80 U.S.

Vol IV No 5 $3 THE TRS·80 USERS JOURNAL Sep/Oct 1981

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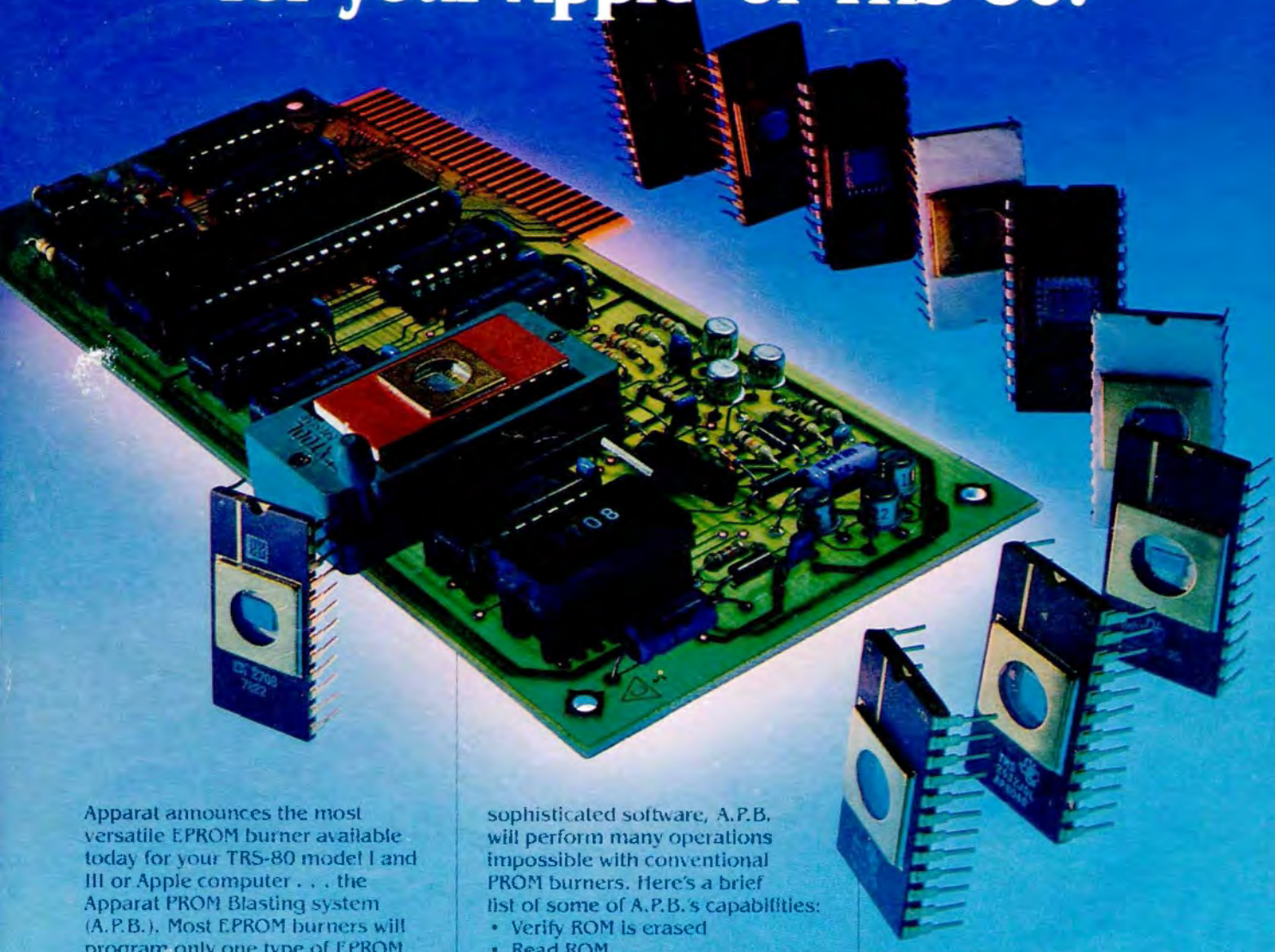

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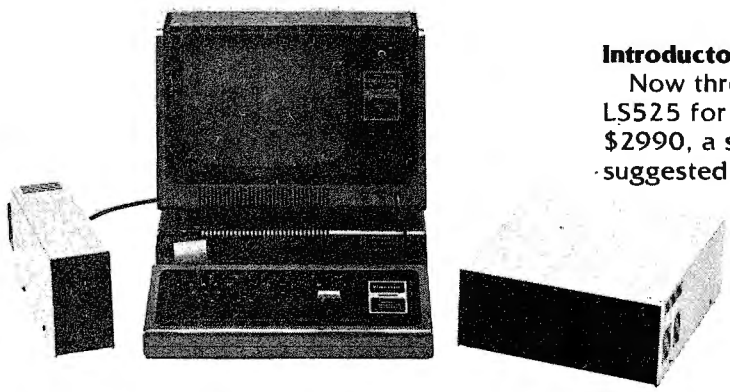

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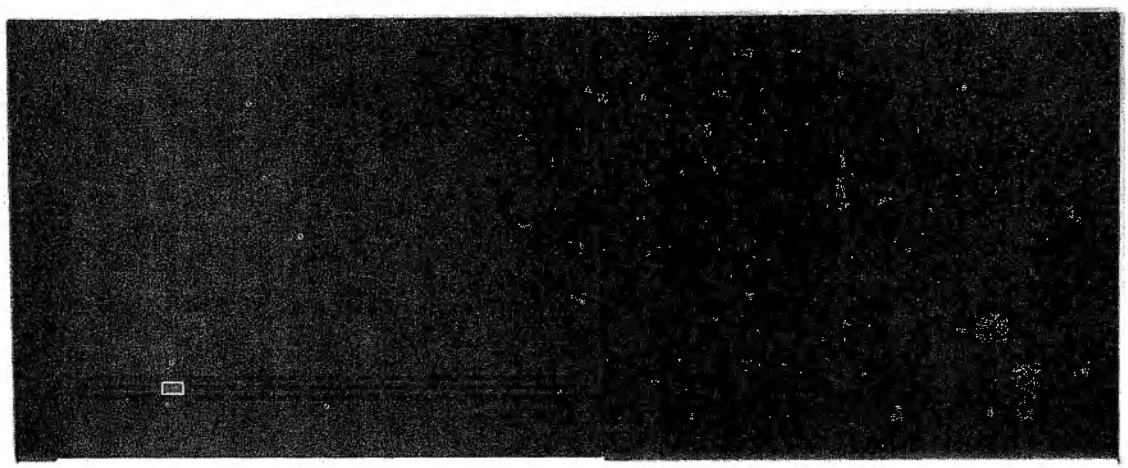

laredo systems inc.

Editorial

This issue marks the beginning of our fourth year as a publication. It's been an interesting three years.

In September 1978, when 80-U.S. first started (it was called 80-N.W. then), there were hundreds of people who had bought into the newest fad, the TRS-80. There was also very little information about how it worked or what to do with it.

At that time, I saw a need for a means of spreading information about the beast. So I gave up what might be called a "semi-lucrative" job as a computer maintenance person and jumped into publishing with both feet. Little did I know!

It started as a "garage operation", and I still have a special feeling for those kinds of people. It takes a certain kind of determination, dedication and just plain guts to let go of what you are doing and start something else - especially when you know next to nothing about what you are getting into.

Well, I did it, and it worked. A few months later Cathy Shapee came to work, and it was a two-person operation for a while.

About a year after it started, we bought an old constuction building and moved in. We also got our own typesetting machine and a light table. It was hot in summer and cold in winter. We had one phone line and it was busy most of the time.

Later, we had Tom Rosenbaum as Technical Editor. That got to be too much for him and when he left Jim Crocker took his place. Tom we don't know about, but Jim left after about a year and is now employed by Microsoft in Bellevue, Washington. We still keep in touch.

We went through a Lynee' and two Cindy's; their efforts were felt in the pages of the Journal, and they are now off doing something else.

Our history, short as it is, is one of continual growth. Considering that we started from absolute zero, it's not half bad.

When I first got into this thing I had visions of myself at the editor's desk, feet propped up on a roll-top desk, green eye-shade in place, and a very old grandfather clock in the corner, ticking very, very slowly. I, presumably, was editing copy for which there was no deadline, and smoking my favorite briar pipe.

Shattered illusions! It's not like that at all. The real world is far better than the fantasy world, even though there are no leisure moments with slowly ticking grandfather clocks.

There is a potential world of TRS-80 owners out there that numbers in the hundreds of thousands (about 400,000 at last count). We have a long way to go, since we now reach only about 20,000 of them. Where are the others? What do they read? Who are they anyway? These are some of the questions we ask daily and try to answer. We don't really want all of them, but we will settle for 90%!

Why not? It takes the same effort on our part to put together an issue for 10,000 as it does for 100,000; they just let the press run a little longer, that's all.

You may have noted that this issue is bigger than any previous issue. This, in spite of the current inflation, is an indication that all is well with us, and our advertisers apparently believe we can deliver. We constantly try to live up to that sort of standard because of our belief that service is the name of the game. We are also showing considerable more color in this issue than ever before. It doesn't cost that much for spot color and it picks up the copy nicely. Our warm spot for garage operations is reflected in our new "micro-mini" ads. If you can say your piece in a two by three inch space, you have a deal with us. Our recently installed reader service should tell you immediately how well you are doing. If it doesn't work, drop it - otherwise, go for a bigger ad. Even though we keep our advertising ratio down to about 40 to 44% of the magazine (check Byte sometime!), our readers have never complained, and ads which change from issue to issue inform the reader as much as our editorial content does.

The decision of going monthly still looms in our future, perhaps a little closer than last year this time, and certainly a question we should address sometime in the next few months. The indicators of the success of such a move are slowly pointing in the right direction. We'll see how it appears shortly.

Mike

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Tegernseer Strasse 18
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Canada

Graymar Data Services
#4-258 East 1st Avenue
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Canada

Printed by
North Plains Press
Aberdeen, South Dakota

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The Cover

Our cover this issue was picked for its splashy color, and the fact that it very remotely ties in with our lead story - computers in industry. The photo was taken in 1957, twenty years before the TRS-80 was even a dream. Milo C Pedersen is the welder (OSHA please excuse us, the man is not wearing gloves!).

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Canada & Mexico: $20 per year, no two or three year subscriptions are offered.
All other: $30 per year via surface mail, $48 per year via airmail. Two and three year subscriptions not offered.

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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Letters

Being a curious person I attempted to make use of the printer test routine in your Jul/Aug 81 issue. When I tried using it several times I became more than a little puzzled by the inconsistent results until I looked a little closer and began considering the TI820 printer I was trying the test on. I thought you might be interested in what I found.

The TI820 is a serial interface printer containing a 1280 character buffer (*very* significant, as it turns out, considering the 1000 character test you employed in each case). It also has complete handshaking ability with the Model II. Another significant factor is that the TI820 buffer can be "loaded" at data rates far in excess of the rated 150 character per second speed the printer itself is rated at. Combining the factor of the buffer and the ability to load it at 9600 baud produced some rather astounding results from your program indicating the printer was consistently running up to 1000 characters per second on all but the forms set.

I have concluded that the printer is happily accepting data from the Model II at the 960 character per second rate and the program sees the whole schmere transfer in about 1 second. At that time since the program doesn't know the printer is trying to catch up, it (the program) goes on to the next test. In the meantime the printer is busily doing its best to empty it's buffer and by that time the Model II is again shipping in more information - at 960 characters per second - with the result that the program continues to be fooled because of the smart printer.

In order to use your program I decided that several things could be done that would permit better timing. They are as follows:

1. Insert a delay before setting the time to zero for each test. I used a simple FOR loop that counted to 5000.

2. The test pattern must contain enough information to guarantee that the data sent to the printer must exceed the ability of the printer buffer to hold data. To accomplish this I simply changed the quantity of printing to a total of 2000 characters for each test and also changed the formulas in statements 660-750 to reflect the situation.

3. The printer must be set for a rate reasonably close, preferably the next higher, to a baud rate that reflects the rated speed of the printer. In the case of the TI820 and the Model II, a baud rate of 2400 was used.

Using these guidelines produced results that were more expected but there were still differences between successive runs. Those differences were not substantial enough to be concerned with.

Another alternative that I tried was to feed information from the Model II to the TI820 at a baud rate less than the rated speed of the printer. As might be expected the printer was able to easily keep up at this rate and ran at or above its rated rate of 120 baud in all but the forms test...

Joseph J O'Loughlin III
Huron, OH

I read with interest and concern the letters from your readers concerning NFL-PIX 80. This letter should help answer the questions many users have voiced.

Let me first express my personal thanks to all those who purchased NFLPIX 80 and to 80-Northwest Publishing for producing and advertising it. You gave it a great kick-off (no pun intended). It was successful beyond my expectations. I hope the users enjoyed it as much as I.

NFL-PIX 80 may, indeed, be updated for the 1981 or another future season. The user must have a limited amount of programming experience, a few free hours, a good schedule of the season and some patience. The update is practical and straightforward.

There are two ways to obtain the 1981 update. I have arranged with Quality Software Distributors of Dallas (QSD) to make available a printed help sheet for NFL-PIX 80 that details the methodology of updating the program. It covers modifications for the Model III. It will be available for the price of $4.00 which includes postage and handling. Their address is: Quality Software Distributors, 11500 Stemmons Expressway, Suite 104, Dallas, TX 75229.

Or, the user may elect to purchase the 1981 version of the program, called PROFOOTBALL-PIX, or PRO-FIX. It is available from Quality Software Distributors, and other distributors of Adventure International products. If the user provides proof of purchase of NFLPIX 80, he will enjoy a discount price for PRO-FIX from Quality Software Distributors.

Thanks again for your support.

James Talley

(Thank you, James. It is one heck of a program, and we enjoyed it too. Good luck on the version for this year. Ed)

The article appearing on page 92 of your May/Jun 81 issue looks very interesting and I think I can find good use for it. However, I have been trying for 15 years to teach my math students that numbers are not written as they will be if the program by George Haller isn't changed.

The word 'and' should only replace the decimal point in a number and should appear nowhere else even when saying the words, i.e., $12,345.67 should be said "twelve thousand three hundred forty five dollars and 67 cents".

Since some programmers may want to shorten the program the best way to do it will be to eliminate all 'ands' except after the units digit of the dollar amount replacing the decimal point.

I really enjoy your magazine and am using the checkwrite program which appeared in the Sep/Oct and Nov/Dec 80 issues. It has been altered some to fit my particular needs but the program works beautifully to keep our household accounts and my husband's business expenses.

Thanks for your many interesting articles.

Sara D Tanner
Visalia, CA

(You are right. In the program, change lines 600 and 640 from LPRINT "AND"; to LPRINT " ";.

Checkwrite has received many good words from readers. We are happy it's working for you. Ed)

This letter is in regard to your Jan/Feb 81 publication, page 118, Patches for Model II, item #3.

I am now using TRSDOS 2.0a for Model II. Using only patches published by TRS-80 Microcomputing News for 2.0a, and adding this patch, I have a problem.

The system seems to handle the new patch well when first applied. However, whenever trying to start or reset the system with the new patch, all-any information given on "Date" is "BAD RESPONSE".

I've had to use my system without this patch. Anyone else have this problem? Anyone else have a solution?

Ron Peterson
Goshen, IN
219-533-7451 evenings
219-533-4161 days
70365,171 CompuServe/Micronet

(Patches (or ZAPs, for that matter) are intended for a particular release of an operating system or program. Any changes between releases, such as TRSDOS 2.0 and 2.0a, can cause the problems you describe. The patch you refer to was for early releases of TRSDOS 2.0 only. Ed)

The Space Marauder program, May/Jun 81 issue, was excellent. With apologies to the author, I feel the following addition gives the player more

see LETTERS, page 6

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TOACC/23

continued from page 4

of a challenge. Add the following to the end of line 700:

:T1=T1+1:PRINT@26,"TIME";T1;

You now have a running time total during play. With each *winning* game, you can now try to better your time.

80-U.S. is a superb publication. My only complaint is - why not monthly rather than bimonthly - Thank you,

Raymond Nehilla
Ambridge, PA

As a relatively new subscriber to your magazine, and an owner of a 779 Centronics printer, I have followed with great interest Larry Panattoni's articles. I have appreciated the wealth of information he has presented.

I am not a newcomer to electronics, having been an electronics technician, ham operator, and project builder for over twenty years.

I just completed the project "Silencing the 779 Printer" presented in your May/Jun 81 issue. The unit works fine, but I am a bit embarrased to say it took me a few hours to trouble shoot the project. My problem was in following the schematic to the letter. No where in the schematic is power applied to IC1, it was only after concluding that I had a bad chip that it hit me that there should be more than three connections to the socket!

May I suggest that you include a correction in your next issue stating that +5 volts should be connected to pin 14 and a ground to pin 7, on IC1?

Further, I was unable to obtain, or to find anyone who had heard of 0.01 uf Tantalum capacitors (C2, C5, C6). I substituted 0.01 disk ceramics, but suspect that 0.1 Tantalums was what was meant to be used.

Despite the frustration I enjoyed the project. Thank you for a fine publication.

Ken Harris
Golden City, MO

(Larry tells us any capacitor type with the correct value (0.01 uf) can be used in place of the Tantalum capacitors described in the article. Ed)

I have recently subscribed to your magazine and have found it quite good. I do a great deal of custom TRS-80 work and have at least one of all the Tandy machines.

I have gotten a number of ideas from your published works. No matter how good you are or think you are, new ideas that are decent always help.

C E Davis Jr
Maitland, FL

HELP! Having recently acquired an MX-80 type II printer for my twin disk 48K TRS-80 I am keen to use the excellent dot matrix capability to produce reproduction quality musical script suitable for school or church use, but the total scope of the project defeats me.

Is there anyone out there with the same need who would be prepared to cooperate in a joint effort to do this? My BASIC is a little above average (I am a fulltime user in another field - yacht design) and my musical knowledge could be said to be the same as my machine language skill, just adequate for the task.

If there are enough starters the effort could be agreeably shared around. So far I have never seen any published material on this topic and any references know to a reader would be appreciated.

Mike Tattersall
Box 14588
Auckland, New Zealand

(Check with users of the Malibu printer, they seem to have had it producing music notes in rather fine detail. We don't see too much from them anymore in the way of ads, but some users may know of the methods they used. Ed)

Leo Christopherson's article on line packing says he has no way of generating error messages or keeping a packed machine language program from crashing.

I think he wants the ERROR and QWHAT routines from Palo Alto Tiny BASIC. They stop the program, print "WHAT?", then print the BASIC line with the question mark embedded where the error occurs. He will want to twiddle them.

These routines can be found in a number of places - inside a Level I TRS-80, in the PCC Reference Book (Li-Chen Wang's most recent version), in Volume 1 of Dr. Dobb's Journal, and in the "Best of Interface Age - Software" volume published by TAB.

They call other Tiny BASIC routines, but I *think* he can substitute calls to Level II ROM and still deep his program alive. The original ERROR and QWHAT routines are called from several places in the original Tiny BASIC, so it's merely a matter of devising the necessary test to get from A to B.

He may want to modify his Line Finder so that he has three classes of lines identified S, D and E for Error.

After he has a crack at it, you may want to ask him for another article.

C J (Mike) Fern, Jr WA6OWJ
Director of Development
Mossman-Pacific, Inc
Covina, CA

(How about it Leo? Ed)

I would like to compliment you on the fine article published in the Mar/Apr 81 issue entitled "Custom Operating System". I, like many others, have owned what I thought was one 35 track and one 40 track drive and suffered with the backup problems it entailed. Finding that I can make disk to disk 40 track copies was a Godsend.

I find the definition of your new daisy wheel printer makes your listings much easier to read, but must make one suggestion. Consider the use of a font that has a back-slashed zero, it makes it much easier to tell an oh from a zero when reading the copy...

Steven P Sherwick
Minnetonka, MN

(We have been, and are continuing to search for a 12-pitch typewheel with a slashed zero. We have the 10-pitch which you describe in your letter, but need the different font due to space considerations. The wheel we use now has a difference between the zero and oh. It is easy to tell the difference: look at a line number to see what the zero looks like, then look at a FOR or GOTO to see what the oh looks like. Ed)

Recently received comments on Jul/Aug 81 issue:

What did you like: *The article by Ira McComic.*

What did you dislike: *That there weren't more articles by Ira McComic.*

What do you want to see? *More articles by Ira McComic.*

Signed: *Ira McComic's mother.*

Your magazine is in error on the prices in several instances. As of today, I no longer consider your magazine accurate as for prices of your advertisers. Today I phoned an order to ... and tried to order ... for $26.95. They told me the price was wrong. The real price is $39.95. I cannot believe these errors are a coincidence any longer. Sincerely,

Ross Bentivegna
Cincinnati, OH

(Did you know that over 99% of all the advertisments in most magazines come to them "camera ready"? That means that the ad is produced somewhere else and is ready for press by the time the magazine gets it. The ads are many times created by an advertising agent who does this sort of work for an advertiser. Sometimes there is a lag in communication between an advertiser and his agent, or between the time an ad is sent for publication and the actual press date. (We don't put the magazine together the day before you get it). There are also cases where the people setting the prices don't really know what they want to say. Sometimes, an overzealous underling takes it upon him or herself to make policy for the boss without getting clearance or approval. Businesses, advertisers, agencies and publishers are all run by people, and people are human, no matter where you find them. Ed)

SOFTWARE PRICE WAR

CSCA is offering its fully integrated user-oriented business and accounting software package at the, until now, unheard of price of $149. Experts have estimated the development costs for a fully integrated software system ranges between $7,200 and $22,000.† When you buy software the developer has to recapture this expense. Computer Services Corporation of America is selling its software with a view that volume sales can almost negate this development cost.

OUR GUARANTEE — Buy both our software and that of our competitors (who will no doubt charge several times our price because they need to recapture their development cost). Compare the two systems and we know you'll return theirs (make sure they'll let you return their software). If you decide not to keep our system, then return it within 45 days for a full refund. Once you've used our system we're confident you'll be delighted.

†Microcomputers for Business, Applications, 1979.

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*The Apple version requires the Microsoft Z80 softcard.

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Circle 60

Items at random

Corrections

In the last issue we made a mistake in the "Rate your printer" article. The Radio Shack line printer V average and ratio were miscalculated (on a calculator, not a computer) and should be 76.8 CPS average and a 48% ratio to rated speed.

We have had numerous letters on this subject. It seems all three computers exhibit a tendency to over-rate a printer with a buffer and so the various tests will have to be adjusted accordingly. If you don't mind wasting paper on a printer test, change the following lines to give an average of 5000 characters per test:

```
110 FOR A =1 TO 50
230 FOR A = 1 TO 250
290 FOR A = 1 TO 125
350 FOR A = 1 TO 62
430 FOR A = 1 TO 13
```

change:

1200/T1 in lines 660 and 670 to: 6000/T1.
1000/ in lines 680 through 730 to: 5000/.
1170/T5 in lines 740 and 750 to 5070/T5.

For Model I and III users, change the following lines to read:

```
100 INPUT "Press (ENTER) when ready to start test";J$
180 CLS:PRINT"Test completed..."
190 INPUT"Enter time to run this test in seconds";T
```

Model I users should use a watch to time the printer test. Time it from when you press the enter key to the last character printed on the test. Record the total seconds. This will also give you accurate times for a printer with a buffer.

Most manufacturers of dot matrix printers rate their units for maximum sustained speed. This is assuming the head is already moving and does not take into account time for paper feed, head startup and stop, or carriage return.

Another item came up when we compared serial and parallel units of the same make and model. It appears that the parallel handshaking of the Model II has a slowing effect on throughput. This may be an area of previously unrealized incompatibility between printer and computer.

Something similar to this existed in the audio world until a couple of years ago. It had to do with cable capacitance betweeen the turntable's cartridge and the amplifier's magnetic input. Top end frequency response was seriously affected. We see a similar situation shaping up in the computer-printer connection.

Correction for the Disk Interfacing Guide

The Model I Disk interfacing guide, by William Barden, published by 80-Northwest Publishing Inc has two errors. They are:

Page 41: In figure 2, Generalized Disk Read Program, all numbers in the left-most column should begin with a 5, i.e., 52C6, 52C9, 52CA etc., and on page 53, in the side by side listing, line number 01140 reads:

50B2 32EF37 01140 DISK06 LD(37EFH),A

should read:

50B2 32EC37 01140 DISK06 LD (37ECH), A

LX-80 and protected disks

Lobo's LX-80 Interface will only work with the LDOS operating system. If you are considering this fine piece of equipment, please be aware that LDOS is compatible with Radio Shack and Microsoft machine language programs. However, the LX-80 will not recognize any other operating system, including self-booting "protected" diskettes.

Our listing format

Some of our readers are not aware of the format for Model I/III BASIC listings which we use. We consistently indent lines two spaces when they wrap around. This is done to offset the wrapped around lines from the line numbers. When these spaces are missing, it indicates that a down-arrow key was pressed at the end of the preceding line. Please be aware of the indent, especially with DATA statements. In some cases the indent has been interpreted to be a separation of data elements.

Model II listings do not contain this indent, nor do the color computer listings. The color computer listings are 32 characters wide and will appear on your screen exactly as they appear in the magazine. To get the listings for the color computer, we transmit them to the Model II in the Terminal mode via LLIST. The Model II then produces the listing after having set the forms width to 32 characters.

All programs as listed in the magazine (with the exception of the pocket computer) are listed from the actual running program. The pocket computer program in this issue was typed into a Model I and Pocket Computer at the same time to maintain accuracy. It's tricky, but it worked, and it's a great program to boot!

Terry says "thanks"

Terry Dettmann conveys his warmest thanks to the many who expressed concern over the health of his son.

This issue

With the coming of the fall season we thought it appropriate to splash some color in this issue. You may note it has increased another 16 pages too. We have selected a whole raft of goodies for you to ponder and play with, and hope you enjoy it. We did.

A lady recently was overheard to say: "Did you know that they sell that TRS-80 in Radio Shacks now?" Really!! We thought *everybody* knew about the TRS-80...

Tell them you saw it in the Journal, and make a nice day!

Mike & Tom

Invest In Yourself

At age 32 **Tom Guldo** climbed down the corporate ladder to become the successful owner of the Chester Inn in Vermont. •

Five years ago, a favorite cheesecake recipe launched San Francisco's Just Desserts. **Eliot Hoffman, Gail Horvath** and **Barbara Radcliff** now run a $2 million, 100 employee bakery offering top quality delights. •

Lee Morgan of Antioch Bookplate in Yellow Springs, Ohio, turned his father's 50 year-old printing company into a fast growing, multi-faceted enterprise. Their sales have doubled every 3 years since 1968. •

Jane Wilson operates the Party Box from a 15' by 30' kitchen in New York City, where she caters huge parties for clients like Bloomingdales, Macy's and Sports Illustrated. •

You Too Can Succeed on Your Own.

If you want to make a living on your own terms... do what you enjoy best, while running a business creatively and profitably, there is good news for you. Like the people above who have left Corporate America behind, you too can invest your time, energy and dollars in new areas of opportunity. And succeed on your own. •

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New products

Micro-Grip

Micro-Grip enables any Epson™ MX-70 or MX-80 printer to feed any friction feed paper, including letterhead, single sheets, preprinted forms and roll paper. Installation is very simple. Using existing mounting points, the Micro-Grip snaps into place in seconds and your existing tractor feed capability remains undisturbed. The Micro-Grip friction feed conversion kit is available for $39.95 (plus $1.50 shipping) from Micro-Grip, Ltd. PO Box 873 Langley AFB, VA 23665

Circle Number 101

Direct Connect Modem

ESI Lynx introduced a new version of its Lynx direct-connect telephone modem for both TRS-80 Model I and III microcomputers at the New York TRS-80 show.

Standard features of the new Lynx include auto-dial and auto-answer functions, originate / answer, programmable word length, parity, number of stop bits and full / half duplex. Also provided are active clear and break keys and "control", programmable I/O porting, and either keyboard-dialing or stored number selection operation.

The new Lynx utilizes no ROM routines, so Radio Shack changes in TRS-80 ROM programming, when they occur, will have no effect on the modem's operation. It connects to either the keyboard or the expansion interface on Model I, and to the 50-pin I/O bus jack on the Model III.

In addition, it can easily be reported to permit simultaneous operation of a serial printer, and can be placed on either side of the Model III unit.

The Lynx package contains all hardware and software needed to get a TRS-80 Model I or III "on line". Included is an instruction manual that lists free bulletin board telephone numbers and describes how to call these and other services, including *Source* and *Compu-Serve*. No tools are needed for installation.

The new Lynx carries a suggested retail price of $299.95. It is currently in stock at computer stores nationwide; details may be obtained by writing ESI LYNX at 123 Locust St., Lancaster, PA, by phoning 717 291-1116 or **Circle Number 102**

New Hard Drive

New World introduced the first 5¼ inch fixed/removable cartridge drive using Winchester technology. While currently designed as an OEM product, the company will sell to individuals interested in supplying the necessary standard +12, +5 volt minifloppy power supply, interfacing controller and software. The fixed/removable combination will fit in the same space occupied by a 5 inch minifloppy as used in Radio Shack equipment.

The proprietary low-mass, multiple-head assembly provides fast access to data. Just 5 milliseconds to shift heads from one cylinder to the next, like changing a complete 40 track minifloppy every 5 milliseconds.

OEM prices start under $500 for the Model 2/0 (2 meg fixed, 0 removable) to under $1200 for the Model 4/4 (4 megs fixed, 4 removable).

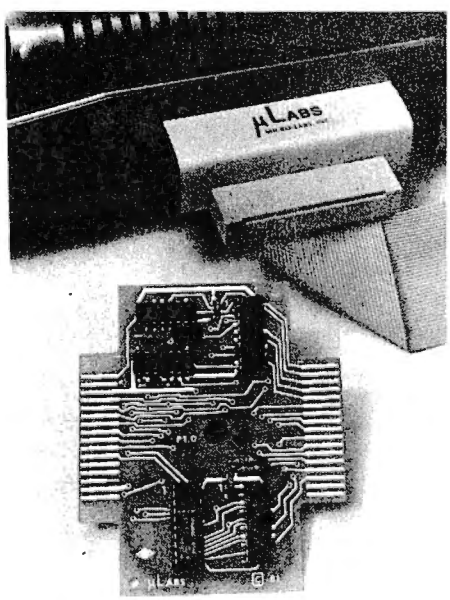
For more information, call or write Philip Haines, New World Computer Co, 3176 Pullman Street #210, Costa Mesa, CA 92626

Circle Number 103

Color Printer Interface

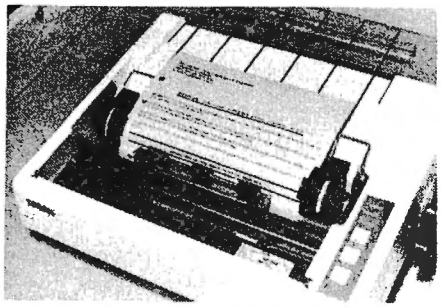
The CPRINT module (photo below) gives your TRS-80 color computer a plug-compatible Centronics type parallel printer port for use with all parallel Radio Shack, Centronics, Epson and similar printers. It is compatible with all versions of the color computer and uses no extra memory. Enclosed in a plastic case, immediately for $49.95 from MicroLabs, Inc., 902 Pinecrest, Richardson, TX 75080

Circle Number 107



Pocket Computer Printer

Radio Shack has introduced a combination Printer/Cassette Interface for the Pocket Computer for $149.95. The interface contains a built-in dot matrix impact printer which uses ordinary roll paper and a replaceable ribbon cartridge. Price of the paper is $1.75 per package of 6. The ribbons sell for $2.75 each. See your local Radio Shack for details.



Friction Feed

Gosub International has introduced a friction feed kit for Epson™ MX-70 and MX-80 printers. This kit is priced at $49.95 and allows the use of single sheet, roll stock, letterhead, business forms, non-tractor labels and personal checks in the printer. It does not affect pin feed use and includes a rack for supporting 8½ inch teletype rolls. For further information contact Gosub International, PO Box 275, Wichita, KS 67201

Circle Number 104

Inexpensive Interface

Interface your TRS-80 to an RS232 printer for less than $2 in parts. A five page booklet provides instructions, schematic, parts list and software driver listing for the TRS-80 user who requires a hardcopy printout via RS-232. The booklet is available for $6.95 from Fobel Enterprises, 552 East El Morado, Ontario, CA 91764

Circle Number 105

DATORG for Model III

Byte Miser Software is announcing that DATORG 2.0 is now available for the TRS-80 16K and up Model III. DATORG is a very flexible and fast file keeping program designed especially for tape based users (See review in Jan/Feb 81 80-U.S. Journal). It features a high speed machine language Shell-Metzner sort (48K in less than a minute), variable length fields, user defined delimiters, machine language search (wild card characters supported), subtotalling for one signed field per record and more. The Model III version allows selectable baud rate I/O (500-1500 baud), and the low speed files are completely compatible with the Model I files. Available from Byte Miser Software, 720 West Haven Blvd., Rocky Mount, NC 27801 for $20 **Circle Number 106**

Free Data Base Information

A new 8-page brochure, produced by Micro Data Base Systems, Inc., invites applications developers and OEMs to compare small computer capabilities of the "MDBS System" for data base management with those of file management systems and other data handling systems. MDBS contends it offers true data base management for small systems; the brochure outlines features which cannot be matched by other data handling systems. It also lists typical MDBS applications, users, etc. Copies may be obtained by contacting Micro Data Base Systems, Inc., Box 248, Lafayette, IN 47902

Circle Number 108

M-ZAL Editor/Assembler

A modular Editor/Assembler for the TRS-80, M-ZAL, is available for the Model I (M-ZAL-T1) and the Model III (M-ZAL-T3). The disk based editor/assembler package includes full screen option menus, full screen text editor, and object module linker. The assembler produces SYSTEM tapes, CMD files, and relocation/external symbol files. The object module linker allows the user to relocate independent program modules and link them together, thus creating larger and more complex programs. Source programs are not limited by memory size and can also be linked together via the assembler's *INCLUDE command. Extensive listing control features are supported, as well as 8 character labels and an alphabetical symbol table and cross reference. The complete package, including comprehensive documentation, is $149 (specify Model I or III) from Computer Applications Unlimited, PO Box 214, Rye, NY 10580

Circle Number 109

Model III Games

Acorn Software Products, Inc., announces the release of its long-awaited entertainment programs for the Model III. The games are supplied on cassette: each program will load on both the Model I and Model III. (Model I/III disk versions coming soon). Acorn Software Products, Inc., 634 North Carolina Ave S E, Washington, DC 20003 **Circle Number 110**

New Light Pen

A self-contained light pen which plugs directly into the TRS-80 Model III has been announced by the 3G Company. This pen makes it possible to bypass the TRS-80 keyboard and interact directly with the information displayed on the video screen. The light pen adds versatility to most graphics programs and makes possible unique games. The entire package sells for $39.95 (Plus $1.50 postage and handling within the US; $6.00 for foreign orders) and is available from the 3G Company, Route 3, Box 28D, Gaston, OR 97119

Circle Number 111

Talk/Tutor™

The Radio Shack Talk/Tutor System presents numbers, upper and lower case text, high resolution pictures recorded by a unique television camera and processor and high quality audio. Only a standard TRS-80 color computer (connected to a TV set) and a single track audio cassette player are required to retrieve lessons prepared with this system. Students interact with the system using the TRS-80 color computer's standard typewriter keyboard or optional joysticks.

Talk/Tutor was developed by Dorsett Educational Systems, Inc., of Norman, Oklahoma, who have licensed it to Radio Shack. According to Lloyd Dorsett, president of the firm, they will supply related video camera control and image processing equipment to Radio Shack's Education Division, which will be used to develop teaching programs for use on the Talk/Tutor System. In addition, under the terms of the agreement, Dorsett will supply Radio Shack with tutorial programs in reading, math and other subjects.

While the video equipment used with this system to develop teaching programs will not be sold as a part of the Radio Shack product line, equipment could be made available to educational publishers under the terms of a sublicense agreement. This agreement would allow educational publishers to develop and sell Talk/Tutor System™ programs for the TRS-80 color computer.

ACCEL2 SPACE TRADEOFFS

Compiled programs run faster than uncompiled programs but they are usually bigger. This is because compiled statements occupy more space than the BASIC source statements they replace. ACCEL2 compiles a selected subset of Level II/Disk BASIC and controls the interpreter to execute uncompiled lines at normal interpreter speed. The uncompiled lines stay exactly the same size and thus do not contribute to code growth at all.

Table below shows the BASIC subset translated by ACCEL2 to machine code. Figures represent the number of extra bytes needed by each instance of the compiled instruction.

	INTEGER	SINGLE	DOUBLE	STRING
Assignment (LET)	5	14	14	14
Array Reference (1-dim)	16	24	25	20
AND or OR	5	14	14	
Compare (< , etc)	11	26	25	10
Add, Subtract, Concat	3	2	2	1
Multiply (*)	5	2	2	
Divide (/)	5	2	2	
Reference to a constant	0	6	10	7
FOR with NEXT	29			
POKE	7	19	19	
SET or RESET	6	18	18	
IF THEN ELSE	15	21	21	21
ON expression GOTO	12	18	18	
Functions				
VARPTR	−3	−9	−9	−9
POINT	3	9	9	
PEEK	0	0	0	
LEN				1
MID$				5
LEFT$				4
RIGHT$				4
CHR$				2
ASC				7
CVI				8
Flow of Control				
GOSUB with RETURN	4			
GOTO	0			
All other BASIC statements and functions	0	0	0	0

The ACCEL2 user may also selectively inhibit compilation of expressions to further minimise code growth. This is controlled by embedding REM NOEXPR and REM EXPR lines in the uncompiled program to bracket performance critical sections. Programs compiled without use of the REM NOEXPR option typically expand to about 1.5–2.5 times the size of the original, but since ACCEL2 strips REM statements from the BASIC program, final size can sometimes be smaller.

ACCEL 2: For 32K TRS-80 Model I (Model III version soon). Compile-time size 5652 bytes, run-time size 1536 bytes, save to ES/F wafer, disk under TRSDOS, NEWDOS, NEWDOS80.
$88.95 + $2.00 shipping

TSAVE: Writes ACCEL2 compiler output to independent SYSTEM tape. $9.95 + $1.00 shipping

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Circle 4

TRS-80, TRSDOS tm Radio Shack Stringy/Floppy tm exatron inc. NEWDOS tm Apparat, Inc

@NEWS

(Stringy Floppy owner's news)

By Jim Perry

Almost everyone has a set routine to start off the day. Different people have different priorities. I 'kick-start' myself with intravenous coffee and a cigarette - but without the mail I'd go back to bed. I am addicted to it. My thanks to everyone who puts pen (or printer) to paper. If you have any ideas, suggestions, comments, problems or nothing better to do, drop me a line at @NEWS, P. O. Box 1681, Upland, California, 91786.

Bill Callahan (from Catonsville, Maryland) commented on his TRS-80 as follows:

> *I think I'm the only guy around that feels like he accomplished almost nothing with his TRS-80. It's strictly a toy, in that I spend a lot of money, but except for my own personal use do little to justify the expense. I rarely play a game, but have loads of fun. I've spent as much as 8 hours in one day (at my machine) . . . but I have made very little progress in really doing any programming.*

In the same mail as the letter from Bill was the following comment from Harry Wegner, from San Luis Obispo, California:

> *I think you should take another look at Stringy owners and their computer skills. Most of the 'Gung Ho' types go from tape to a floppy disk. Maybe I'm wrong, but Stringy owners are mostly too sophisticated to be content with a cassette system - but can't justify the cost of a disk system. We're not too computer sharp!*
>
> *In short, we need a newsletter that holds our hand and leads us through applications - so we learn how to take full advantage of our ESFs.*

So, what do the rest of you want? Explanations, software reviews, fixes, help wanted, programming tricks, commercials, or more of the same mixture as present? Spend 18 cents and let me know.

@LOAD Zero

If you are a registered Stringy Floppy owner you should have received a special present, from Exatron, by now - a complimentary copy of @LOAD Zero. If you haven't received a copy then write or call Exatron and they'll get one off to you poste-haste. @LOAD Zero contains four programs, and comes with lots of documentation. It's Exatron's way of showing you what you'll be getting with a subscription to @LOAD.

Customizing Your TRS-80

By the time you read this a new book from IJG Computer Services will have been published (barring war or earthquake!), *The Custom TRS-80* and Other Mysteries, by Dennis Bathory Kitsz. As well as being an extremely comprehensive guide to software and hardware modifications, it also contains a detailed tour of the Stringy Floppy. Dennis lives in the cold of Vermont, and finds his Stringy much more reliable than his disk system, it even works in the warmth of his refrigerator!

I wish I could give an unbiased review of this excellent book, but I edited it! Of particular interest to Stringy users is a sound generator circuit, with ESF-based software to play 'Oh California' as a demonstration program. *The Custom TRS-80* is available from Exatron, or any IJG dealer, for $29.95 plus sales tax and shipping.

Electric Spreadsheet

Microcomputers can make excellent 'number crunchers', that is if you have the software to crunch the numbers. Electric Spreadsheet is a program by Dan Haney that allows you to perform complex tabular calculations, print the results, and store the information for later use - similar in concept to the popular Program *VisiCalc* (from Personal Software).

Two versions of *Electric Spreadsheet* are available, one for 16K machines the other for 32/48K machines, they are $44.95 and $74.95 respectively. The program comes on a wafer complete with a well-written 52-page indexed manual. Memory does not have to be reserved for the program, as it is a BASIC program. A simple @LOAD1 then RUN is all that is needed.

Calculations can be performed in integer, single precision or double precision - but all calculations must be in the same mode. After being asked to define the precision the number of columns and lines of data are asked for, the default being 4 columns by 14 lines, with 4 columns being the minimum. If the problem defined is too large to be displayed on a single screen *Electric Spreadsheet* can divide it up into separate 'pages'.

The program has four modes of operation:

Startup: Precision and maximum size defined.

Input: Column and line operators, plus data entered.

Output: Calculates the results of problem.

Menu: Input/Output, printing, saving data.

```
INPUT                1981      1982      1983      1984
1LOB START BAL       1000        10         4
2
3
4
5SLD ASSET #1        1000        10         4
6SYD ASSET #2        1000         4
7DBD ASSET #3        1000         4         2
8    CASH FLOW       1000      1200      1400      1600
9CMT COMPOUND           8        10
10TPW PRES WORTH        8        10
11SNK SINK FUND         8         5        10

 OUTPUT          1981      1982      1983      1984
 START BAL                 1000       785       548
 PAYMENTS                   315       315       315
 INTEREST                   100        78        55
 END BAL         1000       785       548       287
 ASSET #1                   225       225       225
 ASSET #2                   400       300       200
 ASSET #3                   500       250       125
 CASH FLOW       1000      1200      1400      1600
 COMPOUND        1000      2300      3930      5923
 PRES WORTH      5679
 SINK FUND        295       295       295       295
```

After entering labels (names) for columns and lines, you perform calculations by specifying 'operators', which call up particular formulas. Operators are specified with a 3 letter code, on the 16K version there are 50 standard codes, with 70 available in the 32/48K version. Available codes in the 16K version are listed below:

ADD - Add consecutive lines.
SUB - Subtract two lines.
MUL - Multiply two lines.
DIV - Divide two lines.
CRT - Column and Row totals.
RET - Retrieve previous line.
ASL - Add selected lines.
ADK - Add a constant to line.
SUK - Subtract constant from line.
MUK - Multiply line by a constant.
DVK - Divide line by a constant.
CPC - Percentage on a column.
ADC - Add columns.
SUC - Subtract columns.
MUC - Multiply columns.
DVC - Divide columns.

Miscellaneous
ACF - Add and carry forward.
CPG - Percent of column to next column.
PCT - Percent of line to next line.
LAB - Label only.
SCF - Add two lines and carry forward.
A1C - Add one column.
S1C - Subtract one column.
M1C - Multiply one column.
D1C - Divide one column.
A1L - Add one line.
R1C - Retrieve one cell of data.
RVS - Reverse sign.
UNL - Underline.
ACL - Add current line to last column.
APL - Add current line, carry previous column.

Mathematical Functions
PIN - Percent increase, year by year.
PIO - PIN with one year delay.
LOG - Natural logarithm.
ESC - Escalate a line.
EXP - E raised to a power.
PWR - Raise line to a power.

Financial Calculations
PWL - Present worth of line.
LON - Payments on a loan.
LOB - Loan balance.
SLD - Straight line depreciation.
SYD - Sum-of-years depreciation.
DBD - Declining balance depreciation.
CMT - Compound amount.
TPW - Total present worth of line.
SNK - Sinking fund.
ROR - Rate of return.

Statistical Calculations
AVG - Average.
SDV - Standard deviation.
HLR - High, low, range.

PROFIT/LOSS EXAMPLE
CALIFORNIA COMPUTER COMPANY
SUNNYVALE CALIFORNIA

	1981	1982	1983
DIVISION A			
SALES A	100.0	110.0	121.0
SALES B		80.0	92.0
HARDWARE SALES	100.0	190.0	213.0
SOFTWARE SALES	40.0	48.0	55.0
TOTAL SALES	140.0	238.0	268.0
MFG COST	61.6	104.7	117.9
SALES COST	22.4	38.1	42.9
TOTAL DIR COST	84.0	142.8	160.8
GEN & ADMIN	10.9	18.6	20.9
TOTAL COST	94.9	161.4	181.7
GROSS PROFIT	45.1	76.6	86.3
TAX	20.3	34.5	38.8
NET PROFIT	24.8	42.1	47.5
PCT NET-SALES	17.7	17.7	17.7
ANNUAL % NET		70.0	12.6
NET IN 1981 $	24.8	38.0	38.5
ANNUAL %-1981 $		53.2	1.4

Because the program is written in BASIC you can add your own specialized codes; in the 16K version you can delete unwanted sections to conserve memory space. The fast cursor movement, and general speed of execution, made me initially think that the *Electric Spreadsheet* was written in machine code - it is an extremely 'tight' and efficiently coded program.

An extremely useful feature is the ability to split-the-screen and scroll between different pages. The 32/48K version can even produce histogram plots of two lines on the screen, with automatic labeling of axes!

All-in-all *Electric Speadsheet* is an extremely useful program with features not even found in *VisiCalc*, and performs according to its specifications.

Saving Programs

Putting BASIC programs onto a wafer is easy, but getting some commercial machine-language programs @SAVEd can cause headaches. William Rogers, from Hickman, California, sent in the following list of programs - complete with their Start addresses, lengths, and Autostart addresses. He can't guarantee that all the numbers are correct (not having all the programs), so try them and see! If you have successfully transfered any other programs to wafer then let me have the details, conversely, if you can't get a program transfered let me know.

While on the subject of converting programs to run on the ESF; Gary Dixon (from Glastonbury, Connecticut) is having problems with the Graphics Editor from the Jan/Feb issue of *80 U.S.*. The program works beautifully, but when running it clobbers the ESF operating system - making @SAVEs or @LOADs impossible - so if anyone has solved this problem let him (and everyone else) know, by writing to @NEWS.

Program	Start	Length	Autostart
Pascal	22592	9996	22592
BASIC 3	17129	5912	17129
RSM	27648	5261	27648
Syscop	17408	630	17408
TRCopy	17152	1583	17152
Copy 2	24576	2885	27447
Tbug	17280	1225	17312
EDTASM (1.2)	17152	6867	18058
EDTASM (1.1)	17152	6872	17152
Level 3	17152	5597	17152
TShort	17136	560	17621
Mon 3	28672	4211	28672
Renum (R/S)	31808	922	31820
Airaid (old)	27624	1246	27624
Airaid (new)	17232	1246	17232
Invade (R/S)	20480	8630	20480
Invade (Level 4)	21760	7429	23310
Electric Pencil	21897	6026	23649
Forth	19200	9516	19200
B17-Low (old)	17384	926	17384
B17-Hi (old)	31536	926	31536

For the Scott Adams Adventures 8.2, set Memory Size? to 22738, then load the program. Next @SAVE #,17152,15614, to run the program @LOAD # then use the SYSTEM command at address /17232. Scott Adams says that they will not Autostart.

Clean Machine

Wee Willy certainly is prolific! In yet another dispatch from his secret programming bunker, somewhere in California, he gave the following tip for cleaning a Stringy capstan.

A quick way to clean the the capstan is to use a wafer and a strip of paper. Wrap the paper strip around the wafer, so that it passes over the cutout area of the pinch roller. Now push the wrapped wafer into the drive and type @LOAD. After a few seconds press the BREAK key, or the RESET button, and pull the wafer out. You'll probably see some blackish material that has rubbed off onto the paper. Clean your capstan once a month like this and you'll prevent any excessive buildup of contamination.

Next Issue

Well I hope you found @NEWS informative and interesting, next time I'll take a look at *Type Right Secretary* and the new *Electric Pencil 2.0*. Don't forget to write!

TUNE-UP YOUR TRS-80

If the thought of using a screwdriver gives you the shivers then you can turn to the software section.

Ever wanted to do things to your TRS-80 that Radio Shack said couldn't be done? How about upper/lower case, reverse video, high-resolution graphics, a high-speed clock, audible keystrokes, an extra keyboard, and a real-time clock? Still not enough? How about using an 8-track as a mass storage device, making music, controlling a synthesiser, monitoring your data bus, and individual reverse characters? All these hardware modifications, plus lots more, are in **The Custom TRS-80** and Other Mysteries, by **Dennis Bathory Kitsz** – the latest book from **IJG Computer Services.**

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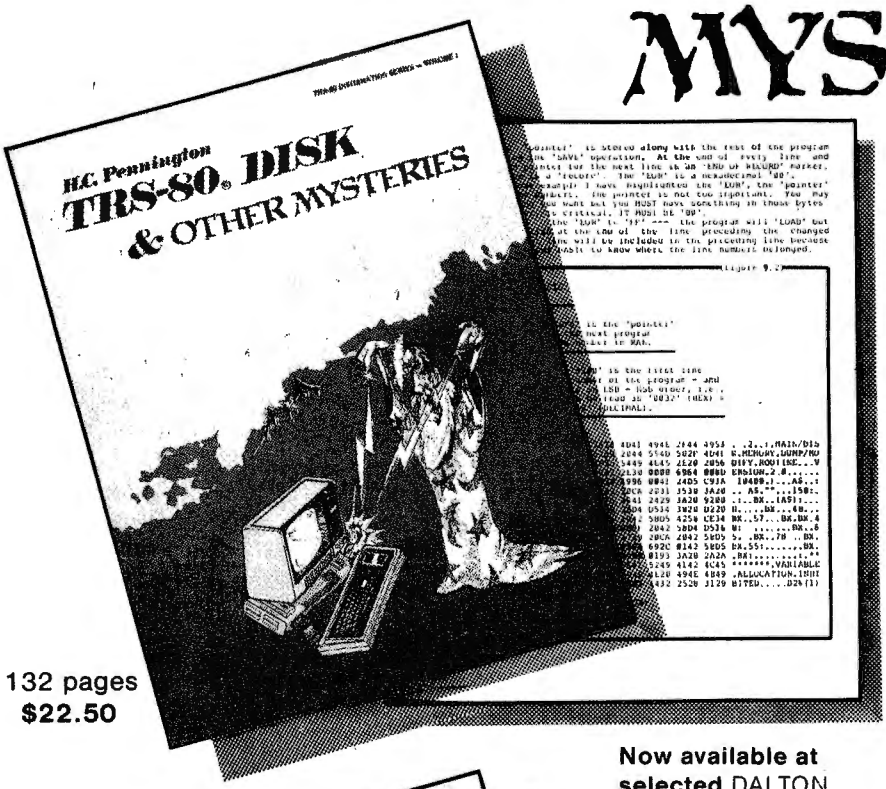

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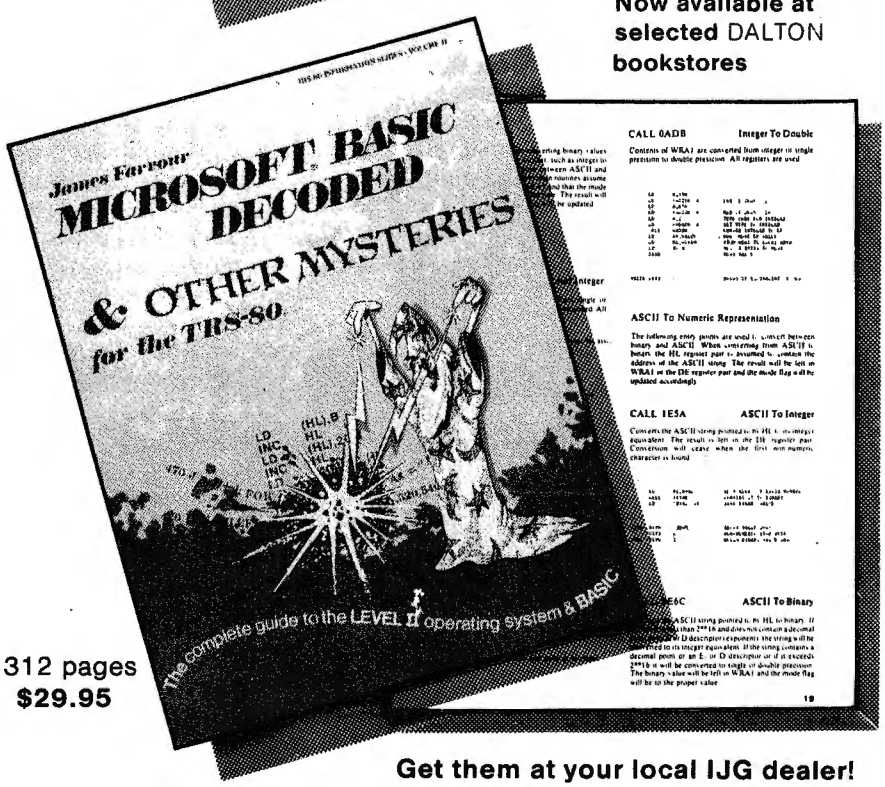

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Circle 92

Cover story

Much more than a toy--

The microcomputer in industry

80-U.S. Staff

Photography by Frederick A Johnsen

As a tool, computers may be used in almost any environment. Some of us play games, others use the computer to study programming and learn how it works, others use them in business for the usual accounting chores.

To answer the question about what else a microcomputer can do, we made a few inquiries around the Seattle area. It didn't take long to unearth some interesting industrial applications. Finding one of them seemed to lead us to another.

Our first stop was at the Engineering office of HiTec, Inc., in Kent, Washington. There, we met with Mr Albert C Saurwein, who satisfies his computing needs with a TRS-80 Level II tape system.

We asked Mr Saurwein how so small a system could do his work.

