the City

CS-3207 TRS-80 Cassette (32K)
CS-3703 TRS-80 Disk (32K) $24.95

Trucker

This program simulates coast-to-coast trips by an independent trucker hauling various cargos The user may haul oranges, freight or U.S. mail All have different risks and rewards. Maximum profit comes from prudent risk-taking.

If all goes well, you can obey the speed limits, stop for eight hours of sleep each night and still meet the schedule Bad weather, road construction or flat tires may put you behind schedule. You may try to increase your profit by skimping on sleep, driving fast or carrying an overweight load

Other factors are choice of routes, truck payments, fuel, food, tolls and fines The simulation is engrossing and informative

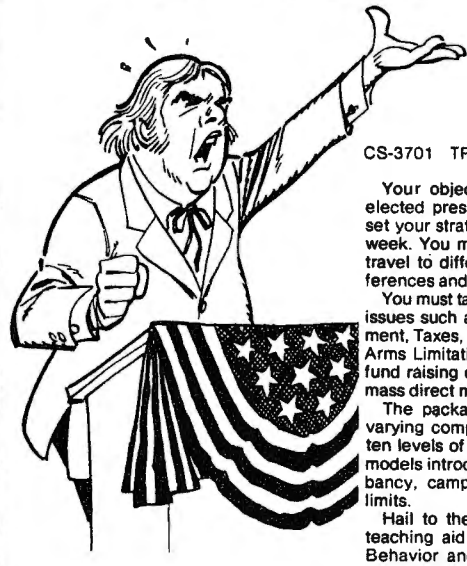
Streets of the City

This simulation is modeled on Grand Rapids, Michigan, a metropolitan area with a population of 550,000. The budgeting, cost and work standard bases are derived from actual experiences of the city over the past five years. The objective of the simulation is to complete a ten-year plan of street and transit improvements while retaining the support of a majority of the City Commission

During your tenure, you must construct streets and Interstate highways, repair existing streets, and improve traffic safety. For the Transit Authority you have to upgrade and replace a delapidated bus fleet, increase ridership, reduce maintenance downtime and improve on-shedule performance

Other factors to be considered are operating tax levies, construction bonding and labor negotiations. The simulation provides a substantial challenge and it is both educational and entertaining

Hail to the Chief



by
Phillip W. Brashear
and
Richard G. Vance

CS-3701 TRS-80 Disk, 48K $24.95

Your object in this simulation is to be elected president. In your campaign you set your strategy and carry it out week by week. You may run TV or magazine ads, travel to different states, hold news conferences and participate in a debate.

You must take a position on ten campaign issues such as Energy Policy, Unemployment, Taxes, Mid-East Policy and Strategic Arms Limitations. You must manage your fund raising efforts to business, labor and mass direct mail solicitations

The package includes four models of varying complexity; each can be used at ten levels of difficulty. The more complex models introduce the influences of incumbancy, campaign finance and spending limits.

Hail to the Chief has been used as a teaching aid in Political Science, Voting Behavior and Computer Science at the University level since 1976 It is a well proven package which includes a comprehensive manual.

3 Adventures

Disk CS-3516 $39.95
Requires 32K

Adventureland (by Scott Adams) You ll encounter wild animals dwarfs and many other puzzles and perils as you wander through an enchanted world trying to rescue the 13 lost treasures Can you rescue the Blue Ox from the quicksand? Or find your way out of the maze of pits? Happy Adventuring!

Pirate Adventure (by Scott Adams)— Yo Ho Ho and a bottle of rum You ll meet up with the pirate and his daffy bird along with many strange sights as you attempt to go from your London flat to Treasure Island Can you recover Long John Silver s lost treasures? Happy sailing matey

Mission Impossible Adventure (by Scott Adams)— Good Morning Your mission is to and so it starts Will you be able to complete your mission in time? Or is the world s first automated nuclear reactor doomed? This one s well named its hard there is no magic but plenty of **suspense**
Good Luck

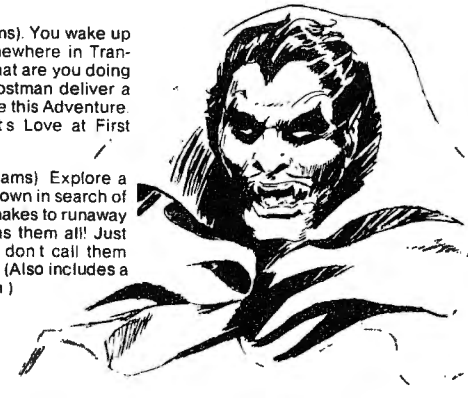
Voodoo Castle The Count and Ghost Town

Disk CS-3517 $39.95
Requires 32K

Voodoo Castle (by Scott Adams) Count Cristo has had a fiendish curse put on him by his enemies There he lies, you are his only hope will you be able to rescue him—or is he forever doomed? Beware the Voodoo man

The Count (by Scott Adams). You wake up in a large brass bed somewhere in Transylvania. Who are you, what are you doing here, and why did the postman deliver a bottle of blood? You ll love this Adventure. In fact, you might say it s Love at First Byte

Ghost Town (by Scott Adams) Explore a deserted western mining town in search of 13 treasures From rattlesnakes to runaway horses, this Adventure has them all! Just remember, pardner, they don t call them Ghost Towns for nothin! (Also includes a new bonus scoring system)



Original Adventure

Disk CS-3518 (48K) $19.95

This is the original adventure game complete with a colossal cave populated with nasty little dwarves, a giant clam, trools and much, much more. Includes the SAM76 language in which the game runs.

Adventures on Cassette

Five adventures are available separately on cassette Each requires 16K and costs $14.95

CS-3007 Adventureland
CS-3008 Pirate Adventure
CS-3009 Mission Impossible
CS-3010 Voodoo Castle
CS-3011 The Count

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Circle 20

```
1220 I$ = INKEY$ : IF I$ = "" THEN 1220
   ELSE IF I$ <> "Y" THEN 1190
1230 FOR Y = 0 TO 4 STEP 2 : PRINT@ 222
   +(Y * 64), CHR$(30); : NEXT : GOTO 1
  200
1240 I$ = INKEY$ : IF I$ = "" THEN 1240
   ELSE IF I$ = CHR$(13) THEN RETURN EL
  SE IF I$ < "0" OR I$ > "9" THEN 1240
  ELSE DE$ = DE$ + I$ : GOTO 1240
1250 ' SHOW THE FABRIC DESIGN ON THE PR
  INTER
1260 IF CO = 1 OR TF = 0 OR TR = 1 THEN
   470 ELSE LPRINT STRING$(2, 138)
1270 OK = 1 : T2 = TR - 1 : Z1 = 1 : SC
   = CO : DE$ = "" : PRINT COUNT - 1; "
  WARP STRINGS" : PRINT : PRINT "COLUMN
  S ON LARGE PAPER = 132 STANDARD OR 13
  2 COMPRESSED" : PRINT "COLUMNS ON SMA
  LL PAPER =  80 STANDARD OR 120 COMPRE
  SSED"
1280 PRINT : INPUT "LARGE OR SMALL PAPE
  R (L/S)"; I$ : PRINT : IF I$ = "L" TH
  EN P = 1 ELSE IF I$ = "S" THEN P = 0
  ELSE 1280
1290 INPUT "BLACK OR WHITE WARP (B/W)";
   I$ : PRINT : IF I$ = "B" THEN C1 = 2
  39 : C2 = 224 : ELSE IF I$ = "W" THEN
   C1 = 224 : C2 = 239 : ELSE 1290
1300 INPUT "STANDARD OR COMPRESSED PRIN
  TING (S/C)"; I$ : IF I$ = "S" THEN LP
  RINT CHR$(27); CHR$(15) ELSE IF I$ =
  "C" THEN LPRINT CHR$(27); CHR$(14) EL
  SE 1300
1310 CL = 132 : IF P = 0 THEN IF I$ = "
  S" THEN CL = 80 ELSE CL = 120
1320 IF COUNT - Z1 > CL THEN OK = 0 : Z
   = COUNT : COUNT = CL + Z1
1330 FOR X = 1 TO T2 : FOR Y = Z1 TO CO
  UNT - 1
1340 IF (TR(PA(X), 1) AND H(Y) = 1) OR
  (TR(PA(X), 2) AND H(Y) = 2) OR (TR(PA
  (X), 3) AND H(Y) = 3) OR (TR(PA(X), 4
  ) AND H(Y) = 4) THEN DE$ = DE$ + CHR$
  (C1) ELSE DE$ = DE$ + CHR$(C2)
1350 NEXT Y : LPRINT DE$ : DE$ = "" : N
  EXT X : LPRINT STRING$(2, 138) : IF O
  K = 1 THEN CO = SC : LPRINT CHR$(27);
   CHR$(15) : LPRINT STRING$(2, 138) :
  GOTO 470
1360 Z1 = COUNT : COUNT = Z : OK = 1 :
  GOTO 1320
1370 LPRINT CHR$(27); "6" : END
1380 ' INPUT PATTERN TITLE
1390 PRINT "ENTER THE PATTERN TITLE" :
  PRINT : P$ = "" : LINEINPUT "...:"; P
  $ : GOTO 470
```

Feature program

Home application...

Joe W Rocke, Ridgecrest, California

For Models I & III, 4K and up

A TRS-80 Super-market comparison shopper program

The two programs presented here are directed toward taking the confusion out of supermarket shopping. Supermarkets are constantly bombarding the public with TV and newspaper advertisements claiming "our prices are lower!" Some are offering to refund the difference between the price of a bag of groceries purchased at store X and the same items purchased at their store. However, I doubt they seldom have to pay off on this; after all, who wants to buy two bags of groceries? The thrifty shopper should be able to compare prices before laying cash on the line for purchased items.

Does shopping for advertised specials pay? Most supermarkets include shopper's specials in their major ads each week. The thrifty shopper is tempted to shop several stores, buying only the advertised bargains. Is doing so a true or false economy? The average shopper has no means of evaluating this shopping approach. The expenses associated with shopping tend to cloud the issue of how and where to shop for maximum economy. For example, the expense of owning and operating the family car used for shopping has a direct bearing on shopping cost. The distances involved in shopping a local market versus a more distant market offering reduced prices does affect shopping costs. The addition of non-household items such as toys, motor oil, etc., tend to hide the true cost of the weekly groceries.

The home computer is ideally suited to providing the information needed for one to become a "smart" shopper. It can provide a guide to which store provides the lowest overall shopping list total, and which store provides the greatest overall shopping economy. Application of the computer to a chore such as this is limited only by the scope of the shopping program.

The two programs presented here permit the shopper to comparison shop their favorite markets via newspaper ads. While this is not an ultimate test of shopping economy, the results provide a measure of the store's claims for economical shopping.

Newspaper advertisements provide the item and price information for comparison shopping entries. The important factor in comparing prices is to compare prices of like items. For example, an apple-to-oranges comparison is no measure of a store's fruit prices. Likewise, items must be compared on the same unit price basis, e.g., price per pound, per box, etc. Most stores use similar pricing units in their advertisements, but one must be aware of possible differences. For instance, a 12 ounce jar of jam at $1.09 may be a better buy than an 8 ounce jar at 98 cents, but comparing prices on a per jar basis would be false economy. However, the computer can easily make price comparisons of this type on a price per ounce basis.

Both programs include the cost of using the family car for shopping. This cost is calculated on a per mile basis for round trip distance from home to store. The cost per mile factor used in the programs is based on an average cost figure used by rental car companies. This figure includes insurance, maintenance and related operating costs.

The "computer shopper" will find that the addition of driving cost makes a surprising difference in shopping totals. Shopping the big discount stores may not reduce the household budget as much as one thinks. The results displayed by either of these programs may surprise you.

The Speedy Shopper (Program 1)

The Speedy Shopper program is just that, a means of quickly comparing costs on the basis of a basic shopping list. The program has provision for comparing the prices of three markets. Results of the data entries are presented as a single video display.

Program input requires the user to enter an item name for each of ten shopping categories. During initial program development this requirement seemed an unnecessary step. However, during trial use of the embryo program it became evident that a pencil/paper list was needed to assure comparison of like items. Using the meat category item as an example, comparing the price of a roast to that of a steak would be a false comparison. Thus, an item name must be entered for each shopping category.

The "PRICE?" prompt appears after entry of the item name. The user responds by entering the advertised price for the named item. The computer responds by displaying the next shopping category. This pattern is continued until inputs have been provided for all ten shopping categories. A typical input display is shown in Figure 1.

Single line input entries are achieved by use of the PRINT@ statement in conjunction with the INPUT statement. The PRINT@ is used for both item name and price inputs. This permits input of entries for all ten shopping categories without scrolling the display. As shown in Figure 1, all data for one market fits within the 16 line display parameters.

The PRINT@ input loop routine is presented in Listing 1. The first PRINT@ location is established by assigning an initial print location to variable G (line 120). Within the loop, G is incremented by 23 spaces to provide the print location for the price entry. Incrementing G by 41 spaces (line 180) establishes the prompt location for the initial entry on the next line. All inputs are stored in subscripted variables for future recall.

```
TYPE/ENTER ITEM NAME AFTER CATEGORY IS LISTED.

 1 .  MEAT ITEM          ITEM NAME ? STEAK      PRICE ? 1.98
 2 .  POUTRY ITEM        ITEM NAME ? CHICKEN    PRICE ? .79
 3 .  DAIRY ITEM         ITEM NAME ? CHEESE     PRICE ? 2.59
 4 .  FRESH VEGETABLE    ITEM NAME ? CELERY     PRICE ? .59
 5 .  FRESH FRUIT        ITEM NAME ? APPLES     PRICE ? .49
 6 .  CANNED ITEM        ITEM NAME ? TOMATOES   PRICE ? .88
 7 .  BAKERY ITEM        ITEM NAME ? BREAD      PRICE ? 1.09
 8 .  STAPLE ITEM        ITEM NAME ? SUGAR      PRICE ? .49
 9 .  BATH/KITCHEN       ITEM NAME ? L. SOAP    PRICE ? 1.79
10 .  MISCELLANEOUS      ITEM NAME ? WINE       PRICE ? 3.19
```

Figure 1

Price inputs for store B are handled in much the same manner as for store A. The exception is that item names entered during the store A input cycle are displayed in place of shopping categories (see Figure 2). Display of the item name prompts the user to enter the price for a like item. The need to rely on human memory or a penciled list for item names is eliminated.

```
TYPE/ENTER ALL-WAYS PRICES FOR SAME ITEMS.

 1 .  STEAK          PRICE ? 2.09
 2 .  CHICKEN        PRICE ? .69
 3 .  CHEESE         PRICE ? 2.79
 4 .  CELERY         PRICE ? .69
 5 .  APPLES         PRICE ? .33
 6 .  TOMATOES       PRICE ? .89
 7 .  BREAD          PRICE ? .99
 8 .  SUGAR          PRICE ? .55
 9 .  L. SOAP        PRICE ? 1.99
10 .  WINE           PRICE ? 2.89
```

Figure 2

The comparison shopper has the option of entering price information for a third store by means of the "TYPE 1 TO ADD A 3RD STORE LISTING ELSE 0 ?" prompt. In response to the prompt, the conditional branch statement of program line 300 either allows program flow to continue to the third input loop or jumps it to the summary display of line 380.

The third store entry loop is virtually a duplicate of that for the second store entries, with the exception of the screen display. In this case, the prices for stores A and B are displayed for reference. This allows the totals to be displayed immediately after the last price entry is made. The resulting display is shown in Figure 3.

```
TYPE/ENTER T-MART PRICES FOR SAME ITEMS.
     ITEM          SAVEWAY        ALL-WAYS        T-MART
 1 .  STEAK        1.98           2.09          ? 2.19
 2 .  CHICKEN      .79            .69           ? .75
 3 .  CHEESE       2.59           2.79          ? 2.49
 4 .  CELERY       .59            .69           ? .49
 5 .  APPLES       .49            .33           ? .39
 6 .  TOMATOES     .88            .89           ? .79
 7 .  BREAD        1.09           .99           ? .89
 8 .  SUGAR        .49            .55           ? .51
 9 .  L. SOAP      1.79           1.99          ? 1.79
10 .  WINE         3.19           2.89          ? 2.99
```

Figure 3

Continuation of the program results in the display of Figure 4. Driving costs have been added at this point. The shopping list totals now represent a more accurate comparison of shopping costs for each store.

As the name implies, this program provides a quick means of comparing the prices of three stores with a minimum of user entries. While the results may not be statistically conclusive, they are a fair representation of the respective store's pricing structure.

This is a "speedy shopper" program, right? They why not enter prices of all stores at the same time? That question can best be answered by a question; have you tried juggling three sheets of newsprint at one time while making keyboard entries? If not, you will find trying to do so very inconvenient! Hence the reason for structuring this program in three input loops.

ITEM	SAVEWAY	ALL-WAYS	T-MART
MEAT ITEM	1.98	2.09	2.19
POUTRY ITEM	0.79	0.69	0.75
DAIRY ITEM	2.59	2.79	2.49
FRESH VEGETABLE	0.59	0.69	0.49
FRESH FRUIT	0.49	0.33	0.39
CANNED ITEM	0.88	0.89	0.79
BAKERY ITEM	1.09	0.99	0.89
STAPLE ITEM	0.49	0.55	0.51
BATH/KITCHEN	1.79	1.99	1.79
MISCELLANEOUS	3.19	2.89	2.99
SUBTOTALS	13.88	13.9	13.28

> SHOPPING SUMMARY <

MARKET	SAVEWAY	ALL-WAYS	T-MART
SUBTOTAL	13.99	13.90	13.28
CAR COST	0.90	1.20	1.80
TOTALS	14.89	15.10	15.08

Figure 4

The Shopping List (Program 2)

The Shopping List program permits entry of a more extensive shopping list. The object of this program is to provide a more thorough price comparison. The program is structured to use the weekly shopping list as a basis for entering item/price information.

The program also includes provision for comparing prices on a common unit basis when necessary. This is achieved by adding an asterisk (*) at the end of any item name entry priced on a quantity basis. For example, how does a 14 ounce bottle of catsup at 89 cents compare to a 44 ounce bottle at $1.35? The asterisk appended to a "CATSUP*" item entry causes the computer to branch to a unit price routine for computation of the price on a per ounce basis. This entry procedure is illustrated in Figure 5 a,b, which also includes the initial program instructions.

The initial input loop calls for the user to enter item names followed by the advertised price. No attempt has been made to format the entries with a PRINT@ input. The program could be edited to include this feature by using an input loop similar to that presented in Listing 1.

All input loops are virtually identical except for the use of different variables. Variables A, B and C have been used for each of the respective loops as a convenience in store identification during program development. The repetitive routines such as mileage computation and total accumulation could have been set up as subroutines. However, the repetitive approach was used for simplicity in programming.

The program provides the option of excluding third store entries. Excluding third store entries created a problem in making final price comparisons via logical operators. This problem is circumvented by initializing third store totals at "99" if no third store entries are made. Thus the "$99.00" totals shown in the summarizing display of Figure 6 are fictitious totals. Otherwise, three valid totals will be displayed if entries have been made for three stores. Use of these totals permits computer identification of the store providing the lowest shopping list total, and the store providing the best shopping economy.

The program concludes with the computer displaying "THE DECISION IS UP TO YOU!". Whether or not the computer shopper alters shopping habits as a result of the program is a matter of shopping preference. However, it is interesting to find how much the total price varies from one store to another, and how driving cost can affect shopping cost. Given these facts, it is probable that we would all change our shopping habits if our cars were coin operated. Until such time, the shopping choice is up to you! ■

```
                > PERSONAL SHOPPING LIST <

TYPE/ENTER YOUR SHOPPING LIST PER TRS-80 INSTRUCTIONS

INCLUDE DECIMAL FOR PRICES LESS THAN $1.00, AS '.59'.

ENTER '*' AFTER ITEM FOR UNIT PRICED ITEM.

TRS-80 WILL PLAY BACK THE SHOPPING LIST SO YOU MAY ENTER
THE PRICES FOR A 2ND OR 3RD STORE.

LIST TOTALS FOR EACH STORE WILL BE DISPLAYED UPON COMPLETION
OF ALL ENTIRES.
```

Figure 5a

```
TYPE/ENTER LIST ITEM ',' AND SAVEWAY ADVERTISED PRICE
(TYPE 'END , 0' TO END ENTRIES);

 1 .  ? RND STEAK, 1.89
 2 .  ? BACON, 1.19
 3 .  ? FRANKS, 1.79
 4 .  ? EGGS, .89
 5 .  ? POTATOES-LB, .29
 6 .  ? CARROTS, .35
 7 .  ? CELERY, .59
 8 .  ? CATSUP*, .89
            . . . UNIT PRICE COMPUTATION . . .
ENTER PRICING UNIT NUMBER FOR CATSUP*? 24
UNIT PRICE FOR CATSUP* IS  .0370833
 9 .  ? COFFEE-LB, 2.89
 10 .  ? FLOUR-5 LB*, .89
```

Figure 5b

LIST ITEMS	SAVEWAY	T-MART	NO ENTRY
1 . RND STEAK	$ 1.89	$ 2.19	$ 0.00
2 . BACON	$ 1.19	$ 1.39	$ 0.00
3 . FRANKS	$ 1.79	$ 1.49	$ 0.00
4 . EGGS	$ 0.89	$ 0.99	$ 0.00
5 . POTATOES-LB	$ 0.29	$ 0.25	$ 0.00
6 . CARROTS	$ 0.35	$ 0.33	$ 0.00
7 . CELERY	$ 0.59	$ 0.49	$ 0.00
8 . CATSUP*	$ 0.04	$ 0.03	$ 0.00
9 . COFFEE-LB	$ 2.89	$ 2.39	$ 0.00
10 . FLOUR-5 LB*	$ 0.18	$ 0.16	$ 0.00
11 . FISH STIX	$ 1.49	$ 1.59	$ 0.00
12 . BREAD	$ 1.09	$ 0.89	$ 0.00

PRESS =SPACEBAR= TO CONTINUE

LIST ITEMS	SAVEWAY	T-MART	NO ENTRY
TOTALS	$ 12.68	$ 12.19	$ 99.00

Figure 6a

```
                PRESS =SPACEBAR= TO CONTINUE

          . . . PRICE COMPARISON SUMMARY . . .
STORE          LIST TOTAL      CAR COST        TOTAL COST

SAVEWAY        $ 12.68         $  0.90         $ 13.58
T-MART         $ 12.19         $  1.80         $ 13.99
NO ENTRY       $ 99.00         $  0.00         $ 99.00

---> T-MART OFFERS LOWEST OVERALL PRICE TOTAL.

     SAVEWAY PROVIDES THE BEST SHOPPING ECONOMY.

THE SHOPPING CHOICE IS UP TO YOU!
```

Figure 6b

Program 1 (The Speedy Shopper)

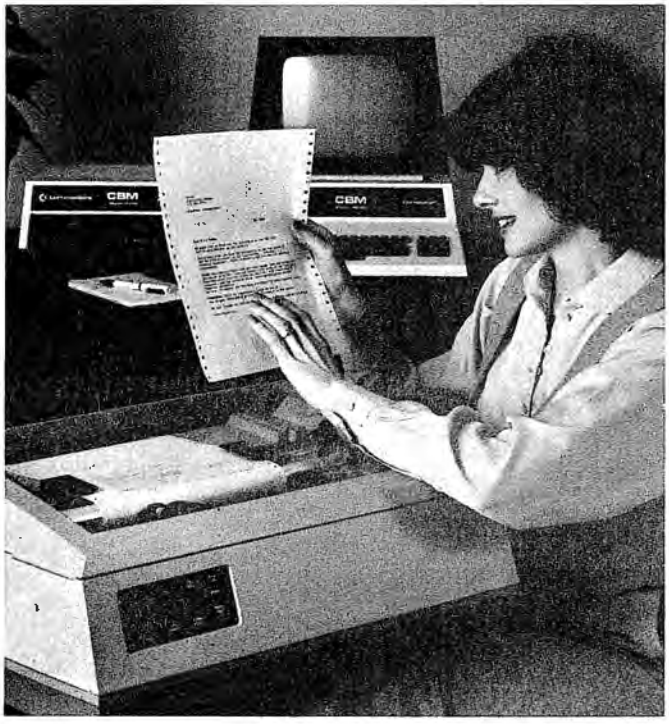
```
1 '          >  COMPARISON SHOPPING  <
2 '                    BY
3 '                JOE W. ROCKE
4 '                224 W BENSON
5 '             RIDGECREST, CA 93555
6 '
7 '        ---- SPEEDY SHOPPER 10/80  ---
  -
8 '
10 CLEAR 100 : S$ = "####.##"
20 CLS : PRINT CHR$(23)
30 PRINT @ 322, "-- COMPARISON SHOPPING
   --"
40 PRINT @ 448, "BASIC 10 ITEM SHOPPING
   LIST"
50 FOR T = 1 TO 2500 : NEXT
60 TA = 0 : TB = 0 : TC = 0 : RESTORE :
   CLS
70 PRINT @ 320, "TYPE 1 FOR BASIC INSTR
  UCTIONS, ELSE 0"; : INPUT Z
80 IF Z = 1 GOSUB 620 ELSE 90
90 PRINT @ 320, CHR$(31) : GOSUB 600
100 A$ = Y$ : MA = D * .3 * 2
110 CLS : PRINT "TYPE/ENTER ITEM NAME A
  FTER CATEGORY IS LISTED."
120 PRINT : G = 151
130 FOR N = 1 TO 10 : READ I$(N)
140 PRINT N".  "I$(N); : PRINT @ G, "IT
  EM NAME "; : INPUT N$(N)
150 '            N$(N)=FOOD ITEM NAME
160 G = G + 23 : PRINT @ G, "PRICE "; :
   INPUT A(N)
170 TA = TA + A(N)
180 G = G + 41 : NEXT
190 GOSUB 580 : CLS : PRINT "PREPARE TO
   ENTER PRICES FOR 2ND STORE"
200 GOSUB 600 : B$ = Y$ : MB = D * .3 *
   2
210 CLS : PRINT "TYPE/ENTER "; B$; " PR
  ICES FOR SAME ITEMS."
220 PRINT : G = 151
230 FOR N = 1 TO 10 : PRINT N ".  " N$(
  N);
240 PRINT @ G, "PRICE "; : INPUT B(N) :
   G = G + 64
250 TB = TB + B(N)
260 NEXT
270 GOSUB 580 : CLS
280 PRINT @ 320, "TYPE 1 TO ADD A 3RD S
  TORE LISTING ELSE 0 ";
290 INPUT Z
300 IF Z = 0 C$ = "" : IF Z = 1 THEN 31
  0 ELSE 380
310 PRINT @ 320, CHR$(30) : GOSUB 600
320 C$ = Y$ : MC = D * .3 * 2 : G = 174

330 CLS : PRINT "TYPE/ENTER "; C$; " PR
  ICES FOR SAME ITEMS."
340 PRINT TAB(5) "ITEM", A$, B$, C$
350 FOR N = 1 TO 10 : PRINT N ".  "N$(N
  ), A(N), B(N)
360 PRINT@ G,; : INPUT C(N) : TC = TC +
   C(N)
370 G = G + 64 : NEXT : GOSUB 580
380 CLS : PRINT@ 0, "ITEM", A$, B$, C$
  : PRINT
390 FOR N = 1 TO 10 : PRINT I$(N),
400 PRINT TAB(16) USING S$; A(N); : PRI
  NT TAB(32) USING S$; B(N); : PRINT TA
  B(48) USING S$; C(N)
410 NEXT
420 PRINT : PRINT "SUBTOTALS", TA, TB,
  TC : GOSUB 580
430 CLS : PRINT TAB(22)"> SHOPPING SUMM
  ARY <" : PRINT
```

```
440 PRINT "MARKET", A$, B$, C$ : PRINT

450 PRINT "SUBTOTAL", : PRINTUSING S$;
  TA,
460 PRINT TAB(32) USING S$; TB; : PRINT
   TAB(48) USING S$; TC
470 PRINT "CAR COST", : PRINT TAB(16) U
  SING S$; MA;
480 PRINT TAB(32) USING S$; MB; : PRINT
   TAB(48) USING S$; MC
490 PRINT "  ", "--------", "--------",
   "--------"
500 E = MA + TA : F = MB + TB : G = MC
  + TC
510 PRINT "TOTALS", : PRINT TAB(16) USI
  NG S$; E;
520 PRINT TAB(32) USING S$; F; : PRINT
  TAB(48) USING S$; G
530 PRINT@ 970, "TYPE/ENTER 1 TO REPEAT
   PROGRAM, ELSE 0 "; : INPUT X
540 IF X = 1 GOTO 10 ELSE 550
550 CLS : PRINT CHR$(23) : PRINT@ 320,
  "THANK YOU. GLAD TO BE OF SERVICE" :
  PRINT@ 896, "END" : GOTO 570
560 DATA MEAT ITEM, POUTRY ITEM, DAIRY
  ITEM, FRESH VEGETABLE, FRESH FRUIT, C
  ANNED ITEM, BAKERY ITEM, STAPLE ITEM,
   BATH/KITCHEN, MISCELLANEOUS
570 END
580 PRINT@ 978, "PRESS =SPACEBAR= TO CO
  NTINUE";
590 Z$ = INKEY$ : IF Z$ <> CHR$(32) THE
  N 590 ELSE RETURN
600 PRINT@ 320, "TYPE/ENTER NAME OF MAR
  KET TO BE SHOPPED "; : INPUT Y$
610 PRINT@ 448, "TYPE/ENTER MILES DRIVI
  NG DISTANCE TO "; Y$; : INPUT D : RET
  URN
620 CLS : PRINT TAB(14)"> SUPERMARKET C
  OMPARISON SHOPPING <" : PRINT
630 PRINT "TRS-80 WILL LIST 10 FOOD CAT
  EGORIES.

TYPE IN AN ITEM NAME AFTER '?' PROMPT."

640 PRINT : PRINT "TYPE/ENTER ITEM PRIC
  E AFTER 'PRICE ?' PROMPT." : PRINT
650 PRINT "INCLUDE DECIMAL FOR PRICES L
  ESS THEN $1.00" : PRINT
660 PRINT "TRS-80 WILL KEEP TRACK OF TH
  E PRICES FOR EACH STORE AND
DISPLAY A SHOPPING LIST TOTAL FOR EACH.
  " : PRINT
670 PRINT "THE FINAL CHOICE IS UP TO YO
  U !" : GOSUB 580 : CLS : RETURN
```

Program 2 (The Shopping List)

```
1 '    >  COMPARISON SHOPPING  <
2 '                BY
3 '           JOE W. ROCKE
4 '           224 W BENSON
5 '       RIDGECREST, CA 93555
6 '             11/1/80
7 ' ---> PERSONALIZED SHOPPING LIST <--
  -
8 '
10 CLEAR 1000 : DIM I$(35), A(50), B(50
  ), C(50), X(59) : S$ = "$###.##"
20 CLS : PRINT TAB(20)"> PERSONAL SHOPP
  ING LIST <"
30 PRINT STRING$(64, 45)
40 MA = 0 : MB = 0 : MC = 0 : TA = 0 :
  TB = 0 : TC = 0 : L = 1
50 PRINT "TYPE/ENTER YOUR SHOPPING LIST
   PER TRS-80 INSTRUCTIONS"
60 PRINT : PRINT "INCLUDE DECIMAL FOR P
  RICES LESS THAN $1.00, AS '.59'."
70 PRINT : PRINT "ENTER '*' AFTER ITEM
  FOR UNIT PRICED ITEM."
80 PRINT : PRINT "TRS-80 WILL PLAY BACK
   THE SHOPPING LIST SO YOU MAY ENTER
THE PRICES FOR A 2ND OR 3RD STORE." : P
  RINT
90 PRINT "LIST TOTALS FOR EACH STORE WI
  LL BE DISPLAYED UPON COMPLETION
OF ALL ENTIRES."
100 GOSUB 690 : CLS
110 PRINT "PREPARE TO ENTER PRICES FOR
  1ST STORE:"
120 GOSUB 710 : A$ = Y$
130 MA = D * .6
140 CLS : PRINT "TYPE/ENTER LIST ITEM '
  ,' AND "A$ " ADVERTISED PRICE
(TYPE 'END , 0' TO END ENTRIES):" : PRI
  NT
150 N = 1
160 PRINT N".  "; : INPUT I$(N), A(N)
170 IF I$(N) = "END" THEN 220 ELSE 180
180 X(N) = A(N) : GOSUB 820 : A(N) = X(
  N)
190 TA = TA + A(N)
200 N = N + 1
210 L = L + 1 : GOTO 160
220 DA = TA + MA
230 GOSUB 690 : CLS
240 CLS : PRINT "PREPARE TO ENTER PRICE
  S FOR 2ND STORE:"
250 GOSUB 710
260 B$ = Y$ : MB = D * .6
```

LETTER-PERFECT PRINTER DOUBLES AS DATA CRUNCHER.



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Printers for the long run.

