

80⁸⁰US.

DATA BASE MANAGEMENT

The Basic Computing Journal for the TRS-80

Vol. VI., No. 3

\$3 per copy

March, 1983



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COMPILER



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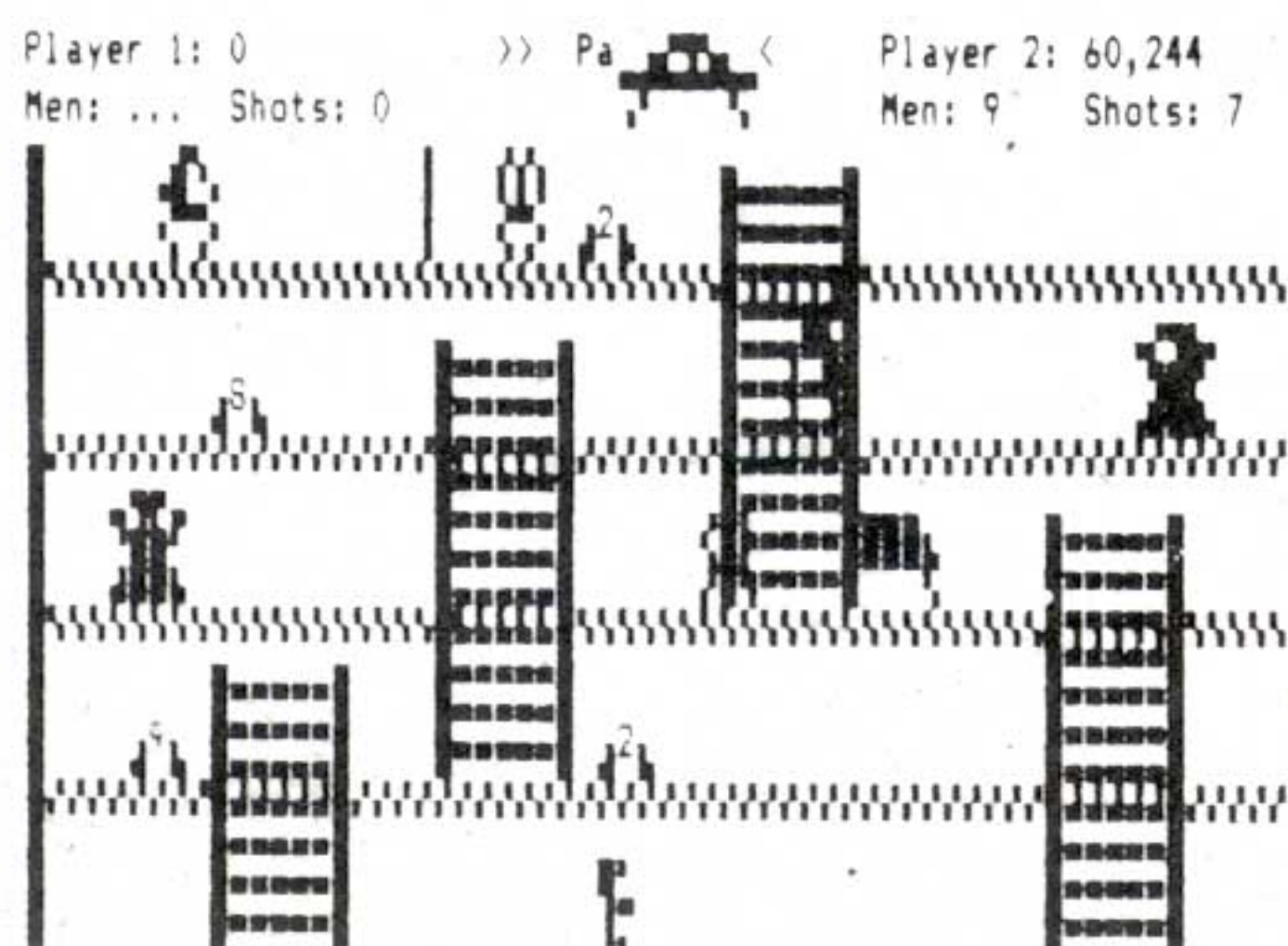


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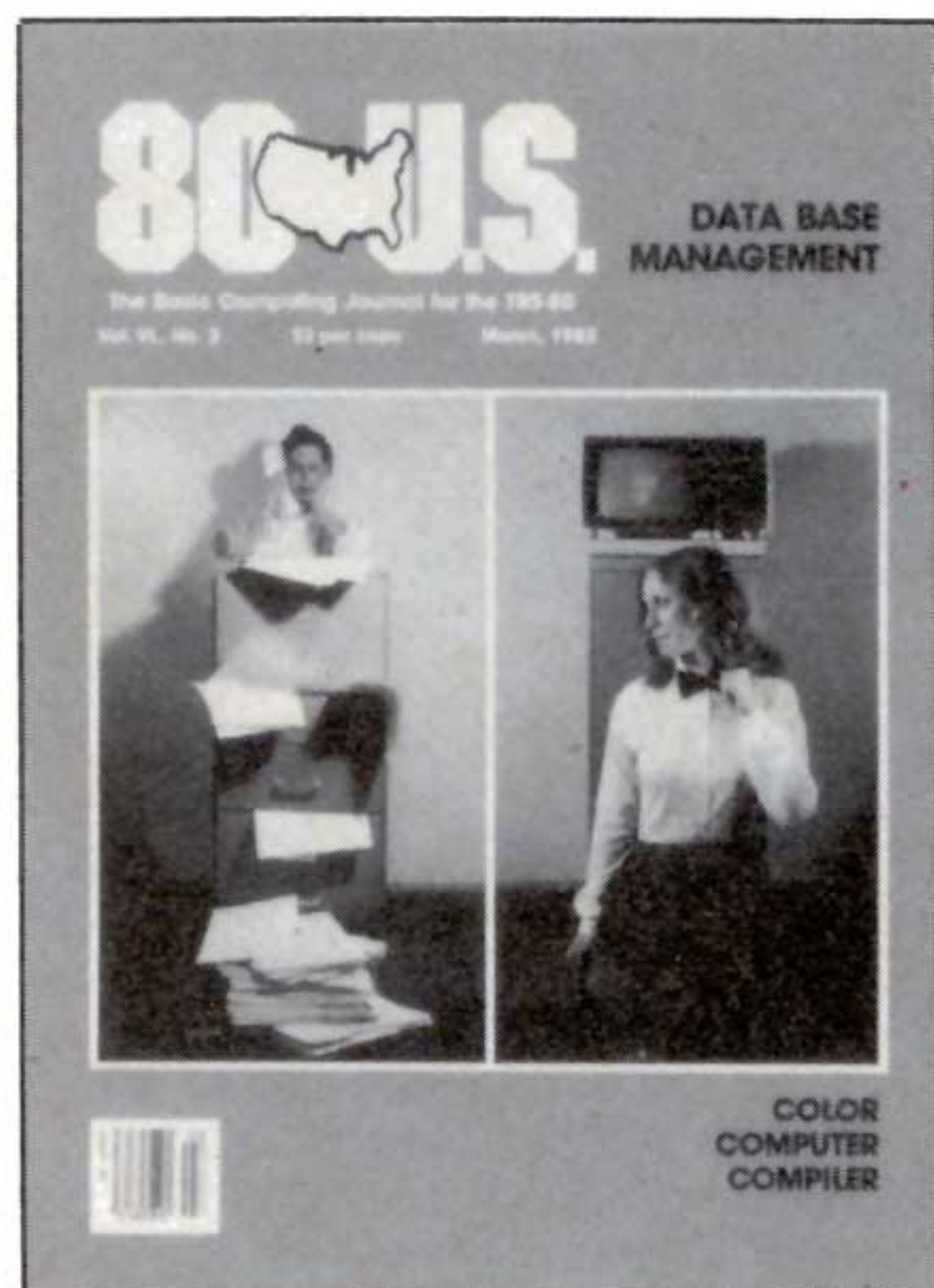
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Data base management is meant to simplify your work. Our before and after model is Barbara Carpenter and the photographer was Fred Johnsen. Both are from Tacoma, WA.

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80-U.S.

The Basic Computing Journal for the TRS-80

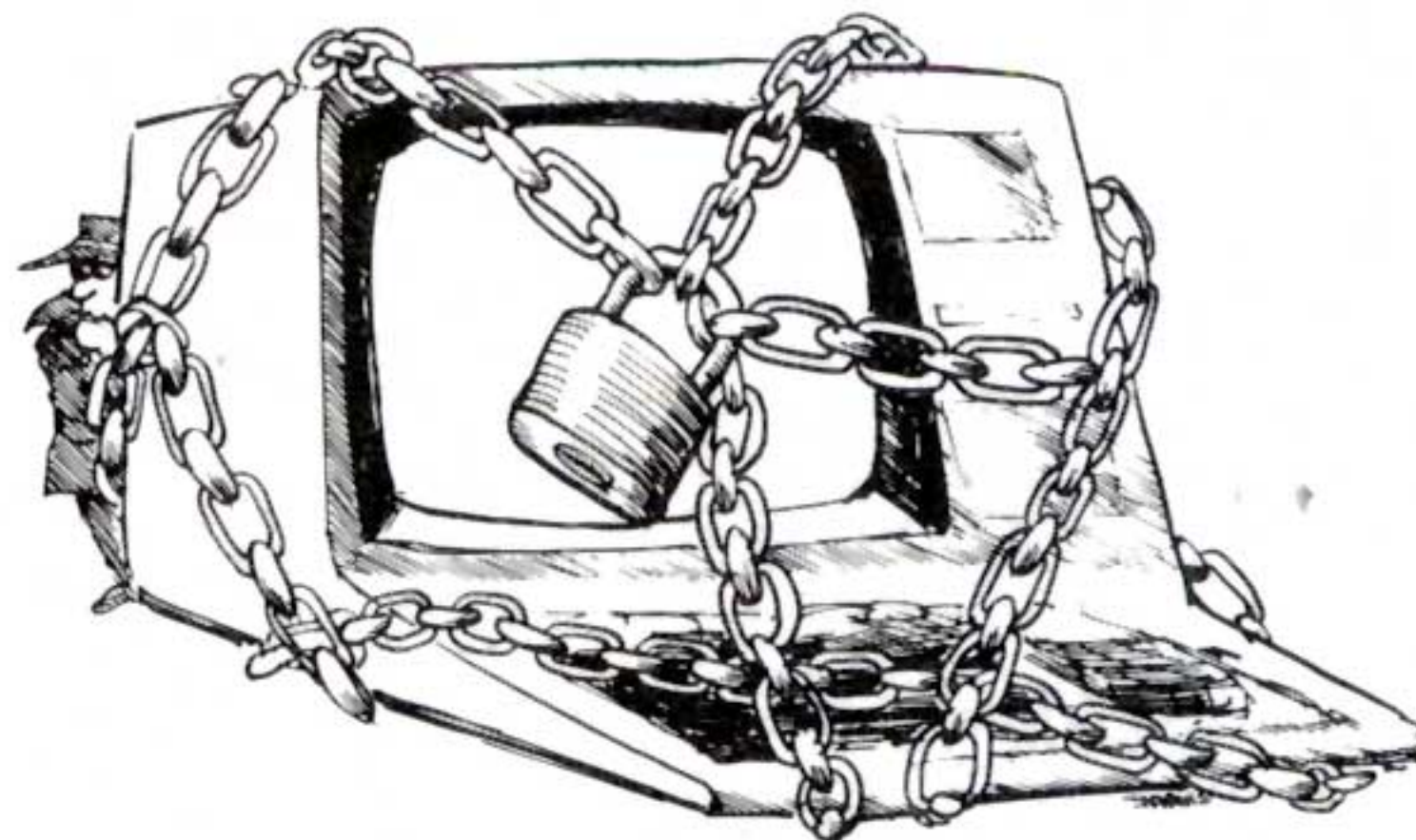
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80-U.S. Journal

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Editorial

Cameron C. Brown

I am the proud owner of a TRS-80 Model II and when I was teaching, I purchased many Model I/IIIs and have steered others to the Color Computer. I have probably been responsible for the sale of at least fifty computers. In fact, I have enough faith in Tandy to have invested in their stock. Their performance in the market has been outstanding. I was able to parlay twenty shares into a complete Model II with expansion drives and still have ten shares left over after all of its splits.

So, what does that have to do with anything? Well, briefly, I am mad. It seems that every day I am inundated with news about the fantastic sales of the brand new ABC computer. I then look for news about "my" company and there isn't any. *Infoworld* says they would like to review material from Radio Shack, but they can't get it. Other magazines obtain sales figures (albeit, probably inflated) from everyone but Tandy. So, we are left to guess and wonder.

Tandy has decided not to play the numbers game and keeps silent. There is a flaw in that strategy. Owners of computers want to be reassured that their purchase was wise and correct. Popularity is no basis for making a decision about a computer, but it certainly is reassuring. For over five years, TRS-80 owners have had to sit quietly and read again and again about everyone but them.

The situation is amplified every night on television. I see Dick Cavett and Apple, Bill Cosby and Texas Instruments, William Shatner and Commodore, "the little tramp" and IBM, and where is Tandy? I know, Tandy does advertise, but certainly not to the extent or with the Madison Avenue slickness that the others are using. It strikes me as one more case where the Radio Shack could change what *Time* magazine called a stodgy image.

When I taught a course in logic, advertising was a great source for examples of erroneous thinking. Almost every classical flaw of logic can be found in one evening's viewing of television, but that doesn't matter. The ads are working, and that does matter.

The current price wars are a sham and should be attacked. Consumers are beguiled into purchasing a

computer for under \$100, yet will have to invest over \$800 to become equivalent to a Color Computer. If they buy an Atari or Commodore, they can buy only their cassettes or their disk drives. If they buy a TI 99/4A, they better be prepared to pay \$30 to \$100 for a ROM pack and simple software can cost well over \$100 per program.

In the long run, this hurts all of us. We know that a TRS-80 is an excellent machine, but will the software and hardware developers stick with it if there is a more lucrative market elsewhere? I doubt it. So, we wind up with hundreds of thousands of consumers who own an inferior system, are frustrated, are spending too much, and who have been burned. At the same time, owners of a fine and reasonably priced system are left to fend for themselves because the outside support has moved on. Who wins? Nobody.

I wish that Tandy would really go on the attack and do what is needed to educate the consumer. Debunk the myths and confront the fallacies. Put on a media campaign that doesn't quit. We have one of the best machines on the market. Why aren't they telling anybody? We want to be able to point to our TV and proudly say, "I own that one."

As some of you may know, there is another microcomputing magazine devoted to the complete TRS-80 line of computers. We read it. We have to. I have too often been confronted with an editorial harangue about Tandy's stupid decisions and how they fleeced me. That is garbage and does nothing to make me feel proud about my purchase. It is a publishing strategy that works, but there is a cost to it. It hurts every TRS-80 owner as much as the silence does.

I really like my Model II, even though it is no longer manufactured. It does everything I want, rarely needs maintenance, and is fun to use. The Color Computer has fantastic capabilities, the Model III is a great workhorse, and the Model 16 is a question mark. It is a good line of hardware, and Tandy's software is usually top-notch. But, I wish both Tandy and that other guy would stop making it so hard to be a supporter. A TRS-80 owner feels like he is alone in left field, and that's baseball, not computing. ■

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Why do I need it?

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

What do I get?

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Directions

I. Mike Schmidt, Publisher

Our slow, up-hill climb started in 1978. In January, 1983 we finally reached the point where other publications start. The difference is that we traded four years of hard work for a large front-end debt. It worked.

Since I still feel that the majority of you who have been with us for a time are "stockholders" in a sense, here is my report to you on the state of the business.

Your February 1983 issue should have come to you wrapped in brown kraft wrap. This should prevent two things: the cover should not be as ripped and bent as before, and the label should no longer obliterate the cover art. Yes, it costs more, but it should be worth it.

We do everything to produce the magazine except print it. It is printed and shipped from Volkmuth Printers, in St. Cloud, Minnesota. However, we have expanded our own facilities here in Tacoma and have installed a small print shop with a 11 x 17-inch press. This was primarily to keep up with our in-house requirements for notices, renewal forms, promotion pieces and the other various and sundry printing that is required.

It also allows us to provide reprint service at a nominal cost to advertisers whose products are reviewed. We are now adding a small perfect binder for short-run books and pamphlets.

Perhaps now we can finally get around to publishing an author's quarterly newsletter, something we have wanted to do for a long time.

All of our promotions, advertising sales, newsstand sales and subscription sales are being stepped up dramatically. Please don't get upset if you are a subscriber and get a subscription promotion in the mail. The lists we mail to are large, and it is uneconomical to clean them. If you get such a promotion piece, give it to a friend who may not

be a subscriber.

In the next issue, we will be announcing that *80-U.S. Journal* programs will be available on cassette tapes. No, we will not decrease the size of the listings in the magazine. They will still be there for anyone who cares to type them into their computer. We expect to produce one tape for Model I/III per month. The Color Computer tape will be produced quarterly. We expect to have at least ten programs per tape, and if there aren't that many in a given issue, we will include some "golden oldies" from past issues.

We are toying with the idea of producing a semi-annual diskette for the Models II/12/16. That one we are not too sure about yet.

The tapes will be available on a per-tape basis or on a subscription basis. We expect the price per tape to be about \$9.95 (somewhat less on subscription for a year). That price will include first class postage. The way it figures out, we will do the typing for you at about a dollar per program, and I don't think that's too bad a deal.

Our original thoughts on this program service were to provide a bulletin board-type download system. But after checking into that whole ball of wax, we found that there were a couple of things that we just couldn't overcome at this time.

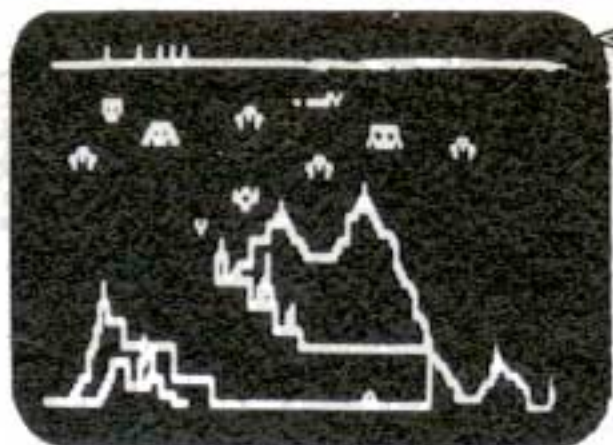
First was the multiplexing of telephone lines. The cost was simply out of our league. Second was the software to operate such a system. Yes, it could be written. It would take a Model 16 or two with multi-user capability. Then there is the cost of a toll-free number, and the possibility of you not getting on because the line is always busy. The tape system does not preclude the use of a download system at a later date. We think that, for the time being, it is the best way to go.