"Well", he told us, "I only use it for a few generalized equations, but they apply to almost everything I do."

Mr Saurwein is a mechanical engineer, and spends much of his time figuring stress loads on beams of various types. He often works with numerical integration with as many as fifteen variables. Some would take days to do by hand, and would be error-prone. Now, he says he can do the same thing on the Level II 16K in about 3 minutes, which not only saves time, but allows him to do the "what if?" cases.

In one example, he figured the buckling load along every inch of a thirty-foot tapered beam. On paper the equations for this problem took several pages of closely spaced third-order equations. The computer allows him to optimize his design, and he feels the cost of the computer, even though it is used for only one group of math equations, is minimal considering what it does for him.

Even so, he feels he can apply the computer to almost any mechanical system, and intends to as the need arises.

In Tacoma, we met with a representative of a larger firm which manufactures automatic pilot equipment for boats. Starting with almost 100% raw material, they fabricate finished units which include metal castings, electric motors built in-plant, sheet metal and electronic control systems. One of their control systems includes an 8085 microprocessor.

This firm got into the TRS-80 Model I early, back in 1977, when they first became available. They now have several Model I's scattered around the plant, and four of the units are tied into a Corvus hard disk system.

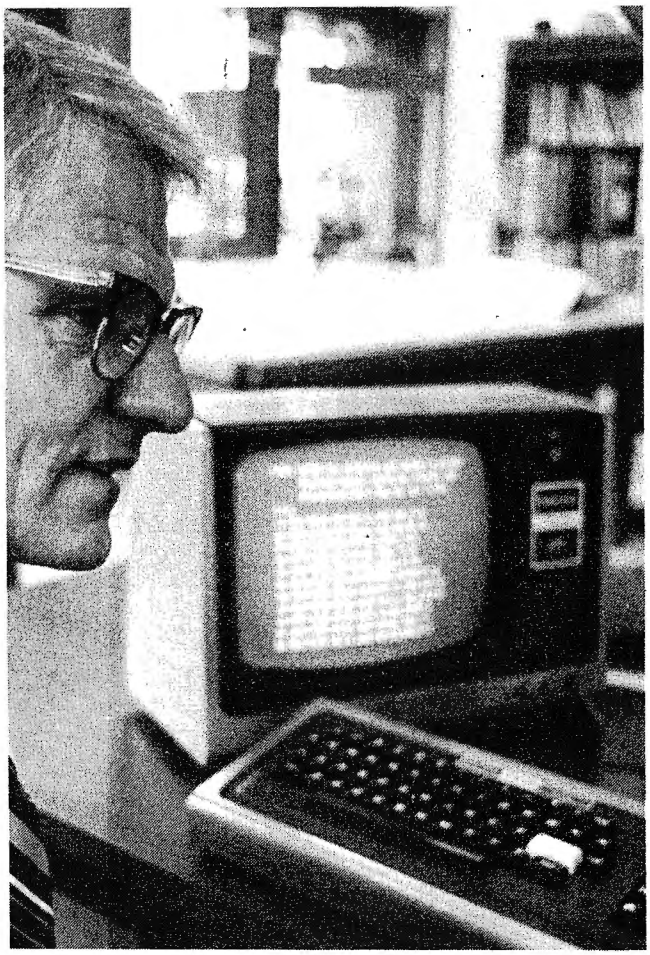
When asked what the main purpose was for these computers, we were told they were running a complete manufacturing inventory system which tracked raw materials coming in and finished units going out.

In addition to doing the usual accounting and payroll, the computer is used in special applications which give a potential customer figures on just how efficiently his boat will operate with this firm's products.

The inventory program, which runs on the Corvus system, contains 4000 items of raw material and almost that many items of saleable parts. This does not include what they call "material in process", which is material in various stages of completion. Each such item gets a different number as more work is done on it, allowing an instant look at progress of work flow. It also allows the tracking of labor costs and additional material costs which go into the item.

The Corvus hard drive used here has a video tape recorder as backup. The hard drive has a ten megabyte capacity, and the video unit can backup 50 megabytes. There are four Model I TRS-80's currently on the hard drive, all of which can be using the hard drive at the same time. Our spokesman claimed there was no degradation of performance except in cases where continuous random access filing was being done.

A demonstration showed that all four Model I's could indeed access the hard disk at what looked like the same time. Actually, about 20 records from one machine were processed, followed by a one second pause. During this pause, one of the other machines did its thing. The controller, located in



Albert C Saurwein, High Technology Products & Engineering, said: "16K is just fine!"

the Corvus unit itself, works on a "round robin" system, giving each machine time as needed. Up to 64 terminals may be connected to the Corvus hard disk.

Did Corvus supply the necessary software for this system?

The answer was yes. Corvus supplies controller firmware for the hard disk, which provides many functions, the round robin (polling) being part of it. The backup system (called the "mirror") is also supplied by Corvus. The backup system on video tape provides archival retrieval, and can be accessed by frame numbers.

What happens when two terminals both access the same record at the same time, one for reading and the other to update?

A feature called "Semaphore" is used to lock the record number to the first machine to access the record. The other machine also tries to lock the record number, but must wait until the first has unlocked.

The Corvus system is capable of supporting other microcomputers, and this firm is planning to add Models III and II. They also have a DEC 11/34 which may be interfaced with the Corvus.

Just how much of microcomputing is in the "playing around" stage, and how much is getting hard results?

Our guide answered this question by saying: "We couldn't get along without it. It turned the TRS-80 Model I from a small business machine - well, let me put it this way - we have within our facility a DEC 11/34 with 28 megabytes of hard disk. The maintenance on that unit is excessive. Once every two to three months we have to have the disk systems serviced, have the whole thing gone through and have it checked out. The Corvus unit sitting right here has over 18,000 hours on it, and has had only two failures. For the cost involved, the micros are much more reliable than the mainframes."

"Not only that", he continued, "but the maintenance on this unit is easier, and there are more terminals than the mainframe unit has. If the Corvus goes down, we're shot, but for the price of them we can afford two, one for backup, and the longest we have been down is about four hours."

It was apparent during the remaining tour of the plant that customer service and product reliability were the crux of their operation. The company, started in about 1934, still had parts for older units on hand. All incoming raw material is checked by quality assurance, and we were told that the rejection rate in some cases ran as high as 60%.

One of the future projects discussed was weighing small parts on a digital scale, and letting the scale feed the number of parts directly to the computer.

"they run a complete manufacturing inventory system, which tracks raw material coming in and finished units going out"

One of the more unique jobs for the Model I in this company is the running of a program they have devised, called the "Rudder Program". Given basic information about a prospective customer's boat, this program will generate a report showing what improvements in steering performance the owner can expect. In some cases they have improved performance of displacement hull boats from one-half to one and a half knots per hour. In boats with planing hulls, speed increased

from 28 knots to 32 knots by reduction of drag and increased steering effeciency. The program takes 34K in a Model I, and puts out about three pages of printout per evaluation. The evaluation tells if the rudder is of adequate size, what efficiency range the vessel is running in, and whether or not the steering system is of adequate size to handle the vessel. It also gives recommendations on how to modify the rudder, improve effeciency and reduce drag and vibration.

Next we took a short drive to Auburn, Washington and visited Mr Elwyn Johnson of Tri-Digital Systems.

Mr Johnson operates a machine shop doing job work on engine lathes, metal milling and other metal machining operations. He is also an OEM distributor for the Tandy microcomputers. He develops software for numerical control of machines and calls this portion of his operation Tri-Digital Electronics. It was the numerical control portion of his operation we were especially interested in.

According to Mr Johnson, their use of computers was originally in accounting for the machine shop and for keeping track of job histories. He also said that job cost programs were of importance, and that he was searching for an adequate program in that area.

"The other thing we use the computer for is a little more technical", he said, "and that's computer assist for numerical control of machine tools".

"The affordable range for most small companies looking for numerical control would be a timesharing situation", he said. He wanted something that would be cheaper and in-house.

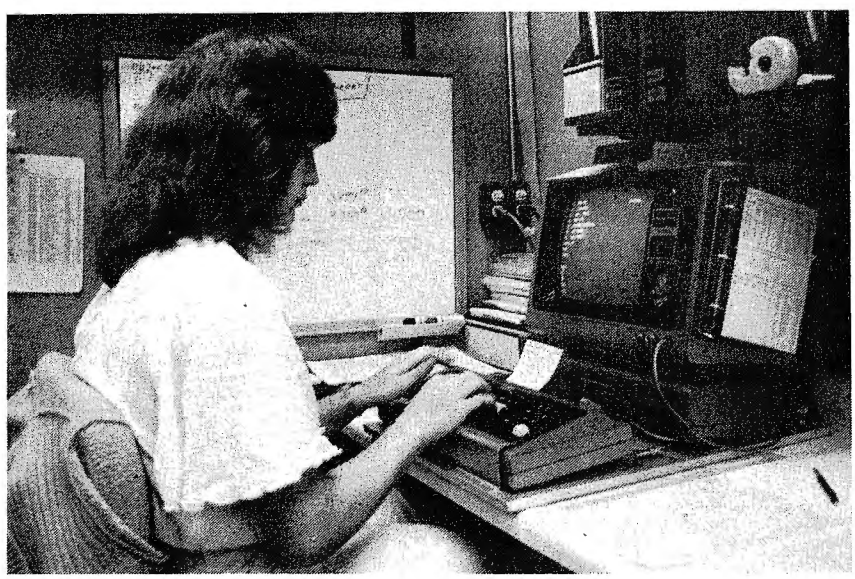
About two years ago, he bought rights to a numerical control program and adapted it to the Tandy II (Model II). The program was written in BASIC, and has since been expanded and written in a combination of FORTRAN and machine language. The program has been expanded and enhanced, and is still being improved upon. Now he has a complete numerical control system that not only does the geometry calculations, but does plotting, post processing and punches paper tape for the machines.

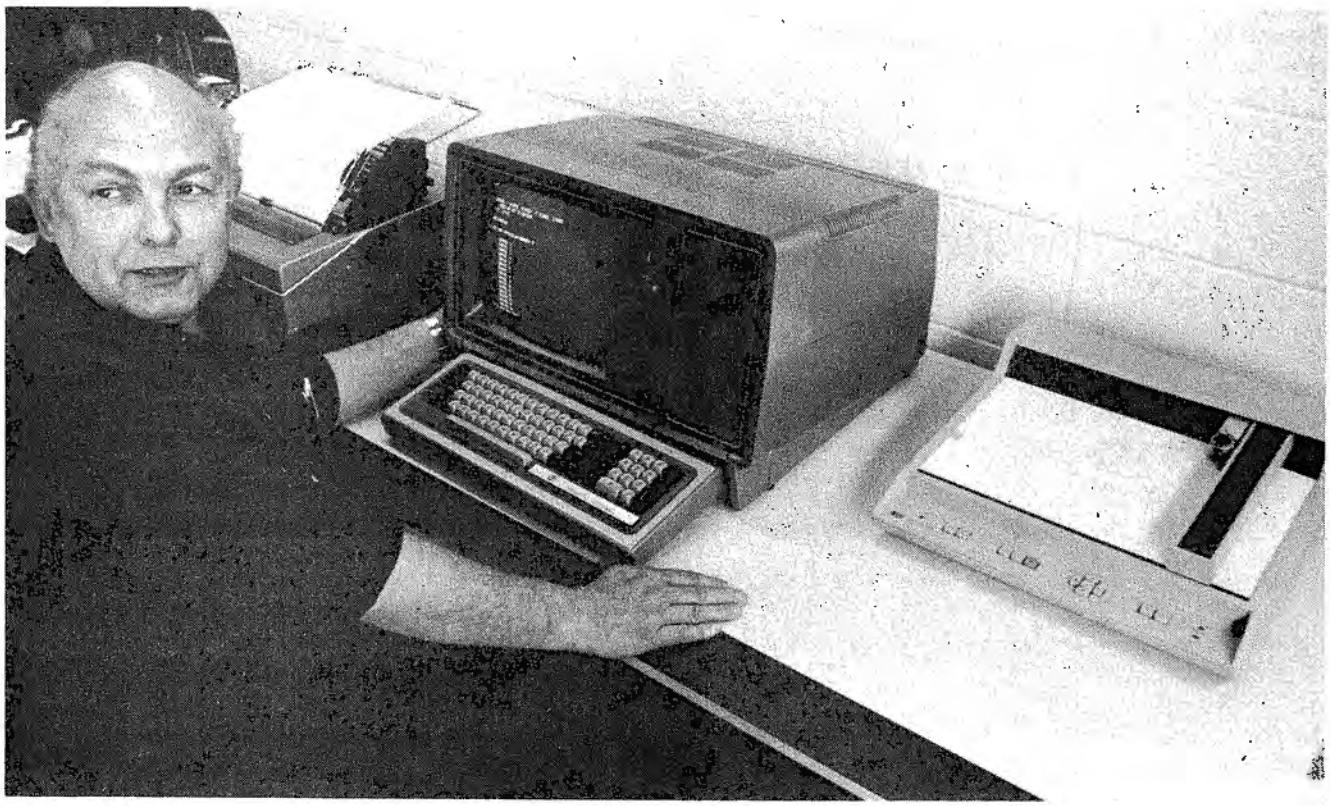
"The affordable range for most small companies looking for numerical control would be a timesharing situation"

"We program the shape of the part to be machined", he told us, "we also have utilities which allow you to duplicate the part in several locations, we can make mirror images with a flip-command, magnify or reduce the size of the part".

The program runs an engine lathe or a milling machine. We observed two such machines set up to be controlled this way. A Bridgeport mill was the

Jayne Smith operates one of four Model I computers interfaced to the Corvus hard drive system.





Elwyn Johnson talked to us while his Tandy II and Hewlett-Packard plotter created figure 1 (below).

easiest to see. An electronics control box was added to the upper right of the machine. Electric motors had replaced the usual hand cranks which control the three axes of the milling table. The electronics box on this unit contains memory, and so the tool control path program is fed directly from the Model II via RS232 to this memory. The operator of the machine may over-ride the computer with his own instructions, and if these instructions are to become permanent, the program may be loaded back into the Model II for future use.

Sample tool path for an aircraft door latch. The dashed lines represent rough-cuts; the solid line the finish cut. The line extending to the left is the "home position" for the tool.

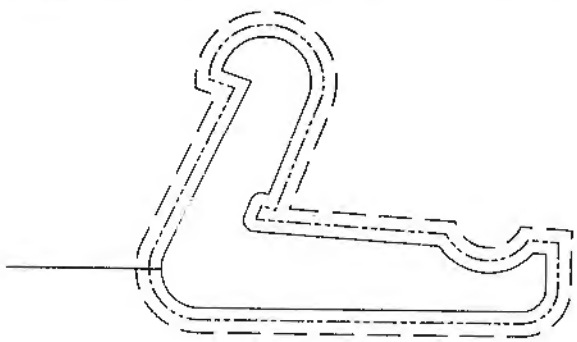


Figure 1

In another part of the shop we were shown a Tandy II which was interfaced to a Hewlett-Packard Model 7225 8 × 11 inch plotter. The plotter is used to check a tool path prior to committing a tool bit to metal. Figure 1 shows a sample of this plotter's output. It represents a plane view of a door latch for an aircraft.

This computer also was interfaced to a printer for listing purposes and a paper tape punch. The punch creates an eight-level code which can be read into the controller on an engine lathe or mill.

Did the program take into account hogging off large amounts of metal to rough-out a part, and does it account for fine finishing cuts?

"Not at the present time", was the answer. "We plan to include that in a future version. Finishing cuts can now be done quite easily using our cutter compensation, when we get down to size we use a cutter that's 20 to 30 thousands larger, which allows us to have finish stock. Then we come back and take another pass. We are able to handle that portion of it."

"Pocketing (as in a milling operation) will also come in the next version of the program, as will the ability to describe the shape of the raw material and the shape of the finished part and let the computer do it all", he promised.

The Hewlett-Packard plotter interface was programmed in-house. It operates from one of the two RS-232 ports on the Model II.

"One problem we have with this piece of hardware", Mr Johnson said, "is that there are only two RS-232 ports, and we have need for several."

Plotted machine tool paths and mechanical drawings are becoming more common these days, according to Mr Johnson.

"The days of Flossy and Bossy are gone ... these days it's strictly business"

Tri-Digital has two Model III, and one Model V line printers. They are satisfied with the performance of these units and the Tandy II computer. They have had no problems, even though Mr Johnson has been using the TRS-80 since late 1977. He attributes much of the new technology to this country's space program, and wondered why such a program was cut off when it was producing so much for so little. We agreed.

A few days later, we talked to Mr Glenn Vanden Bosch. Glenn operates a company called "Dairy Herd Management Services". This company, like TriDigital Electronics, is a spin-off of another company. In Glenn's case it grew out of his dairy contracting business.

Glenn jokingly refers to his program as "the cow program", even though there is more to it than that. His programs provide complete records and computations for dairy herds. He showed us one of his files which contained the records for 1000 cows. It was all contained on a one-drive Model II TRS-80. The programs track each cow and keeps records on breeding date, lactation periods, milk produced and other data important to the dairyman. Visits by the veterinarian can be scheduled for specific parts of the herd, and histories for each animal to be checked can be made available easily.

"The days of Flossy and Bossy are gone", said Glenn, "these days it's strictly business".

"When there were only a couple of dozen cows to be taken care of you simply called them by some pet name", Glenn told us. "Now they all have a number and the amount of milk produced is weighed. When they no longer produce, it's off to the land of hamburgers and soup bones".

A lactation period is the period of time from when the cow first begins to produce milk to the next time she is bred and starts giving milk again. Normally, cows in their second and later lactation periods give more milk than in their first. The program tracks the number of pounds of milk produced, as well as the butterfat content. A good producing cow will provide up to 20,000 pounds of milk per year, with the average being between 16,000 and 18,000 pounds. Butterfat content of 5% is considered good. Glenn cited an example of a "dud" (low-producer), as one who produced only 5400 pounds of milk per year and had 3.5% butterfat.

With the programs, the dairyman can look at the history of such cows and make intelligent decisions. In the case of the non-producer he may decide to breed the cow once more, primarily for the calf, and then if the cow doesn't produce he can sell the animal for slaughter. The program computes averages against like animals.

Glenn's program is compatible with those of the Dairy Herd Improvement Association (DHIA). The reason for using his programs he says, is that the information is immediately available and is considerably more accurate. DHIA provides data in a little over three weeks, while Glenn says his data is available in less than three days.

The more we looked into computers in other than accounting areas, the more we found. Radio Station KMO has a Model II set up for complete station logkeeping. Another gentleman who we could not track down, was said to be controlling a seam welder with a Model I. Another Model I is reportedly being used at Seattle's Kingdome for instant statistics at ball games.

Computers are no longer in the "gadget" class, they are being used for control, better and faster decision making and wherever they can make a profit for their owners.

Our thanks to the following for making their operations available to us:

High Technology Products & Engineering, Mr A C Saurwein, 21620 84th South, Kent, WA 98031 (206) 872-8744

Tri-Digital Electronics, Mr Elwyn Johnson, 2530 E Street NE, Auburn, WA 98002 (206) 833-2523

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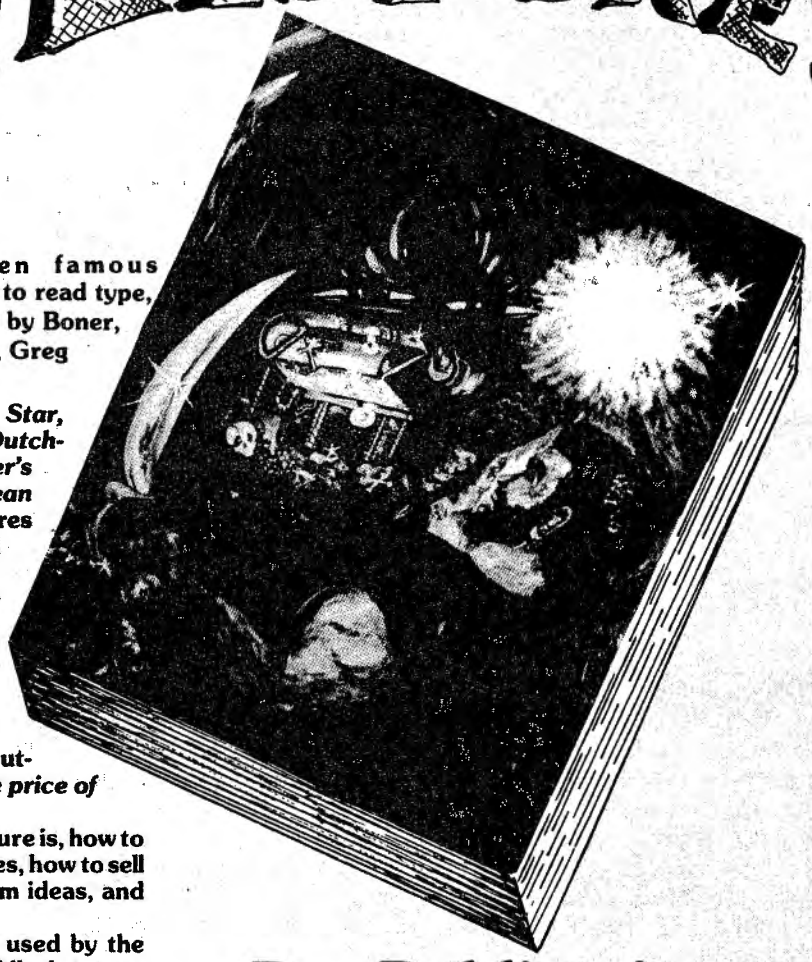

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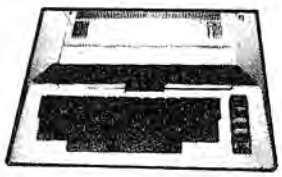

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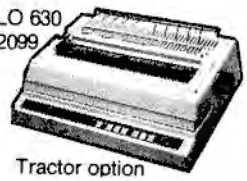

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Feature program

Keyword

For Models I, II or III with disk; Models I, III or color computer with tape.

Jim Peyton, Georgetown, Kentucky

A database with keyword search...

Keyword is essentially a poor man's Versafile. It runs on any of the current TRS-80 computers with the exception of the Pocket Computer and Level I. It can be adapted to the Stringy Floppy or any of the high-speed tape systems such as the B-17 system. Disk and tape versions for the Model I and III are included. Model II and color computer users need to perform several modifications before use.

As you can see by the listings, the code for Keyword is considerably shorter than Versafile; hence, it doesn't support all the features of the latter. On the other hand, Keyword will prove quite adequate for a great number of tasks which call for unstructured records and a key word search. It even boasts some features which Versafile does not have.

Keyword will accept a record as long as your memory! Well, not really. But Keyword does allow you to continue an entry into the next successive record or records and will return all records in the series if selected. The selection takes place when a key word or phrase is found in any of the records.

How does Keyword work?

Run the disk version and you are immediately prompted to enter the name of the data file which you want Keyword to access. Non-disk users are prompted to load a cassette file. This feature allows you to access more than one file from Keyword, which means you can have several files of different subjects on the same disk. Don't worry if you do not have a data file the first time you run Keyword. It will be created, using the file name you give it.

Once the file name is entered, Keyword displays an "Entry" prompt and draws a line for your entry. Your record is entered in sentence structure and terminated with a period. When you press the ENTER key, the screen will be cleared for your next entry. Should you run out of space before you complete your entry, terminate it with a colon, or semi-colon in the tape version, and continue. Your previous material is retained on the screen for reference. The final record in the series must be terminated with a period. Try the following once you have the program up and running:

Enter:

THE WORLD'S TALLEST MOUNTAIN IS MT. MOLEHILL. (ENTER)

NOW IS THE TIME: (ENTER)

FOR ALL GOOD MEN: (ENTER)

TO COME TO THE AID: (ENTER)

OF THEIR COUNTRY. (ENTER)

Searching the Data Base

To search your data base, type in your key word or phrase, terminate it with a question mark, and press the ENTER key. The INSTR function is used to scan the data base for occurrences of your word or phrase. It will print out the record or records in which it appears. The search is global only.

To try Keyword, type the phrase TALLEST MOUNTAIN? and press the ENTER key. The first entry with TALLEST MOUNTAIN in it will be returned along with all others containing the same two words in that order. TALLEST, MOUNTAIN, or MOUNT would have produced the same response with this limited data base. The more specific you are in your query, the less extraneous will be the returning response. However, your query must be matched exactly in the data base for a response.

If you type COUNTRY? and press the ENTER key, the four parts of the statement will be returned even though they were entered separately. You will get the same response with TIME?, MEN?, AID?, or any other word or phrase which occurs in this series of records. Effectively, you have unlimited record lengths!

To see the whole data base, just type the question mark and press the ENTER key. Everything is sent to the screen.

Deleting with the Delete/Edit Feature

The Delete/Edit feature is called by the asterisk. Instead of terminating your key word or phrase with a question mark, use an asterisk (*) and press the ENTER key. The data base will be scanned and the first occurrence will be displayed. You will be prompted if you wish to delete it. If you respond with a yes, answer (Y), the record will be set to null (cleared) and you will be returned to your "Entry" prompt. A no (N) response here returns you to the "Entry" prompt. Pressing the ENTER key by itself will cause Keyword to search for and display the next occurrence. Any other response to the deletion question will bring up the edit prompt which will be explained later.

Exploring the Edit Feature

Now enter MOLEHILL*. The phrase, THE WORLD'S TALLEST MOUNTAIN IS MT. MOLEHILL, will appear on the screen with the prompt DELETE (Y/N)? on the screen. Enter an "E" and press the ENTER key. Now to the prompt, CHANGE (Y/N)? enter a "Y" and press the ENTER key. The next prompt will be WORD OR PHRASE TO BE CHANGED? We want to expand the abbreviation, "MT." to "MOUNT". Enter MT. (ENTER), and when the prompt, CHANGE TO? appears, enter MOUNT (ENTER). The record is now changed in the data base and reprinted to the screen. Pressing the enter key will now return you to the "Entry" prompt.

The edit feature also allows you to delete part of the record. Fetch the same record again by entering TALLEST*. When the DELETE (Y/N)? question comes up hit the ENTER key. Answer yes ("Y") to the CHANGE? question. When the WORD OR PHRASE TO BE CHANGED? prompt

appears, enter WORLD'S. Answer the CHANGE TO? prompt by just hitting the ENTER key. The edited record now reads THE TALLEST MOUNTAIN IS MOUNT MOLEHILL.

Want to insert material into a record? Go back to the "Entry" prompt, fetch the record, and go to the WORD OR PHRASE TO BE CHANGED? prompt. Answer MOUNTAIN. To CHANGE TO?, answer MOUNTAIN IN THE WORLD. Now you know how to insert material.

You will have noted that the edit feature is word based rather than character based. To change part of a word, you have to change the whole word. While this is not as handy as BASIC's line editor, it is a bushel better than having to delete the whole record and re-enter it, as you must with the commercial program of this type.

Ending the Session

To end a session, get to the "Entry" prompt and just press the ENTER key. Keyword checks to see if any records have been added, deleted or edited. If so, the revised data base is dumped to the disk or tape.

Keyword Versions

Three listings are supplied with this article. The first two are for the Model I/III, disk and tape, respectively. The Model II uses a modified version of the disk listing.

The third listing is the tape version for Extended color BASIC. Be aware of the special spacing in the FOR ... NEXT loops. Spaces must be included when variables are used in place of constants in the FOR statement.

Keyword for the Model II

The modifications of the Model I/III disk version for the Model II are as follows:

Line 50 - change both PRINTTAB's to (34)
Line 60 - change PRINTTAB to (15)
Line 70 - change PRINTTAB to (21)
Line 80 - change STRING$'s to (79,95) and (79,252)
Line 90 - change PRINT@ to (160) and CHR$ to (24)
Line 410 - change 2nd PRINT to PRINTTAB(22)
Line 420 - change 2nd PRINT to PRINTTAB(28)
Line 430 - change 2nd PRINT to PRINTTAB(24)

The Tape Version

The Keyword version for the tape takes on some limitations. Since Level II and Extended color BASIC do not support LINEINPUT, commas and colons may not be used within a record and a colon will not work as a terminator. Neither is the INSTR function supported, so this operation must be programmed and results in a slightly longer execution time.

A Final Note

Keyword operates with the data file in memory. This is both an asset (it's fast) and a liability (the size of the data file is limited by the size of your memory). This version is dimensioned for 100 records. With a 32K Model I system, this accommodates an average record length of about 200 bytes. With a smaller average record length the number of records may be increased. You will need to reserve adequate string space to handle these.

The CLEAR (MEM-800) in line 10 works fine on Model II and any Model I or III system except 48K. For some reason, the designers have decreed that the CLEAR function on these machines would only handle a positive integer up to 32767. So if you have a 48K Model I or III, set the CLEAR accordingly. Otherwise, you will get an overflow error.

TRS-80 computers (Model I, III or Color) with only 4K will be able to operate this program on a very small scale. You will have to experiment with various sized arrays to come up with a practical number.

```
1 '**   K E Y W O R D   **
        (DISK  VERSION)
2 '      BY JIM PEYTON
            ROUTE 2
         GEORGETOWN,  KY

        VARIABLE  TABLE
3 '   A$(ARRAY) = DATA RECORDS
      A$ = USER ENTRY
4 '   B$ = OLD STRING (EDIT)
      C$ = NEW STRING (EDIT)
5 '   E$ = BYTE BEFORE B$ (EDIT)
      F$ = BYTE FOLLOWING B$ (EDIT)
6 '   N$ = DATA FILENAME
      Y$ = RESPONSE TO (Y/N)
7 '   A = INSTR RETURN
      B = PUNCTUATION FLAG (E$)
8 '   C = PUNCTUATION FLAG (F$)
      D = DATA ALTERED FLAG
9 '   F = KEYWORD FOUND FLAG
      I,J,K,N = COUNTERS

10 CLS:CLEAR0:CLEAR(MEM-800):DIMA$(100)
  :DEFINTF,I,N,D,A,K
19 ' LOAD DATA FILE IF IT EXISTS
20 INPUT"DATA FILENAME";N$:CLS:IFN$=""T
  HEN20
30 ONERRORGOTO400:OPEN"I",1,N$
40 N=N+1:LINEINPUT#1,A$(N):IFEOF(1)THEN
  CLOSEELSE40
49 ' INPUT DATA, QUERY OR DELETE/EDIT
50 CLS:PRINTTAB(24)"K E Y W O R D":PRIN
  TTAB(24)"= = = = = = =
60 PRINTTAB(4)"ENTRY ENDINGS: <.>=STORE
    <?>=SEARCH <*>=DELETE/EDIT
70 PRINTTAB(11)"( TO CONTINUE AN ENTRY
  END WITH <:> )
```

```
80 PRINT:PRINT">"STRING$(62,95)STRING$(
  62,24);:LINEINPUTA$
90 IFRIGHT$(A$,1)<>":"THENPRINT@128,CHR
  $(31);
100 IFA$=""THEN440ELSEIFRIGHT$(A$,1)="?
  "THEN150
110 IFRIGHT$(A$,1)="*"THEN230
120 IFRIGHT$(A$,1)<>"."ANDRIGHT$(A$,1)<
  >":"THEN430
130 IFRIGHT$(A$,1)=":"THENN=N+1:A$(N)=A
  $:D=1:GOTO80
140 N=N+1:A$(N)=A$:D=1:GOTO50
149 ' SEARCH & PRINT
150 F=0:A$=LEFT$(A$,LEN(A$)-1):FORI=1TO
  N
160 IFINSTR(A$(I),A$)>0THENA=1
170 IFRIGHT$(A$(I),1)=":"THENJ=J+1:GOTO
  220
180 IFA=0THENJ=0:GOTO220ELSEFORK=I-JTOI

190 IFRIGHT$(A$(K),1)<>":"THEN210
200 PRINTLEFT$(A$(K),LEN(A$(K))-1)+" ";
  :NEXTK
210 PRINTA$(K):NEXTK:A=0:J=0:F=1
220 NEXTI:IFF=0THEN410ELSE420
229 ' SEARCH & DELETE/EDIT
230 A$=LEFT$(A$,LEN(A$)-1):FORI=1TON:A=
  INSTR(A$(I),A$)
240 IFA>0THENPRINTA$(I)ELSE390
250 Y$="":INPUT"DELETE (Y/N)";Y$:IFY$="
  Y"THENA$(I)="":D=1:GOTO390:ELSEIFY$="
  N"THEN50ELSEIFLEN(Y$)=0THEN390
259 ' EDIT ROUTINE
260 Y$="":INPUT"CHANGE (Y/N)";Y$:IFY$="
  N"THEN390ELSEIFY$=""THENA=1:I=I+1:GOT
  O240ELSEIFY$="Y"THEND=1:GOTO270ELSE26
  0
270 LINEINPUT"WORD OR PHRASE TO BE CHAN
  GED: ";B$:C$="":LINEINPUT"CHANGE TO (
  HIT ENTER TO DELETE): ";C$
280 A=INSTR(A$(I),B$):IFA>1THENE$=MID$(
  A$(I),A-1,1)
290 F$=MID$(A$(I),A+LEN(B$),1)
300 B=0:IFE$="."ORE$=","ORE$="?"ORE$=";
  "ORE$="!"ORE$=":"THENB=1
310 C=0:IFF$="."ORF$=","ORF$="?"ORF$=";
  "ORF$="!"ORF$=":"THENC=1
320 IFA=1ANDC=1ORB=1ANDC=1THEN360ELSEIF
  A=1ORB=1THENB$=B$+" ":GOTO340
330 IFC=1THENB$=" "+B$:GOTO340ELSEB$="
  "+B$+" ":GOTO340
340 IFC$=""ANDA=1ORC$=""ANDB=1ANDC=1ORC
  $=""ANDC=1THENC$="":GOTO360ELSEIFC$="
  "THENC$=" ":GOTO360
350 IFA=1ORB=1THENC$=C$+" "ELSEIFC=1THE
  NC$=" "+C$ELSEC$=" "+C$+" "
360 A=INSTR(A$(I),B$):IFA=0THEN380
370 A$(I)=LEFT$(A$(I),A-1)+C$+RIGHT$(A$
  (I),LEN(A$(I))-LEN(B$)-A+1)
380 PRINTA$(I):LINEINPUT"TO CONTINUE PR
  ESS ENTER";Y$
390 NEXT:GOTO50
399 ' ERROR HANDLING
400 IFERL=440THENRESUME470ELSERESUME50
410 PRINT:PRINT"I DON'T KNOW NOTHING AB
  OUT NO "A$
420 PRINT:LINEINPUT"TO CONTINUE PRESS E
  NTER";Y$:GOTO50
430 PRINT:PRINT"END ENTRY WITH <.>, <:>
  , <?> OR <*>!":GOTO420
439 ' CHECK FOR EMPTY FILE
440 FORI=1TON:IFA$(I)<>""THEN450ELSENEX
  T:KILLN$:GOTO470
449 ' IF DATA BASE ALTERED, PRINT TO FI
  LE
450 IFD=0THEN470ELSEOPEN"O",1,N$:FORI=1
  TON
460 IFA$(I)=""THENNEXTELSEPRINT#1,A$(I)
  :NEXT
470 CLOSE:CLEAR100
```

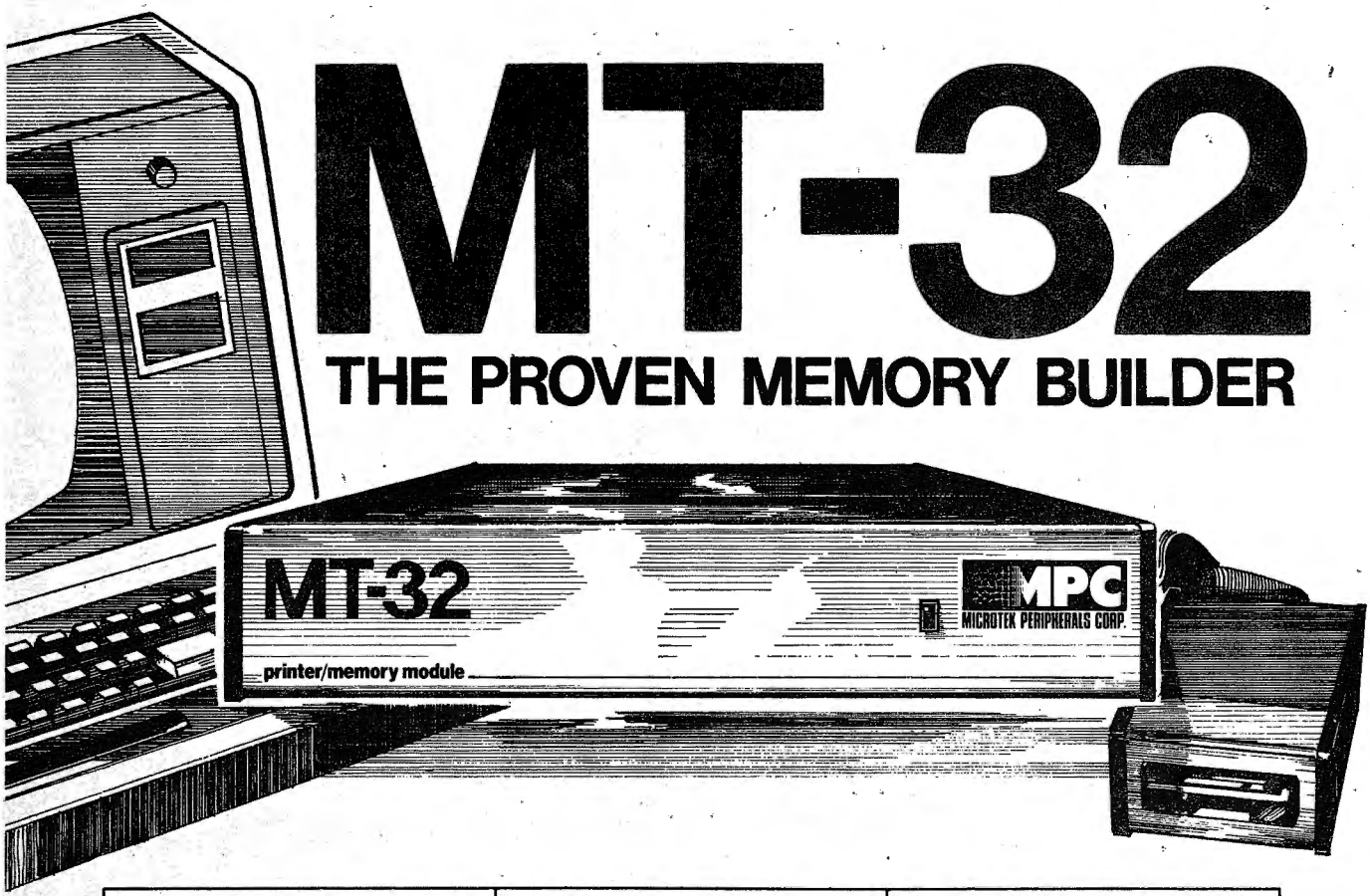
```
1 '      **   K E Y W O R D   **
              (TAPE  VERSION)
2 '           BY   JIM PEYTON
                   ROUTE 2
              GEORGETOWN,  KY

              VARIABLE  TABLE
3 'A$(ARRAY) = DATA RECORDS
   A$        = USER ENTRY
4 'B$        = OLD STRING (EDIT)
   C$        = NEW STRING (EDIT)
5 'E$        = BYTE BEFORE B$ (EDIT)
   F$        = BYTE FOLLOWING B$(EDIT)
6 'N$        = DATA FILENAME
   Y$        = RESPONSE TO (Y/N)
7 'A         = INSTRING RETURN
   B         = PUNCTUATION FLAG (E$)
8 'C         = PUNCTUATION FLAG (F$)
   D         = DATA ALTERED FLAG
9 'F         = KEYWORD FOUND FLAG
   I,J,K,N   = COUNTERS

10 CLS:CLEAR0:CLEAR(MEM-800):DIMA$(100)
  :DEFINTF,I,N,D,A,K
19             'LOAD DATA FILE IF IT EX
  ISTS
```

```
20 Y$="":INPUT"NEED TO LOAD DATA FILE (
  Y/N)";Y$
30 IFY$="Y"THENGOSUB540ELSE50
40 N=N+1:INPUT#-1,A$(N):IFA$(N)="99"THE
  NN=N-1:GOTO50ELSE40
49              'INPUT DATA, QUERY OR DE
  LETE
50 CLS:PRINTTAB(24)"K E Y W O R D":PRIN
  TTAB(24)"= = = = = = =
60 PRINTTAB(3)"ENTRY ENDINGS: <.>=STORE
   <?>=SEARCH <*>=DELETE/EDIT
70 PRINTTAB(11)"( TO CONTINUE AN ENTRY
  END WITH <;> )
80 A$="":PRINT:PRINT">"STRING$(62,95)ST
  RING$(62,24);:INPUTA$
90 IFRIGHT$(A$,1)<>";"THENPRINT@128,CHR
  $(31);
100 IFA$=""THEN440ELSEIFRIGHT$(A$,1)="?
  "THEN150
110 IFRIGHT$(A$,1)="*"THEN230
120 IFRIGHT$(A$,1)<>"."ANDRIGHT$(A$,1)<
  >";"THEN430
130 IFRIGHT$(A$,1)=";"THENN=N+1:A$(N)=A
  $:D=1:GOTO80
140 N=N+1:A$(N)=A$:D=1:GOTO50
149             'SEARCH & PRINT IF FOUND

150 F=0:A$=LEFT$(A$,LEN(A$)-1):FORI=1TO
  N
160 GOSUB480
170 IFRIGHT$(A$(I),1)=";"THENJ=J+1:GOTO
  220
180 IFA=0THENJ=0:GOTO220ELSEFORK=I-JTOI
190 IFRIGHT$(A$(K),1)<>";"THEN210
200 PRINTLEFT$(A$(K),LEN(A$(K))-1)+" ";
  :NEXTK
210 PRINTA$(K):NEXTK:A=0:J=0:F=1
220 NEXTI:IFF=0THEN410ELSE420
229             'SEARCH & DELETE/EDIT
230 A$=LEFT$(A$,LEN(A$)-1):FORI=1TON:GO
  SUB480
240 IFA>0THENPRINTA$(I)ELSE390
250 Y$="":INPUT"DELETE (Y/N)";Y$:IFY$="
  Y"THENA$(I)="":D=1:GOTO390:ELSEIFY$="
  N"THEN50ELSEIFLEN(Y$)=0THEN390
259 '             EDIT ROUTINE
260 Y$="":INPUT"CHANGE (Y/N)";Y$:IFY$="
  N"THEN390ELSEIFY$=""THENA=1:I=I+1:GOT
  O240ELSEIFY$="Y"THEND=1:GOTO270ELSE26
  0
270 INPUT"WORD OR PHRASE TO BE CHANGED:
   ";B$:C$="":INPUT"CHANGE TO (HIT ENTE
  R TO DELETE): ";C$
280 GOSUB510:IFA>1THENE$=MID$(A$(I),A-1
  ,1)
290 F$=MID$(A$(I),A+LEN(B$),1)
300 B=0:IFE$="."ORE$=","ORE$="?"ORE$=";
  "ORE$="!"ORE$=":"THENB=1
310 C=0:IFF$="."ORF$=","ORF$="?"ORF$=";
  "ORF$="!"ORF$=":"THENC=1
320 IFA=1ANDC=1ORB=1ANDC=1THEN360ELSEIF
  A=1ORB=1THENB$=B$+" ":GOTO340
330 IFF$=""ORC=1THENB$=" "+B$ELSEB$=" "
  +B$+" "
340 IFC$=""ANDA=1ORC$=""ANDB=1ANDC=1ORC
  $=""ANDC=1THENC$="":GOTO360ELSEIFC$="
  "THENC$=" ":GOTO360
350 IFA=1ORB=1THENC$=C$+" "ELSEIFF$=""O
  RC=1THENC$=" "+C$ELSEC$=" "+C$+" "
360 GOSUB510:IFA=0THEN380
370 A$(I)=LEFT$(A$(I),A-1)+C$+RIGHT$(A$
  (I),LEN(A$(I))-LEN(B$)-A+1)
380 PRINTA$(I):INPUT"TO CONTINUE PRESS
  ENTER";Y$
390 NEXT:GOTO50
399             'ERROR HANDLING
400 '
410 PRINT:PRINT"I DON'T KNOW NOTHING AB
  OUT NO "A$
420 PRINT:INPUT"TO CONTINUE PRESS ENTER
  ";X$:GOTO50
430 PRINT:PRINT"END ENTRY WITH <.>, <;>
  , <?> OR <*>!":GOTO420
439             'CHECK FOR EMPTY FILE
440 FORI=1TON:IFA$(I)<>""THEN450ELSENEX
  T:GOTO470
449             'IF DATA BASE ALTERED, P
  RINT TO FILE
450 IFD=0THEN470ELSEGOSUB550:FORI=1TON
460 IFA$(I)=""THENNEXTELSEPRINT#-1,A$(I
  ):NEXT:PRINT#-1,"99"
470 CLEAR100:END
479             'INSTRING SUBROUTINE
480 FORA=1TOLEN(A$(I))-LEN(A$)+1
490 IFA$=MID$(A$(I),A,LEN(A$))THENRETUR
  N
500 NEXTA:A=0:RETURN
510 FORA=1TOLEN(A$(I))-LEN(B$)+1
520 IFB$=MID$(A$(I),A,LEN(B$))THENRETUR
  N
530 NEXTA:A=0:RETURN
539             'CASSETTE PROMPT
540 PRINT"PREPARE CASSETE TO LOAD FILE"
  :GOTO570
550 Y$="":INPUT"DATA BASE WAS ALTERED.
   SAVE IT (Y/N)";Y$:IFY$="N"THEN470
560 PRINT"PREPARE CASSETTE TO SAVE FILE

570 INPUT"WHEN READY PRESS ENTER";Y$:RE
  TURN
```

```
1 '**   K E Y W O R D   **
2 '     (COLOR VERSION)

10 CLS:CLEAR0:PCLEAR1:CLEAR(MEM-
800):DIMA$(100)
11 ' COLOR BASIC USERS WILL
12 ' HAVE TO OMIT THE PCLEAR1
13 ' STATEMENT IN LINE 10
20 Y$="":INPUT"NEED TO LOAD DATA
 FILE (Y/N)";Y$
30 IFY$="Y"THENGOSUB540:OPEN"I",
-1,"DATA":ELSE30
40 N=N+1:INPUT#-1,A$(N):IFA$(N)=
"99"THENCLOSE:N=N-1:GOTO50ELSE40
50 :CLS:PRINT"K E Y W O R D":PRI
NT"= = = = = = ="
60 PRINT"ENTRY ENDINGS: <.>=STOR
E        <?>=SEARCH  <*>=DELETE/
EDIT"
70 PRINT"( TO CONTINUE WITH AN E
NTRY     END WITH A <;> )"
80 A$="":PRINT:PRINT">";:INPUTA$
100 IF A$="" THEN 440 ELSE IF RI
GHT$(A$,1)="?" THEN 150
110 IF RIGHT$(A$,1)="*"THEN 230
120 IF RIGHT$(A$,1)<>"."AND RIGH
T$(A$,1)<>";"THEN430
130 IF RIGHT$(A$,1)=";"THENN=N+1
:A$(N)=A$:D=1:GOTO80
140 N=N+1:A$(N)=A$:D=1:GOTO50
150 F=0:A$=LEFT$(A$,LEN(A$)-1):F
OR I=1TON
160 GOSUB480
170 IF RIGHT$(A$(I),1)=";"THENJ=
J+1:GOTO220
180 IFA=0THENJ=0:GOTO220:ELSEFOR
 K= I-J TO I
190 IFRIGHT$(A$(K),1)<>";"THEN21
0
200 PRINTLEFT$(A$(K),LEN(A$(K))-
1)+" ";:NEXTK
210 PRINTA$(K):NEXTK:A=0:J=0:F=1
220 NEXTI:IFF=0THEN410ELSE420
230 A$=LEFT$(A$,LEN(A$)-1):FORI=
1TON:GOSUB480
240 IFA>0THENPRINTA$(I)ELSE390
250 Y$="":INPUT"DELETE (Y/N)";Y$
:IFY$="Y"THENA$(I)="":D=1:GOTO39
0:ELSEIFY$="N"THEN50ELSEIFLEN(Y$
)=0THEN390
260 Y$="":INPUT"CHANGE (Y/N)";Y$
:IFY$="N"THEN390ELSEIFY$=""THENA
=1:I=I+1:GOTO240:ELSEIFY$="Y"THE
ND=1:GOTO270ELSE260
270 INPUT"WORD OR PHRASE TO BE C
HANGED:";B$:C$="":INPUT"CHANGE T
O (HIT ENTER TO DELETE):";C$
280 GOSUB510:IFA>1THENE$=MID$(A$
(I),A-1,1)
290 F$=MID$(A$(I),A+LEN(B$),1)
300 B=0:IFE$="."ORE$=","ORE$="?"
ORE$=";"ORE$="!"ORE$=":"THENB=1
310 C=0:IFF$="."ORF$=","ORF$="?"
ORF$=";"ORF$="!"ORE$=":"THENC=1
320 IFA=1ANDC=1ORB=1ANDC=1THEN36
0ELSEIFA=1ORB=1THENB$=B$+" ":GOT
0340
330 IFF$=""ORC=1THENB$=" "+B$ELS
EB$=" "+B$+" "
340 IFC$=""ANDA=1ORC$=""ANDB=1AN
DC=1ORC$=""ANDC=1THENC$="":GOTO3
60ELSEIFC$=""THENC$=" ":GOTO360
350 IFA=1ORB=1THENC$=C$+" "ELSEI
FF$=""ORC=1THENC$=" "+C$ELSEC$="
 "+C$+" "
360 GOSUB510:IFA=0THEN380
370 A$(I)=LEFT$(A$(I),A-1)+C$+RI
GHT$(A$(I),LEN(A$(I))-LEN(B$)-A+
1)
380 PRINTA$(I):INPUT"TO CONTINUE
 PRESS ENTER";Y$
390 NEXT:GOTO50
400 '
410 PRINT:PRINT"I DON'T KNOW NOT
HING ABOUT NO   "A$
420 PRINT:INPUT"TO CONTINUE PRES
S ENTER";X$:GOTO50
430 PRINT:PRINT"END ENTRY WITH <
.>, <;>, <?>,   OR <*>!":GOTO420
440 FOR I=1TON:IFA$(I)<>""THEN45
0ELSENEXT:GOTO470
450 IFD=0THEN470ELSEGOSUB550:OPE
N"O",-1,"DATA":FORI=1TON
457 PRINT I
460 IFA$(I)=""THENNEXTI:ELSEPRIN
T#-1,A$(I):NEXTI:PRINT#-1,"99"
470 CLEAR100:END
480 FORA=1TOLEN(A$(I))-LEN(A$)+1
490 IFA$=MID$(A$(I),A,LEN(A$))TH
ENRETURN
500 NEXTA:A=0:RETURN
510 FORA=1TOLEN(A$(I))-LEN(B$)+1
520 IFB$=MID$(A$(I),A,LEN(B$))TH
ENRETURN
530 NEXTA:A=0:RETURN
540 PRINT"PREPARE CASSETTE TO LO
AD FILE":GOTO570
550 Y$="":INPUT"DATA BASE WAS AL
TERED.          SAVE IT (Y/N)";Y
$:IF Y$="N" THEN470
560 PRINT"PREPARE CASSETTE TO SA
VE FILE"
570 INPUT"WHEN READY PRESS ENTER
";Y$:RETURN
```

MT-32

THE PROVEN MEMORY BUILDER



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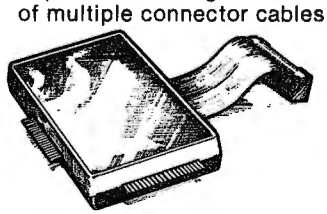

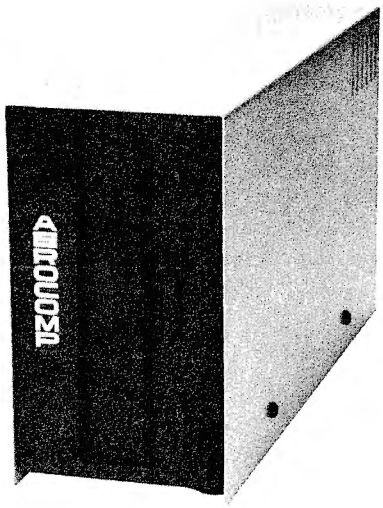

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Hybrid programming

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R B Nottingham, Deerfield Beach, Florida

Those of us who have had computers for a couple of years and spent a few thousand hours programming tend to forget what a confusing world microcomputers and their programming can be. After graduating from Level I to Level II and acquiring 16K of memory, I wrote and copied many BASIC programs. Copying programs from other, better programmers was a good way to learn. Even programs in which one has no real interest can teach useful programming techniques.

Early in my progress, I bought TBUG and the Editor/Assembler. After spending a few hours with them, I put them aside and went back to writing BASIC. My IBM friends kept telling me I should learn assembly language, but the motivation was lacking. Machine language programs work 100 times faster than BASIC, but for me they would also take 100 times as long to write.

I then discovered assembly language programs which would do things I couldn't do in BASIC, or which required prohibitive time to run. I mastered the technique of converting assembly language into BASIC POKE programs and setting memory size from the program. Now I have a library of BASIC machine language programs which do things like:

1. Activate the MERGE command, so one can quickly splice two programs together.
2. Provide single step execution and scrolled listings.
3. Print a list of all line number cross-references and a list of all variable names and the line numbers on which they occur.
4. Make it possible to save and reload an entire array, very rapidly, rather than handling it very slowly by means of PRINT#-1 and READ#-1.

Here is the step-by-step procedure used to convert assembly language programs to BASIC POKE programs. First, remember that when you want to clean house in computer memory you do not need to turn the power off and on again. Simply enter SYSTEM, and when the prompt (*?) appears, type "/0". There is our old friend, MEMORY SIZE, and you are starting fresh.

Listing 1 contains a trivial program to illustrate the technique. Assemble this program and put it out onto a cassette. Note the RET at line 200 is what brings us back to BASIC after the program has executed. If we take the address 7000H and multiply by 4096, we get 28672, the decimal starting address.

Return to BASIC and set the memory size to 28671 (one less than the starting address). Load your machine language program by entering SYSTEM, and the name you have given it. When the system prompt (*?) comes back on, your program is loaded. Hit BREAK - don't execute it yet. (We assume you have executed it a time or two as a machine language program to make sure it works.) Now start at line 100, and enter this short BASIC program:

```
100 FOR X = 28672 TO 28687
110 PRINT PEEK(X);
120 NEXT X
```

Type RUN. You should see the data shown in line 50 of listing 2 appear on the screen. Start with line 50, and copy this data directly into a DATA statement. For our example we will need only one line of data, but some programs will need more, of course.