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```
270 CLS : PRINT "TYPE/ENTER ADVERTISED
  PRICE FOR "; B$; " :" : PRINT
280 FOR N = 1 TO L - 1
290 PRINT N". "I$(N); : INPUT B(N)
300 X(N) = B(N) : GOSUB 820 : B(N) = X(
  N) :
310 TB = TB + B(N) : NEXT
320 DB = TB + MB
330 GOSUB 690 : CLS
340 PRINT@ 320, "TYPE 1 TO ENTER PRICES
   FOR A 3RD STORE, ELSE 0 ";
350 INPUT Z
360 IF A = 1 THEN 380 ELSE 370
370 C$ = "NO ENTRY" : TC = 99 : DC = 99
  : GOTO 450
380 CLS : PRINT "PREPARE TO ENTER PRICE
  S FOR 3RD STORE:"
390 GOSUB 710 : C$ = Y$
400 MC = D * .6
410 CLS : PRINT "TYPE/ENTER ADVERTISED
  PRICE FOR "; C$; " :" : PRINT
420 FOR N = 1 TO L - 1 : PRINT N". "I$(
  N); : INPUT C(N)
430 TC = TC + C(N) : NEXT
440 DC = TC + MC
450 CLS : PRINT@ 320, "TYPE 1 TO REVIEW
   ITEMIZED LIST,
    ELSE 0 FOR STORE TOTALS "; : INPUT
  Z
460 IF Z = 1 THEN 470 ELSE 550
470 GOSUB 740 : C = 1
480 FOR N = 1 TO L - 1 : PRINT N". "I$(
  N);
490 PRINT TAB(30) USING S$; A(N); : PRI
  NT TAB(42) USING S$; B(N); : PRINT TA
  B(55) USING S$; C(N)
500 IF C = 12 GOTO 510 ELSE 520
510 GOSUB 690 : GOSUB 740 : C = 0 : GOT
  O 520
520 C = C + 1 : NEXT
530 PRINT : PRINT "TOTALS"; : PRINT TAB
  (30) USING S$; TA; : PRINT TAB(42) US
  ING S$; TB; : PRINT TAB(55) USING S$;
   TC
540 GOSUB 690 : CLS
550 CLS : PRINT TAB(10)". . . PRICE COM
  PARISON SUMMARY . . ."
560 PRINT "STORE", "LIST TOTAL", "CAR C
  OST", "TOTAL COST" : PRINT
570 PRINT A$; : PRINT TAB(16) USING S$;
   TA; : PRINT TAB(32) USING S$; MA; :
  PRINT TAB(48) USING S$; DA
580 PRINT B$; : PRINT TAB(16) USING S$;
   TB; : PRINT TAB(32) USING S$; MB; :
  PRINT TAB(48) USING S$; DB
590 PRINT C$; : PRINT TAB(16) USING S$;
   TC; : PRINT TAB(32) USING S$; MC; :
  PRINT TAB(48) USING S$; DC
600 GOSUB 750
610 PRINT : PRINT "---> "; X$; " OFFERS
   LOWEST OVERALL PRICE TOTAL."
620 PRINT : PRINT "     "; Y$; " PROVID
  ES THE BEST SHOPPING ECONOMY."
630 PRINT : PRINT "THE SHOPPING CHOICE
  IS UP TO YOU!"
640 GOSUB 690
650 CLS : PRINT "TO REVIEW THE LIST, TY
  PE 1 OTHERWISE 0"; : INPUT Z
660 IF Z = 1 GOTO 470 ELSE 670
670 CLS : PRINT CHR$(23) : PRINT@ 128,
  "THE DECISION IS UP TO YOU"
680 END
690 PRINT@ 978, "PRESS =SPACEBAR= TO CO
  NTINUE";
700 Z$ = INKEY$ : IF Z$ <> CHR$(32) THE
  N 700 ELSE RETURN
710 PRINT@ 320, "TYPE/ENTER NAME OF MAR
  KET TO BE SHOPPED ";
720 INPUT Y$
730 PRINT@ 448, "TYPE/ENTER MILES DRIVI
  NG DISTANCE TO "; Y$; : INPUT D : RET
  URN
740 CLS : PRINT "LIST ITEMS"; TAB(30)A$
  ; TAB(42)B$ TAB(55)C$ : RETURN
750 IF TA < TB AND TA < TC THEN XA = TA
   : X$ = A$
760 IF TB < TA AND TB < TC : XA = TB :
  X$ = B$
770 IF TC < TB AND TC < TA THEN XA = TC
   : X$ = C$
780 IF DA < DB AND DA < DC THEN YA = DA
   : Y$ = A$
790 IF DB < DA AND DB < DC THEN YB = DB
   : Y$ = B$
800 IF DC < DA AND DC < DB THEN YC = DC
   : Y$ = C$
810 RETURN
820 U = LEN(I$(N))
830 X$ = RIGHT$(I$(N), (U -(U - 1)))
840 IF X$ = "*" GOTO 850 ELSE RETURN
850 PRINT TAB(15)". . . UNIT PRICE COMP
  UTATION . . ."
860 PRINT "ENTER PRICING UNIT NUMBER FO
  R "; I$(N);
870 INPUT PU
880 X(N) = X(N)/PU
890 PRINT "UNIT PRICE FOR "; I$(N); " I
  S "; X(N)
900 RETURN
```

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  To allow sections of BASIC programs to be deleted and replaced with lines from a disk file during program execution. Also allows merging of non-ASC II format files.
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Circle 24

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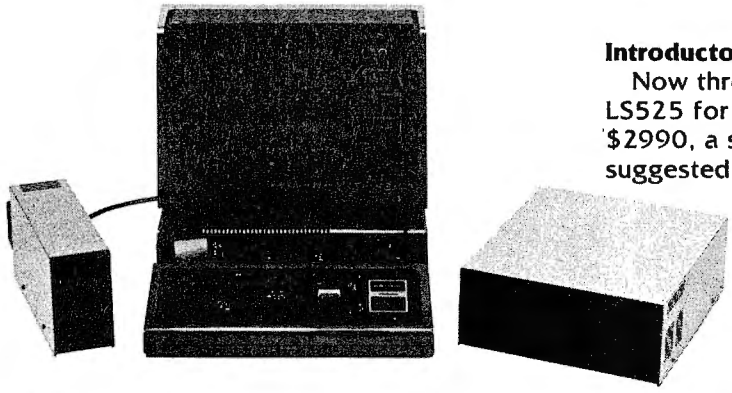

Introductory Offer To TRS80 Users.

Now through October 1, 1981 buy the LS525 for the OEM/dealer price of $2990, a savings of $760 off the usual suggested retail price of $3750.

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For more information about the LS525 Memory System and the LSI 500 Series Controller, contact:

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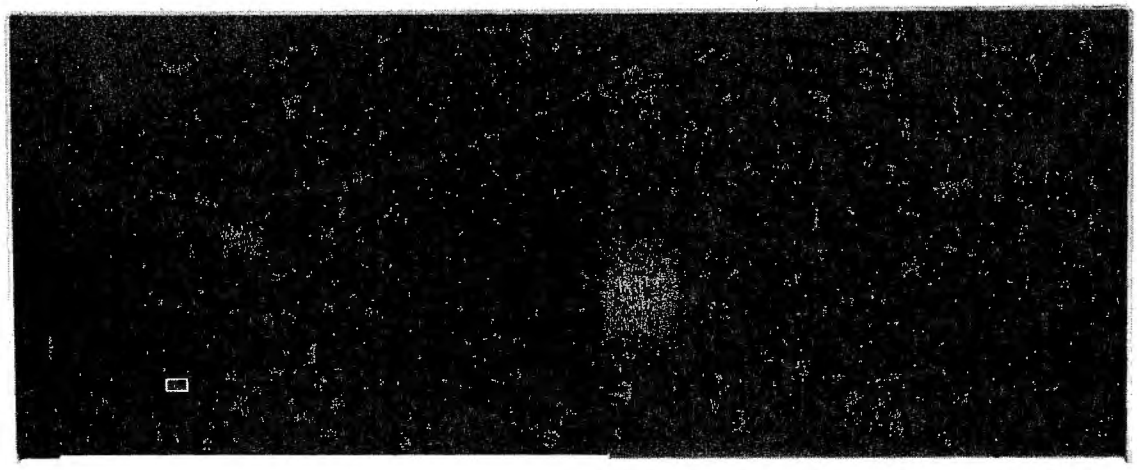
669 Giraudo Drive, San Jose, CA 95111
(408) 629-2283



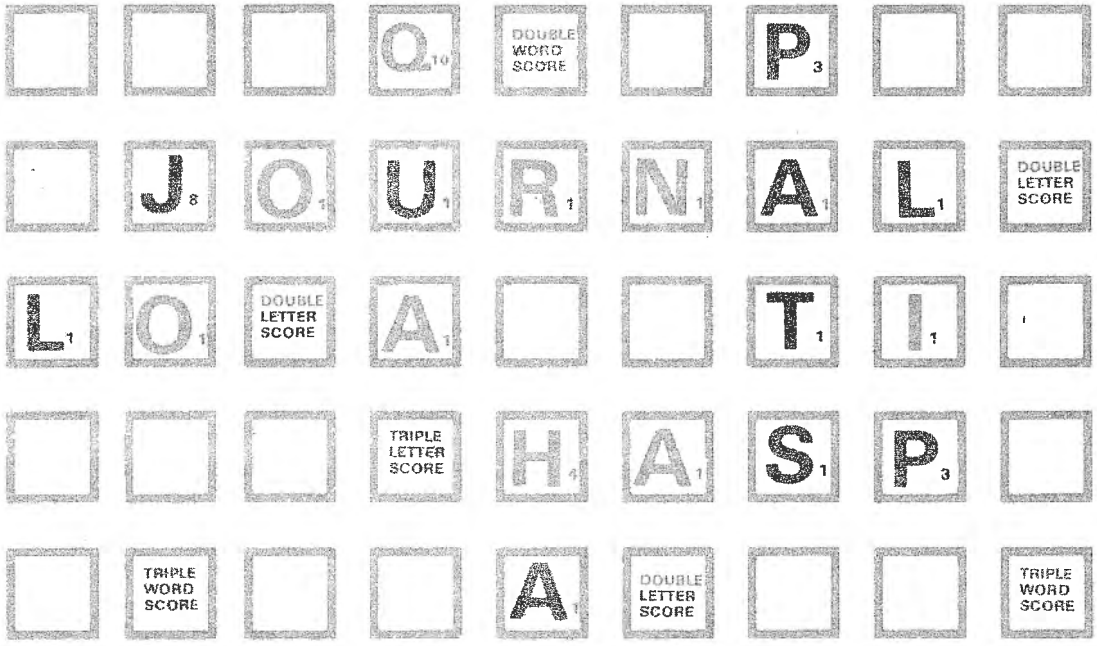
laredo systems inc.

A scrabble-like game for the TRS-80

Crossword

Stanley Silverman, Huntington Beach, California

For Models I & III tape or disk



Crossword may be played by 1, 2, 3 or 4 players. (The one-player game, although not competitive, is valuable for practice.) In the two to four-player games, the players compete for highest score by using skill in the positioning of letters to take advantage of the score value of the letters as well as premium-valued board positions.

To begin

By mutual consent, the players assign themselves a player number. Since the first player to play could have an advantage, the program will determine, by random selection, which player is first.

Load the program. Then type RUN and press the ENTER key. Answer the question "DO YOU WANT RULES?" with yes or no, depending on whether or not you need a refresher course on the game rules. (The rules within the program are more brief than those described here, but contain essentially the same information.)

Answer the question "HOW MANY PLAYERS (1 - 4)" with the appropriate number and press ENTER.

After a brief pause for set-up, the board will be drawn on the screen. The board consists of 255 playable squares arranged in 15 rows of 15 squares. Some squares have premium values as shown by the following:

1. Squares marked D*L double the score of a letter placed on them.
2. Squares marked T*L triple the score of a letter placed on them.
3. Squares marked D*W double the score of the entire word when one of its letters is placed on them.

4. Squares marked T*W triple the score of the entire word when one of its letters is placed on them.

5. The center square is marked ***. It scores as a D*W square.

The players' scores are displayed along the left edge of the screen. Initially, 100 letters are stored in the letter pool. The letter rack is shown at the bottom of the screen just below the last row of the board. Players are dealt seven letters at the beginning of each turn. They are displayed along with their score values. Examples: B(3) E(1) W(4).

There are also two "blank" letters in the letter pool which, when displayed on the letter rack, look like this: -(0). These blanks may be used as any letter desired, but once chosen to substitute for a particular letter they may not be changed during the game. Their score value is zero.

The play

The first player combines two or more of his letters to form a word and places them on the board to read either across or down with one letter on the center (***) square. This is done by typing the desired letter and pressing ENTER. To select a blank type the "-" character. If the letter is available on the rack it will be marked with an arrow. Example: ➧B(3).

Using the arrow keys, move the blinking cursor to the square to which you wish the letter moved. Press ENTER. If that square is available, the chosen letter will appear on that square.

Continue moving letters until the word is complete. If, by accident, you move one or more of your letters to a wrong square, you may retract the letters from the board by typing the word "OOPS" and pressing ENTER. This will not affect your score or cause you to lose your turn. It simply begins your turn anew.

When satisfied that your word is correctly spelled and properly placed on the board, type the word "SCORE" and press ENTER. Your move will now be scored and any unused letters will be returned to the pool. The next player will now be dealt a new ration of letters.

The next player now has a choice: he may begin to move his letters or he may challenge the previous player's word. He would challenge the prior player based on suspected misspelling or improper placement on the board. If, after appropriate discussion, dictionary consultation, etc., the previous player's word is found to be unacceptable, the challenging player now types the word "CHALLENGE" (if all nine letters are typed, it will not be necessary to press ENTER). This will cause the prior player's letters to be removed from the board and placed back into the pool. That player's score total will also be decreased by the amount of the prior word score. Once a player has moved his first letter to the board, the CHALLENGE command will become inoperative, so keep your eyes open!

Each player, in turn, adds one or more letters to those already played to form new words. All letters in a turn must be placed either in one row across the board or down the board. If they touch letters in other rows, they must form complete words with those letters.

Play continues until all letters have been used or until all players agree that further play is impossible. The player with the highest score wins. If asterisks (***) begin to appear on the letter rack, the letter pool is empty.

There are two other commands available which may be helpful. Typing CLEAR then pressing ENTER will permit easier viewing of the played letters: premium legends are abbreviated to a single asterisk.

Typing RESTORE and pressing ENTER will return the screen to its original format.

Scoring

The player's score is increased by the sum of the score values of each letter in each new word formed or each word modified in the player's turn. To this, the premium values which result from placing letters on premium value squares is added.

Premiums for D*L and T*L squares are calculated before calculating the premiums for D*W and T*W squares. If a word covers two D*W or T*W squares, the score will be doubled and then re-doubled or tripled and then re-tripled as appropriate.

Premiums apply only in the turn in which they are first played.

If more than one word is formed in a turn, each word is scored. The common letter is counted (with premium, if any) for each word.

A bonus of 50 points is added if all seven letters are played in a single turn.

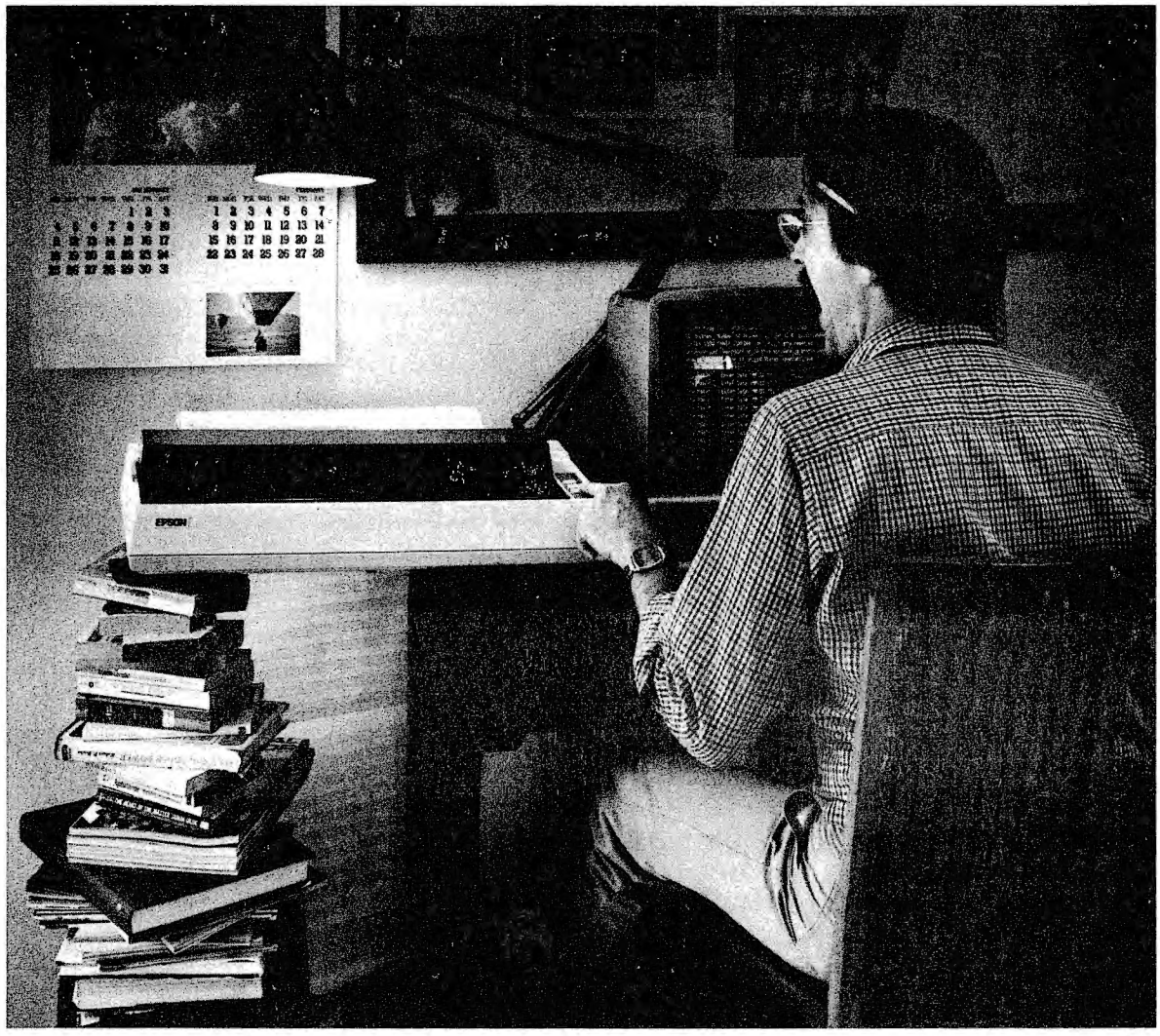
Miscellaneous

Program code is included for WEB Associates "TBEEP". The TBEEP will "beep" when an input error is made. This software causes no ill effect to those TRS-80 machines without TBEEP ■

```
10 'CROSSWORD VERS. 2.0: S. SILVERMAN H
  UNTINGTON BEACH, CA 92647
20 CLS:CLEAR4650:RANDOM:DEFSTRB,M,O,T:D
  EFINTA,C,I-L,P,S,U,Z:DIMB(225),BC(13)
  ,H(6),HC(6),HM(6),HN(6),HS(6),L(13),O
  (13),S(225),SC(4),SS(6),T(99),U(13),V
  (6),VC(6),VM(6),VN(6),VS(6):PRINTCHR$
  (23)TAB(11)"CROSSWORD
```

```
(C) 1979 AND 1981, S. SILVERMAN

"
30 CU=113:INPUT"DO YOU WANT RULES";O:IF
  LEFT$(O,1)="Y"THEN1020ELSEIFLEFT$(O,1
  )<>"N"THEN30
40 CLS:PRINTCHR$(23):INPUT"HOW MANY PLA
  YERS  (1 TO 4)";P:PRINT:IFP<1ORP>4THE
  N40
50 IFP>1PRINT"THE COMPUTER WILL DECIDE
  WHICH
PLAYER IS FIRST.
"
60 PRINTTAB(6)"(SETTING-UP BOARD)":P1=R
  ND(P):FORI=2TO224:B(I)=" . ":S(I)=1:N
  EXT:B1="T*W":B2="D*L":B3="D*W":B4="T*
  L":B(113)="***":B(1)=B1:B(8)=B1:B(15)
  =B1:B(106)=B1:B(120)=B1:B(211)=B1:B(2
  18)=B1:B(225)=B1
70 B(4)=B2:B(12)=B2:B(37)=B2:B(39)=B2:B
  (46)=B2:B(53)=B2:B(60)=B2:B(93)=B2:B(
  97)=B2:B(99)=B2:B(103)=B2:B(109)=B2:B
  (117)=B2:B(123)=B2:B(127)=B2:B(129)=B
  2:B(133)=B2:B(166)=B2:B(173)=B2:B(180
  )=B2:B(187)=B2:B(189)=B2:B(214)=B2:B(
  222)=B2
80 B(17)=B3:B(29)=B3:B(33)=B3:B(43)=B3:
  B(49)=B3:B(57)=B3:B(65)=B3:B(71)=B3:B
  (155)=B3:B(161)=B3:B(169)=B3:B(177)=B
  3:B(183)=B3:B(193)=B3:B(197)=B3:B(209
  )=B3
90 B(21)=B4:B(25)=B4:B(77)=B4:B(81)=B4:
  B(85)=B4:B(89)=B4:B(137)=B4:B(141)=B4
  :B(145)=B4:B(149)=B4:B(201)=B4:B(205)
  =B4:S(1)=6:S(8)=6:S(15)=6:S(106)=6:S(
  120)=6:S(211)=6:S(218)=6:S(225)=6
100 S(4)=2:S(12)=2:S(37)=2:S(39)=2:S(46
  )=2:S(53)=2:S(60)=2:S(93)=2:S(97)=2:S
  (99)=2:S(103)=2:S(109)=2:S(117)=2:S(1
  23)=2:S(127)=2:S(129)=2:S(133)=2:S(16
  6)=2:S(173)=2:S(180)=2:S(187)=2:S(189
  )=2:S(214)=2:S(222)=2
110 S(17)=5:S(29)=5:S(33)=5:S(43)=5:S(4
  9)=5:S(57)=5:S(65)=5:S(71)=5:S(113)=5
  :S(155)=5:S(161)=5:S(169)=5:S(177)=5:
  S(183)=5:S(193)=5:S(197)=5:S(209)=5:S
  (21)=3:S(25)=3:S(77)=3:S(81)=3:S(85)=
  3:S(89)=3:S(137)=3:S(141)=3:S(145)=3:
  S(149)=3
120 S(201)=3:S(205)=3:FORI=0TO99:READT(
  I):NEXT:CLS:PRINT"PLR
#1":IFP=1THEN130ELSEPRINT@256,"PLR
#2":IFP=2THEN130ELSEPRINT@512,"PLR
#3":IFP=3THEN130ELSEPRINT@768,"PLR
#4"
130 GOSUB140:GOTO180
140 I=0:K=1:PRINTCHR$(15);
150 FORJ=KTOK+14:I=I+1:IFS(I)>9THEN160E
  LSEPRINT@J*4-1,CHR$(170);B(I);
160 NEXT:IFI=225THEN170ELSEK=K+16:GOTO1
  50
170 FORI=16259TO16315STEP4:POKEI,138:NE
  XT:RETURN
180 PRINT@981,"(SELECTING LETTERS)";:GO
  SUB910:IFJ=100THEN600
190 IFP1=PTHENP1=1ELSEP1=P1+1
200 FORI=0TO6
210 Z=RND(100):IFT(Z-1)="*"THEN210
220 O(I)=T(Z-1):L(I)=Z:T(Z-1)="*":GOSUB
  910:IFJ>99THEN610
230 NEXT
240 PRINT@960,CHR$(30);:FORI=0TO6:IFO(I
  )="*"THEN620ELSEPRINT@981+I*6,RIGHT$(
  O(I),1);VAL(O(I));CHR$(24);") ";:PRIN
  T@982+I*6,"(";
250 NEXT
260 PRINT@960,P1;:PRINT@960,"#";:PRINT@
  962,"'S MOVE ";CHR$(14);
270 FORI=1TO9
280 M=INKEY$:IFM=""THEN280ELSEIFASC(M)=
  10THEN280ELSEIFASC(M)=13THEN630ELSEIF
  ASC(M)=8THEN670ELSEPRINT@969+I,M;:M(I
  )=M:NEXT
290 GOTO630
300 C=0:K=1+4*CU+INT((CU-1)/15)*4
310 PRINT@K,CHR$(15);CHR$(143);:J=PEEK(
  14400):FORZ=0TO19:NEXT:PRINT@K,MID$(B
  (CU),2,1);:IFJ=1THEN320ELSEIFJ=8THEN9
  80ELSEIFJ=16THEN990ELSEIFJ=32THEN960E
  LSEIFJ=64THEN970ELSE310
320 IFS(CU)>9THEN830ELSESS(I)=S(CU):S(C
  U)=S(CU)+10:B=" "+MID$(O(I),LEN(O(I))
  -1,1)+" ":PRINT@K-1,CHR$(15);B;:BC(I)
  =B(CU):B(CU)=B:U(I)=CU:M=INKEY$:GOTO6
  60
330 FORI=0TO6:HS(I)=0:HN(I)=0:HC(I)=0:H
  M(I)=1:H(I)=0:VS(I)=0:VN(I)=0:VC(I)=0
  :VM(I)=1:V(I)=0:NEXT:IFA=7THENS=50ELS
  ES=0
340 FORI=0TO6:IFRIGHT$(O(I+7),1)<>"*"OR
  LEN(O(I+7))=1THEN470
350 H=INT((U(I+7)-1)/15)*15+1:FORK=0TO6
  :IFH(K)=HTHEN400
360 NEXT:H(I)=H:FORJ=HTOH+14:IFS(J)<9TH
  EN500
370 IFS(J)<99THEN530
380 HC(I)=HC(I)+1:HS(I)=HS(I)+S(J)-100
390 NEXT:GOTO510
400 V=U(I+7)
```



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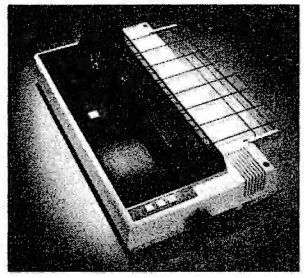

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```
410 V=V-15:IFV>0THEN410ELSEV=V+15
420 FORK=0TO6:IFV(K)=VTHEN470
430 NEXT:V(I)=V:FORJ=VTOV+210STEP15:IFS
  (J)<9THEN550
440 IFS(J)<99THEN580
450 VC(I)=VC(I)+1:VS(I)=VS(I)+S(J)-100
460 NEXT:GOTO560
470 NEXTI:FORI=7TO13:IFRIGHT$(O(I),1)="
  *"THENS(U(I))=100+VAL(O(I))
480 NEXT:FORI=0TO6:S=S+HS(I)+VS(I):NEXT
  :SC(P1)=SC(P1)+S:PRINT@127+(P1-1)*256
  ,STR$(SC(P1));:RETURN
490 PRINT@971," (";:FORJ=91TO94:PRINTCH
  R$(J);:NEXT:PRINT")";:RETURN
500 IFHN(I)=0THENHC(I)=0:HS(I)=0:GOTO39
  0
510 IFHC(I)>1THENHS(I)=HS(I)*HM(I)ELSEH
  S(I)=0
520 GOTO400
530 HN(I)=HN(I)+1:HC(I)=HC(I)+1:GOSUB93
  0:IFS(J)<14THENHS(I)=HS(I)+VAL(O(Q))*
  (S(J)-10)ELSEHS(I)=HS(I)+VAL(O(Q)):HM
  (I)=HM(I)*(S(J)-13)
540 GOTO390
550 IFVN(I)=0THENVC(I)=0:VS(I)=0:GOTO46
  0
560 IFVC(I)>1THENVS(I)=VS(I)*VM(I)ELSEV
  S(I)=0
570 GOTO470
580 VN(I)=VN(I)+1:VC(I)=VC(I)+1:GOSUB93
  0:IFS(J)<14THENVS(I)=VS(I)+VAL(O(Q))*
  (S(J)-10)ELSEVS(I)=VS(I)+VAL(O(Q)):VM
  (I)=VM(I)*(S(J)-13)
590 GOTO460
600 PRINT@960,:INPUT"OUT OF LETTERS.
    GAME IS OVER.    PLAY AGAIN   (YES/
  NO)";T:IFLEFT$(T,1)="Y"THENRUNELSEIFL
  EFT$(T,1)<>"N"THEN600ELSEEND
610 IFI=6THEN240ELSEFORJ=I+1TO6:O(J)="*
  ":NEXT:GOTO240
620 PRINT@981+I*6," *** ";:GOTO250
630 IFI<2THEN650ELSEIFI=2THEN680
640 M=M(1)+M(2)+M(3):IFM="OOP"THEN710EL
  SEIFM="CHA"THEN750ELSEIFM="SCO"THEN79
  0ELSEIFM="RES"THEN900ELSEIFM="CLE"THE
  N860
650 PRINT@971,CHR$(15);" WHAT ??";:GOSU
  B950
660 PRINT@970,CHR$(202);:GOTO260
670 IFI<2THEN270ELSEI=I-1:PRINTCHR$(8);
  :GOTO280
680 FORI=0TO6:IFM(1)=RIGHT$(O(I),1)THEN
  700ELSENEXT
690 GOTO650
700 PRINT@980+I*6,CHR$(15);CHR$(94);:GO
  SUB490:O(I)=O(I)+"*":GOTO300
710 PRINTCHR$(15);:FORI=0TO6:IFRIGHT$(O
  (I),1)="*"THEN730
720 NEXT:GOTO660
730 IFLEFT$(O(I),1)="*"THEN720ELSEPRINT
  @980+I*6," ";:GOSUB740:S(U(I))=SS(I):
  U(I)=0:GOTO720
740 O(I)=LEFT$(O(I),LEN(O(I))-1):B(U(I)
  )=BC(I):PRINT@(INT((U(I)-1)/15)*4)+4*
  U(I),BC(I);:RETURN
750 IFCTHEN760ELSEPRINT@970,CHR$(15);"N
  OT NOW!!";:GOSUB950:GOTO660
760 C=0:PRINTCHR$(15);:FORI=7TO13:IFRIG
  HT$(O(I),1)="*"THEN780
770 NEXT:SC(PO)=SC(PO)-S:PRINT@129+(PO-
  1)*256,"  ";:PRINT@127+(PO-1)*256,STR
  $(SC(PO));:GOTO660
780 GOSUB740:T(L(I)-1)=O(I):S(U(I))=SS(
  I-7):GOTO770
790 PRINT@980,CHR$(15);CHR$(30);TAB(28)
  "(SCORING)";:PO=P1:A=7:C=1:FORI=0TO6:
  O(I+7)=O(I):U(I+7)=U(I):L(I+7)=L(I):B
  C(I+7)=BC(I):NEXT
800 FORI=0TO6:IFRIGHT$(O(I),1)="*"THEN8
  40
810 A=A-1:T(L(I)-1)=O(I)
820 NEXT:GOSUB330:PRINT@960,CHR$(30);:G
  OTO180
830 PRINT@972,CHR$(15);" HUH??";:GOSUB9
  50:PRINT@972,CHR$(198);:GOSUB490:GOTO
  300
840 IFLEN(O(I))=1THENA=0
850 GOTO820
860 I=0:K=1:PRINTCHR$(15);
870 FORJ=KTOK+14:I=I+1:IFS(I)>9THEN890
880 IFMID$(B(I),2,1)="*"THENPRINT@J*4,"
   * ";
890 NEXT:IFI=225THEN660ELSEK=K+16:GOTO8
  70
900 GOSUB140:GOTO660
910 J=0:FORK=0TO99:IFT(K)="*"THENJ=J+1
920 NEXT:RETURN
930 FORQ=0TO6:IFU(Q)=JTHENRETURN
940 NEXT
950 OUT255,1:FORZ=1TO700:NEXT:OUT255,0:
  RETURN
960 IFCU=INT((CU-1)/15)*15+1THEN310ELSE
  CU=CU-1:GOTO300
970 IFCU/15=INT(CU/15)THEN310ELSECU=CU+
  1:GOTO300
980 IFCU<16THEN310ELSECU=CU-15:GOTO300
990 IFCU>210THEN310ELSECU=CU+15:GOTO300

1000 DATAO-,O-,1A,1A,1A,1A,1A,1A,1A,1A,
  1A,3B,3B,3C,3C,2D,2D,2D,2D,1A,1E,1E,1
  E,1E,1E,1E,1E,1E,1E,1E,1E,4F,4F,2G,2G
  ,2G,4H,4H,1I,1I,1I,1I,1I,1I,1I,1I,1I,
  8J,5K,1L,1L,1L,1L,3M,3M
```

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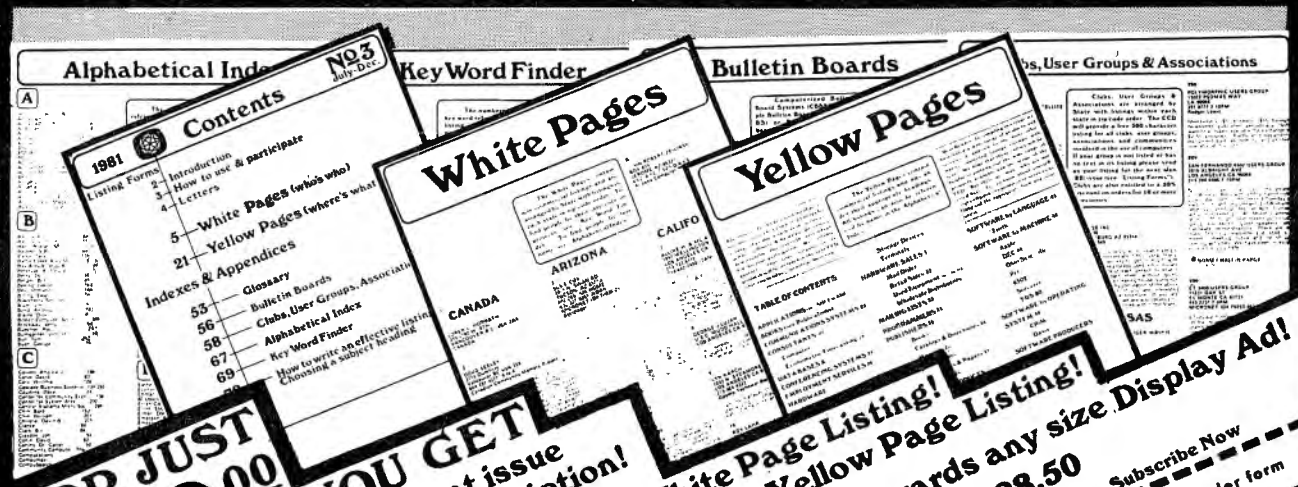

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What is the Computerist's Directory?
It is a national "paper data base" in phone book format dedicated to all computer users including professionals, business people, hobbiests and prospective buyers. It is published twice annually in January and July with quarterly update dates planned for April '82.

(Editor's note: The data in line 1010 is not the number 10, but the number "1" and the letter "O".)

```
1010 DATA1N,1N,1N,1N,1N,1N,10,10,10,10,
  10,10,10,10,3P,3P,10Q,1R,1R,1R,1R,1R,
  1R,1S,1S,1S,1S,1T,1T,1T,1T,1T,1T,1U,1
  U,1U,1U,4V,4V,4W,4W,8X,4Y,4Y,10Z
1020 CLS:PRINT"SEVERAL SQUARES HAVE PRE
  MIUM VALUES:

D*L  = LETTER SCORE IS DOUBLED
T*L  = LETTER SCORE IS TRIPLED
D*W  = WORD SCORE IS DOUBLED
T*W  = WORD SCORE IS TRIPLED
***  = THE CENTER SQUARE.  SCORES AS A
  D*W SQUARE.
"
1030 PRINT"THE LETTER RACK IS SHOWN AT
  THE BOTTOM OF THE SCREEN.  THE"
1040 PRINT"LETTERS ARE SHOWN ALONG WITH
   THEIR SCORE VALUES.  EXAMPLE: B(3)."
  ;:PRINT"THERE ARE ALSO 2 BLANKS IN TH
  E POOL WHICH LOOK LIKE:  -(0).
BLANKS MAY BE USED AS ANY LETTER DESIRE
  D, BUT MAY NOT BE"
1050 PRINT"CHANGED DURING THE GAME.  TH
  EIR SCORE VALUE IS ZERO.":GOSUB1200:P
  RINT"...THE PLAY:
THE FIRST PLAYER COMBINES TWO OR MORE O
  F HIS LETTERS TO FORM A
WORD AND PLACES THEM ON THE BOARD TO RE
  AD EITHER ACROSS OR "
1060 PRINT"DOWN WITH ONE LETTER ON THE
  CENTER SQUARE.  THIS IS DONE BY:
1.  TYPE THE DESIRED LETTER AND PRESS =
  ENTER=.  IF THE LETTER
    IS AVAILABLE IT WILL BE MARKED.
  EXAMPLE:  ";CHR$(94);"B(3)."
1070 PRINT"2.  USING THE ARROW KEYS, PO
  SITION THE CURSOR TO THE SQUARE YOU
    WISH THE LETTER MOVED.  PRESS =ENTE
  R=.  IF THE SQUARE IS        AVAILABL
  E, THE LETTER WILL APPEAR ON THAT SQU
  ARE."

1080 PRINT"3.  CONTINUE MOVING LETTERS
  UNTIL YOUR WORD IS COMPLETE.":PRINT"4
  .  IF YOU MOVE A LETTER TO A WRONG SQ
  UARE, YOU MAY RETRACT YOUR    LETTERS
   BY TYPING THE WORD ";CHR$(34);"OOPS"
  ;CHR$(34);"."
1090 PRINT"5.  WHEN SATISFIED THAT YOUR
   WORD IS PROPERLY PLACED, TYPE THE
    WORD ";CHR$(34);"SCORE";CHR$(34);".
   YOUR MOVE WILL BE SCORED AND THE NEX
  T PLAYER'S    LETTERS WILL BE SELECTE
  D.":GOSUB1200
1100 PRINT"...CONTINUE THE PLAY:
6.  EACH PLAYER IN TURN ADDS LETTERS TO
   THOSE ALREADY PLAYED
    TO FORM NEW WORDS.  ALL LETTERS IN
  A TURN MUST BE PLACED"
1110 PRINT"    IN A ROW ACROSS OR DOWN
  THE BOARD.  IF THEY TOUCH LETTERS
    IN OTHER ROWS THEY MUST FORM COMPLE
  TE WORDS WITH THOSE
    LETTERS."
1120 PRINT"7.  A WORD MAY BE CHALLENGED
   BEFORE THE NEXT PLAYER MOVES HIS
    FIRST LETTER.  IF THE WORD CHALLENG
  ED IS FOUND UNACCEPTABLE,";
1130 PRINT"    TYPE THE WORD "CHR$(34);
  "CHALLENGE";CHR$(34);" AS THE FIRST M
  OVE.  THIS WILL
    CAUSE THE PREVIOUS PLAYER'S LETTERS
   TO BE REMOVED FROM THE
    BOARD AND PLACED BACK INTO THE POOL
  .  THE PREVIOUS PLAY-"
1140 PRINT"    ER'S SCORE WILL ALSO BE
  ADJUSTED.":GOSUB1200:PRINT"8.  PLAY C
  ONTINUES UNTIL ALL LETTERS HAVE BEEN
  USED OR UNTIL ALL    PLAYERS AGREE TH
  AT FURTHER PLAY IS IMPOSSIBLE.  THE P
  LAYER"
1150 PRINT"    WITH THE HIGHEST SCORE W
  INS.  WHEN ASTERISKS (***) BEGIN
    TO APPEAR ON THE LETTER RACK, THE L
  ETTER POOL IS EMPTY.
"
1160 PRINT"...THERE ARE TWO OTHER COMMA
  NDS WHICH MAY BE USEFUL:
TYPING ";CHR$(34);"CLEAR";CHR$(34);" WI
  LL PERMIT EASIER VIEWING OF PLAYED LE
  TTERS."
1170 PRINT"(PREMIUM SQUARE LEGENDS ARE
  REPLACED WITH ASTERISKS.)
TYPING ";CHR$(34);"RESTORE";CHR$(34);"
  WILL RETURN THE SCREEN TO ITS ORIGINA
  L FORMAT.

...SCORES ARE CALCULATED AS FOLLOWS:"
1180 PRINT"FOR EACH TURN, THE PLAYER'S
  SCORE IS INCREASED BY THE SUM OF
THE SCORE VALUES OF EVERY LETTER IN EAC
  H NEW WORD FORMED OR
EACH WORD MODIFIED IN THE PLAY PLUS THE
   PREMIUM VALUES WHICH"
1190 PRINT"RESULT FROM PLACING LETTERS
  ON PREMIUM VALUE SQUARES.":GOSUB1200:
  GOTO40
1200 PRINT@979,"(PRESS ANY KEY TO CONTI
  NUE)";
1210 O=INKEY$:IFO=""THEN1210ELSECLS:RET
  URN
```


■

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Putting the Allocation Table on Disk

Files & Foibles

for Models I, II, III, & Color with disk

Terry Dettmann

In the last issue, we introduced you to the concept of indexing a random access file. This was illustrated by using the TODO program, which unfortunately had one major failing. The file index isn't on diskette with the rest of the file all of the time. Therefore, anything which changes the index (additions, deletions, etc.) will be lost if someone accidentally knocks you off line through power failure, computer reset or unintentional reboot.

Instead of having two files, one for the allocation file and index and another for data, we will put all the information into one file. To do this we will create several different FIELD structures for the same file.

To create an allocation table for the file, set aside one or more sectors for this information. One sector, which is 256 bytes long, will allow us 128 integers, which occupy two bytes each. With bit manipulation, we could fit in 2048 yes/no (1 or 0) responses into a 256-byte sector. We won't worry about getting down to this level at this time, but what about the byte level?

The TRSDOS manual informs us that the smallest sized number which can be used by the system is the integer. An integer occupies two bytes of diskette space.

If you think for a moment, you will realize that an alphanumeric character occupies one byte of space. Not only that, but it is stored in the computer as a number! The range of that number is 0 to 255 and most of the lower half (0 to 127) has been identified as the ASCII code.

When a data file is fielded, the computer is instructed which fields to use as numbers and which to use as letters. The computer must be further instructed to treat the numbers as letters by using the conversion functions MKI$, MKS$ and MKD$, and to reverse the process, CVI, CVS and CVD.

Two other conversion functions have been around since Level II: CHR$ and ASC. These are one-byte conversions of alpha to numeric and visa-versa. The important thing to remember is the limitation of the numeric range when using this technique. As mentioned above, the range of a single byte representing a letter is 0 to 255, which are the limits imposed on us here.

Now, let's open a random access file and work with it. First type in:

```
200 OPEN "R",1,"RANDOM/DAT"
```

We will limit ourselves to a 255 byte record length because of an inherent limitation of strings to this size. Now field the allocation table:

```
210 FOR I=1TO255:FIELD 1,(I-1) AS DMY$, 1
      AS AT$(I): NEXT I
```

Also field for the actual data file:

```
220 FIELD 1, 255 AS DA$
```

Even though two field statements have been used, neither has precedence over the other. Fielding is simply the assignment of certain variables to "buffer" space in memory. There is nothing to prevent the assignment of more than one variable to the same area of memory as we have done here. In the area of file manipulation, it makes this disk BASIC the most powerful and flexible of its kind.

The allocation table is now assigned to some record in the file. For convenience and ease of programming, assign it to the first record.

Next, place a 1 in the first position to indicate the allocation of the table and fill the rest with zeros to indicate empty, or unused, file space. Do this as a subroutine:

```
400 REM  INITIALIZE ALLOCATION TABLE
410 LSET AT$(1)=CHR$(1)
420 FOR I = 2 TO 255
430 LSET AT$(I)=CHR$(0)
440 NEXT I
450 PUT 1,1
460 RETURN
```

Next, several subroutines need to be assigned various tasks. To check our allocation table, use this routine:

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```
500 REM  CHECK ALLOCATION TABLE
501 REM  IF EF=0 THEN THAT TABLE
502 REM  LOCATION IS EMPTY. IF EF=1
503 REM  THEN IT IS FULL. LC IS THE
504 REM  LOCATION WE WANT TO CHECK.
505 REM  FIRST GET THE TABLE FROM
506 REM  RECORD ONE.
510 GET 1,1
520 EF=ASC(AT$(LC))
530 RETURN
```

To find the first available free space in the table, get the table into memory and search the array:

```
600 REM  GET FREE SPACE
601 REM  LC WILL BE THE FREE LOCATION.
602 REM  IF LC=0 THEN THERE IS NO FREE
603 REM  SPACE.
610 GET 1,1
620 FOR I=2 TO 255
630 IF ASC(AT$(I))=0 THEN LC=I : RETURN
640 NEXT I
650 LC=0
660 RETURN
```

To allocate space in the file, find the free space from subroutine 600 and then call the space allocation routine:

```
700 REM  ALLOCATE SPACE.
701 REM  LC IS THE RECORD TO ALLOCATE.
710 GET 1,1
720 LSET AT$(LC)=CHR$(1)
730 PUT 1,1
740 RETURN
```

To deallocate the space (free it up when we delete a record), use the following routine:

```
800 REM  DEALLOCATE SPACE
801 REM  LC IS THE RECORD TO DEALLOCATE
810 GET 1,1
820 LSET AT$(LC)=CHR$(0)
830 PUT 1,1
840 RETURN
```

It is important to keep track of what you are working with when there are two different things in the same fielded file. Lines 710 and 810 insure that we are working with the allocation table before we do anything. The system tracks which record is in the buffer and will not re-access the disk if we already have the record we want.

You may have noticed that subroutines 700 and 800 are, for all intents and purposes, identical. We can eliminate one of the subroutines by passing the number which indicates allocation (1) or deallocation (0) to a single subroutine.

We can expand beyond the 255 number limit by assigning more than one record (sector) to the allocation table. By looking at the records one at a time and rewriting our routines to handle multiples of 255 we can do this.

Where is the index?

Now that the allocation table is on diskette we won't lose more than the very last transaction. What about the index? Here things get slightly complex.

For a sorted index, we have to perform a sort. An on-diskette sort is much slower than in memory. A fairly obvious way to speed this up is to read the index into memory, sort it, and write it back out to disk for use. This way, if a failure occurs during the sort, nothing has been lost because the original is still on diskette and we can resort it if necessary. However, there are still better ways to accomplish the same thing.

In the next session, we will look at ways to use that index without having to sort it. In the process, we will improve the access time to a file.

The technique is called *Hash Coding*, which is a way to turn our key into a number which becomes the location of the data in the file. With a properly designed system, a record may be accessed almost as quickly as if the key was the address of the record itself!

A word of caution--

Dr George Haller, of Naples, Florida, pointed out that in the Mar/Apr 81 issue, we did something which can cause problems if not treated properly. We fielded a variable like this:

8 AS CS$

He correctly pointed out that if we leave out the spaces, we get:

8ASCS$

which the interpreter sees as:

8 ASC S$

ASC is a BASIC function which, on execution, will create a syntax error. Using any variable which starts with the letter C in a field statement may create this type of error. Unless you are aware of this problem, the cause is very difficult to detect as it looks OK, especially if you have other variables fielded that same way - without spaces.

By either *never* using a variable which begins with C or *always* spacing between the AS and the variable, this problem can be avoided.

Postscript

I would like to thank everyone who has written to comment on this series of articles. Your comments, suggestions, and opinions have been most helpful in determining the future of the series. *T R Dettmann* ■

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```
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LEAVE WORD "AS IS":         HIT <ENTER> KEY
DISPLAY WORD IN CONTEXT:    ?
ADD WORD TO DICTIONARY:     +
EXIT:                       !

WORD:          (Your error)
RESPONSE:
```

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There are other proofreading programs available to choose from. Since MICROPROOF became available in December of 1980, a number of companies have announced programs with small dictionaries. It took us almost two years to develop MICROPROOF. During that time we were able to compress our full 50,000 word dictionary into a manageable size (fits on one single density 5¼ inch disk). And we were able to design a proofing program which operates remarkably fast. The chart below illustrates the comparative advantages of MICROPROOF.

ADVANTAGES OF MICROPROOF

	MICROPROOF DICTIONARY SOFTWARE	OTHERS (Mini-Dictionaries)
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DICTIONARY ENLARGEMENT	VIRTUALLY UNLIMITED	EXTREMELY LIMITED
SPEED—400 Words	20 Seconds	1 to 5 Minutes
SPEED—3,000 Words	1 Minute	2 to 10 Minutes
CORRECTION FEATURE	Optional	Not Available

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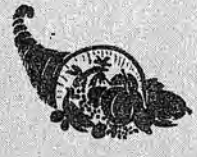

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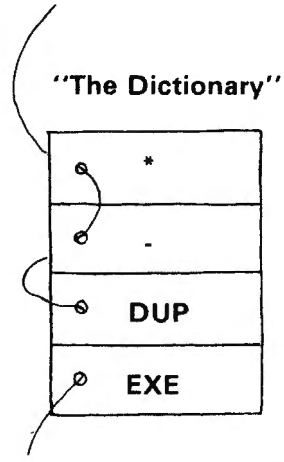
A look at another language

Forth

Terry R Dettmann



Forth commands are "threaded" together with one pointing to the next.

Forth emerged from a need of the developer, Charles H. Moore, to have a program language which allowed use of programming time more effectively. Years ago, as he was busy programming control systems for radio telescopes, he became keenly aware of the need of a high level language with assembler power and speed to work in a small computer.

In his research, he came upon a way to fit this in a small package - 8K of RAM for compiler, interpreter, assembler, disk operating system and development tools. The result was Forth.

The astronomy community extensively uses Forth to run sophisticated telescopes, multi-user computer systems, peripherals and printers. Much of the documentation on Forth has come from them.

As the power of Forth became apparent, its popularity grew and Moore decided that it was worth pushing. He formed his own company, Forth Incorporated, which produces and markets this system to a wide variety of users. Since Forth, Inc., deals with large users, their packages are not found in general hobbyist or small business systems.

An early group of supporters of this language felt it should become more generally available. They formed the Forth Interest Group in the San Francisco Bay area and produced their own Forth system called "FIG Forth". This was put into public domain and is available at nominal cost to anyone who wishes to use it as they see fit. A number of companies offer fully implemented systems to run on a number of computers.

In 1978, Miller Microcomputer Services, 61 Lake Shore Road, Natick, MA 01760 (617) 653-6136, released a TRS-80 Model I Forth. This work was based on that done by Tom Dowling and was not in any way associated with either FIG Forth or Forth, Inc. This first attempt to provide Forth's power to the TRS-80 user did a tremendous job which far exceeded the quality and reliability of most of the other software on the market at the time. In the opinion of many, it is one of the best all-around efforts at Forth available for the small computer.

The Forth language

Forth is a Threaded Interpretive Language. The system works by having a dictionary of allowed "words" or "procedures". Each word, starting from the last defined, is connected to the next. To find a word, the system "threads" its way from word to word until the one wanted is found. The system then actually executes that word. While this may not sound too efficient, the way a word is executed makes up for lost time.

As in all dictionaries, there are definitions and Forth's dictionary is no different. In the definition section, the computer is informed what to do in one of two ways: The first form, referred to as the Forth Form, consists of memory addresses where the routine can be found which will actually accomplish the desired task. The second form is to have the actual machine language routine exist in the dictionary.