Watch for our announcement in the next issue. ■



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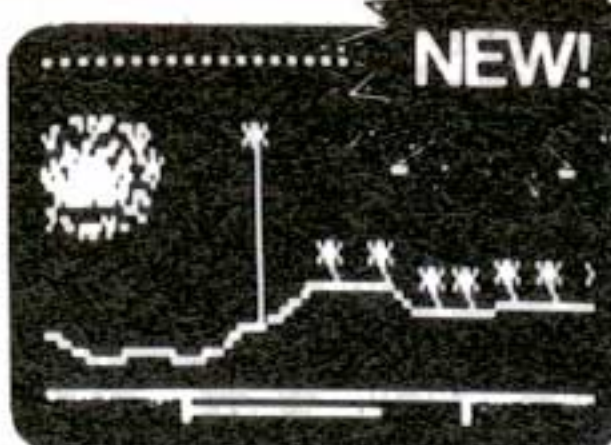
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PANIK

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TOP TEN

1. SCARFMAN - All time favorite
2. PANIK - Remarkable Voices
3. PENETRATOR - Rave reviews
4. ARMORED PATROL - Super 3D graphics
5. CATERPILLAR - Good rendition
6. CRAZY PAINTER - Unique game concept
7. DEFENSE COMMAND - Tough struggle
8. STELLAR ESCORT - Fast and Challenging
9. ROBOT ATTACK - With voice
10. SEA DRAGON - Amazing "Seascape"

STELLAR ESCORT

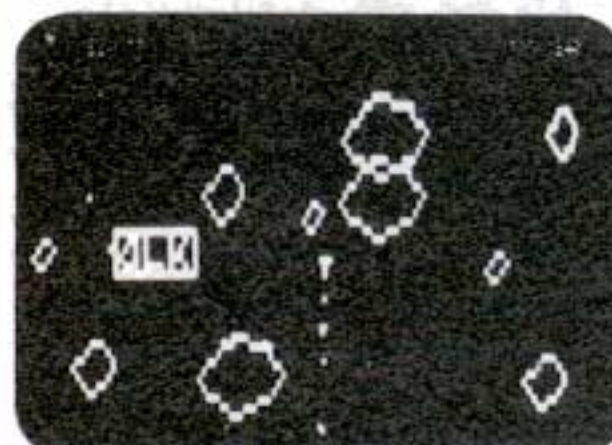
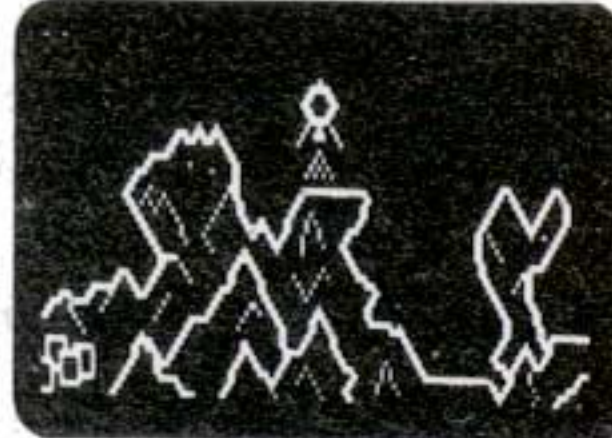
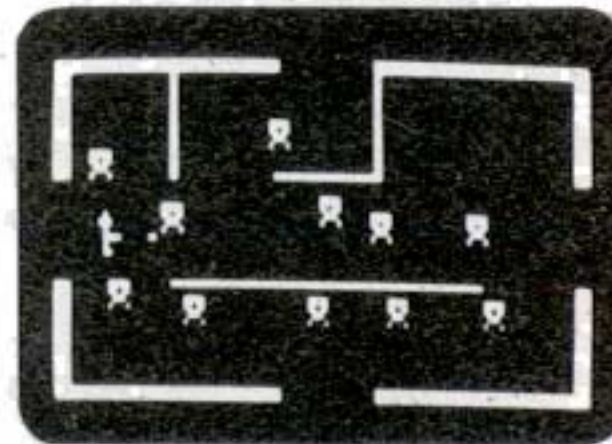
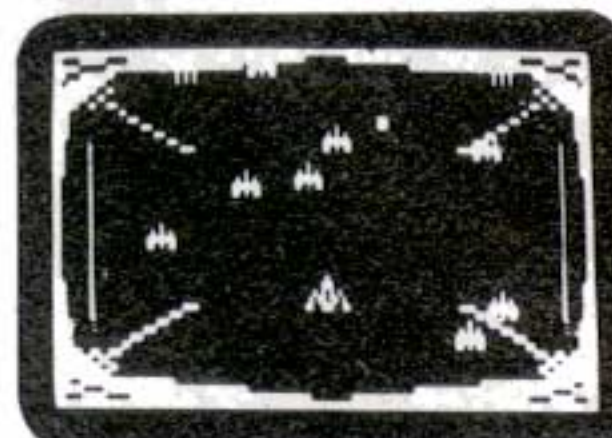
The latest super action game from Big Five. As the Federation's top space fighter you've been chosen to escort what is possibly the most important shipment in Federation history. The enemy will send many squadrons of their best fighters to intercept. With sound. Disk version has voices. Price A

ROBOT ATTACK

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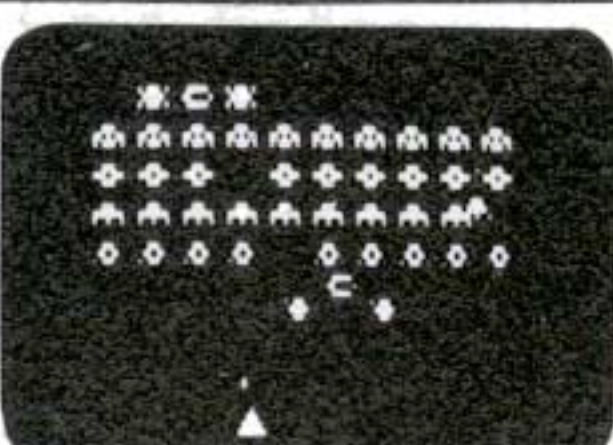
SUPER NOVA

Asteroids float ominously around the screen. You must destroy the asteroids before they destroy you! (Big asteroids break into little ones). Your ship will respond to thrust, rotate, hyperspace and fire. Watch out for that saucer with the laser! As reviewed in May 1981 Byte Magazine. Price A



OUTHOUSE

You are the mighty protector of this small (but important) wooden structure. For reasons unknown, a bizarre gang of miscreants wish to vandalize, loot and otherwise destroy the little half moon house. Your patrol craft has lasers and smart bombs to deal with this terror. From SSM with sound. Price A



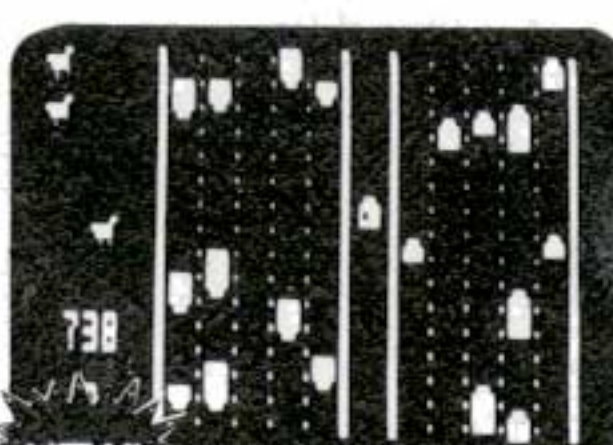
GALAXY INVASION

The sound of the klaxon is calling you! Invaders have been spotted warping toward Earth. You shift right and left as you fire your lasers. A few break formation and fly straight at you! You place your finger on the fire button knowing that this shot must connect! With sound effects! Price A



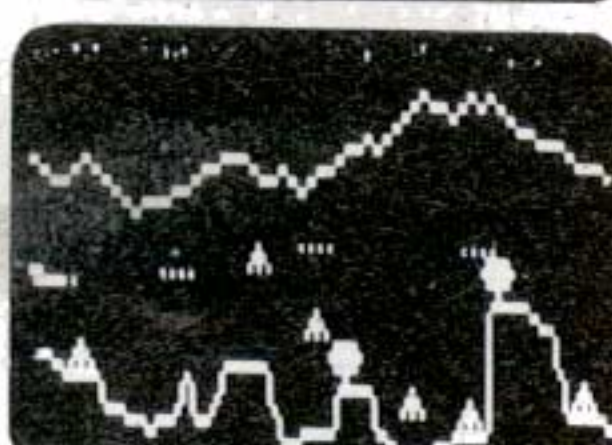
LASER DEFENSE

In this game of IBM's high-energy lasers and particle beams, you control the U.S. strategic defense satellite system. From your viewpoint high above the globe, you intercept Soviet nuclear missiles in flight and attempt to destroy their scattered missile ships. With sound from MED Systems. Price A



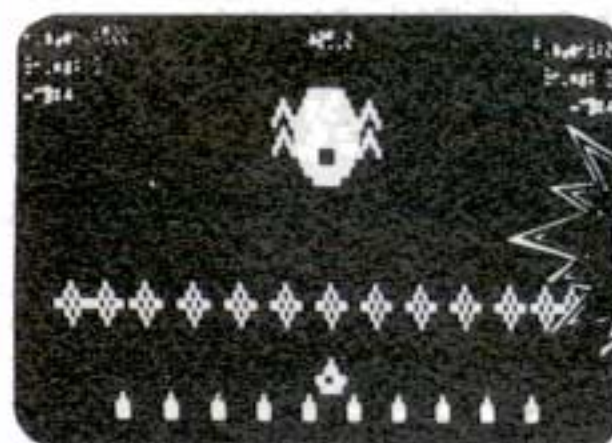
CHICKEN

Will the chicken cross the road? That's up to you. Can you guide these helpless little chicks across the perilous 10 lane super highway to safety? Or will you bumble, littering the blacktop with a storm of chicken feathers? A humorous yet challenging game of nerves from SSM with sound. Price A



PENETRATOR

Soar swiftly over jagged landscape, swooping high and low to avoid obstacles and enemy missile attacks. With miles of wild terrain and tunnels to penetrate, you're well armed with bombs and multiple forward missile capability. From Melbourne House. Features sound, trainer mode and customizing program. Price C



DEFENSE COMMAND

The invaders are back! Alone, you defend the all important nuclear fuel canisters from the repeated attacks of thieving aliens, repeatedly. An alien passes your guard, snatches a canister and flies straight off. Quick! You have one last chance to blast him from the sky! With sound and voice. Price A



BOUNCEOIDS

Huge boulders careen off the walls. You're in the middle, in danger of being flattened. Keep your wits about you as you blast these bounceoids from the screen. Large ones break into many small ones. Clear a screen and enter a fast-paced challenge stage with a chance for big bonus points. From the Cornsoft Group. Price A



SCARFMAN

This incredibly popular game craze now runs on your TRS-80! It's eat or be eaten. You run Scarfman around the maze, gobbling up everything in your path. Try to eat it all before nasty monsters devour you. Excellent high speed machine language action game from the Cornsoft Group. With sound. Price A



ARMORED PATROL

A realistic tank battle simulation. Your view is a 3-D perspective of an alien landscape. Maneuver your T-36 tank to locate and destroy enemy tanks and robots that lay hidden ready to assault you. Clever graphics create the illusion of movement and dimension. From Adventure International. With sound. Price B



CATERPILLAR

An arcade favorite! Stop these multi-sectioned crawlers before they creep down through the mushrooms. Zap one and it splits into two smaller bugs, each with its own sense of direction. There are moths and tumble bugs too. It all adds up to lots of fun for kids and adults alike. From Soft Sector Marketing. With sound. Price code A



CRAZY PAINTER

You have to paint the floor white. We give you the paint and brush. Sounds easy? Hah! You'll be confounded by stray dogs, snakes, sloshing buckets of turpentine, even a ravenous paint eater. A crazy, imaginative new game with ten selectable levels of skill for new or seasoned game players. Lots of laughs. Price A

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Letters to the editor

I am currently a sergeant in the Traffic Division at the Kalamazoo County Sheriff's Department. Do any of your readers know where I may obtain documentation of a program designed for use in scientific traffic accident investigation?

Specifically, I am searching for a program that I could use with my two drive, TRS-80 Model III (which I really like!), that would assist me in reconstructing collisions and thereby save hours of calculating formulas, etc.. If your readers can help me, I would be grateful.

Sgt. Mike Capman
Traffic Bureau
Kalamazoo County Sheriff's
Dept.
1500 Lamont
Kalamazoo, MI 49001

If anyone has such a program, please contact Mr. Capman. Don't forget to contact us if you would like to get it published. -Ed.

Last week, after visiting various computer shops, I decided to purchase a TRS-80 Color Computer with Extended Color BASIC and 32K.

A friend allowed me to borrow his December 1982 copy of 80-U.S. and while I noticed an article referencing the Color Computer, I wondered if other articles which reference just the TRS-80 apply to the Color Computer too. There are the TRS-80 I, II, III; I know their physical differences, but if memory is adequate can some of their programs and ideas be applicable to the Color Computer?

Norman A. Blesman
Bergenfield, NJ

Don't miss the article in this issue on Color Computer Conversions. It should help you over the differences.

In most cases, a program can be converted from one machine to another. The major difficulty comes from graphics characters, and specific PEEKs or POKEs into memory. To convert a Model III

graphics game to a Color Computer is possible, but you will not be taking advantage of the capabilities of the machine you have.

In cases where the program fits an application, or solves a problem you have, the ideas and procedures are certainly transferable. We strongly recommend that all our readers look at the programs and utilities for the other machines. You bought your machine to learn. Don't skip a potential source of insight just because it's not your model. —Ed.

I wish to relate to Spencer Hall and his @ News article, December 1982, that after reading it I jogged (at 61 years old?) down to my nearest office supply house and picked up a package of 8½×11" plastic sheets for a three ring notebook. They will hold 10 wafers per sheet, five sheets per package for \$3.50. I thought perhaps others might be interested in this method of storage.

Thanks for the Christmas Card - modified it to suit our family and used it when we had our Christmas dinner. Fine magazine, keep it up.

Lee Mayfield
New Albany, IN

I was very shocked and dismayed that you are cutting out @ News, by Spencer Hall, as a regular feature. I purchased an Exatron Floppy as an alternative to disc until I could decide if I needed to go to disk at all. It appeared to me that given the proper support, including enough popular and useful programs written to wafers, a disk would not be necessary.

I bet that there are a lot of others out here who feel the same way and I hope you receive many letters like this which will encourage you to run a regular column on the Exatron Floppy. If only you would print letters from owners who could contribute their experiences, I'm sure it would give us another reason to continue to subscribe to your magazine.

Jay Wyrick
Hollywood, FL

This is probably the first letter that I have written to a magazine in my 51 years. I wonder if it will help, but I must express my disappointment that the @ News column will be discontinued. I wonder how many subscriptions like mine were started by the purchase of an ESF unit. I have looked forward to the column and have purchased many of the programs and a 64K memory board, and even a new ESF. I have never seen a company more interested in the end use of their units and providing us with good programs.

Personally, I will probably not renew my subscription when it runs out. Without the ESF column, 80-U.S. is just one more magazine I don't have the time to read.

Freeman M. Crosby
Barnstable, MA

To date, we have received eight letters requesting us to reconsider and one stating agreement. We do not devote a special column to specific printers, disks, or any other specialized peripheral. It made no sense to keep one going just for the stringy floppy.

At the same time, more and more of the information in the @News column related to @LOAD addresses, exactly the kind of information that Exatron should be supplying its customers. We do stand by our promise to publish stringy floppy articles when we can, but very few are submitted. Right now, we only have two articles awaiting publication that pertain to the floppy. We do want to keep the information exchange open. —Ed.

The Cornsoft Group's ENHBAS enhanced BASIC program is one of the most powerful utilities available to the BASIC programmer (see BYTE, Nov. 1981, 80-U.S., Nov. 1981), but it is not compatible with the ESF. The following changes will patch ENHBAS version 2.5a so it will support the ESF @ commands. Owners of earlier versions of ENHBAS can obtain updates for

\$5.00 from Cornsoft.

Procedure for ENHBAS 2.5a, ESF version 4.1: 1) Set memory size to 28672. 2) SYSTEM /12345. 3) @LOAD ESF monitor, relocate to 7000 hex or above. 4) Load ENHBAS from cassette using L (or LC) command. 5) Change the following memory locations (all values are in hex):

47DA from 28 to C3
47DB from 14 to 3C
47DC from F1 to 58
439E from 3C to 43
583C from X to CA
583D from X to F0
583E from X to 47
583F from X to 3D
5840 from X to C3
5841 from X to 91
5842 from X to 30
5843 from X to 00,

where X is some random value. 6) Save patched ENHBAS on wafer using W (or WP) 1, 42EC, 5843, 42EC.

While this patch has worked without problems for a limited period of time, you should recognize that my experience with it is limited, and unrecognized bugs may exist.

Sherman Levine
White Plains, NY

Quite a lot of TRS-80 owners are amateurs. This is a worldwide experience, and it is the case in our country as well. Several thousand of them are united in a TRS-80 users club. The regional divisions have meetings once or twice a month.

Usually a member owns a Model I. There are, however, two or three Model III as well as some Video Genie owners.

A wide variety of peripherals is in use, but no one uses a modem yet. We have no local data base for general use. There is only the National Telecommunications System, but their data are not very useful for an amateur. Of course, there are industrial data bases.

A lot of programming is done by members, mostly in BASIC, but many of the used programs are purchased, since programming in assembly language is hardly a matter for amateurs. We use our equipment for fun.