You got the starting memory address by decoding the Hex address from assembly language. How do you get the ending address? When you write your FOR...NEXT loop, guess the length of the program in bytes, add a safety factor and add that to the starting address to get the upper limit. Now, run it and watch for 201. This is the RET command in decimal. Following it should be a series of 0's and 255's. This will enable you to determine the highest memory address.

See HYBRID, page 36

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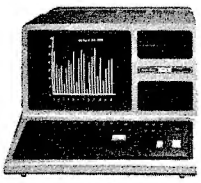

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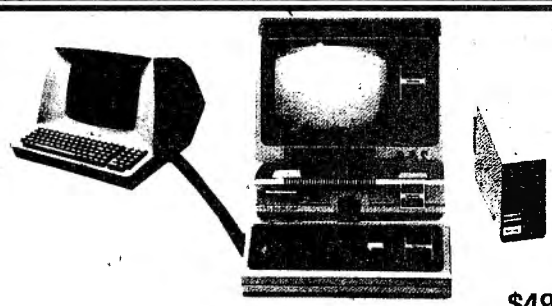

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HYBRID, continued from page 34

When a program has several data lines, it's a chore to try to find a typographical error; therefore, verify each data line as it is entered. To do this, write another FOR...NEXT program at a higher line number, say 1000, using the same values for X as above, where READ D, PEEK (X) and IF D <> PEEK (X) STOP. After entering each DATA line, type RUN 1000, and if the message is OD (out of data) or READY, fine - but if it is BREAK, then there is an error in the last line of data. So find it and correct it.

Now that we have data statements which match our machine language, we delete the PEEK statements and the verification loop at 1000, and make our program look like lines 10-40 of listing 2. These lines will POKE into the proper memory locations the same instructions which our machine language program contained.

Line 1 is the line which sets memory size. Note the CLEAR statements at the beginning and end, and note that it is line 1. The clear statements are important, and since we can run into trouble if we go too far in the program before setting memory size, do it first.

The memory addresses 16561 and 16562 are the location for memory size. How do we arrive at the addresses to poke? Remember that the starting address of our machine language is 28672. With our computer in the command mode, we enter: ?INT(28672/256) and get 112. We want to set the memory size at one less than that. The least significant byte of the address comes first. One from 112 equals 111 as the most significant byte and 255 as the least significant. Therefore, we poke 255 and 111. In line 2, the poke addresses are those where the computer looks when it reads USR, the call for a machine language subroutine. Since 28672 is evenly divisible by 256, we poke 0 in the first address and 112 in the second. If our address had not been evenly divisible, we would have obtained N2, by INT(*address*/256) and N1 by *address*-256*N2.

Lines 100-130 are a short BASIC program which calls the subroutine in 100 with the USR call, holds the screen white for a short time with line 110, then clears the screen and prints a message in line 130. If you load the program and type RUN, there will be a brief delay, followed by READY. This means you have loaded the program and reached line 60. Then type RUN 100 and watch the screen flash.

Suppose your main program has DATA statements. Your computer when it is told to READ, always starts with the lowest numbered data statement. No problem. Change line 60 to DELETE 1-60. Yes, delete is a valid command, and it will delete itself. When you first type RUN, the data pokeing program will execute and then be deleted, leaving your routine in machine language, patiently waiting for you to execute a USR command.

More than one machine language routine can reside in memory at the same time, if they are given memory locations which do not overlap. To call any routine, you must execute the equivalent of line 2, before calling it so that the USR instruction will jump to the proper location.

If you have not used the techniques in this article before, try the procedure as described with the program shown, then look through your back issues of magazines, find an assembly language program that you really want to use, and use it!

Listing 1

```
100              ORG     7000H
110 CLEAR        LD      HL,3C00H
120              LD      BC,1024
130 LOOP         LD      A,0BFH
140              LD      (HL),A
150              INC     HL
160              DEC     BC
170              LD      A,B
180              OR      C
190              JR      NZ,LOOP
200              RET
210              END
```

Listing 2

```
  1 CLEAR 1000:POKE 16561,255:
    POKE 16562,111:CLEAR
  2 POKE 16526,0:POKE 16527,112
 10 FOR X = 28672 TO 28678
 20   READ D
 30   POKE X,D
 40 NEXT X
 50 DATA 33,0,60,1,0,4,62,191,119,35,
    11,120,177,32,247,201
 60 END
100 A = USR(0)
110 FOR T = 1 TO 1000: NEXT T
120 CLS
130 PRINT "WHITE, WASN'T IT?"
```

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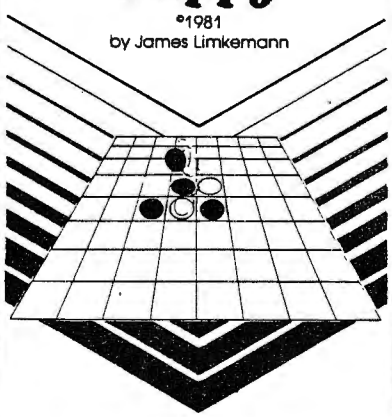

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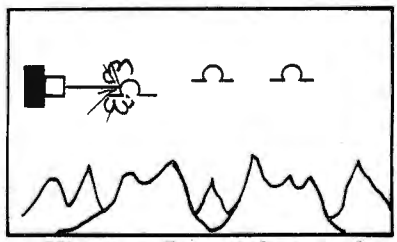

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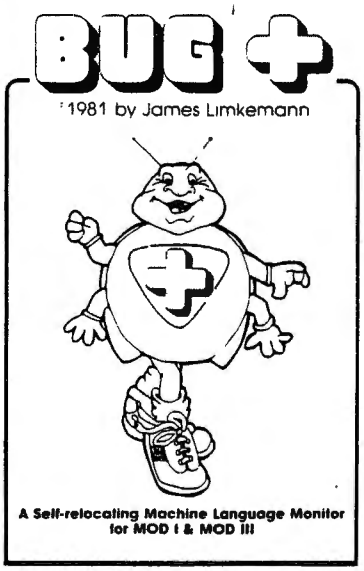

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Zap; display sector (disk, file), display memory, compare disk sectors, copy disk sectors, verify disk sectors, zero disk sectors, string search, sector search, single or double density diskettes (if your machine works normally with double density).

Purge; kill selected files, get disk directory, zero unused directory entries, zero unused granules, remove system files, kill by category, change name, date, password, auto command, change file parameters, remove passwords.

Disk Format; standard format, format without erase, special format, read address marks.

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Tape Copy; this program is to make backup of many TRS-80 tapes, no matter how it is recorded (note agin this program is for the use of the original purchaser for his own programs only).

Disk Repair; repair gat table, repair hit table, repair boot, read protect directory track, recover killed files, check directory.

Memory; move memory, exchange memory, compare memory, zero memory, test memory, input byte from port, output byte to port, memory to disk, disk to memory

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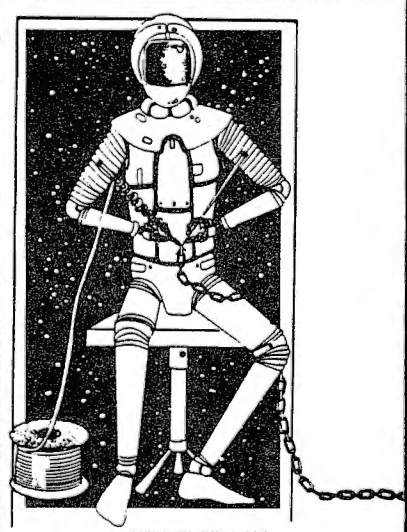

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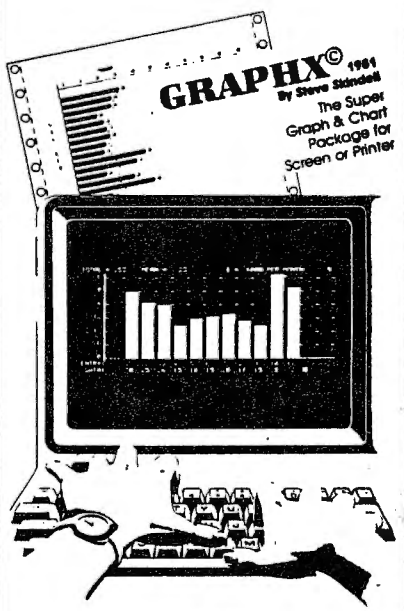

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For Model I with disk

CCA Data Management System

Jim Klaproth, Puyallup, Washington

Anyone who is serious about using their TRS-80 for business or home applications soon finds there is a crying need for the ability to store and retrieve data in an efficient and fast manner. There are two options for the user.

The first is to write a separate program for each specific application. For example, one program for a mailing list, another for a telephone directory, and a third for indexing magazine articles. Each program requires formatting, storing, sorting and retrieving different variable types. A mailing list would typically manipulate 5 string variables (name, address, city, state and company name), and perhaps two integer variables (zip code and mailing code), while a telephone directory would utilize only two string variables. Other applications might even require the use of single or double precision variables. One could write a general file management program and then modify the data structure for each specific application, but that is a lot of work. Enter option 2 - the data management system.

A data management system is a program which allows one to define a particular file structure, then add, delete or update records in the file, sort records by a particular field or combination of fields, print user-defined reports or labels, all the while not knowing or caring about how the actual manipulation of data is taking place. It is not even necessary to know the difference between sequential and random access disk files. The user follows simple instructions and prompts when required and the computer does the rest.

This evaluation deals with the CCA Data Management System (DMS), from Personal Software, the people who brought us Microchess 1.5. They also wrote the excellent VisiCalc package now being marketed through Radio Shack. DMS is a medium priced ($75.00 list), disk based system for the Model I with a minimum of 32K memory and one disk drive, although two drives are required for any serious application and 48K memory is recommended for very large file sorting. A single drive system has only 12K of available storage on the operating diskette, although provision is made for using a data diskette on a one drive system.

The program is supplied on a single cassette, thereby eliminating any copyright infringements involved in supplying a diskette with a host operating system. The cassette contains 6 BASIC program modules and one free application: a simple inventory program. Each module is loaded under disk BASIC using the CMD"T" and CLOAD commands, and then saved as a disk file with a specified filespec. The DMS program uses an overlay scheme for full utilization of memory and must load each module as needed, hence the need for naming each module correctly on the operating diskette. The loading was not critical and the instructions were quite clear. We ran DMS under TRSDOS 2.3, NEWDOS and NEWDOS80 without problems. Also, for those with lower case hardware modification, data can be entered in lower case when using a software driver; however, the commands and file names must be entered in upper case only.

The documentation is excellent and consists of a small, padded 3-ring binder, filled with 65 double sided pages of information. It is well organized, indexed and very comprehensive. It assumes no prior TRS-80 experience, and guides the novice disk user through each step involving the disk operating system as it pertains to DMS. There is a complete section on the meanings of each of over 100 messages unique to DMS. Each prompt is proceeded by one of these messages, such as:

FM01 WHICH FILE DO YOU WANT TO PROCESS?

In the message section, the above line is printed along with the following explanation: "Meaning: DMS wants the name of the file it is to process. Response: Enter the file name. You may also enter a null line to abort the file maintenance function and return to the menu." That should give you some idea of the completeness of the manual. Each operation is accompanied by explicit examples. There is even a section for programmers that explains how to read DMS files and manipulate the data.

The beginning DMS user will probably spend some time reading the manual and creating some test files to gain some experience with the system. The first section deals with simple concepts, with the more complex features explained in later sections. Once the operator is familiar with DMS, it becomes a

very simple system to operate. We find that we seldom need to refer back to the manual for help.

When DMS is loaded, the main menu is displayed and you are given your choice of file definition, file maintenance, file sorting, file compaction, report generation or terminate processing.

The first step in creating a file is to define it. You are asked the file name and then to define up to 24 alpha or numeric fields. Each record may contain a total of 255 characters. Each field has three properties: ID, name, and length. The ID is a 1-5 character identifier used by the system for quick reference. The field name is the full name that is used in all reports and may be 1-15 characters long. The field length is the number of characters reserved for the field in each record of the file. This is the tricky one to define, because once it is defined, the only way to alter it is to redefine the whole file over again! For example, if you define a name file and assign a length of 20 characters to it and a certain name contains more than 20, it will not all fit in that field. You will either have to abbreviate the name or go back and redefine the whole file. This is one of the weaknesses of DMS and similar programs. The final prompts have to do with computed fields, which gives the program mathematical capabilities. You may enter a formula such as: TC (total cost)= C(cost)*Q(quantity)+T(tax), and have the program compute the total cost based on the entered variables. This function gives DMS some good flexibility when used with numeric data.

Once the file has been defined, the next step is to add records to it. The file maintenance option is selected and it askes for the file name. The first prompt is a menu to either add, update, delete, inspect, scan, maintain another file, or exit. Select add, and the record number is displayed along with the field name and length of the first field. The user then enters the data for each field until the last field is entered. Then the record is written using random access techniques. Random access gives the user almost instant access to any record in the file, which is a real advantage over sequential files. The next record is entered, and so on until they are all entered. At any time, you may inspect, update or delete any single record by record number, scan the entire file for an exact match on any field or jump to another file.

So now we have our data in the file. What's next? Well, say we want to sort the data in the file by zip code. Call up the sort module from the main menu and enter the file name. You may sort on up to ten fields in ascending or descending order. The sort routine used is all in BASIC and is a combination disk sort and in-memory sort. It is very slow. One sort of 150 records, each containing 245 characters, on two fields took almost a half hour. This is definitely an area of the program which needs improvement. A fast machine code sort would really benefit the overall performance of this system.

The next step is to compact the file. Compaction removes all deleted records from the file (the deletion process actually only marks the record, but does not remove it) and renumbers the records. This is important, because after a sort, the record numbers remain in their unsorted positions.

After compaction, the file is ready for the final report. The report generator takes care of this task. This module is fairly powerful and allows the user to define several report parameters. One may choose between a columnar report (with or without heading) or mailing labels. The output may be routed to either the screen or a parallel line printer. Serial printers are not supported at all; the user must have the necessary serial drivers written into the program. Automatic page numbering is built in to the columnar report. One may specify a title for the heading, the number of lines per page, width of the report, and the option to print deleted records. Numeric fields may be formatted by specifying where to place the decimal point and non-numeric fields may be truncated by specifying the width of the report field. Totals may be specified on any numeric column, as can subtotals and breaks. As an example, suppose you are printing a report on your employee pay records. Each line displays the department, name, and weekly pay of one employee. The file is sorted by department, and you want subtotals of weekly pay for the employees in each department. By specifiying "break" in the department field, each time there was a change in the department number, a subtotal would be printed for each department. Records can be selected by field values for printing, or the entire file can be printed. For example, print only records with a sales volume of $100 to $500. Only one field can be specified and only the lower and upper limits are used in the selection. If the report is going to be used frequently, the parameters may be saved on the diskette and recalled by only giving the report name. This feature is very handy and saves time. One minor gripe was the inability to exclude record numbers from the report.

Two features of the system are documented in the DMS manual, but are not implemented. One is the ability to manipulate report formats (i.e., delete or list them). This feature does not work at all. The other is the ability to use a separate data diskette on a one drive system. The manual explains that one may insert a formatted data diskette after removing the system diskette at certain prompts in the program. I found that this does not work because DMS needs some information from the DOS in order to GET and PUT data to and from the diskette. However, after much trial and error, I discovered that by creating a reduced sized system (by copying the entire DOS and killing all unnecessary modules), this technique works like a charm and can be a real lifesaver for a two drive owner who suddenly finds out that one drive has taken the KILL command seriously. A minimum NEWDOS80 system consists of BOOT/SYS, DIR/SYS, SYS0/SYS through SYS4/SYS, and SYS10/SYS is needed to handle GET and PUT. For NEWDOS, swap SYS13/SYS for SYS10/SYS. A minimum TRSDOS 2.3 system was not tested in this manner.

This system is not, by any stretch of the imagination, the ultimate in data management systems. However, other data management systems in this price range I have used suffered from some of the same shortcomings. The major weakness in DMS is the slow sort speed. This shortcoming could probably be overcome by the use of a free-standing machine code disk sort.

I found the system virtually error free and well documented. Personal Software does supply patches (called "Fixnotes") to all registered owners to keep them current with all changes. The ability to modify the system is certainly a plus for

experienced programmers and the ability to use files created by DMS in other programs makes it very flexible. Add to this the moderate price tag, and it makes for a very well received package.

Ratings

Documentation	Excellent
Concept	Good
Ease of use	Good
Reliability	Very Good
Features	Good
Operational speed	Good
Sorting speed	Poor
Support	Very Good
Price	$75.00
Overall Rating	Good

Chet Floyd, one of the authors of the program writes, *"Software Arts, the VisiCalc authors, have provided a way to read and write ASCII files. This is documented in the User Manual as the Data Interchange Format (DIF). Its purpose is to let you pass data from one program to another without typing in the data anew each time. Unfortunately, Radio Shack did not see fit to document the DIF file itself. Programmers may obtain DIF documentation by contacting: Data Interchange Format Clearinghouse PO Box 70, MIT Branch, Cambridge, MA 02139. With this in hand, you can write BASIC programs that talk to VisiCalc.*

One commercially available program can give you this capability today: The Creative Computing Applications Data Management System sold by Personal Software for the Model I and III. But there is one hooker... the standard program won't talk to VisiCalc any better than 'Duel-N-Droids' without code available from myself. This code merges into the CCA/DMS to provide a powerful set of well documented DIF data manipulation features. I will gladly send additional information to those who contact me.

With this approach, or with your own homegrown programs, you can automate the transfer of data between your files and VisiCalc, saving hours of your time, and immeasurably broadening the scope of what you can do with VisiCalc and your own existing files."

Chet Floyd
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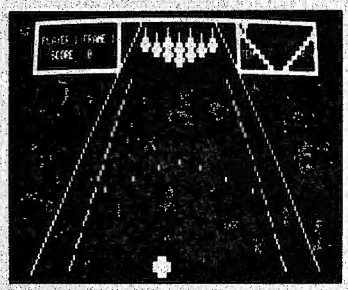

By John Allen from Acorn
TENPINS brings you all the thrills of championship bowling. Up to four players participate, and the program automatically senses the skill of each. Beginners can simply position the ball and "roll" it while more skilled players can vary the force, roll a curve, and cause it to 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.

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Two enemy empires battle for control of the galaxy in this 3-D simulation. You can play against the computer or a human opponent, but either way it's a battle to the end.

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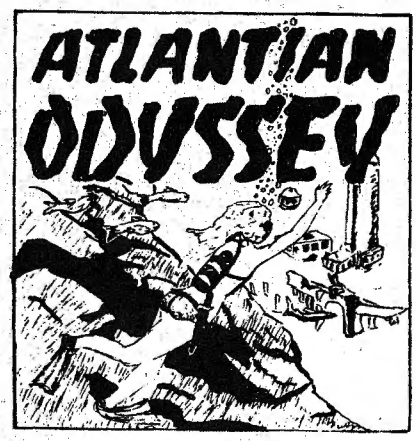

From Interpro
An illustrated adventure for the TRS-80. It's said that "a picture is worth a thousand words," and in this program you'll see why. While still in the classic text-type mold, the graphics give you a new perspective and aid your sense of direction. This saga of the sea contains a 150 word vocabulary and depicts 32 graphic locations.

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16K tape (Text only, No graphics)..$14.95

SUPERSCRIPT

By Richard Wilkes from Acorn
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.

SuperScript comes with drivers for popular serial and parallel printers (now including Centronics 737 and RS Daisy II), and easy instructions for patching to your Scripsit program (does not include Scripsit).

Model I 32K disk...$29.95

Basic Bartender

By William Denman from Med Systems
Liberation from the chore of mixing libations! This program contains complete information on mixing and serving 101 different drinks, and you can even add your own "House Specials." Drink recipes may be requested by name or a menu of subcategories may be requested. Not only useful, this program is very instructive in how to program a coded database.

Tape...$9.95

Pigskin

By Laurence, Sothen & Gavenda from Acorn
Play football against a friend or your computer with PIGSKIN. Featuring a graphic display of the field, the ball and scoreboard statistics, you choose from eleven offensive plays and seven defenses. The 30-second clock and a variety of penalty calls keep you on your toes. If you play against your TRS-80, there are five levels of difficulty. Includes "save game" feature.

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By Charles Forsythe from Programmers Guild
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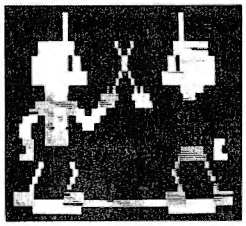

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By Leo Christopherson from Acorn
Your 'droid has already learned NIM, so now it's time to teach it how to wield a laser sword! Starting out as a lowly clown, you teach it how to use a laser sword by controlling its movements -- advance, attack, even retreat if necessary. After training it to be a "Grand Master," you enter the tournament against the program's skilled 'droid. Revel in the fanfares of the victorious -- or hear the funeral dirges of the defeated! Entertainment for all ages.

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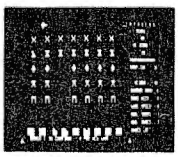

INVADERS FROM SPACE

By Carl Miller from Acorn
A fast machine language approach to this classic (and addictive) space game. The aliens drop bombs and move from side to side trying to overrun your bases. You choose the speed, enemy bomb frequency and accuracy, your number of shots on screen and bases. Unlike most such games, you can move your base and simultaneously fire at the invaders. Full sound effects add even more excitement to the incredible action of INVADERS FROM SPACE. Fun for all ages and skill levels.

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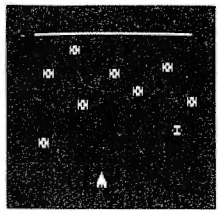

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By Hogue & Konyu from Big Five
Terrific sound, graphics and unique challenges mark this new space game a winner! While fighting off the alien convoys -- each more skillful than the last -- you must keep track of your rocket fuel or risk explosion. Finally your space station appears. Can you dock immediately, or is the station overrun by aliens? Find out by ordering Cosmic Fighter today.

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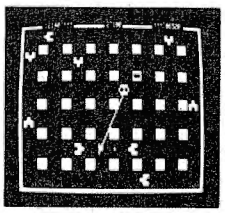

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By Hogue & Konyu from Big Five
Unlike the usual space "shoot-em-ups," Attack Force lets you control both speed and direction as you maneuver all over the screen in search of the alien Ramships and Flagships. Enemy ships chase you everywhere, and the Flagships' lasers can fire in any direction! The Ramships can even impersonate your spacecraft, so don't look away even for an instant. Machine language action with sound.

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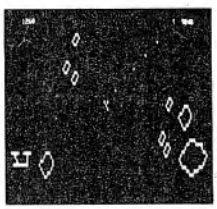

SUPER NOVA

By Hogue & Konyu from Big Five
Asteroids surround your ship. You must shoot the asteroids, as well as any of the five types of alien spaceships. use your thrusters for full movement and rotation of your ship -- if you are overwhelmed, you can even jump to hyperspace! Written in fast machine code with superb graphics and sound, this game is GREAT!

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By Wall & Moncrief from Adventure Int.
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You get a vast lunar landscape, graphically depicted in both long range and close up, with many choices for landing sites. Choose a more difficult site and get more points -- if you can land successfully. You have complete control of your LEM via main engines and small side thrusters, and a successful landing is heralded with a flag raising ceremony. Great graphics and sound add to the realtime challenge and fun.

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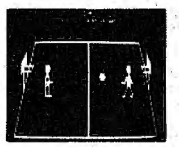

BASKET BALL

By John Allen from Acorn
You have to be fast to outscore your opponent as you play one-on-one basketball against a friend or your computer. Steal the ball, duck around your opponent and slant toward the basket for a lay up! The graphics are based on a 3-dimensional depiction of a basketball court, and ball dribbling sounds add to the realism. It's all there but the cheers -- so real you'll wonder how the ball keeps from coming through the screen of your TRS-80!

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By Roy Soltoff from Misosys & Acorn
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Gameshow simulation

For Model I & III, 16K and up

Robert D Miller, Hopewell, Virginia

One night, while watching a popular game show on television, I became intrigued by the method by which contestants try to win significant amounts of cash and prizes. The game is based on Tic-Tac-Toe, and features two contestants competing against one another to answer questions posed by a moderator. The Tic-Tac-Toe board used occupies an entire wall and consists of a bank of nine individual CRT's, each one being used for a Tic-Tac-Toe square.

By answering a question correctly, the contestant is able to have an X or an O placed on the board, the position of which is determined by the category of question selected. When one contestant achieves three X's or O's in a row, he or she is declared the winner of the contest and is given the opportunity to win additional cash and prizes through a different process.

The Tic-Tac-Toe board is still utilized for this process; only the numbers one through nine are placed on the board from left to right, top to bottom. Associated with these numbers are nine values. Upon selection of a given number by the contestant, the corresponding value is displayed in place of the number on the board. The association of values to numbers is purely at random, and will vary from one game to the next.

The values represented are six dollar values: $100, $150, $250, $350, $400 and $500; two words: TIC and TAC, and a picture of a dragon. The objective is to avoid selecting the number which would cause the dragon to appear, thereby losing the contest and any cash values accumulated up to that point. One wins the contest by selecting enough cash values to equal or exceed $1000 or, if by chance, both TIC and TAC are selected, the contestant automatically wins and his or her cash value is increased by $1000 regardless of its former level. The words TIC and TAC individually have no cash value associated with them.

In actual practice, the contestant is first shown all the values that are to be hidden "behind" the numbers one through nine. Next, these values are shuffled, with different values apparently being shifted from place to place around the board. Then the numbers one through nine are displayed, and the contestant is given the opportunity to select numbers as described above. If a cash value or TIC or TAC is selected, the contestant is given the opportunity of keeping the cash accumulated so far, or of risking all and continuing by guessing more numbers. If the number associated with the dragon is selected, the dragon appears in an animated fashion, starting as a small figure and "growing" in size as it appears to leap out of the CRT, supposedly startling the contestant. This, of course, indicates a loss. Whether a contestant wins or loses, the process is concluded by the moderator displaying the values associated with the remaining unselected squares.

See GAMESHOW, page 48

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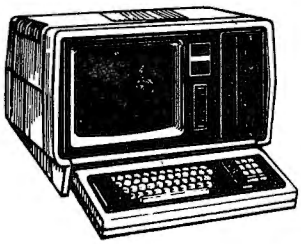

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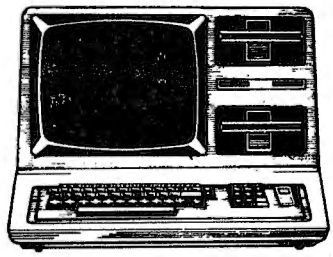

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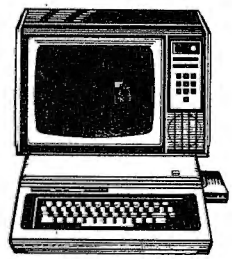

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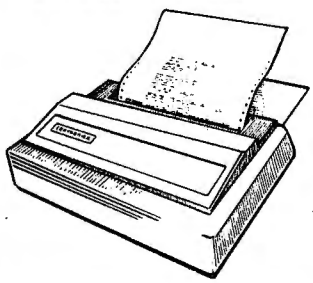

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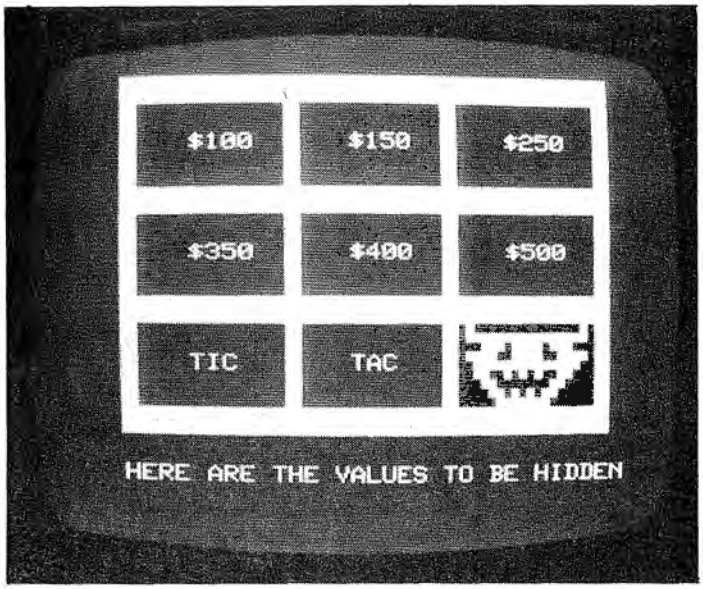
GAMESHOW, continued from page 46



Sample screen display of GAMESHOW

In wondering how well I would do in such a situation, I decided to attempt a simulation of the process of trying to get to $1000 without seeing the dragon. What follows is the result of that attempt.

Certain matters had to be taken into consideration is doing this simulation. First the Tic-Tac-Toe board would have to be depicted graphically on the CRT. In line 140, the horizontal bar is placed in variable A$. In line 150, the vertical bar is placed in B$. Note that B$ consists not only of graphic blocks, but also of backspaces and line feeds. This process enables the board to be drawn quickly and effortlessly, a process which is accomplished by the subroutine starting at line 420.

The subroutine starting at line 450 prints out the values in the Tic-Tac-Toe board. (The construction of the dragon character is discussed later.) Lines 460 through 490 create the effect of values being shuffled about the board.

Lines 210 through 330 comprise the routine for the guessing of numbers. Line 340 flashes the cumulative dollar total on the screen between INKEY$ strobes. Lines 260 through 280 print the animated dragon should the number associated with the dragon be selected.

Of primary inportance was the method by which to not only depict the dragon, but to do so in a manner that would make it appear animated. To do this, I designed five separate pictures of a dragon, starting with a small size and gradually growing larger. By flashing these pictures on the screen in quick succession, a certain degree of animation could be achieved. To provide additional impact, a sixth picture, consisting of the exact reverse of picture number five, was created to enhance simulation of a "flashing" effect when the dragon appears fully on the CRT. The coding for these pictures starts in the middle of line 350 and continues through line 400. The pictures are read into memory in line 130.

Finally, at the end of the game, the routine starting at line 500 prints the board with all the values showing. The player is then queried as to whether he or she desires another game.

Throughout this simulation, expanded graphics were utilized to enhance the visual effects of the program. One must be certain to PRINT@ only even numbered screen locations to achieve the desired results.

This simulation has attempted to encompass all the aspects of the real game on television. The only aspect not programmed was the ability of the player to quit guessing prior to reaching $1000. It was felt that this was unnecessary in this case due to the fact that real money was not at stake.

One may wish to modify this program so that two or more people can compete in trying to achieve maximum dollar values. This could be done by allowing each player a specified number of rounds during which he or she attempts to maximize their winnings. In such a situation, one may want to add the option of quitting prior to reaching $1000 so as to retain a lesser dollar value rather than taking a further chance on seeing the dragon.

In any case, it is hoped that this will not only prove instructive in graphic techniques, but also provide the opportunity to see if you can "beat the dragon". Good Luck!!

```
100 CLEAR2000:RANDOM
110 CLS:PRINTCHR$(23);:PRINT@404,"GAME
    SHOW";:PRINT@532,"SIMULATION";
120 FORI=1TO9:READZ$(I):NEXT
130 FOR I=1TO6:READL:FORJ=1TOL:READK:A$
   (I)=A$(I)+CHR$(K):NEXTJ,I
140 A$=STRING$(30,191)
150 FORI=1TO13:B$=B$+CHR$(191)+CHR$(24)
   +CHR$(26):NEXTI
160 TT=0:VA=0:X$=""
170 GOSUB420
180 GOSUB 450
190 GOSUB410  :GOSUB420
200 FORI=0TO8:PRINT@128+(256*INT(I/3))+
   8+20*(I-INT(I/3)*3),I+1;:NEXT
210 TT=0:VA=0:X$="":PRINT@912,"START GU
   ESSING!!";:FORI=1TO500:NEXT:PRINT@912
   ,"                ";
```

```
220 C$=INKEY$:GOSUB340  :IFC$=""THEN220

230 I=VAL(C$)-1
240 IFZ$(I+1)=""THEN220
250 J=136+(256*INT(I/3))+20*(I-INT(I/3)
  *3)
260 IFZ$(I+1)<>"DRGN"THENPRINT@J,Z$(I+1
  );:GOTO300
270 J=J-70
280 FORK=1TO4:PRINT@J,A$(K);:FORL=1TO75
  :NEXTL,K
290 FORM=1TO10:PRINT@J,A$(5);:PRINT@982
  ,"YOU LOSE!";:FORL=1TO75:NEXTL:PRINT@
  J,A$(6);:PRINT@982,"          ";:FORL=
  1TO75:NEXTL,M:GOTO500
300 IFZ$(I+1)="TIC"ORZ$(I+1)="TAC"THENT
  T=TT+1:IFTT<2THEN220  ELSE320
310 VA=VAL(RIGHT$(Z$(I+1),3))+VA:IFVA>=
  1000THENX$="YOU WIN":GOTO330  ELSEZ$(
  I+1)="":GOTO220
320 VA=1000:X$="YOU WIN":GOTO330
330 FORM=1TO10:GOSUB340  :NEXT:GOTO500

340 PRINT@918,X$;:PRINT@984,"";:PRINTUS
  ING"$$###";VA;:FORJ=1TO50:NEXTJ:PRINT
  @918,"          ";:PRINT@984,"          ";:F
  ORJ=1TO50:NEXTJ:RETURN
350 DATA $100,$150,$250,$350,$400,$500,
  TIC,TAC,DRGN,10,128,128,128,160,128,1
  44,24,24,26,143
360 DATA 11,128,128,128,160,128,160,24,
  24,26,175,133
370 DATA 19,128,128,168,144,128,160,148
  ,24,24,24,24,26,167,143,155,24,24,26,
  131
380 DATA 29,128,128,168,176,176,176,148
  ,24,24,24,24,24,26,172,183,191,187,15
  6,24,24,24,24,24,26,130,164,176,152,1
  29
390 DATA 47,138,172,188,172,188,156,188
  ,156,133,24,24,24,24,24,24,24,24,24,2
  6,130,191,141,158,159,157,174,159,129
  ,24,24,24,24,24,24,24,24,24,26,128,13
  0,173,184,184,184,135,128,128
400 DATA 47,181,147,131,147,131,163,131
  ,163,186,24,24,24,24,24,24,24,24,24,2
  6,189,128,178,161,160,162,145,160,190
  ,24,24,24,24,24,24,24,24,24,26,191,18
  9,146,135,135,135,184,191,191
410 RESTORE:FORI=1TO9:READZ$(I):NEXT:FO
  RI=9TO1STEP-1:J=RND(I):Z$=Z$(I):Z$(I)
  =Z$(J):Z$(J)=Z$:NEXT:RETURN
420 CLS:PRINTCHR$(23);:FORK=0TO768STEP2
  56:PRINT@K,A$;:NEXT
430 FORK=0TO60STEP20:PRINT@K,B$;:NEXT
440 RETURN
```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```
450 PRINT@896,"HERE ARE THE VALUES TO B
  E HIDDEN";:FORI=0TO7:PRINT@136+(256*I
  NT(I/3))+20*(I-INT(I/3)*3),Z$(I+1);:N
  EXT:PRINT@618,A$(5);:FORI=1TO1000:NEX
  TI
460 GOSUB420  :PRINT@900,"NOW LET'S MIX
   'EM UP A BIT";
470 FORI=1TO20:J=RND(9)-1:K=136+(256*IN
  T(J/3))+20*(J-INT(J/3)*3):L=RND(9):IF
  Z$(L)="DRGN"THENZ$(L)=A$(5):K=K-70
480 PRINT@K,Z$(L);:FORM=1TO75:NEXTM:IFZ
  $(L)=A$(5)THENZ$(L)="DRGN":PRINT@K,ST
  RING$(9,128);:PRINT@K+64,STRING$(9,12
  8);:PRINT@K+128,STRING$(9,128);ELSEPR
  INT@K,"    ";
490 NEXT:RETURN
500 PRINT@896,"LET'S SEE WHERE EVERYTHI
  NG WAS";:PRINT@972,"HIDDEN ON THE BOA
  RD";:FORI=1TO750:NEXT
510 FORI=0TO8:J=136+(256*INT(I/3))+20*(
  I-INT(I/3)*3):IFZ$(I+1)=""THENNEXTIEL
  SEIFZ$(I+1)="DRGN"THENPRINT@J-70,A$(5
  );:NEXTIELSEPRINT@J,Z$(I+1);:NEXTI
520 FORI=1TO2000:NEXTI:CLS:PRINTCHR$(23
  );:PRINT@532,"PLAY AGAIN?"
530 Y$=INKEY$:IFY$=""THEN530  ELSEIFY$=
  "Y"THEN190
540 IF Y$<>"N" THEN 530
550 CLS : END
```

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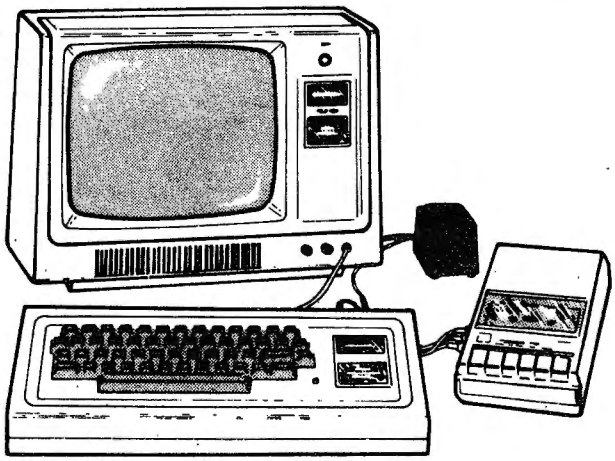

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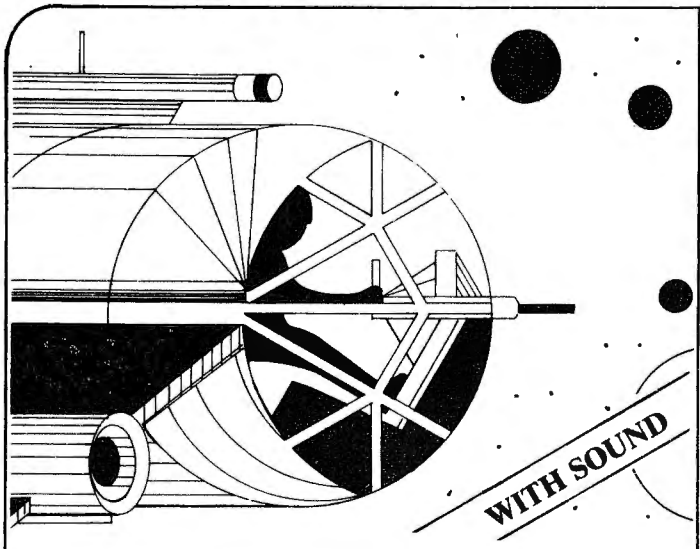

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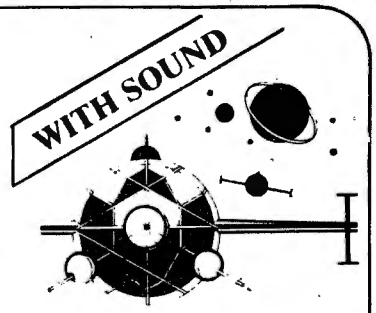

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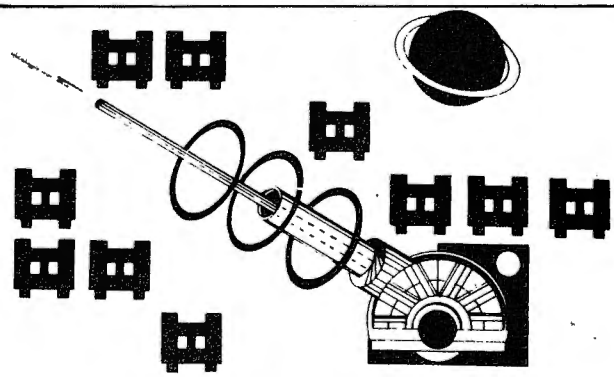

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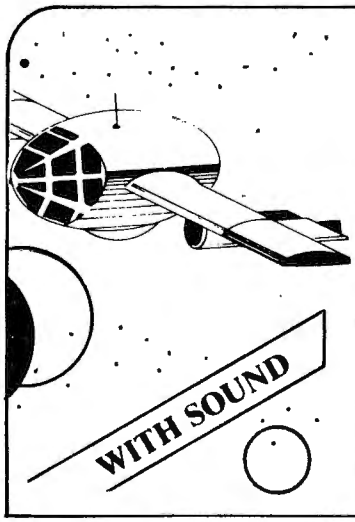

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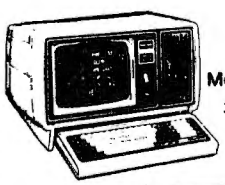

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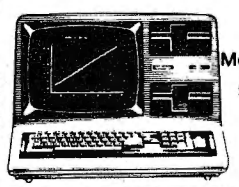

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Reader

Charles Quante, Tacoma, Washington

Just having finished *the* program, I looked around for a tape to record it on. Unfortunately, it was at this moment my wife decided to call me for dinner. Grabbing a tape, and hoping that nothing important was already on it, I quickly made a copy of the program.

If you are anything like me, you probably have guessed what happened. In my rush to get the program recorded, I inadvertently recorded over another program I had just spent weeks debugging. Not only that, but there were other programs recorded on that tape, and I couldn't remember what they were. So out of sheer frustration, Reader was born.

Reader is an assembly language program for 16K Level II. It quickly reads through a tape, finding the file name of each program, and can provide a fairly detailed description of the actual program.

To understand how Reader works, it is necessary to understand the tape format of a CSAVE'd tape.

First, a short leader is recorded, followed by a synchronization byte, A5 in hex. The next three bytes are D3, followed by a one byte file name which is the first letter of the name the program was saved under. Next comes the Basic program: The first two bytes point to the beginning of the second line of the program; the next two are reserved for the line number of the first line and the end of each line is terminated by a byte of 00.

Since the file name is limited to only one letter, it doesn't provide any real information about what the program really does. But by adding the following line, adjusted for each program, it is possible for Reader to provide you with more information:

0 REM INVADER VERSION 1.0 A SPACE BATTLE Reader locates the file name and displays it, and then checks to see if there is a line zero. If there is, it is transferred byte by byte to the screen. In this manner, it is possible to provide up to two lines of descriptive information with each program. As soon as Reader receives a prompt from you, it will continue reading the tape, skipping any garbage, until it comes to the next program. This makes it possible to locate programs on the tape that you forgot existed.

If you had reset the tape counter when you began the tape, it is possible to estimate the beginning of each program. By subtracting from two to five from the count, you can usually locate the beginning of the program.

Another benefit of adding a line zero remark statement will occur the next time your smart-aleck brother-in-law types "RUN THE PROGRAM", instead of "RUN". Rather than the usual error message, the computer will run the program. The reason for this is because the computer sees RUN, and then TH, which it assumes is a variable. Since all variables are reset to zero when RUN is entered, the computer translates the line into "RUN 0"

Program listing for "Reader"

```
7F00            00100          ORG     7F00H          ;MEM =32512
7F00 CDC901     00110 CLR      CALL    01C9H          ;CLS
7F03 21917F     00120          LD      HL,MS1         ; .
7F06 11003C     00130          LD      DE,LIN1        ;FIRST
7F09 012600     00140          LD      BC,0026H       ;MESSAGE
7F0C EDB0       00150          LDIR                   ; .
7F0E CD6D7F     00160          CALL    DELAY          ;WAIT
7F11 CDFE01     00170          CALL    01FEH          ;TURN ON
7F14 CD4102     00180 AGN      CALL    0241H          ;CASSETTE
7F17 FEA5       00190          CP      0A5H           ;SEARCH FOR
7F19 20F9       00200          JR      NZ,AGN         ;SYNC BYTE
                00210          ;
7F1B CD3502     00220          CALL    0235H          ;IS IT REALLY
7F1E FED3       00230          CP      0D3H           ;SYNC
7F20 20F2       00240          JR      NZ,AGN         ;BYTE,
7F22 CD3502     00250          CALL    0235H          ;OR
7F25 FED3       00260          CP      0D3H           ;FALSE
7F27 20EB       00270          JR      NZ,AGN         ;ALARM?
7F29 CD3502     00280          CALL    0235H          ; .
7F2C FED3       00290          CP      0D3H           ; .
7F2E 20E4       00300          JR      NZ,AGN         ; .
7F30 21B77F     00310          LD      HL,MS2         ; .
7F33 11803C     00320          LD      DE,LIN3        ;SECOND
7F36 010B00     00330          LD      BC,000BH       ;MESSAGE
7F39 EDB0       00340          LDIR                   ; .
7F3B 218D3C     00350          LD      HL,LIN3+13     ;PUT FILE
7F3E CD3502     00360          CALL    0235H          ;NAME
7F41 77         00370          LD      (HL),A         ;ON SCREEN
7F42 CD3502     00380          CALL    0235H          ; .
7F45 CD3502     00390          CALL    0235H          ;IS THERE
7F48 CD3502     00400          CALL    0235H          ;A LINE
```

(this listing continues on the next page)

```
7F4B FE00      00410          CP      00H             ;ZERO
7F4D C28B7F    00420          JP      NZ,WAIT         ;IN
7F50 CD3502    00430          CALL    0235H           ;PROGRAM
7F53 FE00      00440          CP      00H             ; .
7F55 C28B7F    00450          JP      NZ,WAIT         ; .
7F58 CD3502    00460          CALL    0235H           ;SKIP TWO
7F5B CD3502    00470          CALL    0235H           ;BYTES
7F5E 21003D    00480          LD      HL,LIN5         ; .
7F61 CD3502    00490 REPEAT   CALL    0235H           ;PUT LINE
7F64 FE00      00500          CP      00H             ;ZERO
7F66 CA8B7F    00510          JP      Z,WAIT          ;ON
7F69 77        00520          LD      (HL),A          ;SCREEN
7F6A 23        00530          INC     HL              ; .
7F6B 18F4      00540          JR      REPEAT          ; .
               00550 ;
7F6D 21C27F    00560 DELAY    LD      HL,MS3          ; .
7F70 11803D    00570          LD      DE,LIN7         ;DELAY
7F73 011100    00580          LD      BC,0011H        ;ROUTINE
7F76 EDB0      00590          LDIR                    ; .
7F78 CD2B00    00600 SCAN     CALL    02BH            ; .
7F7B FE0D      00610          CP      0DH             ; .
7F7D 20F9      00620          JR      NZ,SCAN         ; .
7F7F 21D37F    00630          LD      HL,MS4          ; .
7F82 11803D    00640          LD      DE,LIN7         ; .
7F85 011100    00650          LD      BC,0011H        ; .
7F88 EDB0      00660          LDIR                    ; .
7F8A C9        00670          RET                     ; .
7F8B CD6D7F    00680 WAIT     CALL    DELAY           ;WAIT BEFORE
7F8E C3007F    00690          JP      CLR             ;CONTINUING
3C00           00700 LIN1     EQU     3C00H
3C80           00710 LIN3     EQU     3C80H
3D00           00720 LIN5     EQU     3D00H
3D80           00730 LIN7     EQU     3D80H
7F91 52        00740 MS1      DEFM    'READER - VERSION 1.4 BY CHARLES QUANTE'
7FB7 46        00750 MS2      DEFM    'FILE NAME ='
7FC2 48        00760 MS3      DEFM    'HIT ENTER PLEASE.'
7FD3 20        00770 MS4      DEFM    '                  '
7F00           00780          END     CLR
00000 TOTAL ERRORS


AGN     7F14 00180   00200 00240 00270 00300
CLR     7F00 00110   00690 00780
DELAY   7F6D 00560   00160 00680
LIN1    3C00 00700   00130
LIN3    3C80 00710   00320 00350
LIN5    3D00 00720   00480
LIN7    3D80 00730   00570 00640
MS1     7F91 00740   00120
MS2     7FB7 00750   00310
MS3     7FC2 00760   00560
MS4     7FD3 00770   00630
REPEAT  7F61 00490   00540
SCAN    7F78 00600   00620
WAIT    7F8B 00680   00420 00450 00510
```

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Basic interactions

R C Bahn

Introduction

String constants or variables are single or groups of alphabetic, numeric or graphics characters. String variables are designated in BASIC by the appearance of the dollar sign as the last character of the name, such as A$.

The object of the following exercises is to learn to manipulate "strings" and the ASCII code (reference 1) for simple computer graphics. The major BASIC statements which are concerned with "strings" include ASC(string), CHR$(code exp.), LEN(string), LEFT$(string, n), MID$(string, p,n), RIGHT$(string, n), STR$(numeric exp.), VAL(string), and STRING$(n, char). A single operation, concatenation, can be performed on strings. In this operation, a string may be appended to another string by the use of the plus (+) sign. Complete descriptions of the foregoing statements can be found in the reference manual for your respective computer.

The first part of the article concerns methods for building strings and examining their appearance prior to utilization. The last part of the article describes a demonstration program for the tabular and graphic display of the sine function.

Counting in a loop from 32 to 191

Type and run the following program:

```
 10  FOR I = 1 TO 5
 20  FOR J = 1 TO 32
 30  PRINT 31 +(32*(I-1))+J;
 40  NEXT J
 50  PRINT:PRINT
 60  NEXT I
 70  END
RUN 10
```

Later we will want to automatically build some strings and have the computer do the counting. This nested loop performs the task. The outer I loop (lines 10 and 60) directs program flow through the inner J loop five times. The inner J loop (lines 20 and 40) counts each of the five times from one to thirty-two. The sequential numbers (32 to 191) are computed and printed in line 30. To assure yourself that the statement operates correctly, compute by hand the value for I=1, J=1; I=5, J=32 and several intermediate numbers. The range of numbers from 32 to 191 corresponds to the ASCII codes for characters and graphics symbols. Line 50 separates the video screen output into five blocks of 32 numbers. The first PRINT completes the line. The second PRINT skips a line. Note that if the terminal number in a block occupies the last postion of the video line, an automatic line feed occurs. Thus, the number of blank lines separating blocks may not be constant for all blocks.

Building "strings" and testing the video screen and printer

Type and run the following program:

```
 100  CLEAR 100
 110  B$="ASCII CODES"
 120  FOR I = 1 TO 5
 130  A$=""
 140  FOR J = 1 TO 32
 150  N = 31 +32*(I-1)+J
 160  A$=A$+CHR$(N)
 170  NEXT J
 180  PRINT B$;N-31;"TO";N
 190  PRINT A$
 200  LPRINT B$;N-31;"TO";N
 210  LPRINT A$
 220  NEXT J
 230  END
RUN 100
```

This program displays all the ASCII characters on the video screen and printer. If you have no printer delete lines 200 and 210. You can identify the counting loop consisting of lines 120, 140, 170, and 220. The calculation of the sequence number (N) occurs in line 150. A string of 32 characters (A$) is built by concatenation in line 160. A$ is used in the output in lines 190 and 210. Another string (B$) is defined in line 110 and used as a label in lines 180 and 200.

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Personal Micro Computers Inc.

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Circle 26

This program shows you all the characters available for building strings. The options, particularly for ASCII codes greater than 95, will vary depending upon your type of computer, the presence of lower case capability and your printer. Many printers will not be able to interpret the graphics codes (128-191). Subsequent programs in this article should be modified to conform to your own system's capabilities.

Remember that the graphics codes for Model II only extend from 127 to 159. For Model II computers change line 120 to: FOR I = 1 TO 4. In the next section change line 310 to: FOR K = 32 TO 159.

Organized inspection of groups of characters

```
300  CLEAR 1000:CLS
310  FOR K = 32 TO 191
320  FOR N = 1 TO 23 STEP 2
330  IF N = 1 THEN PRINT "ASCII
     CODE =";K
340  A$ = STRING$(N,CHR$(K))
350  PRINT A$
360  NEXT N
370  FOR T = 1 TO 200:NEXT T:CLS
380  NEXT K
390  END
RUN 300
```

This program demonstrates the STRING$ statement and, in an organized fashion, allows you to inspect the appearance of the characters in lines and in sheets. While there will be few surprises with the alphabetical, numeric and special characters, the graphics characters will provide interesting patterns. The exact pattern will depend upon your model of computer.

Lines 310 and 380 define a loop running from 32 to 191. You might want to confine this study to the graphics range of 128 to 191. Lines 320 and 360 define a loop which will count the twelve odd numbers between and including one and twenty-three. This number is used in line 340 to produce twelve lengthening representations of A$, each of which is printed on the video by the statements of line 350.

Line 330 prints a label for the video screen page. Line 340 forms A$. The STRING$ statement automatically concatenates a string of characters of length N composed of characters defined by CHR$(K).

Line 370 is a timing loop which will enable you to quickly inspect the page. If the pattern interests you, press BREAK or the equivalent on your computer. Record the ASCII code for future reference. Type CONT to continue. Note that when you stop the program sixteen lines of the screen are occupied by the display and systems messages. The label does not scroll off of the screen.

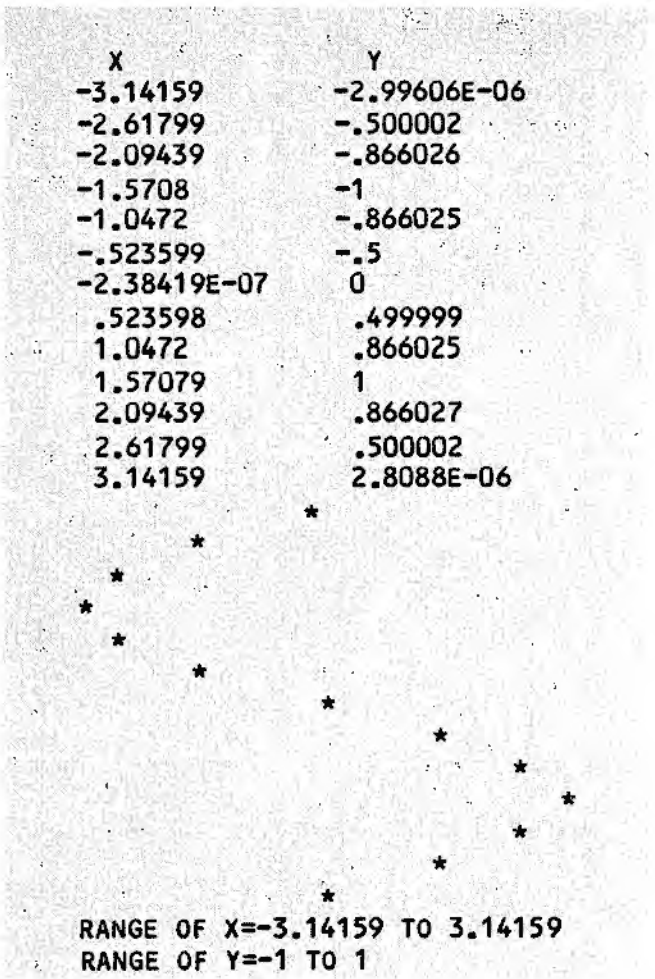

Figure 1

Tabulating and plotting a function

Listed with this article is a program which uses the prior concepts to tabulate and plot the sine function (SIN(T)). To accomplish these objectives four primary tasks must be performed: (1) initialization of the program, (2) computation of data, (3) tabulation of the data, and (4) graphing the data.

In most numerical graphing problems, the range of the numbers to be plotted will not conform to the dimensions of your video screen or printer. Thus, the computed values must be "scaled" in the direction of both the X and Y axes.

For programming ease, we have chosen to display the X axis in the vertical direction and the Y axis in the horizontal direction. The STRING$ statement will be used to build a string of an appropriate length in the horizontal direction of the Y axis (line 380). The number of intervals in the designated range of X will determine the angular scaling (lines 60, 130, 140). Each interval will occupy one line of output.

Note that scaling in both X and Y directions demands knowledge of the maximum and

See BASIC INTERACTIONS, page 60