Let's show how this is done. First, we previously defined *shutter* as "open the shutter of a camera for a preset time", *exposure* as "measure the light and set the exposure" and *focus* as "focus the camera to the right setting". We have simplified the definitions here for clarity. We can now define a new word, *picture*, in terms of old ones to actually take a picture. We do it like this:

```
: PICTURE     (defines new word)
    FOCUS     (focus camera)
    EXPOSURE  (measure and set exposure)
    SHUTTER   (take the picture)
;             (end of definition)
```

The colon symbol tells the Forth System to compile a new word into the dictionary. The first word separated by spaces from the colon is the name of the new word. Then follow the words which define how the new word's task is to be accomplished. In our example, a picture is taken by focusing the camera, measuring and setting the exposure and opening the shutter to take the picture. The semi-colon symbol informs the compiler that the definition is complete.

The compiler places the word and the addresses of the routines into the dictionary. Because only addresses are left, execution is very quick.

Miller Microcomputer Services' Forth (MMSFORTH) has a very impressive demonstration of Forth's power and speed. Random characters are placed on the screen and then sorted into order. The 1023 items sort fast and are fascinating to watch. Their own assembler Quick Sort does it the fastest - just a matter of seconds.

The real potential of Forth is in handling numbers. It is also the bottleneck for most potential Forth programmers.

Forth uses RPN (Reverse Polish Notation) to accomplish all functions. If you haven't heard of RPN, it's time to. Hewlett-Packard has used it for years in their very powerful and highly respected scientific calculators. While the concepts of RPN can be difficult to grasp, they also can be learned thoroughly in a matter of hours.

RPN is used by high level language compilers to analyze mathematical statements. Calculations take place by logical, predetermined rules.

In Forth, when a number is entered in the computer it is placed on the stack. The term stack is very appropriate, since the last thing put on the stack is the first thing wanted off of it.

When an operator, like addition (+) occurs, two thing are taken off the stack and replaced with the sum. Since the numbers have to be on the stack *before* the operator, it is placed or entered, last. To add 2 and 3 we would write:

```
2 3 +
```

and to multiply 5 times 17, we would write:

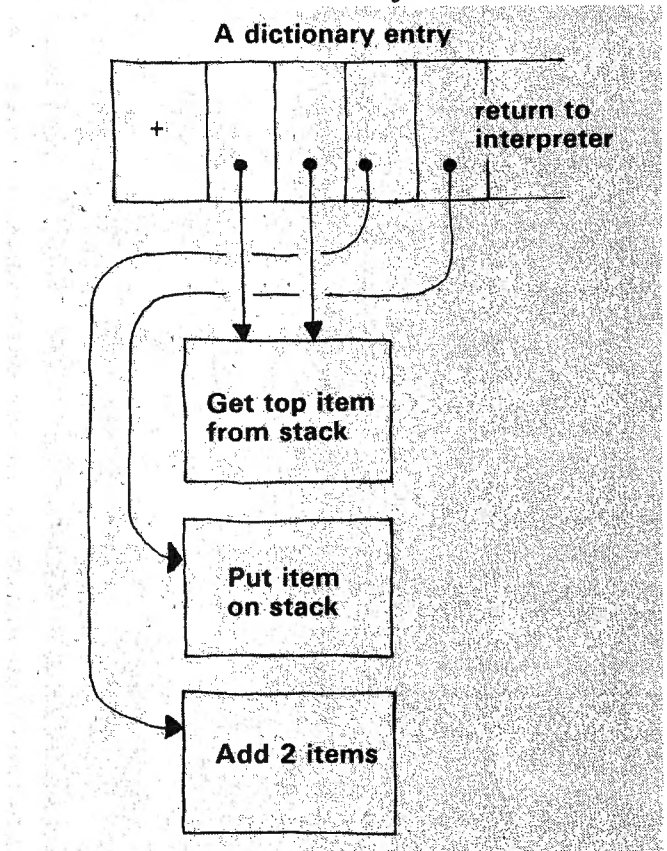
```
5 17 *
```

If we wanted to add 2 and 3, and multiply it by the sum of 5 and 17, we would write algebraic notation (as in BASIC):

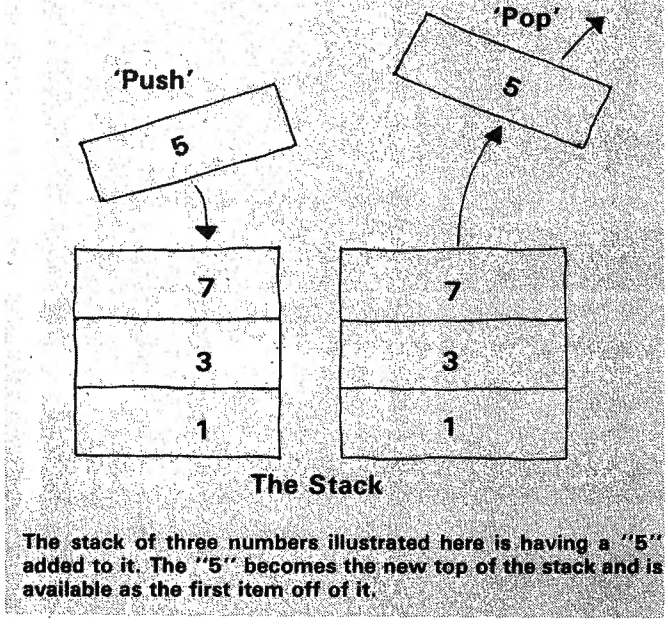
```
(2+3)*(5+17)
```

and in RPN it would be:

```
2 3 + 5 17 + *
```



This is an example of the "+" command in the dictionary. The memory locations following the "+" identifier point contain the memory addresses which point to various machine language routines.



The stack of three numbers illustrated here is having a "5" added to it. The "5" becomes the new top of the stack and is available as the first item off of it.

1. Put 2 on the stack.
2. Put 3 on the stack.
3. Take 3 and 2 off the stack, replace them with the sum, 5.
4. Put 5 on the stack.
5. Put 17 on the stack.
6. Take 17 and 5 off the stack, replace them with the sum, 22.
7. Take 22 and 5 off the stack, replace it with the product, 110.

If people would take the time to understand the principles behind RPN, they wouldn't be quite so quick to drop Forth as a viable language.

Unfortunately, Forth's popularity also suffered from some of the things which make it so powerful. Under some cases, reading someone's Forth program is equivalent or worse than the ancient Chinese water torture. Forth programmers are getting better as they feel the need for good comments. But even the best Forth code can be puzzling when it's good. One could almost say that Forth code is the opposite of COBOL code.

Also, there aren't many Forth application programs available to the general public. Miller Microcomputer Services will write software for you, but you are dealing with custom work which is expensive.

Manuals have been a continuing problem. Most Forth manuals suffer from the author's inability to explain the concepts of Forth in enough detail. Fortunately, there have been several books introduced lately on Forth which help.

Forth's real power lies in it's ability to streamline programming. A job which might take a week can many times be done in a day with Forth.

It is a fast language, topped only by assembly language, and then by only a small margin. Forth is rapidly being adapted for process control work and some of the popular arcade game manufacturers have shifted to it for game development. The University of Washington Applied Physics Lab is doing high speed data acquisition in Forth. These and other users are discovering that the power and speed of Forth is essential to delivering their packages quickly and at low cost.

Two available Forth systems for TRS-80

There are many good Forth systems available, especially under the CP/M operating system on the Model II. FIG Forth is an especially good one. Of the two reviewed here, one is for CP/M on the Model II and the other for Model I & III.

Stackworth's Forth, called SL5, is from SuperSoft Associates, PO Box 1628, Champaign, IL 61820 (217) 359-2112, and sells for $200 plus $2 shipping and handling.

SL5 is a CP/M based system which uses standard input and output routines to maintain maximum compatibility with other CP/M software. This is SL5's big advantage compared to other versions of Forth in that it does not create its own operating system. If you are familiar with CP/M you won't have to learn new file handling techniques to effectively use this package.

As with all versions of Forth, you build the language up to your needs. It grows or contracts as your needs change. All of the source code is provided so you can regenerate the system in any customized fashion you may want.

SL5 is easy to work with and everything tried worked well, including a dumb terminal program and several utilities. Though several pages of the manual were inserted backwards, it was still easy to read and understand.

Although the Model I and III can't run standard CP/M without hardware modification, they do have one of the best Forth packages available. MMSFORTH, from Miller Microcomputer Services has their version 2.0 for $89.95 for tape users and $129.95 for disk (both plus $2 shipping and handling). This version is compatible with the latest standard for Forth language systems: Forth 79. The earlier version has been around since 1978, and we have consistently had fewer disk problems working with MMSFORTH than under all other operating systems.

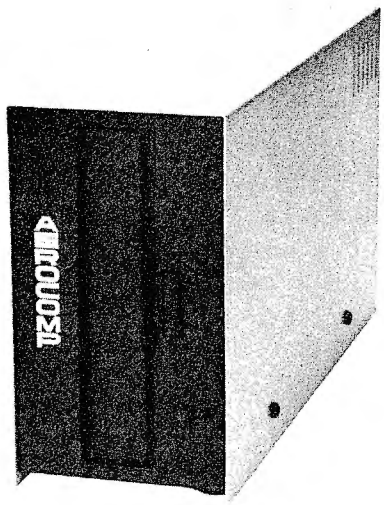
MMSFORTH comes normally with source code in Forth for most of the system. Only the deepest parts of the system are held back as proprietary information. Dick and Jill Miller also provide a newsletter for registered owners at $10 per year. Also available is additional Forth software such as the very flexible *Datahandler* data base manager, a Z80 assembler, a floating point package, games and a smart terminal package.

Normal features include an auto directory; software disk protection; full screen editor; graphics, string and full math functions; backup and format utilities; sorting demonstrations; a checkbook record keeping program; Conway's game of Life, and a one page letter writing program. There is also a customizing program to adapt Forth to your system. ■

Other sources

Mountain View Press, PO Box 4656, Mountain View, CA 94040 (415) 961-4103, advertises as the Forth Source. They specialize in Forth and offer good books on Forth, FIG Forth listings for a wide variety of microprocessors, and Forth Operating Systems.

The Forth Interest Group (FIG) PO Box 1105, San Carlos, CA 94070 (415) 962-8653, publishes an excellent newsletter called Forth Dimensions. It is available with membership in FIG for $15 per year. FIG also makes available a free programmer's reference card. ■



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Don't get strung out!

Stalking the garbage man...

Dan Rollins, Azusa, CA

For Models I and III

This article, though prepared for the Model I & III owner, contains much useful information for the Model II and Color computer owner and programmer. The programs included here are designed specifically for the Model I & III and will not run on the Model II or Color computer. However, the sorting technique and the information on the garbage man is still valid.

TRS-80 BASIC string handling is a real pleasure. There is such a comprehensive selection of commands that just about any conceivable manipulation can be performed. This article, however, concerns itself with the one major complaint often heard about TRS-80 strings, the garbage collection routine.

If you've tuned your transistor radio to KTRS during a long string sort you will have noticed an occasional interruption of the normal buzzing. This is BASIC cleaning up the string space which you set aside with the CLEAR command. Any string which has been redefined leaves behind its old value. This old string is of no use to you or BASIC. It just sits there taking up space until the celebrated garbage man comes along.

When this occurs, the machine checks through its list of string variable pointers and overwrites any of the junk with valid strings. All of these are moved to the top of the string space and the VARPTR for each is adjusted to reflect the changes. This frees the lower areas for new definitions. The process can be very lengthy, especially when a lot of memory was cleared and much of it contains junk strings.

Listing 1, included here, is a demonstration of exactly what happens when the garbage man pays a visit. The program changes three string-related pointers. These usually point to high memory, just below the value of MEMORY SIZE. After lines 90-110 they point to the screen and any new string definitions are stored right there in plain sight. The next lines simply fill the string space with two different types of strings - a string array A$(0) through A$(75) and DUMMY$ which is redefined at each pass of the loop. When the string space has been filled, you will see (and hear if your radio is turned on) as the array strings are packed to the bottom of the screen.

Note that the cleanup is invoked more and more often as the string space (in this case the screen) begins to fill with the array strings. This is one reason a string sort can seem to take forever.

One way to speed up your sort routine is to clear as much space as possible. Another method (seen more often lately) is to exchange the values of the VARPTRs of the strings. Briefly, all sorts will come down to a point when two variables need to be exchanged. The most often seen method is:

```
TEMP$=A$:A$(X)=A$(X+1):A$(X+1)=TEMP$
```

The VARPTR method goes:

```
V1=VARPTR(A$(X)):V2=VARPTR(A$(X+1))
:T=PEEK(V1):T1=PEEK(V1+1):
T2=PEEK(V1+2):POKE V1,PEEK(V2):
POKEV1+1,PEEK(V2+1):
POKEV1+2,PEEK(V2+2):
POKEV2,T:POKEV2+1,T1:POKEV2+2,T2
```

Though there is obviously more processing using the second method, the garbage man is avoided and a lot of time can be saved in long sorts. The reason that the first method is slower is that TEMP$ is constantly being redefined (like DUMMY$ in the listing). All that unused memory has to be swept up.

Another method which I've never seen in print I'll dub the "MID$=" method. This gimmick requires that you use disk BASIC and that all the strings be the same length. It is demonstrated in Listing 2. The main point is that redefining a string with MID$(string1,1)=string2 *creates no new strings*. The area already set apart for its storage is filled with the new value. As long as the strings are the same length, they may be swapped with total abandon and the garbage man never comes.

Forgive my use of the slowest sort known - the bubble sort. It happens to be the quickest to type in and does a good job of proving a point. For a visual demonstration, plug the lines of Listing 2 into Listing 1. The entire sort is performed before your eyes. If you are unfamiliar with what goes on during a sort, here is a chance to see it in action. Watch A$(0)," AAAA", as it "bubbles" its way to the top of the screen. You might also try replacing line 175 with the TEMP$ and VARPTR swapping methods above. Time the results for a benchmark comparison.

During a run of Listing 1, try hitting BREAK and experimenting a little from DIRECT mode. A few ideas:

1) Type F=FRE(A$).

2) Observe what happens with some of the string commands, i.e., LEFT$, RIGHT$, STR$, etc.

3) Concatenate: A$="1"+"2"+"3"+"4" etc.

4) Position the cursor over one of the SAVE A$(n) areas, then type some stars or other recognizable character, then type PRINT A$(n).

Be sure to GOTO 200 after any BREAK. Otherwise, the program will crash upon the next RUN or after an EDIT. Apparently the BASIC stack is oriented on the position of the string pointers. Lines 200-220 put everything back in place. A few more notes on these pointers. You can save some garbage collection time by changing 16544,5 to a lower value. This is the address of the end of string space. Let's say you have just read in a bunch of data from tape or disk. This is your base data and will not need to be changed. PEEK the VARPTR of the last item to find the values to POKE to this pointer. Now the garbage man will ignore the addresses above this point, but you will still retain all the information.

Another idea is to "PRINT to memory" subroutine. Build A$ and send it, along with an address, to a subroutine which pokes the next available byte pointer (16598,9) to the address + LEN(A$). The start of string space pointer must be poked to a value somewhat less. Now the command: A$=A$ will place the string at the desired address. Be sure to restore the pointers afterwards.

Here is something which might forward bias the LED above your head: As you know, some strings are stored in program memory. Let's say you have a program line

```
10 A$="***":B$=STRING$(3,191)
```

If you poke the start of string space pointer (16561,2) with a value *less than* program memory (zero is OK) then the command

```
MID$(A$,1)=B$
```

will replace the '***' with 'USINGUSINGUSING' and A$ has been changed right in the program line! In case you are wondering, the USINGs are just BASIC's way of representing a fully lit graphics byte in a program listing.

This also shows an alternative to poking a machine language USR routine. Just prepare a program line with a dummy string, concatenate the machine codes into a string, POKE 16562 with zero, and use the "MID$=" command to slip the code into place. Be sure to restore the value that was in 16562!

Strings can be lots of fun, if you don't get caught in the cat's cradle! ■

```
0 ' This program demonstrates the
    TRS-80 string-handling "Garbage
    Collection" routine.

10 CLS
20 DIM A$(75)
30 F$ = "...FORGET ME..."
40 ' SAVE THE STRING SPACE POINTERS
50 S = 16561 : S1 = PEEK(S) : S2 = PEEK
  (S + 1)
60 E = 16544 : E1 = PEEK(E) : E2 = PEEK
  (E + 1)
70 N = 16598 : N1 = PEEK(N) : N2 = PEEK
  (N + 1)
80 ' CHANGE THEM SO THEY POINT TO
     VIDEO MEMORY
90 POKE E, 0 : POKE E + 1, 60 '
    End of string space pointer
```

Programming technique

```
100 POKE N, 255 : POKE N + 1, 63 '
    Next available byte pointer
110 POKE S, 255 : POKE S + 1, 63 '
    Start of string space pointer
120 '
130 FOR X = 0 TO 75
140 N$ = RIGHT$(STR$(X), 2)
150 A$(X) = "-SAVE A$(" + N$ + ")-" '
    Define a string to keep and...
160 DUMMY$ = F$ '
    ... one to discard
170 FOR DELAY = 1 TO 100 : NEXT
180 NEXT : DUMMY$ = " ** FINISHED " + "
  ** "
190 ' NOW RESTORE THE POINTERS TO
      AVOID A WIPE-OUT
200 POKE S, S1 : POKE S + 1, S2
210 POKE E, E1 : POKE E + 1, D2
220 POKE N, N1 : POKE N + 1, N2
300 GOTO 300 '
    Break point
```

Program listing 1

(Be sure to GOTO 200 and press (BREAK) if the program is interrupted.)

```
130 TEMP$ = STRING$(8, " ") : B$ = "...
  ...." + "TEMP$ STORAGE -->"
135 A$(0) = "AAAA <" + CHR$(93)
140 FOR X = 1 TO 35
145 A$(X) = "" : FOR Y = 1 TO 5 : A$(X)
   = A$(X) + CHR$(RND(26) + 64)
150 NEXT : A$(X) = A$(X) + "..." : NEXT

155 PRINT FRE(A$) : A$ = STRING$(233, "
   ") : A$ = A$ '
    Erase the junk
160 ' FOLLOWING LINES PERFORM THE SORT
165 C = 0
170 FOR X = 34 TO 0 STEP - 1 : IF A$(X)
   => A$(X + 1) THEN 185
175 MID$(TEMP$, 1) = A$(X) : MID$(A$(X)
  , 1) = A$(X + 1) : MID$(A$(X + 1), 1)
   = TEMP$
180 C = 1 : FOR DELAY = 1 TO 50 : NEXT
  '
    Slow it down
185 NEXT : IF C = 1 THEN 165
190 MID$(A$, 15) = "** SORT FINISHED **
  " '
```

Program listing 2

(Plug these lines into listing 1 for a visual demonstration of the "MID$=" bubble sort.) (Requires disk BASIC.)

■

Christmas Shopping List

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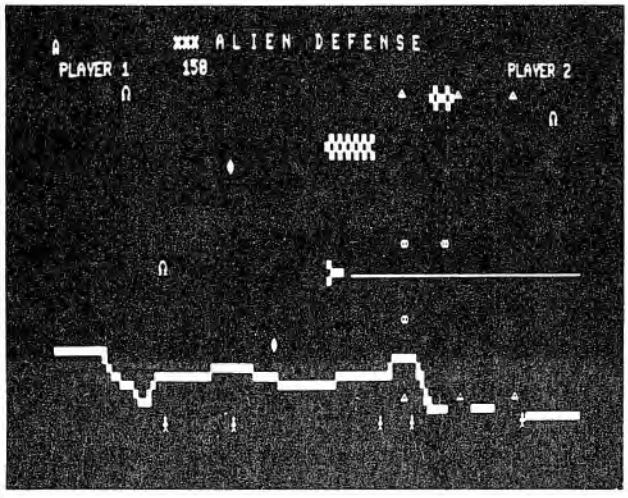
Written by Larry Ashmun



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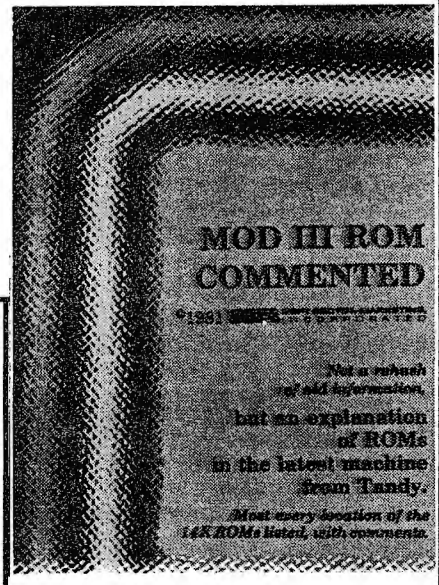

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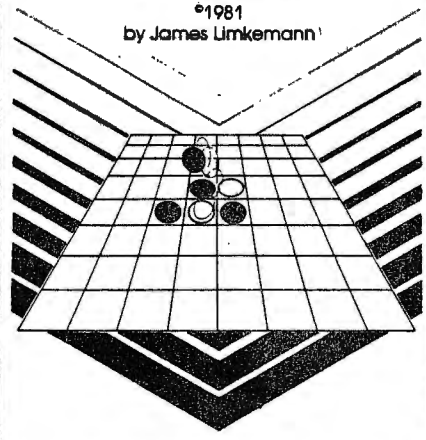

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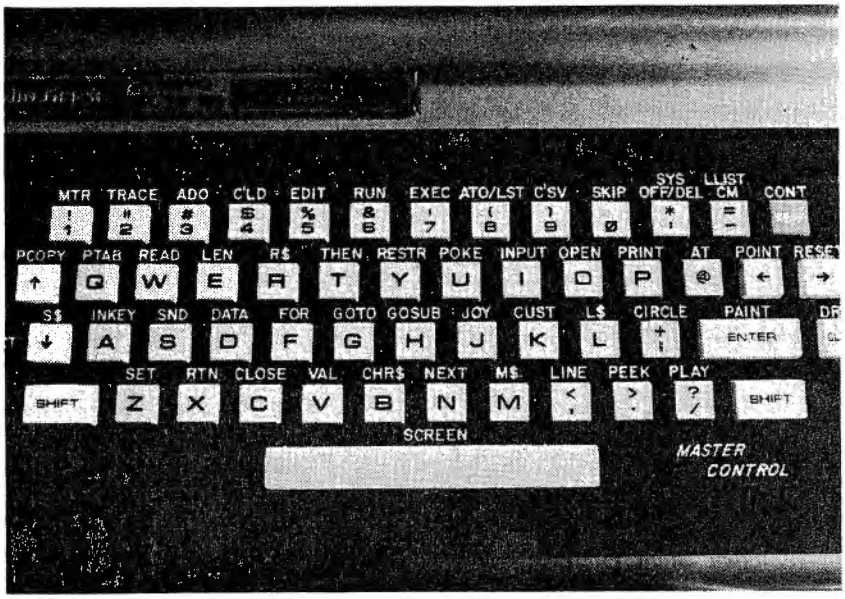

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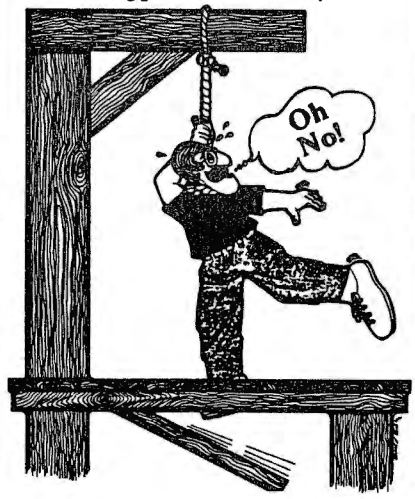

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*TRS-80 is a product of Radio Shack, division of the Tandy Corporation

Utilities

NEW

SUPER UTILITY PLUS

SUPER UTILITY PLUS

Copyright ©1981 Breeze Computing, Inc. SUPER UTILITY PLUS was written by Kim Watt and is the most powerful program of its kind on the market at this time. This program is a machine language, stand alone program that has its own I/O routines, does not use any ROM or DOS calls, and works on SINGLE or DOUBLE DENSITY systems. Super Utility Plus performs such a wide range of varied tasks, that it may truly be called "The King of Utilities". It is not required that the disk be in any drive after initialization of the program and user may custom configure the program to suit his individual system requirements.

ZAP does everything your present "zapping" utility does plus many additional enhancements. It will operate on SINGLE or DOUBLE DENSITY systems and will work with most major operating systems that are presently on the market. The screen printout on Zap displays one sector at a time in HEX and ASCII (as other "zapping" utilities), but also tells user the true and relative track and whether the disk in IBM format or not. Zap also has a search routine that will locate the highest or lowest configured track on the disk and others that will search the disk for byte list, ASCII string, word list, or even encripted code. Zap also allows you to display disk sectors, compare disk sectors, copy sector data, zero disk sectors, copy disk sectors, reverse sector data, sector searches, read ID address marks, or alter data address marks.

PURGE has a full screen editing kill control that allows you to kill files by positioning cursor and pressing one key. Also, Purge has several sub-utilities that allow you to zero out unused directory entries or zero out unused disk granules. In addition, user may kill files by naming the common category of the files, and may compute existing passwords, change the disk name, date, passwords, auto command, or even file parameters (name, passwords, protection levels). Lastly, Purge contains a complete disk directory that indicates all active and non-active files on the disk

FORMAT is a utility that allows the user to format a disk with: standard format, format without erasing existing data, special format (custom format your disk most any way you want it), build a format track and optionally write it back to any track on your disk, and even contains a software bulk erase utility. The total formatting capabilities of this program are just about UNLIMITED and you may even reformat over a disk or add tracks to an existing disk without destroying existing disk data.

DISK COPY will copy most any standard disk, with or without formatting. The Special Disk Copy enables the user to make a backup of most TRS-80® readable disks that are presently on the market, regardless of any efforts that have been made to protect them from being "backed up". (NOTE: This program WILL NOT copy itself). This program's only intended use is for you to make backups of your legally purchased programs. Please DO NOT use this utility to make "bootleg copies" for others as authors of quality programs deser their royalties.

TAPE COPY enables the user to perform a wide variety of actions that include the ability to read, write, or verify tapes and even includes a Bit by Bity copying routine that will back up most ANY TRS-80® readable tape regardless of protection attempts made by authors. This utility also is for your own use only.

DISK REPAIR allows you to automatically repair the HIT and GAT sectors, and will automatically repair a Boot. This utility also does a complete Directory Check and will advise you of errors that exist. In addition, this utility allows the user to recover killed files (if the file was killed by this utility or by NEWDOS), read protect or un-read protect the directory, move it to a different location on the disk, or clear unused entries. Lastly, this utility advises you of all inactive file that are on the disk.

MEMORY supplies the ability to display, move, test, compare, zero, exchange, input or output a byte to any port, exchange, jump to, reverse, fill, string search, or even load/write and entire track or sectors to/from memory

FILE contains the abilities to display file sectors, compare files, copy files, disk directory, free space, file locations, drive status, create files, and clear files from disk. These utilities give you a wide range of powerful complete reorganization of your entire disk with all the files re-written in their most contigious order.

CONFIGURE SYSTEM gives you the ability to custom configure Super Utility Plus to your system. You may select single or double density, in any combination, 5" drives, select your operating system boot of your choice, upper or lower case, high speed clock, single or double headed drives, or even configure your printer

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BOSS III

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for Mod III

This Machine Language utility is designed to aid you in creating and debugging programs written in BASIC. The utility allows you to trace the program flow, to single step the BASIC program, to observe the conditions of variables during program execution, and to push your basic program on the stack during program development. The utility is known to operate with Mod III, TRS-DOS or Mod III Rom BASIC.

Cassette (goes to disk) **$18.95**

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Also **Boss 2.1 version 2.2** ©1980 V.B. Hester for Mod I Cassette (goes to disk) **$18.95**

Original concept by V.B. Hester.

TAPE COPY 2

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This program will load most any TRS-80 500 Baud system tape (standard Mod I speed) and load it into memory and save it at either 500 or 1500 Baud on the Mod III. NO KNOWLEDGE OF MACHINE LANGUAGE NEEDED. Now it gives you a way to back up a machine language program that loads at the lower speed and makes cassette loading into your new Mod III a much faster, more reliable process. Works with Mod I* & Mod III.

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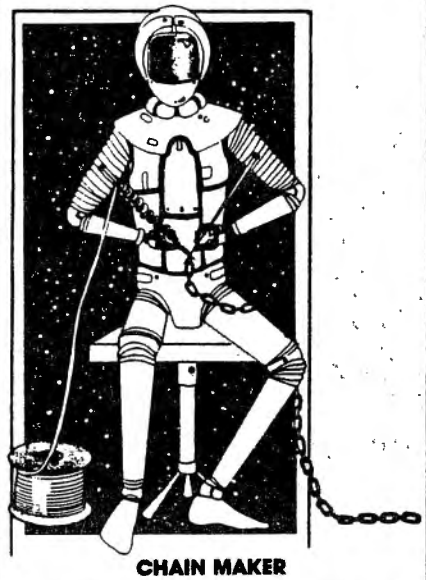

CHAIN MAKER

©1981 Steve Skindell. This program makes writing chain files on NEWDOS-80 a breeze. This is not only a program that creates chain files but it also is an editor of the file. A file can be removed from the disk and edited and saved back to the disk quick and easy. An outstanding program and a must for every NEWDOS-80 owner. Comes with complete, easy to read manual. Purchaser must own NEWDOS-80 ..... **$14.95**

BUG+

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A Self-relocating Machine Language Monitor for MOD I & MOD III

BUG+

©1981 by J. Limkemann. Bug+ is a powerful machine language monitor. The one point most improved over other monitors, is the tape write. Bug+ has the ability to write a "clean" tape (at 500 baud), this tape will read into the TRS-80 under the system command, without the problems previously associated with the volume setting. Regardless what version basic you have or whether or not you have a Radio Shack cassette fix, this monitor will improve the reliability of your cassette by 100%. There is also a verify command that works the same as a "CLOAD?", except when an error is found; the memory address and what is found on the tape is displayed.

Finally a break point that works! When a break point is reached, there is a blinking astrisk in the bottom right hand corner, you are able to see what is on the screen before the monitor takes control. Press the enter key the screen clears and the monitor comes to life. When you continue from a break point, the monitor will restore the screen first then load the CPU registers and return to your program. You do not lose your program or display, and it does work!

Bug+ also has all the commands of T-Bug, they just work better. Bug+ loads into low memory, then relocates itself.

Mod III has all the commands of the Mod I version plus it gives you the ability of reading or writing 1500 baud or 500 baud tapes. You can read at one rate and write at another. MOD I or III, 4K, both on same tape.

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Business Programs

THE COMPLEAT IDIOT'S BOOKKEEPER (TCIB)

Product Overview

GENERAL DESCRIPTION

BACKGROUND

TCIB was written by Larry Raper. Larry is a Chartered Life Underwriter and Licensed Life Insurance Counselor. He has consistently ranked among the top Sales Managers nationally in his company for the past several years. He also writes software for insurance and financial planning applications. TCIB came about as a result of a humiliating visit Larry made to his accountant - carrying a briefcase full of unorganized checks, receipts and other financial information. As a result of that visit, he decided there had to be a better way. TCIB is the result of that experience.

It is intended that this set of programs should be easily usable by any person who has to keep his/her own financial records. The next section will provide an overview of the specific capabilities of this package.

PRODUCT CAPABILITIES

What will TCIB do?

Data Gathering – TCIB provides a simple method of entering your financial information into a disk file. A format screen is presented which will prompt you for entry of the required data from your records. The following fields are provided:

FIELD NAME	NUMBER OF CHARACTERS
Identifier	8
Date	4
Payor/Payee	18
Description	18
Category/Account	5
Income or Expense	1
Deductible or Non-deductible	1
Amount	9

A 'screen-oriented editor' allows you to see the whole record as you are entering it. You are free to move about in the record and change any data you wish. Once you are satisfied with the results, pressing the <ENTER> key causes the program to (1) review the data you entered for possible errors - and (2) assuming no errors, write the record to the disk file.

Since most people are not able or willing to post every financial transaction immediately as it occurs, provision has been made for the fact that 'catching up' will almost always result in duplicate entries. (e.g. you may enter the same check twice, or enter a check and receipt covering the same transaction). A 'PURGE' program guides the computer to search your file or files for possible duplicate entries and, if found, present them to you for disposition.

Data Manipulation – In addition to the 'PURGE' capability just described (technically a data manipulation feature), TCIB also features other important data manipulation abilities:

'EDIT' – allows you to retrieve, edit or delete any record in any TCIB file. You can retrieve a record by its record number. You can search any field of all or part of a file for any record containing your search target as all or part of the target field. You can also do a multiple file, single or multiple field search of from 1 to 20 separate files in a single search after building the appropriate index. Any time a search results in retrieving a record, the record will be displayed and you will have the choice of carrying out any desired editing functions. When you are finished with the record currently being displayed, you will have the choice of continuing with the search, returning to normal edit functions, editing another file or returning to the main menu.

'INDEX' – This program allows the user to build a single index to the contents of from 1 to 20 selected files. The index can span one or more fields in a single record. This information is sorted and stored on the disk. The REPORT GENERATOR and EDIT programs use the index to control their access to the chosen files.

The index is limited to a maximum of 10 character from each of 1000 records. If more than 10 characters per record are used in building the index, the number of records to which it can point will be reduced proportionately. Since the programs are referred to in unprotected source code, you are free to 'play with' the string space and index arrays if your DOS leaves you more headroom.

'REFILE' – The purpose of this utility program is to allow you to build a new file by copying any records in an old file which satisfy your search requirements to the new file. You can also copy selected records from one file to another in the same way. This search can be done with a MATCH or NON-MATCH test. For example, when you instruct the EDIT program to DELETE a record, it replaces the contents of the identifier field with "DELETED". You can then use the REFILE utility to copy all records which DO NOT have DELETED as their identifier to a new file.

'SEPARATE' – This program reads a specified data file and checks each date. Each month's transactions are copied into a separate file. If there are no transactions for a given month, no file is created. The files created are named JAN/DAT, FEB/DAT, etc. This utility can be run several times during an accounting period. If a required monthly data file already exists, the new data will be added to it. Otherwise it will be created and the new data entered into it.

REPORT GENERATOR – This program represents the final step in transforming unorganized financial data into useful financial reports.

After you have INSERTed your financial data, EDITed it to your satisfaction, PURGEd, REFILEd, and SEPARATEd as you want, you are now ready to INDEX it and REPORT. The report generator program first reads the index you have built, and based on that presents you with a finished product. Each major category (the first item of your index) will be presented on a separate page. Income entries will be shown as a simple, formated numeric value. Expense entries will be shown in parentheses. Each page will contain a running sub-total of the current major category (income items will be added, expense items will be subtracted). The sub-total will also be presented in the above format. Finally, a summary page will be printed, itemizing each major category covered in the report (such as IRS form 1040 Line #1) along with that category's sub-total. Finally an overall total of all entries covered by the index will be presented to finish your report.

MAKE-VC – An additional utility program is available at extra cost to allow the transfer of files from TCIB to VISICALC™. This makes use of VISICALC's 'DIF'™ format and is very useful for performing special computations with data gathered by TCIB. Incidentally, if you wish, TCIB files can also be created by VISICALC™ if you conform to the requirements specified in the 'MAKE-VC' program.

Product Limitations – Before we create the impression that this program is the 'end all and be all' let us hasten to talk about its requirements and limitations. This list of limitations is probably not all-inclusive. Doubtless, someone will find some way in which to push the program past its limits that we never thought of - however, this is a good start. PLEASE READ THIS SECTION CAREFULLY TO AVOID DISAPPOINTMENT!

1) With the exception of the screen input routine and the sort routine, the programs are written entirely in BASIC. The programs are furnished to you in UNPROTECTED source code. While this gives you the opportunity to study program and/or modify it to your special needs (AT YOUR OWN RISK, OF COURSE), interpreted BASIC just isn't as fast as machine language.

2) This program does a LOT of string manipulation. As a result, at times the computer will occasionally have to stop and 'collect its wits' (i.e. do "garbage collection" on its string space).

The answer to this peculiarity is 'DON'T PANIC' - we have never seen a "garbage collection" shutdown more than a few moments. Just watch for the cursor. If it is flashing, all is well and you can proceed with data entry. If it is not flashing, relax a moment and proceed when it resumes flashing. You can type as fast as you want in data input. We have yet to see anyone able to type faster than the program can accept the data.

3) There are only two restrictions on the amount of data you can handle with TCIB.

Disk Storage – all data being used by the programs MUST be on disk(s) mounted on drive(s) currently in use. Swapping of data disks during program operation is NOT supported. You can, however, use as many drives as your hardware and operating system will support. You should be able to use any type of disk your hardware and operating system will support. (We have not tested the program with anything besides 5¼" drives, but if problems arise, let us know and we will do our best to help you overcome them.)

Computer Memory – TCIB requires 48K of RAM (and uses every bit of it, I might add!). The INDEXER program leaves 15000 bytes free in which to build an index. Therefore, this is your main program limitation. The index itself uses 5 bytes per record for its own overhead. An index built on the category field (5 bytes) plus the date field (4 bytes) would use 14 bytes per record (5+4+5). A full1000 records can be handled with a single index built on these fields. On the other hand, an index built on category (5 bytes) + date (4 bytes) + description (18 bytes) would use 32 bytes per record (5+4+18+5) and could only handle about 460 records. The 'bottom line' is - don't put more information in your index than you REALLY need if you want to maximize the number of records you can handle. Also - keep an eye on available disk space when you are building an index. Be sure there is enough room or you'll wind up doing it over. If the program encounters a 'disk full' error while writing the index, it will close the index file, kill it and tell you to provide enough disk storage before trying again.

Mod I or III, 48K, 1 drive **$49.95**

CRITPATH*

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CRITPATH* will help

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CRITPATH* provides you with

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- The length of the critical path in work days.
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- A printer output of the actual calendar dates for the earliest start/finish and latest start/finish along with both free and total float for each activity.
- Your choice of printing out data sorted consecutively

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MOD I	**$600.00**
MOD III	**$750.00**
Manual	**$50.00**
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Requires 48K, 2 disk drives and 132 column printer

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- **REQUIRES:** ONLY 32K of memory and one single (Mod I) or double density 5¼ inch (Mod III).
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ENHBAS

Lawrence I Charters, Bremerton, Washington

A review of the Cornsoft Group's ENHBAS, in which the reviewer also includes three short programs written using this BASIC enhancement.

Most reviews are just that, but this one departs slightly and gives not only a review of ENHBAS, from the Cornsoft Group, but three sample programs written in ENHBAS as well. If you already have this remarkable package, key in the programs and enjoy them. If you don't have ENHBAS, read on and find out more about it.

ENHBAS is an extension of TRS-80 BASIC, and is worth every penny of its modest cost. Once loaded, you have the ability to use all normal TRS-80 commands, plus such new and powerful additions as WHILE/WEND structured loops, and elegant little flourishes such as the built-in PI constant. Lovers of the exotic will relish commands such as EXEC, which allows you to execute, as if it were a program line, any string expression.

Unlike most BASIC extensions and utilities, ENHBAS is available for Model I and Model III, cassette and disk systems. (An expanded version is available for the Model II). As long as you have at least 16K of RAM and Level II BASIC, there is a version of ENHBAS you can use, and it will allow you to run virtually any ENHBAS program. When this reviewer sent off a check for ENHBAS, it arrived promptly, packed in a sturdy box and padded by sections of the "Indianapolis Star" - a much better paper than the local paper. (I might even subscribe...)

To give you some idea of what you can do with ENHBAS (pronounced "EN - BASE"), note Spectacular Short Program 1 (Listing 1). Written as a single line, it requires next to no memory; the ENHBAS "SIZE" command reports it to be just 160 bytes long. Yet this tiny program prints, in regular, orderly columns, the full binary and hexadecimal equivalents of all decimal numbers between 1 and 500. If this doesn't impress you, it also prints a caption across the top of the video, labels the columns, draws a bar to separate the labels from the columns, and scroll-protects the top three lines of the video. The binary, decimal and hexadecimal numbers neatly scroll up the screen and disappear under the bar, giving a very professional appearance. Finally, as a parting gesture, the program disables the scroll protection. All of this using just three ENHBAS features: SCROLL, BIN$ and HEX$.

```
10    SCROLL=SET:A$=STRING$(32,42):B$="
      Binary              Dec   Hex":PRI
      NTTAB(14)"BINARY / DECIMAL / HEX
      CONVERSIONS":PRINTB$"     "B$:PRIN
      TA$A$:SCROLL=3:FORI=1TO500:PRINTB
      IN$(I);"  "I;"  "HEX$(I),:NEXT:SC
      ROLL=RESET
```

Listing 1

In answer to "what else can it do?" note Spectacular Short Program 2 (listing 2). Again the program is one line long, requiring a mere 181 bytes. This program (1) sets up a string array of 448 one-byte strings (448 fit nicely on the screen); (2) assigns a random character to every element of the array; (3) prints the array (so you can see that it is truly random); (4) waits patiently for you to press a key; (5) sorts the array in ascending order; and (6) prints out the sorted array. In spite of the complexity of the task, the sort is blindingly fast - it takes just six seconds to sort all 448 elements. A program designed to do the same thing, written in standard TRS-80 BASIC, would be much longer, and could very well take *hours* to finish sorting. Note too, such details as the WINKEY$ command. Even the most dedicated Microsoft purist will admit that:

```
10 Z$=WINKEY$:PRINT"YOU TOUCHED
ME!"
```

is much easier to write and understand than

```
10 Z$=INKEY$
20 IF Z$=""GOTO 10
30 PRINT"YOU TOUCHED ME!"
```

Both of these program segments perform identically. Which would you use?