We'd like to be in touch with an amateur group in the United States. We will be very pleased to receive an

address of any TRS-80 user societies in your country.

W. H. Van Der Smagt
Meesterswijk 9
9421 TJ Bovensmilde
The Netherlands

We have no national TRS-80 users group, but perhaps some local clubs would like to set up correspondence.-Ed.

This tip is for users of the Radio Shack Business Mailing List #26-1558. The program requires the user to enter the assigned system name each time the program is run. Changing the following lines will allow you to run the program without entering the system name. Change lines 150 to 180 as follows (Be sure to insert your system name as NAM\$ in line 160): 150 PRINT @17, "TRS-80 MAILING LIST SYSTEM". 160 NAM\$="system name": PRINT @464, "ASSIGNED SYSTEM NAME: ";NAM\$. 170 ON ERROR GOTO 3060. 180 PRINT @724, "LOADING SYSTEM FILES"

Mike Salisbury
Newport Beach, CA

Does anyone know how to modify the EDTASM+ program to work with the Model III? There seems to be two main problems with it. One is, of course, the baud rate and tape I/O. The other problem has something to do with the keyboard driver routine.

I think we (a friend and I) can fix the first problem if we could locate the tape I/O portion of the program. We were able to do it with RS EDTASM and T-Bug Model I programs as well as several games.

We might be able to fix the other problem if we knew the differences between the Model I and Model III keyboard requirements, and the location of the keyboard routine in EDTASM+. If anyone could be of assistance, we sure would appreciate it. If there is a Model III copy already modified, I would pay for it.

I purchased my copy from an ad which did not state that the program is for Model I only. Microsoft has given me a return authorization number, but I would rather use it than return it. **Wayne P. Staats**
1941 16th Street
Cuyahoga Falls, OH 44223

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Mort Schuchman
Baltimore, Maryland

6

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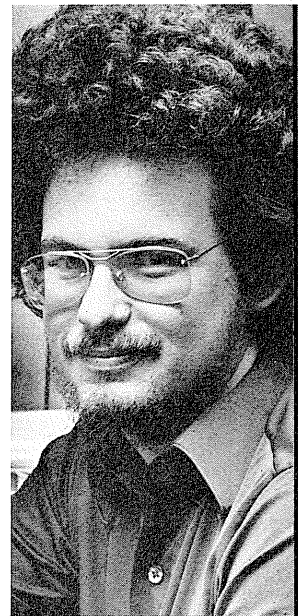
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Notes, etc.

Cameron C. Brown, Editor

Recently, we had our Model III upgraded with a new character generator. Now we find that we cannot print on the first line of the video when in 32-character mode. We can do it using a PRINT@ 0, or a POKE, but under normal use it appears that you can only get fifteen lines when using CHR\$(23), not the sixteen that are normal. The tabs and column settings also behave strangely when using the double-sized characters. Mark the 0,0 position on your video and see what happens when you run these tests.

```
10 CLS: PRINT CHR$(23)
```

```
20 FOR X=1 TO 16
```

```
30 PRINT X,"X"
```

```
40 NEXT
```

```
50 GOTO 50
```

Where is the first X? Are the columns aligned or do they stagger? Reverse the order of the number and the letter. Is the alignment still the same? Now try this one:

```
10 CLS
```

```
20 PRINT CHR$(23)
```

```
30 PRINT "A"
```

```
40 GOTO 40
```

Is the A printed in the position you marked, or is it one line down? From what we can see, the variations are enough to cause some programmers fits.

Color Computer Upgrades

As you may know, there have been numerous changes in the circuit boards of the Color Computer. The earliest machines had the A board and now we are up to a revised E board. Also, the ROM has been upgraded from a 1.0 version to a 1.1 version. Your need for a new board or ROM could vary under a number of circumstances. Our latest information goes like this: An upgrade to 32K or more requires that

the A, B, or C boards be replaced with the revised E board. The D board is not replaced but new jumpers and connections are installed. An upgrade to 16K does not require a new board, but Radio Shack may put one in anyway, at no charge.

The 32K upgrade actually uses 64K RAM chips that are only half-certified. We have heard of potential hardware failure resulting from trying to use the complete 64K that is really in the 32K machines. Also, the memory upgrade to 32K requires the new 1.1 ROM. The ROM is installed by Radio Shack for no charge whenever it is necessary. In many cases, you can have the upgraded ROM installed free by just asking for it.

It seems that the new DMP printer series from Radio Shack requires that a 1.1 ROM be in your Color Computer. If you find that your DMP printer is not working as it should, take it and your Color Computer to a service center. If your ROM needs replacing, they will do it for no charge.

Corrections

In the first listing of Screen Dump, December 1982, page 106, the command NEXT BE in line 20 should read NEXT B.

The New Products section of January '83 had the captions reversed on the top two pictures on page 131. We hope that the Model I owners were not misled by expecting such high resolution from using the 80-Grafix board in their computer.

In the Model II Supervisor Calls article in January 1983 (Part I, A function grapher), we missed a tab setting on the way to the typesetter.

On page 60, program line 230 should have 22 spaces between the numbers -1.0, 0.0, and +1.0. Also the reference to array SV on page 59 should read ...in the integer array CV. Lastly, the GOSUB 1600 reference in the article (bottom of page 59) should be GOSUB 1000. Don't worry, the Model II function grapher does work as published.

Basically BASIC in January, page 102, had a reversal of variables. Line 30 has the variables LA\$ and FI\$ reversed. As published, it would print out first then last name, not last then first as described. Also note in the paragraph following the sample code; "JONES" is stored in LA\$ and not FI\$ as stated. Our apologies, learning BASIC is difficult enough, typos don't help at all.

Scriptit Your Programs, January 1983, page 93, had an error in the instructions about the Convert Document prompt. When the prompt appears, you must first press S <ENTER>, followed by the filename. Without the S option being selected, Scriptit will choose to access the file from TRSDOS, not save it out.

It appears that we got so excited with our first slick issue, we overlooked some details. Our goal is to do better, and when an issue is perfect, we should probably retire.

TRSDOS 1.3 Patches

Sgt. John A. Junod, APO NY sent us a letter about some useful patches for Model III TRSDOS 1.3. Be sure to try them first on a trial diskette before placing them on your operating system. We are giving you them without any rigorous testing. To make a BACKUP of any

TRSDOS disk without knowing the correct password: PATCH *7 (ADD=55A8, FIND=28, CHG=18). To change a disk's password using the PROT (PW) command without knowing the old password: PATCH *6 (ADD=549F, FIND=C23852, CHG=000000) and PATCH *6 (ADD=54A7, FIND=2816, CHG=0000). To copy one file at a time that is protected with an update password, such as BASIC/CMD: PATCH *0 (ADD=4759, FIND=DD7E01, CHG=3E2000). Be sure to reboot after making this patch on the copy command. To stop TRSDOS from clearing (zeroing) memory when it reboots: PATCH *1 (ADD=4E68, FIND=444D, CHG=010100) and PATCH *1 (ADD=4E71, FIND=36, CHG=00).

We have not checked for the effectiveness of these changes, nor do we know of their compatibility with various TRSDOS 1.3 release dates, or other PATCHES. You are on your own.

Puzzler

We were swamped with solutions to our January problem about having a GOTO XXX. We are busy checking them and their effectiveness on different model machines. Look for the winning solution(s) next month.

This month we are looking for a way to convert the numeric expression YYMMDD to MMDDYY. You are not allowed to use any string functions and the procedure should be short. Notice that it will allow a number that represents year, month, and day to be converted to month, day and year format. You may assume that there are no / separators in the variable. For a \$10 prize and a tour of our facilities, send your solution to: Puzzler, c/o 80-U.S. Journal, 3838 South Warner, Tacoma, WA 98409.

In This Issue

Our theme is data base management. But before going into it, I would like to digress for a moment. We were trying to decide on the use of the word database as opposed to the words data base. We found examples of both in the literature and had decided to treat the single word as acceptable and

interchangeable with the two-word form. Then along came an excellent text from Osborne/McGraw-Hill Publishers called *Data Base Management Systems* by David Kruglinski. It defined the term database to be a subset of a data base. That is, a database consists of records and all associated indices and pointers, whereas, a data base is the complete collection of your information. So, we are back to square one. In our articles you may find data base and database. We know what we want to say, but are not sure how it should be done. In any case, managing your data is an extremely important task and this issue should help.

We have an overview of some data base programs and their attributes by Terry Dettmann and myself. Our thanks to the many reviewers that helped put the article together.

It takes a lot of typing, but the Datex program by Paul Emmons may be just what you need. It is a sophisticated and well written data manager program. We believe it is one of the best ever published.

Model II owners can finish their

disk directory program with the listings in the final installment on Supervisor Calls. It gives you everything you need for a diskette management system.

Color Computerists have much to look at. Mr. Steve Stone has done an excellent job of showing how to convert Model I/III software to run on a Color Computer. By using his tips and formulas, a whole world of software is ripe for conversion. This is one article you will want to use over and over.

Dr. Richard Tangeman is back with a compiler for the Color Computer. Its command set is small, but what an impressive pick-up in speed once a BASIC program is put into machine language. This one is fun to use.

To reflect its changing nature, we have renamed New Products to "For Immediate Release." In the past, we did not set aside a specific area for news and, at the same time, felt that restricting New Products to just hardware was too confining. Look for hardware, software and news notices in this renamed department. ■

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Data base management

A look at terminology and various packages for the TRS-80

For all models

Cameron C. Brown, Editor and T. R. Dettmann, Associate editor

To learn what a DBMS (Data Base Management System) is, we have to start with just the DB (Data Base). Simply put, a data base is just a collection of information about something.

Many people can remember the old Hollerith tabulating machines (you often see them in B-grade science fiction movies of the fifties). With a tabulating machine, everything was stored on cards and run through the machine which could select cards based on the content of particular columns. That was a data base manager of sorts (pun intended!) but it was slow and limited.

With the introduction of computers, data bases naturally moved over to them. It became so simple to add more and more information to a computer data base, that problems started surfacing and the situation rapidly became unmanageable. Management of the information went from a luxury to a necessity.

Today, we are accustomed to dealing with large amounts of information, but we're unable to make effective use of it unless we can keep the volume down to some reasonable level. To look for all

books or articles on a given subject, it's no longer possible to just stop by the local library and check the shelves and catalogs. We have to also check the holdings of other libraries. If we were to do this by hand, we could spend years and still not find everything. Let a computer carry out the search for everything dealing with that subject and we're done in minutes.

Today, the volume of information is so great that we've learned how useful the management of our information can be. The Data Base Management System was created to help us. A DBMS is nothing more than a program, or series of programs, that manages a data base and lets us access it in some predefined way.

The important characteristics of a DBMS include its ability to control the physical storage of information as well as to allow a user to access that information. Even more important is the way in which you see that data base.

Probably the most significant concept in DBMS technology is that a data base, as it appears to the user, should not reflect the way it is actually stored. This is called "Data Independence".

A user is, by definition, someone who wants to get at the data in a data base. He really has no interest in knowing exactly how the information is stored. A user who has to know how the information is stored is a user who is handicapped by his system. Ideally, it should be possible for a user of a data base to ask questions of it and let the management system tell him about the data.

System Types

Depending on the expert you choose to read, you will find different categories of data bases, but they boil down to four types: 1) file handling systems, 2) hierarchical storage systems, 3) network systems, and 4) relational systems.

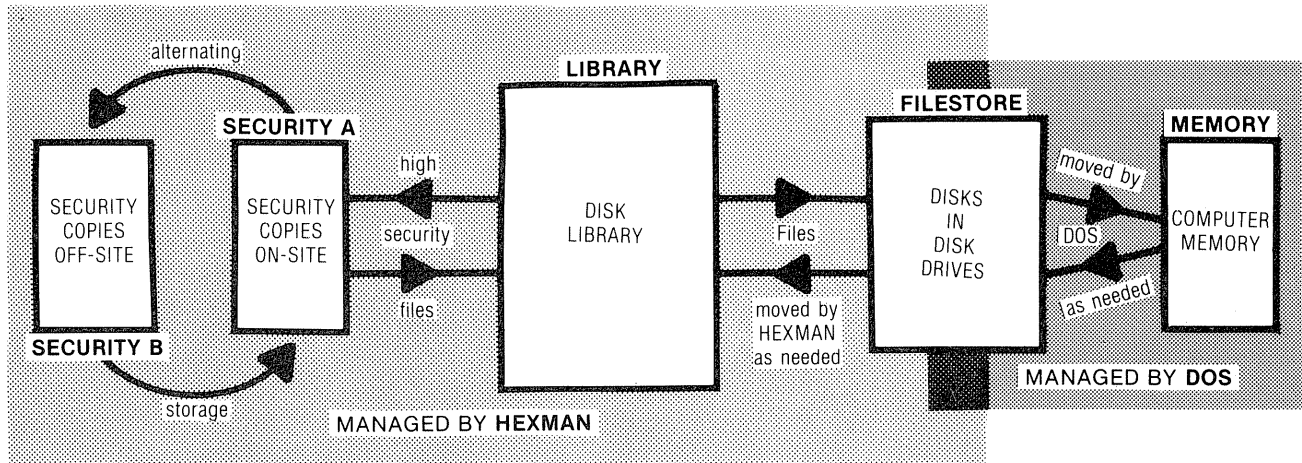
File handling systems are the simplest of the data base managers. They maintain files of information without any overt structure. The files may be sorted, or not, but access is generally through some form of a search.

Profile is an example of a file handling system. It allows access to the data without the user having to worry about its structure, but it doesn't try to be overly sophisticated.

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Only a small portion of your disks can be in your disk drives at any one time. These disks form the "Filestore" to which your computer has immediate access, and the remaining disks form your disk "Library". Ideally the "Filestore" should contain the most active files, while inactive files are kept on "Library" disks stored near the computer.

HEXMAN comes as close to this ideal as it can by monitoring file activity and keeping the most frequently used files in the Filestore. If previously inactive files are needed, they are moved in from the Library. If the Filestore becomes full, the least active files are moved out to the Library. The net result is the files you are most likely to use are ready and waiting.

HEXMAN also performs other storage management chores such as daily backups of modified files, on-site and off-site storage of security copies, and file growth monitoring.

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HEXMAN manages up to 8000 files (2000 originals with up to 4 copies of each). If remembering that many eight letter file names gives you a headache — don't worry. HEXMAN gives you two easy ways to find the files you need. With HEXMAN you find files by function e.g. "Get all the files I need for the end of month Sales Reports" or by description e.g. "Find the letter I sent to Radio Shack about my disk drives". HEXMAN finds your files in seconds. Once you have found them you may Review them, Load them or Delete them as needed.

Requirements

Model III — 48K, 2 drives.

Model I — 48K, 2 drives. Double Density adaptor. Lower case modification.

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The advantage of file handling systems is their simplicity. Since they don't structure the data base in any way, the software can be relatively uncomplicated. The disadvantage is usually time. An unstructured data base must use simple sorting and searching techniques that can be very time consuming.

Hierarchical storage systems are used when the data has a structure such that access to one item depends on access to another. For example, we might form an inventory data base where we keep track of parts by location, within each location by department, and within each department by function.

With this kind of system, if we wanted to know how many paper clips the Seattle store has in the shipping department, we could easily ask it. However, if we wanted to know how many paper clips the company has everywhere, it would be very hard to find out. We would have to ask for every store and every department!

The advantage of a hierarchical system is where the data is naturally structured in this manner. In this case, the organization is fast and efficient. However, uses of the data base not originally planned for rarely fit the predefined structure.

A network storage system connects data items like a hierarchical system, but access can be from any direction. There is no structure which says one thing must logically come first and another second in searching for data.

This system has obvious advantages. You can ask any question about the data base and have the management system find an answer. The trade-off is the considerable amount of overhead that the management system needs to find the data. In some cases, storage overhead can get so bad that more memory is devoted to the management system's needs than to the data!

Relational systems have received their greatest push by E.F. Codd, a Computer Scientist who has been

studying DBMS systems. While he didn't originate the concept, he was able to use some advanced mathematical techniques (called Relational Calculus) to prove that any data base could be maintained as a relational system and that many of the data storage problems associated with other systems simply wouldn't affect these kinds of systems.

Unfortunately, terminology about relational data bases is loaded with mathematical jargon. It's unfortunate since the concept is simple. A relational data base simply keeps tables of data information and provides commands that allow us to manipulate these tables in useful ways.

The techniques for doing this are anything but simple and much effort has gone into trying to make relational systems work. Only recently have relational data bases been perfected to the point that they both work and deserve the name. Unfortunately, it's nearly

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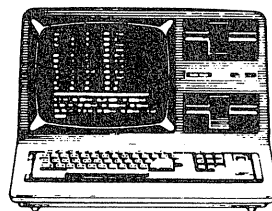
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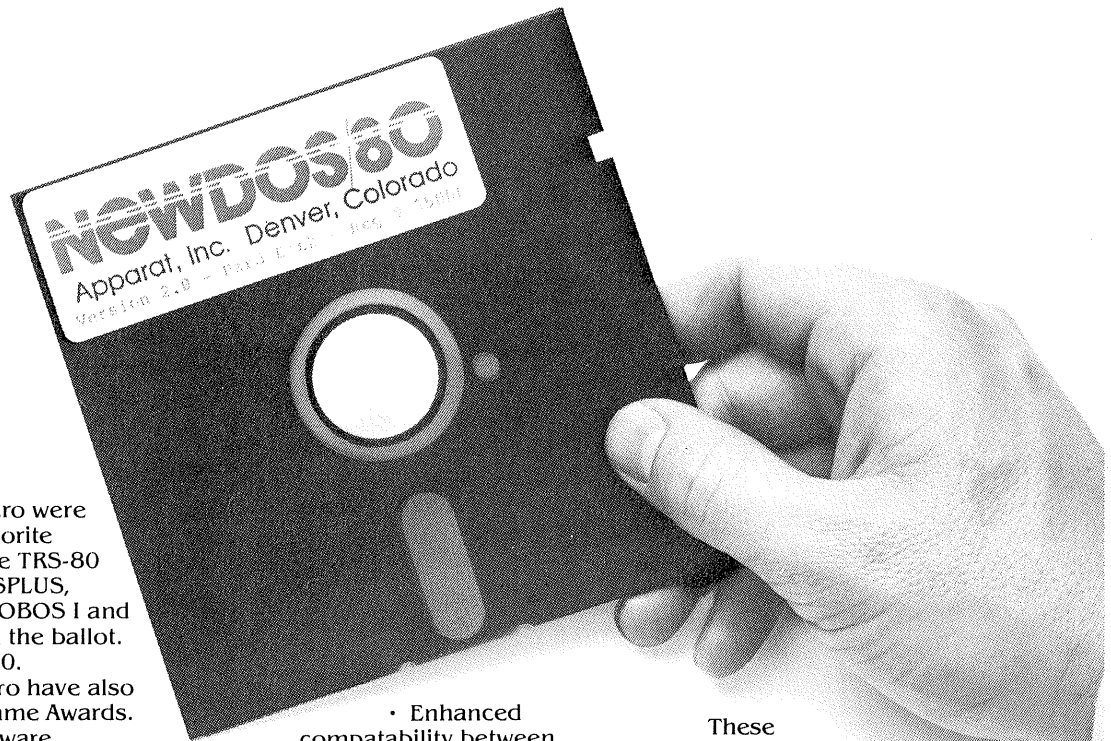
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JOE McMANUS



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IF YOU'RE GOING TO BE PICKY ABOUT AN OPERATING SYSTEM SEE WHICH WAS PICKED BEST.