```
10 REM**********DEMONSTRATION FUNCTION
   PLOTTING ROUTINE******
20 REM****   INITIALIZE  *************
30 CLEAR 1000
40 DIM Y(15), X(15)
50 CLS
60 NL = 12
70 INPUT "PRINTER OUTPUT?(Y/N)"; P$
80 REM *******   COMPUTE RESULTS WITHIN
   DESIGNATED RANGE ***
90 INPUT "ENTER MIN,MAX VALUES OF 'X'";
   DN, UP
100 RNG = UP - DN
110 N = 0
120 BG = - 99999 : SM = 99999
130 ST = RNG/NL
140 FOR T = DN TO UP STEP ST
150 N = N + 1
160 X(N) = T
170 REM FUNCTION IS DEFINED IN THE NEXT
   LINE
180 Y(N) = SIN(T)
190 IF Y(N) > BG THEN BG = Y(N)
200 IF Y(N) < SM THEN SM = Y(N)
210 NEXT T
220 YR = BG - SM
230 REM * DISPLAY NUMERICAL RESULTS *
240 CLS
250 PRINT "  X", "  Y"
260 IF P$="Y" THEN LPRINT "  X", "  Y"
270 FOR K = 1 TO N
280 PRINT X(K), Y(K)
290 IF P$ = "Y" THEN LPRINT X(K), Y(K)
300 NEXT K
310 INPUT "PRESS ENTER TO CONTINUE";A$

320 REM *  GRAPH RESULTS  *
330 CLS
340 FOR NN = 1 TO N
350 WS = 31 : WP = 31
360 DIST =(WS - 1) *(Y(NN) - SM)/YR
370 PD =(WP - 1) *(Y(NN) - SM)/YR
380 PRINT STRING$(DIST, CHR$(132)); CHR
  $(157)
390 IF P$="Y" THEN LPRINT TAB(PD)"*"
400 NEXT NN
410 PRINT "RANGE OF X="; DN; "TO"; UP
420 IF P$="Y" THEN LPRINT "RANGE OF X="
  ; DN; "TO"; UP
430 PRINT "RANGE OF Y="; SM; "TO"; BG
440 IF P$="Y" THEN LPRINT "RANGE OF Y="
  ; SM; "TO"; BG
450 INPUT "(N)EW PLOT OR (E)ND"; A$
460 IF A$ = "N" THEN GOTO 50
```


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continued from page 58

minimum values of X and Y. The range of X is defined in line 90. The range of Y is found in the course of computing values in lines 120, 190 and 200.

Remember that the sine function utilizes angles in radians instead of degrees. The input in line 90 for the sine function should therefore be in radians. Try the following limits in line 90: 0, 3.14159; -3.14159, 3.14159; 0, 6.28318. The formula for conversion of degrees to radians is:

Radians = (3.14159)*(degrees/180)

The above limits in degrees are: 0, 180; -180, 180; and 0, 360.

Discussion

The function plotting program illustrates the fundamental problems of scaling and use of ASCII characters. It is relatively short and serviceable. The next logical improvement would be the introduction of labeled axes. A more complete function graphing program was previously published and documented (references 2 and 3).

The width of the video screen graph was limited to 32 spaces to accommodate the TRS-80 color computer. The variable WS can be redefined in line 350 for wider screens. Similarily the variable WP can be redefined in line 350 for wider printers. The precision of printer plots can be further increased by increasing the number of lines (NL) in line 60. The program can be adapted to the Pocket Computer with printer interface by deleting extraneous statements, appropriately renaming the variables and adjusting the output to 16 characters per line.

Note that the program flow in line 460 returns to line 50 and avoids the clear statement in line 30. Thus, after the first pass, the program will repeat by merely pressing ENTER.

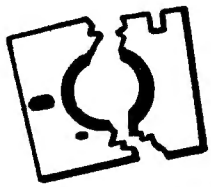
Finally, returning to strings, you should experiment with the "graphics fill" (STRING$(DIST,CHR$(132)) and the graphics symbol (CHR$(157)) of line 380. The numbers 132 and 157 were chosen arbitrarily. The previous exercises probably have generated different choices for you. For bar graphs you may want these two symbols to be identical. Note that in line 390 an alternate, safe and quick way of plotting without "fill" is the use of the TAB statement.

References:

1. Bahn, R C., Basic Interactions (ASCII Code); 80U.S. Jul/Aug 81 pp 70-74

2. Groth, R., Function Grapher/Root Finder; 80U.S. Nov/Dec 79 pp 18-20

3. Bahn, R C., Anatomy (Function Grapher); 80U.S. Nov/Dec 79 p 22



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8. Documentation (listing, variable lists etc.) complete..
9. Program meets advertised claims.....
10. Program meets the use for which it was designed.....
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For Model I and III, disk or tape...

Computing the retail installment contract

Charles P Knight
2708 Roberts Circle
Arlington, Texas 76010

In the retail television and appliance business there is a real need to have complete financing information readily available at the point of sale. Anyone who is engaged in this highly competitive business knows how important it is to be able to answer the customer's questions about financing their purchase quickly and accurately. Many a sale has been lost because the salesman could only clumsily answer questions such as, "How much will the monthly payments be if I pay an extra $50.00 down or take an extra six months to pay?". This program will allow the salesman to answer these and other financing questions immediately

and accurately. This added professionalism could be the difference between closing a sale and losing it to a competitor.

The Retail Contract

Most consumer financing of small loans is done on what is known as the Retail Installment Contract. The exact terms of this contract are regulated by the Federal Government Truth in Lending Regulation Z, and by state government regulations. These are different for each state. Since the requirements of the state of Texas are somewhat representative of other states, they have been used in this program. (You may have to modify the program for your state's requirements.) The maximum add-on rate in Texas is twelve percent per annum on the first $500.00 and eight percent on all amounts above $1000.00. This is an add-on rate and is figured somewhat differently from the way a home mortgage is calculated. For example, if a loan of $100 is made for a period of three years, the interest or "finance charge" would be $36.00 (100 × .12 × 3). This results in a higher rate for smaller loans offsetting the greater risk and costs involved in handling these smaller types of loan.

The federal government, on the other hand, requires that the interest rate be reported to the consumer as an "Annual Interest Rate" and requires that it be "calculated according to the actuarial method of allocating payments made on a debt between the amount financed and the finance charge". This is called the "Annual Percentage Rate" and must appear on the contract the customer signs and on all advertising where contract terms are published. The formula for calculating the true interest rate is:

$$\frac{2 \times NPY \times I}{P \times (NP+1)}$$

where NPY is the number of payment periods to occur in one year (this will always equal 12 on a monthly payment plan and 52 on a weekly plan regardless of the length of the note). I is the amount of the finance charge and P is the principal or amount financed. NP is the total number of payments which are made.

The Truth in Lending Law also requires that the total cost of the merchandise including tax, finance charge and all other charges be given on the contract. This is the "Deferred Payment Price", and is the total cost of the merchandise to the consumer. The total amount of the loan is also given as the "Balance to Finance". It is also sometimes called the "Total of Payments" and is, or should be, self-explanatory.

Also displayed is the amount of each payment required to pay the note. The final payment includes any fractional amounts and may be either larger or smaller than the other payments by a few cents. Essentially however, the payments are equal, since they must be, for the other calculations to be valid.

Options in the Program

Occasionally, a customer will want to know what the "payoff" will be if they finance for 36 months and wish to pay the note early. Almost all commercial paper of this type includes a clause for interest apportionment according to the "Rule of 78's" or the "Sum of the Digits" method. This allows the larger part of the interest to be earned in the earlier months of the note, again to allow for the greater risk and smaller return of this type of contract. Basically, it works like this: In one year there are 12 months. The sum of the digits 1, 2, 3.., 12 is equal to 78 (hence the name of the rule). In the first month 12/78ths of the interest is earned, and in the last month only 1/78th is earned. For a 2 year note, the total of 156 and the first month's earned interest would be 24/156ths and so on. Whether this is fair to the consumer is questionable and not within the scope of this article. This is the way it is usually done. The program allows the salesman to show the customer exactly what the note balance will be at any time and will provide as many hard copies as needed for this purpose.

Running the Program

When the program first comes up, it asks if you want instructions. A reply of ENTER will display the first page of instructions. After the instructions, a form is presented for you to fill in. The first blank is for an item description if desired. If you will ultimately need a printout it is advisable to input a description. The only place this description is used is on the hard copy printout. If you aren't going to request hard copy later on, you may simply press the ENTER key here. Next you enter the price per item of the merchandise. This phase of program operation functions somewhat like a cash register, so the computer does most of the calculating for you.

Next, you are asked for the number of items. The program will not accept garbage (like negative numbers) here. The next input is to determine if the item is taxable under your state's sales tax law. The default here is YES. If you press any other input besides "N" or "NO" the program assumes it is a taxable item and computes tax accordingly. The next question is: "More items?". Again, the default is YES, so you must answer "N" or "NO" here to exit this phase of the program.

When you have entered all your items, the lower part of the screen clears, and you are presented with the total for all the items you entered in the first phase including the tax on the items which you entered as taxable. The program now wants to know how much the customer wants to pay down and how long he wishes to finance the purchase.

```
**************************************************************
*** RETAIL INSTALLMENT CONTRACT (C) 1980 BY CHARLES P. KNIGHT ***
**************************************************************
SOLD BY                          CUSTOMER
PUT YOUR BUSINESS' NAME HERE     Hap P. Customer
YOUR ADDRESS GOES HERE           P. O. Box 6072
YOUR CITY GOES HERE              Arlington, Texas 76011
YOUR PHONE NUMBER HERE           (817) 640-4452
          A LINE OF DESCRIPTIVE ADVERTISING HERE
**************************************************************

QTY     DESCRIPTION OF ITEM              PRICE          TOTAL
 1      Color Television set           $599.95        $599.95 +
 1      Video Tape Recorder            $799.95        $799.95 +
 1      Color TV Antenna                $24.95         $24.95 +
 125    Lead-in cable                    $0.11         $13.75 +
 8      Stand-off insulators             $0.35          $2.80 +
 1      Three-year service policy       $99.95         $99.95
                              TAXABLE TOTAL    --->   $1441.40
                              NON-TAXABLE TOTAL --->    $99.95
                              SALES TAX        --->     $72.07
                              TOTAL            --->   $1613.42
--------------------------------------------------------------

        TOTAL AMOUNT                                  $1613.42
        DOWN PAYMENT                                   $213.42
        BALANCE TO FINANCE                            $1400.00
        35 PAYMENTS OF   $50.72 EACH
        AND A FINAL PAYMENT OF   $50.80
        ANNUAL PERCENTAGE RATE                          19.74%
        DEFERRED PAYMENT PRICE                        $2039.42
        FINANCE CHARGE                                 $426.00
        TOTAL AMOUNT FINANCED                         $1826.00
```

ABOVE: Sample retail installment contract

BELOW: Rule of 78's apportionment

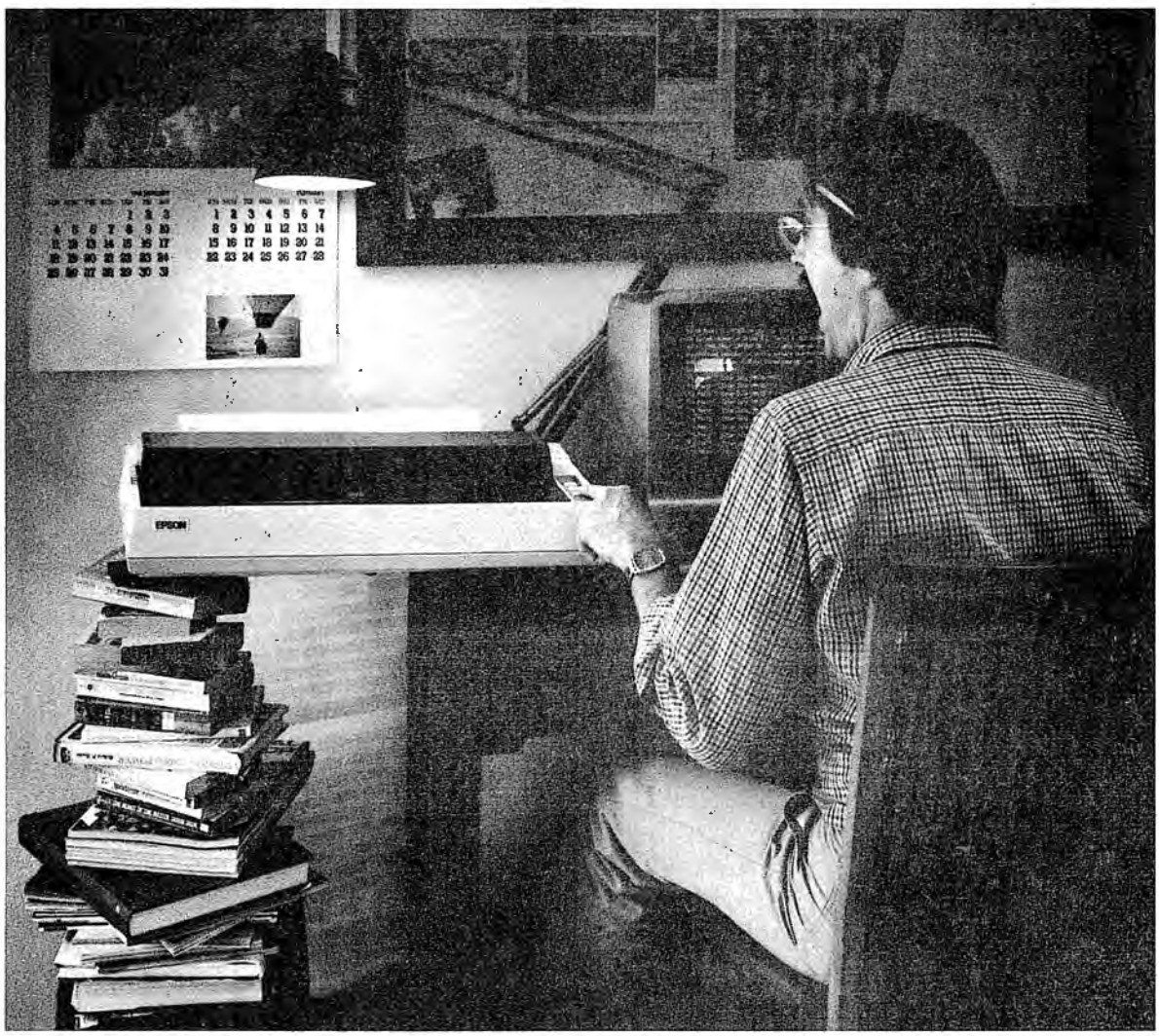
```
**************************************************************
          RULE OF 78'S INTEREST APPORTIONMENT
**************************************************************
PAYMENT MONTH'S   EARNED     UNEARNED   ACCOUNT    PAYOFF
NO.     INTEREST  INTEREST   INTEREST   BALANCE    BALANCE
  1     $23.03    $23.03     $402.97    $1775.20   $1372.23
  2     $22.39    $45.41     $380.59    $1724.48   $1343.89
  3     $21.75    $67.16     $358.84    $1673.76   $1314.92
  4     $21.11    $88.27     $337.73    $1623.04   $1285.31
  5     $20.47   $108.74     $317.26    $1572.32   $1255.06
  6     $19.83   $128.57     $297.43    $1521.60   $1224.17
  7     $19.19   $147.76     $278.24    $1470.88   $1192.64
  8     $18.55   $166.31     $259.69    $1420.16   $1160.47
  9     $17.91   $184.22     $241.78    $1369.44   $1127.66
 10     $17.27   $201.49     $224.51    $1318.72   $1094.21
 11     $16.63   $218.12     $207.88    $1268.00   $1060.12
 12     $15.99   $234.11     $191.89    $1217.28   $1025.39
 13     $15.35   $249.46     $176.54    $1166.56    $990.02
 14     $14.71   $264.17     $161.83    $1115.84    $954.01
 15     $14.07   $278.24     $147.76    $1065.12    $917.36
 16     $13.43   $291.68     $134.32    $1014.40    $880.08
 17     $12.79   $304.47     $121.53     $963.68    $842.15
 18     $12.15   $316.62     $109.38     $912.96    $803.58
 19     $11.51   $328.14      $97.86     $862.24    $764.38
 20     $10.87   $339.01      $86.99     $811.52    $724.53
 21     $10.23   $349.24      $76.76     $760.80    $684.04
 22      $9.59   $358.84      $67.16     $710.08    $642.92
 23      $8.95   $367.79      $58.21     $659.36    $601.15
 24      $8.32   $376.11      $49.89     $608.64    $558.75
 25      $7.68   $383.78      $42.22     $557.92    $515.70
 26      $7.04   $390.82      $35.18     $507.20    $472.02
 27      $6.40   $397.22      $28.78     $456.48    $427.70
 28      $5.76   $402.97      $23.03     $405.76    $382.73
 29      $5.12   $408.09      $17.91     $355.04    $337.13
 30      $4.48   $412.57      $13.43     $304.32    $290.89
 31      $3.84   $416.41       $9.59     $253.60    $244.01
 32      $3.20   $419.60       $6.40     $202.88    $196.48
 33      $2.56   $422.16       $3.84     $152.16    $148.32
 34      $1.92   $424.08       $1.92     $101.44     $99.52
 35      $1.28   $425.36       $0.64      $50.80     $50.16
 36      $0.64   $426.00       $0.00       $0.00      $0.00
```

The values entered here are not permanent - you may change them later if the figures are not to the customer's liking. Next, you need to tell the program how much add-on interest you wish to charge. This value is entered as a whole number and not as a decimal. If you wish to use the routine for 12 - 10 - 8 percent as is used in Texas and many other states, you may enter a "T". The program will calculate the finance charge, balance to finance, payments, annual percentage rate, deferred payment price, and the total amount financed. This information is now displayed for you to examine as long as you like. The flashing ENTER on the screen reminds you that the computer is ready to go on whenever you are.

Pressing the ENTER key at this point brings you to the main menu. You have several options at this point. If you want to change the down payment, the interest rate, or the length of the note, press "T" and you will regress in the program to the point where you may change this input. You will not return to the menu until the financial information has been recalculated and displayed again. When you are satisfied with the terms of the contract, you may request a printout. This is done by pressing "P" or just ENTER at the main menu. You will then be asked for the name, address, city and telephone number of your customer. This provides a permanent record of what terms you discussed should the customer return at a later time claiming you said something else. Any salesman knows that people are prone to do this sort of thing on occasion. You may make as many copies of this as you want and will always be returned to the main menu. You will not be required to enter the customer's name each time you want a printout, just the first time. From the main menu you may also request an amortization schedule calculated on the Rule of 78's, discussed above. Enter a "7" for screen output or a "7P" for screen and printed ouptut. Both the printout and the display provide the following information: Payment number, Earned interest for the current month, Accumulated interest, Interest which at this point remains to be earned, the book balance of the loan and the amount needed to pay the loan off if it is paid in full before the payment for the current month is due. If the print option is not selected, the program pauses after every six months so you may examine the values calculated for any month for as long as you like. When the last page of data has been displayed, pressing ENTER will return you to the main menu. If you wish to run the progam again, press "R" or to end the program, press "E".

Modifying the program to fit your needs

Before running the program, you must modify certain lines in it to suit your state's tax rate and insert your company name in the appropriate places. In line 160, assign your company name to



The MX-100. Not just better. Bigger.

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Our MX-80 was a pretty tough act to follow. I mean, how do you top the best-selling printer in the world?

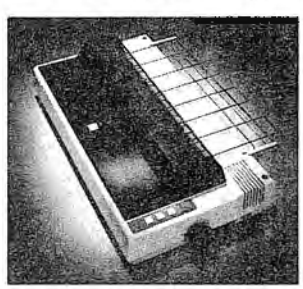
Frankly, it wasn't easy. But the results of all our sleepless nights will knock your socks off.

The MX-100 is a printer that must be seen to be believed. For starters, we built in unmatched correspondence quality printing, and an ultra-high resolution bit image graphics capability. Then we added the ability to print up to 233 columns of information on 15" wide paper to give you the most incredible spread sheets you're ever likely to see. Finally, we topped it all off with *both* a satin-smooth friction feed platen *and* fully adjustable, removable tractors. And the list of standard features goes on and on and on.

Needless to say, the specs on this machine — and especially at under $1000 — are practically unbelievable. But there's something about the MX-100 that goes far beyond just the specs; something about the way it all comes together, the attention to detail, the fit, the feel. Mere words fail us. But when you see an MX-100, you'll know what we mean.

All in all, the MX-100 is the most remarkable printer we've ever built. Which creates rather a large problem for those of us at Epson.

How are we going to top this?



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C1$, your address to C2$, etc. In line 180, make the variable TX equal to your local tax rate. This percentage is entered as a decimal number. If your state charges 3% (we should be so lucky) then make line 180 read:

```
180  TX=.03:GOSUB 530
```

or, if you have no sales or use tax, make line 180 read:

```
180  TX=0:GOSUB 530
```

Lines 110 to 200 provide program initialization. 2000 bytes are set aside for strings in line 110 and the variables "N" and "D" are declared double precision in line 120. These are the variables used as the numerator and denominator in the annual percentage rate calculation in line 1090. This increases the accuracy of this calculation somewhat, but it is not entirely necessary for correct program operation. Line 130 dimensions the arrays which hold the description, price, tax status, etc. for each item entered. You may increase or decrease this according to need and memory capacity. I have never written an invoice in the television retail business which had that many items. Five or six is typical, but it is better to have more space for these values than less. K$ and KK$ are the format strings for the PRINTUSING statements later in the program. When keying in this program it is necessary to count the spaces in these and other strings carefully. The screen is tightly formatted, and missing or extra spaces and missing semicolons will wreak havoc with the screen border. Be careful when keying in this program and you will have a nice presentation, be sloppy and you will be lucky if you can use the program at all. Heed this carefully, you can modify the program later. For now, key in all the spaces shown to preserve the format of the screen.

Line 170 determines whether a Model I or Model III TRS-80 is being used. The Model III has no space compression codes, since these ASCII values are being used for it's special character set. In the Model III, memory location 293 will always equal 73 and in the Model I it will never equal 73. If a Model I is used, the space compression codes allow the lower part of the screen to be cleared more quickly. This peek is an excellent way for a program to know what kind of machine is running it.

Lines 190 to 340 take care of getting the input for the first phase of the program. Before entering the data input subroutine at lines 360 to 470, it is necessary to inform the routine where on the screen to begin accepting input and where to stop accepting it. The difference between these two is the maximum length of data the routine will accept. S% is the starting and E% is the ending point. The subroutine calculates the length and stores it in C. The routine returns the values input as TT$ and the program extracts the value of TT$ for numeric values or assigns the string to another variable. This subroutine takes care of providing a flashing cursor, the speed of which may be adjusted by changing the FOR ... NEXT loops in line 370. If you're a fast typist, you might wish to lower these values somewhat. If you type slow, you can increase these values slightly, but this will slow down the computer's ability to accept data. If your machine has the Scripsit modification, the period will be in the exact center of the graphic block, otherwise the block will seem to set on top of the period. Line 400 wipes off the periods which were not used and then returns to the calling routine. This line is reached only when the ENTER key is pressed, and this is the only way to get out of the input routine. Lines 410 to 470 test for the backspace key or for illegal characters and deals with them accordingly.

The routine at lines 910 and 920 are the flashing ENTER routine. When I demonstrated this routine recently at the Mid-Cities TRS-80 User's Group in Arlington, Texas, it generated almost as much excitment as the rest of the program. It shows what can be accomplished in only two lines of code. It also assures the operator that his machine is still running and not wandering aimlessly around the dark regions of ROM. You can change the values in the FOR ... NEXT loops to make it flash faster or slower. By sampling the INKEY$ in line 910 before the loop, the buffer is cleared and the program will not respond to a key pressed before the ENTER begins flashing.

The program then branches past the input, instructions, and PRINTUSING array initialization routines to reach the point where bulk of the calculation takes place. This part of the program is generously gifted with REM statements, so that program flow may be followed easily.

The main menu begins at line 1260 and the sampling of the input occurs beginning at line 1340. The program then branches to the requested routines. If printout has been selected, and the computer has not yet received input for the customer's name as determined by the flag SK%, then this input is now requested. If this is the second printout, the inputs are not required, and lines 1410 through 1480 are skipped and the printout begins. After the printout, the main menu is displayed again and all options are still available.

The routine at lines 1800 - 1890 calculates the finance charge for 12 - 10 - 8 percent. If you live in a state which allows different rates, you should modify this routine to suit your state's laws. This routine is valid for most states, but check your local courthouse or library to be sure.

Lines 1900 through 2100 calculate the Rule of 78's amortization table and print it on the screen or printer. Lines 1910 to 1930 print the header for the printout; the screen header is printed in the

OMNI-KEY: The Utility for Mere Humans

Mere humans. Sounds insulting, doesn't it? But the fact is, our computers tower over us in one principal virtue. Patience. They can await input for days on end without becoming bored. They can digest DATA statement after endless DATA statement and not once complain of the tedium. They endure our most serious blunders with aplomb. And we humans? We curse the monotony of program entry, mutter at our clumsiness with EDIT, and rail at Tandy for their %#&!%! inadequate keyboard. *Aargh!* Computers are supposed to relieve this tiresome aggravation, not intensify it! Why doesn't somebody do something?

We have. We wrote OMNI-KEY. And if you had OMNI-KEY, your programming would not only be less tiresome, but more productive. How? Well, when was the last time these little annoyances got under *your* skin?

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Repetitive Keying of the Same Character. OMNI-KEY has autorepeat. Hold *any* key down, and it repeats about eight per second.

Typing Out Common Keywords. OMNI-KEY lets you assign BASIC keywords to the *SHIFT*-letter keys. Type *SHIFT*-P, for example, and you get PEEK(, or whatever *you've* made that key represent.

Repetitive Keying of Similar Phrases. Have you typed "DATA x, y, z *ENTER*" one too many times? OMNI-KEY's macro key types the repetitive stuff with a single keystroke. You just fill in the blanks. In fact, it's possible to enter hundreds of DATA statements in a row without typing line numbers, "DATA", or the commas! OMNI-KEY's unique macro pause and macro repeat make it possible. And *you* program the macro key any time and any way (up to 80 characters) you see fit.

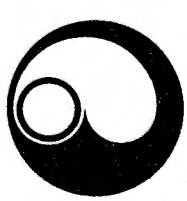
The "What's on the right of the cursor?" EDIT Mode. Come on. You don't *need* to put up with this half-blindness when editing a program. If the statement is listed on the screen (even a multi-liner), OMNI-KEY lets you edit it *in place and in full view* with its movable cursor. And you don't need any fancy commands to do it, either. To insert characters, just type them -- the lines will shift to accomodate them. Deletions are even easier -- just hit the *CLEAR* key. Need to move a statement? Just edit the line number! It's that easy.

Separate Drivers for Lower-case, Printers, Video Display, etc., etc. OMNI-KEY has its own lower-case driver and shifting built in. But the real beauty of the beast is what *you* can add to it. If you can use the Editor/Assembler, you can write your own OMNI-KEY modules. OMNI-KEY has a configuration mode which reads your specially-assembled SYSTEM tapes and merges them with the OMNI-KEY functions into *one single load module*. OMNI-KEY, in its standard and customized forms is equally at home with Level II or Disk BASIC, and you don't even have to set MEMORY SIZE to use it! Just enter BASIC, LOAD or CLOAD OMNI-KEY and RUN. It activates itself, reserves its own memory, and waits in the background until needed. Pretty simple.

Simplicity. That's the power of OMNI-KEY. It's simple, it's easy to live with, and it lets you, the programmer, do what you do best. Program. Without the tedium, without the aggravation, and, best of all, without spending a lot of bucks. At only $23, OMNI-KEY has got to be the best deal going! And if you're a mere human, that's something to think about.

OMNI-KEY *cassette for TRS-80 Model I, Level II and Disk BASIC, instructions, postpaid to any U. S., Canadian, or Mexican address. Others are F. O. B. Port Townsend. VISA and Mastercharge are welcome. Dealer inquiries are invited.*

$23



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subroutine at 2080 and 2090. LP% is the flag denoting whether printout has been requested. PA% holds the screen location for the beginning of the next line of printout. It is incremented by 64 each time a line is printed to the screen. In line 2000, the printer will double space if the printout would be unsightly due to its brevity on 24 month or shorter notes. Line 2060 issues a form feed to the printer when printing is finished. If your printer does not recognize form feeds, you may wish to use a routine here to advance to the top of the form. Perhaps this will work:

```
2060 IF LP% THEN FOR Z = PEEK(16425) TO 66:
  LPRINTCHR$(138): NEXT Z: POKE 16425,0
```

The same technique can be used in line 1770 also.

This program is completely compatible with Microsoft's BASIC Compiler and will compile without problems in their version 5.23 and higher. Some of the early versions of this compiler will not accept statements like 1770, where LPRINT, TAB, and USING are used together. Microsoft has corrected this in their later releases. Line 110 will generate an SI error, but this is not a fatal error and can be ignored. The flashing ENTER routine will now behave strangely because the computer is flashing it faster than the video raster is scanning that part of the screen. This interesting wiping effect is not obtainable any other way on the TRS-80.

A great deal of effort went into the preparation of this program. I hope it will save you time and trouble. If it helps you complete just one difficult sale you would not otherwise have completed, it will have proved its worth many times over. The use of the computer in the customer's presence can be an effective sales tool in the hands of a good salesman. No doubt the availability of instant sales data will save a good deal of time even if its benefits are not recognized by the customer. If you can find a unique application for this program or think of a useful addition or modification for it, I would appreciate hearing about it.

```
10 REM*********************************
  **************
20 REM*****  RETAIL INSTALLMENT CONTRAC
  T PROGRAM  ***
30 REM*****  CALCULATES THE PAYMENTS, F
  INANCE CHG ***
40 REM*****  APR, TAX, AND OTHER INFORM
  ATION      ***
50 REM*****  REQURIED ON A RETAIL INSTA
  LLMENT     ***
60 REM*****  CONTRACT. COPYRIGHT (c) 19
  80         ***
70 REM*****  BY CHARLES P. KNIGHT PO BO
  X 6072     ***
80 REM*****  ARLINGTON, TEXAS 76011 01/
  14/81      ***
90 REM*****  MINIMUM SYSTEM ; TRS-80 LI
  I 16K      ***
100 REM*********************************
  **************
110 CLEAR2000
120 DEFDBLN,D
130 DIMNA$(35),A1(35),A2(35),A4(35),TF(
  35),A$(12)
140 K$="### $$####.## $$####.## $$####.
  ## $$####.## $$####.## $$####.##"
150 KK$="###  $$####.##  $$####.##  $$#
  ###.##  $$####.##  $$####.##"
160 C1$="PUT YOUR BUSINE$S' NAME HERE":
  C2$="YOUR ADDRESS GOES HERE":C3$="YOU
  R CITY GOES HERE":C4$="YOUR PHONE NUM
  BER HERE":C5$="A LINE OF DESCRIPTIVE
  ADVERTISING HERE"
170 IFPEEK(293)=73THENCS$=STRING$(57,32
  )ELSECS$=CHR$(250):REM THIS DETERMINE
  S WHETHER A MODEL III OR A MODEL 1 IS
   BEING USED. MODEL III HAS NO SPACE C
  OMPRESSION CODES
180 TX=.05:GOSUB530:REM TX= STATE SALES
   TAX RATE
190 CLS:PRINT@133,"RETAIL INSTALLMENT C
  ONTRACT (c) 1981 CHARLES P. KNIGHT";
200 GOSUB490
210 PRINT@518,"NEED INSTRUCTIONS?";:S%=
  539:E%=543:GOSUB360
220 IFLEFT$(TT$,1)="n"ORLEFT$(TT$,1)="N
  "THENGOSUB510:GOTO270
230 GOSUB510
240 GOSUB670
250 GOSUB910
260 GOSUB510
270 GOSUB810:S%=410:E%=439:GOSUB360:NA$
  (K)=TT$:REM GET ITEM NAME
280 S%=468:E%=477:GOSUB360:A2(K)=VAL(TT
  $):REM GET PRICE OF ITEM
290 IFA2(K)<=0THEN280
300 S%=541:E%=544:GOSUB360:A1(K)=VAL(TT
  $):REM GET QUANTITY
310 IFA1(K)<1THEN300
320 S%=609:E%=612:GOSUB360:IFLEFT$(TT$,
  1)="N"ORLEFT$(TT$,1)="n"THENTF(K)=0EL
  SETF(K)=-1:REM SET FLAG FOR TAXABLE
330 S%=663:E%=666:GOSUB360:IFLEFT$(TT$,
  1)="N"ORLEFT$(TT$,1)="n"THENMI=0ELSEM
  I=-1:REM MORE ITEMS TO ENTER?
340 IFMITHENK=K+1:GOSUB510:GOTO270ELSEG
  OSUB530:GOTO930:REM IF MORE ITEMS REP
  EAT
```

```
350 REM          DATA INPUT SUBROUTINE
360 C=E%+1-S%:TT$="":PRINT@S%,STRING$(C
  ,".");:M1=S%:X$=INKEY$
370 FORWL%=1TO5:NEXTWL%:PRINT@M1,CHR$(1
  40);:X$=INKEY$:FORWL%=1TO5:NEXTWL%:PR
  INT@M1,".";:IFX$=""THEN370
380 IFX$=CHR$(13)THEN400ELSEIFX$=CHR$(8
  )THENGOSUB440ELSEGOSUB410
390 GOTO370
400 TT$=RIGHT$(TT$,C):PRINT@M1,STRING$(
  C-LEN(TT$),32);:RETURN
410 IFASC(X$)<32ORASC(X$)>122THENRETURN

420 PRINT@M1,X$;:TT$=TT$+X$:M1=M1+1:IFM
  1>E%THENM1=E%
430 RETURN
440 M1=M1-1:IFM1<S%THENM1=S%
450 PRINT@M1,".";:TT$=LEFT$(TT$,M1-S%)
460 IFM1<S%THENM1=S%
470 TT$=LEFT$(TT$,M1-S%):RETURN
480 REM          SET UP SCREEN BORDER
490 PRINT@0,STRING$(67,191);:PRINT@125,
  STRING$(6,191);:PRINT@189,STRING$(6,1
  91);:PRINT@253,STRING$(70,191);:PRINT
  @381,STRING$(6,191);:PRINT@445,STRING
  $(6,191);:PRINT@509,STRING$(6,191);:P
  RINT@573,STRING$(6,191);:PRINT@637,ST
  RING$(6,191);
500 PRINT@701,STRING$(6,191);:PRINT@765
  ,STRING$(6,191);:PRINT@829,STRING$(6,
  191);:PRINT@893,STRING$(6,191);:PRINT
  @957,STRING$(66,191);:POKE16383,191:R
  ETURN
510 FORI%=323TO941STEP64:PRINT@I%,CS$;:
  NEXTI%:RETURN:REM CLEAR LOWER PART OF
   SCREEN
520 REM          INITIALIZE A$ ARRAY FOR
   LATER USE WITH PRINT USING
530 A$(0)="TOTAL PRICE INCLUDING TAX
                $$#####.##"
540 A$(1)="SALES TAX
                $$#####.##"
550 A$(3)="TOTAL AMOUNT
                $$#####.##"
560 A$(4)="DOWN PAYMENT
                $$#####.##"
570 A$(5)="BALANCE TO FINANCE
                $$#####.##"
580 A$(6)="## PAYMENTS OF $$###.## EACH
   "
590 A$(7)="AND A FINAL PAYMENT OF $$###
  .##"
600 A$(8)="ANNUAL PERCENTAGE RATE
                   ##.##"
610 A$(9)="DEFERRED PAYMENT PRICE
                $$#####.##"
620 A$(10)="FINANCE CHARGE
                $$#####.##"
630 A$(11)="TOTAL AMOUNT FINANCED
                $$#####.##"
640 A$(12)="$$#####.##"
650 RETURN
660 REM          FILL SCREEN WITH INSTRU
  CTIONS
670 PRINT@388,"THIS  PROGRAM  CALCULATE
  S THE  NEEDED ENTRIES  ON A";
680 PRINT@452,"RETAIL  INSTALLMENT CONT
  RACT. OPTIONS ARE GIVEN FOR";
690 PRINT@516,"PRINTED  OUTPUT  IF YOU
   HAVE A PRINTER.  IF YOU DO";
700 PRINT@580,"NOT USE  A PRINTER,  IT
  IS NOT NECESSARY FOR YOU TO";
710 PRINT@644,"INPUT ANYTHING WHEN ASKE
  D FOR THE ITEM DESCRIPTION.";
720 PRINT@708,"WHEN YOU  ARE ASKED FOR
   A YES OR NO INPUT, YOU MAY";
730 PRINT@772,"INPUT ONLY THE Y OR THE
  N IF YOU WISH.";
740 GOSUB910:GOSUB510
750 PRINT@388,"WHEN YOU ARE ASKED TO IN
  PUT THE ADD-ON INTEREST  RATE,";
760 PRINT@452,"YOU MAY ENTER  ";CHR$(34
  );"T";CHR$(34);" FOR THE TEXAS  MAXIM
  UM  RATE OF 12%";
770 PRINT@516,"ON THE FIRST  $500,  10%
   ON THE NEXT  $500,  AND 8% ON";
780 PRINT@580,"THE AMOUNT  OVER  $1000.
  ";
790 RETURN
800 REM          PRINT INPUT PROMPT MESS
  AGES FOR ITEMS
810 PRINT@388,"DESCRIPTION OF ITEM :";
820 PRINT@452,"PRICE PER ITEM $";
830 PRINT@516,"HOW MANY OF THIS ITEM :"
  ;
840 PRINT@580,"IS IT A TAXABLE ITEM (Y/
  N) :";
850 PRINT@772,"ITEM NO. ";:PRINTUSING"#
  #";K+1;:PRINT" MAXIMUM 35.";
860 PRINT@644,"MORE ITEMS (Y/N) :";:RET
  URN
870 REM          SET UP INPUT PROMPTS FO
  R FINANCING TERM INPUT
880 PRINT@581,"ENTER THE DOWN PAYMENT
  $";
890 PRINT@645,"ENTER THE NUMBER OF MONT
  HLY PAYMENTS :";
900 PRINT@709,"ENTER THE ADD-ON INTERES
  T RATE :";:RETURN
```

```
910 PRINT@901,"PRESS <      > TO CONTINU
  E.............................";:X$=INK
  EY$
920 PRINT@908,"ENTER";:X$=INKEY$:FORWL%
  =1TO30:NEXTWL%:PRINT@908,STRING$(5,32
  );:FORWL%=1TO38:NEXTWL%:IFX$<>CHR$(13
  )THEN920ELSERETURN
930 GOSUB510:GOSUB880
940 FORKK=0TOK:REM   CALCULATE THE TAX
  AND EXTENDED AMOUNT AND TOTAL
950 A4(KK)=A2(KK)*A1(KK)
960 IFTF(KK)THENA5=A5+A4(KK)ELSEA6=A6+A
  4(KK):REM TAXABLE OR NONTAXABLE TOTAL
  S
970 NEXTKK
980 GT=(A5*TX)+A5+A6:REM GET GRAND TOTA
  L
990 ST=A5*TX:REM CALCULATE STATE TAX
1000 PRINT@389,USINGA$(0);GT;:REM  DISP
  LAY THE TOTAL AMOUNT
1010 S%=606:E%=613:GOSUB360:DP!=VAL(TT$
  ):REM  DOWN PAYMENT
1020 IFDP!<0ORTT$=""THEN1010
1030 S%=684:E%=688:GOSUB360:MP=VAL(TT$)
  :REM  # MONTHLY PMTS
1040 IFMP<0ORTT$=""THEN1030
1050 S%=741:E%=745:GOSUB360:IFLEFT$(TT$
  ,1)="t"ORLEFT$(TT$,1)="T"THENIR=999EL
  SEIR=VAL(TT$)
1060 IFIR<0ORTT$=""ORLEFT$(TT$,1)="."TH
  EN1050
1070 BF=GT-DP!:REM BALANCE TO FINANCE=T
  OTAL-DOWN PMT
1080 IFIR<>999THENV=MP/12:FC=BF*IR*V/10
  0:ELSEGOSUB1790:REM CALCULATE THE FIN
  ANCE CHARGE
1090 NY%=12:I=FC:NP=MP+1:P=BF:N=2*NY%*I
  :D=NP*P:A=CSNG(N/D)*100:REM CALCULATE
   ANNUAL PERCENTAGE RATE
1100 K1=GT+FC:REM CALC DEFERRED PMT PRI
  CE
1110 K2=BF+FC:PM=K2/MP:REM CALC BALANCE
   TO FINANCE & MONTHLY PMTS
1120 PM=INT(PM*100+.5)/100
1130 FP=K2-(INT(PM*100)/100)*(MP-1)
1140 TP=PM*(MP-1)+FP:REM CALC TOTAL OF
  PMTS
1150 GOSUB510:REM   CLEARSCREEN
1160 PRINT@325,USINGA$(3);GT;:REM  TOTA
  L AMOUNT
1170 PRINT@389,USINGA$(4);DP!;:REM  DOW
  N PMT
1180 PRINT@453,USINGA$(5);BF;:REM BALAN
  CE TO FINANCE
1190 PRINT@517,USINGA$(6);MP-1,PM;:REM
  MONTHLY PAYMENTS
1200 PRINT@581,USINGA$(7);FP;:REM FINAL
   PAYMENT
1210 PRINT@645,USINGA$(8);A;:PRINT"%";:
  REM ANNUAL PCT RATE
1220 PRINT@709,USINGA$(9);K1;:REM DEFER
  RED PMT PRICE
1230 PRINT@773,USINGA$(10);FC;:REM  FIN
  ANCE CHG
1240 PRINT@837,USINGA$(11);TP;:REM TOTA
  L OF PAYMENTS
1250 GOSUB910:REM PRESS ENTER TO CONTIN
  UE
1260 GOSUB510:REM  CLEAR SCREEN AREA
1270 PRINT@394,"ENTER ONE OF THE FOLLOW
  ING OPTIONS:";
1280 PRINT@522,"RULE OF 78'S TABLE ENTE
  R "CHR$(34)"7"CHR$(34)" OR "CHR$(34)"
  7P"CHR$(34);
1290 PRINT@458,"HARD COPY OF THIS TRANS
  ACTION ENTER ";CHR$(34);"P";CHR$(34);

1300 PRINT@650,"END PROGRAM  ";CHR$(34)
  ;"E";CHR$(34)"  RUN PROGRAM AGAIN "CH
  R$(34)"R"CHR$(34);
1310 PRINT@586,"DISPLAY CALCULATED VALU
  ES AGAIN "CHR$(34)"V"CHR$(34);
1320 PRINT@714,"TO CHANGE TERMS WITH SA
  ME SALE ENTER "CHR$(34)"T"CHR$(34);
1330 S%=785:E%=787:GOSUB360:GOSUB510:RE
  M DETERMINE OPERATOR WISH
1340 IFTT$="V"ORTT$="v"THEN1150
1350 IFTT$="7"THENLP%=0:GOSUB1900:GOSUB
  510:GOTO1270
1360 IFTT$="7P"ORTT$="7p"THENLP%=-1:GOS
  UB1900:GOSUB510:GOTO1270
1370 IFTT$="T"ORTT$="t"THENGOSUB880:GOT
  O1000
1380 IFTT$="E"ORTT$="e"THENCLS:END
1390 IFTT$="R"ORTT$="r"THENRUN
1400 IFTT$="P"ORTT$="p"ORTT$=""THENGOSU
  B1410:GOSUB510:GOTO1270:ELSEGOSUB510:
  GOTO1270
1410 IFNOTSK%THENPRINT@452,"CUSTOMER NA
  ME :";ELSE1490:REM IF CUSTOMER'S NAME
   ETC ALREADY ENTERED, SKIP ENTRY ROUT
  INE
1420 PRINT@516,"ADDRESS :";
1430 PRINT@580,"CITY, STATE, ZIP :";
1440 PRINT@644,"TELEPHONE :";
1450 S%=468:E%=500:GOSUB360:CN$=TT$:REM
    GET CUSTOMER NAME
1460 S%=526:E%=559:GOSUB360:CA$=TT$:REM
    GET CUSTOMER ADDRESS
```