Listing 2

```
10    CLS:CLEAR500:SCLEAR:DIMA$(447):PR
      INT"*** INITIALIZING STRING ARRAY
       ***":FORI=0TO447:A$(I)=CHR$(RND(
      95)+32):PRINTA$(I)" ";:NEXT:PRINT
      "PUSH ANY KEY TO START";:Z$=WINKE
      Y$:CLS:PRINT"START":KEYA$:SORT:PR
      INT"DONE":FORI=0TO447:PRINTA$(I)"
       ";:NEXT
```

You may have noticed that both listing 1 and 2 are very neatly formatted. ENHBAS does this automatically. Listings on both the video and the printer reserve the first six columns for line numbers, resulting in uniform columns of numbers and very readable program lines. ENHBAS also allows you to set the maximum printing width of your printer. For example, if you have an 80 column printer and want your program listing to look identical to what appears on your 64 column screen, simply type "CLM=64" and your printer will think it has only 64 columns. If this isn't enough, ENHBAS automatically sets the maximum page length of your printer at sixty lines, with a three line margin at the top and bottom. Never again will you have to worry about LLISTing your program on the page perforations! If you don't want a sixty line page, you may change the default by setting PAGE to some other value. Finally, if you don't have a printer (or your printer is turned off) the computer will not hang up if asked to LPRINT or LLIST. Instead, after a few seconds, the message "PRINTER NOT READY" will appear and you can continue on.

Other ENHBAS features include: automatic lower case; a user defined cursor; the ability to "RENEW" programs; one-letter edit commands (D, E, I, L, P, R and F replace DELETE, EDIT, AUTO, LIST, LIST-, RUN, and a new command, FIND); short-entry commands - <control> <SHIFT>S, for example, prints "STRING$("; and the ability to print, directly from the keyboard, all the arrow keys, plus the brackets, Yen and Pound signs, and other special characters available with a lower case modification. With a speaker/amplifier connected, ENHBAS provides an audible key "click"; a two-note error tone; and a one-note <BREAK> tone. Simply writing PRINT CHR$(7) or pushing <control> G will activate the "bell" signal, an eight-note rendition of Westminster Chimes.

If you haven't purchased a disk yet, cassette versions of ENHBAS include the Disk BASIC feature MID$, INSTR, LINEINPUT, and octal and hexadecimal constants. Machine language programmers will appreciate the ENHBAS commands WPEEK, WPOKE, and CALL. The first two commands are sixteen bit versions of PEEK and POKE - no more messing around trying to figure out the backward Z-80 instructions and addresses. CALL is similar to USR, except that addresses of machine language routines do not need to be predefined, and arguments may be passed both ways.

In fact, ENHBAS has something for everyone. Several extensions of BASIC are available, such as Microsoft's Level III, Apparat's Bionic Basic, and Modular Software's NewBasic. None offer the power and flexibility of ENHBAS, and ENHBAS is the only such extension with versions for cassette and diskette, Model I and III. ENHBAS also comes with extremely well written documentation, the only problem area being a somewhat fuzzy explanation of the PLAY (play

music) command. You won't have to flip through cryptic explanations, poorly printed on off-sized, off-color paper - ENHBAS documentation is written in English, and enclosed in an 8½ by 11 inch ring binder. The documentation even includes both a table of contents and an index. Remarkable.

For this review, a disk version of ENHBAS was tested on a 48K Model I using TRSDOS, NEWDOS+, and NEWDOS80. The original version tested, ENHBAS 1.7, worked quite well, with just one trivial bug noted (one command lacked a feature the documentation said it should have). Another minor problem was the use of the down-arrow as a control key for shorthand entry of BASIC keywords - irritating when using the NEWDOS or NEWDOS80 single-line listing functions.

ENHBAS 2.2, the latest version received, added several new features, and fixed the bug noted earlier. The short entry procedure has been changed, allowing all the arrow keys to be used. This latest version also "tokenizes" ENHBAS, resulting in faster operation than 1.7. Probably the most useful feature, though, is the new ZSTEP option. When ZSTEP is set to 1, the programmer can single-step through the program. A pause occurs after each statement is executed, and execution continues only after a key, any key, is pressed. Coupling TRON with ZSTEP makes debugging ridiculously easy.

Some users might find certain aspects of ENHBAS annoying. ENHBAS loads at the top of memory, occupying around 5K that it guards most jealously. Machine language programmers who like to use this area for various routines may find some conflicts, but the WPEEK, WPOKE and CALL command should permit easy adjustments. ENHBAS is also a bit slow. The program "FOR I=0 TO 10000:NEXT" will take 24 seconds to execute under regular disk BASIC, but 29 seconds under ENHBAS 2.2. This, too, is a minor difficulty, since sorts and graphics are the most time-sensitive BASIC operations, and ENHBAS offers routines which *drastically* speed up both types of programs.

The only "defect" noted in ENHBAS 2.2 was the lack of a shorthand entry command for the zero key (it should yield "INSTR", but doesn't). Programs written under older versions of ENHBAS will also require some fairly simple editing, since the "tokenizing" of reserved words in version 2.0 and later releases will create conflicts resulting in syntax errors. If you have an older version of ENHBAS and wish to receive the latest version, the Cornsoft Group will update your disk for around $3.00 (send them the disk). For the very reasonable price of $15.00, they will update your disk and send you the second edition of the manual. The Cornsoft Group appears firmly committed to product support and improvement.

The final sample program (Listing 3) illustrates several ENHBAS features. Borrowing a "turtle graphics" concept, an integer array is used to hold the graphic image of "A Famous Android".

Using the DRAW command, an outline of the android (defined in the array L) is rapidly drawn, rotated at 45 degree intervals, moved all around the screen, inverted from black to white and white to black (using the INVERT command), and expanded and contracted. Two boxes are drawn (with the PLOT command), forming an identification card for the android, and finally the entire display is scrolled off the left edge of the screen (using the LEFT command). While all of this is going on, music vaguely resembling part of Beethoven's Ninth Symphony is played (the command PLAY uses the string S$ for this purpose), together with some other incidental music.

Then, using the RDGOTO and JNAME features, the contents of the array defining the android's outline are replaced with another set of values defining a solid representation of the famous android. In other words, two separate and independent sets of data occupy the same array (L) at different, program-specified times. More androids are drawn, moved and rotated, and more music is played.

Eventually the process is repeated. Note too, that the RDGOTO and JNAME features allow the string S$ to contain, at various times, three different music selections. These features make for a very fast, compact (2963 bytes), and versatile program.

If you do any programming at all, you owe it to yourself to try ENHBAS. The Cornsoft Group also offers an integer BASIC compiler at an attractive price, and is working on a floating point compiler. "Missile Attack", one of Adventure International's latest hits, is another Cornsoft product. Any way you look at it, ENHBAS is a bargain.

Listing 3

```
10    CLS:CLEAR700:DEFINTI-L:DIML(54):P
      OKE16427,1:POKE16409,1
20    PRINT@340,"L APWRROEGNRCAEM MCIHN
      AGR TBEYR S"
30    PRINT@960,CHR$(23):FORI=0TO9:LEFT
      :FORJ=0TO300:NEXTJ,I
40    RDGTO"MUSIC":S$="":GOSUB280:RDGTO
      "ANDY1":FORI=0TO54:READL(I):NEXT
50    IY=12:FORIX=124TO68STEP-14:FORI=1
      TO8:POKE16426,I:CLS:GOSUB270:NEXT
      :IY=IY+4:NEXT
60    PRINT@26,"THE ADVENTURE OF";:PRIN
      T@90,"SECRET 'BOT .037";:GOSUB300
```

```
70    IX=68:IY=28:FORI=2TO11:POKE16427,
      I:GOSUB270:CLS:NEXT
80    CLS:FORI=11TO1STEP-1:POKE16427,I:
      GOSUB270:NEXT
90    RDGTO"MUSIC2":S$="":GOSUB280:FORI
      =0TO11:INVERT:NEXT:GOSUB300
100   CLS:IY=28:FORIX=68TO20STEP-4:GOSU
      B270:IY=IY-1:NEXT
110   CLS:IX=20:IY=16:GOSUB270:PLOTSB,3
      ,2TO34,34:PLOTSB,0,0TO127,47
120   PRINT@88,"SECRETARIAT FOR BUREAUC
      RACY";:PRINT@157,"SECURITY DIVISI
      ON";:PRINT@215,"ANDROID DEPARTMEN
      T, SEC. .037";:PRINT@274,STRING$(
      44,42);
130   PRINT@338,"NAME: Android Nim
       AGE: Two Years";:PRINT@402,"RANK
      : Special Agent    STATUS: Active
      ";:PRINT@466,"WEAPON: Mk 46 Laser
       Blaster, Type III,";:PRINT@538,"
      or Light Saber, 4 Megawatt";
140   PRINT@594,"CLEARANCE: Utmost Top
      Secret, RS-232C";:PRINT@658,"MISS
      ION: Seek out and destroy checksu
      m";:PRINT@731,"errors, bad loads,
       and null sorts.";
150   PRINT@770,"DESCRIPTION-- Wt.: 700
       kg.  Ht.: 200 cm.  Eyes: Two.";:
      PRINT@834,"Hair: None.  Agent Nim
       is fluent in BASIC, Assembler,";
      :PRINT@898,"binary, octal, decima
      l, and hexadecimal.  No oiling re
      quired.";
160   FORI=0TO5:GOSUB300:NEXT
170   RDGTO"ANDY2":FORI=0TO54:READL(I):
      NEXT
180   FORI=0TO63:LEFT:NEXT:POKE16426,4:
      IY=5:FOR IX=15TO127STEP16:GOSUB27
      0:NEXT
190   POKE16426,0:IY=42:FORIX=113TOOSTE
      P-16:GOSUB270:NEXT:RDGTO"MUSIC3":
      S$="":GOSUB280
200   IX=114:IY=12:FORI=0TO10:IX=IX-9:I
      Y=IY+2:CLS:GOSUB270:NEXT
210   FORI=5TO8:POKE16426,I:CLS:GOSUB27
      0:NEXT
220   FORI=0TO5:IY=IY-2:CLS:GOSUB270:NE
      XT
230   FORI=0TO5:IX=IX+14:GOSUB270:NEXT:
      INVERT:FORI=0TO3:GOSUB300:NEXT:FO
      RJ=0TO63:LEFT:NEXT
240   CLS:IX=60:IY=12:GOSUB270:POKE1642
      6,2:IX=80:IY=16:GOSUB270
250   IX=74:IY=33:POKE16426,4:GOSUB270:
      IX=54:IY=29:POKE16426,6:GOSUB270
260   PRINTCHR$(7);:RDGTO"MUSIC":S$="":
      GOSUB280:GOTO40
270   DRAWSET@IX,IYUSINGL:RETURN
280   FORI=0TO120:READJ,K:IFJ=0RETURN
290   K2=INT(K/256):K3=K-256*K2:S$=S$+C
      HR$(J)+CHR$(K3)+CHR$(K2):NEXT:RET
      URN
300   PLAYS$:RETURN
310   JNAME"ANDY1"
320   DATA 1307,513,1027,257,519,513,51
      9,513,519,1025,263,1029,1287,1025
      ,263,1029,519,517,519,517,519,261
      ,1027,773,1031,517,519
330   DATA 517,519,261,515,517,515,517,
      1027,1285,1031,261,1283,2049,2307
      ,2053,1283,257,1031,3329,771,2053
      ,771,257,519,2049,1031,513,0
340   JNAME"ANDY2"
350   DATA 257,258,517,1045,259,529,513
      ,273,513,273,257,258,261,277,261,
      789,261,533,261,259,2817,529,259
360   DATA 517,277,1541,259,1025,273,51
      3,259,261,277,1285,259,1281,273,7
      69,276,3077,259,1553,257,273,513
370   DATA 275,261,277,1285,533,261,275
      ,529,257,0
380   JNAME"MUSIC"
390   DATA 111,200,111,200,105,210,94,2
      40,94,240,105,210,111,200,125,190
      ,140,160,140,160,125,190,111,200,
      111,300,125,90,125,260
400   DATA 111,200,111,200,105,210,94,2
      40,94,240,105,210,111,200,125,190
      ,140,160,140,160,125,190,111,200,
      125,300,140,70,140,220
410   DATA 125,190,125,190,111,200,140,
      160,125,190,111,80,105,120,111,18
      0,140,200,125,190,111,80,105,120,
      111,180,125,190,140,160,125,190,1
      88,200
420   DATA 111,200,111,200,105,210,94,2
      40,94,240,105,210,111,200,125,190
      ,140,160,140,160,125,190,111,200,
      125,300,140,70,140,400,0,0
430   JNAME"MUSIC2"
440   DATA 168,100,168,100,149,120,168,
      100,140,140,149,120,125,160,140,1
      40,0,0
450   JNAME"MUSIC3"
460   DATA 188,180,188,180,168,190,168,
      190,158,200,158,200,168,190,168,1
      90,0,0
```

■

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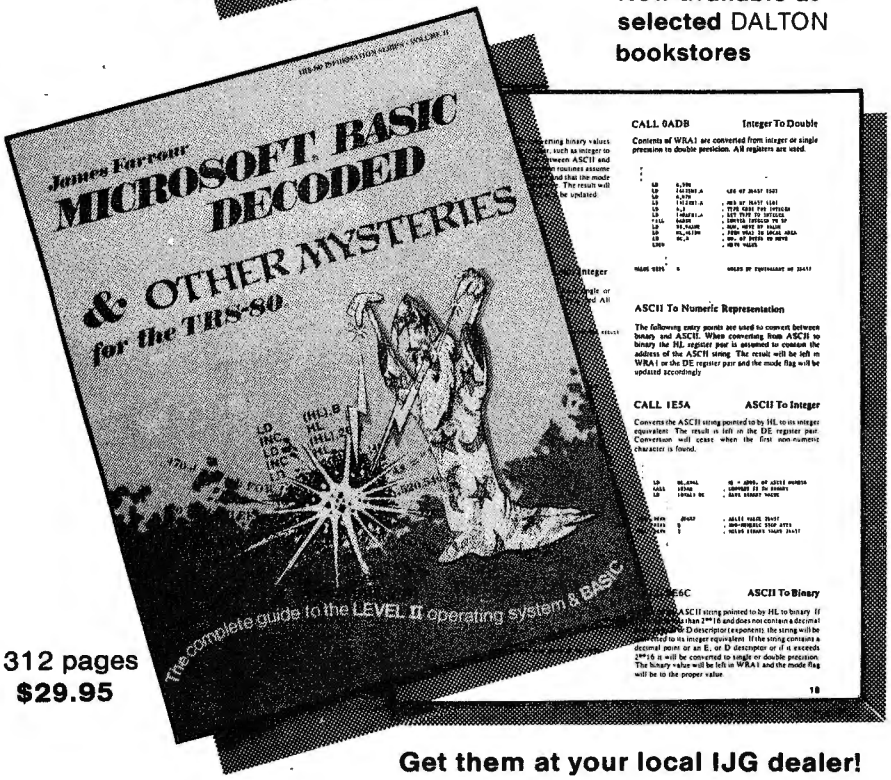

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Snapp enhancements for Model II

Marvin Mallon, Canoga Park, California

As a professional TRS-80 programmer I am always on the alert for any software tools that will increase my work efficiency. So it was that I quickly embraced Apparat's NEWDOS for the Model I. As those of you who are also using this remarkable DOS know, it is a significant improvement.

It was with considerable dejection, therefore, that I discovered that the Model II TRSDOS (version 1.2) was not what I had grown accustomed to. Even TRSDOS 2.0, while introducing some nice features, still fell short of what I thought a useful DOS should be.

The natural assumption was that Apparat would soon provide a NEWDOS for the Model II, but for reasons not known to me, they have yet to announce an interest in pursuing that. So it was with great delight (and some trepidation) that I read the advertisement from Snapp, Incorporated (a name unfamiliar to me) proclaiming the availability of six enhancement modules for Model II TRSDOS. It sounded great, but none of my colleagues had heard of this Cincinnati software firm, much less used their utilities.

Out of desperation I abandoned my cardinal rule about buying software sight-unseen and sent off for a set of all six. I am pleased to report that I have since received ten times their cost in value.

Their eight-inch diskette contains three files: XBPATCH, XBCOPY and DOSFIX. XBPATCH modifies Radio Shack's (Microsoft) BASIC so that it will intercept your keystrokes and jump to Snapp's enhancements. XBCOPY is the actual set of patches that provide the improvements which I will elaborate on in a moment. DOSFIX has nothing to do with either of the other two and is included as a free inducement. It is quite valuable in itself, and is discussed first.

DOSFIX is a set of 13 patches which provide fixes or cosmetic improvement to TRSDOS 2.0. If you are still using 1.2 you will have to obtain version 2.0 for $24.95 from Radio Shack, or Snapp will provide their disk for the "standard" 1.2 DOS which comes with the Model II. This makes little sense because 2.0 is a marked improvement over 1.2.

DOSFIX 1 is a patch which inhibits FORMAT from trying to format a marginal track ten times. Snapp's argument is that FORMAT is the time to discover (and discard) diskettes whose surface quality is dubious.

DOSFIX 2 allows the password (KTA2) to get you into the operating systems. It seems someone inadvertently "shut the door" somewhere in the DOS and this patch unlocks it.

The third fix is a set of patches "from Ft. Worth and offered without comment", by Snapp. The fourth patch is an adjustment which permits TRSDOS to be overlayed. It is required for some of Snapp's other software but mandatory for the XBASIC package.

The fifth fix is an esoteric fix to the DUMP command and will be most useful to machine language programmers. I'm not one, but used it anyway thinking that, like chicken soup for a cold, it couldn't hurt. The sixth fix is like number five and works with DEBUG.

Number seven interested me. If you choose to use it (all of these fixes are optional) then the BREAK key is permanently disabled and moved to the control (CTL) 6 combination. I agonized over implementing this but decided to do so on behalf of my clients. The software I create (or modify) is often run by inexperienced office help and it seems

logical to protect them against problems caused by an inadvertent program interruption.

The eighth fix is a controversial modification which I also hesitated to employ. It seems TRSDOS 2.0 had added a verify detect feature which checks the disks each time an input or output is performed to prevent destruction of the directory if a diskette has been swapped and a SYSTEM "I" has not been issued. It's a great idea but costs so much in access time that 2.0 runs detectably slower than 1.2. Snapp's fix gets you back to the faster, though riskier, mode. Just be sure to initialize when appropriate and you will be OK. I generally take care of this from within a program and thus am not concerned with the problem.

DOSFIX 9 is one I experimented with and chose to ignore. This patch reaches into the DOS and changes the drive's stepping rate from 20 to 12 milliseconds. While it works fine and offers some improvement in program speed, the patch makes my drives sound like a broken pin-ball machine. Rather than answer my clients' questions about the distrubing (but harmless) noise, I left it out.

The tenth patch is a delight. It eliminates the Tandy logo display which comes on with boot-up. I don't think my clients miss it and it leaves the door open to displaying my personal insignia if I ever get around to translating the one I did for the Model I.

DOSFIX 11 and 12 are mutually exclusive. Eleven eliminates the TIME question at boot-up and number twelve rids the DOS of both DATE and TIME questions. I opted for eleven, as I need the date stored away for many programs.

The highly touted 80-key type-ahead which was added to TRSDOS 2.0 doesn't function properly in BASIC. At the cost of the loss of the HOLD key function, it does after installation of fix number thirteen. Since type-ahead can appreciably speed up data entry, I chose to plug it in.

Enhancing BASIC

Six new functions are added to BASIC after performing the XBPATCH and XBCOPY routines from Snapp's instructions. The manual is handy, well-written and 21 pages long.

XBASIC is nothing more than one stroke general keyboard functions. "K" supplants KILL and "M" does nicely for MERGE along with a handful of others. Nice, but not valuable. The single stroke "N" for NEW concerns me with its potentially disastrous results. An un-NEW ("U") command, however, restores the unintentially lost program.

The truly useful portion of this module is the ability to use the cursor control keys (arrows) to list a program line-by-line. This was a feature of NEWDOS (Model I) which I welcomed warmly for my Model II.

XREF is the most useful tool which a BASIC programmer could desire. In essence, you can get a partial or complete dump to the screen or printer of all variables and line number references in a program. This serves as an indispensable map which tells, for example, that the variable X is referred to in lines 1500, 1650 and 2000. Program debugging is made enormously easier with such a guide at hand. When modifying someone else's code, it becomes even more valuable.

XFIND goes beyond Apparat's XREF and dumps out all keyword and string references. One can see, for example, all the program lines which contain an LPRINT statement. This is also true for any other BASIC statement, function, command or operator. Imbedded literals ("Press ENTER when ready") are alphabetically listed with their accompanying line references. Fantastic!

XDUMP rounds out your program dissection by listing all named variables and their value at the time the program was halted. Even an old familiar program will surprise you when you pull an XDUMP and see the current status of the variables. A real eye-opener and invaluable in the debugging process.

XRENUM may mean more to you than to me. I learned long ago *not* to renumber a program under development unless absolutely necessary. I lose all continuity from one version to the next. Nonetheless, this utility, on a limited basis, can be useful. I recently transplanted a lengthy subroutine but had to renumber it prior to merging it with the new program to prevent conflict of line numbers. On other occasions XRENUM was invoked (with one of its options) to scan a program, not to change it, and report on undefined line numbers and similar errors. It works beautifully in this mode and can spare you a lot of grief in a bad encounter.

XCOMPRESS has to be seen to be believed. The one stroke command "H" puts your program through a press which squeezes out 25% (or more) of the code. If you give it unlimited control, it throws out all remarks, irrelevent blanks, extraneous keywords and makes multiple statements wherever it can. To top it off, it renumbers your program on a one by one basis to cast out a few extra digits. You may opt to inhibit one or more of these removals and settle for a partial but more intelligible reduction in program content. This enhancement, while not recommended for use during program development, really pays off in space and performance when implemented.

An interesting by-product of installing XBASIC is worth mentioning here. Snapp utilizes the 26th sector on the diskette in hiding away its code. Consequently, each new backup copy must have the XBCOPY routine run onto it before it will perform. This is not a significant problem and, once done, it sticks even after that disk is used for subsequent backups. Only a fresh FORMAT will wipe out the enhancement code.

In Summary

Snapp's Extended BASIC is intended principally for the serious programmer. My operating procedure is to use this excellent package on all development tasks but to turn over a "non-Snapped" version to the customer. The end-user in a business environment will benefit from the efficiencies which the utilities gave to the programmer, but won't see (or completely appreciate) the hidden powers. The professional programmer, however, needs this software no less than a plumber or carpenter needs the best available tool. To paraphrase Mr Malden, "Don't leave your keyboard without it!" ■

Engineering application

A mathematical function grapher

Supergraph 1.0

For Model I & III disk or tape

Davut Z Korkut, Kenner, Louisiana

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$$\int_0^X (\text{SIN}(X)+\text{COS}(X^2))dx$$

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Supergraph is actually a mathematical/engineering tool that requires approximately 13K of memory. It is three graphing programs in one. It can:

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You can use Supergraph to:

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Submodes - Running Supergraph

Supergraph contains three function modes: the function proper mode (function itself), the derivative mode, and the integral mode. The function mode can be changed during program execution. Under each function mode there are two sub-modes: the graph (G) and the examine (X) sub-mode.

When you load Supergraph and type RUN, you will see:

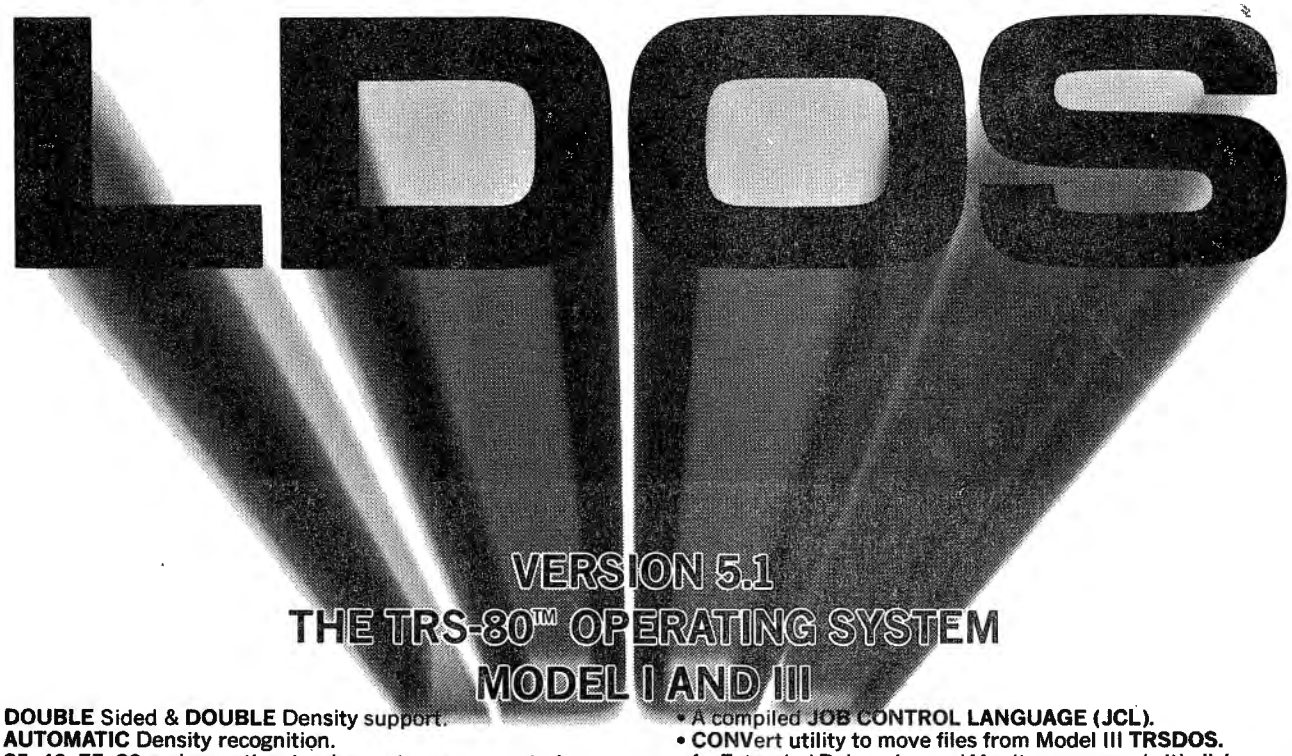
```
ENTER FUNCTION AS SUBROUTINE 5000.
THE ENTRY VALUE SHOULD BE STORED IN
VARIABLE X, AND THE RETURNED VALUE
IN VARIABLE F.
ENTER 'GOTO 20' WHEN FINISHED.
CURRENT FUNCTION (ERROR =0, LINE 0):
5000 F=.398942*EXP(-.5*X*X)
10000 RETURN
READY
>—
```

At this time you can enter the function beginning with line 5000 and ending with RETURN in line 10000. Be sure the function subroutine begins with line 5000 and does not exceed line 10000! Notice that the default equation is the normal distribution function and the current function is automatically listed.

The function subroutine can have discontinuities or can be approximated. If it has discontinuities, be careful when the derivative is plotted, as the slope at a discontinuity may be grossly inaccurate. If the function is approximated, be sure to include a calculation of F for all values of X.

See **SUPERGRAPH**, page 145

Now for the TRS-80™ Models I & III



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Lower case ROM patch

Lower case on power-up with no software driver...

William R Bell, El Granada, California

For Model I Level II

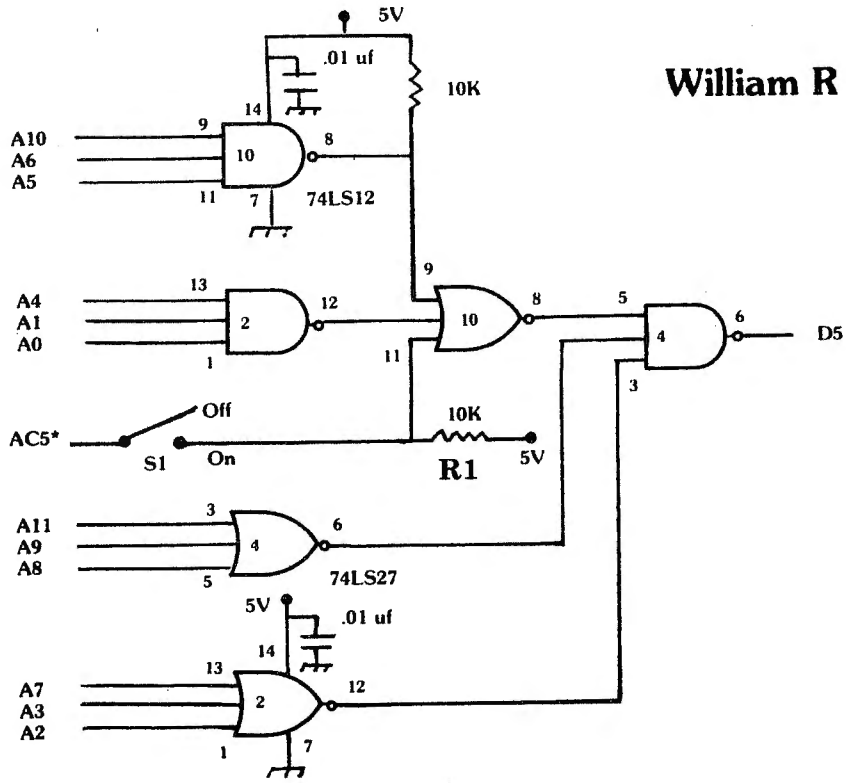

Figure 1

This modification adds two integrated circuits to the TRS-80 Model I Level II to give lower case on power up without needing to load a software driver. It works in conjunction with the Radio Shack or Electric Pencil type lower case modifications.

```
0473  3808     JR C,$+0AH   ;if not letter jump
0475  D640     SUB 40H      ;convert to ASCII 0-31
0477  FE20     CP 20H       ;test for UC or LC
0479  3802     JR C,$+04H   ;if upper case jump
047B  D620     SUB 20H      ;change LC to ASCII 0-31
047D  CD4105   CALL 0541H   ;continue on
```

Program listing 1

The TRS-80 has lower case in everything but video. The video driver routine in ROM converts upper and lower case letters to control codes. The video controller hardware converts the control codes to upper case letters. The Radio Shack and Electric Pencil modifications take care of the video controller. However, a RAM resident video driver routine must be loaded to replace the routine in ROM. This modification patches the ROM so the software driver is not needed.

The patch converts the JR C instruction to JR. This causes the jump to always execute and bypass the code that converts letters to control codes. The code is shown in Listing 1. Memory location 0473 hex is changed from 38 hex, JR C, to 18 hex, JR, by changing bit 5 from a 1 to a 0. This is done by decoding that memory location and pulling data line D5 low. Figure 1 shows the circuit for the patch. S1 and R1 are optional. They allow the patch to be switched out. The output must connect to D5 at the ROM pin 15, not the data bus. This is so D5 is pulled low at the input of the data line tri-state buffer. The 74LS12 is an open collector device. This is necessary whenever more than one device drives the same line.

The patch can get all but one of its signals from the empty ROM socket. The ACS*, ROM A chip select, is available at pin 1 of the 74LS42 on the Level II board. I built my patch into a small module that plugs into the empty socket with a wire to the ROM board for ACS*. It can also be built on a small board and connected to the socket with a DIP cable like the one the Level II board has. If you have the two-ROM Level II, you don't have an empty socket, so you will have to hard wire the modification. ■

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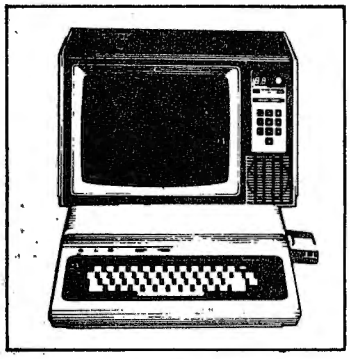

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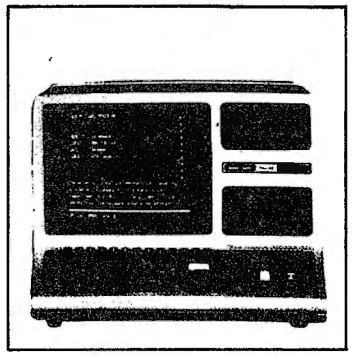

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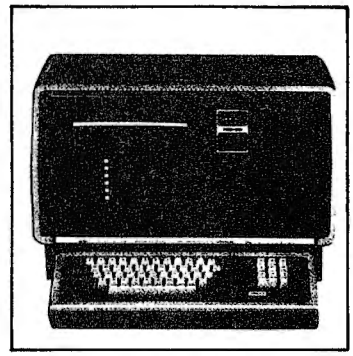

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Circle 39

MAZE of DARKNESS

The test awaited. It hovered in the Initiate's thoughts, a shroud of impending death. It threatened with each heartbeat which brought him closer to the confrontation. It coiled in the gloom like an asp, unseen but anticipated. Yet amid the doubt and fear that dogged his tracks, he felt calm. For he was here by choice, not by the spearpoint proddings and laughing tortures that had laid waste to so many of those he called comrade.

The Tyrant had been on the Graylock throne too long. With his rise to power came an end to the peaceful co-existence between Human and Graylock. Though no war existed between the races, the Humans were raided in their encampments in the foothills and the women hauled off to the Trade City for enslavement. No human, Freeman or otherwise was safe from the whims of the Phooba.

So rose the Guild. An Assassin's trade was honorable in this time for he rid the free people of their overlords, one at a time, with such skill and stealth that they were rumored to be ghosts. Silent, invisible and deadly, the guildsman struck such terror into the hearts of the Graylock gentry that their castles were rebuilt into fortresses of deadly traps, with only the innermost chambers being safe.

The lessons of survival floated inside the Initiate's head. The tools of his trade were his wits and his reflexes and his courage. Clad only in light leather armor and weaponless, he would face the test. To graduate, his training would mean induction into the Assassin's Guild and the chance to strike his blow for freedom. To fail would mean death, his body cremated, his ashes scattered for none would know his fate save his masters.

He paused before the door. A Guildsman's robes awaited. He took the first step into the maze. The deathtraps poised before him as unfeeling as the Graylocks, his enemies. The heavy iron door clanked behind him, echoing into the inky darkness. He had never felt more alive.

Let the test begin...

Combine any number of areas of memory into one machine language tape...

James F Williams, Rocky Mount, North Carolina

System/Command

James Williams of Byte Miser Software has joined our staff as the editor for this column. Besides running his own software house, he has been an Assistant Professor of Music at North Carolina Wesleyan College in Rocky Mount since 1975. He is currently teaching a BASIC course at Wilson Technical Institute. In addition, he is president of the Research Triangle TRS-80 User Group in Raleigh, North Carolina, and has developed a series of Ear Training programs for the Model I which he uses in his music theory classes at Wesleyan. James makes his debut with a real whopper - we welcome him and hope you enjoy his work.

After seventeen great installments, Phil Pilgrim has decided to move on to smaller but better things. Actually, he has gone fulltime into the fishing lure business (his last column was sort of a tip-off). He promises to contribute from time to time though, and we all wish him the best in his new endeavor. *Ed.*

For Models I & III

SYSTPE is a machine language program that will allow you to copy any number of different areas of memory and combine them into one SYSTEM tape. It also has the built-in option of having your programs start execution immediately after loading, without having to initialize with /ENTER.

Applications

This program has a wide variety of uses. Perhaps some of my personal applications will give you ideas of how you can make use of it.

You can modify machine language programs in memory, then make a tape version of your modification. I offer a version of SYSTPE with my program ASPTCH, a program that extends the functions of Radio Shack's editor/assembler 1.2. ASPTCH overlays many sections of EDTASM, and SYSTPE allows one to combine their copy of EDTASM with my ASPTCH modifications into one SYSTEM tape that takes about the same time to load as the editor/assembler itself. Because this combined tape is made on one's own cassette player, it is usually far easier to load than the commercial editor/assembler tape.

You can put several machine language programs in memory, and use SYSTPE to combine them into one tape for a single load. I used this technique to combine a spooler, printer driver, EDTASM and ASPTCH.

If you can figure out how to break into some of the programs with special loaders, you can create regular SYSTEM format tapes for easy loading and backup.

You can copy the screen produced by a BASIC program, combine it with a machine language program, and load the screen directly from tape. This is the technique I used in my Organ program. I wrote the BASIC program that produced the two manual organ keyboard on the screen, then used the USR function to jump to SYSTPE and copy the screen and machine section onto one tape. I had to use the USR function, because typing SYSTEM (ENTER)/SYSTPE(re-entry address)(ENTER) would have messed up the display on the screen. I also made use of the immediate execute option, because manual

initialization (typing /ENTER after loading) would also have messed up the display.

User instructions

To use SYSTPE you must know the beginning, end and entry address (in decimal or hex) of the areas you wish to copy. Armed with that information you are ready to decide where to ORG SYSTPE. If memory is tight, you need to have only the last section (XII-XX) plus the address buffer (4 bytes for each ORG) in memory at the same time your other programs are in memory. You may initialize SYSTPE (I-XI) even before you load the programs you wish copied.

To make use of the automatic execute option, simply include as one of your ORG's, 41E2H-41E4H. SYSTPE automatically loads these locations with JP (entry point). However, be warned. Using this option will cause a jump to your entry point every time you try to use the SYSTEM command. If you plan to be able to return to BASIC from your program, the problem can be fixed from BASIC by typing POKE 16866,201. A better solution would be to have your machine language program fix it as part of its initialization (LD A, 201 / LD (41E2H),A).

Example

Suppose the first machine language program you wish to copy resides at 4F00H-5000H and the second program at 7000H-7D50H. The entry point is 4F00H. The second ORG conflicts with the beginning of SYSTPE, so load and execute the initialization of SYSTPE before loading the two programs.

1. Load SYSTPE.
2. Initialize with /ENTER.
3. Answer "Number of different ORGS?" with 2 and ENTER.
4. Answer "Start address?" with 4F00H and ENTER.
5. Answer "End address?" with 5000H and ENTER.
6. Answer "Start address?" with 7000H and ENTER.
7. Answer "End address ?" with 7D50H and ENTER.
8. Answer "Entry address ?" with 4F00H and ENTER.
9. Load program 1 and do not initialize.
10. Load program 2 and do not initialize.
11. Ready the tape player for recording.
12. Answer SYSTEM prompt with /(SYSTPE re-entry address).
13. Repeat steps 11 and 12 for more copies.

Special notes

SYSTPE uses the screen as an input buffer, so users with the lower case modification will have to have a driver in memory for SYSTPE to work properly.