The readers of 80 Micro were asked to select their favorite operating system for the TRS-80 Model I&III. LDOS, DOSPLUS, TRSDOS, MULTIDOS, WOBOS I and NEWDOS/80 were all on the ballot. They picked NEWDOS/80.

The editors of 80 Micro have also awarded their Hall of Fame Awards. From among every software package on the market, the editors picked only six that they felt made a lasting and significant contribution to the TRS-80 computer. NEWDOS/80 was one of the six.

Since we first introduced the NEWDOS operating system we've been stating its features, capabilities and advantages. Thank you 80 Micro readers and NEWDOS/80 users for supporting us.

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impossible to determine if a particular system is really a relational one without knowing the details of the data base structure and/or having the source code.

The advantage of relational systems is that you can express virtually any question to the data base. This makes them incredibly flexible. But the systems can get cumbersome, particularly if they are working on a small computer.

The Table

We collected some representative programs and took a look at their features. Our goal is to see what is possible, not make a recommendation for a specific product. There are dozens of data base management systems for each model, and in most cases the successful use of a program depends upon your application.

The table that follows is a guide for you to use in selecting the type of program that meets your needs. There are many other excellent packages besides those we have chosen to use for illustration.

Under the requirements section, we have listed minimal system needs. If you have more memory, it should let you sort or store more records. In the case of operating systems, usually any DOS can be substituted for TRSDOS. Be sure to check with the manufacturer as to the suitability of your CP/M operating system with his package.

Files, Records and Fields

A file is your complete collection of data. One file may contain numerous entries which are called records. A record is all your information that pertains to a given entry. Each piece of information within a record is called a field. For example, if your file is a collection of client names and addresses, each client constitutes one record. The name of that client is one of the fields for that record. In most of the packages that are available, the number of fields that you can assign to a record is limited by the fact that you cannot exceed 255 characters total. So, in most cases, you could have 25 ten-character fields or 10 twenty-five character fields as long as you don't exceed a maximum

number.

In many packages you can have additional fields per record, but only a few of the fields can be used for sorting. Also, bear in mind that the total number of fields, or records, is determined by your hardware as well as the software. More disk space can mean more records stored. Fewer total characters per record can mean more records stored. The limits for your application will differ from everyone else's.

In almost every package on the market you have to give each record the same number of fields. Imagine a situation where you want to keep track of items owned by clients. One client may own five items while others own fifty. Almost every data base package would require you to assign fifty fields to each client. That means that a tremendous amount of disk space would be used for the storage of empty fields. At the moment, only some of the relational systems will solve that problem.

Murphy's Law is always working. Once a data base is defined and in operation you may need to expand it, or remove a field that isn't needed. Does your program allow for that? It is harder to redefine a field that is in use, but the situation can arise. After the nine digit Zip code becomes a fact, can you expand your field to accommodate the extra four digits?

Input and Editing

A screen is what the operator sees while entering data. In some cases, field information has to be entered in exactly the same order in which the data base was defined. All information has to be entered and the operator cannot skip any inputs. For other packages, you can define an input screen and select what information needs to be entered. This option is extremely useful if you plan to have different operators use the system and don't want all the information available to everyone.

Must-fill fields are those that the operator has to enter. The program will not allow the operator to move on until it is given the data. This feature is useful for situations where certain figures have to be known for a calculation.

Perhaps your company needs the data in a specific date, time or phone

format. Can you specify that a phone number is (206) 555-1212 or 206/555-1212? Or does the program assume a specific format for all dates or times? Can you select the precision of a numeric field, can it be integer only, how does it handle dollars and cents? If you foresee calculations involving very precise numbers, can you select double precision? Some very sophisticated packages will even allow you to specify an input range. This will enable you to have a check-back on erroneous data entry. By setting an input field for age to less than 150 you can help prevent entering 555 when you meant 55.

Editing

Any data base package has to allow you to change information within its files. The faster you can access a record and its associated fields, the faster your work can get done. There are numerous methods of record access, but the most common is by record number, by a specific field criteria (e.g. last name = Smith), or by an index that is generated by the program. In some cases, a mass edit is desirable. If your file has clients coded by date and you wish to purge all of those who have not renewed, this option is useful. In many programs you have to physically specify the deletion or edit of each record.

Searching for a record is also a key feature. Can you find that salesman who sold over 23 tractors in Utah? Some programs allow you to search for Utah or for 23 tractors, but not both. Other programs give you the searching ability but don't allow you to get the next record that qualifies. In many packages the searching while in the edit phase is not as comprehensive as the one that is allowed in the reporting or label sections.

Reports and Labels

Reports are the real strength of a data base system. By carefully defining criteria, you should be able to pinpoint information and present it in a form that is useful. One of the key steps in printing an invoice is to be able to command a top-of-form after a record is printed. Very few packages allow this option. Others

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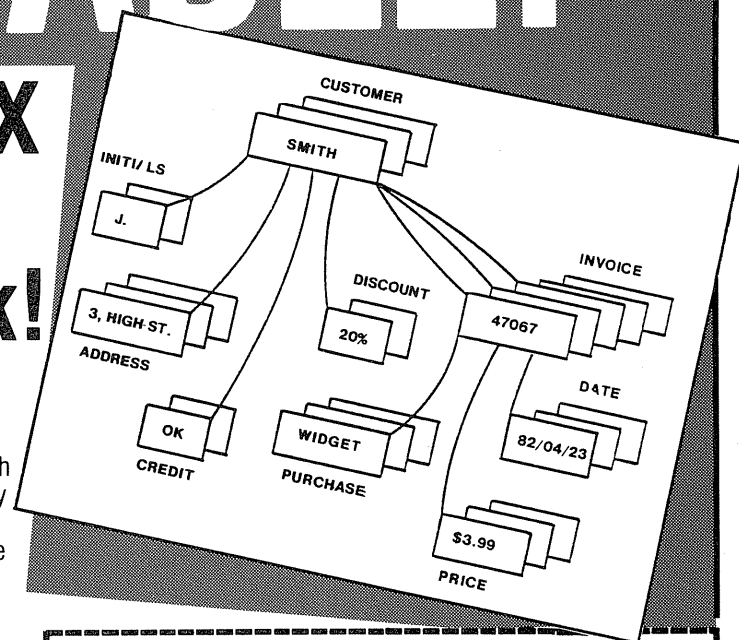
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will let you print only one, or two, or eight lines per record. For accounting purposes, page sub-totals and grand totals are needed. Headers at the top of the page (or footers at the bottom) can clarify your output. Almost all packages allow formatting for labels, very useful for mailing purposes. Usually, the labels are restricted to six lines and can't accommodate multiple-across formats.

The management systems described below were sent to different reviewers for comment. Their results may be found in the tables on pages 24 and 25.

dBase II

It is a flexible DBMS system designed for the user with limited experience. The program prompts for what it needs as it needs it. Commands allow you to create, add, edit singly or globally, print reports or join data bases to create new ones.

The real power lies in its reporting structure. You can use relational commands to select records with very little effort. The system allows for great flexibility in the relational notation; customized output is quite easy. By generating a command file, dBase II offers even greater flexibility in extracting information.

Input and editing is simple and direct, but user control is not possible. The documentation has two distinct parts. The tutorial section is excellent. The latter part, which summarizes all commands and features, is more complex and in some places it is very difficult for a non-programmer to follow it.

The package was reviewed by Terry Dettmann, associate editor, and is available from Ashton-Tate, 9929 West Jefferson Blvd, Culver City, CA 90230 (213) 204-5570.

Quad

The QUAD is also a relational system but it does things quite differently than dBase II. Command files for the QUAD consist of a description of operations to be performed during processing. They bear a much fainter resemblance to a programming language than does dBase II.

You can combine a large number

of files together during report generation or file update. There are powerful facilities for mathematics on fields, report and screen formatting, search control and more. You get much more control over input and editing screens than with dBase II.

The manual includes a sample session and there were no problems setting up a data base. Since QUAD uses a command structure that is not as much like a language as does dBase II, it takes some time to get used to it.

This package, also reviewed by Terry Dettmann, is available from QuanTeckna Research, Inc., 6902 220th St. S.W., Montlake Terrace, WA 98043 (206) 364-6940.

Profile Plus

The table reflects information on the Model II version, but it also holds true for the Model III. Users on the Model III must have 48K and two disk drives.

Profile Plus makes designing a data base quite simple, and the documentation does an excellent job guiding you. There are questions that it does not answer. Trial-and-error is the only way to check some features.

The strength of the system lies in its screen and input capability. You can set up specific user menus, password protect data, require data to be entered and specify data format. The package has worked well for me for over a year. There has been no loss of data or error in the system. Report and label generation is easy.

The major drawbacks of the system have been addressed by the release of upgrade options for the Profile Plus, Model II version. They turn a good system into one of the best. It still suffers from the restrictions inherent in any file handling system, such as all records with the same number of fields.

Profile Plus Upgrades

All of the packages, Prosort, Archives, and Forms are easily appended to your Profile Plus program through an installation DO file. For those using the Profile Plus that was originally sold by The Small Computer, Inc. of Ridgewood

NJ, the installation of the upgrades does not work. After installation, your Profile Plus menu is altered to include the new options. The documentation with each is complete and example files are included. They do assume that you are familiar with Profile Plus and how it operates.

Prosort is a utility that allows you to choose any field for sorting, and they can be up to five levels deep. Now you can easily create Zip code sorts that are also subsorted alphabetically by last name, and then by first name if you wish. Prosort gives you complete control of the data and the sorting is very quick. It can even produce an index file that is then used by the other Profile Plus options such as reports or labels.

Archives is a utility that allows you to mass purge, edit, and delete records from your data base. If your files undergo many changes, or are extremely large, this option should prove useful. Purged records can be spun off into a separate file for recovery, if needed, at a later date. This option is only \$49, but is not one that many people need.

Profile Forms is perhaps the best of them all. This utility sells for \$125 and gives you flexible output. You can specify printer control codes, top-of-form, printer width and length of form. Creating invoices, specialized job forms and other documents is easily taken care of with this option. All of the extended math functions and formulas involving your fields are available.

Be sure you know which options you want to add. During installation, the Profile Forms utility must be added last to your Profile Plus program. If you want to add one of the other utilities later, you will have to move all data files over to a newly created system disk. It isn't difficult, but can be a problem.

Profile Plus and all of the upgrades are available from any Radio Shack store or Computer Center. Reviewed by Cameron C. Brown, editor.

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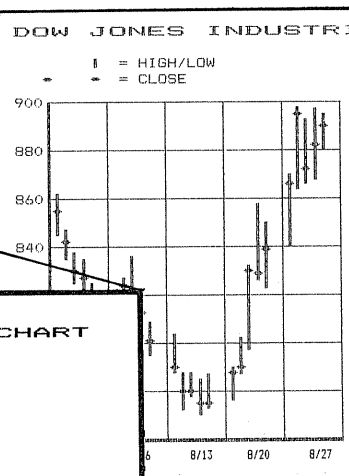
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102	78.26	972.78	401.43	115.12	136.34	1052	495	17,275	8,405		
105	79.08	972.35	405.77	117.81	137.97	1054	433	17,159	14,669		
106	79.14	981.69	402.89	117.16	138.12	1049	640	38,463	23,709		
107	77.29	980.89	391.19	115.19	135.68	216	1555	5,994	85,844		
108	76.20	965.78	385.24	114.07	133.06	578	1028	11,757	37,075		
109	76.44	968.69	384.82	112.89	133.48	907	620	28,753	15,737		
112	76.52	968.77	388.34	112.85	133.52	928	653	23,813	19,192		
113	76.35	965.10	387.18	112.49	133.29	578	993	12,407	24,532		
114	76.55	966.47	389.35	112.38	133.47	914	612	23,382	13,773		
115	76.99	969.07	396.10	112.60	134.22	789	671	21,567	13,526		
116	77.33	973.29	401.98	113.22	134.77	880	642	23,22	14,425		
119	77.10	970.99	403.55	114.35	134.37	740	750	16,115	15,338		
120	75.81	950.68	394.89	113.80	131.65	371	1172	5,859			
121	75.39	946.25	392.46	113.80	131.36	547	954	15,787			
122	74.76	940.44	392.03	113.00	130.26	487	1024	11,057			
123	74.72	940.19	391.61	111.76	130.23	683	780	16,694			
126	74.45	938.91	389.19	111.47	129.84	564	899	11,694			
127	75.19	949.49	394.64	111.72	131.12	943	559	28,173			
128	74.79	942.53	395.43	112.49	130.34	686	788	14,453			
129	74.69	948.69	393.04	112.74	130.24	774	710	19,423			
130	74.27	947.27	402.22	112.82	129.55	727	776	16,777			

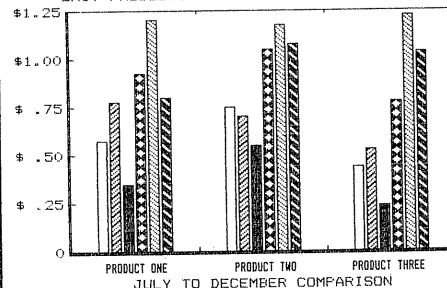
WORKSHEET				
NYSE Vol	10d NYCI	A-D	ADL	
1231	41.21	77.33	447	-1572
102	28.87	77.49	567	1025
105	28.74	77.78	893	-132
106	67.40	78.92	407	277
107	92.89	77.89	-1339	-1052
108	55.35	77.59	-450	-1512
109	50.19	77.38	289	-1223
112	48.76	77.23	295	-928
113	40.89	77.07	-415	-1347



DATAGRAPH BAR CHART

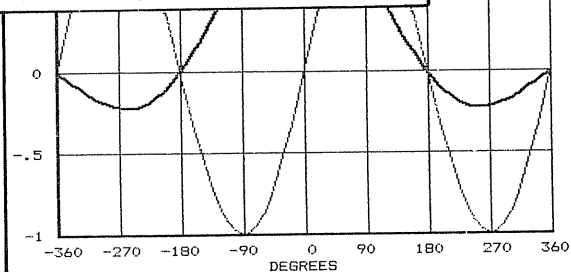
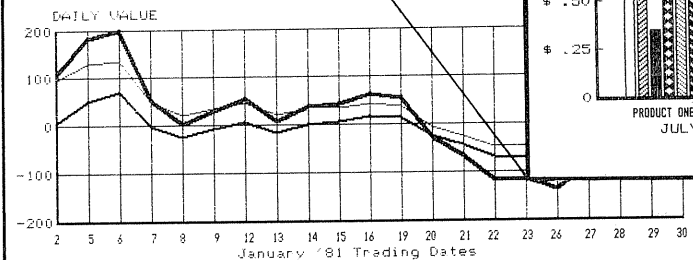
Legend:
 I = JULY
 II = AUGUST
 III = SEPTEMBER
 IV = OCTOBER
 V = NOVEMBER
 VI = DECEMBER

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TRADEMARKS: DATAGRAPH (MICRO SOFTWARE SYSTEMS); VISICALC (VISICORP); TRS-80 (TANDY CORP); DIF (SOFTWARE ARTS INC.); PRISM (INTEGRAL DATA SYSTEMS)

system is capable of storing data. We selected a very inexpensive tape based system for analysis. Most of the features that are noted in Table 1 require a disk system, but if your requirements are truly minimal, it can be done on cassette.

The Tape Information Management System (TIMS) is from Sugar Software, 2153 Leah Lane, Reynoldsburg, OH 43068. It will run on a 16K Color Computer with Extended BASIC (32K recommended) and requires no peripherals besides a cassette recorder. TIMS is susceptible to crashing. Disconcerting but not disastrous because, in most cases, the manual tells you how to recover. Unfortunately, the recovery instructions were wrong. The manual indicates you should key in GOTO 40 when the program bombs, actually it should be GOTO 35.

It would also have been helpful if the manual added that you should follow the GOTO 35 by keying in an uparrow so that you can be returned to the main menu. Recovery did not seem possible after keying in a

record greater than 230 characters. In fairness, the errors are not the kind that a user would normally make. TIMS is not acceptable for business use, but it will probably serve well for hobby or household uses. Reviewed by Stephen G. Stone of Auburn, WA.

Data-Writer

Data-Writer is from Software Options, 19 Rector Street, New York, NY 10006 (800) 221-1624. The package works on a Model I or III, but lowercase is a requirement.

The manual uses a learn-by-doing approach and is so effective that on the first try a complete and highly functional data base was set up. Reports and customized printouts can be generated in minutes.

Data-Writer will automatically allow for fields of up to 35 characters each, but it offers a unique alternative. Using your own word processor, you can have up to twenty fields of 240 characters each. That gives almost 5000 characters per record.

It is easy to understand and use

and overcomes many of the limitations of 48K of memory. Reviewed by Don Scarberry, technical editor.

Maxi-Manager

Maxi-Manager is from The Business Division, A Division of Scott Adams, Inc., P.O. Box 3435, Longwood, FL 32750 (305) 830-8194. It is supplied on a stripped-down DOSPLUS 3.3 but the Model I version is compatible with all DOSs and doublers. The Model III version can run on LDOS 5.1, NEWDOS/80 Version 2, and DOSPLUS.