```
1470 S%=599:E%=632:GOSUB360:CC$=TT$:REM
    GET CUSTOMER CITY
1480 S%=657:E%=672:GOSUB360:CT$=TT$:REM
    GET TELEPHONE #
1490 SK%=-1:LPRINTSTRING$(65,"*"):LPRIN
  TSTRING$(3,"*")" RETAIL INSTALLMENT C
  ONTRACT (C) 1980 BY CHARLES P. KNIGHT
   "STRING$(3,"*")
1500 LPRINTSTRING$(65,"*")
1510 LPRINT"SOLD BY"TAB(32)"CUSTOMER"
1520 LPRINTC1$TAB(32)CN$
1530 LPRINTC2$TAB(32)CA$
1540 LPRINTC3$TAB(32)CC$
1550 LPRINTC4$TAB(32)CT$
1560 LPRINTTAB((63-LEN(C5$))/2)C5$:REM
  CENTER ADVERTISING MESSAGE
1570 LPRINTSTRING$(65,"*")
1580 LPRINT""
1590 LPRINT"QTY     DESCRIPTION OF ITEM
                PRICE              TOTAL
  "
1600 FORKK=0TOK
1610 LPRINTSTR$(A1(KK))TAB(8)NA$(KK)TAB
  (38)USINGA$(12);A2(KK);:LPRINTTAB(55)
  ;USINGA$(12);A4(KK);:IFTF(KK)THENLPRI
  NT" +"ELSELPRINT""
1620 NEXTKK
1630 LPRINTTAB(30)"TAXABLE TOTAL      --
  ->";:LPRINTTAB(55);USINGA$(12);A5
1640 LPRINTTAB(30)"NON-TAXABLE TOTAL --
  ->";:LPRINTTAB(55);USINGA$(12);A6
1650 LPRINTTAB(30)"SALES TAX          --
  ->";:LPRINTTAB(55);USINGA$(12);ST
1660 LPRINTTAB(30)"TOTAL              --
  ->";:LPRINTTAB(55);USINGA$(12);GT
1670 LPRINTSTRING$(66,"-")
1680 LPRINTTAB(8)USINGA$(3);GT:REM    T
  OTAL AMT
1690 LPRINTTAB(8)USINGA$(4);DP!:REM
  DOWN PMT
1700 LPRINTTAB(8)USINGA$(5);BF:REM    B
  ALANCE TO FINANCE
1710 LPRINTTAB(8)USINGA$(6);MP-1,PM:REM
        AMTS OF PMTS
1720 LPRINTTAB(8)USINGA$(7);FP
1730 LPRINTTAB(8)USINGA$(8);A;:LPRINT"%
  "
1740 LPRINTTAB(8)USINGA$(9);K1:REM    D
  EFERRED PMT PRICE
1750 LPRINTTAB(8)USINGA$(10);FC:REM   F
  INANCE CHARGE
1760 LPRINTTAB(8)USINGA$(11);TP:REM   T
  OTAL OF PAYMENTS
1770 LPRINTCHR$(12):REM   ISSUE FORM FE
  ED WHEN FINISHED
1780 RETURN
1790 V=MP/12:REM THIS ROUTINE CALCULATE
  S THE 12-10-8 INTEREST RATE
1800 IFBF<=500THENFC=.12*BF*V:RETURN
1810 CA=BF-500
1820 FC=.12*500*V
1830 IFCA<500THEN1880
1840 FC=FC+(500*.1*V)
1850 CB=BF-1000
1860 FC=FC+(CB*.08*V)
1870 RETURN
1880 FC=FC+(CA*.1*V)
1890 RETURN
1900 T1=MP*(MP+1)/2:REM THIS ROUTINE CA
  LCULATES THE RULE OF 78'S INTEREST EA
  RNINGS AND REFUND
1910 IFLP%THENLPRINTSTRING$(66,"*"):LPR
  INT"              RULE OF 78'S INTERES
  T APPORTIONMENT":LPRINTSTRING$(66,"*"
  )
1920 IFLP%THENLPRINT"PAYMENT MONTH'S .
  EARNED     UNEARNED    ACCOUNT    PAYOF
  F"
1930 IFLP%THENLPRINT"NO.      INTEREST I
  NTEREST     INTEREST    BALANCE    BALAN
  CE"
1940 U=0:PA%=325:GOSUB2080
1950 FORM=1TOMP-1
1960 J=(MP-M+1)*FC/T1:U=U+J:B=FC-U
1970 BL=MP*PM:PO=BL-B
1980 BL=BL-PM*M:PO=BL-B
1990 PRINT@PA%,USINGK$;M,J,U,B,BL,PO;:P
  A%=PA%+64
2000 IFLP%THENLPRINTUSINGKK$;M,J,U,B,BL
  ,PO:IFNP<24THENLPRINT"":REM DOUBLE SP
  ACE IF THERE'S ENOUGH ROOM
2010 IFLP%AND(INT(M/6)=M/6)THENGOSUB510
  :GOSUB2080:GOTO2030
2020 IFM/6=INT(M/6)THENGOSUB910:GOSUB51
  0:GOSUB2080
2030 NEXTM
2040 PRINT@PA%,USINGK$;MP,B,U+B,0,0,0;
2050 IFLP%THENLPRINTUSINGKK$;MP,B,U+B,0
  ,0,0
2060 IFLP%THENLPRINTCHR$(12):REM FORM F
  EED WHEN FINISHED
2070 GOSUB910:GOSUB510:RETURN
2080 PA%=389:PRINT@PA%,"PMT   MONTH'S
   ACCUM     UNEARNED  NOTE      PAYOFF
  ";:PA%=PA%+64
2090        PRINT@PA%,"NO.   INTEREST
  INTEREST  INTEREST  BALANCE   BALANCE
  ";:PA%=PA%+64
2100 RETURN
```

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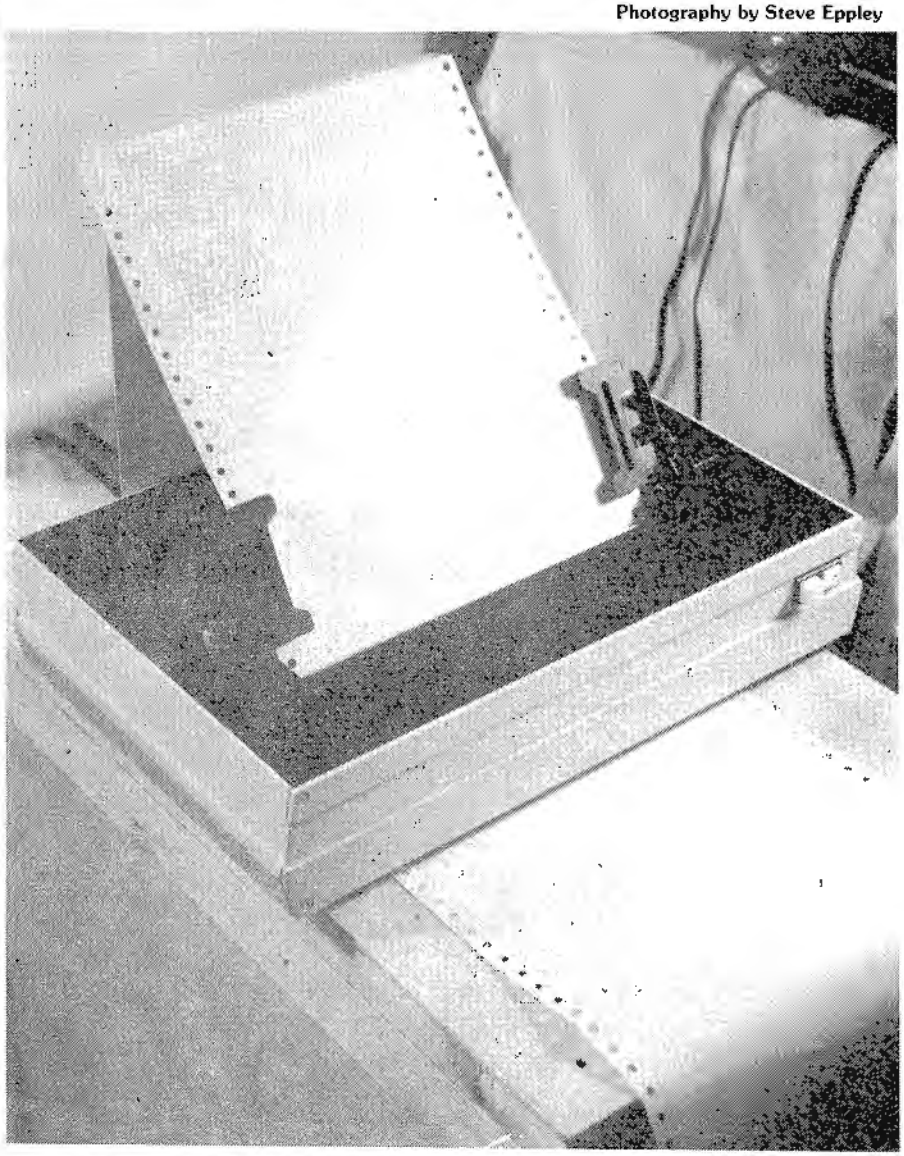
Product evaluation

Printing power for the home, in a small package...

The Base II line printer

Tom Little, Pasadena, California

Photography by Steve Eppley



The Base II Model 800 printer measures 14" wide, 10" deep and 6" tall including the tractor feed mechanism.

The age of the intelligent peripheral is truly upon us. Peripheral manufacturers have been affected by the low cost of microprocessors just like everyone else. The Base II Model 800 uses an 8085 microprocessor chip along with a large collection of software in ROM to control reception of data from the host computer, character generation, and form movement. Since these routine functions do not fully occupy the processor, the Base II people used the additional capacity of the 8085 to provide extras that are rarely found in a printer that sells for less then $700: the number of characters per line can be varied; the printer has full graphic capability; and you can even define your own character set and switch back and forth between your own custom set and ordinary ASCII!

General Description

The Model 800 accepts data over any one of four interfaces: RS-232, 20ma current loop, IEEE-488 or Centronics parallel. The interface to be used is selected by setting DIP switches on the back of the printer. The print head is a 7 wire dot matrix head, which the manufacturer rates at 100 million characters useful life. The head is moved across the paper by a unique (to my knowledge) rotating drum with a spiral groove around it. The print mechanism rides in the groove, so as the drum turns, the print head moves along the groove. Microswitches are used to detect the margins and reverse the direction of head travel. The paper feed mechanism is the usual tractor and stepper motor arrangement found on many printers. The ribbon cartridge is also similar to those found elsewhere.

Setting up the Model 800

After I got my new printer I was prepared for days of fiddling with it before getting it to work with the TRS-80. Was I wrong! The hardest part of interfacing it to my computer was finding a Radio Shack store that had a line printer cable in stock. After I had the cable, I turned everything off and unplugged it, attached the printer cable to the expansion connector at the rear of the keyboard and to the printer's "Centronics" interface, plugged it all back in and turned it on and - it worked! The Base II people, aiming at the home computer market, include default settings for the various switches that configure the printer. This default mode just happens to work perfectly with the TRS-80. All of which means you do not have to figure out every one of the numerous options before you start using your printer just set the switches in their default positions and go. Later, when you want to see what the Model 800 can do, those switches will come in handy. Feeling ready for more after my initial success, I sat down with the manual to figure out some of the options.

The Simpler Options

The first thing was to try varying the page widths. The Model 800 prints 64, 72, 80, 96, 120 or 132 characters per line. As the number of characters on a line goes up, the width of the characters goes down. I find the 120 and 132 column characters a little too small for comfortable reading, but at times being able to print them is very useful. I normally use the 96 column width. The additional 16 characters per line make listings look nicer than the standard 80 column page.

Another handy feature of the Model 800 is its ability to print elongated characters. The printer is toggled in or out of "elongated mode" when it receives a control-N; that is, if you are printing normal size characters a control-N puts it into "elongated mode" and vice versa.

The Model 800 can also be selected and deselected under program control, using the more-or-less standard control-Q to select and control-S to deselect. The other control codes recognized include the usual carriage return, line feed, and form feed codes as well as vertical and horizontal tabs. For the two tab codes, up to sixteen horizontal and ten vertical tab stops can be set under program control.

User Defined Character Set

One of the reasons for choosing the Base II Model 800 was its ability

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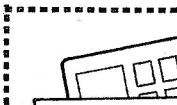

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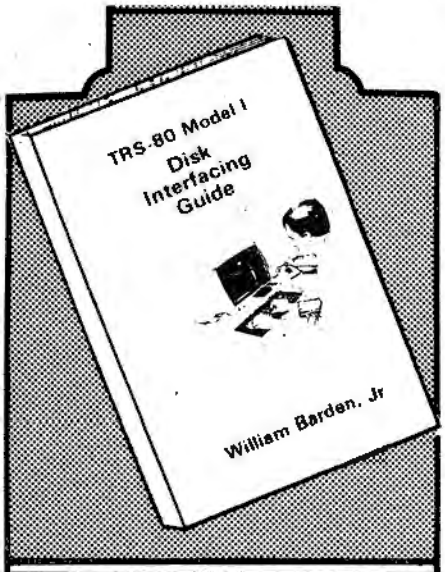

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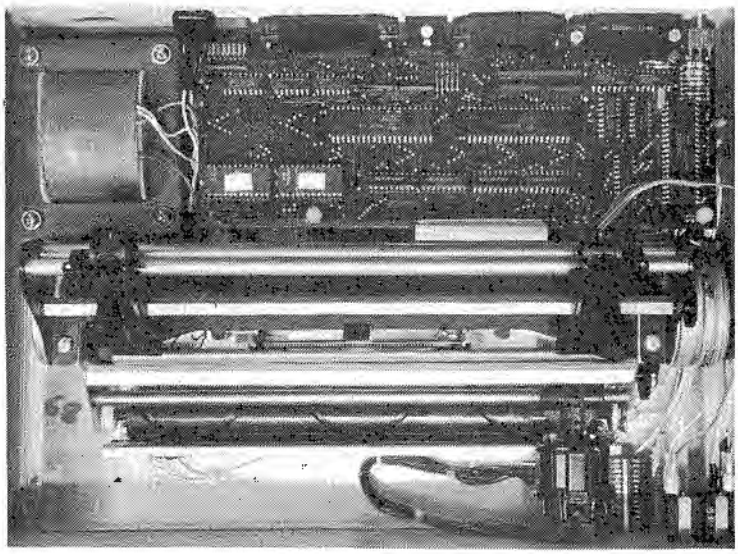


Looking down into the Model 800: The power supply is at the left rear, next to the printed circuit board. The 8085 which controls the printer is at the right end of the board.

to store and use a user defined character set. Having had nothing but success with the printer's simple functions, I plunged boldly into designing my own characters and teaching the printer to use them.

It didn't take long to realize that designing characters is a lot of work. The Model 800 uses a 7 by 5 dot matrix. For each character then, there are 35 dots to print or not to print for each of 96 characters - a total of 3360 dots! The manual does provide a good example of how to design a character, which helps, but designing an entire set of characters is a full day of work. I plan to write a program to do it.

Designing characters, especially on the relatively small 7 by 5 matrix, also happens to be a little tricky. You have no idea what the characters will look like on your first try. Since each attempt requires several hours of work, getting exactly what you want can take a long time.

Graphics Capability

In addition to the user defined characters, the Model 800 operates in "graphics mode", where rather than printing characters, it can print a line seven dots high across the page. In this mode, you must send the printer a byte for each dot column in the line. At the eighty column width this translates to 480 bytes per printed line. Each byte tells the printer which (if any) of the seven dots to print in a particular print column. By using the vertical and horizontal print density control options together with the graphics mode, it is possible to print any (or every) dot position on the page.

Other Options

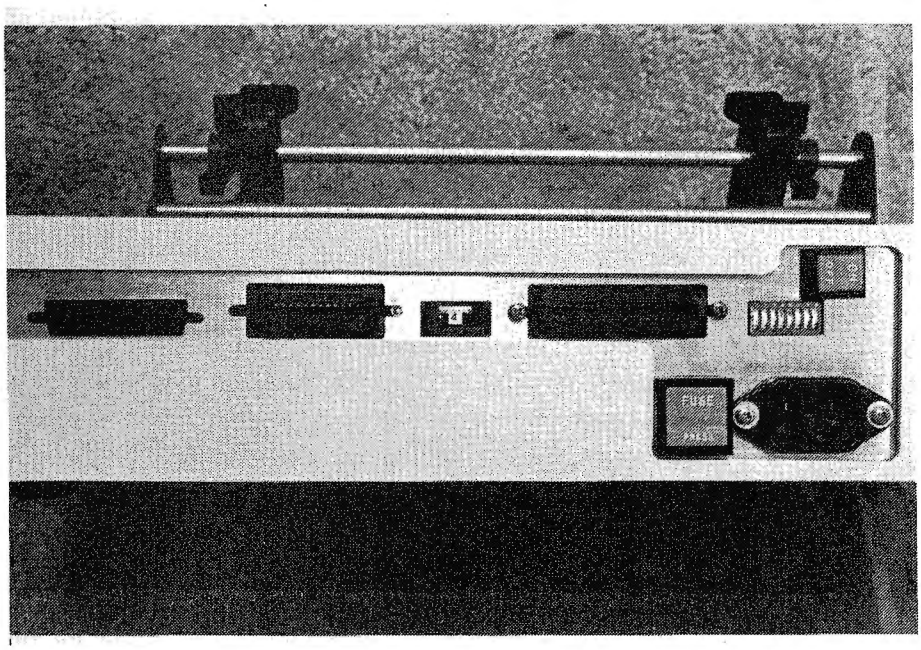
In addition to those already mentioned, the Base II printer has many other software selectable options. One is the auto form feed option. You simply tell the printer how many lines you want on a page, send it the "enable-auto-FF" code and forget about form feeds - the printer does it for you.

Other features of the printer include a "reset" command, disable and enable of bi-directional printing, a variety of options to ignore carriage returns line feeds or both, an "eject N lines" command and an expanded buffer option.

A final feature of the Model 800 is an EPROM socket which will accept either a 2716 or a 2732 EPROM. These chips are expected to contain four (in a 2716) or eight (in a 2732) additional character sets, which can be selected by a single escape sequence. It is possible then, to have up to ten character sets available.

Front Panel Controls

The front panel controls are very simple. The left hand button advances the paper to the top of the next form; the right hand button is pressed in (where it locks) to select the printer, or left out to deselect it.



The rear of the printer. From left to right, RS-232 connector, IEEE-488 connector, thumbwheel switch for baud rate, Centronics parallel connector and dip switches for selection of interface.

There is also a two-direction toggle switch at the rear of the printer. Move it to the left to reset the printer, or to the right to put the printer into self-test. These three are the only printer controls used during normal operation. I find that I seldom touch them at all.

The Manual

The Model 800 manual is very good. There are a few pages at the front giving a general view of the printer's design and operation, followed by a lengthy and well-illustrated section detailing such matters as paper insertion and ribbon changing. For every option I have mentioned here, there are clear, well-organized tables describing the various switch settings or selection codes. Each control code and option is also completely described in a paragraph or more of text, with examples in BASIC, illustrating almost all options.

Using the Model 800

After using the printer for a few months, I've noted a few minor drawbacks. I am still convinced I bought a good printer for a good price I just don't believe I have a *perfect* printer.

The first thing I noted was heat. Both the power supply and its environs and the print head get quite warm after a minute or two of printing. The manual warns that "extended high density graphics ... may cause the print head to exceed its temperature limits". I would go further and say that extended periods of continuous printing of any kind are likely to damage this printer. For a home computerist there should be no problem, but don't expect the Model 800 to print business reports all day.

The second disadvantage of the Base II is the noise it makes. Here I am probably more sensitive than most people, for my old TermiNet made a polite clacking that was quieter and more agreeable than most typewriters. The Model 800 makes a terrible noise, halfway between a petulant Siamese cat and a buzz saw.

The final fault I find with the Model 800 relates to its small size. Because the inside of the printer is very crowded, changing the paper and ribbon are both far more difficult than I would like. With the tractors in place, inserting or removing the ribbon is so difficult that I usually get out a screwdriver and remove the tractors first. Changing the paper is tricky because the clearance between the ribbon and the body of the printer is *very* small, making feeding the paper into the printer a complicated game of threading bendable paper through a maze of mechanical obstacles.

Perhaps I should finish by saying that despite the faults, I continue to use it. Its advantages far outweigh its disadvantages.

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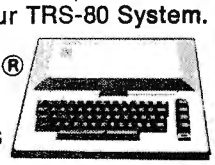

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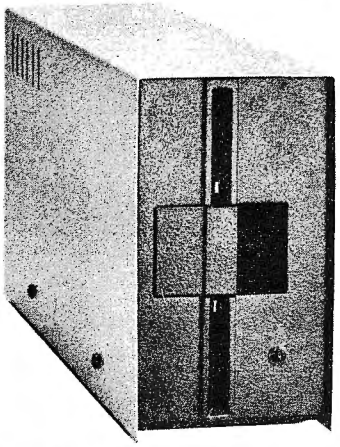

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Company/Drive Model	Price 1/	Flippy	*Formatted* Diskette Storage Capacity		100% Tested	48 hr. Burn-In	Warranty	Trial Period
			Dbl-Density	Sgl-Density				
40-TRACK DRIVES								
Access Unlimited								
AFD-100†	$275 00	no	180 Kbytes	102 Kbytes	yes	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								
80-1k mdi	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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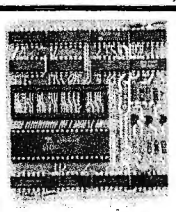

the DOUBLER-II™

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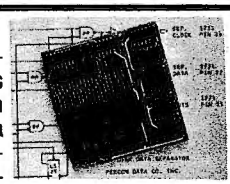

This PC board plug-in adapter for the TRS-80* virtually eliminates data read errors (CRC error — Track locked out!) which occur on high-density inner disk tracks, a problem that has plagued TRS-80* systems. The Percom Data Separator™ is installed in the Expansion Interface without modifying the host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

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Disk technique

For Model I with TRSDOS, NEWDOS, VTOS or LDOS -

A directory hash code generator

Steven Wexler, Huntingdon Valley, Pennsylvania

TRS-80 users: ever wonder how TRSDOS, NEWDOS and VTOS keep track of where programs are located on disk? TRSDOS and descendants place hash codes into the Hash Index Table (HIT); the location of the hash code in the table is used as a pointer to the File Primary Directory Entry (FPDE), which in turn contains pointers to the actual file location or locations on the diskette.

The hash code is a one byte number which is derived from manipulating the ASCII characters in the filespec. When the operating system is looking for a file, it generates a hash code, checks the code for matches in the Hash Index Table (there may be more than one match), uses the location of the matching code to find the filespec located in the FPDE, and finally confirms that the filespec in the FPDE matches the filespec being sought.

Using hash codes is much faster than searching the FPDE's one at a time (linear search), or sorting and constantly dividing the list of FPDE's into two until only one FPDE is left (binary search).

The following program converts filespecs into the appropriate hash code. This is very handy when attempting to recover lost files or for that matter, almost any kind of disk tinkering.

In the three months it has been used, only two cases of nonconformity have been discovered. NEWDOS uses 6F as the hash code for BASIC/CMD, both NEWDOS and TRSDOS use 2C for DIR/SYS. Oddly enough, when the correct codes are substituted for the irregular codes, the operating system continues to work correctly.

DOS uses a linear search to differentiate between duplicate hash code matches (i.e., collisions). In other words the nonconformist codes are not due to rehashing.

```
100 'DIRECTORY HASH CODE GENERATOR
110 'programmed by Steven Wexler
120 '
130 '
140 DATA 0,1,2,3,4,5,6,7,8,9,A,B,C,D,E,
  F
150 CLS:CLEAR 50:DIM CH$(10),HX$(15)
160 FOR I=0 TO 15:READ HX$(I):NEXT
170 PRINT"DIRECTORY HASH CODE GENERATOR
  "
```

```
180 FOR I=0 TO 10:CH$(I)=" ":NEXT
190 PRINT:INPUT "Filespec";F$
200 FL=0
210 L=LEN(F$):IF L=0 THEN 190
220 FC$=MID$(F$,1,1)
230 IF FC$<"A" OR FC$>"z" OR (FC$>"Z" A
  ND FC$<"a") THEN PRINT"First characte
  r of filespec must be alphabetic":GOT
  O 190
240 FOR I=1 TO L
250 IF MID$(F$,I,1)="/" THEN SL=I:GOTO
  280
260 NEXT
270 SL=L+1
280 IF SL>9 OR L>12 THEN PRINT "Filespe
  c is too long":GOTO 190
290 IF L-SL>3 THEN PRINT"Extension is t
  oo long":GOTO 190
295 IF SL=L THEN PRINT"What?":GOTO 190
300 FOR I=1 TO SL-1
310 I1=I:FE$="filespec"
320 CH$(I-1)=MID$(F$,I,1)
330 GOSUB 560
340 NEXT
350 IF SL >= L THEN 410
360 FOR I=9 TO L-SL+8
370 I1=I-8:FE$="extension"
380 CH$(I-1)=MID$(F$,SL+I-8,1)
390 GOSUB 560
400 NEXT
410 IF FL=1 THEN 180
420 HA=0
430 FOR I=0 TO 10
440 CH=ASC(CH$(I))
450 H1=NOT(CH AND NOT HA)
460 H2=NOT(NOT CH AND HA)
470 HA=NOT(H1 AND H2)
480 HA=2*HA
490 IF HA>255 THEN HA=HA-255
500 NEXT
510 IF HA=0 THEN HA=1
520 D2=INT(HA/16):D1=HA-D2*16
530 HA$=HX$(D2)+HX$(D1)
540 PRINT"The hash code for '";F$;"' is
   ";HA$
550 GOTO 180
560 CH$=CH$(I-1)
570 IF CH$>="a" AND CH$<="z" THEN PRINT
  "Note: character";I1;"of the ";FE$;"
  is lowercase":RETURN
580 IF CH$<"0" OR CH$>"Z" OR (CH$<"A" A
  ND CH$>"9") THEN PRINT"Character";I1;
  "of ";FE$;" must be alphanumeric":FL=
  1
590 RETURN
```


CONVERT YOUR TRS-80 MODEL-I INTO A
DEVELOPMENT SYSTEM

Now you can develop Z-80 based, *stand-alone* devices such as games, robots, instruments and peripheral controllers, by using your TRS-80 as a development system. The DEVELOPMATE plugs into the expansion connector of your TRS-80 and adds **PROM PROGRAMMING** and **IN-CIRCUIT-EMULATION** capabilities to your system (with or without expansion interface).

Complete instructions and sample schematics are included to help you design your own simple stand-alone microcomputer systems. THESE SYSTEMS CAN BE AS SIMPLE AS FOUR ICs: one TTL circuit for clock and reset, a Z-80, an EPROM, and one peripheral interface chip.

When the In-Circuit-Emulation cable is plugged into the Z-80 socket of your stand-alone system, the system becomes a part of your TRS-80: You can use the full power of your editor/assembler's debug and trace programs to check out both the *hardware and the software*. Simple test loops can be used to check out the hardware, then the system program can be run to debug the logic of your stand-alone device.

Since the program is kept in TRS-80 RAM, changes can be made quickly and easily. When your stand-alone device works as desired, you use the Developmate's PROM PROGRAMMER to copy the program into a PROM. With this PROM, and a Z-80 in place of the emulation cable, your stand-alone device will work by itself.

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FOR TRS-80*

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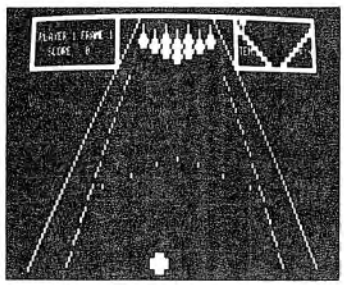
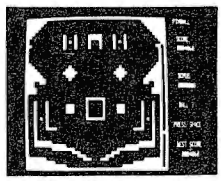


By John Allen

John Allen works his machine language magic again! With the realistic action and sounds made famous by his bestselling "PINBALL" and "BASKETBALL" arcade games, TENPINS now brings all the thrills of championship bowling to your TRS-80* model I or III.

From one to four players participate, and the program automatically senses the skill of each player. 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.

Scoring, pinsetting and ball return are all automatic, and you can view the entire scoresheet at any time. TENPINS even has factors to simulate the imperfections found in bowling lanes, adding even more realism—and sometimes frustration—to the game. It's almost as hard to roll a perfect 300 score in TENPINS as it is in real bowling, but it sure is fun trying! Available for only $14.95 for 16K tape version, $20.95 for 32K disk.



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By John Allen

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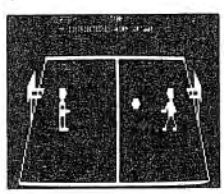

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By John Allen

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Circle 5

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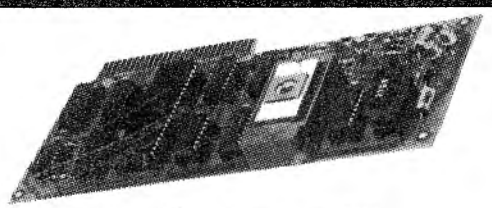

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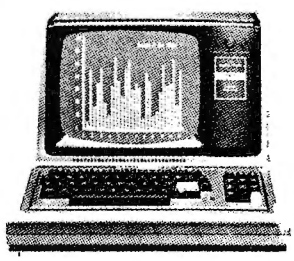
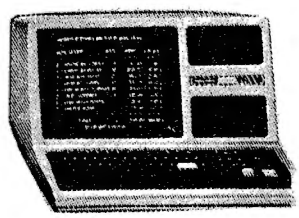
For Models I and III...

String pack using your BASIC editor





Woody Pope, Garland, Texas

String packing is a method used to POKE graphic codes into a string variable that has been loaded or defined with dummy characters. The location in memory is found by using VARPTR and then a FOR... NEXT loop is set up and the graphic codes are read from a DATA statement and poked into the successive addresses of the string's contents. When this is done, the loop routine may be deleted from the program and the poked string may be called to be printed to the screen, making for relatively fast graphics.

Rather large and complicated graphics pictures may be created in this manner using more than one string. This method has several drawbacks. First, the original string must contain the exact number of dummy characters that are to become the graphic characters. Second, a DATA statement must be created containing the graphic codes, and third, the string cannot be edited after it has been poked. If you try editing, the token words will be printed instead of the desired characters. The method presented here eliminates all three of these objections by using the EDIT mode of the TRS-80 to pack strings.

If string A$="123" is defined in a program and then the first quote is poked into an asterisk (*), A$ then may be edited and changed any way desired. The numbers 1, 2 or 3 may be replaced by token words that are equivalent to any graphics code from 128 to 191. As an example, suppose the numbers 1, 2 or 3 were replaced with SYSTEM USING EDIT using the editor. Next, the asterisk is poked back to a quote mark and if A$ is now listed it would appear as:

A$="SYSTEMUSINGEDIT"

A$ may now be printed and the graphics codes 174, 191 and 157 will be printed instead of SYSTEMUSINGEDIT, showing that A$ has truly been packed with graphics codes using the editor. If more graphic codes are to be added, first poke the leading quote to an asterisk, then edit the line, type in the token words to be added, poke the quote back in and print it.

The program with this article is an example of how to set up this operation in a usable fashion. Lines 1040 contain four sample strings to play with. Once the strings have been packed as desired, lines 1000-1040 may be deleted, leaving the packed strings to be used in your program. Table 1 is a list of token words and their corresponding graphic codes.

Table 1
Graphic Codes vs. Token Words

128 END	129 FOR
130 RESET	131 SET
132 CLS	133 CMD
134 RANDOM	135 NEXT
136 DATA	137 INPUT
138 DIM	139 READ
140 LET	141 GOTO
142 RUN	143 IF
144 RESTORE	145 GOSUB
146 RETURN	147 REM
148 STOP	149 ELSE
150 TRON	151 TROFF
152 DEFSTR	153 DEFINT
154 DEFSNG	155 DEFDBL
156 LINE	157 EDIT
158 ERROR	159 RESUME
160 OUT	161 ON
162 OPEN	163 FIELD
164 GET	165 PUT
166 CLOSE	167 LOAD
168 MERGE	169 NAME
170 KILL	171 LSET
172 RSET	173 SAVE
174 SYSTEM	175 LPRINT
176 DEF	177 POKE
178 PRINT	179 CONT
180 LIST	181 LLIST
182 DELETE	183 AUTO
184 CLEAR	185 CLOAD
186 CSAVE	187 NEW
188 TAB(	189 TO
190 FN	191 USING

PROGRAM LISTING

```
0 REM $tring Packing Using Your Basic E
  ditor by Woody Pope
2 CLS:Q=0:CLEAR 200
5 DIM A$(4)
10 A$(1)=""
20 A$(2)=""
30 A$(3)=""
40 A$(4)=""
1000 IF Q=1 GOTO 1040
1010 INPUT "ENTER A$ SUBSCRIPT WANTED";
  X
1015 A1=PEEK(VARPTR(A$(X))+1) : A2=PEEK
  (VARPTR(A$(X))+2) : AD=A2*256+A1
1020 POKE AD-1,42 : CLS : PRINT"ADDRESS
  =";AD-1 : PRINT"EDIT STRING WITH LEAD
  ING * THEN RE-ENTER VIA GOTO 1030"
1025 LIST 10-40
1030 INPUT"ENTER ADDRESS LISTED @ TOP O
  F SCREEN";A
1035 POKE A,34 : Q=1 : GOTO 5
1040 FOR X=1 TO 4 : PRINT A$(X); : NEXT
   : PRINT : LIST 10-40
```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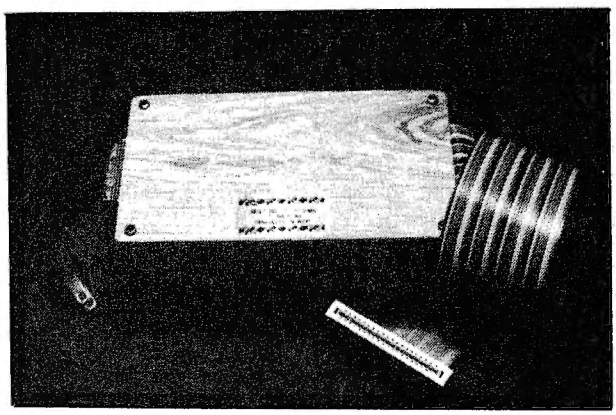

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Circle 40

For 16K extended color BASIC...

Moire' patterns

Dennis Anderson, Brooklyn, New York

Moire' Patterns are overlays of patterns used to produce interesting designs. This program will give two good examples of that. It will also demonstrate the remarkable graphics capability of the TRS-80 Color Computer with extended color BASIC (16K).

Similar patterns are used by industry. Lasers create patterns which are projected onto objects to be placed under stress. Where the stress is unequal, the patterns become distorted.

This program is for visual enjoyment only. Note that if you wish to hold a pattern, simply press the SHIFT key and the @ key together, otherwise the picture will time out and the program will return for the next picture.

```
10 ' ***   MOIRE PATTERNS ***
20 CLS:PCLS
30 PRINT"     MOIRE' PATTERN MEN
U"
40 PRINT:PRINT
50 PRINT"1) RECTANGLES AND CIRCL
ES"
60 PRINT"2) OVALS AND OVALS"
70 PRINT:PRINT
80 PRINT"ENTER SELECTION NUMBER"
;
90 A$=INKEY$:INPUT A$
100 IF A$="1" THEN 120
110 IF A$="2" THEN 350
120 CLS:PCLS
130 ' ***RECTANGLES AND OVALS***
140 A=0:B=0
150 PRINT"     RECTANGLES AND OV
ALS":PRINT
```

```
160 PRINT"THE DETAIL IS THE SPAC
ING       BETWEEN THE OVALS AND
          RECTANGLES. ANY WHOLE
AND       FRACTIONAL NUMBER MAY
BE USED."
170 PRINT
180 PRINT"ENTER 9999 TO EXIT TO
MENU"
190 PRINT
200 INPUT"DETAIL OF CIRCLE";E
210 IF E=9999 GOTO 10
220 INPUT"DETAIL OF RECTANGLE";C
230 PMODE 4,1
240 PCLS
250 SCREEN 1,1
260 FOR F=2 TO 185 STEP E
270 CIRCLE (128,96),F,,,.75
280 NEXTF
290 A=A-C : B=B+C
300 IF 95+A<0 OR 97+B>192 THEN 3
30
310 LINE (126+A*1.3,95+A)-(130+B
*1.3,97+B),PSET,B
320 GOTO290
330 FOR D=1 TO 3000 : NEXT D : P
CLS
340 GOTO130
350 '   ***OVALS AND OVALS***
360 CLS
370 PRINT"     OVALS AND OVALS"
380 PRINT
390 PRINT"SHAPE DETERMINES THE D
EGREE TO  WHICH THE OVAL IS ELON
GATED."
400 PRINT:PRINT"ENTER 9999 TO EX
IT TO MENU"
410 PRINT
420 INPUT"SHAPE(... TO 1.999)";A
430 IF A=9999 GOTO10
440 INPUT"SHAPE(2.01 TO ...)";B
450 CLS:PCLS
460 PMODE 1,1
470 SCREEN 1,1
480 FOR D=2 TO 100 STEP A
490 CIRCLE (128,96),D+.5,6,B*.5
500 NEXTD
510 FOR D=2 TO 200 STEP B
520 CIRCLE (128,96),D+.5,4,B*.5
530 NEXT D
540 FOR X=1 TO 2000 : NEXTX
550 PCLS
560 GOTO350
570 END
```


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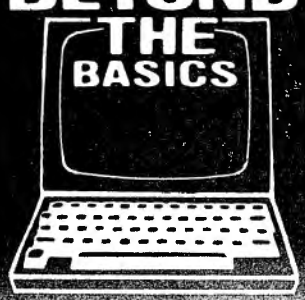

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Traveling with the pocket computer

George Haller, Naples, Florida

One of the neat features of the Pocket Computer is that when it is turned off it not only retains the BASIC program, but also the values of the variables. This makes it ideal for an automobile trip calculator.

The program listed with this article provides the calculation of miles per gallon (MPG) of fuel, average speed in miles per hour (MPH), and the miles left to reach the destination.

Figures are obtained for the total and also each leg of a journey.

Analyzing the program, there are two subroutines: Lines 20 and 30 convert hours and minutes to decimal hours; and lines 410 to 420 accomplish the reverse. Note that all times must be entered using the 24-hour format, i.e., 1:35 PM would be 13 hours, 35 minutes.

The program starts on line 40 and allows for three sub-programs: Initialization, start or stop. Each ends with a "FINISHED" message.

Initialization clears all variables and would be used once for a trip. It asks for beginning fuel in the tank, the beginning miles from your odometer, the starting time of your trip and the miles to your destination. The beginning fuel figure will probably come from an estimate based on your fuel gauge. To make it easier, start with a full tank.

The start portion is for startup figures after a rest stop, meals or overnight at a motel. It does not clear the variables and so retains all current information.

The stopping program should be used each time a major stop is made. It could be for gas, but is not necessary here. Because time is lost at rest stops, for meals and overnight stays, it should be used at that time. It will call for stopping mileage, time and any fuel added during that leg of the journey. From these inputs, miles per gallon, miles per hour and miles to the destination are calculated and displayed.

The stopping program will also produce accumulated totals when zero is input for the stopping miles query. In addition to the usual figures, the cumulative travel time is displayed.

The results of the program could easily be jotted down in a trip log for later analysis, particularly if you want to see how different drivers or road conditions affect mileage.

The little pocket computer is small enough to be carried in the glove compartment and is ready for the job of trip analysis. I usually have the fuel tank filled at the start and finish of the day for the final analysis. If I wish to use the computer in the evening, I put the program back into it using the cassette interface and re-initialize the next morning.

I usually put my programs on a Model I. As I develop them, I can run and modify them until satisfied. I then save the program to disk and modify it for use on the pocket computer. Usually the modifications are minor and while the second version may not run on the Model I, I do save the program on disk which can later be studied.

```
10:"A"GOTO 40
20:INPUT "HOURS=";H
25:INPUT "MINUTES=";M
30:P=H+M/60:RETURN
40:X=0
45:USING "#####.##"
50:INPUT "1.INIT 2.START 3.STOP ";X
55:IF X=0GOTO 5
60:IF X=1GOTO 90
65:IF X=2GOTO 110
70:IF X=3GOTO 170
90:CLEAR
100:INPUT "FUEL IN TANK ";D
110:INPUT "STARTING MILES= ";A
120:PAUSE "STARTING TIME"
125:GOSUB 20
130:INPUT "MILES TO DEST. ";I
155:E=18-D
160:T=P
165:PAUSE "FINISHED":END
170:PAUSE "STOPPING"
180:INPUT "STOPPING MILEAGE";B
185:IF B=0GOTO 340
190:K=K+B-A
195:PAUSE "STOPPING TIME"
200:GOSUB 20
205:V=V+P-T
210:C=(B-A)/(P-T)
215:INPUT "FUEL ADDED ";F
220:N=N+B-A
225:IF F=0GOTO 280
230:D=18
250:G=F-E
255:L=L+G
260:J=N/G
270:PRINT "MPG=";J
275:N=0
280:PRINT "MPH=";C
282:R=I-K
283:PRINT "MILES TO DEST. ";R
285:PAUSE "FINISHED":END
340:GOSUB 410
342:PAUSE "DRIVING TIME"
344:PRINT O;" HRS";S;" MIN"
345:W=K/V
350:PRINT "TOTAL MILES=";K
355:PRINT "AVERAGE TRIP MPH ";W
357:R=I-K
358:PRINT "MILES TO DEST. ";R
360:IF F=OTHEN GOTO 400
370:PRINT "TOTAL GALLONS ";L
380:Q=K/L
390:PRINT "TRIP MPG=";Q
400:PAUSE "FINISHED":END
410:O=INT (V)
420:S=(V-O)*60:RETURN
```


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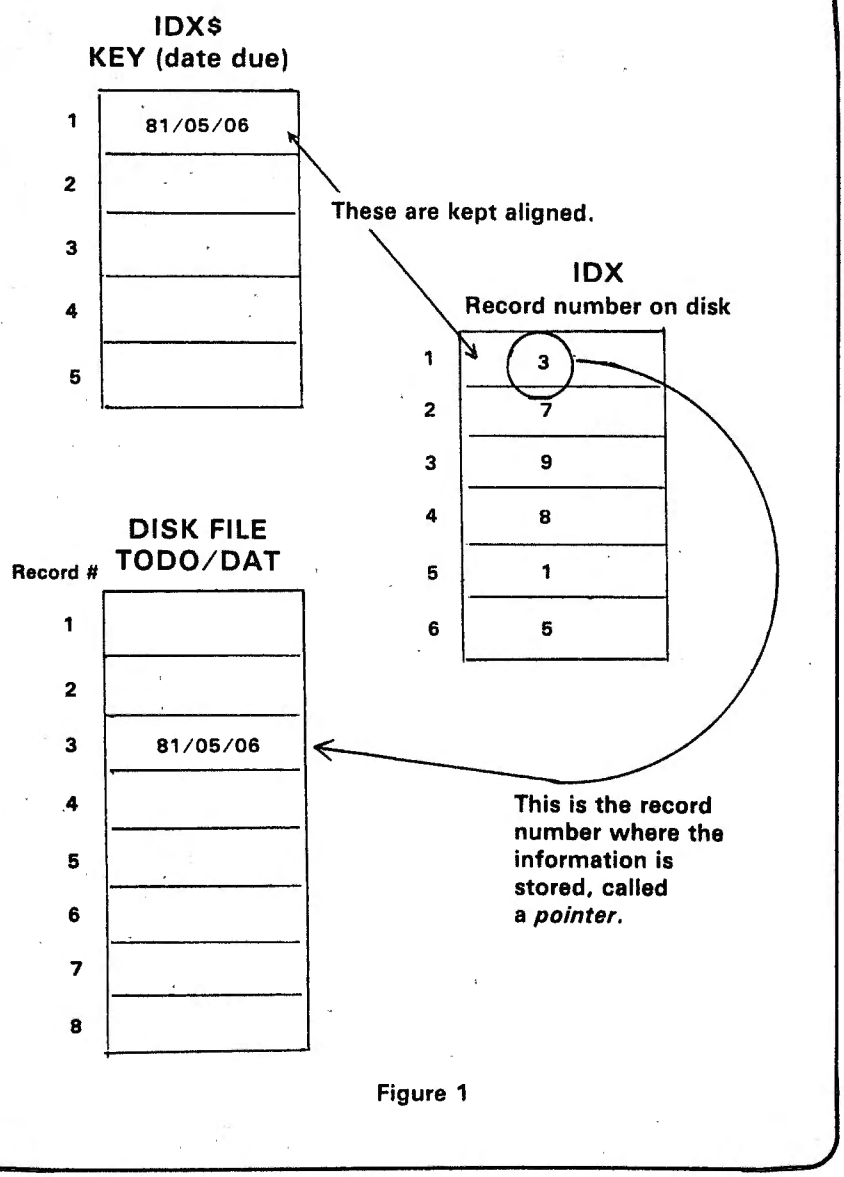

Figure 1

In previous issues we discussed problems associated with fielding random access files and with accessing records in the file. This issue, we will extend our discussion of indexing for files.

Indexed Files

Indexing is a good method of keeping track of where things are in a file. If we set up a *"key"* variable for a file, we can treat and store it in a way that makes it easy to be searched.

To see how to do this, let us first set up our "To Do List" file. The "To Do List" program accompanies this article. We will store the information given in Table 1 with the field sizes given. The Date Due will be our *key* variable. We want to be able to pull things out of the file by the key variable, in date order.

Note the use of the "standard" computer date form, with year first, then month and day. Using this layout, all the dates can be sorted into order. This will be correct no matter what the year, month or day (it is important to always use 2 digit numbers, i.e., 03 instead of 3).

Now define 2 arrays: IDX$ and IDX. Array IDX$ will hold the date due for all the items in the TO DO list. Array IDX will hold the record numbers of the dates in array IDX$.

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In order to make these useful, we will sort array IDX$ while keeping array IDX aligned with it. Now we can pull out records from the file by stepping through array IDX from the first to the last entry. This will bring out all of the items in order of Date Due.

Figure 1 illustrates how arrays IDX$ and IDX relate to one another and to the file on the diskette.

Once the index arrays are sorted into proper order, they can be stored on diskette in another file and read back into memory at the beginning of a program. Later we will see how this can be done with Random Access files, but for now we'll put them in sequential files. The advantage here is that it is simple to do. The disadvantage is that if we don't get the index back on the diskette after we modify it we could lose some records.

Being able to find an item is only half the story. We still have to be able to find a place to put an item quickly as well as be able to show that an item is deleted. For this we use another index called an "Allocation Table".

The Allocation Table

In order to keep track of how much space we are using in our file and what space is available for new items, we set up another array, ALL. This array will contain a "one" if an item is present and a zero if no item is present for each diskette record. In order to add an item, we search until we find a zero, then we put the item there. To delete an item, we put a zero in the table where the item is. What could be simpler?

The problem with this approach is that for large files, it becomes very slow. Other techniques (such as Hash coding and others) are used to get around this time problem. We will cover those techniques in a later article.

Sorting the Index

Once an item is in the index, we need to sort it into order by date. Any sorting method you feel comfortable with can be used to do this. If you have some kind of sorting utility such as the GSF programs from RACET, you need not worry about writing one yourself. However, if you do need to sort, then you might want to try the sort included in the accompanying program.

The sort technique used here is known as the Shell Sort. It is a fast sorting technique based on the assumption that items to be sorted into a list will get sorted more quickly if they can move in large steps. The "gap" (variable GAP in the program), is the step they will take as they move into the list.

Searching the Index

The simplest way to find an item in the list to edit or delete it is simply to start at the beginning of the array IDX$, find the date that matches it, and then step through the dates to find the item desired. This searching procedure is known as the "Linear" search. It is simple, but time consuming on large systems.

What's Next?

Next time, we will get into more efficient allocation techniques which will allow us to handle the files more quickly. We will also take care of our allocation through a Random Access file so even if the system crashes, we never lose anything except the very last item entered.

Table 1
To Do List

Item	Field Size
Task	30
Date Due	8
Priority	1
Date Started	8
For Whom	20
Total	67 characters

```
10 REM**********************************
20 REM
30 REM  TO DO LIST
40 REM  TERRY R. DETTMANN
50 REM
60 REM  FOR 80US JOURNAL
65 REM          NOTE: ALL REMARKS WITH
                LINE NUMBERS WHICH ARE
66 REM          MULTIPLES OF TEN ARE
                ESSENTIAL!
67 REM          REMARKS WITH LINE NUM-
                BERS OTHER THAN MULTI-
68 REM          PLES OF TEN MAY BE LEFT
                OUT.
70 REM
80 REM  FILE TODO/BAS
90 REM
100 REM**********************************
105 REM         INITIALIZE VARIABLES
110 CLEAR10000:DEFINTA-Z:N=0
120 DIM ALL(100),IDX$(100),IDX(100),DB$
(5,3),DA$(5)
125 REM         READ ENTRY TITLES
130 FORI=1TO5:READNM$(I):NEXTI
135 REM         OPEN MASTER DATA FILE
136 REM         THEN FIELD FOR ENTRIES
140 OPEN"R",1,"TODO/DAT"
150 FORI=1TO3:FIELD1,(I-1)*80ASDM$,30AS
DB$(1,I),8ASDB$(2,I),1ASDB$(3,I),8ASDB$
(4,I),20ASDB$(5,I):NEXTI
155 REM         SETUP FOR 1ST TIME
                USING THE PROGRAM.
156 REM         IF TODO/CTL DOESN'T
                EXIST, THEN THE PROGRAM
157 REM         HASN'T BEEN USED
160 ON ERROR GOTO 220
165 REM         OPEN CONTROL FILE AND
                READ IN INDEX AND
166 REM         ALLOCATION TABLES
170 OPEN"I",2,"TODO/CTL"
180 FORI=1TO100:INPUT#2,IDX(I),IDX$(I):
NEXTI
190 FORI=1TO100:INPUT#2,ALL(I):IF ALL(I
)<>0 THEN N=N+1
200 NEXTI
210 GOTO240
215 REM         INITIALIZE INDEX IF
                NEVER USED BEFORE
```

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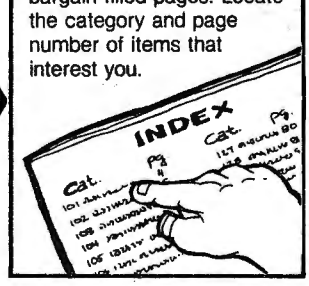

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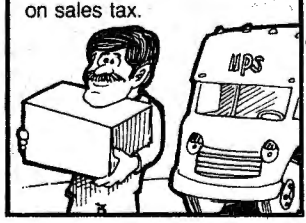

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Circle 86

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```
220 FORI=1TO100:IDX$(I)="ZZZZZZZZ":NEXT
I
230 RESUME240
240 CLOSE2
245 REM          SETUP THE RUNNING ERROR
                 TRAP
250 ON ERROR GOTO 900
255 REM          SIGN-ON MESSAGE
260 CLS:GOSUB830
265 REM          COMMAND LOOP
266 REM          ENTER COMMAND,
                 INTERPRET & EXECUTE IT
270 INPUT"COMMAND";CMD$
278 REM          SPACING IS CRITICAL IN
                 LINE 280
279 REM12345678901234567890123456789012
280 S=INSTR("ADD   DELETEEDIT  HELP  PR
INT QUIT  CLS   SORT  ",CMD$)
285 REM          COMMAND DIDN'T EXIST
290 IF S=0 THEN PRINT"ERROR - ILLEGAL C
OMMAND, TRY HELP":GOTO270
295 REM          COMPUTE BRANCH FOR
                 EXECUTING COMMAND
300 CH = ((S-1)/6)+1
310 IF CH=6 THEN 340
320 ON CH GOSUB 960,1060,1400,1610,1740
,340,400,580
330 GOTO270
340 REM - - - - END OF OPERATIONS - - -
345 REM          MUST PROPERLY CLOSE
                 FILES AND WRITE TABLES
346 REM          TO DISK
350 CLOSE
360 OPEN"O",2,"TODO/CTL"
370 FORI=1TO100:PRINT#2,IDX(I),IDX$(I):
NEXTI
380 FORI=1TO100:PRINT#2,ALL(I):NEXTI
390 CLOSE:END
400 REM - - - - CLEAR SCREEN - - - - -
410 CLS:RETURN
420 REM - - - - GET SPACE FOR A RECORD
425 REM          SEARCH FOR AN OPEN
                 SPACE IN THE ALLOCATION
426 REM          TABLE. IF NONE EXISTS
                 THEN EF (ERROR FLAG) IS
427 REM          1
430 EF=0
440 FORI1=1TO100:IF ALL(I1)=0 THEN 470
450 NEXTI1
460 PRINT"ERROR - FILE FULL":EF=1:RETUR
N
470 SPC = I1:RETURN
480 REM - - - - STORE RECORD IN LIST -
485 REM          CONVERT THE LOCATION
                 (SPC) TO A PHYSICAL AND
486 REM          LOGICAL RECORD NUMBER
490 IF SPC<=0 THEN EF=1:RETURN ELSE EF=
0
500 PRN = INT((SPC-1)/3)+1:LRN=SPC-(PRN
-1)*3
505 REM          IF RECORD HAS ALREADY
                 BEEN USED THEN GET IT.
506 REM          THIS PREVENTS WRITING
                 BAD DATA IN OTHER
507 REM          LOGICAL RECORDS
510 IF PRN<=LOF(1) THEN GET1,PRN
515 REM          STORE DATA IN FIELD
520 FORI1=1TO5:LSETDB$(I1,LRN)=DA$(I1):
NEXTI1
525 REM          STORE DATA ON DISK
530 PUT1,PRN
535 REM          IF THIS IS A RESTORE,
                 THEN DON'T INCREASE THE
536 REM          INCREASE THE NUMBER OF
                 RECORDS
540 IF RS=1 THEN RETURN
550 N=N+1
560 IDX$(N)=DA$(2):IDX(N)=SPC:ALL(SPC)=
1
570 RETURN
580 REM - - - - SORT INDEX (SHELL SORT)
590 PRINTTAB(15)"*** SORTING ***"
595 REM          SET THE COMPARISON GAP
600 GAP = N
610 IF GAP <=1 THEN RETURN
615 REM          HALVE THE GAP
620    GAP = INT(GAP/2)
625 REM          HIGHEST ELEMENT TO
                 COMPARE
630    MX = N - GAP
640    FLAG = 0
645 REM          LOOP OVER THE ARRAY,
                 SWAPING ELEMENTS
646 REM          INTO ORDER
650    FOR I2 = 1 TO MX:P = I2 + GAP
660       IF IDX$(I2)<=IDX$(P) THEN 690
665 REM          MODEL I AND III OWNERS
                 SHOULD REPLACE LINE 670
666 REM          WITH THE CODE IN LINE
                 675
667 REM          AND 676
670          SWAPIDX$(I2),IDX$(P):SWAPI
DX(I2),IDX(P)
675 REM      T$=IDX$(I2):IDX$(I2)=IDX$(
P):IDX$(P)=T$:T=IDX(I2):IDX(I2)=IDX(P):
IDX(P)=T
676 REM          T=IDX(I2):IDX(I2)=IDX(P
):IDX(P)=P
```

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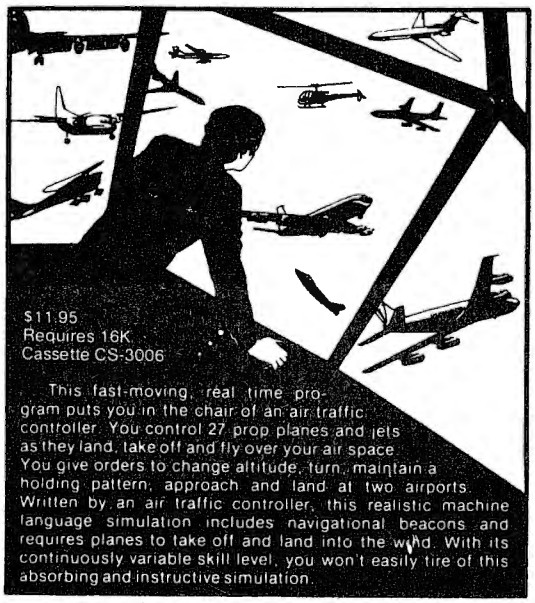
Air Traffic Controller



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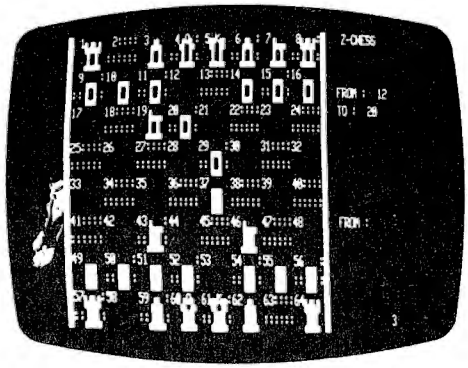

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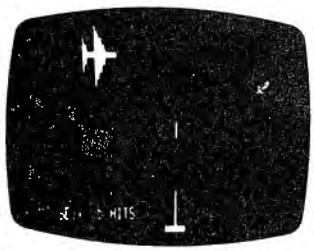
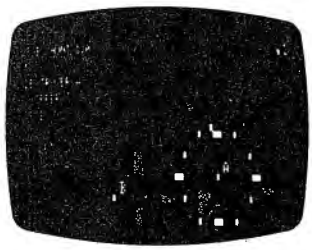
Cassette CS-3012 $11.95 4 Programs Requires 16K



GUNNER. Destroy enemy aircraft with your anti-aircraft gun.



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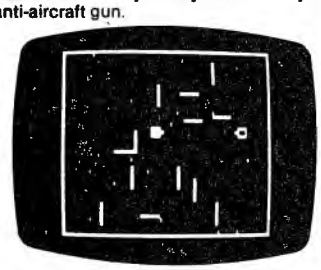
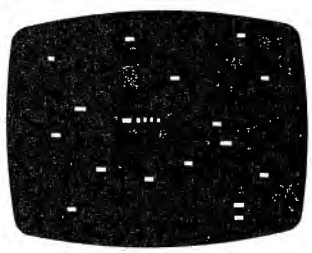


TANK BATTLE. Two players battle it out in this real-time graphic game.