Model III users may wish to add the following line to the source code so that they may select the output baud rate:

```
01985    CALL    3042H
```

■

```
                00100 ;SYSTPE BY JAMES F. WILLIAMS
                00110 ;BYTE MISER SOFTWARE
                00120 ;720 WEST HAVEN BOULEVARD
                00130 ;ROCKY MOUNT, NC 27801
7D00            00140         ORG     7D00H           ;ORG ANYWHERE SO THAT
                00150                                 ; RENTRY TO THE END WILL
                00160                                 ; NOT CONFLICT WITH
                00170                                 ; AREA(S) TO BE COPIED.
                00180                                 ; ALSO REMEMBER TO LEAVE
                00190                                 ; ROOM AT THE END OF THE
                00200                                 ; PROGRAM FOR ADDRESSES
                00210                                 ; (4 BYTES FOR EVERY
                00220                                 ; SEPARATE ORG).
                00230 ;*****************************************************
                00240 ;       I.      FILE NAME INPUT
                00250 ;*****************************************************
7D00 21747D     00260 ENTRY   LD      HL,FNAME        ;PRINT FILE NAME PROMPT
7D03 CDA728     00270         CALL    28A7H
7D06 2A2040     00280         LD      HL,(4020H)      ;CURSOR POSITION TO HL
7D09 CD4900     00290 STRINP  CALL    49H             ;LOOP 'TIL KEY PRESSED
7D0C FE0D       00300         CP      0DH             ;CARRIAGE RETURN ?
7D0E 2805       00310         JR      Z,NAMESV        ;YES, SAVE NAME IN BUFFER
7D10 CD3300     00320         CALL    33H             ;NO, PRINT CHARACTER
7D13 18F4       00330         JR      STRINP          ;LOOP BACK FOR MORE
```

```
7D15 110A7F   00340 NAMESV  LD      DE,STRDAT       ;NAME STORAGE AREA IN DE
7D18 010600   00350         LD      BC,6            ;SAVE 6 CHARACTERS
7D1B EDB0     00360         LDIR                    ;MOVE FROM SCREEN TO BUF
              00370 ;*****************************************************
              00380 ;       II.     NUMBER OF ORGS INPUT
              00390 ;*****************************************************
7D1D 21807D   00400         LD      HL,NUMBER       ;PRINT # OF ORGS PROMPT
7D20 CDA728   00410         CALL    28A7H
7D23 CDF17D   00420         CALL    INPUT           ;INPUT HEX OR DEC VALUE
7D26 45       00430         LD      B,L             ;# OF ORGS TO B
7D27 7D       00440         LD      A,L             ;# OF ORGS TO A
7D28 329B7E   00450         LD      (NUMDAT+1),A    ;SAVE # OF ORGS
7D2B DD21107F 00460         LD      IX,ADDAT        ;ADDRESS STORAGE AREA
              00470 ;*****************************************************
              00480 ;       III.    START-END ADDRESS INPUT LOOP
              00490 ;*****************************************************
7D2F C5       00500 INPADS  PUSH    BC              ;SAVE # OF ORGS (IN B)
7D30 219C7D   00510         LD      HL,STRTAD       ;PRINT START ADRS PROMPT
7D33 CDA728   00520         CALL    28A7H
7D36 CDF17D   00530         CALL    INPUT           ;INPUT HEX OR DEC
7D39 DD7500   00540         LD      (IX+0),L        ;SAVE LOW ORDER
7D3C DD23     00550         INC     IX              ;BUMP POINTER
7D3E DD7400   00560         LD      (IX+0),H        ;SAVE HIGH ORDER
7D41 DD23     00570         INC     IX              ;BUMP POINTER
7D43 21AC7D   00580         LD      HL,ENDAD        ;PRINT END ADRS PROPMT
7D46 CDA728   00590         CALL    28A7H
7D49 CDF17D   00600         CALL    INPUT           ;INPUT HEX OR DEC
7D4C DD7500   00610         LD      (IX+0),L        ;SAVE LOW ORDER BYTE
7D4F DD23     00620         INC     IX              ;BUMP POINTER
7D51 DD7400   00630         LD      (IX+0),H        ;SAVE HIGH ORDER BYTE
7D54 DD23     00640         INC     IX              ;BUMP POINTER
7D56 C1       00650         POP     BC              ;RESTORE # OF ORGS COUNT
7D57 10D6     00660         DJNZ    INPADS          ;LOOP UNTIL ALL ORGS IN
              00670 ;*****************************************************
              00680 ;       IV.     ENTRY ADDRESS INPUT
              00690 ;*****************************************************
7D59 21BA7D   00700         LD      HL,ENTRAD       ;PRINT ENRTY ADRS PROMPT
7D5C CDA728   00710         CALL    28A7H
7D5F CDF17D   00720         CALL    INPUT           ;INPUT HEX OR DEC
7D62 22E37E   00730         LD      (ENTDAT+1),HL   ;SAVE ENTRY ADDRESS
              00740 ;*****************************************************
              00750 ;       V.      DISPLAY RE-ENTRY ADDRESS
              00760 ;*****************************************************
7D65 21CA7D   00770         LD      HL,SYSPMT       ;PRINT RECORD PROMPT
7D68 CDA728   00780         CALL    28A7H
7D6B 21777E   00790         LD      HL,RENTRY       ;RE-ENTRY ADDRESS TO HL
7D6E CD487E   00800         CALL    DECOUT          ;DISPLAY DECIMAL NUMBER
7D71 C3B202   00810         JP      2B2H            ;TO BASIC SYSTEM PROMPT
              00820 ;*****************************************************
              00830 ;       VI.     PROMPTS
              00840 ;*****************************************************
7D74 46       00850 FNAME   DEFM    'FILE NAME ?'
7D7F 00       00860         DEFB    0
7D80 0D       00870 NUMBER  DEFB    13
```

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7D81 4E         00880           DEFM    'NUMBER OF DIFFERENT ORGS ?'
7D9B 00         00890           DEFB    0
7D9C 53         00900 STRTAD    DEFM    'START ADDRESS ?'
7DAB 00         00910           DEFB    0
7DAC 45         00920 ENDAD     DEFM    'END ADDRESS ?'
7DB9 00         00930           DEFB    0
7DBA 45         00940 ENTRAD    DEFM    'ENTRY ADDRESS ?'
7DC9 00         00950           DEFB    0
7DCA 54         00960 SYSPMT    DEFM    'TO RECORD, ANSWER SYSTEM PROMPT WITH /'
7DF0 00         00970           DEFB    0
                00980 ;*********************************************************
                00990 ;         VII.    HEX-DEC INPUT
                01000 ;*********************************************************
7DF1 3E5E       01010 INPUT     LD      A,94            ;ASCII FOR RIGHT ARROW
7DF3 CD3300     01020           CALL    33H             ;DISPLAY IT
7DF6 3E1E       01030           LD      A,30            ;CLEAR TO END OF LINE
7DF8 CD3300     01040           CALL    33H
7DFB 2A2040     01050           LD      HL,(4020H)      ;CURSOR LOCATION TO HL
7DFE CD4900     01060 SCAN      CALL    49H             ;LOOP 'TIL KEY PRESSED
7E01 FE0D       01070           CP      0DH             ;CARRIAGE RETURN?
7E03 2805       01080           JR      Z,EVAL          ;YES, SEE IF HEX OR DEC
7E05 CD3300     01090           CALL    33H             ;NO, PRINT CHARACTER
7E08 18F4       01100           JR      SCAN            ;GET ANOTHER CHARACTER
7E0A ED5B2040   01110 EVAL      LD      DE,(4020H)      ;CURSOR POSITION TO DE
7E0E 1B         01120           DEC     DE              ;BACK UP ONE
7E0F 1A         01130           LD      A,(DE)          ;CHARACTER TO A
7E10 FE48       01140           CP      'H'             ;IS IT H?
7E12 2810       01150           JR      Z,HEX           ;YES, EVALUATE AS HEX
                01160 ;*********************************************************
                01170 ;         VIII.   DECIMAL INPUT
                01180 ;*********************************************************
7E14 13         01190           INC     DE              ;PLACE 0 BYTE AT END
7E15 AF         01200           XOR     A
7E16 12         01210           LD      (DE),A
7E17 CD4F1E     01220           CALL    1E4FH           ;EVALUATE AS DECIMAL
7E1A EB         01230           EX      DE,HL           ;VALUE TO HL
7E1B CD537E     01240           CALL    HEXOUT          ;DISPLAY HEX EQUIVALENT
7E1E 3E0D       01250 CR        LD      A,0DH           ;PRINT CARRIAGE RETURN
7E20 CD3300     01260           CALL    33H
7E23 C9         01270           RET
                01280 ;*********************************************************
                01290 ;         IX.     HEX INPUT
                01300 ;*********************************************************
7E24 110000     01310 HEX       LD      DE,0
7E27 EB         01320           EX      DE,HL           ;HL=0:DE=FIRST CHARACTER
7E28 1B         01330           DEC     DE              ;PREPARE FOR LOOP
7E29 13         01340 NEXT      INC     DE              ;BUMP SCREEN POINTER
7E2A 1A         01350           LD      A,(DE)          ;CHARACTER TO A
7E2B FE48       01360           CP      'H'             ;IS IT H?
7E2D 2814       01370           JR      Z,DECDPY        ;YES, SHOW DEC EQUIVALENT
7E2F FE30       01380           CP      '0'             ;LESS THAN ASCII "0"?
7E31 38F6       01390           JR      C,NEXT          ;YES, IGNORE IT
7E33 29         01400           ADD     HL,HL           ;SHIFT HL LEFT 4 TIMES
7E34 29         01410           ADD     HL,HL
7E35 29         01420           ADD     HL,HL
```

```
7E36 29       01430          ADD     HL,HL
7E37 FE3A     01440          CP      ':'             ;> OR = ASCII "A"?
7E39 3002     01450          JR      NC,LTR          ;YES, A-F
7E3B C607     01460          ADD     A,7             ;NO, 0-9
7E3D D637     01470 LTR      SUB     55              ;ADJUST TO VALUE
7E3F B5       01480          OR      L               ;MERGE A AND L INTO A
7E40 6F       01490          LD      L,A             ;BACK TO L
7E41 18E6     01500          JR      NEXT            ;LOOP FOR NEXT DIGIT
              01510 ;*********************************************************
              01520 ;        X.      DISPLAY DECIMAL NUMBER
              01530 ;*********************************************************
7E43 CD487E   01540 DECDPY   CALL    DECOUT          ;VALUE TO DECIMAL STRING
7E46 18D6     01550          JR      CR              ;PRINT CARRIAGE RETURN
7E48 E5       01560 DECOUT   PUSH    HL              ;SAVE VALUE
7E49 3E20     01570          LD      A,20H           ;ASCII FOR SPACE IN A
7E4B CD3300   01580          CALL    33H             ;PRINT IT
7E4E CDAF0F   01590          CALL    0FAFH           ;DISPLAY DEC STRING
7E51 E1       01600          POP     HL              ;RESTORE VALUE
7E52 C9       01610          RET
              01620 ;*********************************************************
              01630 ;        XI.     DISPLAY HEX NUMBER
              01640 ;*********************************************************
7E53 0E04     01650 HEXOUT   LD      C,4             ;SET FOR 4 DIGITS
7E55 E5       01660          PUSH    HL              ;SAVE HL
7E56 3E20     01670          LD      A,20H           ;ASCII FOR SPACE TO A
7E58 CD3300   01680          CALL    33H             ;PRINT IT
7E5B 0604     01690 DIGIT    LD      B,4             ;SET FOR 4 BITS
7E5D AF       01700          XOR     A               ;CLEAR A
7E5E 29       01710 SHFT     ADD     HL,HL           ;SHIFT HL 4 BITS
7E5F 17       01720          RLA                     ;INTO A
7E60 10FC     01730          DJNZ    SHFT            ;LOOP 4 TIMES
7E62 C630     01740          ADD     A,48            ;ADJUST TO 0-9
7E64 FE3A     01750          CP      58              ;LETTER?
7E66 3802     01760          JR      C,PRINT         ;NO, 0-9: PRINT IT
7E68 C607     01770          ADD     A,7             ;ADJUST TO A-F
7E6A CD3300   01780 PRINT    CALL    33H             ;PRINT CHARACTER
7E6D 0D       01790          DEC     C               ;DIGIT COUNT
7E6E 20EB     01800          JR      NZ,DIGIT        ;MORE
7E70 3E48     01810          LD      A,'H'           ;ASCII H TO A
7E72 CD3300   01820          CALL    33H             ;PRINT IT
7E75 E1       01830          POP     HL              ;RESTORE VALUE
7E76 C9       01840          RET
              01850 ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
              01860 ;ALL PREVIOUS CODE MAY BE OVER-WRITTEN AFTER EXECUTION.
              01870 ;%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%%
              01880 ;*********************************************************
              01890 ;        XII.    IMMEDIATE EXECUTE OPTION
              01900 ;*********************************************************
7E77 AF       01910 RENTRY   XOR     A               ;CLEAR A
7E78 21E241   01920          LD      HL,41E2H        ;SYSTEM PATCH TO HL
7E7B 36C3     01930          LD      (HL),0C3H       ;PUT JP INSTRUCTION THERE
7E7D 2AE37E   01940          LD      HL,(ENTDAT+1)   ;ENTRY ADDRESS TO HL
7E80 22E341   01950          LD      (41E3H),HL      ;AUTO JP TO ENTRY
              01960 ;*********************************************************
              01970 ;        XIII.   WRITE HEADER BLOCK
              01980 ;*********************************************************
```

```
7E83 CD1202    01990          CALL    212H            ;DEFINE DRIVE
7E86 CD8702    02000          CALL    287H            ;WRITE LEADER
7E89 3E55      02010          LD      A,'U'           ;HEADER CHARACTER TO A
7E8B CD6402    02020          CALL    264H            ;WRITE IT TO TAPE
7E8E 110A7F    02030          LD      DE,STRDAT       ;FILE NAME STORAGE AREA
7E91 0606      02040          LD      B,6             ;6 CHARACTERS
7E93 CD007F    02050          CALL    WRTLP           ;WRITE TO TAPE
7E96 DD21107F  02060          LD      IX,ADDAT        ;ADDRESS STORAGE TO IX
7E9A 0601      02070 NUMDAT   LD      B,1             ;MODIFIED TO # OF ORGS
7E9C C5        02080 NXTBLK   PUSH    BC              ;SAVE # OF ORGS (IN B)
7E9D DD5E00    02090          LD      E,(IX+0)        ;LOW ORDER START ADDRESS
7EA0 DD5601    02100          LD      D,(IX+1)        ;HIGH ORDER START ADDRESS
               02110 ;*********************************************************
               02120 ;        XIV.    WRITE BLOCK OF DATA TO TAPE
               02130 ;*********************************************************
7EA3 3E3C      02140 TBLOCK   LD      A,'<'           ;TEXT BLOCK CHAR TO A
7EA5 CD6402    02150          CALL    264H            ;WRITE IT TO TAPE
7EA8 DD6E02    02160          LD      L,(IX+2)        ;LOW ORDER END ADDRESS
7EAB DD6603    02170          LD      H,(IX+3)        ;HIGH ORDER END ADDRESS
7EAE AF        02180          XOR     A               ;CLEAR CARRY
7EAF ED52      02190          SBC     HL,DE           ;# OF BYTES-1 IN HL
7EB1 B4        02200          OR      H               ;HIGH ORDER BYTE 0?
7EB2 2844      02210          JR      Z,LSTTME        ;YES, WITHIN 256 BYTES
               02220                                  ; OF END OF THIS MEM AREA
7EB4 AF        02230          XOR     A               ;NO, SET TO 256
7EB5 47        02240          LD      B,A             ;256 COUNT IN B
7EB6 CD6402    02250 CONT2    CALL    264H            ;WRITE COUNT TO TAPE
7EB9 7B        02260          LD      A,E             ;LOW ORDER START ADDRESS
7EBA CD6402    02270          CALL    264H            ;WRITE TO TAPE
7EBD 7A        02280          LD      A,D             ;HIGH ORDER START ADDRESS
7EBE CD6402    02290          CALL    264H            ;WRITE TO TAPE
7EC1 4B        02300          LD      C,E             ;LOW ORDER BYTE TO C
7EC2 81        02310          ADD     A,C             ;ADD TO HIGH ORDER BYTE
7EC3 4F        02320          LD      C,A             ;TOTAL TO C (CHECKSUM)
7EC4 CD007F    02330          CALL    WRTLP           ;WRITE DATA TO TAPE
7EC7 79        02340          LD      A,C             ;CHECKSUM TOTAL TO A
7EC8 CD6402    02350          CALL    264H            ;WRITE IT TO TAPE
7ECB 18D6      02360 LSTFLG   JR      TBLOCK          ;MODIFIED BY LSTTME TO
               02370                                  ; JR TO NEXT INSTR (0)
               02380 ;*********************************************************
               02390 ;        XV.     PREPARE TO WRITE NEXT MEMORY AREA
               02400 ;*********************************************************
7ECD C1        02410          POP     BC              ;RESTORE # OF ORGS COUNT
FIELD OVERFLOW
7ECE 3ED6      02420          LD      A,TBLOCK-LSTFLG-2       ;ASSEMBLY TIME
               02430                                  ; CALCULATION OF LAST
               02440                                  ; BYTE OF JR INSTRUCTION
7ED0 32CC7E    02450          LD      (LSTFLG+1),A    ;RESTORE INSTR TO ORGINAL
7ED3 DD23      02460          INC     IX              ;POINT IX TO NEXT SET OF
               02470                                  ; ADDRESSES
7ED5 DD23      02480          INC     IX
7ED7 DD23      02490          INC     IX
7ED9 DD23      02500          INC     IX
7EDB 10BF      02510          DJNZ    NXTBLK          ;LOOP FOR NUMBER OF ORGS
```

```
                02520 ;*****************************************************
                02530 ;       XVI.    WRITE TRAILER BLOCK
                02540 ;*****************************************************
7EDD 3E78       02550         LD      A,78H           ;TRAILER BLOCK CHAR TO A
7EDF CD6402     02560         CALL    264H            ;WRITE IT TO TAPE
7EE2 210000     02570 ENTDAT  LD      HL,0            ;MODIFIED TO CONTAIN
                02580                                 ; ENTRY ADDRESS
7EE5 7D         02590         LD      A,L             ;LOW ORDER ENTRY TO A
7EE6 CD6402     02600         CALL    264H            ;WRITE IT TO TAPE
7EE9 7C         02610         LD      A,H             ;HIGH ORDER ENTRY TO A
7EEA CD6402     02620         CALL    264H            ;WRITE TO TAPE
                02630 ;*****************************************************
                02640 ;       XVII.   FINAL ODDS AND ENDS
                02650 ;*****************************************************
7EED CDF801     02660         CALL    1F8H            ;TURN OFF MOTOR
7EF0 21E241     02670         LD      HL,41E2H        ;SYSTEM PATCH ADDR TO HL
7EF3 36C9       02680         LD      (HL),0C9H       ;RESTORE WITH RET
7EF5 C3B202     02690         JP      2B2H            ;TO BASIC SYSTEM PROMPT
                02700 ;*****************************************************
                02710 ;       XVIII.  ROUTINE TO HANDLE LAST BLOCK
                02720 ;*****************************************************
7EF8 32CC7E     02730 LSTTME  LD      (LSTFLG+1),A    ;A SET TO 0. MODIFIES
                02740                                 ; "JR TBLOCK" TO "JR 0"
                02750                                 ; (NEXT INSTRUCTION)
7EFB 23         02760         INC     HL              ;SET HL TO # OF BYTES
7EFC 45         02770         LD      B,L             ;BYTES IN BLOCK TO B
7EFD 7D         02780         LD      A,L             ;BYTES IN BLOCK TO A
7EFE 18B6       02790         JR      CONT2           ;WRITE LAST BLOCK IN THIS
                02800                                 ; AREA
                02810 ;*****************************************************
                02820 ;       XIX.    WRITE DATA TO TAPE AND DEVELOP CHECKSUM
                02830 ;*****************************************************
7F00 1A         02840 WRTLP   LD      A,(DE)          ;LOAD A WITH DATA
7F01 CD6402     02850         CALL    264H            ;WRITE IT TO TAPE
7F04 13         02860         INC     DE              ;BUMP POINTER
7F05 81         02870         ADD     A,C             ;DEVELOP CHECKSUM
7F06 4F         02880         LD      C,A
7F07 10F7       02890         DJNZ    WRTLP           ;LOOP FOR NUMBER OF BYTES
7F09 C9         02900         RET
                02910 ;*****************************************************
                02920 ;       XX.     DATA STORAGE AREA
                02930 ;*****************************************************
0006            02940 STRDAT  DEFS    6               ;FILE NAME STORAGE
7F10 00         02950 ADDAT   DEFB    0               ;BEGIN ADRS STORAGE AREA
7D00            02960         END     ENTRY
00001 TOTAL ERRORS
```

```
ADDAT   7F10 02950   00460 02060
CONT2   7EB6 02250   02790
CR      7E1E 01250   01550
DECDPY  7E43 01540   01370
DECOUT  7E48 01560   00800 01540
DIGIT   7E5B 01690   01800
ENDAD   7DAC 00920   00580
```

The listing accompanying this article has one field overflow error. This error is introduced by the Apparat editor/assembler being used to produce the listing. The calculation of the byte D6 is correct. ASPTCH does not produce this error.

```
ENTDAT 7EE2 02570    00730 01940
ENTRAD 7DBA 00940    00700
ENTRY  7D00 00260    02960
EVAL   7E0A 01110    01080
FNAME  7D74 00850    00260
HEX    7E24 01310    01150
HEXOUT 7E53 01650    01240
INPADS 7D2F 00500    00660
INPUT  7DF1 01010    00420 00530 00600 00720
LSTFLG 7ECB 02360    02420 02450 02730
LSTTME 7EF8 02730    02210
LTR    7E3D 01470    01450
NAMESV 7D15 00340    00310
NEXT   7E29 01340    01390 01500
NUMBER 7D80 00870    00400
NUMDAT 7E9A 02070    00450
NXTBLK 7E9C 02080    02510
PRINT  7E6A 01780    01760
RENTRY 7E77 01910    00790
SCAN   7DFE 01060    01100
SHFT   7E5E 01710    01730
STRDAT 7F0A 02940    00340 02030
STRINP 7D09 00290    00330
STRTAD 7D9C 00900    00510
SYSPMT 7DCA 00960    00770
TBLOCK 7EA3 02140    02360 02420
WRTLP  7F00 02840    02050 02330 02890
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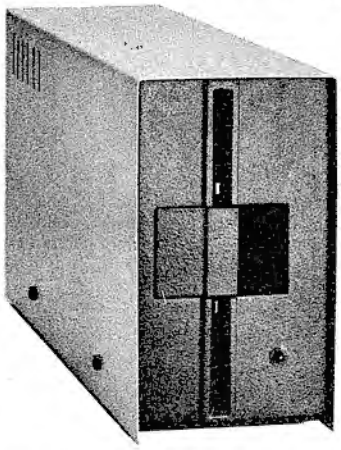

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Access Unlimited AFD-100†	$275 00	no	180 Kbytes	102 Kbytes	yes	yes	yes	yes
AFD-100F†	329 00	yes	360 Kbytes	204 Kbytes	yes	yes	yes	yes
MTI TF-5	359 00	no	?	?	?	?	?	no
Midwest Comp. & Per MPI B-51	321 00	no	?	102 Kbytes	?	?	yes	no
Aerocomp Mdl 40-1	349 95	yes	?	?	yes	?	yes	yes
CPU Shop CCI-100	314 00	no	?	102 Kbytes	?	?	yes	no
AMI 40-track	325 00	no	?	?	?	?	?	no
80-TRACK DRIVES								
Access Unlimited AFD-200†	429 95	no	368 Kbytes	205 Kbytes	yes	yes	yes	yes
AFD-200F†	449 95	yes	736 Kbytes	410 Kbytes	yes	yes	yes	yes
MTI TF-8	639 00	no	?	200 Kbytes	?	?	?	no
Aerocomp 80-tk mdl	459 95	yes	?	?	yes	?	yes	yes
CPU Shop CCI-280	429 00	no	?	204 Kbytes	?	?	yes	no
AMI 80-track	560 00	no	?	?	?	?	?	no

1 As advertised in 80 Microcomputing, Jan 1981

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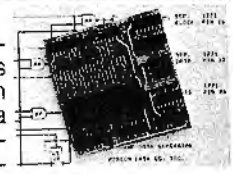
DATA SEPARATOR™



This PC board plug-in adapter for the TRS-80* virtually eliminates data read errors (CRC error — Track locked out!) which occur on high-density inner disk tracks, a problem that has plagued TRS-80* systems. The Percom Data Separator™ is installed in the Expansion Interface without modifying the host system. Caution: Opening the TRS-80* Expansion Interface may void the limited 90-day warranty: $23.95

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A flying saucer bumper hovers at the top, lights flashing, while spaceship bumpers fly across the board beneath it. Your ball bounces off the moving spaceships in a most unpredictable fashion, so you must stay alert to keep it in play.

As your ball zings around the board scoring on the bumpers, knock out five of the meteor rollovers and you'll get an extra ball. There are double and triple bonus targets to increase your score, too, but be careful—below each is a black hole, waiting to swallow your ball!

ASTROBALL will have all your family and friends lining up for the action and challenge. Five selectable playing speeds make it suitable for all skill levels. Available on your choice of 16K tape or 32K disk for $19.95. Order its companion, PINBALL, for $14.95 on 16K tape, $20.95 on 32K disk.

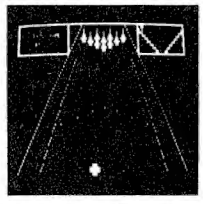
ACORN PROGRAMS ARE AVAILABLE AT FINE COMPUTER STORES EVERYWHERE

By Steven Kearns

Huge antimatter rocks appear on the Tactical Display Screen of your spacecraft. You blast away but they just explode into smaller chunks for you to destroy.

To add to your woes, alien ships and time bombs appear periodically. If the ships hit you or the timers reach zero—BOOM! Maneuver, fire lasers, jump to hyperspace—anything to avoid the onslaught. For one or two players, with five skill levels.

For TRS-80* model I or III. Versions for 16K tape or 32K disk are $19.95 each.



TENPINS

By John Allen

A realtime action game with 3-D graphics and sound, TENPINS brings the thrill of championship bowling to your TRS-80*

From one to four players participate, and the program senses the skill of each player. Beginners can simply "roll" the ball while more skilled players can vary the ball's force, direction, and spin.

TENPINS even has factors to simulate imperfections in the lanes, adding even more realism. Available for only $14.95 for 16K tape version, $20.95 for 32K disk.

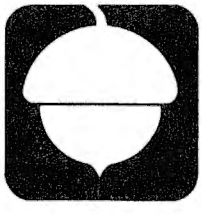
SUPERSCRIPT

By Richard Wilkes

Using your SUPERSCRIPT modified SCRIPSIT Word Processor and a compatible printer, you can now underline, boldface, insert text during printout, slash zeros, set type pitch, subscript and, of course, superscript! You can even read your directory and kill files without ever leaving SCRIPSIT.

Includes drivers for popular printers and easy instructions. Just $50.00 for TRS-80* model I (requires 32K, 1 drive, SCRIPSIT/LC) or model III (requires 32K, 2-drives, SCRIPSIT/LC model I version).

*Trademark of Tandy Corp.



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Circle 43

Hi-res for your Model I or III...

Mikee Electronics high resolution graphics board

80-U.S. Staff

Video resolution is one of the problems with the Models I and III. Now, a new company from Bellevue, Washington, called Mikee Electronics Corporation, has introduced a product to fill the need.

We were introduced to the board, called the Mikeeangelo (pronounced MIK-E-ANGELO), recently and were very impressed. The resolution of the Model III version is fine enough to produce grey-scale pictures or fine-line charts for business. The resolution is 512 horizontal by 192 vertical on the Model III and 384 by 192 for the Model I.

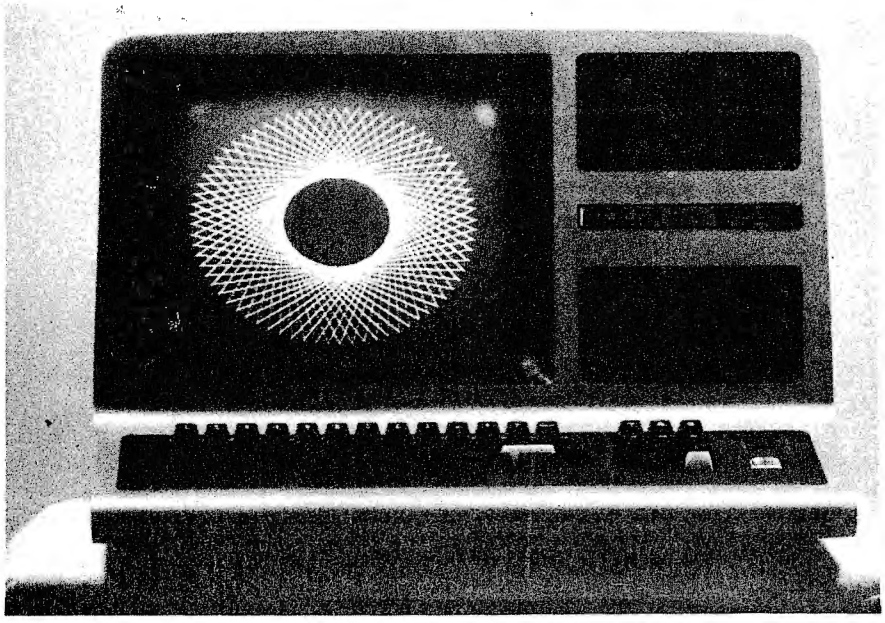
The driver program used for point to point lines and individual graphic point setting, resetting and testing, is supplied as a machine language program of a little less than 500 bytes. Parameters, which are poked into RAM for use by the driver routine, can be passed in about 10 lines of BASIC code.

Like the normal video, the screen is memory mapped and parallels part of the last 16K addressable by the TRS-80. The memory is static RAM and can be software switched in or out for those who wish to utilize all 48K of normal RAM. This is somewhat the way in which the Model II uses its video memory. Also, like the normal video of the I and III, alphanumeric characters are produced by the regular character generator and intermixed with graphics in the same manner as an unmodified TRS-80.

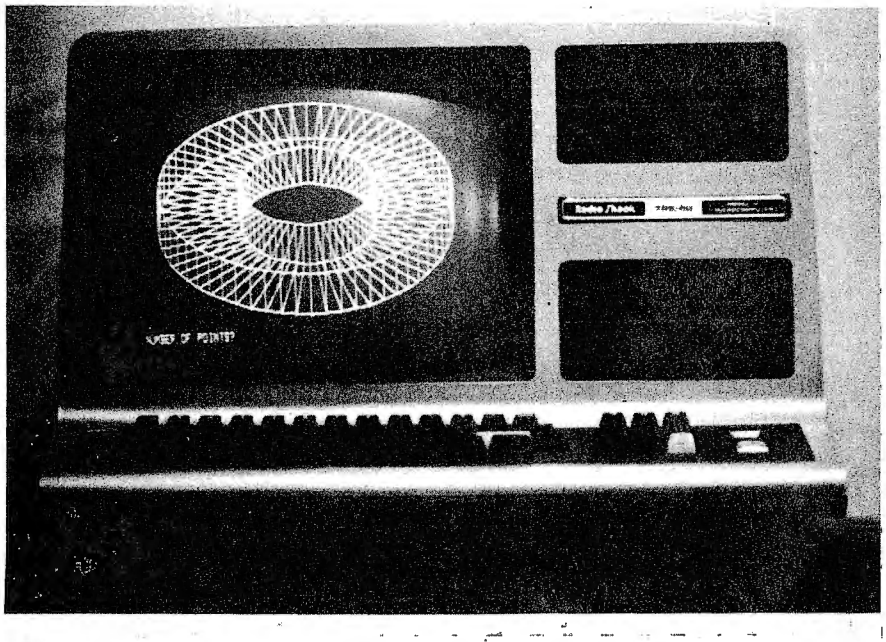
Total inverse video can be optionally selected. However, you cannot select partial inverse video at this time.

The entire assembly comes as two separate units connected via a flat ribbon cable. The interface board which requires ten solder point connections to the computer and one trace line (or integrated circuit pin) cut is located inside the computer case. The outlying module contains the other large circuit board (for the 12,288 bytes of video memory) and the power supply. For Model I owners, it does not require the expansion interface and can be used in a system with as little as 16K of RAM.

The real benefit comes from finally having super graphics for these computers. We looked at and played with the Model III version and were very impressed. The photos included here are representative of the quality available on the Model III. The Model I, by its inherently lower resolution monitor, still gives a remarkably good performance. ■



Actual screen photos above and below, showing the Mikee Electronics board in action. Note on the bottom photo that the characters are still normal size, but the graphics resolution is increased.



Captain 80

The adventures of a software secret agent...

Captain 80

Here's the Software Secret Agent reporting back to headquarters after a grueling four day mission into the heartland of the American countryside. The purpose was to visit Advanced Operating Systems in Michigan City, Indiana. You might remember these guys as the publishers of Leo Christopherson's new *Voyage of the Valkyrie*. I've visited many publishers in the last couple of years and have seen some unusual locations. Instant Software, for example, occupies a converted motel, thirty some odd rooms crammed full of computers, clerks and reviewers. Acorn Software, by contrast, is situated in the basement of a Washington, D C townhouse. The Programmer's Guild is laid out in the rear third of a small town Radio Shack dealer store, and Advanced Operating Systems takes up the whole top floor of a high rise bank building, overlooking a really good sized shopping center.

The way they are laid out is inspiring. There are several specialists, experts in individual areas of software evaluation, and each has a broad market knowledge to cover the gray areas. Additionally, top marketing people and expert media people round out this staff which I found to be the most enthusiastic of any commercial software marketing team I have ever visited.

Software Procurement Manager, Palmer Wolf, summed up his company's goals simply and in the straightforward manner for which he is known.

"We want to market the very best software obtainable anywhere," he told me.

While there, I saw a top quality PAC-MAN program rejected due to its publisher's unwillingness to relinquish full control. Advanced Operating Systems will not co-publish, at least not as of this writing. So before submitting there make sure you are willing to give them complete authority to market your program. If accepted, the reward should exceed your ability to produce income with it yourself under other circumstances.

While in Michigan City, the Secret Agent Mobile, recently returned to my possession by a repentant phone company, was broken into and robbed. This incident, a rude re-introduction to the world of thieves and burglars, points up the need to think about insurance. Check it out. Do you carry your computer over to a friend's house once in a while? Or maybe go to a computer show or flea market where a disk drive or CPU or other goodies would spend time in your car? Chances are, your auto insurance does not cover anything in the car that is not attached to it. This means that anything stolen is gone and you are out the bucks. It only has to happen once.

If you check with your insurance agent, you will find that it is very inexpensive to cover all your valuable equipment against break-in in the home or car. No, I haven't gone into the insurance business. It's just that when I got home, I had a check waiting for me to cover the loss of equipment which was ripped off while in Indiana. The check would have been larger, had I scheduled ~~the~~ equipment by the piece. Talk to your agent, you can't lose.

This column completes more than a year of bimonthly tomfoolery and sometimes semi-seriousness, since Mike invited me to join his crew. During that time, I've completed a book and become self sufficient as a writer/reviewer. The success I've enjoyed over the last year has been largely due to you, the readers, and I am grateful.

As *80-U.S. Journal* enters a new era, namely that of monthly publication, I am called upon to produce this column twice as often as before - which leads me to the following question. What would you like to see reviewed? What topics would you like discussed? This column is as much yours as mine, because it is the readers who ultimately decide the fate of a writer.

Drop a letter to me, just a few lines and help me lay out this column for the future. I'll ask Mike to print the best ones, and maybe we can get a two-way dialog going. Thanks for a great year and we are all looking forward to the next.

Here's the Software Secret Agent checking out headquarters for new stuff to review. Wait a minute, there's a thirty ton tractor trailer outside, backing into the driveway, dropping new software packages on the lawn! Oh, wow, there must be three thousand new game packs, in every color of the rainbow, an ocean of tape, plastic wrap and styrofoam. And no two of them alike, Hmmm, they're all from the same company. Where's my Electric Pencil?

Dear Scott,

Did you have to send them all in the same shipment.....? ■

Product review

ABS Doubler
ABS Suppliers
PO Box 8297
Ann Arbor, MI 48107

5¼ inch diskette aid
$3.50 postpaid

The floppy diskette is a thin pancake of plastic which is coated on both sides with a magnetic material similar to that used in cassette tapes. It has the ability to accept and store magnetic impulses which are interpreted as data by the computer.

The standard mini-floppy diskette used by the TRS-80 Models I, III and Color computer is designed for recording on one side. This leaves the reverse side unused. While some manufacturers of hardware have introduced double-sided disk drives, the majority of drive owners possess single-sided designs.

The desire of many disk owners is to get more information on a diskette. The Percom and LNW companies both produce double density controllers which are not inexpensive and still leave the reverse half of the diskette unused. The answer for most is to make a floppy into a flippy-floppy, and ABS has come up with a simple solution.

The ABS-Doubler is a heavy duty plastic template to be used in the conversion process. It measures 5¼ by 3¼ inches and contains a notch on one side and a hole in the center. The notch and hole correspond to the write-enable slot and timing hole, respectively, of a 5¼ floppy diskette. The instructions are clear with good illustrations. The unit itself is durable and should last for years.

By using a pencil, one can trace the positions of the hole on the floppy, and with a quarter inch punch remove those corresponding portions of the floppy sleeve and liner. This makes the use of the reverse side of the diskette possible.

The only reservations we have about using a device of this nature is with the diskette itself. The standard floppy is certified for use on one side only. While the reverse side does contain the same material, it sometimes is not as finely polished and may cause head wear problems.

It is the reverse side of the diskette which comes into contact with the head load pad. The pad is a small circular felt pad which, when it gets dirty, can and will put microscopic scratches on the diskette surface. This normally presents no problem as that side of the diskette is not used. But with the flippy diskette, those scratches increase disk abrasion and one could lose valuable information. Normal maintenance and periodic replacement of the head-load pad can solve this problem and extend the life of your equipment.

While the floppy diskette is turning, the liner inside serves a double purpose. It cleans the diskette surface and protects the diskette from the outer plastic sleeve. When the diskette is flipped, the direction of travel of the diskette is reversed. It is possible to end up with a piece of dirt previously captured by the liner coming loose and damaging the diskette or drive head. Again, the solution is relatively simple. Keep your diskettes in their protective envelopes and away from dust, dirt and smoke.

The diskette motion will cause the nap of the liner to lie with the direction of the motion. If the diskette is heavily used, this becomes very pronounced. Such a diskette should not be made into a flippy, because when reversed, it will be turning against the nap which will increase the possibility of scratches from particles lodged in the nap itself.

Most disk owners will never experience any problems, and so for them these objections will not be valid. The idea of inexpensively doubling the capacity of your diskette library has merit and should be seriously considered as an alternative to more expensive solutions.

Staff

Circle 45

Book review

Introduction to TRS-80 Level II BASIC and Computer programming
$10.95
186 pages, illustrated

Introduction to TRS-80 Level II BASIC and Computer Programming is a very well written book designed to teach Level II BASIC. It uses solid examples to emphasize the text, and each example is accompanied by several lines of comment, which aid the beginner in following the author's train of thought. The book is divided into ten chapters and three appendices.

Chapter one is entitled "Your TRS-80 Computer", and describes the cassette based Level II system. It explains the keyboard layout, and highlights some of the non-typewriter keys and their functions. This chapter introduces the idea of communicating with the computer with a generous dose of examples and exercises.

Chapter two introduces the print command, and gives examples of its various forms and uses. This chapter also defines variables and their assorted functions. It also presents the arithmetic functions available on the TRS-80, and covers single and double precision.

While chapter two deals with BASIC statements or expressions, chapter three defines a program, and clarifies the difference between typing in statements in command mode and typing in program lines in the programming mode. It explains the significance of line numbers and gives many examples of short programs to get the user familiar with the idea of programming. Remark statements are explained as are the INPUT, CLS, STOP, CSAVE, CLOAD, CLOAD? DEFINT, DEFDBL and DEFSTR, commands. Program line editing on the TRS-80 is explored, and the reader is presented with many exercises designed to sharpen line editing skills.

Chapter four introduces the relational and logical operations. AND, OR, NOT are discussed and the truth tables for these operations are presented. The next idea dealt with in this chapter is flowcharting. All of the flowcharting symbols and conventions are presented and given exercises and examples which should be completed before moving on to the next section. After flowcharting, transfer statements are discussed. The various types of transfer statements (conditional, unconditional, on X GOTO) are explained, and the ON ERROR statement is defined. At this point, some fairly complex programs can be developed by the user and the exercises at the end of this section integrate all of the commands covered up to this point.

Chapter five concerns itself primarily with the processes of looping. IF THEN and FOR NEXT loops are discussed, and many examples of their use are given. The principles of nested loops are also studied. Subscripted variables are covered in this chapter, and their uses are explored. The chapter ends with a lesson on debugging loops for greater speed and readability.

Chapter six is entitled "Input/Output", and covers several of the ways in which data may be stored and retrieved

by the TRS-80. The ways presented include READ DATA statements and cassette input/output. The commands given under cassette I/O are CSAVE, CLOAD, CLOAD?, PRINT#-1 and INPUT#-1. Also presented in this chapter are ways to present on-screen data as neatly and effectively as possible. The commands explained under this section are TAB, POS and PRINTUSING.

Chapter seven is concerned entirely with the "library" functions of the TRS-80. Among others they include RND, COS, SIN, TAN, LOG, ABS. One of the program examples is a short routine to graph some of the math functions.

Chapter eight deals with the subject of subroutines, and outlines some of their major functions. Unconditional and conditional transfer statements for subroutines are explained, and several exercises at the end of the chapter help accent the ideas presented.

Chapter nine covers the principles behind primary TRS-80 graphics. The commands introduced are SET, RESET and POINT. These three commands are effectively integrated in an example program which simulates the random path of a rodent trying to escape from within the confines of a given space on the video screen. In this simulation, the subject is not allowed to retrace steps at any time, thereby creating the possibility of "painting oneself into a corner."

The tenth chapter deals with string manipulation. All of the ASCII codes are presented and explained, and several character manipulation functions are presented. These functions are LEN, LEFT$, RIGHT$ and MID$. Other string function commands deal with CHR$, ASC, STRING$, CLEAR, FRE, STR$, VAL and INKEY$.

At the end of the book are three appendices and the solutions to the even numbered exercises. Appendix one contains all of the Level II error messages. Appendix two is a list of all of the words reserved in Level II BASIC. Appendix three is a very extensive glossary covering all of the Level II commands, and any given words that might be associated with programming and computers.

Throughout the book there are small grey boxes which contain thoughts or messages which the author thought needed extra clarification or emphasis. These boxes are quite convenient and aid in learning. The author, Michael Zabinski, is a professor at Fairfield University in Connecticut. Dr Zabinski is a consultant to public schools on computer usage in classroom situations. He is also the author of several programming books as well as educational materials for Radio Shack. His strong background clearly shines through in this book.

As the title clearly states, this book is an introduction to programming and is not designed to be an advanced technical course in the nuances of advanced programming techniques offered by Level II BASIC. I have come to the conclusion that after studying this book and implementing the examples and exercises that the reader will end up with a very solid working knowledge of programming in general, and programming the TRS-80 Level II specifically.

W W Harper II

Color computer game reviews

To celebrate the Color computer's first anniversary, *80-U.S.* evaluated five of the color computer cartridge games. Overall, they represented some real fun, though some held our attention better than others.

Dino Wars
26-3057
$39.95

Dino Wars is a fairly entertaining two-player game. Adults and teens soon tired of this one, but it kept the younger generation going for hours.

Each player controls movement and attack of his own Tyrannosaurus Rex with the joystick control. The big dino can move towards the players or away, and left or right in any combination of directions. Attack is accomplished by pressing the controller button and is accompanied by a growl and a bite by the attacking monster. If effective, the opponent obediently falls on its back and twenty points are removed from its score. The object is to reduce your opponent's score to zero, effectively "killing" him.

The graphics and sound effects are excellent. The dinosaurs are shown in perspective with walking sounds accompanying their ponderous steps. The scenario contains mountains in the distance and a number of cactus patches. The dinos and cactus patches don't mix and each time a dino collides with a cactus, he falls down and looses 5 points. Should one or both dinos wander off-screen, the "camera" slowly pans toward the closer of the two. The effective field of battle is 360 degrees.

When one or the other of the dinos looses all his points, he retreats into the mountains in the distance, yelping all the way.

Pinball
26-3052
$29.95

Pinball is an arcade favorite. The older age groups enjoyed this one while the younger set's attention span was too short to hold them very long.

Pinball accepts up to four players. Flippers are controlled by joystick buttons. A joystick acts as the plunger and also to control the shaking of the "machine".

While the game comes with an excellent field, the configuration may be modified or a new one built from scratch. The results can be saved on tape for later retrieval.

It is possible to design fields where the game gets stuck and runs up impossible scores. Really challenging playing surfaces are difficult to design but will certainly challenge the creativeness of the most avid pinball fan.

One note is worth mentioning here. The game is noisy and realistic. The volume control on the TV set can be turned down to keep the sound at a minimum. The "machine" can be "tilted", just as in the real thing, by too liberal a use of the joystick.

Quasar Commander
26-3051
$39.95

This must be Radio Shack's obligatory space game. It is a typical shoot'em up, one-player arcade game of a style popularized by the Odyssey series of several years ago.

The joystick controls of this game are very realistic with enough delay to simulate flying a real space fighter. The enemy fighters look somewhat like the Star Wars' Tie Fighters although there are enough differences to prevent trademark problems. Both controls are used to the utmost with one controlling speed and the other direction. The scenario is deep space with dozens of enemy fighters, a couple of battlecruisers and lots of space mines.

The objective is to destroy as many of the enemy targets as possible. Several options are possible including time, number of enemy targets and enemy movement.

Quasar Commander was very challenging, much too difficult for smaller children. Adults tired of it quickly, while it received a mixed reaction from teens.

Skiing
26-3058
$39.95

Skiing the slalom run against the clock is fun and exciting. There is much to be said for this new addition to the Radio Shack repertoire. It has two modes, one which requires only simple joystick movement, the other requiring pushing (via a controller button) with ski poles to achieve speed.