It is a very good program, but not quite excellent. It can integrate with the other business software from The Business Division, a definite plus. The manual needs some improvement, but is useful. The limitations on field mathematics are a drawback, but you can define some equation fields (e.g. Cost*Units) and rounded fields. Field arithmetic is possible by utilizing the functions during the set-up of the data base, but not later. Reviewed by Jim Klapproth, associate editor. ■

	dBase II	QUAD	Profile Plus	TIMS	Data-Writer	Maxi Manager
Requirements:						
Model	II	II	II	CC	III	I/III
Minimum memory (K)	64	64	64	16	48	48
Minimum number of disks	2	2	1	0	2	1
Operating system	CP/M	CP/M	TRS	na	DOS+	X
Written in (BASIC,Compiled,Other)	C	C	C	B	C	B
Special peripherals needed	N	N	N	Cass	N	N
Price:	700	495	299	25	145	150
Documentation:						
Complete with examples:	Y	Y	Y	Y	Y	Y
Includes index and references	Y	Y	Y	Y	N	Y
Assumes prior experience by user	N	Y	N	N	N	N
Readability (Easy,Avg,Difficult)	A	A	A	E	E	E
Data base structure:						
Fixed or variable number of records	V	V	V	V	V	V
Files can span disks	N	N	Y	na	Y	Y
Maximum number of fields per record	32	30	99	8	20	20
Maximum field size(chr)	254	30	256	234	240	40
Alter fields after set-up (Y/N)	*	*	N	Y	Y	N
Access files from other prgs	*	Y	Y	Y	Y	Y but
(Yes, No, Yes but must write own utility)						
Fixed or variable field length(F/V)	V	V	V	V	V	V
Add fields after set-up	*	*	Y	N	Y	N
All records have same # fields	Y	Y	Y	Y	Y	Y

Input/Edit						
User defined data screens for input	N	Y	Y	N	N	N
User defined special function keys	Y	Y	Y	N	N	N
Password protect Input/Edit modes	Y	Y	Y	N	N	Y
Video highlighting	Y	Y	Y	N	N	N
Must-fill fields during input	*	*	Y	N	Y	N
User defined formats for data	*	*	N	N	N	N
Program defined formats for date, time, etc.	Y	Y	Y	N	N	Y
Specify fields as:						
Whole number	*	*	Y	N	N	N
Dollars & cents ####.##	*	*	Y	N	Y	Y
Double precision	*	*	N	N	N	Y
Within certain relation during input (e.g. <150)	*	*	N	N	N	N
Able to cancel edits made	*	*	Y	N	Y	N
Access records for editing by:						
Control number:	*	*	Y	N	Y	Y
Key field search:	*	*	Y	Y	Y	Y
Program defined index:	*	*	Y	N	N	N
Able to mass purge/edit files	*	*	N	N	N	N
Search and Inquiry						
Able to define I/O screens	Ltd	Y	Y	N	N	N
Select fields displayed	Y	Y	Y	N	N	Y
Search						
last record:	*	Y	N	N	Y	N
previous record:	*	Y	Y	N	N	Y
next record:	*	Y	Y	N	N	Y
specific record #	Y	Y	Y	N	Y	Y
by field criteria (=,<,>,<>)	*	Y	Y	Y	Y	Y
how many criteria?	UnLtd	UnLtd	2	1	UnLtd	*
Reports and labels						
Able to save formats for recall	Y	Y	Y	Y	Y	Y
Field arithmetic:						
Addition	Y	Y	Y	N	Y	Y
Subtraction	Y	Y	Y	N	Y	X
Multiplication/division	Y	Y	Y	N	Y	X
Extended formulas	Y	*	Y	N	Y	X
Select reports by field criteria	Y	Y	Y	N	Y	Y
Select reports by multiple criteria	Y	Y	Y	N	Y	Y
Page subtotals and final totals	Y	Y	Y	N	Y	Y
Combine files for a single report	Y	*	N	*	Y	N
Maximum lines per record printed	*	*	8	8	UnLtd	66
Header or footer lines	*	Y	Y	N	N	Y
Specify special printer codes(CHR\$)	*	*	N	N	Y	N
Special utilities:						
Able to merge different files	Y	Y	N	N	Y	N
Able to append different files	Y	Y	N	Y	Y	N
Access files with wordprocessor	Y	Y	Y	N	Y	Y
Sorting						
Machine or BASIC sort (M/B)	M	M	M	M	M	M
Ascending or descending order	*	*	A	A	A,D	A,D
Multiple keys (how many?)	*	5	1	3	2	5

Note: * This feature may be present but reviewer did not verify it.

X See discussion on the product for a clarification.

Security and privacy

Guidelines for protecting your data base

For all models

Kenneth Hipple, Brandon, MS

What a great day to be heading for work! Today is the day you are going to finish that new game that is sure to make you at least slightly rich. Then, as you pull into your parking space, you see it. The front door is swinging open in the wind. You rush in to see what was taken and find that all tapes, diskettes, and printouts are either missing or destroyed. Is all your work on that game lost? And what about that mailing list dat da boys said only youse was to see? Welcome to the world of computer security and privacy. Whether the above situation is a minor problem or a major disaster depends entirely upon you.

Computer security and privacy is an issue of primary importance to all serious computer users. Unfortunately it is often neglected until too

late. Every time someone starts a new mailing list, data base, or file management system, the question of privacy becomes more significant. Since privacy depends on having a secure system, I will look at security first and then discuss the privacy issue.

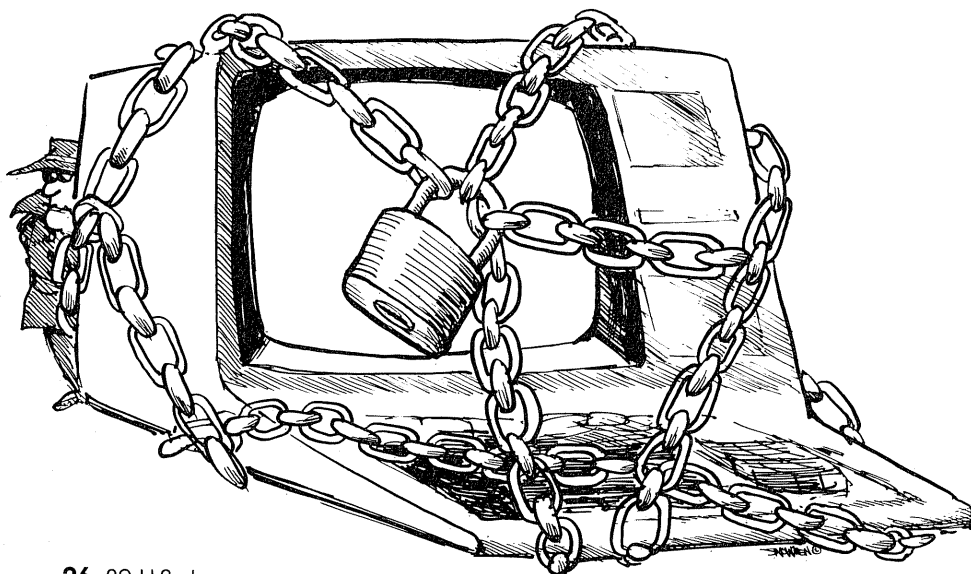
Security is the protection of data against destruction, unauthorized disclosure, or modification either by accident or intention. Also, the computer must be protected from destruction or damage. If the following steps are taken, a reasonably secure system can be achieved. The data and the machine must be protected from all possible means of destruction or theft. The data must be reconstructable in case something does happen to it. A method should be provided that will allow any additions, deletions or

changes to the data to be checked. A method should be provided to make sure that only authorized persons use the system and that they only perform authorized actions to the data. Finally, the system should be monitored so that any attempts to perform unauthorized actions will be caught.

I break security down into two components: physical and system. The physical component deals with preventing the physical destruction or modification of the data or machine, and with preventing unauthorized persons from getting to the data or machine. Methods used by this component include fire and burglar alarms, fire extinguishing systems, and file backup plans. The last item is possibly the most neglected aspect of security as far as mini- and microcomputer systems are concerned.

Backups should be done on a regular basis with the frequency of them depending on the importance of the data concerned. These backups should then be kept in a safe, fireproof place, preferably off-site. Access control methods are a part of the physical component. These include any means used to prevent unauthorized persons from getting to the computer and the data. Other items to be dealt with by the physical component are power and equipment failure, natural disasters, and contingency planning that will allow a company to keep operating no matter what happens to the computer department.

The system component is concerned with the methods used to preserve the integrity of the data



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OSI

VIC-64

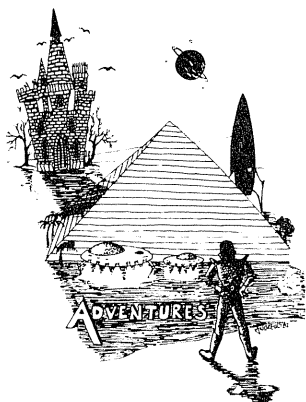
VIC-20

SINCLAIR

TIMEX



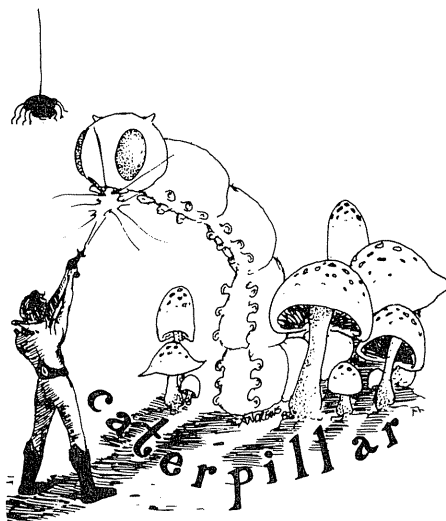
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Adventures require 16k on TRS80, TRS80 color, and Sinclair. They require 8k on OSI and 13k on Vic-20. Derelict takes 12k on OSI. \$14.95 each.



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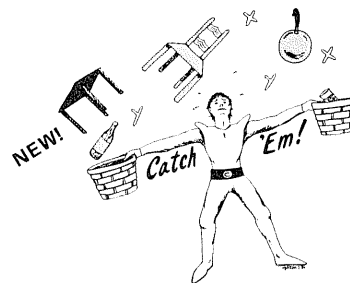
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use it. Two of the major legislative acts concerned with privacy are the Fair Credit Reporting Act of 1971, which dealt with credit agencies, and the Privacy Act of 1974, which laid down rules for federal agencies concerning the collection of information. Also, many states have passed laws concerning privacy. These laws usually are concerned with controlling government agencies not private businesses. The Privacy Act of 1974 set up a two-year study of the privacy issue. This study arrived at eight principles concerning privacy. Summarized, these say that no personal data keeping system shall be secret, that people can access any data kept about them, and that people have the right to correct any information kept about them. There are limits on the types of information that can be collected, limits on how information can be used, and limits on the types of disclosures of the information to groups other than the one that collected the data. The study also said that the organization that

collects the data is responsible for making policies concerning its information management and that the organization is accountable for its policies, practices, and systems. These principles should be kept in mind any time you are dealing with information gathered about other people. They represent ethical, and possibly legal, considerations you should be concerned with.

Security and privacy are related issues. Security is the more straightforward of the two. The security of a computer system and data base is determined by the company or the person who owns it. They must decide how important security is to them and how much effort and money they want to spend on achieving a secure system. Privacy is another matter. You may not care who sees your mailing list but some of the people on it may care very much. If you maintain any sort of information gathering system, you have a moral and possibly legal obligation regarding privacy.

But, security and privacy are

exactly alike in one manner. If you own a data base, or information gathering system, the person responsible for what happens to it, how it is used, and what will happen to your business if it is lost is you.

Suggested Reading List

Computer Security, Hsiao, Kerr, and Madnick, Academic Press, 1979.

Data Base and Computer Systems Security, John Carroll, Q.E.D. Information Sciences, Inc. Mass., 1976.

Security, Accuracy, and Privacy in Computer Systems, James Martin, Prentice-Hall, Inc., New Jersey, 1933.

Modern Methods for Computer Security and Privacy, L. J. Hoffman, Prentice-Hall, Inc., New Jersey, 1977.

Computer Data Base Organization, James Martin, Prentice-Hall, Inc., New Jersey, 1977. ■

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by William James Haga

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Datex

An in-memory data management program including a high speed sort routine and modifications for different users

Models I/III, PMC-80, LNW80

Paul Emmons, Ellensburg, WA

A small number of well-designed programs can accomplish an enormous variety of a computer user's applications. The TRS-80 now has several fine text editors. For manipulation of numeric data, VisiCalc is a milestone whose competitors are largely imitators. One reason for their success is their flexibility. They are adaptable to many uses or can do many things with one set of data. Though it is more difficult to write a program with such generality than to design one for a specific application, the results are often worthwhile.

Data base management is an area in which attempts have been made to write for a variety of needs. Having used and studied several in-memory systems, I was not convinced that they optimally exploited the possibilities of a microcomputer, or worked around its limitations. They were inefficient to operate, or posed unnecessary restrictions.

This program to manage data files addresses several objectives differently from other systems. It accommodates maximal data in memory, it attacks the problem of garbage collection, it offers a wide variety of input, editing, and output features, and it is kind to the hardware.

I wanted to give you a functioning system with its own mix of features and to share with you some operating conveniences and programming techniques.

Applications using short, but variable length, records and fields of string values best exploit Datex's features. The small memory capacity of a microcomputer is best suited to small records. Accepting a limitation in record size of approximately 250 characters (more or less depending on the number of fields) allows some gratifying advantages. At the extreme, should the records average no more than twenty characters, about a thousand can be held in memory and manipulated without disproportionate degradation in speed — and there may be as many as nine fields per record. In cases like this, you also want to enter and edit the data efficiently and search it heuristically in many ways. These are the cases, and the ways, in which Datex can dramatically outperform its alternatives. The data

structure precludes intentional sorting on secondary keys — a significant limitation, but such are the trade-offs. The system is amenable to additional modules, either stand-alone programs or mergeable routines. They could perform additional functions such as calculations on the data, case modification, or specialized report formats.

Environment

The program was written on a 48K Model I using either TRSDOS or Newdos and a Centronics 737 printer. It is easily adapted to other printers. With line 510 amended, it can run on a Model III or under NEWDOS/80 Version 2 even more easily. The 255-byte "Emert" sort used has its equivalent (and in NEWDOS/80 version 2, far more as well) in CMD "O". CMD "O" obviates the need to reserve high memory and pre-load machine code. I also use NEWDOS/80's lowercase with a brief chain file to load the sort, set "himem" at 65279, load the lowercase driver (which locates itself just below the existing "himem" and adjusts it accordingly), enter BASIC, and run Datex.

Initializing and Adapting

Listing 2 gives a program which I adapted from the *TRS-80 Microcomputing News*, July 1980, to POKE and DUMP Mr. Emert's excellent string Shell-sort into a 16K, 32K, or 48K computer. (The 16K form is unsuitable for Datex.) The actual dump command formed in line 140 is in NEWDOS/80 syntax; users of other operating systems should adapt this portion of the program or delete it and key in the dump command manually. The starting values in hexadecimal are 7D00 for 16K, BF00 for 32K, and FF00 for 48K. The ending values are FFFF. Before running Datex, specify the memory size given in the table of Listing 2.

Three changes are needed for use with a 32K computer. In line 900, change the numbers 26000 and 25000 to 11000 and 10000 respectively. In either version, you may decrease these figures somewhat if you are using very short records (less than 20 bytes) or increase

them for long records (over 150) to divide memory more efficiently between string space and array pointer space. 32K users also need to change FF00 to BF00 in line 905.

Program Listing 3 gives a modification of the sort routine to exploit the Model III's CMD "O". If you are blessed with NEWDOS/80 version 2, Listing 4 provides a descending sort option and exploits CMD "F=SASZ" to adjust memory allocation automatically for various record sizes.

Operation of Datex

Once Datex is running, answer the prompt "Filespec or est. record size" either with the name of an existing file from which you wish to read the format or with an estimate of average record length — i.e., an integer from 20 to 255. Overstate the length to speed up execution for small files. The figure you enter is used only to calculate the dimension of the main array. It does not restrict the record sizes that you may actually use.

Field Names

If you have replied with a record length, you are asked the number of fields and the name of each field. Field names should begin with a non-numeric character and contain fewer than thirteen characters. If you wish to sort or search on positive numeric values in a field, end its name with the pound sign (#) and the maximum number of integer digits desired (those to the left of a real or assumed decimal point), e.g., "Amount #5." Then, keyed input is automatically aligned. It is possible to use such a field for a numeric value followed by alphabetical data, provided that the number contains an actual decimal point. The system can accommodate negative numbers if an additional integer space is reserved for a leading minus sign. The program, however, does not properly evaluate negative numbers for sorting or searching purposes.

The program calculates, dimensions, and displays on the menu screen, the possible number of records given record length and number of fields. You may wish to experiment with several values, running the program for each up to the menu display, before deciding.

Record Format

The record format comprises the size of the main array, the number of fields, and the name of each field. Originally set during initialization, this information is written at the head of all disk files, where the subsequent program runs can read it. Tape files do not contain format information. You must initialize the file manually or from disk before reading tape.

If you answer the first prompt with a filespec, the program opens the file and reads any line print format, the file format, and displays the main menu. At this point, the file is open but only the format has been read. Your next step will usually be to load data from it. Most of the menu operations need at least one record in memory in order to execute.

Once you establish the record format, either by reading it from a file, or by keying it in, it applies to the remainder of the run. You can load files with different

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estimates of record length or different field names, as long as the number of fields matches the number in effect. The format information of subsequent files loaded is ignored, except for the print format.

If, after entering a substantial amount of data, you decide on a different record length or a different name for a field, you can write the data to a file, run the program again (initializing as desired), load the file, and continue. This method cannot be used, however, to change the number of fields.

Menu of Commands

The menu screen displays the number of full and empty records and the list of commands. For a simple invocation, type the letter of the operation desired. However, most of the commands can be modified with options. To set a command's options, type the slash. Then type the command's initial and the option(s) to be set, ending with <ENTER>. Any options not typed are canceled. Except for those described as transient, the program remembers the options currently set, displays them to the right of their commands in the menu, and invokes them when a command is given.