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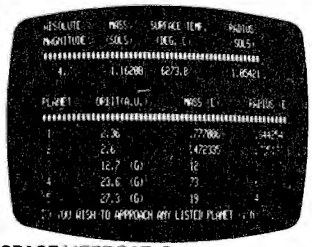

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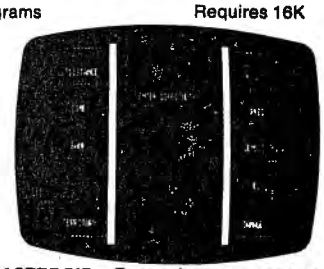

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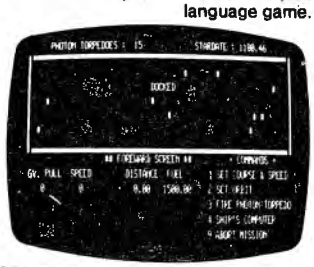

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```
680          FLAG=1
690     NEXTI2
695 REM          IF NO SWAPS THEN GET
                 ANOTHER GAP OTHERWISE
696 REM          SCAN AGAIN
700     IF FLAG>0 THEN 640ELSE 610
710 REM - - - - GET RECORD FROM LIST -
715 REM          IS THE SPACE IN USE, IF
                 NOT THEN ERROR
720 EF=0:IF ALL(SPC)=0 THEN EF=1:RETURN
725 REM          COMPUTE THE LOGICAL AND
                 PHYSICAL RECORD NUMBERS
730 PRN=INT((SPC-1)/3)+1:LRN=SPC-(PRN-1
)*3
735 REM          IF PRN IS PAST THE END
                 OF FILE THEN ERROR
740 IF PRN>LOF(1) THEN EF=1:RETURN
745 REM          GET THE RECORD FROM DIS
K
750 GET1,PRN
755 REM          PUT THE DATA IN THE
                 ARRAY
760 FORI1=1TO5:DA$(I1)=DB$(I1,LRN):NEXT
I1
770 RETURN
780 REM - - - - LINEAR SEARCH FOR
                 RECORD
785 REM          SEARCH THROUGH THE
                 INDEX ARRAY IN DATE
786 REM          ORDER TO LOCATE THE
                 SPACE WHERE THE RECORD
787 REM          IS STORED
790 EF=0
800 FOR I2=1TO100:IF IDX$(I2)=DD$ THEN
SPC=IDX(I2):LX=I2:RETURN
810 NEXT I2
820 EF=1:RETURN
830 REM - - - - PRINT LOGIN MESSAGE  -
840 PRINT:PRINT"WELCOME TO 'TODO' - A P
ERSONAL TO DO LIST GENERATOR"
850 PRINT"YOU CAN GET A LIST OF COMMAND
S BY TYPING 'HELP'"
860 PRINT"THIS PROGRAM WORKS STRICTLY I
N UPPER CASE FOR COMMANDS"
870 PRINT:PRINT"DO NOT - REPEAT DO NOT
TERMINATE THIS PROGRAM BY"
880 PRINT"PRESSING THE BREAK KEY! YOU M
UST USE 'QUIT' TO EXIT"
890 PRINT:PRINT:RETURN
900 REM - - - - ERROR TRAP - - - - - -
910 PRINT"UNEXPECTED ERROR NUMBER ";ERR
;" IN LINE ";ERL
920 RESUME 270
930 REM - - - - DATA RECORDS - - - - -
940 DATA "TASK","DATE DUE YY/MM/DD","PR
IORITY (A,B,C)"
950 DATA "DATE STARTED YY/MM/DD","FOR W
HOM"
960 REM - - - - ADD NEW ITEMS  - - - -
970 RS=0
980 CLS:PRINT:PRINTTAB(10)"ADD NEW ITEM
S - 'END' WHEN DONE":PRINT:PRINT
990 FORI=1TO5:PRINTTAB(15)NM$(I);:INPUT
DA$(I)
1000    IF DA$(I)="END" THEN 1040
1010 NEXTI
1015 REM         GET SPACE FOR THE
                 RECORD, THEN IF SOME
1016 REM         IS AVAILABLE, STORE IT
1020 GOSUB420:IF EF=0 THEN GOSUB480ELSE
 1050
1030 GOTO960
1040 REM         SORT THE INDEX AND
                 RETURN
1050 GOSUB580:RETURN
1060 REM - - -  DELETE ITEMS  - - - -
1070 DD$="":RS=1
1080 PRINT:PRINTTAB(10)"DELETE ITEMS -
'END' TO QUIT"
1090 PRINT:PRINT
1100 PRINTTAB(15)"DATE DUE";:INPUTDD$
1105 REM         AFTER ALL DELETIONS,
                 SORT INDEX AND RETURN
1110 IF DD$="END" THEN GOSUB580:RETURN
1120 PRINTTAB(15)"ENTER 'F' TO FIND DAT
E, 'D' TO DELETE UP TO DATE";
1130 INPUT FD$
1140 IF FD$="F" THEN GOSUB 1170
1150 IF FD$="D" THEN GOSUB 1270
1160 GOTO1100
1170 REM         FIND DATE
1175 REM         SEARCH FOR DATE
1180 GOSUB780:IF EF=1 THEN PRINT"CAN'T
FIND DATE":RETURN
1185 REM         GET THE RECORD
1190 GOSUB710
1195 REM         DISPLAY THE RECORD
1200 FORI=1TO5:PRINTTAB(10)I;" ";NM$(I)
;TAB(40)DA$(I):NEXTI:PRINT:PRINT
1210 PRINTTAB(10)"ENTER 'D' TO DELETE,
'N' FOR NEXT, 'X' FOR EXIT"
1220 INPUT N$
1230 IF N$="X" THEN RETURN
1240 IF N$="N" THEN LX=LX+1:IF LX>100 T
HEN LX=100:SPC=IDX(LX):GOTO1190:ELSE SP
C=IDX(LX):GOTO1190
1250 IF N$="D" THEN J=LX:GOSUB1340
1260 RETURN
```

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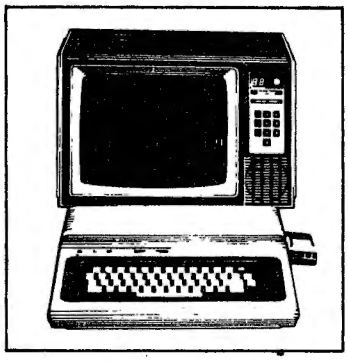

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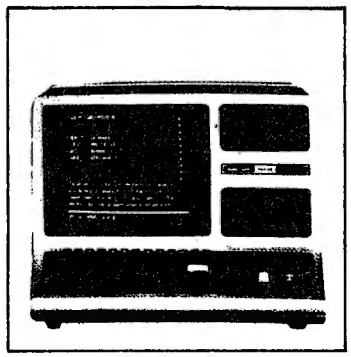

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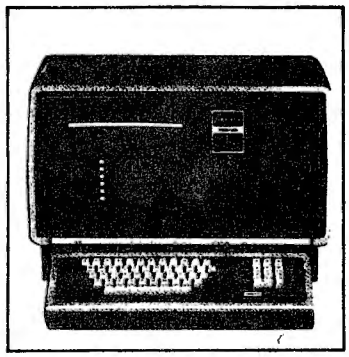

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Circle 49

```
1270 REM          DELETE UP TO DATE
1275 REM          FIND THE DATE
1280 GOSUB780
1290 IFLX=0 THEN RETURN
1295 REM          DELETE ALL RECORDS UP
                  TO THAT DATE
1300 FORJ=1TOLX-1
1310     SPC=IDX(J):GOSUB1340
1320 NEXTJ
1330 RETURN
1340 REM          DELETE A RECORD
1350 RS=1
1360 FORI=1TO5:DA$(I)="":NEXTI:GOSUB480
:ALL(SPC)=0
1370 IDX(J)=0:IDX$(J)="ZZZZZZZZ"
1380 RS=0
1390 RETURN
1400 REM - - -  EDIT ITEMS  - - - - -
1410 RS=1:DD$=""
1420 PRINT:PRINTTAB(10)"EDIT ITEMS - 'E
ND' TO QUIT"
1430 PRINTTAB(10)"'ENTER' TO SCAN LIST"
:PRINT:PRINT
1440 PRINTTAB(15)"DATE DUE";:INPUT DD$
1450 IF DD$="END" THEN RS=0:RETURN
1455 REM          IF NOTHING INPUT, THEN
                  SCAN LIST FROM THE
1456 REM          EARLIEST DATE
1460 IF DD$="" THEN LX=1:SPC=IDX(LX):GO
TO1490
1465 REM          FIND RECORD
1470 GOSUB780
1480 IF EF=1 THEN PRINT"ERROR - CAN'T F
IND RECORD":GOTO 1440
1485 REM          GET RECORD
1490 GOSUB710
1495 REM          DISPLAY RECORD
1500 FORI=1TO5:PRINTTAB(10)I;" ";NM$(I)
;TAB(40)DA$(I):NEXTI:PRINT:PRINT
1510 PRINTTAB(10)"ENTER NUMBER TO CHANG
E, N FOR NEXT RECORD, S TO SEARCH AGAIN
"
1520 INPUT N$
1530 IF N$="END" THEN RS=0:RETURN
1535 REM          GET THE NEXT RECORD BY
                  DATE
1540 IF N$="N" THEN LX=LX+1:IF LX>100 T
HEN LX=100:SPC=IDX(LX):GOTO1490:ELSE SP
C=IDX(LX):GOTO1490
1545 REM          GO BACK TO BEGINNING
1550 IF N$="S" THEN 1400
1560 IF VAL(N$)>=1 AND VAL(N$)<=5 THEN
GOSUB1580
1570 GOTO1500
1580 REM          CHANGE LINE
1590 LN=VAL(N$):PRINT"ENTER ";NM$(LN);:
INPUTDA$(LN)
1595 REM          AFTER GETTING NEW INFO,
                  STORE IT AND RESORT THE
1596 REM          INDEX ARRAY
1600 GOSUB480:IF LN=2 THEN IDX$(LX)=DA$
(LN):GOSUB600:RETURN ELSE RETURN
1610 REM - - -  HELP  - - - - - - - -
1620 PRINT:PRINT
1630 PRINTTAB(10)"ALLOWED COMMANDS:":PR
INT
1640 PRINTTAB(15)"ADD       ADDS NEW ITE
MS TO THE FILE"
1650 PRINTTAB(15)"DELETE    DELETES ITEM
S FROM THE FILE"
1660 PRINTTAB(15)"EDIT      EDITS ITEMS
IN THE FILE"
1670 PRINTTAB(15)"PRINT     PRINTS THE F
ILE BY DUE DATE"
1680 PRINTTAB(15)"HELP      PRINTS THIS
LIST"
1690 PRINTTAB(15)"QUIT      TERMINATES P
ROCESSING"
1700 PRINTTAB(15)"CLS       CLEAR SCREEN
"
1710 PRINTTAB(15)"SORT      SORTS LIST I
NTO ORDER BY DUE DATE"
1720 PRINT:PRINT
1730 RETURN
1740 REM - - -  PRINT - - - - - - - -
1750 PRINT:PRINTTAB(10)"PRINT TO DO LIS
T":PRINT
1760 LPRINTSTRING$(80,"=")
1770 LPRINT"TO DO LIST"
1780 LPRINTSTRING$(80,"-")
1790 LPRINT"TASK";TAB(35)"DATE DUE";TAB
(45)"PR";TAB(50)"DATE STD";TAB(60)"FOR
WHOM"
1800 LPRINTSTRING$(80,"-")
1810 FORI=1TO100
1820     IF IDX$(I)="ZZZZZZZZ" THEN RETU
RN
1830        SPC=IDX(I):GOSUB710
1840        LPRINTDA$(1);TAB(35)DA$(2);T
AB(45)DA$(3);TAB(50)DA$(4);TAB(60)DA$(5
)
1850 NEXTI
1860 RETURN
29995 REM         USE 'GOTO 30000' TO
                  SAVE FILE. THIS WAY YOU
29996 REM         NEVER HAVE TO REMEMBER
                  THE FILE NAME
30000 SAVE"TODO/BAS"
```

The adventures of a software secret agent...

Captain 80

Bob Liddil © 1981

Here's Captain Eighty, in Software Secret Headquarters, putting the finishing touches on Aggravation 80, Peterborough, New Hampshire's only computerized community access data base (community bulletin board). I received some polite inquiries about Aggravation 80, whether or not it was actually working. Yes, it is. The phone number is (603) 924-7920 and it is on a dedicated 24-hour phone line. Disguised as a mild-mannered literary specialty board, it also serves as a message center for all software secret agents.

A new product came in the mail the other day from Greg Hassett. You might remember Greg as the young boy in Chelmsford, MA., whose adventures have been distributed nationwide through several major mail order sources. The new release is called *Fasteroids*, a name likely to draw fire from Atari who have been quietly warning manufacturers of asteroid-type games to steer clear of their trademark.

The packaging on Fasteroids is a radical departure for Greg's fledgling Adventureworld, which has evolved through various stages of rubber stamp and photocopy. I mention this, because Greg's home manufactured products never got much shelf exposure in retail stores due to poor packaging. Fasteroids is attractively shrink-wrapped in its own cassette library case, with snappy color artwork on the front and a good description of the product on the back.

The game is equally impressive. It is Asteroids with GUSTO. There is only one sound routine, no distracting click-whirr-beep-buzz-zap-zing to distract the player. The graphics are fast and well written. The bullet-shots move easily on the screen with very little flicker. There are several types of spaceships, which shoot little dots, to take your mind off all those floating rocks. The keyboard positions are so wierd that one of my apprentice secret agents very nearly wept in frustration. But he got over it and was soon happily popping off asteroids and spaceships all over the place.

Fasteroids has the ability to save the game's high scores to tape. This is a nice touch as the score influences the variables in the game. Another nice touch is the game's ability to suspend play while the player is distracted. It is possible for a player to halt his game, grab a bite, and return to his current score. As long as the power is on, the game will be there.

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Captain 80

Fasteroids will give young Greg the fame and acceptance in the commercial micro-programming community that eluded him as an adventure writer. He deserves this recognition, for his game is fast, fun, well written, fully debugged, attractively merchandised and fully documented down to the last comma. Welcome to the ranks of the professionals, Greg. You've been a long time on the train.

While speaking of adventure, INTERPRO, of Manchester, NH, has at long last released Teri Li's Atlantean Oddysey, the illustrated version. This is the machine language version of Teri's 32K BASIC program, which will appear in my new book of BASIC Adventures. When we say illustrated (as opposed to graphics), in front of the word adventure, some qualification is required. A graphics adventure is one which has maps or mazes drawn on the screen, flat or 3-dimensional. An illustrated adventure is one in which the scenes are drawn on the screen as they are described.

Author Li's credits as a programmer are quite extensive, and he proves his qualifications with Oddysey. When the program says, "You see: a beach, a sailboat.",*you really see these things on the screen*, and right now! The graphics are fast and believable. The storyline is well timed and the puzzle is difficult, but solvable. It is the sort of thing we have come to expect from Teri, whose *Spider Mountain* and *Lost Dutchman's Gold* are both considered classics of adventure. Atlantean Oddysey presents the serious adventurer with an illustrated twist and is a must for any collector. It is not a flash in the pan, but an attempt to punch up an already overwhelmingly popular genre.

Voyage of the Valkyrie, Leo Christopherson's latest effort, has been picked up by Advanced Operating Systems, of Michigan City, IN, an agressive marketing organization which is rising up to challenge the industry establishment. The new offering is Leo's best work yet on the TRS-80, and continues the tradition of "Christopherson Graphics".

Valkyrie is a serious attempt to present a complex gaming situation which may take many hours of practice to master. It is an Invasion-type program, from the invader's point of view. As pilot of the attack ship Valkyrie, your goal is to conquer the Island of Fugloy, which means "bird island" in Norwegian. As a private in the Space Vikings, your future depends upon your performance.

After the dazzling music and graphics combination presented in Duel-N-Droids, it is difficult to visualize anything equal or better. That is, until you watch absolutely flickerless birds flitting about on the screen, disappearing partially behind the opening instructions, all to the strains of nothing less than the March of Tannhauser, a stunningly executed selection from the Richard Wagner opera. You hear some of Wagner's "Ride of the Valkyrie" each time you capture a castle from the bird defenders - or sigh to a selection of "Die Walkyrie" after crashing your ship into a mountainside.

With ten levels of play ranging from difficult to dang near impossible, Leo has provided Valkyrie players with such a high degree of challenge that is unlikely that they will ever be bored. Just the names of some of the castles should give you a tantalizing clue to the stunning level of effort it will take to master this simulation: Angrep (attack), Drage (dragon), Frykt (fear), Gevaer (weapons), Luftig (windy), and Aekel (loathsome). All this and you have to get past laser-wielding birds, that can pop you out of the sky like yesterday's clouds, zap-pop, bye-bye.

Leo, a true genius, has scored a hit. His art is in a class alone. Only he can produce the combination of style, wit and classical music, in a blend suitable to the taste of the entire range of microcomputer software consumers world-wide. Leo, you rascal, you've done it again and it's great!

Now I am off to visit a few of the top software authors and production companies to get to know them better. Of course, I'll be in disguise. No one will recognize me in my trenchcoat and Sam Spade hat. Not even Mom.

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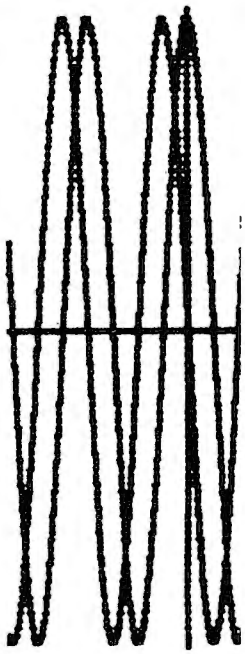

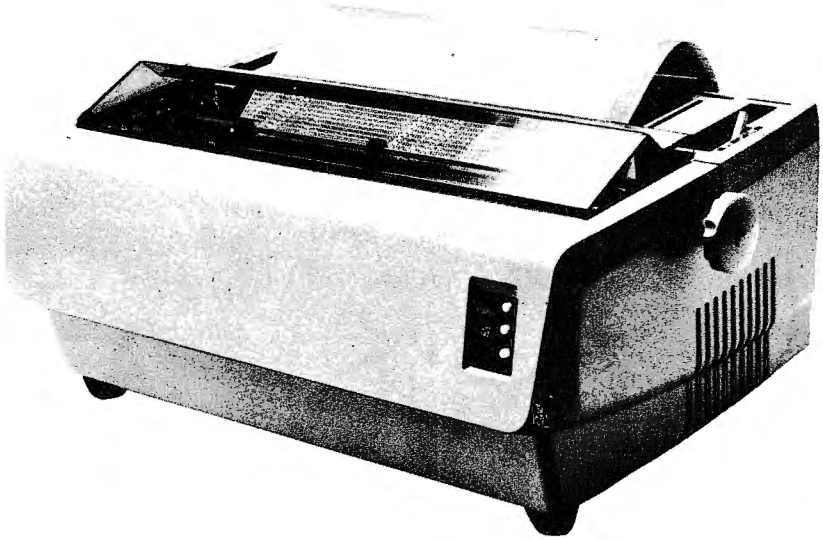

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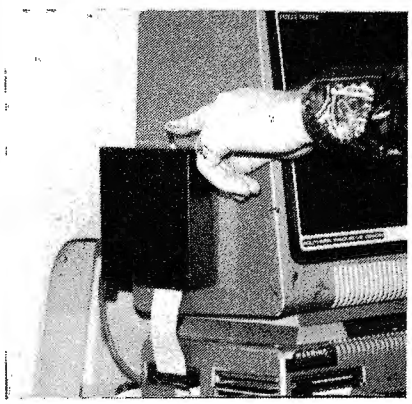

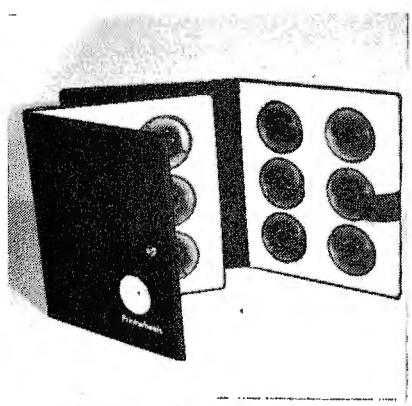

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- Edits most file formats
- Block text copy command
- Locate, Delete, and Change with windows
- Inserts and maps up to five input files
- Upper/lower case compatible
- Operates with or without line numbers
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- Recovers from most DOS errors
- Fast file entry point map
- Change text command for any number of occurrences
- DOS Directory and Kill commands
- Line printer paging with adjustable forms
- Sophisticated reprinting line editor, handles line feeds
- Disk BASIC, Disk EDTASM, and EDIT-80 format compatible
- Display status command, includes free memory, current pointer printer forms, number of input files, output filename and format.

XEDIT will handle files of any size up to 2.7 Megabytes or 10K lines in length. Comes complete with instructions covering operation, externals, and file formats.

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ASM/CMD, a disk based assembler which generates object code to disk or tape (disk only on Model II). Accepts any file format including ASCII Disk BASIC. Listing may be outputted to display, disk file, or paged with adjustable forms to printer. Operates under standard Z80 Zilog Mnemonics with 9 pseudo operations. Comes complete with operating manual.

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PACK/CMD removes spaces from text files generated by XEDIT, and EDIT-80 to reduce file lengths by 5 to 40 percent. PACK will also strip comment fields and line numbers for additional space savings. Text can be masked for upper case only. Does not destroy compatibility of assembly and FORTRAN source files. Comes complete with instructions.

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XDIR/CMD, an extended directory that offers more than the standard TRSDOS™ directory. XDIR will do multiple drive directories with all file attributes including extent locations, file length, EOF index, EOF record, protection level, LRL, password indication, track lockout indication, and much more. XDIR will also display to the printer.

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CALL/CMD extends and improves the TRSDOS™ AUTO function. Can be enabled and disabled by prompts, and through keyboard, resident program, or the call file.

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Circle 32

Clean up your video display...

Model I monitor modifications

The following project was written by a television engineer. Due to the nature of the monitor, you should not attempt any of the following modifications unless you are qualified to service the inside of a TV set. There are high voltages present even after the power is off and the plug removed from the wall socket. The chassis is hot (not grounded) and under no circumstances should you have the back of the monitor removed while the cord is plugged in. Ed.

Truman Krumholz, Springfield, Missouri

There are at least two versions of the monitor used on the Model I TRS-80. The earlier version has two vertical plug-in boards as illustrated in Photo 1. The later version which contains circuitry similar to the suggested changes here (in modifications 1 and 2, see photo 2) has only one vertical plug-in board.

This is a Sunday afternoon project for hardware types who would like to improve the readability of the TRS-80 monitor.

There are a number of shortcomings in the TRS-80 monitor as it was originally delivered. Some have been corrected in later versions. Earlier versions can be corrected quite easily by qualified persons. This article describes how to correct three of them. Each may be done separately, so you may decide which you need to do.

1. Horizontal distortion

The first problem, which is applicable to all versions, is when the screen is painted all white and the picture pulls horizontally. If the edges of the white area are not a straight vertical line, then you have this problem.

The cause of this is sync compression in the early stages of the video amplifier. The TRS-80 keyboard unit outputs a standard video signal. However, the amplitude (strength) of the signal is too high. This modification will correct the situation.

Find the 75 ohm resistor on the plug-in video board. This resistor is color coded violet, green, black, gold and is usually identified with an "R1" printed on the board. It is located near where the input cable connects to the board. Replace this resistor with a divider network as shown in Figure 1. This reduces the video signal level to a point where sync compression is no longer a problem.

2. "Hum" bars

The second problem we will correct is video "hum". This, and the third problem as well, can be present in the monitors with two plug-in boards as shown in Photo 1. If you have this problem, you will notice a lighter, and then a darker area of the picture slowly drifting through the picture. This is more apparent at certain brightness levels.

The cause of this problem is inadequate filtering of the video output collector supply. The cure is to add another filter section to that supply.

In my monitor there was an unused section in the electrolytic capacitor at the rear of the main board and close to the back of the set. If yours is the same, use this section, otherwise you will need to add your own capacitor. The change in the circuit is shown in Figure 2 and also illustrated as part of Figure 3. Any value of capacitor from 10 to 100 microfarads with an adequate voltage rating will do. The paralleled 0.1 mfd capacitor should be mounted near the 4700 ohm load resistor. This keeps the collector load constant at higher video frequencies. Its value is not critical. With this modification the "hum" should disappear.

3. Tightening horizontal resolution

Now we come to number three. This is a tough one. By using a sweep generator and an oscilloscope it was found that the video response of the monitor does not extend beyond about 6 Mhz. Without getting into the mathematical end of things, let's just say that because of the way the TRS-80 display is arranged, a response of near 10 Mhz is needed.

An easy way to see if you need this modification is to type some "T's" on your monitor. Set the brightness so that the horizontal line structure is just visible with normal contrast. Use a magnifying glass and look at the dots which make up the vertical line of the "T". If these dots are not round, if they are stretched horizontally, then you can use this modification.

See MODIFICATIONS, page 106

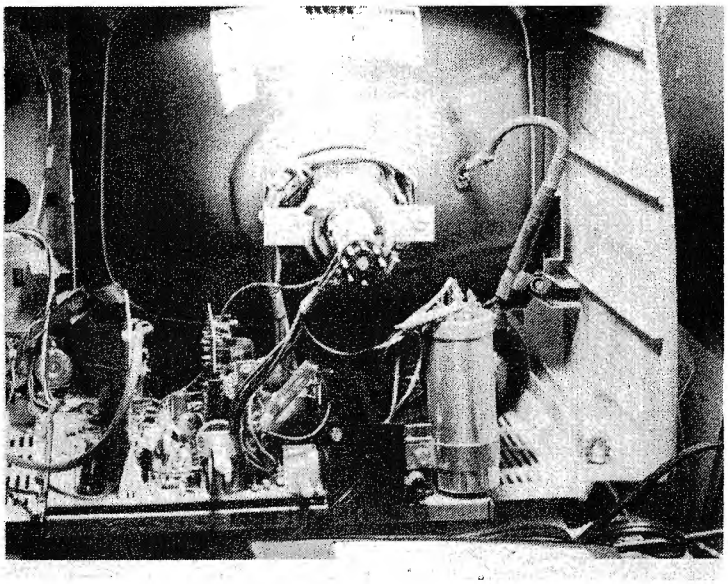
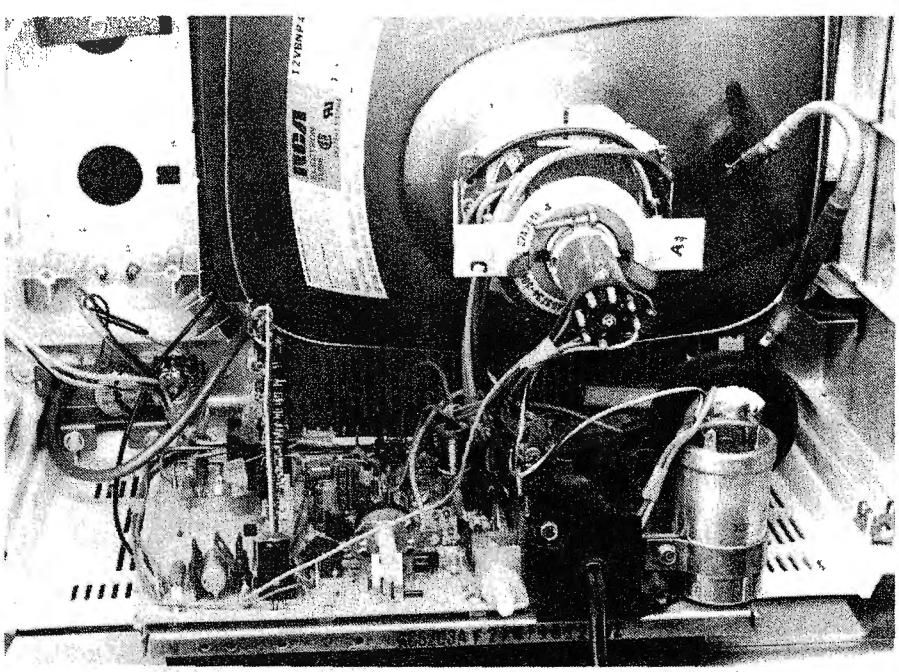


Photo 1

(Above) Inside of the TRS-80 Model I video monitor. This version contains two vertical plug-in boards (bottom left of photo) and is typical of those monitors needing all three modifications.

Photo 2

(Below) The "one-vertical-board" version of the Model I TRS-80 monitor. If your video monitor looks like this, you probably already have the modifications suggested in 2 and 3 of the article installed.



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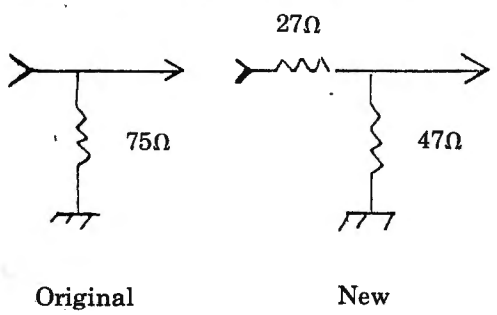


Figure 1

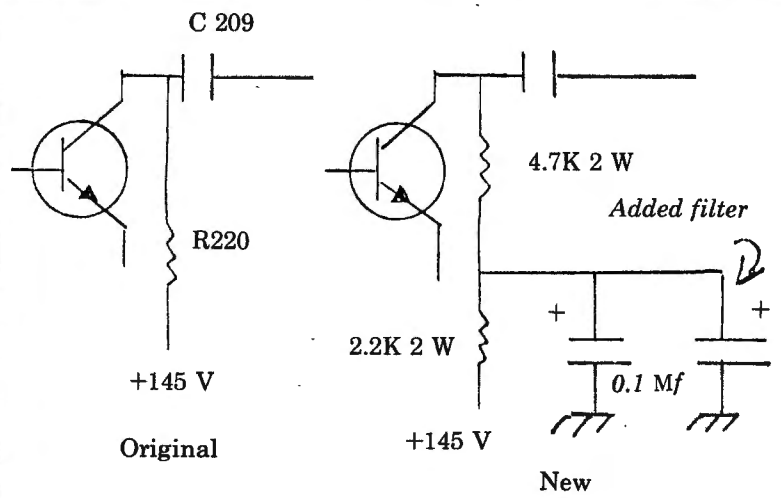


Figure 2

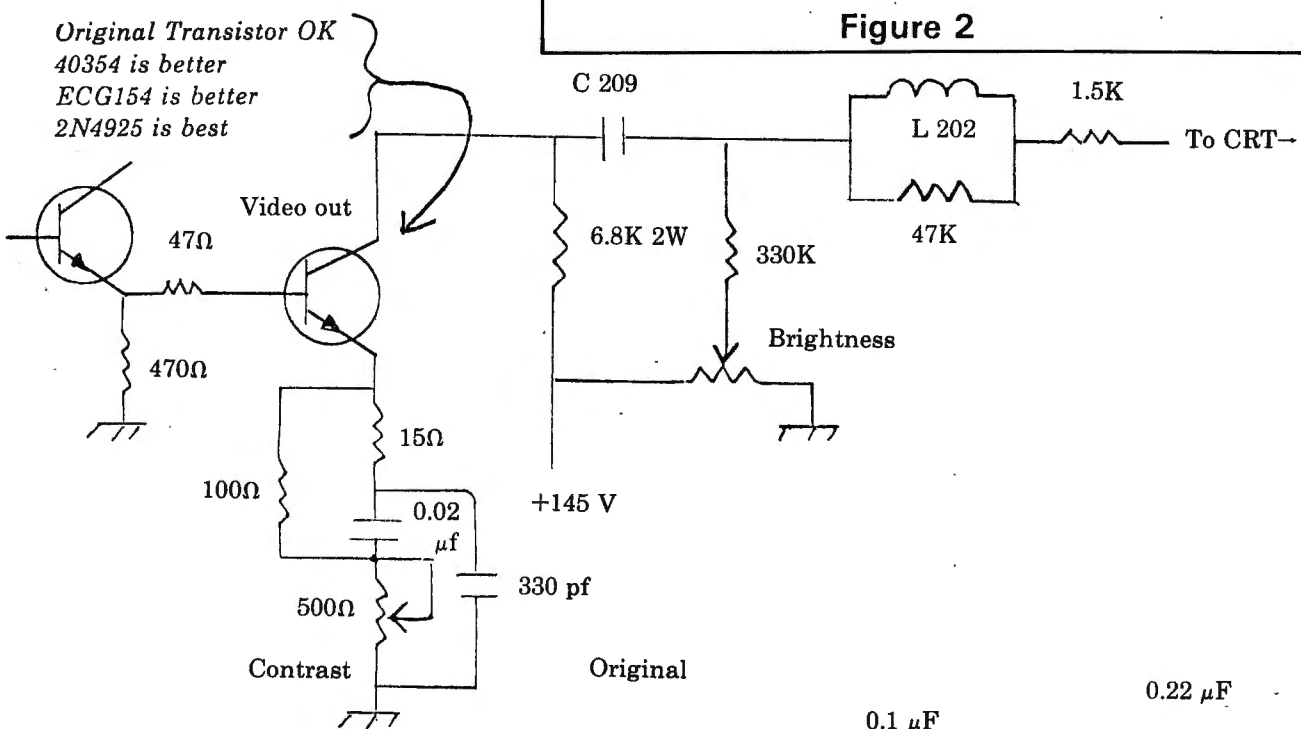
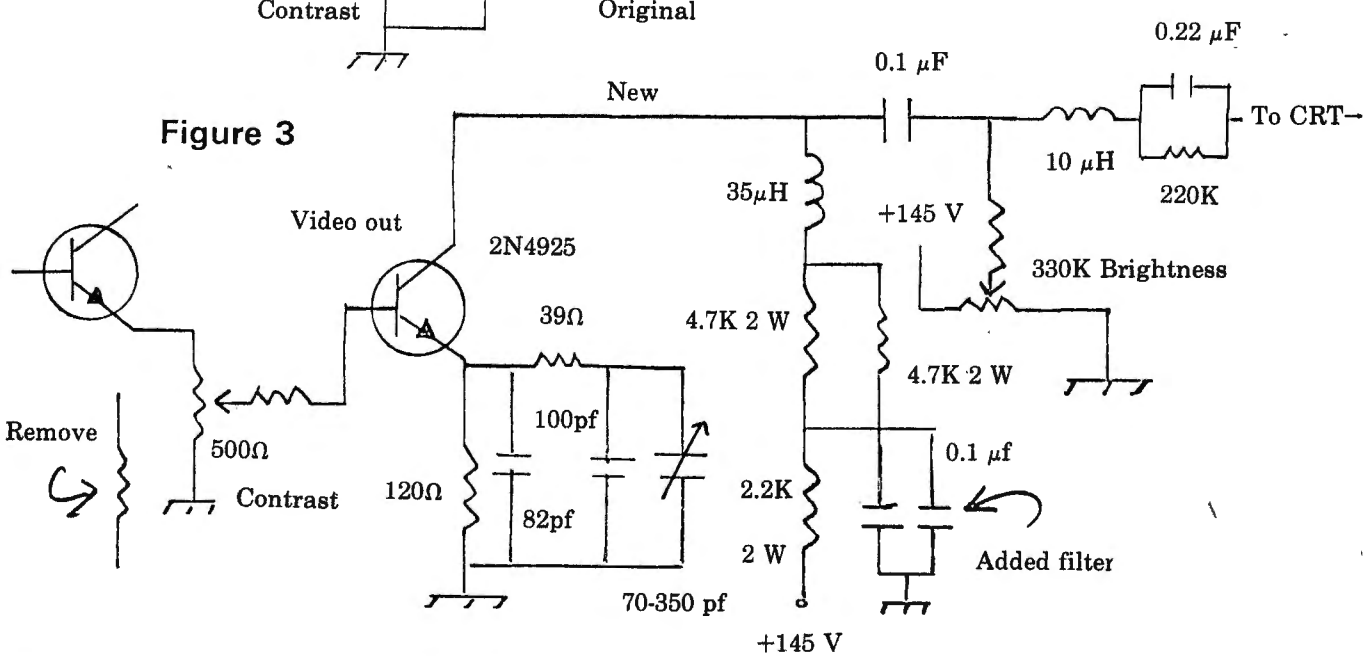


Figure 3



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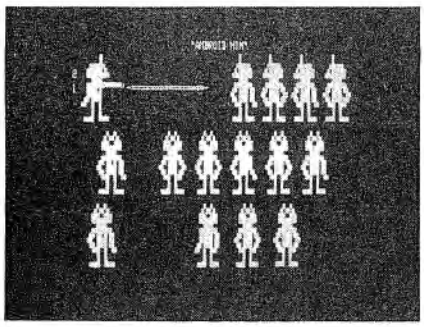

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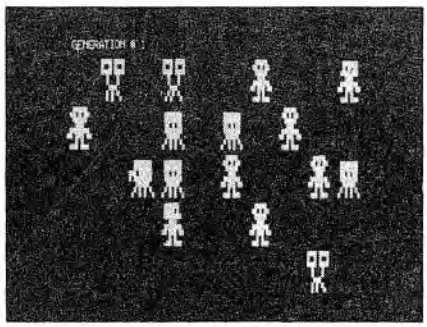

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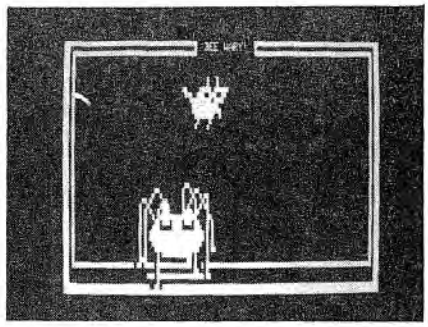

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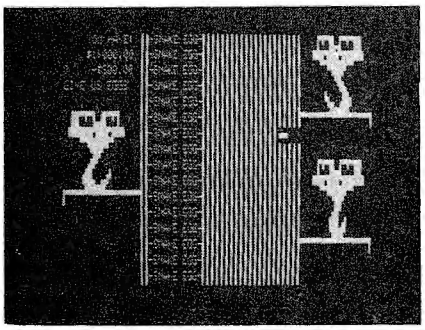

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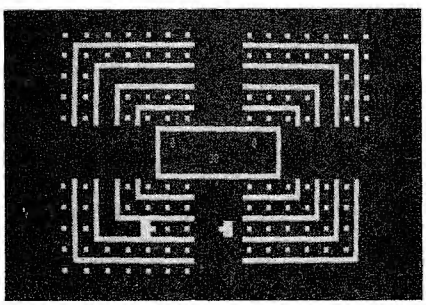

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6. ZBASIC programs may be used as USR routines from basic
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8. Limited variables: A-Z, A1-Z1, A2-Z2, A$-Z$. Arrays are not supported to decrease memory demands and speed up compiling of programs.
9. COMPILE TIMES ARE TYPICALLY 1 TO 10 SECONDS! THERE IS NO NEED TO USE COMPLICATED COMPILE TIME MODULES!
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ALL COMMANDS DIRECTLY SUPPORTED BY ZBASIC

FOR	NEXT	STEP	IF	THEN	ELSE	PEEK
SET	RESET	POINT	CHRS	RANDOM	RND	POKE
DATA	READ	RESTORE	END	GOTO	GOSUB	CLS
INPUT	INKEYS	LET	STOP	OUT	INP	RETURN
PRINT	LPRINT	PRINT@	USR	SGN	INT	ABS
SQR	LEN	ASC	VAL	STRS	POS	ON GOTO
ON GOSUB	REM	NOT	AND	OR		

INTEGER MATH *MULTIPLY /DIVIDE +ADD -SUBTRACT +/- 32767

NOTE Some commands do not act exactly as BASIC commands act

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Circle 48

Hardware modification

continued from page 102

The cause of this lack of horizontal resolution is the limited bandpass of the video output amplifier. I have tried various "easy" fixes for this with mixed results. The only real solution is to completely rebuild the video output amplifier.

This modification is for the experienced printed circuit board handler and should not present any problems. There is plenty of space for the necessary changes. Parts placement is not critical as long as lead lengths are kept to a minimum. The changes are shown in Figure 3.

There are two things to note. First, the ground end of the contrast control will need to be changed to the other end from where it is now. This is to maintain normal clockwise contrast control.

The other thing, although not critical, is that the replacement of the transistor will provide some improvement. Otherwise, try to stay as close to the given values as possible.

Upon completion of this modification, adjust the variable capacitor. To do this, turn the brightness down and note the horizontal line of a "T". Adjust the capacitor for equal brightness along the line. When the brightness and contrast are brought up to normal levels, you should have a much sharper character display. You will find the contrast control will be close to maximum (full clockwise), but more than adequate for a normal display.

Final Thoughts

Further improvement is possible, but there are no easy solutions. A DC restorer would have required a more complex video change. I have yet to find a satisfactory way to accomplish this with my version of the monitor.

Improved focus of the spot size is important. The focus anode of the tube in my monitor is connected to the +145 volt supply. I have varied this voltage through the limits (-300 to +300 volts) without significant improvement. I believe further improvement would require changing the picture tube type, which is not practical.

The monitor is much easier to read with these modifications, particularly lower case. The display now compares favorably with that of the Model II.

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Tiny Pascal compared with BASIC

Jon J Waples, East Greenwich, Rhode Island
Norm Jacobson, Seattle, Washington

Pascal has received wide acceptance since its introduction in 1970. It was developed from ALGOL, which although popular in Europe, never really got off the ground in the United States. Pascal, named for the seventeenth century mathematician Blaise Pascal, bears many similarities to ALGOL. Because Pascal forces a certain amount of discipline, it has become a popular language on college campuses.

In this issue we take a look at Radio Shack's Tiny Pascal from Supersoft. Jon Waples examines Tiny Pascal and gives us two versions of Conway's Game of Life. Norm Jacobson takes the Pascal program apart, converts it to BASIC and explains how it works. There are timed runs from the various versions.

Radio Shack's Tiny Pascal

Tiny Pascal comes with a twenty-six page user manual and a cassette with a 16K Level II version on one side and a 32K version on the other. As supplied, it will run on both the Model I and III. The cost is $19.95 from Radio Shack.

There are three sub-systems to Tiny Pascal. The first is the monitor which provides run-time support of the compiled Pascal program. It also provides for the saving and loading of source code and compiled "P-code". Unfortunately, this product does not support a printer or disk drives.

The second sub-system is the compiler which compiles the source code into P-code. One nice feature of the compiler is its 127 error codes. If there is a bug in your source code, it will let you know precisely what the error is, but not necessarily exactly where it exists.

The final sub-system is the editor. This allows the user to create and modify source programs. The first thing a BASIC programmer will notice is that there are no line numbers, which may take a bit of getting used to. In the end, it is much better, because you can never run out of space between lines of code. Lines may be deleted, inserted or extended at will. However, if any error occurs in the middle of the line you will have to retype it.

As for Tiny Pascal itself, some of its more pleasant features are decimal or hexadecimal input. The variable identifiers can be any length (the compiler recognizes the first four characters, not just the first two as in BASIC). It also includes a command to call a user defined machine language routine, and statements similar to PEEK, POKE, and INKEY$.

The user manual suggests that you should buy a book on Pascal; that the manual is merely a guide. Beginners should plan on doing this. Experienced programmers may be able to learn Pascal from the syntax diagrams in the back of the manual and a little experimentation.

Program listing 1 is a Pascal version of John Conway's "Game of Life", written in Pascal.

See LANGUAGES, page 110

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continued from page 108

Conway's "Game of Life"

John Horton Conway, a mathematician at Cambridge University, came up with "Life" in the late 1960's. It is a mathematical game which simulates the rise, fall and alterations of a society of living organisms.

Originally, it was played on a fairly large checkerboard with the checkers representing the organisms. A method using graph paper and pencil was also used at times. Both of these, however, were tedious and prone to error. With the introduction of the microcomputer, the manual methods became obsolete.

Basically, the idea is to start with a simple configuration of organisms and observe their progress as Conway's "genetic laws" are applied to births, deaths and survivors. Conway chose these laws carefully after much experimentation. They will produce the following results:

1. There will be no initial configuration which can grow without limit.

2. There will be initial configurations which will *apparently* grow without limit.

3. All patterns, after some period of change, will come to an end in one of three ways:

   a. Fade away completely either from over or under population.

   b. Become a stable pattern.

   c. Enter into an oscillating phase in which the configuration repeats the same patterns endlessly.

Conway's "genetic laws" are extremely simple. Each organism has eight neighboring cells (see Figure 1). These cells may or may not be filled with organisms.

The rules are as follows:

1. Survival: Each organism with two or three neighbors will live to the next generation.

2. Death: Each organism with one or zero neighbors will die from isolation; each organism with four or more neighbors will die from overpopulation.

3. Birth: Each empty cell with exactly three neighbors will give birth to a new organism.

At the conclusion of each generation, all births become adults, and all deaths are eliminated. It is important to note that births do not affect any other cells until they become adults. Figure 2 illustrates the life-histories of three sample colonies.

Figure 3 is a flow chart of the Life program. The first version is written in Tiny Pascal (Program listing 1). Level II BASIC is slow by comparison (program listing 4), and unless you have a compiler, the game can be played faster by hand!

See LANGUAGES, page 112

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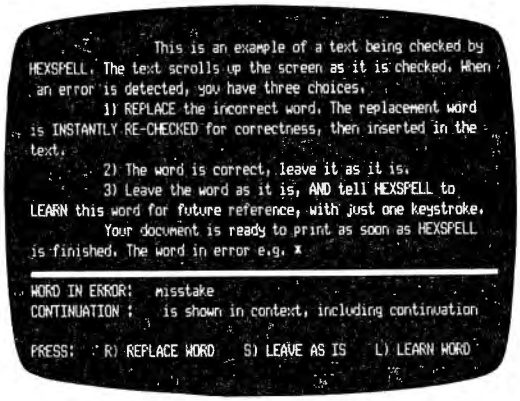

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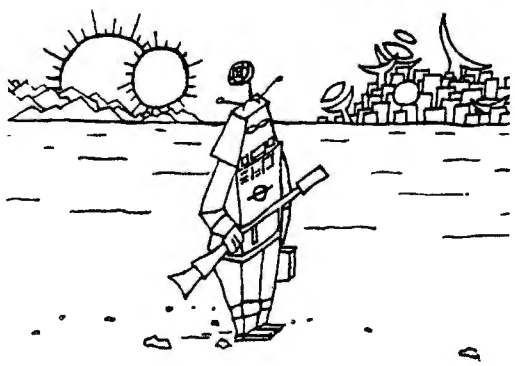

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Circle 63

Program listing 2, for 16K tape machines, and program listing 3, enhancements for disk, include two machine language routines to speed up the process. Memory must be set to 32602 in both tape and disk versions.

When run, the program pokes in the two machine language routines, starting at address 32603. Line 12 provides data verification. If this check stops execution of the program, recheck your data lines for accuracy.

To operate the program, move the cursor about with the arrow keys. When the cursor is in the desired position, press the space bar to place an organism, or clear to remove it. You can use any combination of these keys to draw your colony of organisms. With the 16K version, pressing BREAK will clear the screen. This is disabled in the disk version.

When you are ready, press the ENTER key to start computing the colony's fate. Your small society will change rapidly (or very slowly in straight BASIC). At the top of the screen, the generation and population counts are displayed. In the actual colony, an "O" indicates an adult or survivor; a "." a birth cell and an "X" a death. If you wish to return to the draw mode, press the BREAK key for the Pascal and 16K versions and the CLEAR key in the disk version.

If the colony dies, the program will prompt you accordingly. Since "Life" uses the break key in the tape version, you must press the SHIFT-BREAK combination to stop program execution.

Note that if you assemble your colony near the edge of the screen, it may dribble off the page, so to speak. This is because "Life" is theoretically to be played on an infinite plane.

The Pascal version in BASIC

Pascal does not have line numbers, but since the BASIC program in listing 4 is a line-for-line conversion of the Pascal, we will look at it to see how the program works. The misspelled words in the BASIC version are intentional to avoid keyword interaction and resultant syntax errors when run, i.e., LOCASHUN instead of LOCATION.

10-30	Remark statements: Program title and author.
100	Defines variables to be used as integers
110	Clears the screen
120-130	Prints instructions at top of screen
140	Sets the start of the usable screen to

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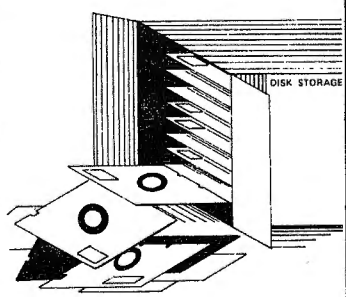

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Circle 42

the beginning of the fourth line; i.e., video location 15552

150 Sets the character used to create the flashing cursor, a space (decimal 32)

160-190 Flashing cursor loop

160 Pokes the underline character to screen

170 Delay loop

180 Pokes the blank character to screen

190 Delay loop

200 Reads the value of certain keys into a variable. The keys are the control keys and spacebar which will produce a value at location 14400

210-240 Arrow key values. Moves the cursor accordingly

250 Space bar value. Pokes an "O" to the screen

260 Replaces the cursor character with "O"

270 Returns to the beginning loop if no key is struck

280 Sets generation counter to zero

290 Sets population counter to zero

300-320 Counts the number of "O's" on the screen which constitute the current population

330-340 Prints the generation and population figures

350 Begins check for survival, death and birth

360 Sets a number counter to zero

370-450 Counts the neighbors of each cell in the generation according to Conway's laws

370 Upper left neighbor

380 Upper middle neighbor

390 Upper right neighbor

400 Left neighbor

410 Right neighbor

420 Lower right neighbor

430 Lower middle neighbor

440 Lower left neighbor

450 Results: If cell is "O" and count is not 2 or 3 then "O" becomes "X" (death). If cell is empty and count is 3 then cell becomes "." (birth)

470-490 Loop to complete births or deaths

480 "X's" are replaced by a space; "."s" by an "O"

500 Increments the generation counter

510 If population count is not zero then continue

520 Population is zero: print appropriate message

530-540 Program end

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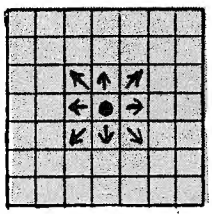

Figure 1

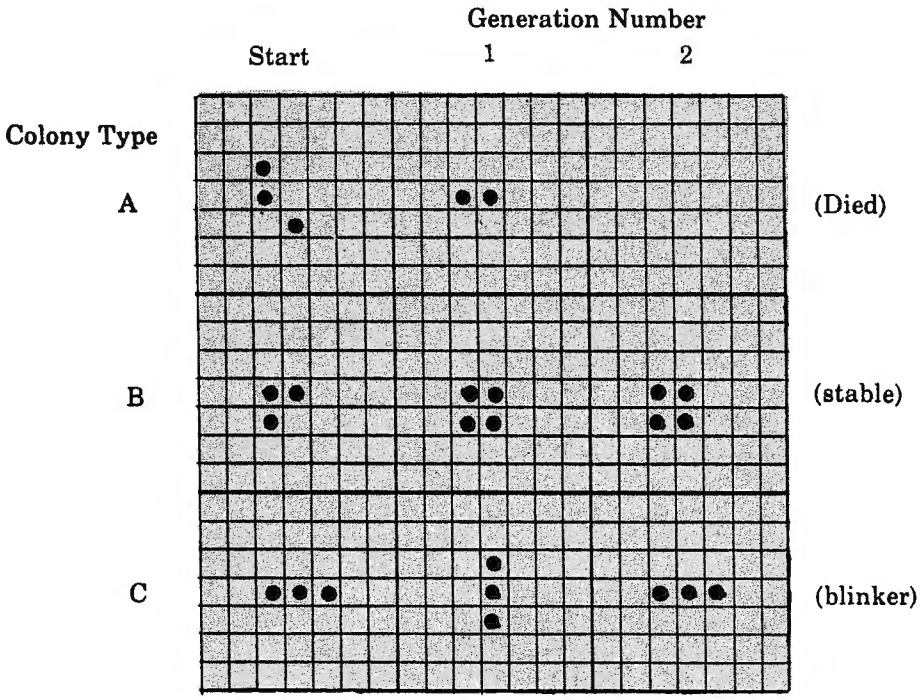

Figure 2

Timing the runs

There is a vast difference in the running time of the four programs (the fourth is not listed here, but is Program listing 4 as compiled by Microsoft's latest BASIC compiler). As might be expected, the hybrid BASIC-assembly language version runs the fastest, with the compiled BASIC a close second. Tiny Pascal runs quite well and the interpreted BASIC is a sad last. The times for thirty generations are:

Level II BASIC with
machine language calls..... 18 seconds
BASIC version compiled by Microsoft..... 28 seconds
Tiny Pascal version ..... 5 minutes, 38 seconds
Level II BASIC ..... 46 minutes, 20 seconds

The beginning figure was the same for all the languages and was allowed to run through 30 generations. To put the figure on your screen, bring the cursor down four lines and over 20 spaces to the middle of the screen. It is eleven organisms wide:

```
OOOOOOOOOOO
O         O
O         O
OOOOOOOOOOO
O         O
O         O
OOOOOOOOOOO
```

The time figures are representative for both the Model I and III. Although Microsoft's BASIC compiler is not yet available for the Model III, it soon will be. A review of that compiler is scheduled for a future issue.

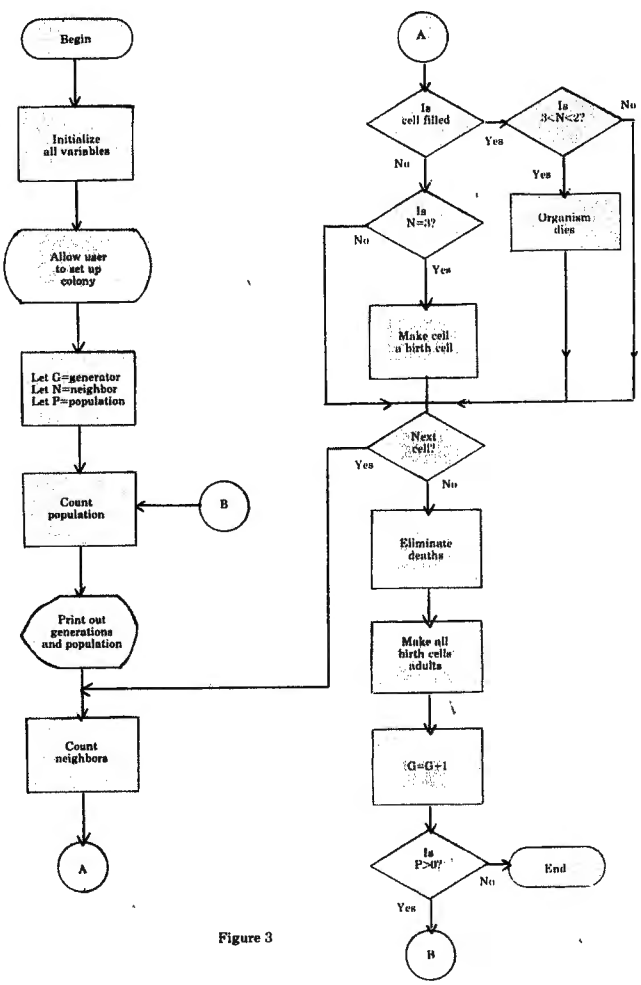

Figure 3

Listing 1

```
(* JOHN HORTON CONWAY'S GAME OF LIFE *)
(* WRITTEN IN RADIO SHACK'S TINY PASCAL BY SUPERSOFT, INC. *)
(* BY JOHN WAPLES *)
VAR CURSOR,GENERATION,INDEX,KEYSTRUCK,LOCATION,NUMBER,POPULATION:INTEGER;
BEGIN
   WRITE(28,31,'THE GAME OF LIFE',13);
   WRITE('SET UP COLONY. PRESS <ENTER> WHEN READY.',15);
   LOCATION:=15552;
   CURSOR:=32;
   REPEAT
      MEM(LOCATION):=95;
      FOR INDEX:=1 TO 100 DO BEGIN END;
      MEM(LOCATION):=CURSOR;
      FOR INDEX:=1 TO 100 DO BEGIN END;
      KEYSTRUCK:=MEM(14400);
      CASE KEYSTRUCK OF
         8:   IF LOCATION>15616 THEN LOCATION:=LOCATION-64;
         16:  IF LOCATION<16526 THEN LOCATION:=LOCATION+64;
         32:  IF LOCATION>15552 THEN LOCATION:=LOCATION-1;
         64:  IF LOCATION<16319 THEN LOCATION:=LOCATION+1;
         128: MEM(LOCATION):=79
      END;
   CURSOR:=MEM(LOCATION);
   UNTIL KEYSTRUCK=1;
   GENERATION:=0;
   REPEAT
   POPULATION:=0;
   FOR INDEX:=15552 TO 16319 DO
      BEGIN
         IF MEM(INDEX)=79 THEN POPULATION:=POPULATION+1;
      END;
   WRITE(28,'THE GAME OF LIFE',13);
   WRITE('GENERATION ',GENERATION#,', POPULATION ',POPULATION#,'.');
   FOR INDEX:=15552 TO 16319 DO
      BEGIN
         NUMBER:=0;
         IF MEM(INDEX-65)>78 THEN NUMBER:=NUMBER+1;
         IF MEM(INDEX-64)>78 THEN NUMBER:=NUMBER+1;
         IF MEM(INDEX-63)>78 THEN NUMBER:=NUMBER+1;
         IF MEM(INDEX-1) >78 THEN NUMBER:=NUMBER+1;
         IF MEM(INDEX+1) >78 THEN NUMBER:=NUMBER+1;
         IF MEM(INDEX+63)>78 THEN NUMBER:=NUMBER+1;
         IF MEM(INDEX+64)>78 THEN NUMBER:=NUMBER+1;
         IF MEM(INDEX+65)>78 THEN NUMBER:=NUMBER+1;
         IF (MEM(INDEX)>78) AND ((NUMBER>3) OR (NUMBER<2)) THEN MEM(INDEX):=88
         ELSE IF (MEM(INDEX)=32) AND (NUMBER=3) THEN MEM(INDEX):=46;
      END;
   FOR INDEX:=15552 TO 16319 DO
      BEGIN
         IF MEM(INDEX)=88 THEN MEM(INDEX):=32
         ELSE IF MEM(INDEX)=46 THEN MEM(INDEX):=79;
      END;
   GENERATION:=GENERATION+1;
   UNTIL POPULATION=0;
   WRITE(13,'THE COLONY HAS PERISHED.',13);
END.
```

Listing 2, hybrid BASIC program