The objective is to ski the slalom through a course of flags, just like the real thing. The perspective is from the skier's eyes and the sound effects emulate skiing and striking the flag and course markers. The run is as quick (or slow) as your capabilities allow. The graphics and sounds are excellent; much improved over earlier cartridges.

The Color computer, even with extended BASIC, has capabilities far beyond those described in the manuals. I strongly suspect that this machine will beat out the best of the competition, given time and the ingenuity of programmers. The sound from Skiing is a good example. A very realistic applause greets you at the end of the run. The slapping sound of the markers and flags as you strike them is realistic. The fine line high-speed graphics on the white snowy background is

impressive, but not as great as we should see in the future. The video chip is capable of 64 shades of color and very fine resolution. It is directly accessable from machine language with the introduction of the 32K version with floppy disk. There is a whole world of excitement and fun opening up for this machine.

Chess
26-3050
$39.95

Computer Chess graduated from a dream to reality with the advent of the micro-computer. When Star Trek portrayed computer chess (albeit, three dimensional) the notion was that the *moves* had to be programmed for a particular board combination rather than utilize the deductive logic inherent in the computer. This type of thinking slowed the development of computer chess as most machines did not have a large core memory.

Radio Shack's only other computer chess program (Microchess 1.5) was one of the first to effectively *play* a real game of deductive logic, though heavily weighted toward attack. The most amazing factor was that this program ran in only 4K of memory on the Level I, Model I. It was quickly outclassed by two versions from Dan and Kathie Spraken under the Hayden label: Sargon and Sargon II.

The color version of this ever-popular board game is much improved over Microchess 1.5, and is somewhere between the two versions of Sargon in its power and capability. There are several levels of difficulty, the board is presented in a very pleasing display, and the logic is very good.

For color computer owners, there should be no reason to go out and spend two or more times the price of this cartridge for one of the more recent chess games.

In general

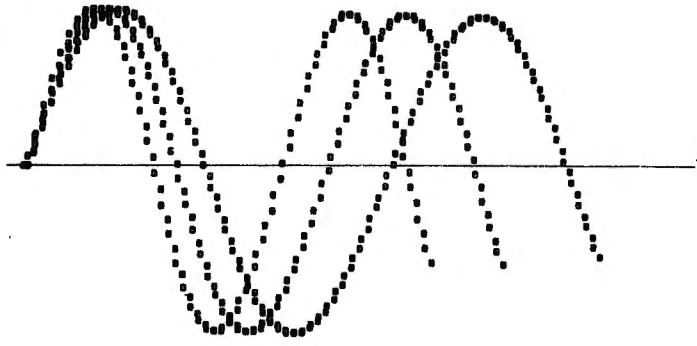
As with most Radio Shack software products, the documentation on the cartridges is excellent. Several of the earlier releases, in being rushed into production, had mistakes in the manuals, which have been corrected with errata sheets. The four by four inch size is not convenient; we would rather have seen an 8 x 11 inch folder format, or something to be punched for a three-ring binder.

The cartridges themselves are as wide and thick as an 8-track cartridge but only half the length. They are well constructed and should last many years.

The (relatively) high cost of the individual cartridges is offset somewhat by the lower initial cost of the machine in which they run. Whether they are worth the price will depend upon your preferences. In comparison to other software now available for this machine, Radio Shack has an obvious advantage. These games are well thought out, and represent excellent software for the color computer.

Pat Perez
Clay Caldwell

Pocket biorhythms



Robert D Miller, Hopewell, Virginia

When I bought my TRS-80 pocket computer, I was immediately impressed with the power, flexibility and capability of such a small device. The developers of this miniature computer have my deepest respect. Because of its small size, it is extremely portable, so naturally I wanted to show off my new purchase to my friends. Those of my friends who are familiar with computers and computer languages were duly held in awe of the pocket computer and its capabilities, but those friends who know little of computing somehow couldn't get too excited about 1.9K of RAM and programming in BASIC; they just wanted to know, "but what does it do?"

I set out to develop a program which would allow the computer to demonstrate itself in such a manner that even the non-computer types would gain an appreciation for its capabilities. I wanted to make the program self-instructive and conversational. Plus, I wanted to deal with a subject that would be familiar and interesting to a wide cross-section of people. What I came up with is a program entitled "Pocket Biorhythm Demonstration". It satisfies the self-instructional and conversational requirements, and it has proven to be of much interest to those to whom I've shown it. In fact, it has even proven to be an effective "ice-breaker" in getting to know people better! And for the computer types, it demonstrates a few programming techniques that may be of interest.

Now I don't claim to be an expert on the subject of biorhythms; I just know enough to make me mildly dangerous! The idea behind biorhythms revolves around the theory that on the day a person is born, three cyclical "clocks" start ticking in their body. One such clock is referred to as the physical cycle, upon which your physical state of being is supposedly based. The cycle is like a sine wave which completes one oscillation every twenty-three days. For half of these twenty-three days, your physical state is on the "plus" side of an imaginary axis; the rest of the time is spent on the "minus" side. Biorhythm theorists claim that an individual will experience a "critical" day when their physical cycle crosses from the plus to the minus (or the minus to the plus), an event which happens every eleven and one-half days. The body, at that point, is supposedly in a state of change. The theory goes on to say that one should be aware of such critical days and be duly cautious of any activities that would require physical stress.

A second clock is the twenty-eight day emotional cycle. It is similar to the physical cycle except for the length. Again, one experiences critical days when crossing from plus to minus and minus to plus; in this case, every fourteen

days. On such days, one should avoid emotionally trying situations if possible.

The final clock is the intellectual cycle, the length of which is thirty-three days. In this case, one should avoid intellectually stressful situations when a critical day is encountered every sixteen and one-half days.

All three cycles start the day you are born and continue, independent of one another, until you die. Occasionally, two cycles will cross the axis on the same day, thus bringing about a "double critical" day, one on which due caution should be taken. And every once in a great while a "triple critical" day will occur when all three cycles cross the axis on the same day.

I am not claiming any validity to the biorhythm theory. If the subject interests you, then I suggest you read some of the many articles and books written on the subject. My purpose in choosing biorhythms as the subject of my demonstration program is twofold. First, it is entirely mathematical and thus, lends itself readily to computer programming. Second, it is a subject with which most people have at least some familiarity, thus making the program of more interest.

If you want to figure out your biorhythm manually, you first have to compute how many days old you are on the date for which you wish to examine. Dividing this number by twenty-three and taking just the remainder will let you know how many days you are into your current physical cycle. If the remainder is zero or eleven (actually eleven and one-half), the date is to be considered physically critical. Dividing your age in days by twenty-eight and thirty-three respectively and taking the remainders will show you the current positions of your emotional and intellectual cycles. Zero and fourteen are critical points for the emotional cycle, and zero and sixteen (and one-half) days are intellectually critical days.

This program will take care of all the mathematics for you. First type in the program *exactly* as listed. Note that line 75 cannot be completely entered as written in one step unless you are using the word PAUSE with a reservable key. Simply enter as much of the line as you can, press ENTER, and then space out to the end of the line and finish entering the information. The word PAUSE when entered letter-by-letter takes up five bytes of memory. When the ENTER key is pressed, this is reduced to only one byte, thus allowing the additional space to complete the line.

When you have finished typing in the program, type MEM and press ENTER. If the display says "1STEPS 0MEMORIES", then chances are you have entered the program correctly. Notice that this program occupies all but one byte of program memory, so it serves as an excellent example of how much can fit in such a small device.

Now that you have done the hard part, type RUN, press ENTER and enjoy the fruits of your labor. From time to time during the program, execution will stop to allow you to read the display; simply press ENTER to continue. The first thing you will be asked to do is input your name. (If your name is longer than seven letters, only the first seven will be retained.) Next, you will be asked to enter your birthdate. Do so using numbers (not letters) representing the month, day and year of birth. Also be sure to enter the *full year*, not just the last two digits. The computer will then tell you on what day of the week you were born! Then you will be asked to put in the computation date. Do so, again being sure to enter four digits for the year. You will then be told the day of the week of the computation date. Press ENTER and the computer will reveal your age in days (ouch!). Following this you will be told on what points each of your three biorhythm cycles are for that date. If any cycle is critical, you will be so informed with appropriate "warning" beeps. Finally, a summary statement is made, letting you know whether the day is a single, double or triple critical day, or more than likely, not a critical day at all. To compute the biorhythm for another date, simply press ENTER and the program will loop to the point requesting the computation date.

Now let's look at the program and see how it works. Lines 55-190 represent the mainstream of the program. Lines 55-110 are primarily the opening verbiage of the program. Your name is stored in the variable J$ and is used several times in the program.

Line 110 jumps to the subroutine starting at line 300, which performs most of the calculations of the program. For continuity's sake, I'll describe this subroutine now. Lines 300-320 accept month, day and year as numerical input. Checks are made on month and day to insure that the values are within acceptable ranges.

Line 330 computes the number of days that have transpired between the year zero and the year prior to the one you just entered. This calculation takes our current calendar system and projects it backwards as if it has always existed in its current form. This, of course, is not actually true, but for the purposes of the program the calculation works fine. All leap year conditions are taken into account during this calculation.

Lines 340-450 calculate the number of days that have transpired during the year you entered, up through the month prior to the one that you input. Note that line 340 (also lines 180 and 480) utilizes a very powerful feature of the pocket computer, which is the ability to GOTO a line number based on an arithmetic calculation. This can be used in a

similar manner as the "ON N GOTO line number" statement found in Microsoft BASIC. Lines 442-446 check to see if the year entered is a leap year and if it is, adds an extra day for February.

Line 460 adds the days that have transpired in previous years to the days that have transpired in the year you entered. Using this number, you can tell on what day of the week the date you entered falls. Divide the number by seven and take the remainder (line 470). If the remainder is zero, the date falls on a Sunday; a remainder of one indicates a Monday, etc. Lines 480-550 take care of this determination.

A technique I used in lines 480-550 allows you to construct string values that are longer than seven letters (the maximum allowed by the pocket computer for one variable). Every day of the week has the word "day" as the last three letters in its name. Thus, by setting G$ equal to "DAY", and F$ to the appropriate value, one can construct a compound value that not only contains more than seven letters, but also saves on memory space. When the day of the week is printed in lines 120 and 145, the values of F$ and G$ are printed back to back, forming the complete spelling of the appropriate day of the week. (A similar technique is employed in lines 165-175 with respect to the printing of a variable longer than seven letters in line 700).

The subroutine consisting of lines 300-550 returns to the main program with the number of days since the year zero in variable C and the day of the week in variables F$ and G$. Line 120 displays the day of the week and copies the day count to variable Z. Lines 130-140 send you back through the same subroutine with the computation date. The day of the week returned is printed by line 145. Then the new day count just returned from the subroutine is subtracted from the previous one (stored in Z) to obtain the net difference in days between the two dates (stored in X). This is displayed as your age in days in lines 150 and 155.

Line 160 computes the current position on each of the three biorhythm cycles (P,E, I). Lines 165-175 each set variables to the length (L$), name (N$ and O$) and midpoint (Q) of the respective cycles. The variable R is set to the value of the current position of the cycle, and a transfer is made to the subroutine starting at line 700. Let's look at this now.

Lines 700 and 710 tell you the appropriate cycle name and your current position in that cycle. Lines 720-740 and 900 tell you whether the day is critical or not. If your current position (R) is equal to zero or the midpoint (Q)(line 730), the day is critical and a transfer is made to line 900, which beeps a warning and informs you of the situation. A counter (U) is also incremented to keep track of how many of the three cycles are critical. If the day is not critical, line 740 prints "NORMAL DAY!" prior to returning to the main program.

After each of the three cycles are analyzed (lines 165-175), a final summary for the day is made in lines 180-185. Depending on the value of the critical day counter (U), the variable V$ is set to the applicable value, and line 185 prints out the final assessment along with a number of beeps equal to the value of U. Line 190 then loops back into the program to provide you the opportunity to calculate biorhythms for other days.

In addition to providing biorhythm analysis, this program can be used to tell you the day of the week for any given date. In addition, you can use it to find the number of days between two dates. Just enter the earlier date as the birthdate and the latter as the computation date. The number of days between the two dates will be displayed as your "age" in days (line 155).

This program has proven to be very successful as a demonstration vehicle for the TRS-80 pocket computer. Hopefully, it will provide the same degree of success for you. Watch out for those critical days!

```
55:PAUSE "BIORHYTHM DEMONSTRATION":PAU
 SE "HI THERE!":INPUT "WHAT IS YOUR NA
 ME? ";J$
65:PAUSE "OKAY, ";J$:PAUSE "LETS COMPU
 TE YOUR":PAUSE "BIORHYTHM!"
75:PAUSE "FIRST, I NEED TO KNOW":PAUSE
  "YOUR BIRTH DATE.":PAUSE "SO, ENTER
 YOUR BIRTHDAY"
90:PAUSE "USING NUMBERS FOR YOUR":PAUS
 E "MONTH, DAY AND YEAR":PAUSE "OF BIR
 TH."
110:PAUSE "OKAY, ";J$:PAUSE "HERE WE G
 O!":GOSUB 300
120:PAUSE "WOW, YOU WERE BORN ON":PRIN
 T "A ";F$;G$;", ";J$;"!":Z=C
130:U=0:PAUSE "NOW, I NEED THE":PAUSE
 "COMPUTATION DATE IN"
140:PAUSE "THE SAME FORMAT.":GOSUB 300

145:PRINT "THAT DAY IS A ";F$;G$;"!":X
 =C-Z
150:PAUSE "ON THAT DATE YOU ARE"
155:PRINT USING "######";"EXACTLY";X;"
  DAYS OLD!"
160:P=X-INT (X/23)*23:E=X-INT (X/28)*2
 8:I=X-INT (X/33)*33
165:L$="23":N$="PHYSICA":O$="L":Q=11:R
 =P:GOSUB 700
170:L$="28":N$="EMOTION":O$="AL":Q=14:
 R=E:GOSUB 700
```

```
175:L$="33":N$="INTELLE":O$="CTUAL":Q=
 16:R=I:GOSUB 700
180:GOSUB 181+U:GOTO 185
181:V$="NOT A":RETURN
182:V$="SINGLE":RETURN
183:V$="DOUBLE":RETURN
184:V$="TRIPLE":RETURN
185:BEEP U:PRINT V$;" CRITICAL DAY!"
190:GOTO 130
300:B=0:INPUT "MONTH? ";M:IF (M<1)+(M>
 12)THEN 300
310:INPUT "DAY? ";D:IF (D<1)+(D>31)THE
 N 310
320:INPUT "FULL YEAR? ";Y
330:A=INT ((365.25)*(Y-1))-INT (Y/100)
 +INT (Y/400)
340:GOTO (13-M)*10+340
350:B=B+30
360:B=B+31
370:B=B+30
380:B=B+31
390:B=B+31
400:B=B+30
410:B=B+31
420:B=B+30
430:B=B+31
440:B=B+28
442:IF INT (Y/4)<>(Y/4)THEN 450
444:IF (INT (Y/100)=(Y/100))*(INT(Y/40
 0)<>(Y/400))THEN 450
446:B=B+1
450:B=B+31
460:C=A+B+D
470:W=C-INT (C/7)*7
480:G$="DAY":GOTO W*10+490
490:F$="SUN":RETURN
500:F$="MON":RETURN
510:F$="TUES":RETURN
520:F$="WEDNES":RETURN
530:F$="THURS":RETURN
540:F$="FRI":RETURN
550:F$="SATUR":RETURN
700:PAUSE "YOUR ";L$;"-DAY ";N$;O$
710:PRINT USING ;"CYCLE IS ON DAY ";R
720:PAUSE "THAT DAY IS A"
730:IF (R=0)+(R=Q)GOSUB 900:RETURN
740:PRINT "NORMAL DAY!":RETURN
900:BEEP 3:PRINT"CRITICAL DAY!!!":U=U+
 1:RETURN
```

■

For Model I Disk with NEWDOS version 2.1

Modifying NEWDOS 2.1

Steven Wexler
Huntingdon Valley, Pennsylvania

The following article deals with Apparat's NEWDOS and NEWDOS+ version 2.1. These should not be confused with NEWDOS80 versions 1 and 2.

Fast typists: How often have you lost characters on your TRS-80 because of the erratic NEWDOS debounce routine? For those of you with Radio Shack's lower case modification, would you like the JKL command to work without requiring the lower case driver to be loaded? If you can answer yes to either of these questions, read on.

A word of caution: Before attempting to modify your diskette, make a backup copy.

The first modification replaces the NEWDOS debounce routine with a more sophisticated routine. The original routine traps duplicate key strokes and rejects the second if it was typed too quickly. Although this method is effective for debounce purposes, the occasional loss of a legitimate keystroke is too much. The new code avoids this problem while retaining the integrity of the JKL command.

To implement this new routine load NEWDOS's SUPERZAP utility, enter the DD mode and read track 0, sector 6. Type MOD29 and key in the following code:

```
21 36 40 01 01 38 16 00 0A 5F AE 73 A3 20 09 14
2C CB 01 F2 85 43 18 10 5F C5 01 DF 04 CD 60 00
C1 0A A3 28 03 CD FB 03 CD B5 43 F5 AF 32 B4 43
F1 C9 00 00
```

Confirm that the next byte reads 3A, double check that the new code was entered correctly, and finally press the ENTER key. The display, (before and after) is shown in Figure 1, page 125. Please note that this figure also shows the results of the next modification as well.

We have just inserted the TRSDOS 2.3 debounce routine, modified to work with the NEWDOS JKL command. This routine will load from address 437DH to 43B0H.

The second modification alters the JKL

Please turn to page 120

command so that it will interpret ASCII control codes as uppercase codes. Graphic codes are printed as a pound sign (#) rather than as a period.

Again, use SUPERZAP DD mode to read track 0, sector 6, type MOD80 and key in:

23 CD EF 44

Verify that the next byte is 18, double check the new code and press the ENTER key.

The first byte (23) is ASCII code for the pound sign (#), it replaces the ASCII code for a period. The next three bytes (CD EF 44) call a subroutine that we will insert at 44EFH. This call replaces one to the printer output routine. We do this because the new routine exits to the printer output routine.

Now use SUPERZAP to read track 1, sector 6, type MODCA and key in:

81

The next byte should contain FE. If it does, press the ENTER key.

We have just altered a DOS loader code instructing it to load 13 less bytes than normal. We do this because we are going to shorten the NEWDOS power up message printed at the top of the screen. This makes space on the diskette for the JKL modification subroutine.

While still in the DD mode of SUPERZAP, press the + key. You should now be at track 1, sector 7. Type MOD24 and enter the following code:

```
20 43 4F 4F 4B 2C 20 31 39 37 38 2E 20 20 41
4C 54 45 52 41 54 49 4F 4E 53 20 42 59 20 41 50
50 41 52 41 54 2E 0D 03 01 0B EF 44 FE 20 30 02
C6 40 C3 3B 00
```

The next byte should read 02. Confirm that the code was typed in correctly and press the ENTER key. (See Figure 2, page 126)

To begin with, we altered ASCII codes used for the power up print out. Notice the code beginning on the third line, ninth byte (01 0B EF 44). This is a loader code instructing DOS to load the next 9 bytes into memory starting at location 44EFH. The first byte (01) tells the DOS to load the object code to follow. The second byte (0B) tells the DOS the number of bytes to load minus 2 which, in this case, is 9 bytes (0BH = 11 minus 2 = 9). The third and fourth bytes (EF 44) represent the memory

address (44EFH) used to locate the starting address where the next 9 bytes will be stored.

The 9-byte subroutine will change ASCII control codes to upper case codes. The ROM video driver loads control codes into video memory. An unmodified TRS-80 changes the control codes to upper case via hardware. This is not the case when a lower case modification is installed. That's why machines with lower case modifications require a new video driver for proper operation. This is also the reason we have added our subroutine to the NEWDOS JKL code. ■

```
                00100 ;        *** LISTING 1 ***
                00110 ;
                00120 ;
                00130 ;SUBROUTINE TO DEBOUNCE KEYBOARD
                00140 ;WHILE RETAINING THE INTEGRITY
                00150 ;OF THE JKL COMMAND
                00160 ;
0060            00170 DELAY   EQU     0060H   ;DELAY LOOP IN 14.66
                00180                         ;MICROSECOND INCREMENTS
43B4            00190 GATE    EQU     43B4H   ;IF GATE=C9H AN INTERRUPT
                00200                         ;CAN'T BE USED TO CALL JKLSCN
                00210                         ;IF GATE=00H JKLSCN CAN BE
                00220                         ;ACCESSED VIA INTERRUPT
43B5            00230 JKLSCN  EQU     43B5H   ;SUBROUTINE THAT PRINTS
                00240                         ;SCREEN IF JKL IS PRESSED
3801            00250 KEYBRD  EQU     3801H   ;FIRST ADDRESS OF
                00260                         ;THE KEYBOARD MATRIX
                00270                         ;EACH BIT OF MATRIX
                00280                         ;(3801H, 3802H, 3804H,
                00290                         ;3808H, 3810H, 3820H,
                00300                         ;3840H) IS TIED TO A KEY
                00310                         ;1=DEPRESSED 0=NOT DEPRESSED
03FB            00320 KEYROM  EQU     03FBH   ;ENTRY POINT FOR RETURN
```

```
                00330                           ;TO THE ROM KEYBOARD ROUTINE
4036            00340 STATUS  EQU     4036H     ;FIRST BYTE OF KEYBOARD STATUS
                00350                           ;ARRAY - THE ARRAY IS A MEMORY
                00360                           ;MAP OF STATUS OF EACH KEY AS
                00370                           ;OF THE LAST KEYBOARD SCAN
                00380 ;
                00390 ;NOTE: THE FIRST TWO LINES OF CODE (440, 450) ARE NOT
                00400 ;SUPERZAPPED ONTO THE DISKETTE SINCE THE NEWDOS DEBOUNCE
                00410 ;ROUTINE ALREADY CONTAINS THEM
                00420 ;
4378            00430         ORG     4378H
4378 21B443     00440         LD      HL,GATE         ;DISABLE JKLSCN ACCESS
437B 36C9       00450         LD      (HL),0C9H       ;VIA INTERRUPT
                00460 ;
                00470 ;THE FOLLOWING CODE SCANS THE KEYBOARD, UPDATING THE
                00480 ;KEYBOARD STATUS ARRAY.  IF NO NEW KEY DEPRESSION IS
                00490 ;DETECTED, THE JKL KEYS ARE CHECKED, AND THE SUBROUTINE
                00500 ;EXITS WITH REG. A SET TO 0.
                00510 ;
437D 213640     00520         LD      HL,STATUS       ;KEYBOARD STATUS ARRAY
4380 010138     00530         LD      BC,KEYBRD       ;FIRST KEYBOARD ADDRESS
4383 1600       00540         LD      D,00H           ;KEYBOARD ROW COUNTER
4385 0A         00550 SCAN    LD      A,(BC)          ;A=STATUS OF 8 KEYS
4386 5F         00560         LD      E,A
4387 AE         00570         XOR     (HL)
4388 73         00580         LD      (HL),E          ;UPDATE STATUS ARRAY
4389 A3         00590         AND     E               ;A<>0 IF NEW DEPRESSION
438A 2009       00600         JR      NZ,DEBNCE       ;JUMP IF NEW KEY DETECTED
438C 14         00610         INC     D               ;UPDATE ROW COUNTER
```

```
438D 2C       00620          INC     L               ;UPDATE STATUS ARRAY PTR
438E CB01     00630          RLC     C               ;UPDATE KEY ADDRESS PTR
4390 F28543   00640          JP      P,SCAN          ;IF MORE KEYS THEN LOOP
4393 1810     00650          JR      EXIT
              00660 ;
              00670 ;
              00680 ;THE FOLLOWING CODE CHECKS FOR DEBOUNCE.  IF NO BOUNCE
              00690 ;IS DETECTED THEN CALL BACK TO ROM IS MADE TO CONVERT
              00700 ;INFORMATION IN REG. E (KEY MATRIX COLUMN POINTER)
              00710 ;AND REG. D (ROW POINTER) TO ASCII CODE.
              00720 ;
4395 5F       00730 DEBNCE   LD      E,A             ;SAVE MATRIX COLUMN PTR
4396 C5       00740          PUSH    BC
4397 01DF04   00750          LD      BC,04DFH        ;SET DELAY DURATION
439A CD6000   00760          CALL    DELAY           ;WAIT FOR KEY TO SETTLE
439D C1       00770          POP     BC
439E 0A       00780          LD      A,(BC)          ;CHECK FOR DEPRESSION
439F A3       00790          AND     E               ;A<>0 IF KEY STILL DOWN
43A0 2803     00800          JR      Z,EXIT          ;IF BOUNCE JUMP
43A2 CDFB03   00810          CALL    KEYROM          ;SET REG. A TO ASCII CODE
              00820 ;
              00830 ;THE FOLLOWING CODE CHECKS FOR JKL DEPRESSION, ENABLES
              00840 ;JKL VIA INTERRUPT, AND EXITS SUBROUTINE.
              00850 ;
43A5 CDB543   00860 EXIT     CALL    JKLSCN          ;IF JKL DOWN PRINT SCREEN
43A8 F5       00870          PUSH    AF
43A9 AF       00880          XOR     A               ;REG. A=00H
43AA 32B443   00890          LD      (GATE),A        ;ENABLE JKL INTERRUPT
43AD F1       00900          POP     AF
43AE C9       00910          RET
43AF 00       00920          NOP
```

```
43B0 00          00930          NOP
0000             00940          END
00000 TOTAL ERRORS


                                        JKLSCN 43B5 00230   00860
DEBNCE 4395 00730   00600           KEYBRD 3801 00250   00530
DELAY  0060 00170   00760           KEYROM 03FB 00320   00810
EXIT   43A5 00860   00650 00800     SCAN   4385 00550   00640
GATE   43B4 00190   00440 00890     STATUS 4036 00340   00520

                 00100 ;        *** LISTING 2 ***
                 00110 ;
                 00120 ;
                 00130 ;SUBROUTINE TO CHANGE ASCII CONTROL
                 00140 ;CODES TO ASCII UPPER CASE CODES
                 00150 ;
003B             00160 PTROUT   EQU     3BH
44EF             00170          ORG     44EFH
44EF FE20        00180 JKLFIX   CP      20H             ;IF NOT ASCII CONTORL
44F1 3002        00190          JR      NC,LPOUT        ;CODE THEN DO NOT ALTER
44F3 C640        00200          ADD     A,40H           ;CONVERT TO UPPER CASE
44F5 C33B00      00210 LPOUT    JP      PTROUT          ;OUTPUT REG. A TO LINE
                 00220                                  ;PRINTER
0000             00230          END
00000 TOTAL ERRORS


JKLFIX 44EF 00180
LPOUT  44F5 00210   00190
PTROUT 003B 00160   00210
```

```
000600  01A6 5843 B7FA 0000 C300 00DD CB01 EEC3  ..XC............
000610  2348 CD0E 48C0 DD7E 0ADD 350A B720 03DD  #H..H.....5.....
000620  350B AFC9 21B4 4336 C9E5 2136 4001 0138  5...!.C6..!6@..8
000630  16Q0 0A5F AE73 A320 0914 2CCB 01F2 8643  .....,.....C
000640  180A C5F5 CDFA 03CD B543 D1C1 E136 00B7  .........C...6..
000650  C8FE 0032 A643 C05F 0AA2 C87B C93A 4038  ...2.C.....:@8
000660  0067 3A02 38FE 1C7C C0D5 2100 3C7D E63F  ..:.8.....!.<..?
000670  3E0D CC3B 007E CB74 2320 0BFE 8038 023E  >..;....#....8.>
000680  2ECD 3B00 18E7 D1AF C97D C616 CB66 C078  ..;.............
000690  FE06 3E58 C209 4476 F57C D644 C2F9 487D  ..>X..D....D..H.
0006A0  D6A0 20F8 C1F6 1DC9 0105 0044 3E93 EF01  ..........D>...
0006B0  0505 443E B3EF 0105 0944 C3B0 4401 140D  ..D>.....D..D...
0006C0  44C3 B444 C396 45C3 9345 C3A5 45C3 8E45  D..D..E..E..E..E
0006D0  3EC3 EF01 0520 443E A4EF 0105 2444 3E94  >.....D>....$D>.
0006E0  EF01 0528 443E 95EF 0105 2C44 3EA5 EF01  ...(D>....,D>...
0006F0  3830 44C3 164C C306 4CC3 6D47 C38B 47C3  80D..L..L..G..G.
```

Figure 1

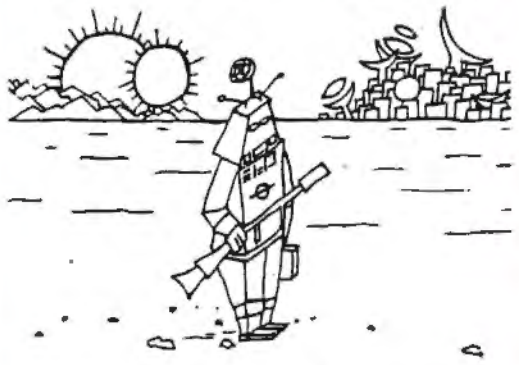
```
000600  01A6 5843 B7FA 0000 C300 00DD CB01 EEC3  ..XC............
000610  2348 CD0E 48C0 DD7E 0ADD 350A B720 03DD  #H..H.....5.....
000620  350B AFC9 21B4 4336 C921 3640 0101 3816  5...!.C6.!6@..8.
000630  000A 5FAE 73A3 2009 142C CB01 F285 4318  ........,....C.
000640  105F C501 DF04 CD60 00C1 0AA3 2803 CDFB  .........(....
000650  03CD B543 F5AF 32B4 43F1 C900 003A 4038  ...C..2.C....:@8
000660  0067 3A02 38FE 1C7C C0D5 2100 3C7D E63F  ..:.8.....!.<..?
000670  3E0D CC3B 007E CB74 2320 0BFE 8038 023E  >..;....#....8.>
000680  23CD EF44 18E7 D1AF C97D C616 CB66 C078  #..D.....
000690  FE06 3E58 C209 4476 F57C D644 C2F9 487D  ..>X..D....D..H.
0006A0  D6A0 20F8 C1F6 1DC9 0105 0044 3E93 EF01  ..........D>...
0006B0  0505 443E B3EF 0105 0944 C3B0 4401 140D  ..D>.....D..D...
0006C0  44C3 B444 C396 45C3 9345 C3A5 45C3 8E45  D..D..E..E..E..E
0006D0  3EC3 EF01 0520 443E A4EF 0105 2444 3E94  >.....D>....$D>.
0006E0  EF01 0528 443E 95EF 0105 2C44 3EA5 EF01  ...(D>....,D>...
0006F0  3830 44C3 164C C306 4CC3 6D47 C38B 47C3  80D..L..L..G..G.
```

Figure 2

```
001700  2046 4F52 4D41 5429 204F 5249 4749 4E41  .FORMAT).ORIGINA
001710  4C4C 5920 434F 5059 5249 4748 5445 440D  LLY.COPYRIGHTED.
001720  4259 2052 414E 444F 4C50 4820 482E 2043  BY.RANDOLPH.H..C
001730  4F4F 4B2C 2031 3937 382E 2020 414C 5445  OOK,.1978...ALTE
001740  5241 5449 4F4E 5320 4152 4520 4259 2041  RATIONS.ARE.BY.A
001750  5050 4152 4154 2E0D 0302 0200 4E5B 40CB  PPARAT......N.@.
001760  FE11 F745 ED53 5940 CBF6 3E01 320F 4311  ...E.SY@..>.2.C.
001770  AF45 3E07 CD10 4421 ED4E 7E00 00CD 3300  .E>...D!.N....3.
001780  23FE 0320 F5CD 2B00 FE0D CA00 440E 0016  #.....+.....D...
001790  111E 0021 0042 CD35 4BC2 0944 3AE0 42FE  ...!.B.5K..D:.B.
0017A0  0DCA 0044 21E0 4211 1843 0120 00ED B021  ...D!.B..C.....!
0017B0  1843 CD67 44C3 0544 4E45 5744 4F53 202D  .C..D..DNEWDOS.-
0017C0  2044 4953 4B20 4F50 4501 8EFE 4E52 4154  .DISK.OPE...NRAT
0017D0  494E 4720 5359 5354 454D 202D 2056 4552  ING.SYSTEM.-.VER
0017E0  2032 2E31 0D0D 5448 4953 2044 4F53 2028  .2.1..THIS.DOS.(
0017F0  424F 4F54 2C20 5359 5330 2D53 5953 362C  BOOT,.SYS0-SYS6,
```


```
001700  2046 4F52 4D41 5429 204F 5249 4749 4E41  .FORMAT).ORIGINA
001710  4C4C 5920 434F 5059 5249 4748 5445 440D  LLY.COPYRIGHTED.
001720  4259 2052 2E20 434F 4F4B 2C20 3139 3738  BY.R..COOK,.1978
001730  2E20 2041 4C54 4552 4154 494F 4E53 2042  ...ALTERATIONS.B
001740  5920 4150 5041 5241 542E 0D03 010B EF44  Y.APPARAT......D
001750  FE20 3002 C640 C33B 0002 0200 4E5B 40CB  ..0..@.;....N.@.
001760  FE11 F745 ED53 5940 CBF6 3E01 320F 4311  ...E.SY@..>.2.C.
001770  AF45 3E07 CD10 4421 ED4E 7E00 00CD 3300  .E>...D!.N....3.
001780  23FE 0320 F5CD 2B00 FE0D CA00 440E 0016  #.....+.....D...
001790  111E 0021 0042 CD35 4BC2 0944 3AE0 42FE  ...!.B.5K..D:.B.
0017A0  0DCA 0044 21E0 4211 1843 0120 00ED B021  ...D!.B..C.....!
0017B0  1843 CD67 44C3 0544 4E45 5744 4F53 202D  .C..D..DNEWDOS.-
0017C0  2044 4953 4B20 4F50 4501 8EFE 4E52 4154  .DISK.OPE...NRAT
0017D0  494E 4720 5359 5354 454D 202D 2056 4552  ING.SYSTEM.-.VER
0017E0  2032 2E31 0D0D 5448 4953 2044 4F53 2028  .2.1..THIS.DOS.(
0017F0  424F 4F54 2C20 5359 5330 2D53 5953 362C  BOOT,.SYS0-SYS6,
```

CYBORG WARS



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Book review

Pathways through the ROM
George Blank, Editor
Softside Publications
6 South Street
Milford, New Hampshire 03055
1-800-258-1790
116 pages, $19.95
For Model I

There are now a number of books which give you the inside story on the TRS-80 Model I ROM (Read-Only-Memory): how it is built, how to use it, where to find the routines you want.

After looking at several books on the subject, I feel that Pathways Through the ROM is a reasonable choice for the only book on the ROM. Actually, it isn't a singular work, but a compilation of three books plus additional material originally published by Softside.

The book includes the Fuller Supermap; Richardson's TRS-80 Disassembled Handbook; John Phillipp's machine language monitor program - HEX MEM; George Blank's BASIC Z-80 Disassembler; and guides to the Level II BASIC, Model I TRSDOS and NEWDOS source codes by John Hartford.

Like most books on the subject, it includes comments on the ROM routines and a discussion on how to access those you wish to use. You have to use the disassembler to get your own listings, as they are protected by copyright from being published.

I do a lot of machine language programming, and this book sits next to my machine as a constant reference. I have found it gradually becoming my principal resource because so much is contained in this one volume. Most of the other books are not as complete, and it is necessary to go from one to another to find different information.

All the available books agree on how things are done and therefore, I tend to think that only one book is really needed for most people.

With most good things, there are some limits and Pathways has several. First, it *is* about machine language programs. It does *not* teach you *how* to program, it just tells you where things you may need are in ROM. While the instructions are not hard to read, they are not completely clear for the novice. A new programmer may have trouble making some of the techniques work. However, this is true of any of the books on the Level II ROM.

Some of the discussions, while informative, are very short. This means that the novice and, in some cases, an experienced programmer won't find the answer to questions. The discussion may not be enough even to use the routine or technique being covered.

A beginner can benefit from the programs and ROM comments. They will help a person learn how things are done. While some comments in the ROM listing are useless (06AFH has the comment "Twiddle thumbs"), they are fun for the experienced programmer. The novice may experience some frustration before he realizes that this is a call to a delay loop routine.

The manual is worth its price, and may be the only one of this type you will need. Don't expect it to make a Bill Gates or Phil Pilgrim out of you. No book can do that - it takes time and hard work - and Pathways through the ROM may make it easier.

T R Dettmann

Showdown
by Russel Starkey
Adventure International
PO Box 3235
Longwood, FL 32750
$14.95 Model I tape

There is now a game on the market which fulfills the daydreams of those who would like to have had the chance to do battle with the evils of the Old West, to rid a town of infamous gunfighters, to become a hero. Picture yourself in this situation:

You are looking through the branches of the tree in front of you, searching for a clue as to where your opponent is. Your heart beats rapidly for you know that this is a "kill or be killed" situation. "Where is he?", you mumble to yourself. The agony of waiting is getting to you, so you decide to make

the first move. While checking to see how many bullets are left in your six-shooter, you notice a large covered wagon approaching. Figuring it is now or never, you apply an old but nonetheless effective trick and dash behind the slowly moving wagon. As you jog along-side the wagon it rolls off into the sunset where you cannot follow it. You realize you are now out in the open. Being in such a position can be extremely hazardous to your health, therefore you throw up a blaze of fire as you simultaneously scramble for cover behind the nearest cactus plant. But alas, your opponent spies you! He fires rapidly with accuracy and you go down in a hail of bullets rather than history. Not to worry, this is only a TRS-80 computer game named "Showdown" and you will have plenty of opportunities to gain revenge.

Showdown is the TRS-80 version of the popular arcade game "Boot Hill". Showdown is a fast-paced shoot'em up game with sound effects and was written in machine language by Russel Starkey. The program is sold by Adventure International and will run on either the TRS-80 Model I or the PMC-80.

After you have loaded the program, it allows you to pick a few options. The first option is called "Shooting Type", which chooses your shooting ability. There are three choices; Gunslinger (the hardest), Old Smokey (moderate) and Greenhorn (for beginners). The type you pick will determine the overall speed of the game.

Once you have chosen the desired shooting type, you get the option of playing the computer or a human opponent. This two-player option greatly enhances the fun of the game.

The motion and movement of the gunfighters may be controlled on the screen. There are 5 angles at which the arm may be held and about 10 different places where the gunfighters can stand. With the correct positioning and gun angle, it is possible to hit your opponent no matter where he is, provided there is no obstacle in the path of the bullet.

There are three different obstacles in all; trees, cacti, and a moving covered wagon. The trees and cacti are randomly placed on the screen before every shootout. The wagon is constantly scrolling from the bottom of the screen to the top. Many a misplaced shot hits that rickety wagon and when it does, the wagon slowly deteriorates as do the other obstacles. Although shooting the obstacles may prove to be entertaining, the real fun begins with the Showdown.

While playing, you must remember to keep looking to see how many bullets you have left in your Smith & Wesson (the computer keeps track of the number and it is displayed continuously). If the number reaches zero, then you must reload which takes anywhere from 10 to 25 seconds depending on the shooting type you picked earlier. When you have to reload you become easy picking for your enemy. The only thing that will keep you alive is some fancy footwork and quick reflexes. If your opponent runs out of ammo while you are reloading, the screen clears for a moment while both load up and then the shootout continues as before. The showdown is over when someone gets sloppy and ends up with a bullet in the gut.

After a shootout, the screen clears and a chart is displayed. On this chart appears the amount of times each gunfighter has been shot during the series of individual showdowns. There is an antagonizing blinker over the name of the poor soul who has been hit the most. At this point you have the choice of either pressing (R) to restart the series with new options, or pressing (ENTER) to continue the slaughter. There is no time limit nor a restriction as to how many separate showdowns you may play, thus the game is endless.

The game makes good use of all the TRS-80 graphics capabilities and has enjoyable sound effects. It is a quick moving game which will sharpen your reflexes. It is as close to the game "Boot Hill" as possible, and if you enjoy that one, then this one is for you!

Owen Linzmayer

Software review

Super Nova
by Bill Hogue
Big Five Software
PO Box 9078-185
Van Nuys, CA 91409
Cassette $15.95 +$1.50 p/h
Model I/III 16K Level II

Spaceships, laser beams, energy torpedoes, alien threats and space intrigue - sound familiar? Well, to anyone who has been around computer or arcade games recently these elements are probably old hat. The growing number of computer-based arcade games makes isolation from them quite difficult. High technology games have been the topic of numerous articles and discussions in diversified publications, and the games themselves are popping up everywhere. Even the local grocery story is taking part in this revolution. It is rather common these days to see some pinball or arcade game in the local supermarket, next to the fireplace logs and dog food. The most popular of these games is from Atari, and is entitled "Asteroids". It was the biggest money maker in 1980, and still retains much of its popularity.

Super Nova, from Big Five, is the TRS-80 answer to Asteroids. Super Nova is played exactly the same with the exception that it does not have sound. Perhaps I should stand corrected, the *major* difference is that whenever you wish to play Super Nova, you need not insert twenty-five cents into the little slot!

The game places your ship in the center of an "endless" asteroid field. This is accomplished by using the natural wraparound feature of the computer. You can maneuver right, left, thrust, fire, or engage a hyperspace jump. If you select the latter, you run the risk of re-entering normal space very close to, if not inside of, an asteroid or an alien vessel. Points are earned by shooting asteroids and by destroying enemy ships bent on your destruction. A large asteroid is worth 20 points, a medium asteroid is worth fifty, and a small asteroid is worth one hundred points. There are five types of alien ships you must disintegrate before they kill you. The "JLK" alien is worth 200 points, the "BH" alien is worth 300 and the odd shaped "Battlestar" is worth 400. The two most deadly ships are the "Space Rover" and the "Flagship". The Space Rover is worth 1000 points and the ever-so-dangerous Flagship earns the pilot with a good aim 2000 points.

For those of you who have seen the Atari arcade version of Asteroids, you know the graphics are excellent. The process is called "Vector-Scan", and allows very high resolution to aid in game clarity and enjoyment. Super Nova's graphics, while not high resolution, do not detract from the enjoyment of the game.