Some options are designated by a letter followed by a number, represented by the pound sign in the descriptions below. Others are set by a letter only. An invalid character in an option string will generally be ignored, unless it comes between a valid letter and a number that should directly follow. A letter specified in a command, option, or print format can be upper- or lowercase. The program converts lower to upper.

ADD

This routine allows you to enter data from the keyboard into the next available record position, field-by-field, after the prompt for each. Any character on the keyboard is available (except the quote mark must not be used for tape-written files), and certain characters at the end of a field become control characters rather than data. The "add" screen displays the current record number and a reminder of the possible terminating control characters, which are as follow:

= Duplicates the same value for the field as in the previous keyed record.

Uparrow cancels the field and returns to the previous field or record for correction. The backward movement skips constant-value or constant-skip fields.

/ Enters the current field into the record, skips the remaining fields, and begins the next record. Constant values specified for the omitted fields are written, but prefixes are not. Remember this feature when you choose the order of fields in a file. If a field is frequently expected to be null, you might wish to place it near the end of the record.

@ Returns you to the menu, canceling the current record. Normally, you will finish a record and enter this as the first character of a new record.

Options for ADD

C# (Constant)— Instead of being prompted, the specified field receives an automatic value.

N# (I.D. Number)— The designated field automati-

cally receives an integer which increases by one with each record input. An initializing prompt asks for an offset number to be added to the record number. If offset equals zero, I.D. equals record number. Proper searching and sorting on this field require that it should have been defined as numeric, usually three integer digits. This option saves keying effort if the data include a serial number which advances by one in input order. Use it if the file must be sorted out of, and returned to, an original order which cannot be determined from the natural numeric or alphabetical order of any other field.

P# (Prefix)— The specified field begins with an automatic value; the remainder is keyed in for each record. This facilitates entering, for example, an index of magazine articles with one field containing a code for the magazine and issue (a prefix) and the page number (entered with every record).

Uparrow— The uparrow scrolls, rather than clears, the screen between records. Returning to the menu cancels values preset for constants and prefixes, but not the fact that they are desired.

S# (Skip a field)— This amounts to a constant value of null for the field, avoiding the prompt for a constant value.

The following, as input from the menu, illustrates an option string: /AC1P2P3S4N5. The slash indicates that a routine is to be called with new options. The "A" specifies the Add routine. This particular set of options modifies the input of five fields:

Field 1 will automatically receive the same value for every record until the routine is exited; fields 2 and 3 will have automatic prefixes followed by data to be keyed in for each record. Field 4 will be skipped so that it will contain nothing, and field 5 will receive a serial number increasing by 1 with each record. The use of these options will cause prompts for the appropriate constant strings and I.D. offset before the input for individual records begins. No more than one option may apply to one field at a time. The order in which these options appear makes no difference.

Search

This subroutine, called by most of the menu commands described below, determines the records in memory to be treated. Search has its own menu with the following choices:

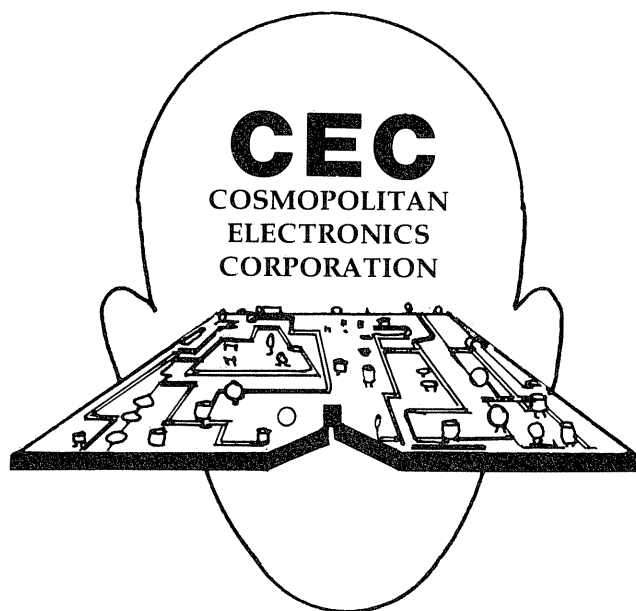
K (Keep the current group)— By this command, you can use several main menu commands without repeating a search strategy. Frequently, you may wish to see a selection on the screen before editing it, or use it as the basis for a refining search. The K response avoids doing the same search twice.

A (Use all)— This selects all records, regardless of previous searches or of any previous "unite or intersect" instruction.

F (Find)— Looks for a given string value imbedded anywhere in the record. It is faster than limiting a search to one field.

X (No find)— The opposite of F, looks for a string and selects the records that do not contain it.

C (Complement)— Reverses all flags so that those records currently selected become deselected and vice-



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R (Record number(s))— Leads to a prompt for a single record number, an inclusive range of beginning and ending numbers separated by a hyphen, or a list of record numbers separated by commas. An ending number greater than the last existing record is interpreted as the last record number.

Field numbers— Type the number of a field in which you wish to seek a value (a number greater than the number of fields appointed aborts the main command and returns you to the menu).

Value prompt— The field-number response elicits a prompt for a relation sign followed (immediately) by a value. The relation may be: < (less than), L (less than or equal to), = (equal to), / (not equal to), G (greater than or equal to), > (greater than), F (find string), X (does not contain string).

String values are assumed in all cases, because numbers are stored as character rather than numeric values. If you have specified a numeric alignment in the field name, precede the value to be sought with the appropriate number of spaces to align it and it will perform as if searching for the numeric value.

The computer distinguishes between capitals and lowercase letters, with the entire lowercase alphabet higher in value than the capitals.

The value given for “=” or “/” may end with an asterisk (*) for a “wild-card” search. In this case, those

records are selected whose chosen field begins with the value, and the remainder of the field is irrelevant. Otherwise, the “=” search is for a field constituting the given value exactly, while the “F” or “X” search is for a value appearing anywhere in the field.

Searching is slower for some cases of specific-field searches than for those specified with direct letters from the search menu. If you have several hundred records in memory, the following specific-field searches are as fast as a general “F” or “X” search: “=” or “/” in all fields except the first and last; or “= x” and “/ x” in all fields except the first.

After a search, a timed prompt allows the following: C, to obtain a list and a count of the records selected as the net effect of searches done; I, to perform another search yielding the “intersection of sets,” i.e., to eliminate those previously selected records that do not satisfy the criterion of the new search; U, to perform another search yielding “union of sets.” All records already selected remain, and others satisfying the new search are added. A null, or other response, ends the search subroutine and control returns to the command that called it. If you wish to do anything other than end the search process, be quick.

The distinctive timed prompt “...” occurs at this, and various other, points in the program, either to give you a chance for optional input or to allow a moment to read a message. You can proceed quickly with execution



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anytime this prompt appears by hitting any key.

DISPLAY

After calling the search, this command displays on the screen by fields the records selected, with record number and field names for each.

Ordinarily, a keystroke is required between records. M terminates the display prematurely for the menu. "-" removes the record from the selection group. A numeral 1-9 scrolls rather than clearing the screen. Uparrow backs up to the previous record in the selection group. Any other key displays the next-selected record.

The following options are available for the Display command.

F# (Flash)— Instead of requiring a keystroke between records, the display continues automatically. The number ranging from 0 (or null) to 9 (or larger if desired) establishes a pause time. The M, -, or uparrow retain their functions, although if the pause is short they may be tricky to use.

Uparrow— Scrolls the display rather than clearing the screen after each record displayed.

S#— Skips the display of the field #.

EDIT

After calling the search, this command allows rekeying of fields or reassigning them predetermined values. Each record you have selected appears at the top

of the screen. Then, each field available for change is displayed individually at the bottom. There are these possible responses:

F— To accept the field and proceed to the next (skipping fields according to options).

R— To accept the field and the remainder of the record.

K— To rekey the field.

X— To extend the field — accept the field so far presented and key in an addition to it.

C— To substitute a preset constant value for the field. This choice and the candidate value appear only for those fields designated by the "C" option.

Uparrow— Backs up to the previous field in the record or the previous record in the selection group. It differs from ADD's backup in that when returning to a previous record, it goes to the first field rather than the last. It can back up into skipped fields, but only if they are earlier fields in the same record.

M— Accepts the record and returns to the menu.

EDIT Options

C# (Constant value)— As for the Add command, but the substitution is not automatic. It applies only by responding to the field's prompt with "C" as described above. You may always leave the field alone or rekey it explicitly.

K# (Key the field anew without the preliminary

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prompt)— This is useful to make systematic changes in a field, but you sacrifice some control over the edit process.

S# (Skip the numbered field)— The field is assumed correct and its prompt bypassed. However, unlike the uparrow field backup in the ADD routine, here you can back up to edit an earlier field in the record that is normally skipped according to the option instructions.

G# (Global change)— A completely different procedure from the above. After the search and selection of records, the program automatically replaces the string answering a "Replace:" prompt with that answering a "With:" prompt. When you set # equal to zero, or skip it, all fields of a record are scanned indiscriminately. With # equal to a field number, changes are restricted to the specified field. If a replacement would cause too long a record, the change is not made, but the record number is shown in a timed display. Global change is especially useful if the data includes repeated terms or values of considerable length. To save keying effort or storage space, these may be represented by distinctive abbreviations and expanded with global change. As with most other inputs in this program, you may use leading or trailing spaces in designating old and new strings for greater specificity.

D (Decide)— An option modifying the global change. Each time the specified global substitution might be

made, the record is displayed as tentatively changed. The change takes effect only if you respond to the prompt with "Y."

A (Automatic editing)— A transient option, is also different from the standard mode. It replaces, or adds to, field values in all records selected. Its blind power may illustrate the adage "to err is human: to really foul things up requires a computer," and should be used with care. Its action is controlled with the following options accompanying it in the option string: S#, to clear the field; C#, to substitute a value; P#, to add a value at the beginning of the field; or X#, to add a value at the end (no more than one operation per field). The respective values are requested with prompts. The prefix and suffix options are particularly useful for a field to contain code letters, e.g., attributes to control a mailing list. Planting codes in a field reserved for the purpose allows you to mark records for selective retrieval in ways not otherwise apparent from the data.

KILL

This routine calls the search and then, in response to a prompt, deletes either those records selected or those not selected by the search. The file, condensed and renumbered, remains in the same order. The screen briefly displays the old and new numbering of records. No options affect the Kill routine. Replying to the prompt with other than 1 or 2 returns you to the menu.

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LOAD

This command brings data into memory from either disk or tape. If an input file is opened and no option set to close it, the program assumes that this file should be read. Otherwise, the previous filename opened in the run, whether for input or output, appears with a prompt for filespec. To accept this as the file to be used, simply hit <ENTER>. Otherwise, you may read from cassette drive #-1 or #-2 by responding with 1 or 2, or from a disk file by giving the filespec.

The Load routine reads a print format into memory, but ignores the record format information in favor of that already established for the run. Files with too few fields cause the program to crash, and the program will not distinguish any surplus fields. Be sure that input files opened are compatible!

Disk loads display the record numbers loaded; tape loads display the data as well.

The load adds to data already in memory. If you wish to deal only with new data from the file, KILL all records before calling the load routine. If the entire file remaining fits into memory, the program closes the file. Otherwise, the load stops when all records allotted are full, returns to the menu, and leaves the file open. It is possible to select records for deletion (with or without having written them to another file), clearing memory for more to be loaded. By this means, you can handle files that exceed memory capacity.

Should you get into the LOAD routine by mistake, you can exit to the menu by replying to the file prompt with a number greater than 2.

A transient option, "C," closes any input file currently open so that another disk or tape file can be read.

Hitting capital M halts a load in progress in the same manner as with a display. In the case of tape input, the M must be pressed when the cassette drive is off.

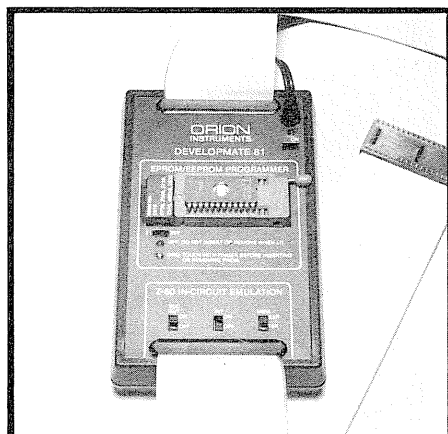
There are situations in which tape files are advantageous even on a disk-based system, in that a load can be started and stopped in the interior of a tape file. Should a file of addenda have to be merged into a series of files, with no two files fitting entirely into memory, this capability can prove useful if the addenda file is on cassette. The program performs a certain amount of validity checking upon tape input to insure that misread tape data does not find its way into memory with possibly fatal results to the run. Thus, you may cue the tape by trial-and-error to locate the section of the file you wish to use.

WRITE

This is the output counterpart of Load which allows either disk or tape files specified and with the same possibility of the "C" option. The routine calls Search and handles the records Search has selected.

The option "E" opens an output file for extending, to write additional records at the end. Otherwise, an output

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file is recreated from scratch. If you open a file already in existence for output, it will be replaced by the newly-written data without the E option, or added to with it.

A file may be opened for output while another file is open for input. When opened, output disk files first receive the format information of the run, and then the records selected. Before terminating the routine, a prompt asks whether to close the file (if disk) or print the end-of-file mark (if tape).

SORT

A prompt displays field numbers and names and requests the number of the field to use as a key. Whatever field is the key, equal values cause the next field to act as a secondary key, with the last wrapping around to the first. Field number 1 as the key sorts faster than the others. These considerations may influence your choice of field order in setting up the file. If a file is often sorted into various orders during use, you may find it most efficient to sort it by some other field than the first before writing it to disk. This keeps it in a form representing a greater investment in machine time and can save time later. Sort has the side effect of setting all records as selected. If, in the next search, you wish to use all records, simply hit "K."

LPRINT

This routine calls Search. Before the first LPRINT of

the run, a dialogue allows you to establish small type (132 columns). The alternative default is 80 columns. You are also asked the total and printed numbers of lines to be printed to handle page slews. A third prompt allows a pause after a page slew, in case you are not using a continuous form, but must attend to the printer manually. You should preset the printer not to the top-of-page as with most programs, but one line above the desired beginning of text.

The options affecting the initial operations of LPRINT are:

I (Initialize)— To repeat the dialogue establishing print size, etc.

T (Top of page)— To reset the line counter after you have put a new page in the printer between printouts.

L# (Lengths)— Examines each record of the selection group and reports the maximum length found in each field as well as the greatest record length and, assuming that you wish to display all fields across the page, a suggested starting position of each field with # spaces between fields. This information is useful in preparing the print format described below.

B (Banner)— Requests text to be printed in extended type centered before printing any records. This text should not exceed one-half the selected print characters per line.

C (Caption)— This is similar to the banner except that the message is in ordinary font and not centered.

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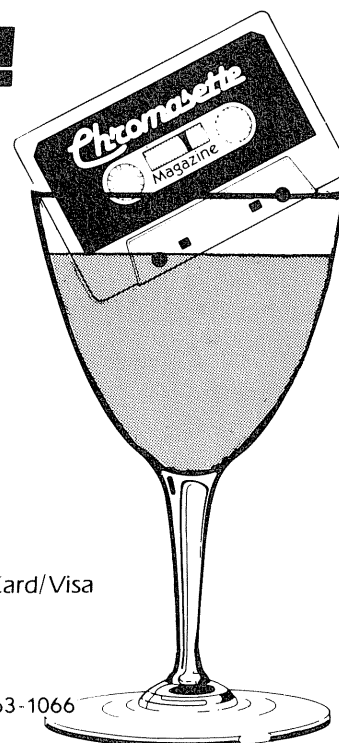
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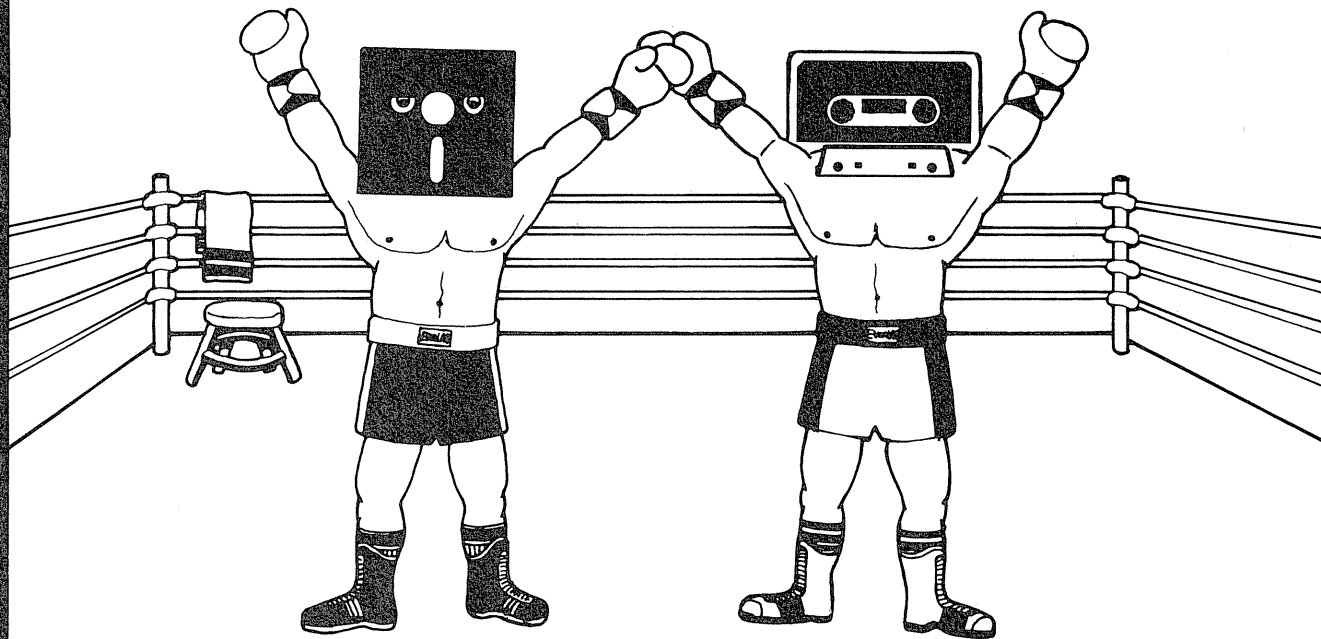
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Format Spec.