```
1 REM * THE GAME OF LIFE * VERSION 3.2
  * 28-MARCH-1981 *
2 REM * WRITTEN BY JON WAPLES *
3 REM * RESERVE MEMORY SIZE AT 32602 *
4 REM * ONLY TYPE IN LINES WITH LINE NU
  MBERS ENDING IN 0 *
10 N=0:POKE16396,165:CLS:PRINT@400,CHR$
  (23)"THE GAME OF LIFE":PRINT@448,"BAS
  ED ON THE GAME BY JOHN CONWAY":PRINT@
  520,"WRITTEN BY JON J. WAPLES":FORI=3
  2603TO32767:READJ:N=N+J:POKEI,J:NEXT
11 REM * DATA FOR 1ST MACHINE LANGUAGE
  PROGRAM *
12 IF N<>18095 THEN CLS:PRINT"DATA IN L
  INE 20, 30, AND/OR 40 IS INCORRECT":S
  TOP:ELSE N=0
20 DATA33,0,0,17,128,60,1,64,3,26,254,7
  9,32,1,35,19,11,120,177,32,244,195,15
  4,10
21 REM * DATA FOR 2ND MACHINE LANGUAHE
  PROGRAM *
30 DATA221,33,128,60,1,64,3,46,0,221,12
  6,191,205,245,127,221,126,192,205,245
  ,127,221,126,193,205,245,127,221,126,
  255,205,245,127,221,126,1,205,245,127
  ,221,126,63,205,245,127,221,126,64,20
  5,245,127,221,126,65,205,245,127,221,
  126,0,254,79,32,15,125,254,2,40,10
40 DATA254,3,40,6,221,54,0,88,24,16,221
  ,126,0,254,32,32,9,125,254,3,32,4,221
  ,54,0,46,221,35,11,120,177,32,161,33,
  128,60,1,64,3,126,254,88,32,4,54,32,2
  4,6,254,46,32,2,54,79,35,11,120,177,3
  2,235,201,254,79,40,5,254,88,40,1,201
  ,44,201
41 REM * DRAW MODE *
42 REM * INITIALIZE VARIABLES AND SET U
  P SCREEN *
50 CLEAR200:DEFINTA-Z:CLS:PRINT@3,"THE
  GAME OF LIFE: SET UP COLONY.  PRESS <
  ENTER> WHEN DONE.":L=15552:C=32:G=0
51 REM * DISPLAY CURSOR AND SCAN KEYBOA
  RD *
60 POKEL,95:FORI=0TO100:NEXT:POKEL,C:FO
  RI=0TO100:NEXT:K=PEEK(14400)
61 REM * CHECK FOR ALL COMBINATIONS OF
  KEYS *
70 IFK=1THEN370
80 IFK=2THENPOKEL,32
90 IFK=4THENPRINT@128,CHR$(31);
100 IFK=8THENIFL>15551THENL=L-64
110 IFK=10THENIFL>15551THENL=L-64:POKEL
  ,32
120 IFK=16THENIFL<16256THENL=L+64
130 IFK=18THENIFL<16256THENL=L+64:POKEL
  ,32
140 IFK=32THENIFL>15488THENL=L-1
150 IFK=34THENIFL>15488THENL=L-1:POKEL,
  32
160 IFK=40THENIFL>15552THENL=L-65
170 IFK=42THENIFL>15552THENL=L-65:POKEL
  ,32
180 IFK=48THENIFL<16257THENL=L+63
190 IFK=50THENIFL<16257THENL=L+63:POKEL
  ,32
200 IFK=64THENIFL<16319THENL=L+1
210 IFK=66THENIFL<16319THENL=L+1:POKEL,
  32
220 IFK=72THENIFL>15550THENL=L-63
230 IFK=74THENIFL>15550THENL=L-63:POKEL
  ,32
240 IFK=80THENIFL<16255THENL=L+65
250 IFK=82THENIFL<16255THENL=L+65:POKEL
  ,32
260 IFK=128THENPOKEL,79
270 IFK=136THENIFL>15551THENL=L-64:POKE
  L,79
280 IFK=144THENIFL<16256THENL=L+64:POKE
  L,79
290 IFK=160THENIFL>15488THENL=L-1:POKEL
  ,79
300 IFK=168THENIFL>15552THENL=L-65:POKE
  L,79
310 IFK=176THENIFL<16257THENL=L+63:POKE
  L,79
320 IFK=192THENIFL<16319THENL=L+1:POKEL
  ,79
330 IFK=200THENIFL>15550THENL=L-63:POKE
  L,79
340 IFK=208THENIFL<16255THENL=L+65:POKE
  L,79
350 C=PEEK(L)
360 GOTO60
361 REM * CALL 1ST MACHINE LANGUAGE SUB
  ROUTINE: *
362 REM * RETURN WITH POPULATION COUNT
  *
370 POKE16526,91:POKE16527,127:P=USR(0)
371 REM * CENTER GENERATION AND POPULAT
  ION COUNT AT TOP *
380 A$="THE GAME OF LIFE: GENERATION"+S
  TR$(G)+", POPULATION"+STR$(P)+"."
390 PRINT@0,CHR$(30);
400 PRINT@32-FIX(LEN(A$)/2+.5),A$;
401 REM * CALL 2ND MACHINE LANGUAGE SUB
  ROUTINE: *
402 REM * DO BIRTHS, DEATHS, AND SURVIV
  ALS *
410 POKE16526,115:POKE16527,127:X=USR(0
  )
```

```
411 REM * CHECK FOR BREAK *
420 K=PEEK(14400):IFK=4THEN50
421 REM * INCREMENT GENERATION COUNT AN
  D LOOP *
422 REM * IF POPULATION > 0 *
430 G=G+1:IFP>0THEN370
431 REM * PRINT PERISH MESSAGE AND WAIT
   FOR ENTER *
440 PRINT@69,"THE COLONY HAS PERISHED.
   PRESS <ENTER> TO PLAY AGAIN.";
450 K=PEEK(14400):IFK=1THEN50ELSE450
```

Listing 3
changes and additions required for disk use

```
10 CLS:PRINT@400,CHR$(23)"THE GAME OF L
  IFE":PRINT@448,"BASED ON THE GAME BY
  JOHN CONWAY":PRINT@520,"WRITTEN BY JO
  N J. WAPLES":FORI=32603TO32767:READJ:
  POKEI,J:NEXT
370 DEFUSR1=32603:P=USR1(0)
410 DEFUSR0=32627:X=USR(0)
411 REM * CHECK FOR CLEAR *
420 K=PEEK(14400):IFK=2THEN50
421 REM * CHECK FOR END OF PROGRAM *
422 IF K=8THENEND
423 REM * INCREMENT GENERATION COUNT AN
  D LOOP *
424 REM * IF POPULATION > 0 *
```

Listing 4
Straight BASIC listing

```
10 REM JOHN HORTON CONWAY'S GAME OF LIF
  E
20 REM WRITTEN IN RADIO SHACK'S DISK BA
  SIC
30 REM ADAPTED BY NORMAN H. JACOBSON
100 DEFINT C,G,I,K,L,N,P
110 CLS
120 PRINT "THE GAME OF LIFE"
130 PRINT "SET UP COLONY. PRESS <ENTER>
   WHEN READY."
140 LOCASHUN=15552
150 CURSER=32
160 POKE LOCASHUN,95
170 FOR INDEX=1 TO 50 : NEXT INDEX
180 POKE LOCASHUN, CURSER
190 FOR INDEX=1 TO 50 : NEXT INDEX
200 KEYSTRUCK=PEEK(14400)
210 IF KEYSTRUCK=8 THEN IF LOCATION>156
  16 THEN LOCATION=LOCATION-64 : GOTO 2
  60
220 IF KEYSTRUCK=16 THEN IF LOCASHUN<16
  526 THEN LOCASHUN=LOCASHUN+64 : GOTO
  260
230 IF KEYSTRUCK=32 THEN IF LOCASHUN>15
  552 THEN LOCASHUN=LOCASHUN-1 : GOTO 2
  60
240 IF KEYSTRUCK=64 THEN IF LOCASHUN<16
  319 THEN LOCASHUN=LOCASHUN+1 : GOTO 2
  60
250 IF KEYSTRUCK=128 THEN POKE LOCASHUN
  ,79
260 CURSER=PEEK(LOCASHUN)
270 IF KEYSTRUCK<>1 THEN 160
280 GENERASHUN=0
290 POPULASHUN=0
300 FOR INDEX=15552 TO 16319
310 IF PEEK(INDEX)=79 THEN POPULASHUN=P
  OPULASHUN+1
320 NEXT INDEX
330 PRINT@0,"THE GAME OF LIFE"
340 PRINT "GENERATION";GENERASHUN;"POPU
  LATION";POPULASHUN
350 FOR INDEX=15552 TO 16319
360 NUMBER=0
370 IF PEEK(INDEX-65)>78 THEN NUMBER=NU
  MBER+1
380 IF PEEK(INDEX-64)>78 THEN NUMBER=NU
  MBER+1
390 IF PEEK(INDEX-63)>78 THEN NUMBER=NU
  MBER+1
400 IF PEEK(INDEX-1)>78 THEN NUMBER=NUM
  BER+1
410 IF PEEK(INDEX+1)>78 THEN NUMBER=NUM
  BER+1
420 IF PEEK(INDEX+63)>78 THEN NUMBER=NU
  MBER+1
430 IF PEEK(INDEX+64)>78 THEN NUMBER=NU
  MBER+1
440 IF PEEK(INDEX+65)>78 THEN NUMBER=NU
  MBER+1
450 IF (PEEK(INDEX)>78) AND ((NUMBER>3)
   OR (NUMBER<2)) THEN POKE INDEX,88
    ELSE IF (PEEK(INDEX)=32) AND (NUMBE
  R=3) THEN POKE INDEX,46
460 NEXT INDEX
470 FOR INDEX=15552 TO 16319
480 IF PEEK(INDEX)=88 THEN POKE INDEX,3
  2
   ELSE IF PEEK(INDEX)=46 THEN POKE IN
  DEX,79
490 NEXT INDEX
500 GENERASHUN=GENERASHUN+1
510 IF POPULASHUN<>0 THEN 290
520 PRINT : PRINT "THE COLONY HAS PERIS
  HED."
530 PRINT
540 END
```

Software review

Superscript
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For Model I Disk Scripsit with Lower Case Modification

Much has been written about Scripsit over the past year. Endless comparisons with the Godfather of micro-text editing, the Electric Pencil, have been made and invariably each program has suffered some in comparison. There will always be those who will stay with one or the other program because they like it and it does the job they want to do.

Recently, a new package of enhancements for Scripsit was released by Acorn Software. The enhancements were written by Richard P Wilkes, and are as follows:

1. You can now get a directory of any disk without leaving Scripsit with the new "D" command.
2. Files can be killed from within Scripsit with the new "K" command.
3. The keyboard driver program is changed so that the key repeat is faster.
4. Files can now be read in NEWDOS or TRSDOS.
5. You can now add lines into a text during printout. For example, you can have a multiple letter with "Dear" and a special character group, and then fill in the name while printing.
6. When the program is customized you have a choice of three serial or three parallel port printer drivers, or you have the option of using a customized driver for either serial or parallel ports. The CR/LF problem encountered by many users can be fixed in these drivers.
7. Serial drivers incorporate ETX/ACK protocol for 1200 baud operation.
8. On printers that can backspace, the ability to do slashed zeros and underlining is added.
9. Diablo and NEC printers can now use superscripts, subscripts, underlining boldface, 10/12 pitch and slash zeros.
10. The file loading command is changed so that you must input a filename to prevent accidental loss of a text buffer if the L command is intended but L is typed.
11. Required spaces are allowed to give the user more control over his spacing in lines.
12. Brackets, braces and carets can now be entered through the keyboard.
13. Drivers located in high memory are protected by the modified system.

The source code for the printer drivers is included on the diskette. Even better, you will find that the drivers have some really nice features like auto-repeat, upper-case lock, printer toggle and JKL screen printing.

The ability to look at disk directories and kill files is very important. Ever since Scripsit came out, this has always been my one complaint about the program. At one stroke, that problem has disappeared. Scripsit has gradually been taking over my text editing load, and this modification will definitely speed it up.

Equally as impressive was the speedup of the repeating key. Everyone who has used Scripsit has seen the screen scroll go on forever. With the repeat modification, the screen scrolls past so quickly that it becomes a reasonable way to move from one point in the program to another.

One fact which came as a very pleasant surprise, is that the actual modification is painless. The Superscript modification takes only a few minutes and requires that you answer a few simple questions to handle the customization of the program. The diskette with the programs comes without Scripsit (you must already have the Scripsit program). To modify it, you power up your system and boot the Acorn Superscript diskette by pressing RESET.

After the Acorn system is running, you first choose which driver you want to have compiled into the program. Next, you let it load a copy of Scripsit and answer some questions about the characteristics of your printer. Once these answers are done, the modification takes place and a new file called SCRIPT/CMD is written to disk for your use. This is the modified version of Scripsit. One-drive systems have special instructions.

As to limitations: first, this is a disk system modification. It requires at least 32K of memory **and lower case.** Either Radio Shack or Pencil modifications will work with the package, but there is no modification for the upper case only version of Scripsit.

There are also some new restrictions to be observed if you are using any of the special options. For example, the instructions warn that if you press CLEAR while a printer toggle option is in effect, the driver doesn't get told about it and the only way to save things is to save the text and rerun SCRIPT/CMD.

More serious to the average user is the fact that the message "Printer Not Ready" is no longer displayed. But pressing "CLEAR" will get back to the text if the system hangs up because the printer is not ready.

Some people will consider it a disadvantage that the status messages at the bottom of the screen are shortened. More will worry about the fact that the modification adds slightly more than 1K to the Scripsit program (calculated from the length of the file on the diskette). However, by checking ?M for characters available in memory, I have only lost 671 characters from the text space. Whatever figure you take, it does make the program longer, so you could have an old file that will not fit.

None of these objections amount to very much however. In fact, all of them can be safely ignored by most users and those who do come into contact with them will find the instruction booklet clear enough to keep them out of trouble.

T R Dettmann

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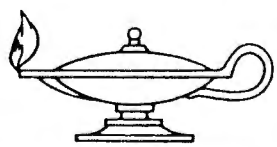

Circle 163

The vertical mill: A three-dimensional plotter?

System/Command

Phil Pilgrim, Port Townsend, Washington

For the past few months, I've been experimenting with a rather unique output device on my TRS-80. In lieu of my regular machine language theme, I'd like to tell you about it. The device is a Sears Craftsman vertical mill. Manufactured for Sears by Sherline Products (San Marcos, CA), it has a bed capable of motion along the X and Y axes, and a rotatable head assembly which moves along the Z axis. For the price ($299), it is a very solidly built and capable machine.

By removing the handcranks which control the bed and tool motions, and replacing them with stepper motors, one may control the contour cutting strokes of this machine from a computer. I chose a North American Philips (Cheshire, CT) series 82900 stepper for each. It has a torque of around 25 oz./inch and an angular resolution of 48 steps per revolution. By a gear reduction of 75:24, torque is increased threefold, and a linear resolution of three steps per thousandth of an inch is obtained. If the machine is kept well-adjusted and lubricated the torque is more than adequate for most applications. (I'm using mine to cut aluminum molds for fishing lures.)

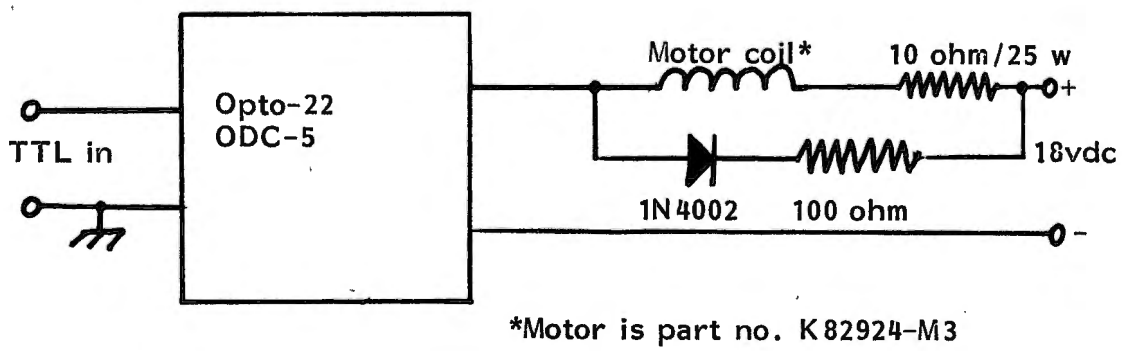

Figure 1. Schematic for one motor coil (of 12).

```
01950 SHORTP  LD      H,0          ;H=0
01960         LD      D,H          ;D=0
01970 R2      LD      A,(DY)       ;DY=0?
01980         OR      A            ;  .
01990         JR      NZ,DYNZ1     ;  NO: OKAY
02000         INC     A            ;  YES: MAKE IT 1
02010 DYNZ1   LD      L,A          ;HL=DY
02020 R3      LD      A,(DZ)       ;DZ=0?
02030         OR      A            ;   .
02040         JR      NZ,DZNZ1     ;  NO: OKAY
02050         INC     A            ;  YES: MAKE IT 1
02060 DZNZ1   LD      E,A          ;DE=DZ
02070         CALL    0BF2H        ;HL=HL*DE
02080 R4      LD      (TX),HL      ;SO TX=DY*DZ
02090 R37     LD      (TTX),HL     ;SAME FOR TTX
02100 R5      LD      A,(DX)       ;AND SO ON, FOR TTY AND TTZ
02110         OR      A
02120         JR      NZ,DXNZ1
02130         INC     A
02140 DXNZ1   LD      L,A
02150 R6      LD      A,(DZ)
02160         OR      A
02170         JR      NZ,DZNZ2
02180         INC     A
02190 DZNZ2   LD      E,A
02200         LD      H,0
02210         LD      D,H
02220         CALL    0BF2H
02230 R7      LD      (TY),HL
02240 R38     LD      (TTY),HL
02250 R8      LD      A,(DX)
02260         OR      A
02270         JR      NZ,DXNZ2
02280         INC     A
02290 DXNZ2   LD      L,A
02300 R9      LD      A,(DY)
02310         OR      A
02320         JR      NZ,DYNZ2
02330         INC     A
02340 DYNZ2   LD      E,A
02350         LD      H,0
02360         LD      D,H
02370         CALL    0BF2H
02380 R10     LD      (TZ),HL
02390 R39     LD      (TTZ),HL
```

Figure 2. Calculating step intervals for X, Y, and Z axes.

Interface to the steppers can be very tricky, or so it seems if you read all the manufacturers' literature on the subject. Simply put, each motor has four windings which must be energized in certain sequences depending on whether clockwise or counter-clockwise motion is desired. There are special circuits and integrated circuits designed to do this (at premium prices), or a driver can be built from scratch. If you opt for the latter, you will find enough design specs to keep any electrical engineer in calculator paradise. When it came time in my project to choose a power transistor with the right combination of response time and current capability to drive the coils, I'd had enough. Fortunately, a simpler solution presented itself.

The Opto-22 Corporation (Westminster, CA) offers a line of opto-isolator modules and mounting boards capable of converting TTL (Transistor-Transistor Logic) signals to the current levels required by the steppers. I use an ODC-5 module on each coil (see Figure 1), making 12 altogether for three motors, and do the step sequencing via software. One and a half parallel output ports are necessary, mine being derived from an Exatron memory expansion box.

Once the hardware is completed, a software driver must be written to do the sequencing, timing, acceleration, and step counting for each axis. Since my application involves the milling of smooth contours, I also wanted the driver to handle short, straight strokes in three dimensions, so my molds wouldn't have a jagged, stair-step look to them. This involves the principal

```
03010 R12      LD      HL,(TTX)        ;GET TTX
03020          OR      A               ;RESET CARRY
03030          SBC     HL,BC           ;SUBTRACT MINIMUM OF TTX, TTY, TTZ
03040 R31      CALL    Z,MOVEX         ;IF ZERO, DO ONE STEP
03050 R14      LD      (TTX),HL        ;SAVE NEW VALUE OF TTX
03060          LD      D,H             ;DE=TTX
03070          LD      E,L             ;   .
03080 R13      LD      HL,(TTY)        ;GET TTY
03090          OR      A               ;RESET CARRY
03100          SBC     HL,BC           ;SUBTRACT MINIMUM
03110 R32      CALL    Z,MOVEY         ;IF ZERO, MOVE IT
03120 R15      LD      (TTY),HL        ;SAVE NEW VALUE OF TTY
03130          RST     18H             ;NEW TTY LESS THAN NEW TTX?
03140          JR      NC,HLOK1        ;  NO: OKAY
03150          EX      DE,HL           ;  YES: DE=TTY
03160 HLOK1    LD      HL,(TTZ)        ;GET TTZ
03170          OR      A               ;RESET CARRY
03180          SBC     HL,BC           ;SUBTRACT MINIMUM
03190 R33      CALL    Z,MOVEZ         ;IF ZERO, MOVE IT
03200 R16      LD      (TTZ),HL        ;SAVE NEW VALUE OF TTZ
03210          RST     18H             ;NEW TTZ LESS THAN DE?
03220          JR      NC,HLOK2        ;  NO: OKAY
03230          EX      DE,HL           ;  YES: DE=TTZ
```

Figure 3. Code to perform one "macro-tick" of step clock.

of a master "step clock" which ticks at a fixed rate. Each axis is stepped every n ticks, where n for a given axis is a function of the slope of the line being milled. If the slope in the XY plane is ½, for example, X would step every tick, and Y every other one. This would continue until the desired number of steps was reached. Finding n for each axis is the object of the code shown in Figure 2. DX, DY, and DZ are the number of steps desired in each axis (absolute values). TTX, TTY, and TTZ are the n's calculated for the three axes. This is done as follows:

TTX=DY*DZ
TTY=DX*DZ
TTZ=DX*DY

with exceptions made when DX, DY or DZ = 0.

One might object that this is inefficient, and it is. TTX, TTY and TTZ should be divided by the greatest common denominator to eliminate redundant ticks; but there is an easier way. By keeping track of which axis has the least number of ticks to go before it steps, we can advance the master step clock by this amount instantly, thus guaranteeing at least one step at each such "macro tick". Thus a short, straight line is milled in the least amount of time.

The code segment in Figure 3 shows how this is done with the TRS-80. BC contains the minimum of TTX, TTY and TTZ. MOVEX, MOVEY and MOVEZ perform the stepping and restore TTX, TTY and TTZ, respectively, to their original values (from TX, TY and TZ). At the end of this code DE will contain the new minimum value, which can be put in BC for the next cycle.

Once the driver program is complete, experimentation is in order. The first thing I noted was that the spindle motor on the milling machine (a DC brush-type with an SCR speed control) drove the TRS-80 bananas. The solution was to put a capacitor across the brushes and a low-pass filter in the power lead, and to plug the thing in on the other side of the room from the computer. Another thing which became apparent (after a couple of broken bits) is that the feed rate (bed and tool head speed) had to be software controlled. Not only this, but a sure-fire interrupt system had to be built into the driver to stop the beast instantly and yet preserve its status (in case the phone rang, or it started gouging itself). This observation leads naturally to another note: Never leave such a machine running unattended. Program bugs tend to manifest themselves as soon as you turn your back, possibly ruining an entire 8 hour milling job. And, finally, because contour milling is such a time-consuming job, requiring a small bit and many floating point calculations, I highly recommend a clock speed-up mod for the TRS-80. Mine is made by Exatron and works great. You won't want to speed up the tool feed rate, of course, but the intervening calculations go a lot faster.

Admittedly, this has been a very cursory overview of the project, but the details would fill the magazine. I hope, nonetheless, that if you are considering a similar project, there are enough tips here to get you started.

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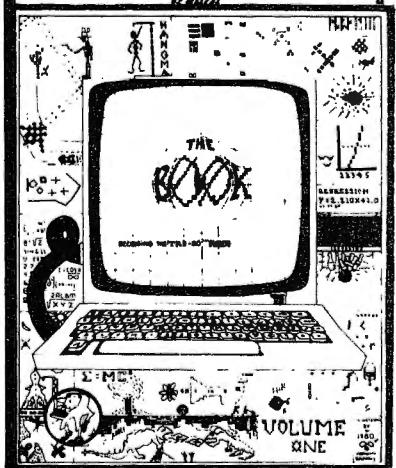

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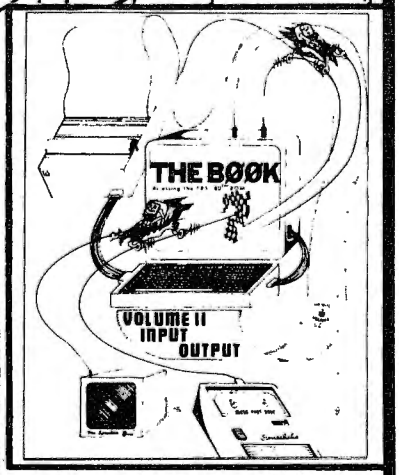

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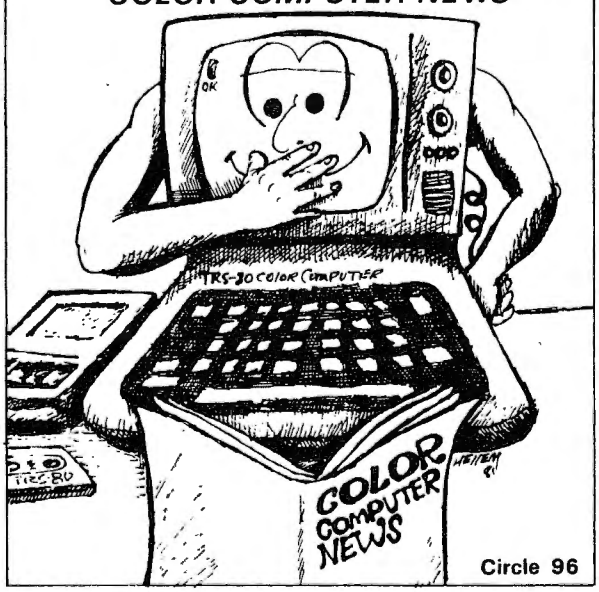

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The past year has seen an increased interest in alternatives to interpreted BASIC as a programming vehicle for microcomputers. One language which has probably elicited more curiosity than any other is Pascal. As a new language touted by some as the language of the future, Pascal is said to embody the best features of other languages such as FORTRAN and COBOL while avoiding their weaknesses. Because Pascal is a highly structured language, it is an excellent choice for teaching the fundamentals of programming. Its structuring imposes a certain amount of discipline on the programmer. While it is certainly possible to write bad Pascal code, it is not as easy a language to misuse as BASIC, for example, with its potential for rat's nests of GOTO's and GOSUB's. For the newcomer to computers, Pascal has one other attraction: as a completely new language, there are not a lot of old Pascal hands around, thus permitting newcomers to start even.

TRS-80 Model I and III owners interested in Pascal are fortunate to have available to them a small, modestly priced, cassette-based Pascal compiler which runs in only 16K of RAM. Called "Tiny Pascal", this compliler was developed several years ago by Kim Man-Chung and Herbert Yuen, graduate students at the University of Illinois. Tiny Pascal was first marketed by Supersoft and the Computer Information Exchange (People's Software). In 1980 Radio Shack acquired the rights to Tiny Pascal, and it is now being sold as catalog number 26-2009.

As tiny as Tiny Pascal is, the amount of information supplied by Radio Shack's accompanying user manual is even tinier. For the individual new to Pascal, the manual is a major disappointment. Radio Shack dismisses the problem of

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Circle 53

explaining Pascal fundamentals by listing four standard textbooks on the subject (none of which deal specifically with Tiny Pascal) "... for those who need a more thorough introduction." Not listed among the references is David Heiserman's book, entitled simply, *Pascal.*

Pascal is a godsend for the Tiny Pascal user since it was written specifically about Tiny Pascal as it is implemented on the TRS-80. The importance of this distinction from other texts which deal with Pascal in general cannot be overemphasized. While Tiny Pascal is a faithful subset of Pascal, it does have its idiosyncrasies. Trying to apply the Pascal described in Conway, Gries and Zimmerman's *A Primer on Pascal*, for example, can be a very frustrating experience.

Pascal covers the details of Tiny Pascal from loading the cassette to writing very long and involved programs. Following the introduction to Tiny Pascal, Heiserman explains, one by one, the commands of Pascal, making extensive use of sample programs. Along the way the operation of the Tiny Pascal monitor, compiler and editor are also covered. This process takes approximately one half of the book. The remainder is dedicated to listing and examining in detail Pascal code of increasing sophistication. From the outset, readers are urged to enter each sample program and use it before dealing with the code analytically. Many of the sample programs are games, and so this method of sugar-coating the instruction is very effective.

It may be Pascal's academic roots which cause most books on the language to be concerned with the concept of structuring almost to the point of an obsession. This is a problem which Heiserman happily avoids. In *Pascal*, the author does deal with structuring, and deals with it competently, but only incidentally to the commands of Pascal and in connection with the analysis of the various programs. This craftsman-like approach to the language as opposed to the scholarly tone of other Pascal books seems to be exactly what most users of Tiny Pascal would need and want. Once the fundamentals of Pascal have been digested there is plenty of time to

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appreciate the subleties of the language.

Another problem which those new to Pascal may need to face is that of learning to read syntax diagrams. Many users are familiar with regular flow charts. While these are as important to Pascal as to any other language, Pascal makes extensive use of another type of diagram to represent the syntax of the language. Syntax diagrams are not unique to Pascal, but they are rarely applied to BASIC, and thus many TRS-80 users may be unfamiliar with them. In *Pascal*, the author does not automatically assume that the reader can read syntax diagrams. Instead, he devotes a whole section to learning this skill. Here, once again, the discussion is meaningful and down-to-earth. Incidentally, the syntax diagrams as well as the flow charts throughout the book are excellent.

All in all, *Pascal* is quite an impressive book. However, as with many good things, it does have its flaws. While the actual programming language *is* well covered, the advanced user would be better served with more details about the mechanics of the Tiny Pascal compiler. Details, such as how the run-time section works and how machine language routines may be called from Tiny Pascal, would make the book even more valuable. *Pascal* also fails to mention the 32K version of the Tiny Pascal compiler which comes along with the 16K compiler. The 32K version is a bit different and a few words explaining these differences would have been helpful. Then there is also the price of the book: at $9.95 for the paperback edition, it is not cheap.

While a good case might be made that the problems mentioned thus far have been rather subjective, the final problem is not. There are an unusually heavy crop of typographical errors in the book. Not only are there tens of typos, but many, (perhaps most) of these errors occur in the program listings which the reader is expected to enter into the computer and run. For the novice who is following the listings in the book without fully understanding the code, the results can be disastrous.

In summary, one must weigh the very substantial value of the information which Heiserman has put into *Pascal* against a fairly steep price for a less than impeccably published product. But for many and especially those new to Pascal, the good features will clearly outweigh the bad.

Stephen Sharro

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For insight into some of the basic principles underlying **ISAAC NEWTON** see GODEL, ESCHER, BACH by Douglas R. Hofstadter, Chapter XIX and Martin Gardner's MATHEMATICAL GAMES column in **Scientific American,** October, 1977 and June, 1959. $24.95.

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Three reviews by Carr

BOSS, Packer & Infinite BASIC ...

BOSS
Soft Sector Marketing Inc.
6250 Middle Belt
Garden City, MI 48135
Model I & III Tape or Disk
$18.95 (cassette to disk)
plus $2.50 shipping & handling

Boss is a utility program to aid in the creation and debugging of programs written in BASIC. It is a machine language program which can be located anywhere in memory. It allows the tracing of program flow, single steps in BASIC programs, observation of conditions of variables during execution, and the pushing and popping of BASIC programs to or from a stack during program development. It works with most disk operating systems, as well as 16K Level II.

With Boss, the @ key becomes a control key. (To print the @ character you use the shift and 0 key in combination.)

The trace function allows you to follow the logical path of a program without destroying the screen as badly as the trace function of Level II. The three major trace commands described in the manual are:

Control 1 - trace off.
Control 2 - Trace on, ouput to the video display.
Control 3 - Trace on, output to the printer.

You can enable any of these commands by pressing the control (@ key) plus the corresponding number key. The trace displays the line numbers as they are executing in the upper right hand corner of the video in a column of four at a time. This is much superior to the standard Level II trace function.

The single step function allows stepping through individual lines of a program or individual instructions within a line. There is also a variable delay for pauses in the execution of program steps. The four single step commands are:

Control 4 - Single step off.
Control 5 - Single step to end of line.
Control 6 - Single step instruction.
Control 7 - Variable delay step.

Control 5 will cause your program to pause at the end of each line until the space bar is pressed. The video display trace will also be initiated to show you which line number is being executed. Control 7 will cause your program to delay about 0.25 seconds at the end of each line. This delay has nine settings from 4 milliseconds to 0.9 seconds. To speed up execution you press control-up-arrow. To slow down execution you press control-down-arrow. This allows you to run a program at close to normal speed until you reach the point where you wish to slow execution.

The trace and single step commands can be invoked by your program while it is running with an imbedded poke instruction.

You can pause to look at selected variables during program execution. While the normal screen display is destroyed when this is done, it will be returned to its original condition when the program is continued. The commands for reviewing variables are:

Control N - Select variables for review.
Control O - Review the selected variables.

It's nice to be able to press control-O anywhere in your program and check the values of selected variables. It is also nice to have your screen returned to normal when execution of the program is continued. It is a lot better than interrupting the program flow and display as you would with BASIC only.

The following controls allow you to stack one or more programs into high memory while you work on or run another program. The only limitation is the amount of memory space available.

Control - - Save the BASIC program in high memory.
Control : - Recall the last saved program from memory.
Control 8 - Append the last saved program to the current program.
Control 9 - Append the next to last saved program to the current program.
Control O - Recall the next to last saved program.

These options in Boss are very useful when writing and testing programs. I know of no other utility like this for BASIC programming. It's great.

Packer
Cottage Software
614 N Harding
Wichita, KS 67208
Model I & III tape or disk
$29.95 (cassette to disk)

Packer is one of the many utilities which will shorten BASIC code by removing spaces, remarks and unnecessary code from the program. It is written in machine language and is quite fast and versatile.

The commands are UNPACK, SHORT, PACK, RENUM, and MOVE. Their explanations follow:

UNPACK cause Packer to unpack the resident BASIC program into single statements lines, add spaces for easy reading and renumber the

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program in increments of ten starting with line ten.

The SHORT command shortens your resident program by deleting unnecessary words, spaces and remark statements. SHORT* will retain the remark statements.

The PACK command executes the unpack and short commands and then will logically pack lines together where possible, forming multiple statement lines.

Two commands, RENUM and MOVE affect the lines themselves. RENUM is a very fast renumbering program while MOVE will allow any one line or group of lines to be moved to any new location within an existing program. Following the move, all lines and references are renumbered.

This is an excellent utility to own. It can save a lot of memory and works very quickly on most programs. Altogether, a great addition to any programmer's library.

Infinite BASIC
RACET Computes
702 Palmdale
Orange, CA 92665
Model I & III tape or disk
$50. Model I / $60. Model III

Infinite BASIC is a package which contains many machine language subroutines. You may load only the routines which you need into memory. Once the desired routines are defined and loaded, the defined set may be downloaded to a disk or tape file for later use.

Infinite BASIC has two main features, the MATRIX and STRING functions, and such niceties as the GSF SORT. With the MATRIX function, you can initialize a single dimension array, reshape it into a two dimensional array for processing and then delete it. With the STRING functions you can draw lines on the video from one point to another by using a single command. It is very fast and fun to use.

You can also SCROLL the information on the screen. Let's say you have a logo or header on the bottom of the screen and want to move it to the top. All you have to do is enter "X=&SSUP(n)". "n" is how far you want it to scroll. The logo or header will jump to the top of the screen almost instantaneously.

These are super grahic and screen formatting routines and are just a small part of the 80 different routines included in Infinite BASIC.

Some of the commands, and what they do are:

&SAP$(I,J) - This is a fast function for clearing arrays or screen contents to a constant value. If you want you can fill the screen with any character you want in a fraction of a second.

&SCPY(S$,T$,N) - You can use this to copy elements of one matrix to another.

&SDHL(X,Y,LEN) - This, with other commands like it, makes the SET statement obsolete. It is a much faster and easier way to draw lines.

&SEHL(X,Y,LEN) - This allows you to erase lines on the video.

&SRTC(S$,I,J,E) - This is used for a character string sort.

&SRTV(S$,I,J) - This is the multivariable sort routine. If you have not previously used a RACET sort routine you will be surprised, since they execute extremely fast.

&SCP$(S$) - This allows you to compress a string.

Since there are some 80 commands available, these barely scratch the surface of the capabilities of this package. Infinite BASIC is very powerful, and you find yourself doing things you would never have attempted without it.

Pete Carr

Software review

COCOBUG
Allen Gelder Software
Box 11721 Main Post Office
San Francisco, CA 94101

Monitor Program for TRS-80 Color Computers
$19.95 on cassette

A new and timely program entitled "Cocobug" was recently released by Allen Gelder Software. Cocobug is a very compact monitor program designed for use with the new TRS-80 color computers. It can be used with the 4K, 16K and the 16K extended color versions. It is delivered as a package consisting of a pamphlet from Motorola containing advanced design specifications relating to the MC 6809E 8-bit microprocessing unit. Additionally, there is a handy pocket-sized, fold-up reference card which among other features, includes the complete MC6809E instruction set. Finally, the package includes documentation as well as the actual program.

Loading Cocobug is quite straightforward, and requires no special talent except that one must be aware of the specifications for his particular machine. If your computer has 16K extended color, then side 2 of the cassette will be used, while 4K machines require the use of side 1. The 16K machine without extended color BASIC must use side 2 with a trivial one-line modification.

Cocobug allows the user to examine or modify either memory or CPU registers. The program allows for placement of break-points and execution of single instructions or entire machine language programs in real time. A very nice bonus is that RAM or ROM may be examined in hexadecimal, ASCII, or mixed hex/ASCII forms., This feature should be very helpful for those not yet comfortable with hex/ASCII code conversions. Table 1 lists Cocobug's set of commands and a brief summary of their interpretations.

This reviewer took Cocobug through its paces from beginning to end, using only knowledge gained from the documentation as a guide. The program operated flawlessly and each command performed as described.

The documentation, which is as adequate as that of T-Bug and D-Bug, should be sufficiently rich in content for experienced programmers already familiar with programming in assembly or machine language. This reviewer would have preferred to have documentation which includes some in-depth information which guides the user gently, but completely, through an entire programming sequence. As provided, the documentation does list examples of the use of commands, but may be slightly shallow for the beginner.

Cocobug is a good value if purchased by the experienced programmer. He will be up and running quite smoothly and will appreciate the ease with which commands are executed. The novice however, may need to do some preliminary study of terms before he can fully appreciate this program.

Don Scarberry

Table 1
Cocobug Commands

Mnnnn	Display contents of 112 consecutive RAM/ROM locations
Nnnnn	Display contents of 56 consecutive RAM/ROM locations in mixed hex/ASCII form
@	Scroll up one full line
;	Scroll down one full line
.	Shift lines left one location
/	Shift lines right one location
R	Display two programming models of the 6809 MPU (side by side). The left display indicates entry conditions before execution of an instruction while the right display presents exit conditions after a breakpoint.
T	Disables the programming models, displayed by the R command, in the event your subject code requires use of the screen
>	Restores the three bytes originally written over by the last breakpoint
L(Address)	This command allows the entry of code and breakpoints as well as certain imbedded commands which allow one to run the program
<	Imbedded within the L command code. Places a break point at the next three memory locations The three bytes overwritten by this code may be restored using the > command.
*	Also imbedded with the L command code, this character allows real time execution of code at the last address specified which precedes the character

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Everest Explorer
Acorn Software Products Inc
634 N Carolina Ave., S E
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At 29,028 feet, Mount Everest (discovered in 1852 by British surveyors) is a mountain climber's dream. For over 100 years it defeated Europe's best climbers. In the spring of 1953 however, Edmund Hillary and Tenzing Norgay reached the summit. Since then it has been scaled several more times and by varying routes. While other peaks may be technically more difficult to climb, it is the number of obstacles that must be overcome to reach the summit that makes Everest such a challenge. Such things as rapidly changing weather, tremendous altitudes, and difficult logistics all come together to make Everest the ultimate in climbing experiences. The simulation Everest Explorer is based around the climbing of this mountain.

As director of an Everest expedition, you need to plan the mountain assault in three phases: selection of climbers and equipment, establishment and provisioning of a series of camps up the mountain face, and direction of the final summit assault. For the first phase, the user is given an amount of money varying from $80,000 to $275,000. This money is used to buy equipment and finance the expedition. With this money, the climb director must organize climbers, sherpas (guides), tents, oxygen bottles, food units and fuel units. In making the selection of climbers and equipment, the computer keeps track of all expenditures.

The next major factor to be considered is the route to be attempted. There is a choice of two possible ways up the mountain. The first, pioneered by Hillary, is to continue from the glacier near the base up to the notch or valley between the peak of Everest and that of its neighbor, Lhotse. From this point, known as the South Col, one climbs to the south summit and then to the main summit. A more difficult route, first climbed by the American expedition in 1963, is the west ridge route. This route takes off from camp two, established on the glacier at about 20,200 feet, and climbs steep snow fields up to the western ridge. This route is more dangerous and allows less margin for error than does the traditional route.

The final pre-climb factor is that of timing since the weather can be bad on Everest at any time during the year. The best time to climb is when one has the least possible chance of severe weather. This "calm" period usually occurs from some time around April 1st until monsoon season, which is around the end of May. An alternate time period for good climbing weather is from mid-September to mid-October These dates should be taken as suggestions only; one can never tell exactly when the weather will change, but as the climb director you cannot simply wait around and look at the sky. An educated guess is about the best possible method for selecting a climb date.

After all the pre-climb data has been set, the team of climbers and sherpas begin the mountain assault. The climbers must establish six camps at increasing altitudes during the quest for the summit. After the sixth and final camp has been properly set, and assuming that all events prior to the establishment of this camp went well, the climbers begin the attempt to reach the summit. If supplies last and the climbers are healthy, the summit can be reached, otherwise, your party will join the others who have attempted to conquer Everest and have failed.

This game is not simple. Although easy to operate, there are many factors and random events which must be dealt with or the climb will end in a dismal failure. The documentation is very clear and tastefully presented. It begins by giving a brief description of the program and then goes into instructions on how to load from either tape or diskette. There are differences between the cassette and diskette versions aside from recording media. There is a game

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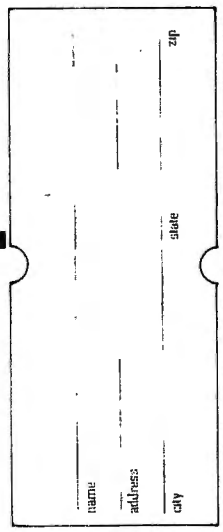

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saving feature on the diskette version which allows the user to halt program operation, save the climb data on diskette, and commence the game at a later time from the point at which it was halted. Also included on the diskette version but not on the cassette are several more details in the program itself, such as servant morale and special medical attention. With both versions, a map of the mountain is included which highlights the west ridge and the south ridge routes and their appropriate camp locations. The map is a very nice touch and aids the player in visualizing the climbing routes and the overall mountain.

Although this is not a word interpreter as in the adventure games (and in my opinion this game is superior to many adventure games), the human interventions in this program are made as carefree as possible. This is accomplished by using single character inputs whenever necessary and by minimizing the number of numerical values which must be entered. After a strategic command is given by the user, the program will ask for positive verification of the command. This is quite handy and does not slow down input time any considerable amount. The only problem that occured during playtesting for this review dealt with the input of a number. To check for error trapping (of which there is not quite enough in this program), I input an exceedingly large number and the program bombed. This lack of error trapping is the only fault I have found, and if one pays attention to inputs, no problems will arise.

This is not one of those games which is easily mastered. It takes much time to successfully "get the hang of it", and even then, random events and the choice of two climbing trails virtually eliminate the acquisition of one sure-fire strategy which will get the expedition to the top every time. This game is truly challenging and requires a bit of reasoning and general common sense. It holds your attention for quite a while, and I have yet to get bored with it. However, if you wish to purchase this program and successfully operate it, study a bit about mountain climbing and ascents of the past Everest expeditions. Doing this will give you extra knowledge which will make the simulation more enjoyable.

W W Harper, II

Kid Venture #1
Kid Venture #2
Adventure International
PO Box 3435
Longwood, FL 32750
Model I 16K Level II and up
Model III 32K Level II and up
$14.95 each, on cassette

Never Fear! Kid Venture is here!

At last, someone has developed an adventure-type program for the small fry in your family. That someone is James Talley, and his Kid Ventures were designed for the 4 to 10 year old computerists hogging your computer.

The Kid Ventures available at this time are based on the story of "Little Red Riding Hood" and "The Night Before Christmas". Each is a two-tape package. One tape is the program written in BASIC for the Model I/III TRS-80. Tape two is a voice tape of James reading the story as it is presented on the screen. It is presented both with words and a picture. At the audio cue, the child "turns the page" by pressing the space bar.

Everest Explorer assult routes

Kid Venture #1
Little Red Riding Hood

This program package has the features mentioned above with two modes. Mode 1 is the story mode. In this mode, you have the voice tape reading the story while the child presses the space bar to advance ths story. This mode is especially good for non-readers. Once you have trained them to recognize what to do at the cue, you can leave them to play alone. It is somewhat like the Little Golden Books that come with a record.

Mode 2 is a quiz mode. In this you have the option of computer generated sound effects. These sound effects consist of a musical tune that identifies certain aspects of the story. For instance, the tune "My Old Kentucky Home" is played when the Grandmother's house is shown. "A Tisket, A Tasket" is played for the basket of goodies.

For non-readers, there are cardboard cutouts that mask all the keys but the "QWERTY" row and the space bar. These cutouts have pictures designating the keys that correspond to various elements of the story. However, the child will still need a reader with him or her because the voice tape doesn't go with the quiz mode.

The quiz mode presents the story but stops at certain points to present a "fill in the blank" type of question. Such as: Red Riding Hood knocked on the what? At this point the child finds the picture which represents the answer and pushes the indicated key.

My 3 year old likes the quiz mode on this one better. She can't wait to get to the question about the "big sharp teeth". (As a matter of fact, she tries to use the teeth to answer anything! It's her way of making a joke. If confronted, she will give the correct answer.) I think the user should write the words under the pictures. There is no harm in presenting the word along with the picture to help promote word recognition. Then later, replace the picture masks with word masks. You might as well teach the kid to read while she plays.

As wonderful as the program is, there is a problem. The program will not run on a Model III with only 16K memory. When Tandy stole those 258 bytes from RAM to extend ROM, it didn't leave enough space for this program. So, if you have a Model III, you will need at least 32K. It will run just fine on a Model I with 16K.

Other than this problem, the program is very good. There is good interaction between the player and the machine in the quiz mode. In the story mode, the tape reading is fun and easy for a smaller child. The sound effects are quite elaborate and add a great deal to the program. I just wish they were available in both story and quiz mode.

Kid Venture #2
The Night Before Christmas

This program is a storybook - computer style. The voice tape reads the poem, as with Riding Hood. The graphics presentation of the story are quite artistic given the low resolution of the TRS-80. The limited animation is eye-catching. For example, the grandfather clock's pendulum swings as the candle flames flicker. Santa's eyes really twinkle and his belly shakes. Much to the delight of my 3 year old, Santa comes down the chimney with a bound! However, Kid Venture #2 doesn't have the quiz mode. Only the reading of the story from the voice tape.

My daughter really likes this one. She "talks" back to James' tape as he reads, and when he says, "Let's go on a Kid Venture", she yells out, "Yeah!". She gets great joy out of doing it herself.

This program is designed for children 4 to 10, but I think with a little help, even a 2 year old would enjoy it. Conversly, I suspect a child much over 7 would soon tire of it. My 6 year old enjoyed it the first couple of times, but left after that. There was not enough interaction for him.

There are a couple of problems here too. First, as with Riding Hood, this program will not run on a Model III 16K system. You will need 32K.

Also, there are some sound effects made by toggling the cassette relay. Since Tandy changed the cassette port on the Model III, you won't get these sounds. It is used to make the grandfather clock tick. While editing the program to replace the 255 port with 236 will give you the click, it destroys the graphics. You can get these sounds though by connecting the "AUX" lead from your cassette to an external amplifier. However, the story is just as good without the sound effects.

As with the Red Riding Hood program, "Night ..." works fine on the Model I.

Another problem is the fact that you get only one copy of "The Night Before Christmas" program. Since it dosen't have a quiz mode, you are given a bonus program called "Match Maker". You are given 2 passes on the tape of this program, but only one for "Night Before Christmas". So, as soon as you see that you get good loads, make a backup copy quick!

Bonus Program - Match Maker

Since I have mentioned "Match Maker" as the bonus program, I should say a few words about it.

I like it very much. It is a child's version of "Concentration", in that you have 13 pairs of objects concealed randomly on a game board. You must match the objects which are alike. This means you must remember where you saw it last. The objects are "covered" by letters of the alphabet. The board covers the entire screen and the letters and objects are drawn graphically.

There are sound effects too. When you correctly match two objects, you get a rendition of "Dixie". If you match it wrong, you get a tune that sounds like "You didn't get it!"

My daughter likes to play if I help her. I have found that I can teach her letter recognition and also teach her the typewriter keyboard arrangement while playing. (She'll be touch typing by the time she is in 2nd grade!)

My son enjoys "Match Maker" very much. He knows his letters and the keyboard well now, and can remember where he has seen an object better than I. He holds the family record high score of 146.

Speaking of scores, the program gives you 100 points to begin. With each correct match, you earn 10 points. With an incorrect match, you give up 7 points.

I think this program is worthwhile. I'd like to see it offered separately at a cheaper price. It keeps my son absorbed for some time trying to beat his previous score.

Sherry M Taylor

Feature program

For Models I, II & III with DOS

A BASIC letter writing program

Charlie Jones, San Diego, California

Every once in a while, it's nice to produce a letter without the hassle of Scripsit.

This program allows the user to quickly type in all the pertinent data and text for a letter. It is fully self-prompting and easy to use. Users may even want to modify the program to merge the letters produced here with names and addresses from a mailing list program. A letter is stored on the disk as a sequential file under a filename generated by the program using the date and Zip code (or under one supplied by the user). This way, the disk directory can serve as a reminder of correspondence sent. The program provides for rough copy and paging as well.

Here are some notes and thoughts on the body of the program. Line 60 is set for 48K machines. The clear statement should be adjusted accordingly for smaller systems. The variable RL in line 70 is set to 14 as the number of lines required by the heading on page 1.

If the automatic paging option is selected, the lines per printer page should be set to 66 for eleven inch paper. This is used for ejection of single sheets. The number of letter lines refers to the actual number of printed lines per page and includes the 14 allowed for the page one heading. A typical number is 50 for this prompt.

The string manipulations from line 170 on allow for use of a mail list or other routine with the capability to mix text and names and addresses. The results are also necessary to the manual editing of any letter produced by the program.

Lines 240 to 260 construct part of the filename to be used later in the program. The "XX" assigned to Q3$ is a default for a two-digit date. By entering the Zip code into a separate variable in line 340, we can develop the remainder of the filename.

At the "Salutation" prompt, the user needs to provide the "Dear" portion of the salutation, in addition to the name of the party being addressed.

The prompts for new paragraph (+P), new page (++P), and end of body of the letter (+END), all are for program control later on. The paragraph signal will provide for an automatic additional line between paragraphs. The new page signal will eject the sheet currently in the printer. The end signal will go into the closing.

This program does not provide any editing features; but because the output can print the variables used, any lines can be corrected by just retyping it in the form:

```
G$ = "G$      Dear John;"
```

and executing the GOTO 620 command. This will bring you back to the area of the program where the letter is saved.