At the start of the game each player is presented with three ships. A ship is eliminated when it is destroyed by either contact with an asteroid, contact with an enemy ship (which eliminates the tactic of ramming an alien ship), or contact with an enemy torpedo. The player is awarded an extra ship for each 10,000 points. Once those first 10,000 points have been accumulated, the program begins to send alien flagships to destroy you. The ships move very fast and are quite accurate with their laser cannons. If you are lucky enough to shoot one of these chaps you are awarded 2000 points. At the end of the game, if you have scored relatively high, you are asked to input up to four initials for placement next to your score on the program display menu. This allows easy reference to past scores, and your progress may be charted by comparing past and present scores.

Super Nova is a very good game and provides many hours of entertainment.

W W Harper II

TRS-80 Programming in Style
Thomas Dwyer
and
Margot Critchfield
Radio Shack
$10.95 illustrated

This large book (8 x 11 inches) introduces itself as "An inventive, idea-oriented approach to creative programming for those who have mastered the fundamentals of Level II BASIC...Chock full of programming ideas!"

After reading this I expected a

great book to follow. I was deceived.

In describing this book, it really must be broken into two sections. Section one, which covers the first two chapters, is designed for someone with no prior computer experience, and covers BASIC syntax rules and gives several program assignments and examples. One rather confusing observation about this first section is that the authors repeatedly refer to several program examples as being "silly", yet they insist those programs are necessary. The demo programs in this section are not very interesting and fail to be useful in later programming efforts. Ditto for the exercises in this section. They are not interesting to do and the final result is quite bland.

The second section of the book improves considerably in that a number of useful programs and routines are presented. Some of these are a loan/interest program, a savings account program and a check book balance/file keeper.

Chapter three, which begins the second half of the book, is entitled "Getting Serious", which is what should have been done on page 1 instead of page 145.

Chapter four is about "Taking the plunge", and is involved in upgrading to a more powerful computer system. It explains why certain peripherals are advised as the programmer advances and how to effectively use them. Several programs are offered to show the usefulness of such devices as printers and disk drives. The disk routines include a "Filebox" program to keep track of any important data, and the explanations of how to use disk-based files are quite good. A simple word processor/text editor is developed at the end of chapter four. This chapter also touches upon the attributes of machine language programming.

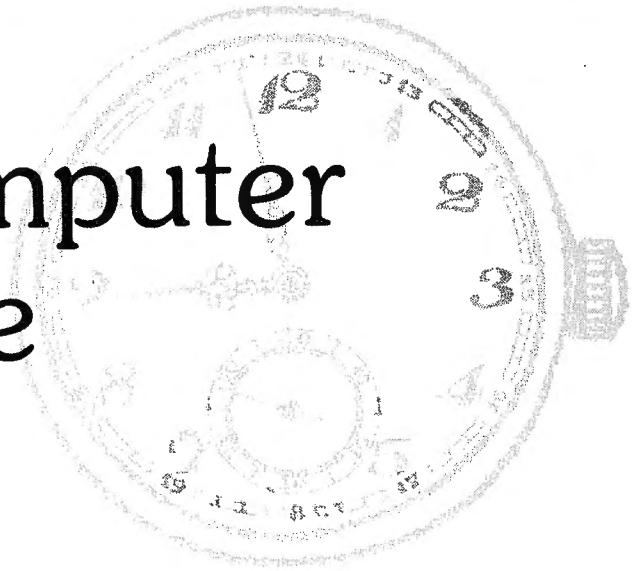
Chapter five is the last chapter, and gives solutions to the problems presented in the earlier part of the book.

The appendices at the end of the book cover a summary of Level II BASIC and the ASCII codes.

The book is well written and one can learn BASIC programming from it. I would suggest though, that you give it a good hard look before spending $10.95 on it.

W W Harper II

Let your computer read the time



For Model I, Level II

Joseph St. Lucas, San Diego, California

Have you ever wanted a real, real-time clock? One which wouldn't lose track of time whenever you loaded a tape or did a disk backup? Afraid to open the case on your computer? Here is an article on just such a clock which is constructed and connected to the external bus on the TRS-80.

I've always longed for a way to tell time with my TRS-80. Not having an expansion interface and the real-time clock, I looked for a better way to read the time for controlling external devices via the BSR remote control system. When I looked, I could find no clock integrated circuits made specifically for microcomputers. The closest available was the National Semiconductor MM5318 (available from JAMECO Electronics, 415-592-8097, for $10 plus $1.50 postage and insurance).

This particular device will act as a polled clock. By outputting specific data to the chip, it will return the time according to this table:

Output to port 243	Returned to port 243
0	Ten's of hours
1	Hours
2	Ten's of minutes
6	Minutes
5	Ten's of seconds
4	Seconds

Since we are using an output port, the clock will keep time on its own, requiring no attention or signals from the TRS-80. The MM5318 is a 60 Hz, line-driven clock, and since it does not use a quartz crystal for timing, it is as accurate as your power company's supply grid. No interrupts are provided to the computer, so you are only able to read the time from a program and act upon that time. This still beats putting timing loops in your program.

To start this project, you will need a four bit input/output port. The port I chose is number 243. Details on port addressing can be found in the TRS-80 Technical Reference Handbook (26-2103). Originally, I built an 8-bit I/O port, waiting for something useful to hang onto it. The clock turned out to use half of this port.

The schematic shows that the clock requires both a plus 5 and plus 12 volt supply. To the MM5318, a logical 1 is plus 12 volts, while a logical 0 is negative 2 to plus 4 volts. To the rest of the TTL (Transistor-Transistor-Logic) devices, however, both logical 1 and logical 0 fall under plus 4 volts, so some voltage matching must be done. The voltage translation from the TTL plus 3.5 to plus 12 volts is handled by a 74LS75 driving a 2N2222 transistor. The reverse comes through a simple Zener 1N5227B or 1N747A diode network. The 60 cycle signal is provided by a small 12 volt transformer and a full-wave bridge rectifier.

To read the clock, use the machine language program included with this article. (Both source code for the editor-assembler and a BASIC loader with equivalent DATA statements are included). It runs in about .005 seconds and is about ten times faster than the equivalent BASIC program. This routine polls the clock and displays the results in the upper right-hand corner of the display as six continuous digits without separators for hours, minutes and seconds. This was done to conserve display space. This same figure is stored in memory locations 32756 to 32761. The last six memory locations, 32762 to 32767, are left blank for storage of another time for comparison, if desired.

Set your memory size to 32701 and load the system program. POKE address 16526 with 198 and 16527 with 127. Then, to read the time, use X=USR(0) in your BASIC program. The clock time is then displayed on the screen.

The first time the clock is powered up, or following any major power interruption, the time must be set. This is done by executing a short BASIC program, such as:

```
1  X=USR(0):GOTO 1
```

and then grounding pin 18 on the clock for fast setting or pin 17 for slow setting. Once this has been done, you could power down the computer and come back any time later, power up, and read the current time. However, with the high cost of electricity, I turn my clock off when not needed. Some unused outputs on the MM5318 could even be used to provide a LED (light emitting diode) display of the time.

This clock provides a low cost means to be able to tell the time to your computer without worrying about interrupts and software for tape users which the expansion interface clock requires.

Note: Pin 13, ground for 12 hour time, +12 volts for 24 hour time.

Power

+12	+5	Gnd	
15	-	1,14	MM5318
-	14	7	74LS02
-	14	7	74LS04
-	5	12	74LS75
-	14	7	74LS30
-	20	10	81LS95

Parts

3-2N2222 transistors
4-1N4001 diodes
1-110 volt to 12 volt transformer
2-SPST normally open switches
4-1N5227 3.6 volt zener diodes
7-2K, ¼ watt resistors
3-1.2K ¼ watt resistors
3-1.5K ¼ watt resistors
Also requires a +5 volt and a +12 volt power supply.

Basic loader program

```
10 FOR A= 32701 TO 32767 : READ B : POK
  E A,B : NEXT A
20 DATA  33, 198, 127, 34, 142, 64, 195
  , 204, 6
30 DATA  6, 0, 17, 244, 127, 33, 56, 60
  , 205, 230
40 DATA  127, 4, 184, 202, 217, 127, 19
  5, 206, 127, 6
50 DATA  6, 205, 230, 127, 5, 184, 202,
  243, 127, 195
60 DATA  219, 127, 120, 211, 243, 219,
  243, 18, 246, 48
70 DATA  119, 62, 3, 35, 19, 201, 0, 0,
  0, 0
80 DATA  0, 0, 0, 0, 0, 0, 0, 0
```

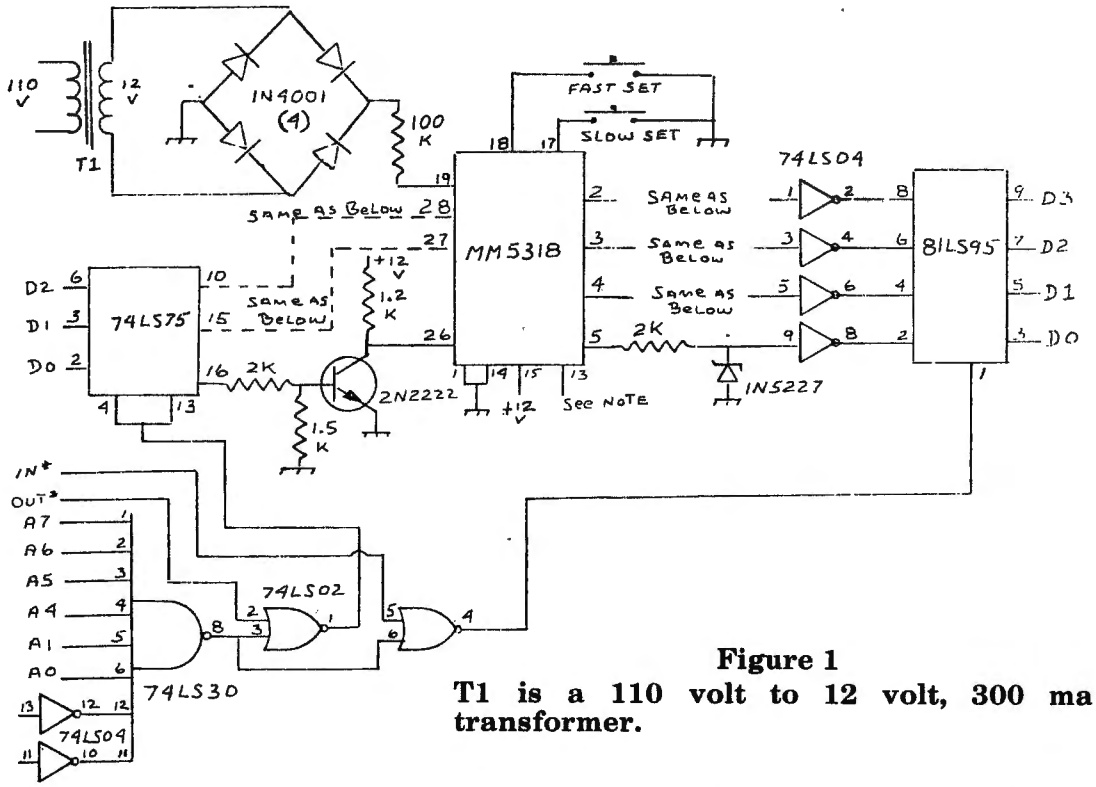


Figure 1
T1 is a 110 volt to 12 volt, 300 ma transformer.

```
7FBD            00100           ORG     7FBDH
7FBD 21C67F     00110 START     LD      HL,TIME         ;SAVE FOR AUTOSTART
7FC0 228E40     00120           LD      (16526),HL
7FC3 C3CC06     00130           JP      6CCH            ;FOR NON-DISK USERS
7FC6 0600       00140 TIME      LD      B,0
7FC8 11F47F     00150           LD      DE,7FF4H        ;UPPER MEM TIME STORAGE
7FCB 21383C     00160           LD      HL,3C38H        ;SCREEN POSITION
7FCE CDE67F     00170 FIRST     CALL    AGAIN
7FD1 04         00180           INC     B
7FD2 B8         00190           CP      B               ;ARE FIRST 3 DIGITS DONE
7FD3 CAD97F     00200           JP      Z,NEXT          ;IF SO, DO LAST 3 DIGITS
7FD6 C3CE7F     00210           JP      FIRST           ;ELSE DO AGAIN UNTIL DONE
7FD9 0606       00220 NEXT      LD      B,6
7FDB CDE67F     00230 SECND     CALL    AGAIN
7FDE 05         00240           DEC     B
7FDF B8         00250           CP      B               ;DONE 3 TIMES?
7FE0 CAF37F     00260           JP      Z,STOP          ;ALL DONE,RETURN TO BASIC
7FE3 C3DB7F     00270           JP      SECND           ;ELSE DO REMAINDERS
7FE6 78         00280 AGAIN     LD      A,B
7FE7 D3F3       00290           OUT     (0F3H),A        ;OUTPUT VALUE TO PORT 243
7FE9 DBF3       00300           IN      A,(0F3H)        ;READ CLOCK VALUE RET'D
7FEB 12         00310           LD      (DE),A          ;WRITE DIGIT IN MEMORY
7FEC F630       00320           OR      30H             ;CONVERT TO ASCII CODE
7FEE 77         00330           LD      (HL),A          ;WRITE DIGIT ON SCREEN
7FEF 3E03       00340           LD      A,3             ;USED TO COMPARE WITH B
7FF1 23         00350           INC     HL              ;INCREMENT THE COUNTERS
7FF2 13         00360           INC     DE
7FF3 C9         00370 STOP      RET
7FBD            00380           END     START
00000 TOTAL ERRORS
```

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You may think another full screen BASIC program text editor is the last thing we need. There are several excellent ones on the market, and they are powerful tools for the prolific programmer. However, this one is different! In addition to the features of the others it adds some very powerful ones of its own. For instance, it will actually renumber all line numbers which are referenced to or from the line which is currently being edited.

The program is supplied on cassette for a 16K Model I and is compatible with either Level II or Disk BASIC. It can be configured according to the memory size of the machine. The documentation is excellent for a program of this type, with clear examples of each function and a sample program with which to experiment.

As the program loads as a SYSTEM tape, the user must set the memory size to protect the last 5K of memory for the editor. This minor inconvenience is heavily outweighed by the features of this powerful programming tool. After loading, the user types XEDIT and the magic begins.

The resident BASIC program is now displayed with twelve lines and a blinking cursor on the screen at one time. The indestructible cursor can be positioned with 6 different keys. One can delete or insert characters, extend a statement, scroll the display through the text, and type in BASIC keywords using shifted letters. For example, typing shift-D would insert the keyword DATA where the cursor was positioned. The user may change the meaning of each of the twenty-six alphabetic keys at any time.

More magic is accomplished using the CLEAR key. In this mode, one may delete an entire line, insert a line, copy or move a line to any location(moving the line deletes the original line while copying duplicates it), or even copy or move an entire block of lines. It is also in this mode that one may scroll to the top of the program and exit the editor.

The final frontier is the extended command mode. While in this altered state, the user may perform such trivial tasks as defining the line number increment for text insertion or defining what each shifted key is to mean. Some not so trivial features are search for a particular line number, find a character string, and change a character string. It is very much like the global search and replace features of SCRIPSIT. The final function is a swift renumbering utility.

The most amazing feature of the editor is its ability to selectively renumber any group of statements without destroying the program logic. For example, we may have a subroutine with an embedded subroutine with line numbers of 600 to 660 which we want to move to a new location starting at line 1000. 600 used to read:

```
600 F=0:GOSUB650:GOTO630
```

After the move:

```
1000 F=O:GOSUB1050:GOTO1030
```

and all other lines would be subsequently renumbered correctly.

This is not the easiest editor to use, but it may be the most powerful. The initialization routine could certainly be improved upon and the scrolling commands are a bit unnatural, such as using the ENTER key to move down a line. However, the package is an excellent value and done very well. The author is certainly to be congratulated on a fine product.

Jim Klaproth

Book review

Fifty BASIC Exercises
J.P. Lamoitier
Sybex Publishing
253 pages w/illustrations
$12.95

Fifty BASIC Exercises is a 253 page, 7 x 9 inch book from Sybex publishing. It is designed to aid in the primary phases of learning BASIC programming. The book also helps to "tune-up" the form and methods used by more advanced programmers. This book makes extensive use of listings, flow charts, and sample runs. These detailed illustrations help to convey and highlight the major points discussed in the text. Fifty BASIC Exercises is very easy reading despite all of the useful information it contains. For someone with a moderate grasp of BASIC, it should take about two evenings to fully digest all of the data. For the more advanced programmer, the first few chapters are not essential, but they at least should be briefly scanned. The reason for this is that some very useful routines are presented in the beginning as well as in the later chapters.

Each exercise in Fifty BASIC Exercises is presented so as to include: 1) a statement of the problem to be solved, 2) an analysis of said problem, 3) the solution with a flow chart and comments, 4) a corresponding program, and 5) a sample run of the program. This systematic approach allows readers to verify their understanding and progress at every step of the learning process. Fifty BASIC Exercises teaches by using solid examples of programming situations and possible problems occurring therein. The author, J. P.Lamoitier, has taught FORTRAN and BASIC for 15 years in industry as well as at several universities, and he feels that this method is one of the best that can be used to teach programming.

As was stated earlier, the book makes extensive use of graphic illustrations. Many of these illustrations are actual program listings. All of the programs are written in Microsoft BASIC, and are verified for direct use on the TRS-80 microcomputer. Each program will execute directly on a TRS-80, and minute syntax changes are all that are necessary to make the examples operate on a PET, Apple, or any other popular computer equipped with Microsoft BASIC. All of the programs in the book are available from Sybex, on cassette. The cassettes are only in TRS-80 format, and will not function on any other machine.

The chapters in Fifty BASIC Exercises are subdivided into numbered sections (1.3, 2.7, 8.5 etc...) for easy reference. Each chapter covers one particular section of programming and goes into an in-depth study of this section.

Chapter 1, entitled "Your First Program in BASIC", offers a quick look at how a BASIC program is developed using a pertinent example from the income tax form 1040. It teaches the rudimentary code and rules of the BASIC language, and shows several ways to improve upon a program after it has been written.

Chapter 2 teaches flow charting. Many examples are given to aid the beginner in "getting the hang of it". It teaches that a flow chart is a graphic representation of the procedure proposed to solve a problem and therefore a very useful tool indeed. The author even goes as far as to call flow charts, "An Indispensable Tool...". The exercises in chapter 2 include such problems as sorting numbers and working with simple arrays.

Chapter 3 deals with exercises using integers. The applications range from ancient mathematics (Egyptian Fractions) to modern computer science (integer base conversions). Chapter 3 presents exercises demonstrating the use of whole numbers in BASIC. More advanced flow charts are used, but documentation explains each step thoroughly without being redundant. Chapter 3 also deals with using the computer to factor numbers, determine primes, and convert number bases. The execises are of varying difficulty, and always emphasize the usefulness of section by section flow charting.

Chapter 4 concerns elementary exercises in geometry. It states how BASIC can be used to program some fairly complicated formulas from analytic geometry. It deals with such problems as plotting curves, determination of a circle passing through three given points, perimeters, and areas. Chapter 4 offers many examples of the numerical applications in analytic geometry as opposed to Euclidean

geometry. As always, the exercises are designed for their practical application and simplicity.

Chapter 5 presents some simple exercises in data processing. The exercises are business oriented, dealing with shell sorting, merging files, and report generation. The author uses the shell sort method over the bubble method because shell sorting speeds up execution time by reducing the number of comparisons that need to be made. Two of the programs in this chapter are a telephone directory and a routine to determine the time elapsed between two dates. The exercises on data processing are relatively straightforward because only a limited amount of data is actually processed.

Chapter 6 concerns itself with mathematical computations. It uses common formulas from algebra and calculus to evaluate polynomials and integrals, and to solve equations. It also addresses the validity and range of the numerical results in a microcomputer. Since the BASIC language was developed for the programming of simple mathematical calculations, the flow charts and programs in this section are generally uncomplicated and easy to design and execute. Chapter 6 states what can be done to avoid the possibility of error accumulation due to internal round-off errors. The exercises include synthetic division of polynomial, calculation of a definite intergral, calculation of Pi using regular polygons, equation solving by Dichotomy, and numerical evaluation of polynomials. All things considered, the exercises in chapter 6 are actually easier than those in chapter 3.

Chapter 7 is concerned primarily with the financial side of computing in BASIC. It has exercises involving sales and growth forecasting, loan payments, interest computations, and advanced income tax applications. The author treats the subject of business computing in much the same way he handled the scientific and mathematical computations in earlier chapters.

Chapter 8 enters the realm of game programming. It offers a little light programming practice after the rather engrossing sections concerning data processing and financial computing. This chapter teaches the level of computer involvement in any given game. The emphasis in this chapter is to teach how to increase the amount of computer involvement in some of the simple games that are presented. Some of the exercises are, a "too low/too high" game in which the player must guess a computer generated number, while being given clues as to his position relative to said number. A matchstick game is also included. This is a nim-type game in which the last player to draw a "matchstick" from the pile loses. A simple craps dice game is discussed in this chapter, as are more advanced games such as chess and Othello.

Chapter 9 is entitled "Operations Research" and deals primarily with the use of arrays and subscripts. The exercises include task scheduling, project management (PERT), and optimal course planning. The programs in this chapter are the most complicated and lengthy of any up to this point. The reason for this is that several graphs are needed in each program, and whenever it is necessary to "walk a graph", subtle subscript handling operations are created. Since these operations have a tendency to build up, lengthy programs are the result.

Chapter 10 is based on statistics and the measuring of data. The exercises are in such areas as mean, variance, standard deviation, skewness, and kurtosis. Other exercises concern linear regression and the behavior of the BASIC RND (random number generator) function. The programs mentioned offer few if any major problems and if any happen to occur, the reader should be able to handle them at this point in the book. The problems in this chapter are fairly stimulating and particularly useful.

Chapter 11 is the last and is entitled "Miscellaneous". It consists of exercises that are interesting from an information processing point of view, but do not fit well under any of the previous chapter headings. The exercises in this chapter involve clever programming techniques and/or unique flow chart development. One of the two main problems addressed is to design and execute a program which, when given the month and day of birth, will output the corresponding zodiac sign. The other main problem is to design a

program to solve the "Eight queens problem". This is a classic problem for computer science students as well as chess players. The problem entails finding all of the possible ways to arrange eight queens on a chess board so that no two queens are "en prise" (threatening to take one another). One solution is given, and the others must be worked out.

The two appendices at the end of the book deal with A) the characters and symbols that comprise the "BASIC alphabet", and B) the main syntax rules that should be followed in all BASIC programming. Some of the areas covered in appendix B are constants, numerical variables, arithmetic expressions, assignment instructions, program loops, character strings, and input/output methods. Appendix B offers several examples of how each of the above areas can be utilized to their fullest.

To conclude in one sentence, Fifty BASIC exercises is a very complete, well written and informative book that will make a useful addition to anyone's computer information library.

W. W. Harper II

Microcomputer Power Series
John P. Grillo
and
J. D. Robertson
Wm. C. Brown Co. Publishers
2460 Kerper Blvd.
Dubuque, Iowa 52001

The authors have developed a four volume paperback series to aid the microcomputer programmer. The series covers the following: 1) Guide to Systems Applications ($17.95), 2) Techniques of BASIC ($18.95), 3) Introduction to Graphics ($15.95) and 4) Data Management Techniques ($16.95). This reviewer was quite impressed with the quality and depth of the texts.

The Guide to Systems Applications begins with elementary concepts and introductory terminology. After a thorough discussion of microcomputer systems, computer functions, and BASIC commands, the authors begin to show the reader the possibilities. The chapter on File Manipulation Techniques is exceptional. Sorting via a number of methods is discussed and shown by example. The authors take you through an Exchange, Shell-Metzner 'Quicksort', Key Record, Sort-Merge, BSST or Binary Sequence Search Tree. This material is followed by discussions on designing file structures and complete system programming.

Once you have digested the material, the authors demonstrate the various techniques with some major programs. The programs are all well remarked and completely tested for the TRS-80, some run on a 4K Level II (personal file system), 16K Level II (gradebook record system), 32K Level II with disk & printer (Mailing List System).

The intent is not to give the reader the 'best' program possible as it is to show how programs can be developed to meet your needs.

The Techniques of BASIC volume covers the topics of data analysis, graphing data, text processing, error trapping, sorting and includes over 60 programs.

The volume on Introduction to Graphics is aimed at showing the reader a variety of possibilities for inclusion in their own programs. It is aimed at the beginning programmer. Thirty-eight programs are included.

The fourth volume, Data Management Techniques, is written with the more advanced reader in mind. Memory, tape and disk files are managed in a number of ways. There is list, array, queue, stack and tree processing. ISAM files, linked lists, BSST transaction file merging, and multilist file management are discussed. Listings for 48 programs are given.

Pick the volume that most fits your needs. Not all volumes will appeal to every user of the TRS-80, and each text does include material that is either too elementary or too advanced for the general audience.

Cameron Brown

The four BASIC statements

Basically BASIC

T. R. Dettmann

For all TRS-80 models

In programming, we often lose sight of the forest for the trees. We have a tendency to confuse good programming with very specialized techniques. We forget that it is more than an ability to program random files, faster sorts, or tricky input routines. Good programming is the development of simple solutions to a given problem.

In reading magazines, many beginners will try a new technique before they have mastered the simpler basics. Even the seasoned professional will find he can accomplish a lot with the simplest BASIC commands and statements.

The four BASIC statements we will use in this article are: PRINT, INPUT, IF-THEN and GOTO. By learning how to use these statements effectively we can expand our programming skills a great deal. By adding one or two statements at a time, we can come up with some amazing capabilities.

INPUT

We will use the INPUT statement in its very elementary form. At this point we will not allow it to do anything *but* enter information (data). The form of the statement is:

INPUT *variable-name*

where the variable-name can be either an alphanumeric string or a number. Strings are defined by using a dollar sign ($) behind the variable name. Those without the string declarator are numeric variables.

PRINT

The PRINT statement is used to get information from the computer. It prints data to the video screen. The form we will use is:

PRINT *variable-name list*

where the variable name list can be one or more variable names consisting of numeric or string variables or constants. The only variable name list separator we will use in this article will be the comma.

IF-THEN

The IF-THEN statement is used to make decisions. The form we will use is:

IF (*condition to be tested is true*)
THEN (*do this*)

GOTO

The GOTO statement is used to jump or branch to a new place in the program. We will use it with the IF-THEN statement in complex situations. Its form is:

GOTO *line number*

where the line number is the number of the program line to be jumped or branched to.

Program design

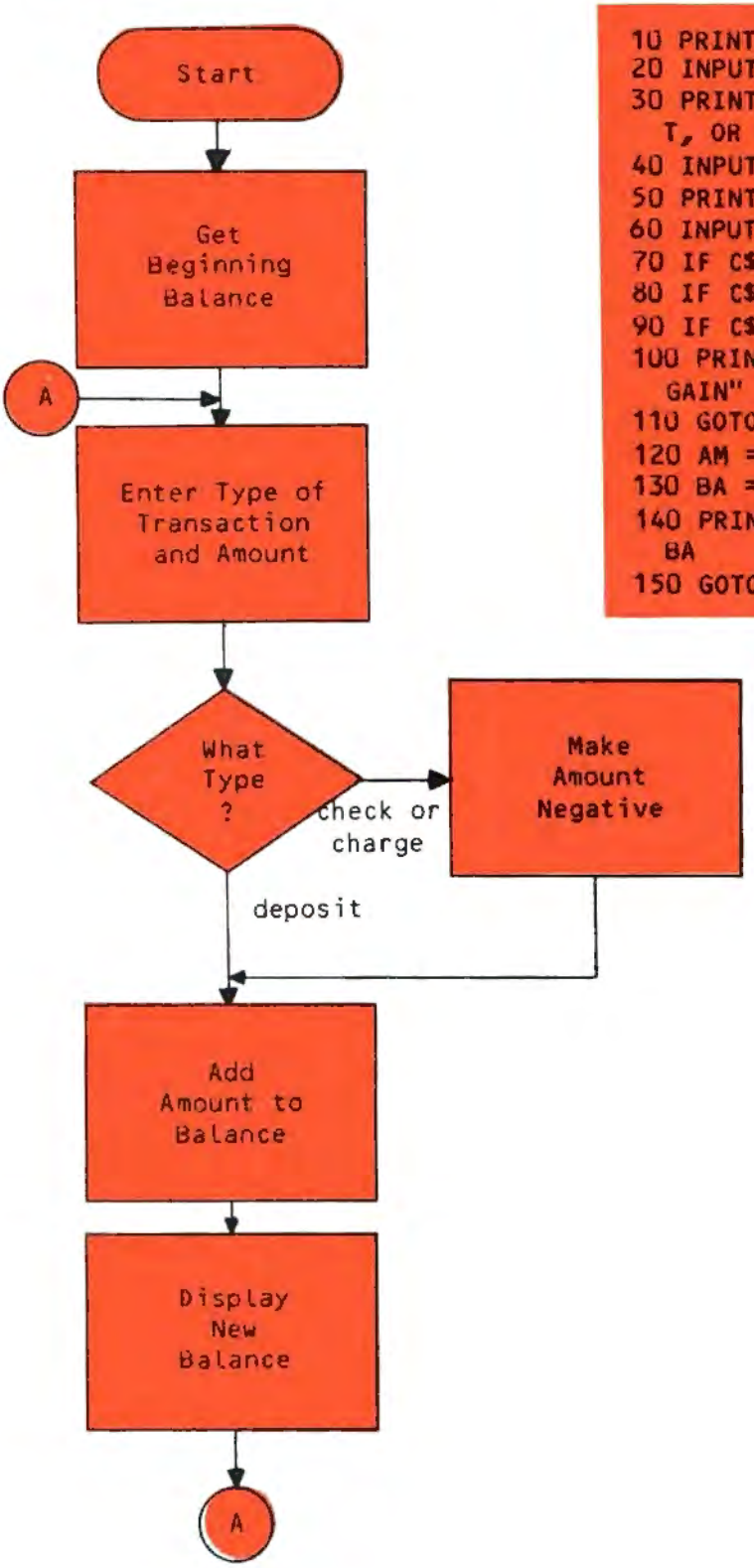
The first step in any program is the design stage. Unfortunately, many BASIC programmers just sit down at the keyboard and make up little programs as they desire. For serious programming, nothing beats prior planning.

The standard method for design is the flow chart. It is a series of symbols, connected by lines to show the flow of the program. In its greatest detail, every minute step of the program is illustrated. In its simplest form, it isn't much more than a block diagram of the program concepts. There are arguments for both ends of the spectrum of the flow chart. We will show you a variation which is gaining wide-spread acceptance among computer scientists.

This variation uses English intermixed with BASIC statements and commands. As the program is prepared and refined, more and more of the English text is converted into BASIC. For foreign programmers, a foreign language text could just as easily be used, even though the BASIC portion is still in English.

Before we get into our sample program, there is one more thing to understand about BASIC. We talk about statements and commands. These are very much like English sentences. In BASIC, each sentence must be assigned a line number. The computer will numerically follow these line numbers unless instructed to do otherwise by the program itself.

Now let's design our program.



Flowchart for Program in Figure 1

```
10 PRINT "ENTER THE BEGINNING BALANCE"
20 INPUT BA
30 PRINT "ENTER (CK) CHECK, (DP) DEPOSI
   T, OR (CH) CHARGE"
40 INPUT C$
50 PRINT "ENTER AMOUNT"
60 INPUT AM
70 IF C$ = "CK" THEN 120
80 IF C$ = "DP" THEN 130
90 IF C$ = "CH" THEN 120
100 PRINT "ERROR IN DATA ENTRY -- TRY A
   GAIN"
110 GOTO 30
120 AM = - AM
130 BA = BA + AM
140 PRINT "AMOUNT", AM, "NEW BALANCE",
   BA
150 GOTO 30
```

Figure 1

The first step in any program design is to state or define "*the problem we wish to solve*" which is widely referred to as the program objective. More programs have been lost by ignoring this step. If the problem or objective is inadequately defined, the program will almost always require redesign.

For our problem, we state:

> Do standard checkbook math starting with a beginning balance amount and then subtract checks and charges and add deposits. Print the results.

The flow of this program is shown in Figure 1. The initial English version will look like this:

```
    PRINT prompt for the beginning
    balance.
    INPUT the beginning balance.
A/  Print prompt for check, deposit or
    charge.
    INPUT transaction type.
    PRINT prompt for amount.
    INPUT amount.
    IF check THEN B/
     IF deposit THEN C/
      IF charge THEN B/
       PRINT error message.
       GOTO A/
B/  Make amount negative.
C/  balance = balance + amount
    PRINT amount, new balance
    GOTO A/
```

Next we assign variable names which are similar to our English names in the program flow: BA for balance and AM for amount. See how closely our finished program matches the flow. ■

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What's the difference?

BASIC & machine language

Jim Klaproth, Associate editor

For Models I & III

This article deals with a subject that should be of great interest to a majority of *80-U.S.* readers, namely, how does a machine language program differ from a BASIC program? To the great majority of TRS-80 users, assembly language is a mystery, reserved for only the elite who hold a Ph. D. in computer science. It is also a subject that most of us would like to know more about, judging from the tremendous interest generated by Leo Christopherson's magical animation techniques that have been published in past *80-U.S.* issues. This article will attempt to explain what machine language is and how it differs from the native language of the TRS-80. It assumes no prior knowledge of the subject and is being written by a virtual novice to assembly language. Hopefully, it will serve as the beginning of a series of tutorials dealing with teaching the neophyte how to take the plunge into programming in assembly language.

Is machine language the same as assembly language?

Machine lanuage is not the same as assembly language, although the terms are sometimes mistakenly used interchangeably. Machine language consists of the actual binary or hexadecimal numbers that cause the Central Processor Unit (CPU) to carry out a specific function. Assembly language refers to a higher level language that enables the programmer to issue commands that will be translated into machine language by a program known as an "assembler".

What is binary

"Binary" means "based on 2"; therefore, the binary numbering system contains only 2 elements: the numerals 0 and 1. Any decimal number can be expressed as a binary number, although very large numbers tend to be very clumsy when expressed in binary. Just as in the decimal system, digits are

placed in position by the power of ten they represent, so it is in binary only each digit represents a power of two. For example, the decimal number 1456 is composed of the following:

$1 \times 10^3 + 4 \times 10^2 + 5 \times 10^1 + 6 \times 10^0$
$1000 + 400 + 50 + 6 = 1456$

The binary number 1010 would be broken down as follows:

$1 \times 2^3 + 0 \times 2^2 + 1 \times 2^1 + 0 \times 2^0$
$8 + 0 + 2 + 0 = 10$

What does binary have to do with the TRS-80?

The TRS-80 utilizes an 8 bit microprocessor (CPU) known as the Z-80. This means that the Z-80 has the capability to input and output 8 binary digits (bits) at a time. 8 bits form what is known as a byte. This is important because it means that the largest binary number that can be represented during any one cycle is the number 11111111, which equals 255 in decimal. If we include the binary 0, that gives us a total of 256 possible byte combinations. What that means is that we can have a total of 256 possible instructions, each represented by a unique byte. For example, the instruction 00001000 tells the Z-80 to exchange the contents of two of its internal registers, while 00110100 tells it to increment by one the contents of another register. Actually, the Z-80 has more than 500 instructions, which is possible by combining two or more bytes into each instruction. Don't let the sheer numbers scare you - the majority of programs utilize only a handful of the basic instructions.

What is hexadecimal?

In early days of microcomputing, the programmer would actually program the computer by inputting each byte into memory through the use of switches on a front panel. You may have seen one of these panels on some of the older machines such as the IMSAI. This was a slow and tedious process that was prone to errors. Imagine inputting 4000 instructions, each containing 8 switch settings! A better way had to be developed - and it was. Why not break down the 8 bits into 2 groups of 4 like thus: 1000 1101. Now treat each group as a separate number, each containing 4 digits. The highest number that can be represented is now 1111 which equals 15 in decimal. By using the numerals 0-9 and the letters A-F, with A=10 and F=15, we can represent each 4 bit group with only one character. Thus, the binary 10001101 now becomes 8D in our new number system called hexadecimal or, simply, hex. (See page G/1 in your Level II Manual for further enlightenment.) Now the instructions could be entered via the keyboard in hex, with a sideline benefit of a great decrease in error probability. One is less likely to make an error with 2 digit hex numbers than with 8 digit binary numbers. A simple monitor program in the computer converts the hex numbers back into binary numbers for internal use of the processor. The TRS-80 and most all modern computers utilize the hex numbering system, while the octal (base 8) system is still used by some of the older generation machines.

What is an assembler?

At this point, the computerist still had a problem - namely, 8D or 4F still a long way from relating to the actual function that was desired. The problem was solved by creating a program called an "assembler". Each instruction was assigned a unique abbreviation or mnemonic that relates to each specific function. The mnemonic LD means to LOAD a register, ADD means to add two registers, and SUB means to subtract, and so on. The assembler allows the programmer to enter mnemonics into a text buffer and then the assembler converts each mnemonic into the corresponding hexadecimal Z-80 code. We call the actual mnemonics the "source" code, and the assembled output the "object" code. The object code is the machine language that the computer can actually run on.

BASIC differences

With all of that out of the way, we can now consider how a machine language program differs from a BASIC program. One of the most obvious differences, that should be apparent to even the most novice TRS-80 user, is the manner in which the two types of programs load from tape in Level II. To run a BASIC program, the CLOAD command is issued at the >READY prompt, while a machine language program uses the SYSTEM command. The difference in the two is the way that each loads into memory and the

format of the data on the tape. A machine language program must include the starting and ending memory addresses (where to load the program), and the transfer address (where to begin execution of the program), while the BASIC program simply loads text (similar to source code) into a reserved area of RAM. To begin execution, we enter RUN for BASIC or "/" for machine language. If we simply type "/" the program will automatically jump to the transfer address on the tape. We can also type "/" followed by an address in decimal and the program will jump there instead. This is the equivalent of entering GOTO XXX instead of RUN in Basic.

What about speed?

Another obvious difference is that machine language programs run much faster than most BASIC programs. The difference in speed is due to the fact that machine language is optimized for the machine and does not require any processing before it is executed. On the other hand, the BASIC that is built into the TRS-80 is an interpreter BASIC. This means that before anything takes place at the machine level, each BASIC statement has to be converted or interpreted into its machine language equivalent, which takes time. What we have done in BASIC is achieved a higher level language with a trade-off of some execution speed. For most applications, this is not a serious deficiency; however, animation and certain repetitive functions, such as sorting, require the higher speed of machine language. Another alternative is a BASIC compiler,which gives us the best of both worlds. A compiler takes the BASIC text and compiles it into a machine readable format, thereby giving an increase of 2-8 times the speed over an interpreter.

How does the Level II ROM work?

The Level II ROM (Read Only Memory) contains the machine language routines that accomplish this magic for us. The interpreter actually looks at the BASIC text and decides what machine language subroutine or "call" to execute. The BASIC ROM contains many such routines and these can be combined in many ways to accomplish a certain task in BASIC. For example, when we type the BASIC command "CLS" and the program is run, the interpreter "recognizes" the characters CLS and tells the program to jump to an address in the ROM that contains the machine code to clear the screen. This particular routine is a very short one that causes the program to return to its original location after clearing the screen, much as a RETURN from a GOSUB does. Now, if we were to write a machine language program that simply cleared the screen, we could either write out the actual instructions with the aid of an assembler or a monitor program, such as TBUG, or we could simply call the routine that is contained in the Level II ROM. Therein lies the power of the BASIC ROM for the assembly language programmer.

Why bother with machine language?

Why do we even need to mess with machine language, if we have a high level language like BASIC, and even a BASIC compiler? There are many answers to that question. First of all, there are times when we have an excellent BASIC program which could be enhanced by adding a machine language subroutine, through the USR function or by use of string or line packing. Examples of this include adding sound to a game, adding a high speed sort to a mailing list, or adding a flashy animated title page to that fancy program we are going to submit. Secondly, most games that utilize high speed graphics require the speed of machine language. Third, some functions, such as matrix operations, are not available to the BASIC programmer and can be performed in machine language. Fourth, programs written for process control tend to be more efficient when written in machine language. For example, it would be an easy task to interrogate a temperature sensor 20 times per second in machine language, but not so in BASIC. Lastly, it gives one an opportunity to learn a new and exciting computer language. Hopefully, we will touch a little on each of these applications in future articles. In the meantime, I hope you have a better understanding of what machine language is and more interest in learning this fascinating and powerful language. ■

SUPERGRAPH,

from page 90

The function subroutine must assign one value to F for one value of X. Be sure not to use the following variables in the subroutine: MD, X1, X2, Y0, X0, DY, DX, Y1, Y2, M1, M2, I1, I2, XL, XR, FF, FK, FG, FP, F1, CN, CA, CB, CC, CD, CE, DG, ER, IO, IN, MO, MN, XA, XB, XC, YC, FX(I), IX(I), MX(I), FC(I), MC(I), and IC(I) (I=0 to 98)

When you are ready to graph, type "GOTO20" and you will see:

```
ENTER Y-AXIS LABEL (11 CHARS. MAX)?—
```

Now enter the axes labels. If no labels are entered, the default labels will be "FUNCTION" for the y-axis and "INDEPENDENT VARIABLE" for the x-axis. Labels exceeding the maximum allowable length will have to be shortened and re-entered.

After the label information has been entered, enter the initial function mode and initial end points.

```
ENTER Y-AXIS LABEL (11 CHAR MAX)? PROB!DIST
ENTER X-AXIS LABEL (40 CHAR MAX)? VARIABLE
INITIAL FUNCTION MODE:
        1=FUNCTION ITSELF
        2=DERIVATIVE OF THE FUNCTION
        3=INTEGRAL OF THE FUNCTION
?1

ENTER LEFT ENDPOINT:    -5
```

Valid modes are 1, 2 and 3. Any other entries will be rejected. When entering end points, note the following:

1) Except for E, +, -, ., „ ← and "Shift←, non-numeric data is ignored.

2) Values beyond the capability of the machine are rejected (e.g., 1E+45).