Before printing records, the routine displays the print format already stored and asks for a print format. To accept the stored format, simply hit <ENTER>. To edit the format with an old- and new-substring dialogue, press 'E' and <ENTER>. Any other keystrokes constitute a new format. This is constructed of the following elements:

F#— Field number to be printed.

T#— Tab to the column number (1-63) in the current line.

' (Apostrophe)— Introduces a literal to be inserted. Terminate the literal value by another apostrophe.

U#— Prints the specified field USING the following editing, string, surrounded by ', as provided by TRS-80 BASIC. The editing string should describe only one field. If it calls for numeric data, the routine takes the VAL of the field as explained in BASIC. This is the only way to obtain the effect of a tab beyond position 63 (due to a deficiency in Disk BASIC). For example: U3' \$###.##'.

/ Terminates the line with a carriage return and begins the next line. This code must appear somewhere in the format if you wish an explicit new line. There is no default CR at the end of the format.

N# (Name)— Prints the name of the field number.

R (Proceed to the next record and continue to interpret the format)— Ordinarily, one scan of the format applies to one record. By placing R between segments of the format, more than one record can be handled per print line.

- Prints a line of underscore.

< Truncates the format. When the program encounters this sign, it deletes it and everything preceding it in the format string after the first scan. Place it after instructions that you wish executed only once, such as captions or column headings.

H (Heading)— Similar to <, heading truncates the format string when first noticed. However, instead of simply becoming inoperative, the instructions preceding the H are moved to a special format executed after each page slew. Precede it with the format for a heading at the top of a page.

B (Banner)— Performs like the B in the LPRINT menu option, but gives you the opportunity to incorporate the text permanently in the format. The B must be followed directly by the desired text in '. Lowercase letters in the text are converted to uppercase. Ordinarily, you would follow the text by < or H.

At end-of-file, if the print format is new, you are asked whether you want to save it. If so, it replaces any previously-stored format in memory and will be saved in the format heading of any output disk file subsequently opened.

INFORM

This menu command displays the field numbers and names, the remembered print format, if any, total data bytes, average record length, and the non-string free memory. Press any key to return to the menu.

F (Free space)— The only option for INFORM. In this case, the routine also reorganizes free string space and

displays it in number of characters. Reorganizing may take considerable time and will occur whenever needed during the program. During this time-out, execution is interrupted and the computer does not respond to the keyboard. If you take a break from working at the machine, you can keep it occupied with this option, forestalling the time when it must reorganize of its own accord and delay your work.

QUIT

Should an output disk file be open, you can close it or return to the menu. With files closed, a final prompt asks whether you wish to end the run.

Other modules have been written to perform such tasks as selectively converting data to lowercase, making global changes automatically by reading from a file of old and new values, restructuring a file with different numbers and orders of fields, writing files under the control of format specifications similar to those of LPRINT, printing labels or data in multiple columns arranged down the page, or performing arithmetic on the data. A desired module may be merged with the main program before running and then called from the menu with "O." If no special module is loaded, this response enables you to see the directory of any available disk drive.

Error Conditions

Most errors which break the program's execution result from either operator syntax errors in option or format strings. The program catches many, but not all, of these. Also, DOS errors, such as disk full or bad data in memory are improbable, but could occur. The last problem is the most difficult to deal with, usually requiring either a rerun or finding and killing the offending record(s). In most other cases, you can return to the menu by typing GOTO 1.

Listing 2 — Shortpoke/BAS From TRS-80 Microcomputer News, July 1980

```
10 CLEAR 100: DEFINT A-Z: N=0
20 CLS: PRINT "Emert string sort module
loader, relocatable for chosen memory
size. Memory size should be set as below before
running me!"
30 PRINT: PRINT "INPUT", "CAPACITY", "MEM SIZE",
"DEFUSR": PRINT
40 PRINT " (1)", " 16 K", 32511, "&H7F00"
50 PRINT " (2)", " 32 K", 48895, "&HBF00"
60 PRINT " (3)", " 48 K", 65279, "&HFF00"
70 INPUT M: IF M<1 OR M>3 THEN 20
80 X=63+64*M: SI=16128+16384*M
90 IF M=1 THEN P=32511 ELSE IF M=2 THEN
P=-16641 ELSE P=-257
100 FOR I=1 TO 203: READ A: N=N+A: IF A=255
THEN A=X
110 POKE I+P,A
120 NEXT
130 IF N<>25337 THEN PRINT "DATA STATEMENT
```

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```

ERROR; N="";N: END
140 LINE INPUT "CODE HAS BEEN POKED. NAME
YOUR CORE-IMAGE FILE: ";FS: CS=
"DUMP,"+FS+"", "+MID$(STR$(SI)
,2)+"", "+MID$(STR$(SI+255),2): PRINT CS: CMD CS:
END
150 DATA 205,127,10,94,35,86,237,83, 19,255,35,
94,35,86,237,83
160 DATA 213,255,33,0,0,34,211,255, 237,91,211,
255,203,59,175
170 DATA 203,58,48,2,203,251,237,83, 211,255,
122,179, 200,42,19
180 DATA 255,237,82,34,207,255,33,0, 0,34,205,
255,42, 205,255,34
190 DATA 203,255,42,203,255,237,91, 211,255, 25,34,
209,255,235,33
200 DATA 0,0,25,25,25,229,237,91,203, 255,33, 0,0,25,
25,25,237
210 DATA 75,213,255,9,235,225,9,229, 213,14, 0,126,
71,26,184,48
220 DATA 3,14,1,71,175,176,40,25,197, 19,35, 78,35,
70,197,225
230 DATA 235,78,35,70,197,225,193,26, 150,56,
10,32, 39,19,35,16
240 DATA 246,203,65,32,31,209,225,6, 3,78, 235,126,
113,235,119

```

```

250 DATA 35,19,16,246,42,211,255,235, 42,203,
255,175, 237,82,34
260 DATA 203,255,48,144,24,2,209,225, 42,205,
255,17, 1,0, 175,25
270 DATA 34,205,255,237,91,207,255,237, 82,218,
58,255, 195,24,255

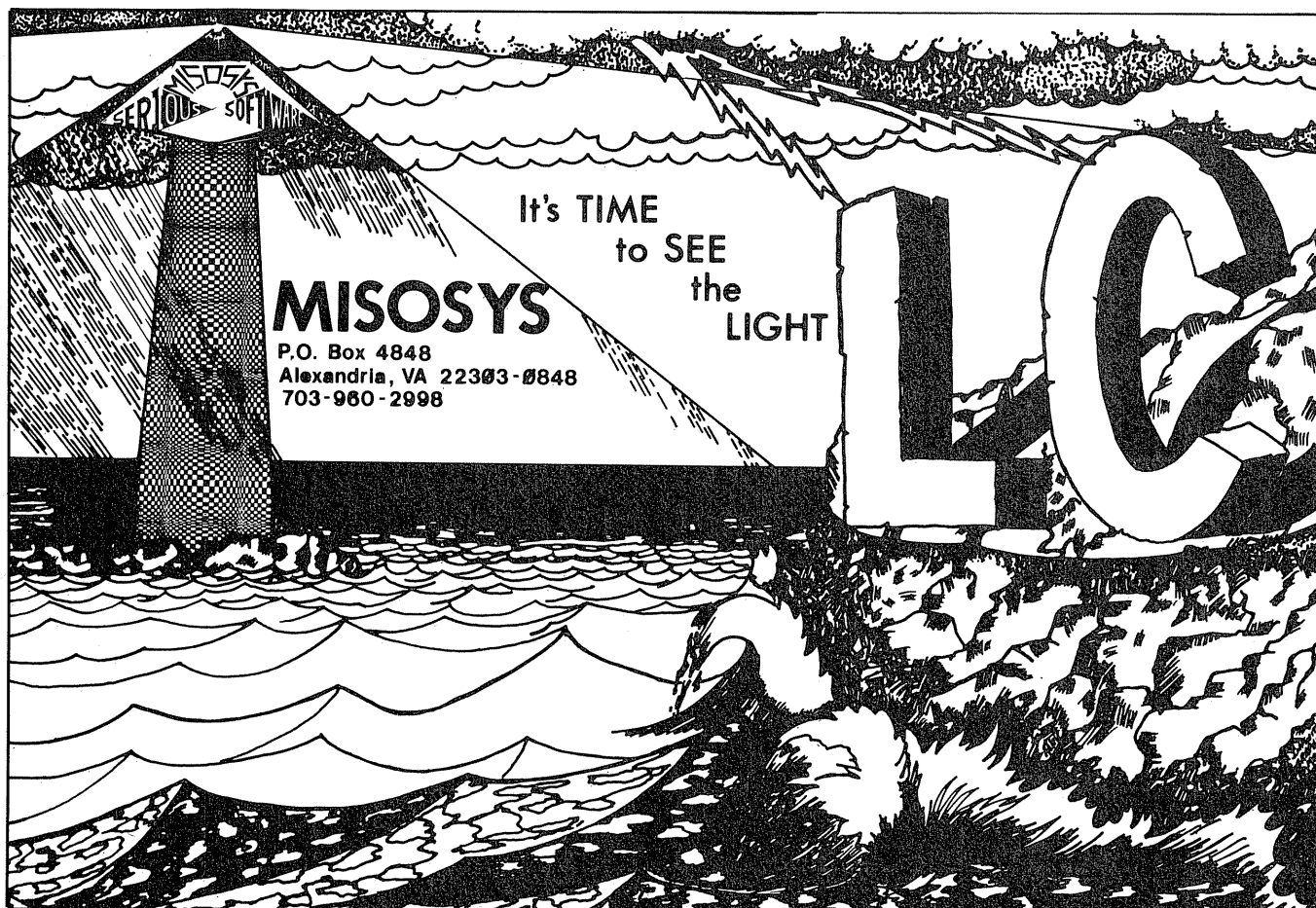
```

Listing 3 Model III 32K Modifications to DATEX

```

500 J = 0: A = STRING$(255,32): CLS: PRINT "Key
field no.? "; GOSUB 864: K = Q: IF K = 0 OR K > S
RETURN ELSE FOR I = 1 TO R: MID$(A(I),1) =
CHR$(1): NEXT: K = K-1: IF K GOSUB 530
520 CMD "O",R,A(1): IF K THEN K = 0: J = 1 ELSE
RETURN
530 FOR I = 1 TO R: PRINT @56,I: P = FNP(K)-J:
LSET A = MID$(A(I),P): MID$(A,LEN(A(I))-P+2) =
LEFT$(A(I),P-1): LSET A(I) = A: NEXT: RETURN
900 CLEAR 12500: DEFINT I-Z: DEFSTR A-H: DEFFN
P(J) = INSTR(A(I),D(J))+1: DEFFN V(I) =
VAL(MID$(G,I+1)): LINE INPUT "Filespec or est.
record size: "; A: P = VAL(A): IF P INPUT "Fields
(2-9)"; I: LR = 11500/(P+I) ELSE GOSUB 645: INPUT
#1,LR,I
905 CMD "T": DIM

```




```
D(I),A(LR),F(I),FP(I),FT(I),C(I),G(12),PT(I),S(I): DEFFN
W(A) = FNV(INSTR(G,A)): FOR J = 1 TO I: D(J) =
CHR$(J+13): IF P PRINT "Field title"J,: INPUT FT(J)
ELSE INPUT #1,FT(J)
```

Listing 4 — NEWDOS/80 Version 2 Modifications to DATEX

```
500 J = 0: A = STRING$(255,32): CLS: PRINT "Key
field no.? ": GOSUB 864: K = Q: PRINT "A
Ascending D Descending? ": GOSUB 868: IF K =
0 OR K > S RETURN ELSE FOR I = 1 TO R:
MID$(A(I),1) = CHR$(1): NEXT: K = K-1: IF K GOSUB
530
510 IF E = "D" THEN CMD "O",R,-A(1) ELSE CMD
"O",R,A(1)
520 IF K THEN K = 0: J = 1 ELSE RETURN
530 FOR I = 1 TO R: PRINT @56,I,: P = FNP(K)-J:
LSET A = MID$(A(I),P): MID$(A,LEN(A(I))-P+2) =
LEFT$(A(I),P-1): LSET A(I) = A: NEXT: RETURN
900 CLEAR 999: DEFINT I-Z: DEFSTR A-H: DEFFN P(J)
= INSTR(A(I),D(J))+1: DEFFN V(I) =
VAL(MID$(G,I+1)): LINE INPUT "Filespec or est.
record size: ": A: P = VAL(A): IF P INPUT "Fields
(2-9)": I: LR = 26000/(P+I) ELSE GOSUB 645: INPUT
#1,LR,I
```

```
905 CMD "F=SASZ",29300-3*LR: CMD "T": DIM
D(I),A(LR),F(I),FP(I),FT(I),C(I),G(12),PT(I),S(I): DEFFN
W(A) = FNV(INSTR(G,A)): FOR J = 1 TO I: D(J) =
CHR$(J+13): IF P PRINT "Field title"J,: INPUT FT(J)
ELSE INPUT #1,FT(J)
```

Listing 5 — Duplicate Skipping Routine

```
1000 I = 1: PRINT "D Dups S Skips: ": GOSUB 868:
ON INSTR("DS",E) GOTO 1100,1200: RETURN
1100 A = STRING$(255,32): INPUT "Field to be
checked for duplicates (0 for whole record)": J: IF
J GOSUB 2 ELSE N = 2: P = LEN(A(I))-1
1110 MID$(A(1),1) = CHR$(0): LSET A =
MID$(A(I),N): FOR I = 2 TO R: IF J GOSUB 2 ELSE P
= LEN(A(I))-1
1130 IF MID$(A(I),N,P) = LEFT$(A,P) THEN PRINT I-1
"=" I,: MID$(A(I-1),1) = CHR$(1): MID$(A(I),1) =
CHR$(1) ELSE MID$(A(I),1) = CHR$(0)
1140 LSET A = MID$(A(I),N,P): NEXT: RETURN
1200 INPUT "Field to be checked for skips": J: IF J <
1 OR J > S RETURN ELSE GOSUB 2: K =
VAL(MID$(A(1),N))+1: FOR I = 2 TO R: GOSUB 2: M
= VAL(MID$(A(I),N)): MID$(A(I),1) = CHR$(0)
1210 IF M > K PRINT K "": I: MID$(A(I),1) = CHR$(1):
```



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```
MID$(A(I-1),1) = CHR$(1): K = K+1: GOTO 1210
1220 K = M+1: NEXT: PRINT "": GOTO 868
RETURN ELSE GOSUB 2: K = VAL(MID$(A(1),N))+1:
FOR I = 2 TO R: GOSUB 2: M = VAL(MID$(A(I),N)):
MID$(A(I),1) = CHR$(0)
```

Listing 1 — DATEX

```
1 IF S GOTO 915 ELSE 900'DATEX--Paul Emmons,
23 Wahle Apts., Ellensburg WA 509/925-5707
*82Sp10
2 IFJ=&H1THENN=&H2ELSEN=FNP(J-&H1)' **
frame field
3
IFJ=STHENP=LEN(A(I))-N+&H1ELSEP=INSTR(A(I),D
(J))-N
4 RETURN
5 N=2:FOR J=1 TO
S-1:P=FNP(J):F(J)=MID$(A(I),N,P-N-1):N=P:NEXT:
F(J)=MID$(A(I),P):RETURN' ** get fields
6 P=S:FOR J=1 TO
S:P=P+LEN(F(J)):NEXT:IFP>&HFFPRINT"TOO
LONG":P=0:GOTO872ELSEA(I)=STRING$(P,0):P=1:
FORJ=1TOS:MID$(A(I),P)=D(J-1)+F(J):P=P+LEN
(F(J))+1:NEXT:RETURN' ** make record
10 IF R THEN L=1:GOSUB 70:P=0:CLS:PRINT,"Record
selection K Keep present group"," A use All F
Find"," X no find R Record no.," C
Complement":GOSUB 864 ELSE 870
12 I=INSTR("KARXFC",E):IF Q AND Q<=S THEN
J=Q:LINE INPUT "< L = / G > F
X...":E=A=MID$(E,2):GOSUB
874:I=INSTR("<>=FGL/X",LEFT$(E,1)):IF I THEN
I=I+6:IF I>10 GOSUB 68:I=I-4
14 ON I+1 GOSUB
870,4,18,20,32,34,40,42,46,50,60:IF I PRINT "C Count
U Unite I Intersect":GOSUB 872:U=INSTR("
UIC",E)-3:ON U+3 GOTO 16,10,10,64
16 PRINT:RETURN
18 FOR I=1 TO R:MID$(A(I),1)=C:NEXT:RETURN
20 LINE INPUT "Rec # or range: ";A
22
P=INSTR(A+",""/","/"):G=LEFT$(A,P-1):A=MID$(A,P+1):
J=VAL(G):K=FNP(""):IF K>R OR K=0 THEN K=R
24 IF J>K THEN J=K ELSE IF J ELSE J=1
26 IF U=1 FOR I=1 TO J-1:MID$(A(I),1)=D:NEXT:IF
K<R FOR I=K+1 TO R:MID$(A(I),1)=D:NEXT:U=-1
28 IF U FOR I=J TO K:MID$(A(I),1)=C:NEXT ELSE FOR
I=J TO K:MID$(A(I),1)=CHR$(ASC(A(I))+1):NEXT
30 IF A="" THEN G=G(Z):IF U THEN RETURN ELSE FOR
I=1 TO
R:MID$(A(I),1)=CHR$(VAL(MID$("001",ASC(A(I))+1,
1))):NEXT:RETURN ELSE 22
32 GOSUB 68
34 LINE INPUT "Value: ";A
36 FOR I=1 TO R:IF U+ASC(A(I)) IF INSTR(A(I),A)
MID$(A(I),1)=C ELSE MID$(A(I),1)=D
```