```
10 '  ********************************
20 '  **** LETTER WRITING PROGRAM ****
30 '  ****   COPYRIGHT (C) 1981   ****
40 '  ****    BY CHARLIE JONES    ****
50 '  ********************************
60 CLEAR 27000 : DIM L$(1000)
70 CLS : RL = 14 : P = 1 : X = 1 : R =
  1000
80 PRINT "LETTER WRITING ROUTINE" : FOR
   I = 1 TO 100 : NEXT I
90 INPUT "AUTOMATIC PAGING DESIRED (Y/N
  )"; PA$ : IF PA$ <> "Y" THEN LP = 100
  0 : NL = 1000 : GOTO 130
100 INPUT "TOTAL LINES PER PRINTER PAGE
  "; LP
110 IF PA$ = "Y" THEN INPUT "NUMBER OF
  LETTER LINES PER PAGE"; NL
120 INPUT "STARTING PAGE #"; P : IF P >
   1 THEN RL = 0
130 CLS : INPUT "NEW LETTER (Y/N)"; X$
  : IF X$ = "N" THEN GOTO 760
140 PRINT "PLEASE PROVIDE THE THE FOLLO
  WING INFORMATION:"
150 INPUT "STARTING PAGE #"; P : IF P >
   1 THEN 400 : RL = 0
160 IF P > 1 THEN 400
170 LINEINPUT "RETURN ADDRESS, LINE ONE
  : "; A1$
180 A1$ = "A1$  " + A1$
190 LINEINPUT "RETURN ADDRESS, LINE TWO
  : "; A2$
200 A2$ = "A2$  " + A2$
210 LINEINPUT "RETURN ADDRESS, LINE THR
  EE: "; A3$
220 A3$ = "A3$  " + A3$
230 LINEINPUT "DATE OF LETTER (EXAMPLE:
   FEBRUARY 7, 1981): "; D$
240 Q2$ = LEFT$(D$, 3)
250 Q3 = INSTR(D$, ",")
260 Q3$ = "XX" : IF D$ <> "" THEN Q3$ =
   MID$(D$, Q3 - 2, 2) : Q4 = VAL(Q3$)
  + 100 : Q3$ = RIGHT$(STR$(Q4), 2)
270 D$ = "D$   " + D$
280 LINEINPUT "ADDRESS NAME, LINE ONE:
  "; D1$
290 D1$ = "D1$     " + D1$
300 LINEINPUT "ADDRESS STREET, LINE TWO
  : "; D2$
310 D2$ = "D2$     " + D2$
320 LINEINPUT "ADDRESS CITY, ST, LINE T
  HREE: "; D3$
330 D3$ = "D3$     " + D3$
340 LINEINPUT "ADDRESS (ZIP ONLY): "; D
  4$
350 Z$ = "Z" + D4$
360 IF LEN(Z$) > 6 THEN Z$ = LEFT$(Z$,
  6)
370 D4$ = "D4$     " + D4$
380 LINEINPUT "SALUTATION:"; G$
390 G$ = "G$      " + G$
400 PRINT "ENTER +P FOR PARAGRAPHS, ++P
   FOR NEW PAGE, +END TO STOP"
410 PRINT "NOW, INPUT LINES AS DESIRED,
   64 LETTERS/LINE IS OK."
420 FOR I = X TO 1000
430 NI = 1000 + I
440 NI$ = STR$(NI)
450 LN$ = RIGHT$(NI$, 3)
460 L1 = L1 + 1
470 TL = RL + L1 : IF TL > NL THEN INPU
  T "NEW PAGE (Y/N)"; NP$ : IF NP$ = "Y
  " THEN LL$ = "++P" : NP$ = "" : GOTO
  500
480 PRINT TAB(10)"INPUT LINE #"TL
490 LINEINPUT LL$
500 IF LL$ = "++P" THEN RL = 0 : TL = 0
   : L1 = 0
510 L$(I) = "L$(" + LN$ + ") " + LL$
520 IF LL$ = "+END" THEN R = I : LL$ =
  "" : L1 = 0 : GOTO 550
530 LL$ = ""
540 NEXT I
550 IF NL < TL + 7 THEN INPUT "FINISH O
  N NEW PAGE (Y/N): "; XX$ : IF XX$ = "
  Y" THEN TL = 6 : XX$ = "" : L$(I) = "
  PAGE    ++P" : L$(I + 1) = "PEND    +
  END" : R = R + 1
560 LINEINPUT "END OF LETTER; CLOSING:
  "; S$
570 S$ = "S$   " + S$
580 LINEINPUT "SIGNATURE LINE: "; S1$
590 S1$ = "S1$  " + S1$
600 LINEINPUT "TITLE: "; T$
610 T$ = "T$   " + T$
620 Q1$ = Z$ + Q3$ + "/" + Q2$
630 PRINT "DEFAULT LETTER FILE NAME IS:
   "; Q1$
640 LINEINPUT "ENTER NEW FILE NAME FOR
  LETTER OR PRESS ENTER "; Q4$
650 IF Q4$="" THEN 660 ELSE Q1$=Q4$
660 PRINT "FILE NAME IS: "; Q1$
670 OPEN "O", 1, Q1$
680 PRINT# 1, R; CHR$(34); A1$; CHR$(34
```

```
  ); CHR$(34); A2$; CHR$(34); CHR$(34);
   A3$; CHR$(34); CHR$(34); D$; CHR$(34
  ); CHR$(34); D1$; CHR$(34); CHR$(34);
   D2$; CHR$(34); CHR$(34); D3$; CHR$(3
  4); CHR$(34); D4$; CHR$(34); CHR$(34)
  ; G$; CHR$(34)
690 FOR I = 1 TO R
700 PRINT# 1, L$(I)
710 NEXT I
720 PRINT# 1, CHR$(34); S$; CHR$(34); C
  HR$(34); S1$; CHR$(34); CHR$(34); T$;
   CHR$(34); CHR$(34); "ZZZZ9.99999"; C
  HR$(34);
730 CLOSE 1
740 INPUT "LETTER IS ON DISK; ENTER TO
  CONTINUE"; X$
750 GOTO 860
760 LINEINPUT "FILENAME OF PREVIOUS LET
  TER"; Q1$ : PRINT "LOADING "; Q1$
770 OPEN "I", 1, Q1$
780 INPUT# 1, R, A1$, A2$, A3$, D$, D1$
  , D2$, D3$, D4$, G$
790 FOR I = 1 TO R
800 LINEINPUT# 1, L$(I)
810 IF EOF(1) THEN 850
820 IF MID$(L$(I), 9, 4) = "+END" THEN
  840
830 NEXT I
840 INPUT# 1, S$, S1$, T$
850 CLOSE 1
860 INPUT "ENTER R FOR ROUGH, S FOR SMO
  OTH COPY "; X$ : IF X$ = "S" THEN PRI
  NT "SMOOTH COPY" ELSE PRINT "ROUGH CO
  PY" : X$ = "R"
870 INPUT "PRINT PAGE #'S (Y/N) "; PB$

880 IF P > 1 THEN 1000
890 IF X$ = "R" THEN LPRINT TAB(40)A1$
  ELSE LPRINT TAB(45) MID$(A1$, 6, 30)
900 IF X$ = "R" THEN LPRINT TAB(40)A2$
  ELSE LPRINT TAB(45) MID$(A2$, 6, 30)
910 IF X$ = "R" THEN LPRINT TAB(40)A3$
  ELSE LPRINT TAB(45) MID$(A3$, 6, 30)
920 LPRINT "  " : IF X$ = "R" THEN LPRI
  NT TAB(40)D$ ELSE LPRINT TAB(45) MID$
  (D$, 6, 30)
930 LPRINT "  " : IF X$ = "R" THEN LPRI
  NT D1$ ELSE LPRINT TAB(9) MID$(D1$, 9
  , 50)
940 IF X$ = "R" THEN LPRINT D2$ ELSE LP
  RINT TAB(9) MID$(D2$, 9, 50)
950 IF X$ = "R" THEN LPRINT D3$; : LPRI
  NT "  "; ELSE LPRINT TAB(9) MID$(D3$,
   9, 50); : LPRINT "  ";
960 IF X$ = "R" THEN LPRINT D4$ ELSE LP
  RINT TAB(9) MID$(D4$, 9, 20)
970 LPRINT "  "
980 IF X$ = "R" THEN LPRINT G$ ELSE LPR
  INT TAB(9) MID$(G$, 9, 50)
990 LPRINT "  "
1000 FOR I = X TO R
1010 IF MID$(L$(I), 9, 2) = "+P" THEN L
  PRINT "  " : GOTO 1070
1020 IF (MID$(L$(I), 9, 3) = "++P") AND
   (PA$ <> "Y") THEN P = P + 1 : INPUT
  "NEW PAGE; ENTER TO CONTINUE"; XX$ :
  GOSUB 1170 : GOTO 1070
1030 IF (MID$(L$(I), 9, 3) = "++P") AND
   (PA$ = "Y") THEN P = P + 1 : FOR IP
  = 1 TO LP - NL : LPRINT CHR$(138) : N
  EXT IP : GOSUB 1170 : GOTO 1070
1040 IF INT(I/LP)=I/LP AND PA$="Y" THEN
   P=P+1 : FOR IP = 1 TO LP - NL : LPRI
  NT CHR$(138) : NEXT IP : GOSUB 1170 :
   GOTO 1060
1050 IF MID$(L$(I), 9, 4) = "+END" THEN
   1080
1060 IF X$ = "R" THEN LPRINT L$(I) ELSE
   LPRINT TAB(9) MID$(L$(I), 9, 200)
1070 NEXT I
1080 INPUT "ENTER TO CONTINUE WITH CLOS
  ING"; XC
1090 LPRINT CHR$(138) : IF X$ = "R" THE
  N LPRINT TAB(40)S$ ELSE LPRINT TAB(45
  ) MID$(S$, 6, 30)
1100 LPRINT CHR$(138); CHR$(138)
1110 IF X$ = "R" THEN LPRINT TAB(40)S1$
   ELSE LPRINT TAB(45) MID$(S1$, 6, 30)

1120 IF X$ = "R" THEN LPRINT TAB(40)T$
  ELSE LPRINT TAB(45) MID$(T$, 6, 30)
1130 PRINT "IF NEEDED, BREAK FOR CORREC
  TIONS, THEN GOTO 630"
1140 INPUT "OR ENTER FOR RESTART"; XX$

1150 IF PA$ = "Y" THEN PRINT "SCROLLING
   PRINTER TO NEXT PAGE" : FOR I = 1 TO
   LP - TL : LPRINT CHR$(138) : NEXT I
1160 CLOSE : RUN
1170 CLS:PRINT"INSERT NEXT PAGE AND PRE
  SS ANY KEY TO CONTINUE";
1180 IF INKEY$="" THEN 1180
1190 IF (PA$ = "Y") AND (P <> 1) THEN L
  PRINT TAB(37)"PAGE"; P : LPRINT CHR$(
  138); CHR$(138) ELSE LPRINT CHR$(138)
  ; CHR$(138); CHR$(138)
1200 CLS : PRINT "PRINTING PAGE:"; P
1210 RETURN
```

Computerese simplified

Most TRS-80 owners are not computer or electronic experts, yet most computer magazine articles routinely use terms, abbreviations, acronyms, slang and jargon known only to computer specialists. With the following dictionary though, even a rank amateur can get in there and speak computerese with the best - or worst - of them. Never again fear that you will display your ignorance of essential computer terms! This dictionary will let you obfuscate with supercilious disdain, and no one will be the wiser.

Lawrence I. Charters,
Bremerton, Washington

8-BIT MACHINE - A computer selling for four quarters.
16-BIT MACHINE - A computer selling for two bucks.
6502 - The year you will finally pay off your computer.
6800 - The year you will finally pay off your peripherals.
8080 - A much larger caliber than .3030.
68000 - The year your spouse will forgive you for buying a computer.
ACOUSTIC COUPLER - Lips.
AD / DA - Computer equivalent of the missionary position.
ADA - A computer language designed for government use. It is presently undefined (like most government language).
ADDRESS - Type of attire worn by some female programmers (and even some males).
ADVENTURE - Complex game involving puzzles, mazes, uncertain goals and huge waste of time. Also known as "debugging"

ALGOL - Husband of Polygol. Their missing daughter is Polygon.
ALGORITHM - 1. Musical beat used in computer music. 2. Form of birth control used by Algol.
ALPHANUMERIC - Inventor of the characters used by computers.
ALTAIR - 1. A place where computers are married. 2. A place where computers are sacrificed.
ANSI - Troubled by insects.
APL - An Apple computer after it has been dropped from the roof.
APPLE - Computer for hard-core programmers (see PET).

APPLICATION - Generic name for a type of program. No one is certain what an application program is, but it always has a hefty price tag.
ARRAY - A blast from a CRT.
ASCII - Usually used in pairs, it is ideal for travelling down snowy mountain sides.
ASSEMBLER - Person who puts your computer together after it has been aligned by a computer club. (see COMPUTER CLUB).
ATARI - Famous John Wayne movie involving elephants. ATARI 800 is the large theatre version in 70mm stereo; ATARI 400 is the 8mm silent version.
BACKUP - Opposite of forward.
BANK SELECT - Used by thieves to remember whom they intend to rob.
BAR CODE READER - Electronic device used to find taverns.

BASIC - 1. What an environmentalist would say about the health of the San Francisco Bay. 2. Computer language used for generating errors. Most billing programs are, apparently, written in BASIC.
BATCH PROCESSING - Making lots of cookies at once.
BAUD RATE - The number of attractive and skimpily clad women/men passing by you on the beach.
BAUDOT - Short for "baud audit". Audit of baud rates (see BAUD RATE).
BCD - Three of the first four letters of the alphabet.
BINARY - A rating of computers developed by astronomers. A "binary" computer would rate just two stars - strictly mediocre.
BIPOLAR - Admiral Richard Byrd (1888-1957).
BIT - 1. One eighth of a byte. One half of a byte is a nibble. One byte, in turn, is half of a gobble. 2. Twelve and a half cents.
BOMB - A picture printout of a really nice looking human being, usually blonde.
BOOLEAN LOGIC - Your spouse's term for your reasoning.
BOOT - 1. English term for engine compartment cover. 2. Steeltipped foot covering used for kicking computers. 3. Good way to end a four hour sort.
BOOTSTRAP - 1. Famous programmer, Melvin Bootstrap, author of all bootstrap programs. 2. Item of apparel worn by computer when running sexy programs.
BRANCH - Stick used for beating CPU's. If the stick is watered, someday it might turn into a computer club.
BREADBOARD - The only kind of board you can afford after buying a computer.
BUBBLE MEMORY - Your spouse's nickname for you.
BUBBLE SORT - Your spouse's term for your friends.
BUFFER - Programmer who works in the nude.
BUG - Intercom system used in Watergate complex.
BURN IN - Opposite of burnt out.
BUS - A misspelled kiss.
BYTE - See BIT.
C - Programming language used by sailors. "Tiny C:" c.
CARD READER - Card cheat.
CHARACTER - Hamlet.
CHECKSUM - Slang for a random number generator.

CHIP - 1. One California Highway Patrolman. 2. Used in computers, they come in four flavors: silicon, potato, chocolate and buffalo.

CLOAD - Command to lock up keyboard.
COBOL - Far better than monobol.
CODING - Addictive drug.
COMMAND - A suggestion made to a computer.

COMPILER - Noah Webster (1758-1843).
COMPONENT - Part of a computer, usually forgotten when the machine was sold to you, that costs extra.
COMPUTER - A device designed to speed and automate errors (see MINICOMPUTER and MICROCOMPUTER.
COMPUTER CLUB - 1. Baseball used for aligning data in a computer. 2. The group of people that spilled beer all over the keyboard.
COMPUTER MAGAZINE - Where your computer stores am—munition.
CONCATENATION - A convention of all the nation's kittycats.
CONFIGURE - Computer slang; a "configure" is the price the salesman quotes over the phone to con you into stopping by his place of business.
CONFIGURATION - Opposite of profiguration.
CONTROL CHARACTER - Computer magazine editor.
CONSOLE - What you must do to a computer owner while the computer is being repaired.
CONSTANT - A variable. (see VARIABLE).
CONSULTANT - Person who makes more money than you do to tell you how to save money with your computer.
CONSULTATION - Getting a second opinion on why your computer doesn't work.
CP/M - Program listing for "look in evening section." (see PROGRAM LISTING).
CPS - Used in referring to word processing equipment, it means "Corrections Per Second".
CPU - C3PO's mother.
CRASH - Normal termination.
CROSS REFERENCE - One that is angry.
CRUNCH - Noise made when putting a diskette in a disk drive.
CRT - Cathode Ray Tube, a superlethal Defense Department weapon being developed by NBC, ABC and CBS.

CSAVE - Command to write blank tapes.
CURSOR - A light on the video monitor, so called because the computer generates the light with an obscene command.
CYCLE TIME - When gas gets to $5.00 per gallon.
DAISY WHEEL - Mechanical simulation of a flower, used by programmers when reciting to their computers, "I love it, I love it not ..."
DATA - An Italian word, meaning a single piece of information, as in "look at disa and data".
DATA ANALYSIS - Computer treatment of Freudian slips.;
DATA BASE - Not as good as data noble.
DATA SEPARATOR - A miniature binary food processor used for sorting digital bits.
DATUM - What you should do if you discover a rich, unmarried computer company owner of the opposite sex.
DEBOUNCE - Superglue poured over keyboard.
DEBUG - Raid sprayed on the keyboard.
DECIMAL - One tenth of a motorcycle gang member's girlfriend.
DEDICATED - A programmer trying to decode a string-packed program.
DENSITY - A programmer that you can't understand is single density; a programmer that makes no sense is double density.
DIGITAL - Something done with the fingers, as in checking computer mathematics.
DIGITAL COMPUTER - A computer which uses fingers and toes for counting.
DIGITALIZER - Computer equivalent of Alka-Seltzer.
DIP - Inventor of a famous switch.
DISASSEMBLER - Another term for a computer club.
DISK DRIVE - 1. A trip through the woods in search of flying saucers. 2. A motor for a Frisbee.
DISKETTE - A Frisbee used to carry information, similar to a passenger pigeon.
DISK PACK - Six cans of fluid, used by disk drive technicians to improve their thinking.
DISPLAY - 1. A question you ask the salesman when you find a tape player on the markdown table. 2. What a computer flasher does.
DMA - Abbreviation of "Direct Memory Access"; brain surgery.
DOCUMENTATION - Instructions which come with hardware or software and explain how

much more money you will have to spend in order to get your hardware or software to work.
DOS - Short for "Disk Operating System", a course in Frisbee offered by Cal State Sonoma.
DOT MATRIX - Phrase used in claiming credit for clever programming; e.g., "Dot ma trix".
DOWNTIME - Slang for periods when a programmer is being realistic. (see JUMP; UPTIME).
DUPLEX - Having two apartments.
DUMP - Spouse's term for area around the computer.
DYNAMIC MEMORY - Memory that has been stampeded. (see MEMORY).
EBCDIC - Security code for IBM computers. Means "Erase Backup, Chew Disk, Ignite Cards". For a variety of obvious reasons, only IBM computers use EBCDIC code.
EDITOR - A program which deletes obscene commands.
ELECTRIC CRAYON - Toddler version of Electric Pencil.
ELECTRIC PENCIL - Great technological advance, batteries not included.
EMULATE - A large, but tardy, Australian bird.
EPROM - Acronym for "Exit Program, Read Owner's Manual"

ERROR - A programmer's decision to skip making a flowchart and exclude comments.
ERROR TRAP - A black hole placed in a computer to capture bugs.
EXECUTION - What your computer did to your program, also known as murder.
EXPANSION - Computer slang for "vital parts missing". A computer with "expansion capability" is capable of working only when the extra parts are purchased.
EXPRESSION - Quaint phrase uttered by a computer programmer when the computer does something unexpected. (see SPECIAL CHARACTER).
FEATURE - A hardware limitation as described by the advertising department.
FIFO - Good name for a French poodle.
FILE - Found in cakes, it is used to end lockups.
FIRMWARE - Hardware that is beginning to melt.
FLAG - White sheet raised by computer to indicate surrender.
FLIP FLOP CIRCUIT - Device used by politicians to determine policy.
FLOPPY DISK - The back pain you claim is from an old war injury.
FLOWCHART - Current map of Gulf of Mexico.
FLUSH - Using a hose to wash old information out of a computer.
FLYING HEAD - Airliner toilet.
FORMAT - FORTRAN command used exclusively by Matthew. There used to be several such commands, such as FORBEAR, FORCEPS, FORFEIT, FORLORN , FORMICA, FORNICATE, FORUM, FORSYTHIA, and FORTRESS, but none of these people used the command as much as Matt, and only his command remains.
FORTH - One of the top five computer langauges.
FORTRAN - A high level computer language used by those who have mastered BASIC syntax errors and are looking for a challenge.

FUDGE - Delicious chocolate candy, commonly found in programs written for chips made in Hershey, PA.
GARBAGE - Debris left by memory (see MEMORY).
GENERAL PURPOSE COMPUTER - A computer not terribly good at anything in particular.
GIGO - "Garbage In, Garbage Out". Normal result of most computer programming.
GLITCH - A bug with ambitions.
GRAPHICS TABLET - Pill taken by overworked computer artists.
HACKER - A frustrated programmer armed with a hatchet.
HANDSHAKING - Symptom of too much programming. Most commonly seen among programmerers who have just had their programs erased by power fluctuations.
HANGUP - Why your computer won't run "Interlude".
HARD COPY - Cheating during a well-monitored test.
HARDWARE - A computer related to rumor, as in "I hardware they are going to do this and that".
HASHING - Programming technique whereby nice, neat information is made indecipherable.
HEXADECIMAL - Unlucky numbers used by computers.
HIGH RESOLUTION - A law passed in Denver.
HOME COMPUTER - Real estate agent's loan calculator.
I/O - Abbreviation of the phrase used by programmers while they watch their programs crash, known in full as "Aaaaiiiieee! Ooooooooh...".
IBM - 1. Incredibly Big Machine. 2. Invasion of Bug-eyed Monsters. 3. In London, a frequent answer to the question, "Where is the tourguide? "I be 'im".
IC - 1. How you feel in an air conditioned data processing center. 2. Understanding, as in "Oh, now IC".
INFINITE LOOP - (see LOOP, INFINITE).
INFORMATION - Ordered material in a computer, as when you see all the transistors and note that they are lined up information.
INITIALIZE - 1. Carving your initials on a floppy disk. 2. Used to describe the process in which, when a computer is first turned on, it monograms everything in sight.
INPUT - Where your program is (see OUTPUT; PUT).
INSTRUCTION - A suggestion made to a computer.
INTERACTIVE - Used to describe programs you can get involved in, such as "Interlude".
INTERFACE - A computer's true self, revealed to no one else.
INTERPRETER - A program that converts high-level language such as BASIC into a low-level language, such as Modern English.
ITERATE - A healthy illiterate.
JOYSTICK - Peripheral intended for use only by consenting adults.
KEYBOARD - 1. Piece of wood used for unsticking keys. 2. The most important part of a computer. Resembling a typewriter, a keyboard is used for entering errors into a computer.
KEYPAD - Place where you take your date when you want results!
KEYPUNCH - 1. The one that won the fight. 2. The one that gave you a hangover.
KEYWORDS - All the words left out of your computer.
KILO - What you could have spent your money on if you hadn't bought a computer.
LANGUAGE - A system of organizing and defining syntax errors.
LIFO - Usual result of attempting to set up a FIFO quque.
LIGHT PEN - One weighing less than ten pounds.
LINE PRINTER - Computer used for writing excuses.
LOOK UP TABLE - Crib sheet for computers.
LOOP - (see LOOP).
LOOP, INFINITE - (see INFINITE LOOP).
LOST DATA - 1. Data left in the nooks and crannies of the computer overnight. 2. (See DATA, LOST).
LOW RESOLUTION - A law passed in Amsterdam.
LSI - Acronym for "Large Scale Integration", used to describe the process of getting heavy people to weigh themselves in kilograms.
MACHINE LANGUAGE - A language spoken only by machines. You can hear it sometimes while talking long distance on the telephone. We don't know what they are saying yet, but they are up to something..
MACRO - Scottish fish eggs.
MAINFRAME - What the salesman said you were getting when you bought your micro (see SIMULATOR).
MANUAL - 1. A handy book, to be used as a guide to your computer, software and peripherals. It is usually a photocopy of some hand-written notes, and tells you how to use the manual and not on how to use the computer, software or peripheral. 2. The name of the system you are forced to use when your computer is on strike.
MATH CHIP - Piece of broken abacus.
MEGABYTE - Nine course dinner.
MEMORY - Miniaturized elephants used for information storage in a computer. (see DYNAMIC MEMORY, GARBAGE,OEM,STATIC MEMORY)

MEMORY MAP - 1. Elephant paths. 2. Sheet of paper showing location of computer store.
MENU DRIVEN - A gourmet.
MHZ - Acronym for "megahertz", meaning "a million pains".
MICROCOMPUTER - One millionth of a computer (see COMPUTER, MINICOMPUTER

MICROFICHE - Sardines.
MICROPROCESSOR - A very short version of a processor (see PROCESSOR).
MINICOMPUTER - Wife of Ottocomputer.
MINIDISKETTE - A diskette left out in the rain.
MITS - Warm coverings for the hands and fingers.
MODEM - What the phone company detective looks for when he tries to find out why your computer ate the telephone, as in "We need to find the modem".
MONITOR - A Yankee TV screen used to display computer data. The Confederate equivalent is called a Merrimac.
muLISP - A computer language popular in San Francisco.
MULTI USER - Someone who uses multis.
muMATH - A computer language for kittens.
MUX - Short for multiplexer, a device which plexes multis. A device which plexes cats is a perplexer.
NANOSECOND - Mork's stuntman.
NETWORK - What Tarzan says after capturing elephant in a trap.
NEWDOS - Acronym for "Not Exactly What Dealer Offers to Sell".
NIM - Anyone who consistently loses at a famous computer game.
NORMALIZE - What a spouse claims to be trying to do by cutting the power to the computer (usually done at 3 a.m.).
NS - Abbreviation used to describe memory. It stands for "Nice and Slow".
NULL STRING - The result of a four hour sort.
NUMBER CRUNCHING - Placing a computer on the floor and jumping on it.
OBJECT CODE - Reason given by computer as to why it won't run a program.
OEM - Acronym for "Offal Efficient Memory". As the name implies, it refers to exceedingly tidy elephants that leave little garbage. (see MEMORY,

GARBAGE).
OFF LINE - A computer joke in bad taste.
ON LINE - A computer joke in good taste.
ON/OFF - Computer memory is composed of thousands of bits of memory which are either on or off. The reason why computers need so much memory is due to the fact that, at any given time, roughly half of all memory is off, sleeping on the job.
OPERATOR - The guy/gal that gets all the good dates.
OUTPUT - Where your program is when you search for it (see INPUT, PUT).
p CODE - Toilet training shorthand.
PAPER TAPE - Not very good for fixing leaking computers.
PARALLEL - LL.
PASCAL - Computer language used for college football players, known in full as "Pass Calvin or else".
PASSWORD - The nonsense word taped to the CRT.
PATCH - Used for fixing programs, also called Scotch tape.
PERIPHERAL - 1. Something attached to your computer with wires, cables, or chewing gum, such as the case, the monitor, whips and chains, dynamite, and other programming aids. 2. Your spouse after you have purchased your computer.
PERSONAL COMPUTER Electronic device that makes unkind remarks about your physical and mental attributes.
PET - Computer for soft-core programmers (see APPLE).
PILOT - Computer language used for flight simulations. A small version of this language is called "PILOT light".
PINFEED - The diet your spouse threatens you with every time you mention a new program or peripheral you want.
PL/1 - Short for "Programming Language 1", a very vulgar computer language. (This conclusion based upon listening to programmers discuss their PL/1 programs).
PLOTTER - Someone who tries to take over the organization/city/state/country/world or universe with a home computer.
POINTER - An informer.
POP - 1. Coca Cola. 2. Machine language instruction for "Punch Operator's Proboscis".
PORT - 1. A type of sweet, dark red wine. 2. One of the ways a program might list.
PORTABILITY - 1. Capable of making wine. 2. Capable of drinking wine. (Definitions apply to both programmers and computers).
PRIME NUMBER - Tender, juicy numbers used in only the most expensive computers.
PRINT - Name of the computer used by the FBI for analyzing handwriting.
PRINTER - Johann Gutenberg (1400-1468).
PRINTED CIRCUIT - Centerfold from the magazine "Playbit".
PROCESSOR - A thing that digests data or food, sometimes called a boyfriend, girlfriend, spouse, child or relative.
PROGRAM - A broadcast that occasionally interrupts commercials (see PROGRAM LISTING).
PROGRAM INTERRUPT - Power blackout.
PROGRAM LISTING - 1. TV Guide (see PROGRAM). 2. Used to describe programs that fill with water and lean to one side.
PROGRAMMER - A person who thinks he knows how to talk to a computer. A person who really does know how to talk to a computer is known as a fruitcake.
PROM - Used by desperate computers, it is an acronym for "Please Read Operator's Mind".
PROMPT - Bills.
PROTECTED DATA - (Definition withheld).
PROTOCOL - System of stylized rules by which computers and people talk to people and computers, also called profanity.
PSEUDOCODE - 1. Program that isn't for real. 2. Program written under a pseudonym.
PUNCHED CARD - Fended, Molded, Bindled and Sputilated card used to compute your tax return.
PUT - 1. Name of the place where the computer has your program (see INPUT, OUTPUT). 2. An event in the Computer Olympics. Contestants strive to throw a computer as far as possible with one hand.
QUQUE - Where the director sends you after you forget your quque during a performance.
RAM - 1. Acronym for "Randomize All Memory". 2. Nickname for a veteran programmer, also known as "old goat".
READ/WRITE PROTECT (c)1981.
READY - Computer message which says that it is bored.
REAL NUMBERS - What you wish your computer would use instead of all this phony binary/hex stuff.
REAL TIME - Opposite of phony time.
REDUNDANCY - Kkeybbounce.

REGISTER - Never found in a Radio Shack store.
RESERVED WORDS - All the good ones that you wanted to use.
RESET - Another method of ending four hour sorts.
REVERSE/INVERSE - .elpoep egnarts yllaer ot ylno lufesu era syalpsid esehT .syalpsid oediv esrevni ro esrever evah sretupmoc emoS
RIBBON - What your spouse gives you every time your friends ask about your computer.
RND - Short for "random number generator", a computer command used for calculating checkbook balances, income tax, rent, phone bills ...
ROM - 1. Built on seven hills, all roads lead to it. 2. Drink made from fermented molasses.
RS-232 - R2D2's father (see CPU).
S 100 BUS - An experimental rocket powered bus designed by NASA.
SAVE - What you should do before you buy a computer.
SCREEN - A wire mesh which protects the computer from the programmer.
SCRIPSIT - What your article does after you send it to the editor.
SCROLL - What the instructions do when you are trying to read them.
SERIAL - Wheaties.
SIMULATOR - What you actually purchased when you bought your computer (see MAINFRAME).
SINGLE BOARD COMPUTER Unmarried comuter with nothing to do.
SNOBOL - Computer language used in cold climates.
SOFTWARE - 1. Data cassette, diskette, disk left out in the sun or in the pizza oven too long. 2. What a female computer programmer wears on a data.
SORCERER - Computer that uses hexadecimal numbers exclusively
SOURCE CODE - Guide to famous novel by J Michener.
SPECIAL CHARACTER - 1. A compiler of computer dictionaries. 2. One of the characters used in computer expressions, like: @, &, , $, # and !, as in the famous expression, "@#$%&%" (see EXPRESSION).
SPOOLER - Device used to pack up data processing equipment using ribbon cable.
STAND ALONE - What happens to a programmer who starts talking about computers at a party.
STAR TREK - Where most data processing time goes.
STATE OF THE ART - Undefined.
STATIC MEMORY - Sleeping elephants (see MEMORY).
STORAGE - How long a business has been in operation.
STRING - Technique used for attracting computer users, the most famous string being, "Come and see my latest program!".
STRING PACKING - 1. Technique used for shipping strings through the mail. 2. Technique used for shipping Androids through the mail.
STRINGY FLOPPY - A diskette that needs to put on weight.
STRUCTURED PROGRAMMING Propped up with two by fours.
STYLUS - Pig farmer after moving to the city and becoming a computer repair technician.
SUBROUTINE - Closing hatches before diving.
SUBSCRIPT - Underwater handwriting.
SUPERSCRIPT - Fantastic handwriting.
SYNTAX - Tax on sex.
SYNTHESIZER - A device for measuring synthes.
SYSTEM - Foolproof method for winning at blackjack on a computer.
TAPE DRIVE - Campaign to raise money for the release of Nixon's White House tapes.
TELETYPE - A talkative person, opposite of the silent type.
TERMINAL - Mental state of most programmers.
TEXT - The book you used in your programming class and wish you had read before buying a computer.
THREADED LANGUAGE - One stitched together out of odds and ends.
THERMAL PRINTER - Printer used by pilots of hangliders and sailplanes.
TIMESHARE - What Tarzan tells you when he wants to use your microcomputer.
TOGGLE - Goggle for toddler.
TOKEN - Slang for smoking pot.
TRS-80 - World's most advanced computer, it writes computer dictionaries in its spare time.
TRSDOS (TRISS DOES) - But Susan doesn't.
TTL - Computer command (used by computers when playing chess or similar games): "Turn Tables and Laugh".
TTY - Computer command (used by computers when loading programs from cassette): "Twist Tape and Yawn".
TURNKEY - A bad computer, as in "That's a turnkey computer if I ever saw one".
TWO'S COMPLIMENT - We think that is nice.
TWO'S COMPLIMENT ARITMETIC - We think you look younger every year.
UNIX - Plural of eunuch.
UPTIME - Slang for period when programmer is being naive. (see JUMP, DOWNTIME).
USER - Someone requiring drug rehabilitation.
UTILITY - TPC (The Phone Company, The Power Company), TWC (The Water Company), TCG (the Garbage Company).
VARIABLE - A constant. (see CONSTANT).
VIRTUAL MEMORY - Cheap RAM which the manufacturer claims is "virtually memory - will do everything but remember".
VOLATILE STORAGE - A disk drive filled with nitroglycerin.
WAND - An expensive light pen.
WINDOW - Aluminum foil dropped into your computer by the enemy to mess up the video.
WRITE - Opposite of wrong.
Z-80 - The production run that finally worked.
Z-CODE - The method used to determine the age of Z-280 sports cars.
ZORK - The large bird that delivered your computer.

Unclassified ads

Unclassified rates

$5.00 per half inch and $5.00 per each additional half inch per insertion. Ads must be typewritten or printed clearly, and must be accompanied with payment in advance. No telephone orders or "bill me's" will be accepted. Unclassified ads are always set in the type on this page with the first line in bold caps. Use the ads on this page as a guide to figure your size and payment. Commercial store-front ventures please use our display advertising. Send for rates. This space is for "garage operations", individuals and "one of a kind" items. Send your ads to 80-U.S. Journal, 3838 South Warner Street, Tacoma, Washington, 98409

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NEW QUARTERLY NEWSLETTER FOR VisiCalc® users. Disks too. $7.50. Micro-Calc Business Users Group, PO Box 12039, Salem, OR 97309 (012)

PERSONALIZE YOUR SCRIPSIT™!! PERSCRIP lets you design your OWN word processor. Your name or message up to 35 chars will be displayed upon initializing your word processor. Defaults (all margins, spacing, video width, etc.) will be yours, not arbitrary to be reset constantly. Change your cursor to any character! Rid yourself of "loud", eye-straining graphics (cursor, bottom demarcation line, etc.) Underline (most printers)!! Finally, the most eye-saving SCRIPSIT™ enhancement ever our famous non-cursor. Try it, and you will never use a conventional cursor again!! Package includes manual, cassette, complete map of graphics characters. Disk SCRIPSIT™ req. Specify SCRIPSIT/LC or /UC PERSCRIP will be nationally advertised at $15.95 Mention 80-U.S., and your cost is $12.95. Add $1.00 post/handling. Send to: Dave Rose, Rohan Concepts, PO Box 20873, Atlanta, GA 30320. (111)

GL, A/R, A/P, PAYROLL FOR TRSDOS 1.2 Not Osborn's. Fast ISAM, double entry accounting, full screen and integrated. MAI 96 Dothan St., Arlington, MA 02174 (091)

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UNIQUE TRS-80 SOFTWARE & BOOKS Disassembled Handbook for TRS-80 all postpaid. Vol 1 5th printing "save one year's study" $10. Vol 2 3rd printing "all you wanted to know" $15. Vol 3 New 1981 "exploring new horizons" $17. Morse code transmit program: cassette/disk $15. Richcraft Engineering Ltd. Box 1065, 1 Wahmeda Industrial Park, Chautauqua Lake, NY 14722 Phone (716) 753-2654 for COD orders (111)

EXATRON STRINGY FLOPPY SOFTWARE and patches: 1) ESF version of ENHBAS, enhances Basic from Cornsoft Group - complete package $49.95, supplied on wafer. 2) Basic Toolkit (c) Bottom Shelf, patch only. 3) Microchess 1.5 (c) Peter Jennings, patch only. 4) Pinball (c) Acorn Software, patch only. 5) Basketball (c) Acorn Software, patch only. New patches will be added on a regular basis Call or write for patch prices and additions to this list Multi Media Systems, PO Box 41084, Indianapolis, IN 46241 (317) 839-6520 (091)

DATA BASE MANAGER - IDM - "There are many data base managers available these days, some may do the job for you, others may not. This one is doing a very good job for us." - 80-U.S. Jul '80. Now, new documentation and fastest machine sort. Mod II $199. Mod I 48K $149. Micro Architect Inc., 96 Dothan St., Arlington, MA 02174 (111)

MEMOREX DISKETTES 100% TESTED AND guaranteed! $28 00 for 10 packaged in the plastic storage box Send check or MO to TSG Co., PO Box 10653 2095 South Ogden St., Denver, CO 80210 (091)

TRS-80 ASSEMBLY LANGUAGE SYMBOLIC coding pads (50 each pad) $2.95 or 2 for $5 00 Add $1 postage These were custom designed to be used by an experienced TRS-80 programmer. Now available for you Send to C & J Enterprises, PO Box 18982 Austin, TX 78760 (091)

IMPROVE TYPING SKILLS. 3 PROGRAMS for TRS-80 Color 16K, $20 00 CWare, 120 South 350 East, North Salt Lake, UT 84054 (091)

COMPUTER ASSISTED HANDICAPPING aids for your TRS-80 (Model I or Pocket computer versions). Be a winner with WelMur's HARNESS or GREYHOUND software for your handicapping needs. Just $29.95 (cassette) or $34 95 (disk) plus $1 shipping (CA residents add 6% sales tax). Please specify HARNESS or GREYHOUND and cassette or disk Send check, MO or request for additional information to. WelMur of California, Inc.,PO Box M-11B, Fremont, CA 94537 (111)

DAILY APPOINTMENT CALENDAR IS A year round computerized diary for home or office. Each daily appointment table allows 20 exact time reminders, also records birthdays and other important events. Calendar display highlights important days, month after month. Includes printout capability for daily appointment table. L2 16K cassette $19.95; diskette $29.95. Tape-Tronics, 346 N Western Ave., Los Angeles, CA 90004 (111)

LOOKING FOR PRACTICAL SOFTWARE? Applications for home, office, school and the computer buff. Low cost TRS-80 software with full written documentation For example our education series programs with unique phonetic recognition of misspelled answers are only $7.95 each. Send SASE to DEMI-Software, 6 Lee Road, Medfield, MA 02052 (111)

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WE'LL INSTALL YOUR SPEEDUP Small Business Systems Group, Inc is offering to install an 'Archbold' speed-up for your TRS-80. This feature will improve the performance by 100%, automatically returns to normal speed during disk and cassette operation No software mods are required. All speed ups are installed by trained personnel and are guaranteed for 30 days. This feature is ideal for systems running hard disk, or double density or 8" drives. The cost is $125 + shipping. All systems will be checked out before any work is done to insure proper operation. Call or write Small Business Systems Group, 6 Carlisle Road, Westford, MA 01886 (617) 692-3800 (012)

PERCOM ELECTRIC CRAYON USERS Are you looking for action, instructive, or game programs to run on your Electric Crayon equipped TRS-80? Write for list of programs and program descriptions Send SASE to F S Kalinowski, 16 N Alder Drive, Orlando, FL 32807 (111)

FOTO FILE ORGANIZES YOUR PHOTOS, slides or negatives for easy reviewing by title, code, location or category Uses data files for unlimited capacity - great for assembling slide shows. Anybody who owns a camera (and a computer) should have this program. L2 16K cassette $19 95; diskette $29.95 Tape-Tronics, 346 N Western Ave , Los Angeles, CA 90004 Write for free brochure (111)

SFINKS MICROCOMPUTER CHESS program was recently challenged by the best programs available for the TRS-80 in a Canadian Round Robin. The result Sfinks riddled Mychess, Sargon II, and Gambiet 80 to finish in a tie for 1st place. Sfinks features an audio alert, a problem mode, superb graphics, and nine levels of play Play chess with the best for less 32K Model I TRS-80 cassette or disk only $29 95 William Fink, PO Box 5912, Lighthouse Point, FL 33064 Dealer inquires welcome (111)

TRS-80 BASIC SOFTWARE INTERPRETED Have you purchased a program that does not do exactly what you want? Perhaps you don't understand the instructions. Would you like to make it do just a little bit more? Is there something you want your nice machine to do and you just can't figure out how to do it? Do you just want to understand the BASIC language for your TRS-80? If any of these are your problem, just call me. That's right, I'll customize that canned program, explain the instructions (even write a new manual for you), write that special application program or just plain help you understand BASIC. I work on all TRS-80 models and most DOS systems For BASIC applications on the TRS-80 Model I, II, III, Color or Pocket computer, call me. CHAPPIE 435 N Deep Hill Rd., Diamond Bar, CA 91765 (714) 595-2765 (091)

Microsoft BASIC Decoded and Other Mysteries
by James Farvour
Published by IJG Computer Services, 1260 W Foothill Blvd
Upland, CA 91786
312 pages, $29.95
plus $2.00 shipping

Everywhere one looks these days, there are articles and books on the wonderful machine language routines which have been written by Bill Gates and his minions at Microsoft. These, of course, are locked up in the ROM which you purchased with your Level II BASIC in the TRS-80 Model I.

All you need is the key, right? So, pull out that edition of the one magazine which had all the machine language goodies in it. Oh, can't find it? Well, how about that book you bought that promised to show you exactly how to write programs in Z-80 machine code in three easy lessons? You threw it away after the first lesson, because it wasn't so easy. Well, at last the book has been written which does all these things and more.

The book is "Microsoft BASIC Decoded and Other Mysteries", by James Farvour. At last, even if we can't have the actual source code and documentation from Microsoft or Radio Shack, we do have something at least as good, and possibly better.

Mr Farvour has done his homework. All the things wrong with all the other books and articles purporting to take apart the Level II ROM are missing in this work. It would be hard to imagine needing any other book on the subject.

Chapter one is an introduction to the BASIC operating system of Level II. In the chapter, Mr Farvour goes into a fair amount of detail describing how memory is used, the different forms of numbers (integer, single and double precision), and input/output drivers. There is also a quick, limited look at the disk operating system.

In chapter two, the assembly language programmer will strike gold. All the subroutines which are capable of being used in a program are listed, along with examples of how to call them. Included are the I/O routines and the math and data manipulation routines.

A detailed look at tape and disk formats is found in chapter three. Seeing that this book is mainly about BASIC, the disk format is probably one of the "Other Mysteries" of the title.

Chapter four is devoted to an explanation of the addresses and tables found in the Level II ROM and the RAM used by the system. These include the reserved word list, Arithmetic routines, data conversion routines, verb action routines, and the error code table. The RAM contains the mode table, program statement table, variable list table and literal string pool. A memory map of the RAM from 4000 Hex to 4200 Hex, the so-called communications region, is also included. This is where the Level II ROM "hooks onto" the system RAM and, if used, disk BASIC.

Demonstrations of the use of the tables and ROM calls previously described are given in chapter five. This is done by showing how to add a verb to BASIC. The verb is SORT, and the machine lan guage routine included is worth the price of the book alone.

Chapter six describes that method by which BASIC can be manipulated to load and execute overlays. This is similar to the COMMON function in FORTRAN where variables are preserved while loading and executing another program.

Chapter seven covers the differences between the older three-chip Level II ROM set and the newer two-chip set. A casual user can tell which set he has in his machine by the way it powers up in Level II. If it asks "MEMORY SIZE?" it's the old set; "MEM SIZE?" indicates the newer two-chip set.

The whole *raison d'etre* for this book is found in chapter eight: 248 pages of comments on a disassembled listing of Level II BASIC. These comments are made to be used with the listing from a disassembler which produces 62 lines per page. The binding is such that the pre-drilled pages may be removed and placed into a three-ring binder.

This is a completely annotated listing of BASIC. Virtually every line of code has a comment explaining what is going on. Some of the comments are so extensive they are continued on the back of the page. To prevent copyright infringement with Microsoft, the operands for the instructions have been left out.

After having a copy for over two months, I honestly don't know how I ever got along without it. This book explains so much about the TRS-80 that it is almost like having a new machine. The TRS-80 does all the things it did before, but now it does so much more that it is incredible. All this is thanks to having the proper tools, like this book.

It is indeed a tool which is sorely needed by anyone who programs in Z-80 machine language. As Harv Pennington says in the foreword, "This book even has something for anyone running Microsoft BASIC on a Z-80 based computer. Microsoft ... has a system that generates similar code for similar machines. Although you may find that the code is organized differently in your Heath or Sorcerer the routines are, for the most part, identical!"

Norm Jacobson

Unclassified ads

LETTER QUALITY "DAISY WHEEL" DIABLO printer with interface for TRS-80 or Apple This is a brand new Diablo Hytype 1 for only $650 The interface as a kit is $75 or $300 installed Ribbons are only $2 50 ea Maintenance manual and additional interface info available. There is no better buy anywhere for a high quality letter printer, new and fully checked out. Scott Priester, 211 White Water Court, Greer, SC 29651 803-244-7872 for additional info (091)

ATTENTION LASER EXPERIMENTERS!! Use your TRS-80 Model I to aid you in the planning design and research of lasers. Over 30 subroutines are at your command (through menu selection) relating to laser fundamentals and design. Powerful table-generation capabilities are built in for professional table outputs to your video screen or your video screen to your printer. Instant screen dump to your printer and variable margin compliment this laser package (RS-232 driver comes as part of the package). System requirements: Tape, Level 2, 16K; Disk, 32K. Your data sheet and order form for "LASER!" will be mailed to you within 24 hours from receipt of your request Westcomp, PO BOX 494, Temple City, CA 91780 (111)

CHEAPTALK FOR THE TRS-80 - SOFTWARE package lets your TRS-80 16K Level II reproduce speech through any small audio amplifier connected to the cassette plug. Digitize your own words with simple hardware mod. $19 95 ppd or send SASE for more details to Alan Saville, PO Box 5190, San Diego, CA 92105 (091)

TRS-80 COLOR COMPUTER PROGRAMS send receive Morse code and RTTY. Hex debugger, also 20 line parallel I/O card, and other programs and things. Low prices, no middle man. Send SASE for info to Frank Lyman 12 Reservoir St., Cambridge, MA 02138 (091)

Notes

Model I/III can spell out the date

The following program decodes the disk BASIC TIME$ function and should be of interest to those who wish to print the date with the month written out as SEPTEMBER 21, 1981 instead of 09/21/81 as represented by the Models I and III:

```
90 CLS : CLEAR 2 * MEM/3
100 X = VAL(LEFT$(TIME$, 2))
110 DA$ = MID$(TIME$, 4, 2)
120 YR$ = MID$(TIME$, 7, 2)
130 FOR N% = 1 TO X: READ MO$: NEXT N%
140 DT$ = MO$ + CHR$(32) + DA$ + CHR$(4
  4) + CHR$(32) + CHR$(49) + CHR$(57) +
   YR$
150 DATA "JANUARY", "FEBRUARY", "MARCH"
  , "APRIL", "MAY", "JUNE", "JULY", "AU
  GUST", "SEPTEMBER", "OCTOBER", "NOVEM
  BER", "DECEMBER"
160 PRINT @ 537, DT$
```

Line 90 is included here only as housekeeping for the demonstration. Incidently notice that the CLEAR function reserves 2/3 of available memory for string space. Lines 100, 110 and 120 can be combined into one line and establish the various elements of the date.

For error trapping in those cases where the date was not set with TRSDOS, the following test line could be added between lines 100 and 110:

```
105 IF X=0 THEN DT$="": GOTO 160
```

and you may wish to modify line 110 to read:

```
110 DA$=MID$(TIME$,4,2):DA$=MID$(VAL(DA$),
    2,LEN(DA$)-1)
```

to produce a day number without the leading zero.

Lines 130 and 140 can also be combined. Line 130 reads the data set in line 150 to produce the month. This same set could be installed in an array for use in line 140 which concatenates the results into DT$. Line 160 is the output of the results and may be used as needed.- Contributed by Roger Hoxie, La Mirada, CA

Color computer makes interesting syntax errors

In our last issue we published a color version of "Sundance", wherein a couple of strings (lines 320 and 330) were built to be used later in the program (line 530) with the DRAW statement. If you accidently named the string in line 320 C$ instead of SC$, the DRAW statement in line 530 will come back with a syntax error message. A quick glance might lead you to say that it should read DRAW C$ instead of DRAWSC$. However, this is not the case. The problem lies with the naming of the original string.

This problem is similar to the READ and DATA problem encountered in the Models I, II and III, where a program will sometimes stop on the READ statement when the problem lies in the DATA statement.

Color computerists may want to watch for this in debugging programs: Simply stated, a syntax error in a DRAW statement may lie in the string used.

There is no easy way

Assembly language and machine language for the TRS-80 equipment is an order of magnitude more complex than BASIC. You must sincerely want to learn it and be willing to spend considerable time in its study and practice. There is no painless way to learn it. Those who have though, say that it is worth the effort.

Potential Model II diskette Wipeout

Model II users with the expansion drive unit should be aware of a problem which can cause much grief. Due to the design in the disk system, power must be applied for proper termination of the floppy disk controller circuitry. If not, a bias signal will be sent to the read/write head in drive 0 of the main unit. When the head engages, this signal effectively erases all information passing under the head, including at times, format information. In other words, *don't put a diskette into drive 0 without having power on the expansion unit.* You will destroy the information on drive 0 diskette if you do.

Improved Z-Sub

Spencer Hall's 9 Z-Subs in our Jan/Feb 81 issue were very popular. Both Dick Straw and Dave Howe have pointed out that Sub 6 can be simplified by using:

```
6 PRINT@ 64*ZP,CHR$(31);: RETURN
```

Model I/III compatability

If you have USR routines in your programs, the places to POKE USR entry points are the same on both Model I and III' Level II BASIC. Disk BASIC users must use the DEFUSR statement.

It's in the book

Pages 12/24 and 12/25 of the Model III manual have addresses in ROM and RAM which contain useful routines and code. Page 12/22 tells how to disable the break key. In fact, the whole of chapter 12 gives information on writing routines to interface with the ROM.

How to pass a variable to memory

You can pass the location of a variable in memory to a machine language subroutine using VARPTR simply by making the VARPTR an argument of your USR call: Y=USR(VARPTR(A$))

Make a special control code

If a special control code character is needed by a printer or other peripheral, the way to send it is to get the code number (ASCII) for the code and then convert it to a string character with CHR$(xx), where xx is the number. To send it to the printer try:

```
LPRINT CHR$(xx)
```

with your number replacing the xx. For those codes requiring the ESC signal, the code is 27 and would look like:

```
LPRINT CHR$(27)CHR$(xx)
```

with the ESC code number being the xx.

Model II Graphics

Everyone talks about the lack of Model II graphics,

but no one has mentioned that it has double those shown in the manual. If you print a graphics code in reverse video, it comes out as the complement. While this still isn't as good as addressable points, you can do a pretty fair imitation of Star Trek's Enterprise and other graphic creations.

Model II Scripsit exit

Model II Scripsit owners should be sure to exit the program through the "SWAP DISKS OR EXIT" route. We don't have absolute proof, but it seems that not exiting properly can leave the disk file with your text open. When this happens, you may lose all the text on that particular disk.

Use INSTR to make dates

You can use the INSTR function to quickly pick out and identify substrings for various purposes. For example, say you have to get the number of a month from the name. You can do it by making a string like this:

```
D$="JANFEBMARAPRMAYJUNJULAUGSEPOCTNOVDEC"
```

Now, if M$ is the three letter abbreviation for the month, we can find the number of the month by computing:

```
M=(INSTR(D$,M$)-1)/3+1
```

Try it. If M$="APR", the INSTR(D$,M$)=10, and M=(10-1)/3+1=4

On the Model II, this is useful for taking DATE$ and converting it to a date in the form 12/21/81. In DATE$, the month is MID$(DATE$,1,3), day is MID$(DATE$,4,2) and the two digit year is MID$(DATE$,8,2). We can get the form we want by setting M$=MID$(DATE$,1,3, computing M as above, then letting M$=RIGHT$(STR$(M),2,). The RIGHT$ is to assure that M$ is only two spaces because STR$ always puts a space in front of the number when it converts it to a string. On a two digit number, this would make our date too long. Now we reform the date like this:

```
DT$=M$+"/"+MID$(DATE$,4,2)+"/"+
    MID$(DATE$,8,2)
```

Read a random file sequentially

There is a lot of capability in the Model II that is not apparent on casual examination. An example of this is our experience in trying to read a file produced by a word processor running under TRSDOS. We had the file, but no way to read it. The file structure was fixed at 256 byte blocks, but included carriage returns (HEX 0D) which a sequential file recognizes as an end-of-record. So we wrote and used the following short program to read the file:

```
10 CLEAR 5000
20 SYSTEM "DIR"
30 INPUT"ENTER NAME OF FILE";F$
40 OPEN"I",1,F$
50 IF EOF(1)THEN CLOSE:LPRINTCHR$(21);
       GOTO 20
60 INPUT#1,T$
70 PRINT T$
80 LPRINT T$
90 GOTO 50
```

Remember, sequential files write in one-byte records. But the program worked, it read the random file sequentially and produced our printout.

Model II DOS 2.0a error

J A Miller of Livonia, Michigan tells us he has been told by Shana Hill at Radio Shack of a DOS error existing in TRSDOS 2.0a. This error will prevent the use of certain filespecs when attempting to open or otherwise access that file. The system response will be an "IE ERROR IN LINE...", if in BASIC. When in DOS, the system response will be "ERROR 39" (Illegal I/O attempt).

This error was usually encountered when first attempting to open a particular file, or when creating a data disk with the MOVE or COPY commands. Oddly, other similar files could be accessed or copied with no apparent problem. Another aspect of this DOS error has been the ability to create a file but not be able to access it at all, even though it showed up in the directory. (Most disconcerting was to have two apparently identical filespecs on the same disk!! The 96th directory entry could not be accessed.)

Mr Miller says that while he has not made an exhaustive study, the two patches shown below appear to correct this error. Both patches must be applied to all your DOS diskettes, including the factory master.

With TRSDOS READY displayed on the video, type the following:

```
PATCH SYSRES/SYS A = 1682 F = 5F C = 60
PATCH SYSRES/SYS A = 1699 F = 03 C = 00
```

Press ENTER after each line above, naturally.

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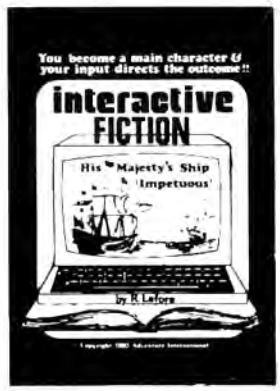

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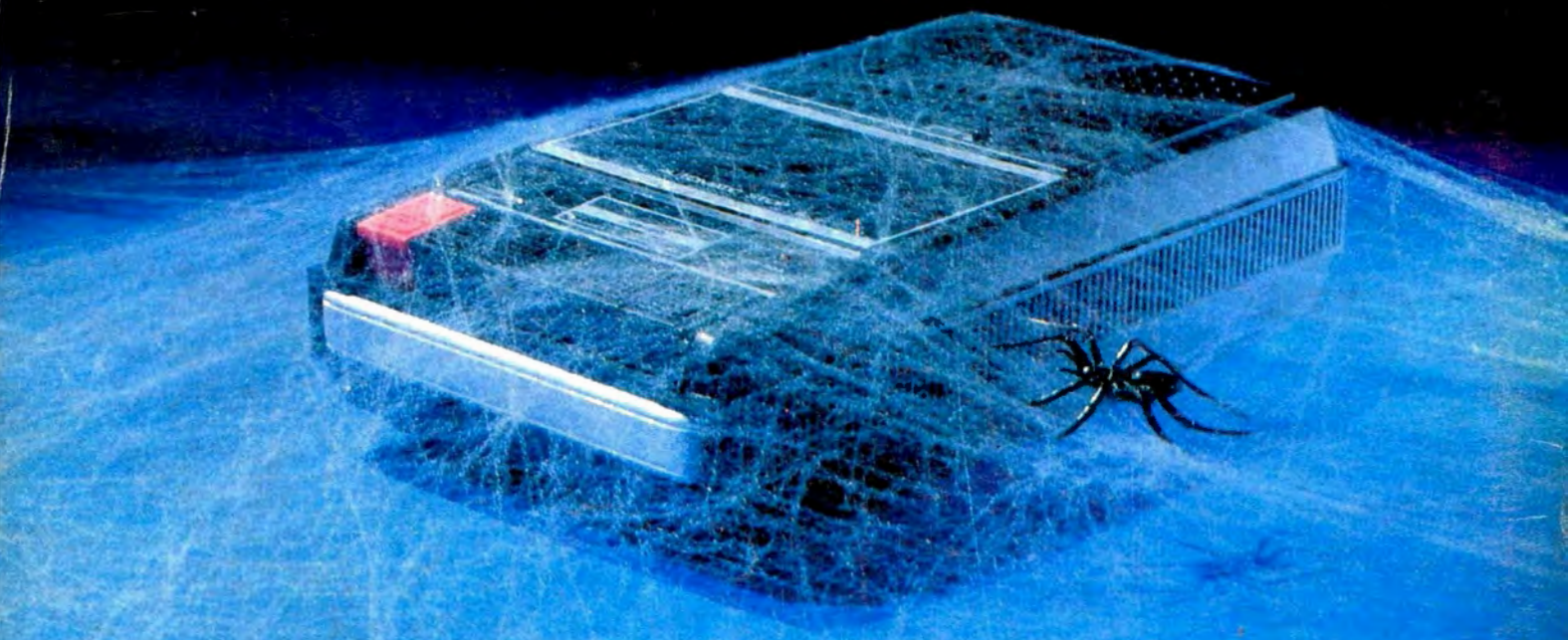

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