3) Pressing ← clears the last character entered.. Pressing the "Shift ←" key clears the entire entry.

4) Meaningless data will be treated as 0.

5) If the initial left end point (lep) equals the initial right end point (rep), both have to be re-entered.

6) If the rep is less than the lep, they are automatically switched.

When the initial end points are entered, the program will graph the function, the derivative of the function, or the integral of the function depending on the function mode selected. In the

case of the default equation, graphing takes approximately 25 seconds for the function itself and 35 seconds for the derivative and integral. A count will be displayed in the lower left hand corner. Calculation can be stopped at any time while this count is displayed. To stop calculation, press "S". Stopping is independent of the function mode.

When the graph is complete, the count will be replaced by a "G" in the lower left hand corner of the screen. The program is now in the G sub-mode.

The function mode which the program is in can be determined at any time by observing the y-axis label. If the graph is a derivative "D*(assigned label)*" will be printed as the label. If the function itself is plotted, the assigned label will appear by itself. For example, if the assigned label is "PROB!DIST", the label of the derivative will be "D*PROB!DIST*". Under the G sub-mode, the following are available:

T - Display x-axis label in lieu of current end points.
W - Display current end points in lieu of x-axis label.
C - Insert cross-hatch reference points.
L - Move one range left and graph under current function mode.
R - Move one range right and graph under current function mode.
D - Double range and graph under current function mode.
H - Half range and graph under current function mode.
(Note: 1 range is defined as ABS(rep-lep) or 1 x-axis length).
P - Change lep.
Q - Change rep.
(Note: If you use "Q" to enter "5" and then try to use "P" to enter "5", the program will not accept the new data. However, you do not have to re-enter data using the "Q" command (as under initialization). Use the "W" command to view endpoints as they are changed.)
E - Graph under the current function mode using data entered with the "P" and/or "Q" commands.
S - Stop calculation of graph and return to the G sub-mode.
F - Change function mode to function proper (1) and graph using end points as modified by above commands.
M - Change function mode to derivative (2) and graph using end points as modified by above commands.
(Note: Graph calculation begins immediately upon pressing E, F, M or I. If you have made a mistake in choosing the correct function mode, merely press "S" and then the correct mode).
X - Go to the examine sub-mode (X) under the current function mode.
(Note: If the end points have been altered or graph calculation has been stopped using the "S" command, you cannot enter the X sub-mode until a complete graph is plotted and a "G" has appeared in the lower left hand corner of the screen).

Here is an example of using the G sub-mode. Under initialization you choose the default equation F = .398942*EXP(-.5*X*X). The y-axis label and x-axis label will be "PROB!DIST" and "VARIABLE" respectively. The initial function mode will be (1). After entering -5 for the lep and 5 for the rep, the familiar bell curve will be plotted. You now press "M" so that you can see what the derivative looks like. d/dx(.398942*EXP(-.5*X*X)) will be plotted. Now press "I" to graph the normal probability curve

$$\int_{-5}^{X} (.398942*EXP(-.5*X*X))dx.$$

Now press "F" to re-graph the function itself.

Further manipulation of the graphing can be achieved by using the "S" command in connection with the "L", "R", "H" or "D" commands. First press "W" to display the current end points. By pressing "R" and then "S" you will have moved the endpoints to 5,10. By pressing "R" and "S" again you will have moved the endpoints to 10,20. When you have obtained the desired end points press "F", "M" or "I". Thus, you can quickly scan a function and/or its derivative and integral. Similarly, you can use the "H" and "D" commands to quickly zero in on or expand the function.

Once the graph is plotted, the X sub-mode can be entered. Pressing "X" will cause the following to happen:

1) Blinking cursors will appear on the function. Non-blinking cursors will appear on the x and y axes.
2) The x-axis label will be replaced by the x-y coordinates of the blinking cursors.
3) The "G" in the lower left hand corner of the screen will be replaced by an "X" signaling that the program is ready to accept X sub-mode commands.

If the program is in any function mode (1), (2) or (3), the following commands are available:

↑ - Move the left cursors 1 division right.
Shift↑ - Move the left cursors continuously right.
↓ - Move the left cursors 1 division left.
Shift ↓ - Move the left cursors continuously left.
Note: Left arrow, right arrow, shift-left arrow and shift-right arrow do the same as above,

but manipulate the right cursors.

H - Halts continuous movement of cursors.

E - Exits X sub-mode, and enters G sub-mode. End points remain unaltered and no new graph is plotted.

G - Exits X sub-mode, enters G sub-mode, and graphs the function under the current function mode using the end points as altered by cursor movement.

If the program is in the function proper mode (1), the following additional commands are available to further examine the function. They are ignored under function modes (2) and (3):

M - Allows manipulation of the left cursors while displaying the x-y coordinates and slope at the blinking left cursor. This will allow scanning of the slope of the function. The right cursors are disabled.

A - Calculate slope at left function cursor to±1 in the fifth significant digit (± 1 5SD).

Note: a) The iteration count replaces "X" in the lower left hand corner of the screen. The current approximation is displayed at the bottom of the screen.

b) If the slope does not seem to converge, or the current approximation is satisfactory, press "S". The lasst approximation and the final iteration count will be displayed at the bottom of the screen.

I - Calculate integral between current cursor positions to ± 1 in the sixth significant digit (± 6SD).

Note: a) The integration count replaces the "X" in the lower left hand corner of the screen. The current approximation is displayed at the bottom of the screen along with the current iteration count.

b) If the integral does not seem to converge, or the current approximation is satisfactory, press "S". The last approximation and the final iteration count will be displayed at the bottom of the screen).

S - Solve for a root which lies between cursors to ± in the sixth significant digit.

Note: a) The iteration count replaces "X" in the lower left hand corner of the screen.

b) If the root is less than 1E-07, it is assumed to be 0 due to the precision of the machine.

c) Since the bi-section method is used, the function value at each cursor must differ in sign.

R - Re-display x-y coordinates of each cursor at the bottom of the screen after a calculation using the M, A, I or S command.

Note: a) If the left cursor position has been modified by the "M" command, the position will remain the same when "R" is pressed.

See SUPERGRAPH,page 150

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SUPERGRAPH,

from page 147

b) Full cursor control of both end points is returned).

Here is an example of using the X sub-mode. You have just plotted the bell curve in the first example. Now you press "X" to enter the X sub-mode. Now press "I" to find

$$\int_{-5}^{+5} (.398942*EXP(-.5*X*X))dx.$$

This integral should approach 0.999999 and as you will see, it does. (Check a standard probability table to confirm this and other integrals.) Now press "R" and position the left cursor at L = (0.857143,.0.276295). Observe the left coordinates as you move the cursor. Press "A" to calculate the slope at this point. The answer will be printed at the bottom of the screen.

Error handling

Make a mistake? Errors are handled as follows:

1) If an overflow, division by 0, or illegal function call is encountered within the function subroutine, "ERROR/OVERFLOW at X = "number", TRY NEW ENDPOINTS" will be printed at the bottom of the screen. Control is returned to the G sub-mode and you may enter new end points with the "P" and "Q" commands. Be sure not to include "number" within the new range!

2) Syntax errors which occur in the function subroutine will cause "SYNTAX ERROR IN LINE (number) OF FUNCTION" to be printed at the bottom of the screen. In 5 seconds, the program will re-initiate itself printing the current error code and number of the line where the error occurs.

3) Other errors are treated like syntax errors above. The program is restarted with the error information printed. However, the error information may or may not concern the function. Consult the User Manual to determine the error.

Disk operation

Supergraph will run with disk BASIC as well as with Level II BASIC. However, there is one advantage to using disk. Suppose you write the following program which describes a special function:

```
LIST
30 Y$="SOME FUNC":X$="SOME VARIABLE"
5000 IFX<0,F=1/0
5010 IF X>=0 AND X<1, F=X
5020 IFX>=1ANDX<5,F=X*X
5030IFX>=5,F=25
5040 RETURN
```

Now save the program under the file name "SPECFUNC/BAS" but use the A option. Load Supergraph and then merge "SPECFUNC/BAS". When you type RUN and then "GOTO20, you will see:

```
TITLE: SOME FUNC VS. SOME VARIABLE
INITIAL FUNCTIONS MODE:
        1=FUNCTION ITSELF
        2=DERIVATIVE OF THE FUNCTION
        3=INTEGRAL OF THE FUNCTION
?_
```

The old function is over-written and the titles are automatically entered! Following the above procedure you can build your own library of special functions to be called when needed. However, observe the following rules:

1) Using line 30 only, assign the y-axis label to Y$ and the x-axis label to X$. Observe maximum lengths!

2) Start the next line with line 5000 and use 10 line increments. Make sure that the last statement is a RETURN statement and does not exceed line 9999. Following these procedures will insure that the old function is erased when the new one is loaded.

3) Make sure that a value for F is assigned for all values of X. If F is undefined for a given X, it will force an error as in line 5000 of "SPECFUNC/BAS". The error handling routine will then trap the error and allow a shifting of end points.

Some other notes

Since differentiation is a subtracting type function, graphing a derivative of a rapidly changing function will give errors. First graph the function itself to insure that it is not changing too rapidly over the given range, then graph the derivative.

When using the "A" command in the "X" sub-mode, a slope may not converge if it is too close to 0. If the program senses this case, it will assume that the slope is 0.

In some graphing programs, a horizontal function will cause an error. For example, the default equation (probability distribution) when graphed from 100 to 200 will yield a horizontal line at F = 0. Supergraph will sense this and graph it as such.

```
10 CLS:PRINT"ENTER FUNCTION AS SUBROUTI
   NE 5000. THE ENTRY VALUE SHOULD":PRIN
   T"BE STORED IN VARIABLE X, AND THE RE
   TURNED VALUE IN VARIABLE F.":PRINT"EN
   TER 'GOTO20' WHEN FINISHED.":PRINT:PR
   INT"CURRENT FUCTION ( ERROR="DU",LINE
   "ERL"):":PRINT:LIST5000-10000
20 CLS:CLEAR300:S1$=STRING$(63," "):S2$
   =STRING$(31," "):DIMFX(99),MX(99),IX(
   99),YC(99),MC(99),IC(99):PRINTTAB(25)
   "SUPERGRAPH":PRINTTAB(25)"VERSION 1.0
   ":PRINT:PRINTTAB(22)"BY DAVUT Z. KORK
   UT":PRINT:PRINT:X$="":Y$="":ONERRORGO
   TO11460
```

```
30 REM *** MERGED LABEL INFORMATION GOE
   S IN THIS LINE ***
40 IFLEN(X$)<>0ANDLEN(Y$)<>0,PRINT"TITL
   E: "Y$" VS. "X$;:GOTO100ELSEPRINT@384
   ,"ENTER Y-AXIS LABEL (11 CHARS. MAX.)
   ";:INPUTY$
50 IFLEN(Y$)>11,PRINT@384,S1$;:Y$="":PR
   INT@384,"TOO MANY CHARACTERS.":FORI=0
   TO1000:NEXT:GOTO40
60 IFY$="",Y$="FUNCTION"
70 PRINT@448,"ENTER X-AXIS LABEL (40 CH
   ARS. MAX.)";:INPUTX$
80 IFLEN(X$)>40,PRINT@448,S1$+" ";:PRIN
   T@448,"TOO MANY CHARACTERS.";:PRINT@5
   12,S1$;:X$="":PRINT@576,S1$;:FORI=0TO
   1000:NEXT:GOTO70
90 IFX$="",X$="INDEPENDANT VARIALBLE"
100 PRINT@512,"INITIAL FUNCTION MODE:
                  1 = FUNCTION ITSELF
                  2 = DERIVATIVE OF THE F
   UNCTION
                  3 = INTEGRAL OF THE FUN
   CTION
";:INPUTDU$
110 MD=VAL(DU$):IFMD<1ORMD>3,PRINT@768,
   S1$;:PRINT@768,"ILLEGAL MODE, ENTER A
   GAIN";:PRINT@832,S1$;:PRINT@896,S1$;:
   FORI=0TO1000:NEXT:GOTO100
120 PRINT@832,S1$;:PRINT@896,S1$;:PRINT
   @960,S1$;:PRINT@960,"ENTER LEFT ENDPO
   INT:";:GOSUB11370:X1=DU:PRINT@960,S1$
   ;:PRINT@960,"ENTER RIGHT ENDPOINT:";:
   GOSUB11370:X2=DU:PRINT@960,S1$;
130 IFX1=X2,PRINT@960,S1$;:PRINT@960,"X
   L=XR (XL="X1",XR="X2"),UNACCEPTABLE";
   :FORI=0TO1000:NEXT:GOTO120
140 IFX1>X2,DU=X2:X2=X1:X1=DU
150 FG=0:FP=0:ON MD GOSUB 10010,10150,1
   0320
160 IFFK=1,PRINT@960,S1$;:PRINT@960,"LE
   P="X1",REP="X2;ELSEPRINT@960,S1$;:PRI
   NT@960+INT(50-LEN(X$))/2+13,X$;
170 PRINT@896,"G    ";
180 B$=INKEY$:IFB$="",GOTO180
190 IFB$="T",FK=0:GOTO160
200 IFB$="W",FK=1:GOTO160
210 IFB$="L",C=X2:X2=X1:X1=2*X1-C:GOTO1
   50
```

Circle 98

Circle 99

Circle 100

```
220 IFB$="R",C=X1:X1=X2:X2=2*X2-C:GOTO1
  50
230 IFB$="D",C=.5*(X2-X1):X1=X1-C:X2=X2
  +C:GOTO150
240 IFB$="H",C=.25*(X2-X1):X1=X1+C:X2=X
  2-C:GOTO150
250 IFB$="F",MD=1:GOTO140
260 IFB$="M",MD=2:GOTO140
270 IFB$="I",MD=3:GOTO140
280 IFB$="X"ANDFF=1ANDFG=1ANDFP=0:GOSUB
  10500:GOTO160
290 IFB$="X"ANDFF=1ANDFG=0ANDFP=0:C1=29
  :C2=127:GOSUB10500:GOTO160
300 IFB$="C",FORI=0TO40STEP10:SET(60,I)
  :SET(94,I):SET(127,I):NEXT
310 IFB$="Q",FP=1:GOSUB11600:GOTO160
320 IFB$="P",FP=1:GOSUB11630:GOTO160
330 IFB$="E"ANDFP=1,GOTO140
340 GOTO170
350 CLS:FORI=0TO41:SET(29,I):NEXT:FORI=
  28TO127:SET(I,40):NEXT:FORI=0TO30STEP
  10:SET(28,I):NEXT:SET(60,41):SET(94,4
  1):SET(127,41)
360 IFF1=0,NY$=Y$:GOTO380
370 IFF1=1,NY$="D*"+Y$+"*"ELSENY$="I*"+
  Y$+"*"
380 FORN=1TOLEN(NY$):PRINT@INT((14-LEN(
  NY$))/2+(N-1))*64,MID$(NY$,N,1);:NEXT
  :PRINT@960+INT(50-LEN(X$))/2+13,X$;
390 DU=YO+DY*40:GOSUB10460:PRINT@3,;:PR
  INTUSINGFM$;DU;:DU=YO+DY*30:GOSUB1046
  0:PRINT@195,;:PRINTUSINGFM$;DU;:DU=YO
  +DY*20:GOSUB10460:PRINT@387,;:PRINTUS
  INGFM$;DU;:DU=YO+10*DY:GOSUB10460:PRI
  NT@643,;:PRINTUSINGFM$;DU;:DU=YO:GOSU
  B10460:PRINT@835,;:PRINTUSINGFM$
400 DU=XO:GOSUB10460:PRINT@901+OF,;:PRI
  NTUSINGFM$;DU;:DU=XO+DX*31:GOSUB10460
  :PRINT@917+OF,;:PRINTUSINGFM$;DU;:DU=
  XO+DX*65:GOSUB10460:PRINT@934+OF,;:PR
  INTUSINGFM$;DU;:DU=XO+DX*98:GOSUB1046
  0:PRINT@949+OF,;:PRINTUSINGFM$;DU;
410 RETURN
5000 F=.398942*EXP(-.5*X*X)
10000 RETURN
10010 FF=0:DX=(X2-X1)/98:XO=X1:X=X1:GOS
  UB5000:FX(0)=F:X=X1+DX*98:GOSUB5000:F
  X(98)=F:Y1=FX(0):Y2=FX(98):FORI=1TO97
  :X=X1+DX*I:GOSUB5000:PRINT@896,I;:FX(
  I)=F
10020 D$=INKEY$:IFD$="S",RETURN
10030 IFY1>FX(I),Y1=FX(I)
10040 IFY2<FX(I),Y2=FX(I)
10050 NEXT
10060 IFY1>FX(98),Y1=FX(98)
10070 IFY2<FX(0),Y2=FX(0)
10080 IFABS(Y2)<ABS(Y1):DU=Y1ELSEDU=Y2
10090 IFDU=0,Y1=-1:Y2=1:FORI=0TO98:FX(I
  )=0:NEXT:GOTO10120
10100 IFABS((Y2-Y1)/DU)<1E-3,Y2=2*Y2:Y1
  =0:DU=(Y2+Y1)/2:FORI=0TO98:FX(I)=DU:N
  EXT
10110 IFY2<Y1,DU=Y2:Y2=Y1:Y1=DU
10120 F1=0:YO=Y1:DY=(Y2-Y1)/40:GOSUB350

10130 FORI=0TO98:YC(I)=40-INT((FX(I)-Y1
  )/(Y2-Y1)*40+.5):SET(I+29,YC(I)):NEXT

10140 FF=1:RETURN
10150 FF=0:X3=X1:X4=X2:XO=X3:DX=(X4-X3)
  /98
10160 X=XO-DX:GOSUB5000:FA=F:X=XO:GOSUB
  5000:FX(0)=F:X=X3+DX:GOSUB5000:FX(1)=
  F:X=X3+97*DX:GOSUB5000:FX(97)=F:X=X3+
  98*DX:GOSUB5000:FX(98)=F:X=X3+99*DX:G
  OSUB5000:FB=F
10170 MX(0)=(FX(1)-FA)/(2*DX):MX(98)=(F
  B-FX(97))/(2*DX)
10180 F2=0:M2=MX(0):M1=MX(0):FORI=2TO98
  :X=X3+DX*I:GOSUB5000:FX(I)=F:PRINT@89
  6,I;:MX(I-1)=(FX(I)-FX(I-2))/(2*DX)
10190 D$=INKEY$:IFD$="S",RETURN
10200 IFM1>MX(I-1),M1=MX(I-1)
10210 IFM2<MX(I-1),M2=MX(I-1)
10220 NEXT
10230 IFM1>MX(98),M1=MX(98)
10240 IFM2<MX(98),M2=MX(98)
10250 IFABS(M2)<ABS(M1),DU=M1ELSEDU=M2
10260 IFDU=0,M1=-1:M2=1:FORI=0TO98:MX(I
  )=0:NEXT:GOTO10290
10270 IFABS((M2-M1)/DU)<1E-3,M2=2*M2:M1
  =0:DU=(M2+M1)/2:FORI=0TO98:MX(I)=DU:N
  EXT
10280 IFM2<M1,DU=M2:M2=M1:M1=DU
10290 F1=1:YO=M1:DY=(M2-M1)/40:GOSUB350

10300 FORI=0TO98:MC(I)=40-INT((MX(I)-M1
  )/(M2-M1)*40+.5):SET(I+29,MC(I)):NEXT

10310 FF=1:RETURN
10320 FF=0:X5=X1:X6=X2:XO=X5:DX=(X6-X5)
  /98:X=X5-DX:GOSUB5000:FA=F:X=X5:GOSUB
  5000:FX(0)=F:X=X1+DX*98:GOSUB5000:FX(
  98)=F
10330 IX(0)=((FA+F(0))/2)*DX
10340 AD=0:I2=IX(0):I1=IX(0):FORI=1TO98
  :PRINT@896,I;:X=X5+DX*I:GOSUB5000:FX(
  I)=F:AD=AD+((FX(I)+FX(I-1))/2)*DX:IX(
  I)=AD
10350 D$=INKEY$:IFD$="S",RETURN
10360 IFI1>IX(I),I1=IX(I)
10370 IFI2<IX(I),I2=IX(I)
10380 NEXT
10390 IFABS(I2)<ABS(I1),DU=I1ELSEDU=I2
10400 IFDU=0,I1=-1:I2=1:FORI=0TO98:IX(I
  )=0:NEXT:GOTO10430
10410 IFABS((I2-I1)/DU)<1E-3,I2=2*I2:I1
  =0:DU=(I2+I1)/2:FORI=0TO98:IX(I)=DU:N
  EXT
```

```
10420 IFI2<I1,DU=M2:I2=I1:I1=DU
10430 F1=2:YO=I1:DY=(I2-I1)/40:GOSUB350

10440 FORI=0TO98:IC(I)=40-INT((IX(I)-I1
  )/(I2-I1)*40+.5):SET(I+29,IC(I)):NEXT

10450 FF=1:RETURN
10460 D1=LEN(STR$(FIX(DU))):DU$=STR$(DU
  )
10470 IFLEFT$(RIGHT$(DU$,4),1)="E"ORD1>
  7,FM$="#.####^^^^":OF=0:GOTO10490
10480 IFD1>0ANDD1<=7,FM$="######.##":OF
  =INT((6-D1)/2)
10490 RETURN
10500 CN=MD
10510 PRINT@896,"X    ";:FG=1:IFMD=1,SET
  (C1+1,YC(C1-28)):IFC1>29,SET(C1-1,YC(
  C1-30))
10520 IFMD=1SET(C2-1,YC(C2-30)):IFC2<12
  7,SET(C2+1,YC(C2-28))
10530 IFMD=1,XL=X1+DX*(C1-29):YL=FX(C1-
  29):XR=X1+DX*(C2-29):YR=FX(C2-29):PRI
  NT@960,S1$;:PRINT@960,"L = ("XL","YL"
  )";TAB(32)"R = ("XR","YR")";
10540 IFMD=2,SET(C1+1,MC(C1-28)):IFC1>2
  9,SET(C1-1,MC(C1-30))
10550 IFMD=2,SET(C2-1,MC(C2-30)):IFC2<1
  27,SET(C2+1,MC(C2-28))
10560 IFMD=2,XL=X1+DX*(C1-29):YL=MX(C1-
  29):XR=X1+DX*(C2-29):YR=MX(C2-29):PRI
  NT@960,S1$;:PRINT@960,"L = ("XL","YL"
  )";TAB(32)"R = ("XR","YR")";
10570 IFMD=3,SET(C1+1,IC(C1-28)):IFC1>2
  9,SET(C1-1,IC(C1-30))
10580 IFMD=3,SET(C2-1,IC(C2-30)):IFC2<1
  27,SET(C2+1,IC(C2-28))
10590 IFMD=3,XL=X1+DX*(C1-29):YL=IX(C1-
  29):XR=X1+DX*(C2-29):YR=IX(C2-29):PRI
  NT@960,S1$;:PRINT@960,"L = ("XL","YL"
  )";TAB(32)"R = ("XR","YR")";
10600 IFMD=4ANDER=0,PRINT@960,S1$;:PRIN
  T@960,"INTEGRAL FROM "XL" TO "XR" = "
  IN" +/- 1 6SD";ELSEIFMD=4ANDER=1,PRIN
  T@960,S1$;:PRINT@960,"WILL NOT CONVER
  GE IN"N+1"ITERATIONS. LV=("IN")";
10610 IFMD=5,XL=X1+DX*(C1-29):X=XL:GOSU
  B5000:YL=F:X=XL-DX:GOSUB5000:A=F:X=XL
  +DX:GOSUB5000:B=F:M=B/(2*DX)-A/(2*DX)
  :PRINT@960,S1$;:PRINT@960,"SLOPE @ ("
  XL","YL") = "M;
10620 IFMD=6ANDER=0,PRINT@960,S1$;:PRIN
  T@960,"THE ROOT IS: ";XC" +/- 1 6SD";

10630 IFMD=7ANDER=0,PRINT@960,S1$;:PRIN
  T@960,"SLOPE @ ("XL","YL")="MN" +/- 1
   5SD";ELSEIFMD=7ANDER=1,PRINT@960,S1$
  ;:PRINT@960,"WILL NOT CONVERGE IN"I+1
  "ITERATIONS. LV=("MN")";
10640 IFFC=1,GOSUB11080:GOTO10660
```

```
10650 B$=INKEY$:GOSUB11080:IFB$="",GOTO
  10650
10660 C$=INKEY$:IFC$="H",FC=0
10670 IFMD=4ORMD=6ORMD=7,GOTO10770
10680 IFASC(B$)=10,C1=C1-1:IFC1<29,C1=2
  9:GOTO10880ELSEGOTO 10880
10690 IFASC(B$)=26,B$=CHR$(10):FC=1
10700 IFASC(B$)=91,C1=C1+1:IFC1=C2,C1=C
  1-1:GOTO10930ELSEGOTO10930
10710 IFASC(B$)=27,B$=CHR$(91):FC=1
10720 IFMD=5ORMD=7,GOTO10770
10730 IFASC(B$)=9,C2=C2+1:IFC2>127,C2=1
  27:GOTO11030ELSEGOTO11030GOTO11030
10740 IFASC(B$)=25,B$=CHR$(9):FC=1
10750 IFASC(B$)=8,C2=C2-1:IFC2=C1,C2=C2
  +1:GOTO10980ELSEGOTO10980
10760 IFASC(B$)=24,B$=CHR$(8):FC=1
10770 IFB$="G",X1=X1+(C1-29)*DX:X2=X2-(
  127-C2)*DX:MD=CN:GOTO150
10780 IFB$="I"ANDMD=1:MD=4:GOSUB11120:G
  OTO10510
10790 IFB$="R"AND(MD=4ORMD=5ORMD=6ORMD=
  7),MD=CN:GOTO10510),MD=CN:GOTO10510
10800 IFB$="E",MD=CN:FORI=0TO41:SET(29,
  I):NEXT:FORI=29TO127:SET(I,40):NEXT:R
  ETURN
10810 IFB$="M"ANDMD=1,MD=5:GOTO10510
10820 IFB$="S"ANDMD=1,MD=6:GOSUB11230:G
  OTO10510
10830 IFB$="A"ANDMD=1,MD=7:GOSUB11500:G
  OTO10510
10840 GOTO10640
10850 IFMD=1ORMD=5,SET(C1,YC(C1)):SET(C
  2,YC(C2)):RESET(C1,YC(C1)):RESET(C2,Y
  C(C2))
10860 IFMD=2,SET(C1,MC(C1)):SET(C2,MC(C
  2)):RESET(C2,MC(C2)):RESET(C2,MC(C2))

10870 IFMD=3,SET(C1,IC(C1)):SET(C2,IC(C
  2)):RESET(C2,IC(C2)):RESET(C2,IC(C2))

10880 RESET(C1,40):SET(C1+1,40)
10890 IFMD=1ORMD=5,SET(29,YC(C1-28))
10900 IFMD=2,SET(29,MC(C1-28))
10910 IFMD=3,SET(29,IC(C1-28))
10920 GOTO10510
10930 RESET(C1,40):SET(C1-1,40)
10940 IFMD=1ORMD=5,IFC1>30,SET(29,YC(C1
  -30))
10950 IFMD=2,IFC1>30,SET(29,MC(C1-30))
10960 IFMD=3,IFC1>30,SET(29,IC(C1-30))
10970 GOTO10510
10980 RESET(C2,40):SET(C2+1,40)
10990 IFMD=1,SET(29,YC(C2-28))
11000 IFMD=2,SET(29,MC(C2-28))
11010 IFMD=3,SET(29,IC(C2-28))
11020 GOTO10510
11030 RESET(C2,40):SET(C2-1,40)
11040 IFMD=1,IFC2>30,SET(29,YC(C2-30))
11050 IFMD=2,IFC2>30,SET(29,MC(C2-30))
11060 IFMD=3,IFC2>30,SET(29,IC(C2-30))
11070 GOTO10510
11080 IFMD=1ORMD=5,RESET(C1,YC(C1-29)):
  RESET(C2,YC(C2-29)):SET(C1,YC(C1-29))
  :SET(C2,YC(C2-29)):RESET(29,YC(C1-29)
  ):RESET(29,YC(C2-29))
11090 IFMD=2,SET(C1,MC(C1-29)):SET(C2,M
  C(C2-29)):RESET(C1,MC(C1-29)):RESET(C
  2,MC(C2-29)):RESET(29,MC(C1-29)):RESE
  T(29,MC(C2-29))
11100 IFMD=3,SET(C1,IC(C1-29)):SET(C2,I
  C(C2-29)):RESET(C1,IC(C1-29)):RESET(C
  2,IC(C2-29)):RESET(29,IC(C1-29)):RESE
  T(29,IC(C2-29))
11110 RETURN
11120 N=0:IO=1:HD=2:CA=XL:CB=XR:PRINT@9
  60,S1$;:PRINT@960,"CALCULATING . . ."
  ;
11130 DC=(CB-CA)/HD:CD=0:CE=0
11140 FORI=1TOHD/2:X=CA+(2*I)*DC:GOSUB5
  000:CE=CE+2*F:X=CA+(2*I-1)*DC:GOSUB50
  00:CD=CD+4*F:PRINT@896,I;
11150 B$=INKEY$:IFB$="S",ER=1:RETURN
11160 NEXT
11170 PRINT@991,S2$;:PRINT@992,IO;"("N+
  1")";
11180 X=CA:GOSUB5000:CG=F:X=CB:GOSUB500
  0:CH=F:IN=.333333*DC*(CG+CD+CE-CH)
11190 IFIN=0,ER=0:RETURNELSEIF(ABS(IO-I
  N)/(ABS(IO)+ABS(IN)))<1E-7,ER=0:RETUR
  N
11200 HD=HD*2:IO=IN:N=N+1
11210 IFN>=10,ER=1:RETURN
11220 GOTO 11130
11230 A=FX(C1-29):B=FX(C2-29):IFA*B>=0,
  PRINT@960,S1$;:PRINT@960,"FUNCTION AT
   TWO ENDPOINTS MUST DIFFER IN SIGN, M
  OVE ENDPOINTS.";:ER=1:RETURN
11240 XA=X1+(C1-29)*DX:XB=X1+(C2-29)*DX

11250 X=XA:GOSUB5000:YA=F
11260 XC=(XA+XB)/2
11270 PRINT@960,S1$;:PRINT@960,"APRROXI
  MATING: ";XC;
11280 X=XC:GOSUB5000:YC=F
11290 IFYC=0,GOTO11360
11300 IFYA*YC<0,GOTO11330
11310 XA=XC:YA=YC
11320 GOTO11340
11330 XB=XC
11340 IFABS(XA-XB)<=1E-6,GOTO11360
11350 GOTO11260
```

```
11360 IFXC<1E-7,XC=0:ER=0:RETURNELSEER=
  0:RETURN
11370 DU$="":PRINT@990,S2$;
11380 C$=INKEY$:IFC$="",GOTO11380
11390 IFC$="0"ORC$="+"ORC$="-"ORC$="E"O
  RC$="."ORASC(C$)=13ORASC(C$)=8ORASC(C
  $)=24,GOTO11410
11400 IFVAL(C$)=0,GOTO11380
11410 IFASC(C$)=13,DU=VAL(DU$):RETURN
11420 IFASC(C$)=24,GOTO11440ELSEDU$=DU$
  +C$:PRINT@990,DU$;
11430 IFASC(C$)=8ANDLEN(DU$)>1,DU$=LEFT
  $(DU$,LEN(DU$)-2)
11440 IFASC(C$)=24,DU$="":PRINT@990,S2$
  ;:GOTO11380
11450 GOTO11380
11460 DU=ERR/2+1:IFERL>=5000ANDERL<=100
  00AND(DU=50RDU=60RDU=11),PRINT@960,S1
  $;:PRINT@960,"ERROR/OVERFLOW @ X="X",
  TRY NEW ENDPOINTS";:RESUME180
11470 DU=ERR/2+1:IFERL>=5000ANDERL<=100
  00ANDDU=2,PRINT@960,S1$;:PRINT@960,"S
  YNTAX ERROR IN LINE"ERL"OF FUNCTION";
  :FORI=0TO1000:NEXT:RESUME10
11480 IFERL=11410,PRINT@990,S2$;:PRINT@
  990,"UNACCEPTABLE ENTRY";:FORI=0TO100
  0:NEXT:RESUME11370
11490 DU=ERR/2+1:PRINT@960,S1$;:PRINT@9
  60,"ERROR"DU"HAS OCCURED IN LINE"ERL;
  :FORI=0TO1000:NEXT:RESUME10
11500 MO=1:HD=1:CA=XL:I=0:PRINT@960,S1$
  ;:PRINT@960,"CALCULATING ...";
11510 X=XL:GOSUB5000:YL=F
11520 CB=(XR-XL)/98
11530 PRINT@896,I;:PRINT@992,MO;
11540 B$=INKEY$:IFB$="S",ER=1:RETURN
11550 X=CA-CB/HD:GOSUB5000:CC=F:X=CA+CB
  /HD:GOSUB5000:CD=F
11560 MN=(CD-CC)/(2*CB/HD)
11570 IFMN=0,ER=0:RETURNELSEIFABS((MN-M
  O)/(ABS(MN)+ABS(MO)))<1E-5,ER=0:RETUR
  N
11580 MO=MN:I=I+1:HD=HD*1.05:IFI>=500,E
  R=1:RETURN
11590 GOTO11530
11600 PRINT@960,S1$;:PRINT@960,"ENTER X
  L, LEFT ENDPOINT:";:GOSUB11370
11610 IFDU=X2,PRINT@960,S1$;:PRINT@960,
  "XL=XR (XR="X2"),NOT ACCEPTABLE";:FOR
  I=0TO1000:NEXT:GOTO11600
11620 X1=DU:RETURN
11630 PRINT@960,S1$;:PRINT@960,"ENTER X
  R, RIGHT ENDPOINT:";:GOSUB11370
11640 IFDU=X1,PRINT@960,S1$;:PRINT@960,
  "XR=XL (XL="X1"),NOT ACCEPTABLE";:FOR
  I=0TO1000:NEXT:GOTO11630
11650 X2=DU:RETURN
```

■

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NEWDOS80 users take note! When assigning a string variable in the IMMEDIATE OR COMMAND mode (by direct keyboard entry) and that variable's name begins with an A, D, or E and has a numeric character (0 thru 9) for its second character, you will end up with a "Syntax Error". Also, the variable will not be changed.

NEWDOS80 sees the A, D and E commands as shorthand for AUTO, DELETE and EDIT, respectively. The situation only comes up in the immediate mode and will not happen in a program. Apparat is not sure at this time if a ZAP will be issued to correct version 1.X of NEWDOS80, but version 2.0 should be OK. The explicit BASIC statement LET should never be used in the immediate mode to prevent the above error.

Jerry Latham
Midwest City, OK

Remember that on Model I and III, when you go into BASIC, you are automatically alloted three buffers for disk files. This is space that you could be using for something else if you are not going to have three files open at the same time. However, on Model II you get no buffers unless you ask for them specifically when going into BASIC.

If you do work with files, remember that you can't use a file buffer number higher than the number of files you specified upon entering BASIC.

Using the LINEINPUT versus INPUT statements: the effect on the variable involved is different. If you press the Enter key without any text using the LINEINPUT statement, the variable will be nulled. If you do this with the INPUT statement, the variable will retain its previous value.

Model I and III Scripsit is a great tool with which to edit BASIC programs. Here is another way it can help:

If you need to break up a multi-statement program Line, this is the easiest way to do it. When your BASIC program has been loaded into Scripsit, hit a carriage return at the point you want the original line to end. Then insert the new line number at the beginning of the (now) new line. You may also insert any new lines using regular Scripsit methods. Don't forget to terminate any new program lines with a carriage return, and don't forget to save the program using the S,A filename combination.

Many have requested that we publish the information on how we transmit Color Computer programs to the Model II for printout. Here are the details.

The Color Computer sends out line listings via the RS-232 port to a serial printer like Radio Shack's Line Printer VII or VIII. This serial signal is a standard RS-232 signal which can be routed to the Model I, II, or III. The wiring is as follows:

Model II		Color Computer	
Pin	Signal	Pin	Signal
2	RS232OUT	2	RS232IN
3	RS232IN	4	RS232OUT
6	DSR	1	Carrier Detect
7	Ground	3	Ground
8	Carrier Detect	1	Carrier Detect
20	DTR	1	Carrier Detect

Notes:
1 - Pins 6, 8 and 20 are tied together at the Model II end.
2 - All pin references are at the cable and refer to cable connector pinouts, not at the machine. Close examination of the cable plugs will reveal very tiny numbers stamped into the connector body next to the pin.

The Color Computer Transmits at 600 Baud, 1 Start Bit, 7 Data Bits, 2 Stop Bits, and no parity. To receive this signal correctly, set up the Model II A-channel to these parameters and go into the terminal mode. Open and clear the RAM buffer type LIST on the Color Computer keyboard, and the BASIC program will appear on the Model II screen.

If you receive any error message, double check your wiring connections and don't forget the terminator plug in the B-channel! On occassion, the Model II displays an F in inverse video between normal text. This indicates a parity error was detected and you probably have the wrong parameters set for your A-channel.

If you drop out of terminal mode on the Model II, the Color Computer will continue transmitting the listing until finished as there is no way for it to detect a printer (modem) fault.

After completion of the transmission, take the Model II to the Terminal Menu and save the RAM buffer to disk. Since the Model II Terminal package saves the RAM buffer in ASCII format, BASIC will load it properly unless the program contains lines greater than about 240 characters long. A "Direct Statement in File" error will be generated in these cases. The rest of the program will not be loaded. You will have to go back to the color computer, split the guilty program line and retransmit the whole thing over again.

To Transmit data files, treat them like a sequential file, but send the signal to the printer instead of the tape. Don't forget to open the file in the Color Computer. The resultant disk file (handled the same way as a BASIC program) at the Model II may also be treated as a sequential file.

In the July Notes section, we suggested a number of different routines for double precision handling of certain numbers. If you tried them, you may have found that none worked all the time for the Model II BASIC, especially if you did not want a two decimal place answer. Try the following routine using A# and B# as the two input numbers and C# as their sum. The answer will be in I#:

```
5 CLEAR 1000
100 CLS
110 INPUT "ENTER A#"; A#
120 INPUT "ENTER B#"; B#
130 C# = A# + B#
140 I# = C#
150 I$ = STR$(I#)
160 IF LEN(I$) < 17 THEN 210
170 I2 = INSTR(I$,".") : IF I2=0 THEN I
  2 = LEN(I$) + 1 : I$ = I$ + ".00"
180 I1$ = LEFT$(I$, LEN(I$) - 2)
190 I3 = LEN(I$) - I2
200 IF ABS(VAL(I$) - VAL(I1$)) > 50 * 1
  0^-I3 THEN I# = I# + (VAL(I$) - VAL(I
  1$) - .5*10^-I3)
210 I$ = LEFT$(STR$(I#), 15)
220 I# = VAL(I$)
230 PRINT A#, B#, C#, I#
```

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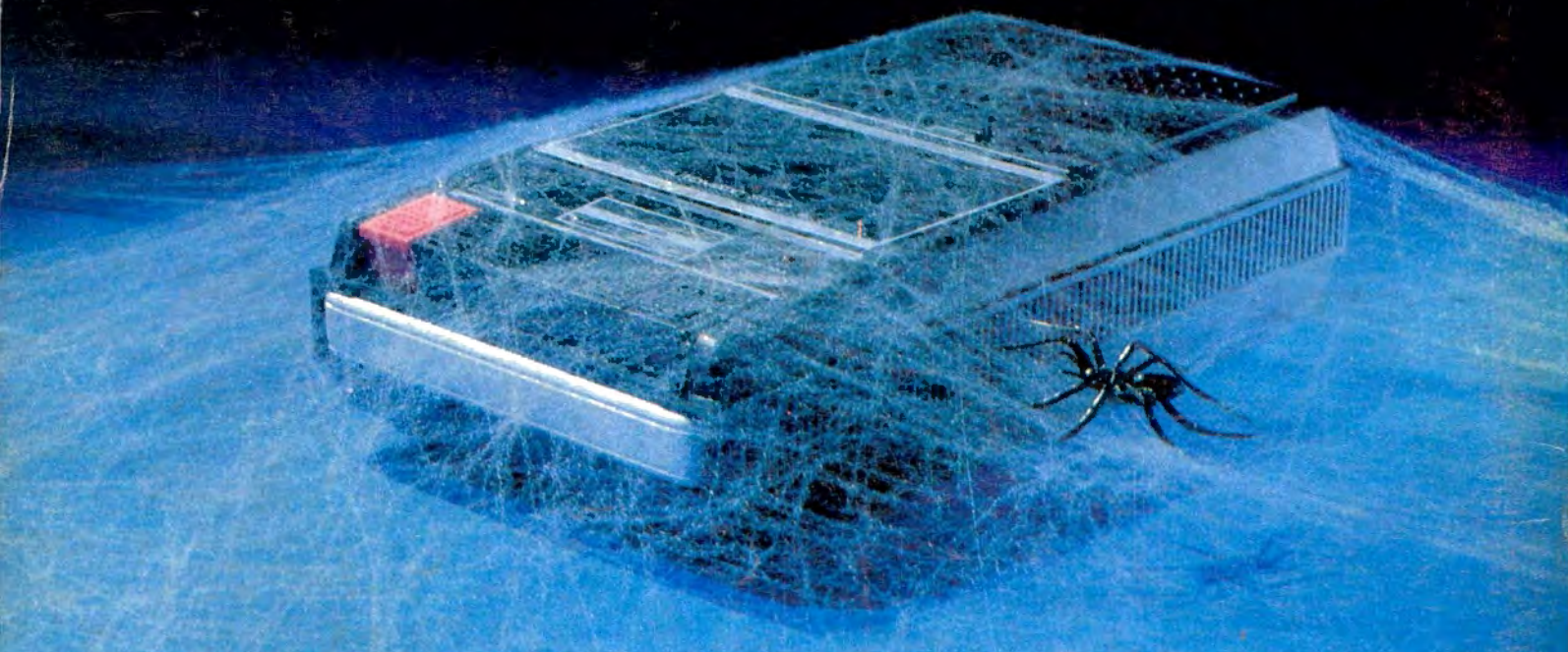

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