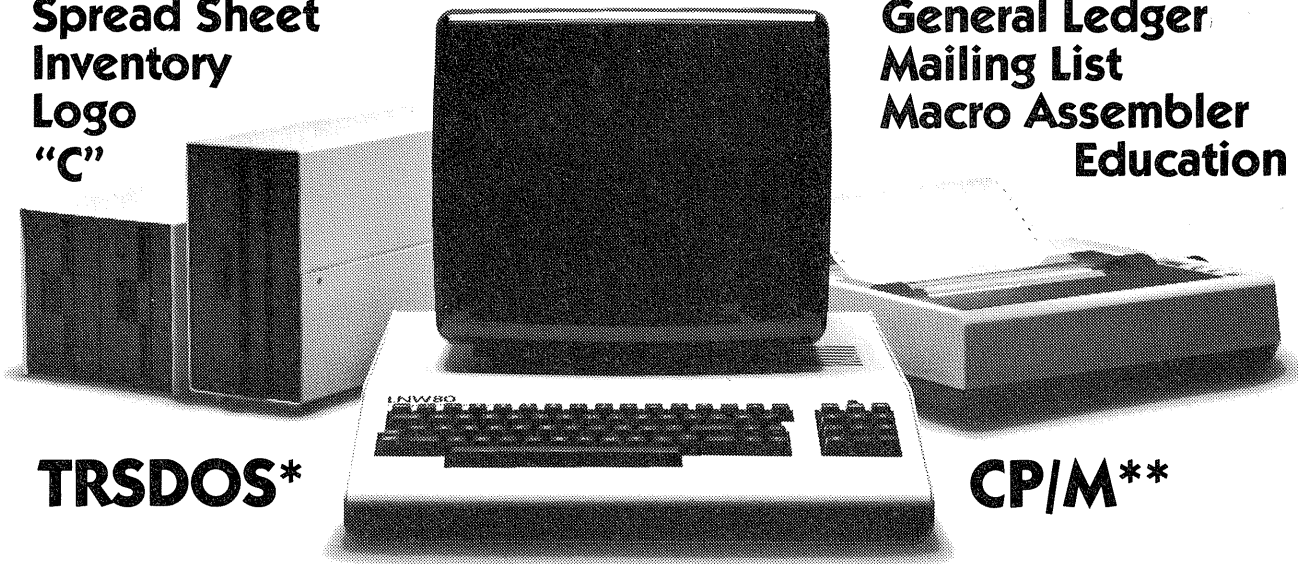
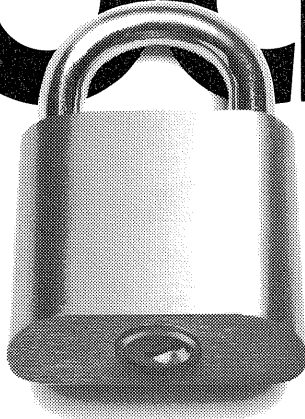
```
38 NEXT:RETURN
40 FOR I=1 TO
R:MID$(A(I),1)=CHR$(1-ASC(A(I))):NEXT:RETURN
42 FOR I=1 TO R:IF U+ASC(A(I)) GOSUB 2:IF
MID$(A(I),N,P)<A MID$(A(I),1)=C ELSE
MID$(A(I),1)=D
44 NEXT:RETURN
46 FOR I=1 TO R:IF U+ASC(A(I)) GOSUB 2:IF
MID$(A(I),N,P)>A MID$(A(I),1)=C ELSE
MID$(A(I),1)=D
48 NEXT:RETURN
50 IF RIGHT$(A,1)="*" THEN
L=LEN(A)-1:A=LEFT$(A,L):GOTO 56 ELSE IF J>1
AND J<S THEN A=D(J-1)+A+D(J):GOTO 36
52 FOR I=1 TO R:IF U+ASC(A(I)) GOSUB 2:IF
MID$(A(I),N,P)=A MID$(A(I),1)=C ELSE
MID$(A(I),1)=D
54 NEXT:RETURN
56 IF J>1 THEN A=D(J-1)+A:GOTO 36 ELSE FOR
I=1 TO R:IF U+ASC(A(I)) GOSUB 2:IF
MID$(A(I),N,L)=A MID$(A(I),1)=C ELSE
MID$(A(I),1)=D
58 NEXT:RETURN
60 FOR I=1 TO R:IF U+ASC(A(I)) GOSUB 2:IF
INSTR(MID$(A(I),N,P),A) MID$(A(I),1)=C ELSE
MID$(A(I),1)=D
62 NEXT:RETURN
64 CLS:J=0:FOR I=1 TO R:IF ASC(A(I)) PRINT
I::J=J+1
66 NEXT:PRINT:PRINT J "selected ":I=99:GOSUB
868:GOTO 14
68 L=0
70 C=CHR$(L):D=CHR$(1-L):RETURN' toggle
80 FOR I=1 TO
S:S(I)=0:C(I)="" :NEXT:C=MID$(M$,Z*5+44,5):FOR
P=1 TO LEN(G):I=INSTR(C,MID$(G,P,1)):IF I THEN
N=FNP(P):IF N<=S AND S(N)=0 THEN S(N)=I:IF I>1
AND NOT (Z=2 AND I=5) PRINT FT(N)
MID$(M$(I-2)*12+1,12):LINE INPUT C(N)
82 NEXT:RETURN
100 GOSUB 80:M=INSTR(G,"1"):CLS
105 P=0:U=0:IF M PRINT R+1 ELSE CLS:PRINT
"Record" R+1,"(1 Redo / Skip = Dup @ Menu)"
110 FOR K=1 TO S
115 PRINT FT(K):IF S(K)=1 OR S(K)=2 THEN
F(K)=C(K):PRINT F(K):GOTO 155 ELSE IF S(K)=5
THEN F(K)=MID$(STR$(R+1+VAL(C(K))),2):PRINT
F(K):GOTO 155
120 IF U THEN F(K)="" :PRINT:GOTO 160 ELSE IF
S(K)<5 PRINT C(K):
125 LINE INPUT F(K):ON INSTR("
@/=1",RIGHT$(F(K),1))+1 GOTO 150,150,4,145,140
130 F(K)="" :K=K-1:IF K ELSE IF R PRINT "Record"
R:K=S:GOSUB 5:R=R-1 ELSE RETURN' 1 back up
135 ON S(K)+1 GOTO 115,130,130,115,115,130
140 F(K)=FP(K):PRINT FT(K),F(K):GOTO 160' = dup
145 U=1:F(K)=LEFT$(F(K),LEN(F(K))-1) ' / skip
```


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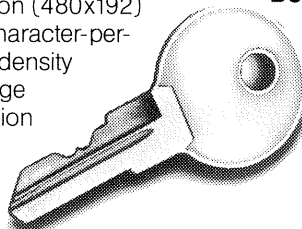


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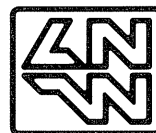


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```

150 IF S(K)=3 THEN F(K)=C(K)+F(K)
155 IF PT(K) GOSUB 165:IF PT ELSE PRINT:PRINT
FT(K):GOTO 120
160 FP(K)=F(K):NEXT K:R=R+1:I=R:GOSUB 6:IF R<LR
GOTO 105 ELSE RETURN' make rec
165 PT=INSTR(F(K)+",",","):IF PT>PT(K)+1 PRINT
"Number too long!":PT=0 ELSE
F(K)=STRING$(PT(K)-PT+1,32)+F(K)
170 RETURN
200 GOSUB 10:IF I IF INSTR(G,"G") THEN
T=FNW("G") ELSE 214 ELSE RETURN
202 K=INSTR(G,"D"):LINE INPUT "Old: ";A:LINE INPUT
"New: ";F:W=LEN(F)-LEN(A):PRINT "Changed":FOR
I=1 TO R:M=1:U=0:IFASC(A(I))GOTO208ELSE210
204 IF K THEN B=A(I)
206 IF LEN(A(I))+W>255 PRINT I "TOO LONG.
SKIPPED":GOSUB 872 ELSE
A(I)=LEFT$(A(I),M-1)+F+MID$(A(I)
,M+LEN(A)):PRINT I:U=M:M=M+LEN(F):IF K GOSUB
212:PRINT "O.K.? ":GOSUB 868:IF L THEN PRINT "NO
CHANGE":M=U+1:A(I)=B:IF E="M" RETURN
208 M=INSTR(M,A(I),A):IF M THEN IF T=0 GOTO 204
ELSE J=T:GOSUB 2:IF M=>N AND M<=N+P GOTO
204 ELSE M=M+1:GOTO 208
210 NEXT I:GOTO 872
212 GOSUB 5:CLS:PRINT,"Record":FOR J=1 TO

```

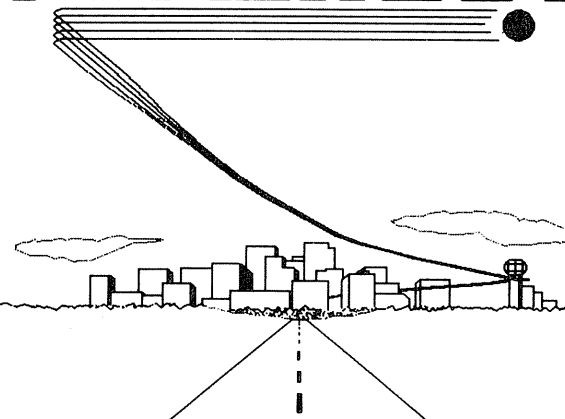
```


S:PRINT FT(J),F(J):NEXT:RETURN
214 GOSUB 80:IF INSTR(G,"A") THEN 242 ELSE FOR
I=1 TO R:IF ASC(A(I)) GOSUB 212 ELSE 236
216 FOR J=1 TO S:ON S(J) GOTO
232,218,218,218,222
218 PRINT @832,CHR$(30):PRINT
@960,CHR$(30):PRINT @896,CHR$(30)
FT(J),F(J):PRINT @768,CHR$(30)"R nrt Rec, F nrt Fld,
K Key, X eXtend, E Edit, 1 Back, M Menu: ";IF
S(J)=2 PRINT @832,"C Constant ",C(J)" ";
220 GOSUB 868:ON INSTR("RFCMKEIX",E)+1 GOTO
218,234,232,228,6,222,226,238:PRINT @896,CHR$(30)
FT(J),F(J):LINE INPUT E:F(J)=F(J)+E:GOTO 230
222 PRINT @896,CHR$(30) FT(J):LINE INPUT
F(J):GOTO 230
226 GOSUB 252:J=J-1:GOTO 232
228 IF S(J)=2 THEN F(J)=C(J):PRINT,C(J)
230 IF PT(J) K=J:GOSUB 165:IF PT ELSE
J=J-1:GOSUB 872
232 NEXT J
234 GOSUB 6:IF P ELSE 216
236 NEXT I:RETURN
238 J=J-1:IF J GOTO 218 ELSE GOSUB 6
240 I=I-1:IF I IF ASC(A(I)) GOSUB 212:GOTO 216
ELSE 240 ELSE RETURN
242 FOR I=1 TO R:IF ASC(A(I)) PRINT @59,I:GOSUB
5:FOR J=1 TO S:ON S(J) GOSUB
246,246,248,250:NEXT:GOSUB 6
244 NEXT:G(Z)=""':RETURN
246 F(J)=C(J):RETURN
248 F(J)=C(J)+F(J):RETURN
250 F(J)=F(J)+C(J):RETURN
252 PRINT @896,FT(J),F(J):PRINT
@768,CHR$(30):LINE INPUT "Old: ";A:PRINT
@832,CHR$(30):LINE INPUT "New:
";F:P=INSTR(F(J),A):IF P THEN
F(J)=LEFT$(F(J),P-1)+F+MID$(F(J),P+LEN(A))
254 RETURN
300 GOSUB 10:IF I PRINT "Kill records (1) selected,
(2) not selected? ":I=1:J=0:GOSUB 868:IF Q=1 OR
Q=2 Q=Q-1 ELSE RETURN ELSE RETURN
310 IF ASC(A(I+J))-Q THEN J=J+1:IF I+J<=R THEN
310 ELSE 340
320 IF J THEN A(I)=A(I+J):A(I+J)=""':PRINT I+J
CHR$(94) I;
330 I=I+1:IF I+J<=R THEN 310
340 FOR L=I TO R:A(L)=""':NEXT:R=R-J:RETURN
400 GOSUB 10:IF I GOSUB
80:Q=0:M=INSTR(G,"i"):K=INSTR(G,"f")+250*FNW
("f") ELSE RETURN
405 FOR I=1 TO R:IF ASC(A(I)) IF M+Q ELSE CLS
ELSE 425
410 PRINT I:FOR J=1 TO S:IF S(J) ELSE GOSUB
2:PRINT FT(J),MID$(A(I),N,P)
415 NEXT:IF K FOR J=0 TO K:NEXT:E=INKEY$ ELSE
GOSUB 868:PRINT CHR$(27);
420 ON INSTR(" Mm+","E")+1 GOTO

```


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```

425,425,4,4,430:MID$(A(I),1)=CHR$(0)
425 NEXT I:RETURN
430 I=I-1:IF I IF ASC(A(I)) CLS:GOTO 410 ELSE 430
ELSE RETURN
500 J=0:A=STRING$(255,32):CLS:PRINT "Key field
no.? ";GOSUB 864:IF Q=0 OR Q>S OR R<1 RETURN
ELSE C=CHR$(1):GOSUB 18:Q=Q-1:IF Q GOSUB
520
510 S(0)=R:S(1)=VARPTR(A(1))
:I=USR(VARPTR(S(0))):IF Q THEN Q=0:J=1 ELSE
RETURN
520 FOR I=1 TO R:PRINT @56,I:P=FNQ(Q)-J:LSET
A=MID$(A(I),P):MID$(A,LEN(A(I))-P+2)
=LEFT$(A(I),P-1):LSET A(I)=A:NEXT:RETURN
600 IF INSTR(G,"C") FI=""
605 K=S:IF FI="" GOSUB 640:IF J THEN 620 ELSE
GOSUB 645:LINE INPUT #1,C
610 IF EOF(1) CLOSE 1:FI="":PRINT @980,"END.
CLOSED":GOTO 872
615 IF INKEY$="M" OR R>=LR RETURN ELSE
R=R+1:LINE INPUT #1,A(R):PRINT @58, R:GOTO 610
620 N=999:IF J>2 RETURN ELSE IF K<S PRINT "BAD
DATA",A
625 IF N>LEN(A) THEN IF INKEY$="M" THEN RETURN
ELSE INPUT #1,A:N=1:IF A=">" PRINT "END":GOTO
872
630 P=N:FOR K=1 TO S:P=INSTR(P,A,D(K)):IF P NEXT
ELSE 620
635 R=R+1:A(R)=D(0)+MID$(A,N,P-N):PRINT
R:A(R):N=P+1:IF R<LR GOTO 625 ELSE RETURN
640 G(Z)="":CLOSE Z-6:PRINT "Previous file ";FS:LINE
INPUT #1, 2 or file: ";A:IF A="" THEN A=FS
642 FS=A:J=VAL(A):RETURN
645 OPEN "I",1,A:FI=A:FS=A:LINE INPUT #1,FP:RETURN
700 GOSUB 10:IF I IF INSTR(G,"C") CLOSE 2:FO=""
ELSE ELSE RETURN
705 IF FO="" GOSUB 640:IF J THEN 720 ELSE
FO=A:C=CHR$(79+10*(INSTR(G,"E")>0)):OPEN
C,2,A:IF C="O" PRINT #2,FP:PRINT #2, LR:S:FOR J=1
TO S:PRINT #2,"FT(J):NEXT:PRINT #2,"
710 PRINT "Close? ";GOSUB 868:FOR I=1 TO R:IF
ASC(A(I)) PRINT #2,A(I)
715 NEXT:J=3:IF L ELSE CLOSE 2:FO=""
720 IF J>2 RETURN ELSE
A=CHR$(34)+STRING$(247,S+13):P=2:FOR I=1 TO
R:IF ASC(A(I)) ELSE 735
725 L=LEN(A(I)):IF P+L>248 GOSUB 750
730 PRINT A(I):MID$(A,P,L) =MID$(A(I),2):P=P+L:IF
INKEY$="M" I=R
735 NEXT:IF P>2 GOSUB 750
740 PRINT "E.O.F. Mark? ";GOSUB 868:IF L ELSE PRINT
#-J,">"
745 RETURN
750 K=INSTR(2,A,CHR$(34)):IF K
MID$(A,K)=""GOTO 750
755 PRINT #-J,LEFT$(A,P-1):LSET
A=STRING$(248,S+13):MID$(A,1)=CHR$(34):P=2:

```

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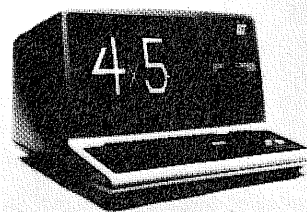
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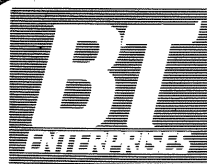


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RETURN
800 IF INSTR(G,"") NC=0
802 GOSUB 10:IF I=0 RETURN ELSE U=16425:IF NC
GOTO 806 ELSE PRINT "132 cols? ";GOSUB 868:IF L
THEN NC=80:L=19 ELSE NC=132:L=20
804 LPRINT CHR$(27) CHR$(L):INPUT "Lines per
page— TOTAL,PRINTED";L,SL:POKE U-1,L+1:POKE
U,1:PRINT "Pause between pages? ";GOSUB
868:PF=L
806 IF INSTR(G,"L") L=FNW("L"):CLS:PRINT
"Maximum lengths" ELSE 816
808 K=0:FOR I=1 TO S:S(I)=0:NEXT:FOR I=1 TO
R:N=2:IF ASC(A(I)) ELSE 814
810 FOR J=1 TO S:GOSUB 3:IF P>S(J) THEN S(J)=P
812 N=N+P+1:NEXT J:IF N>K THEN K=N
814 NEXT I:N=1:FOR I=1 TO S:PRINT
I,FT(I),S(I),N:N=N+L+S(I):NEXT:PRINT
"Record",K-S-2,N-L
816 IF INSTR(G,"T") POKE U,1
818 IF INSTR(G,"B") LINE INPUT "Banner: ";B:GOSUB
854
820 IF INSTR(G,"C") LINE INPUT "Caption: ";B:LPRINT
B:GOSUB 828
822 PRINT "Stored format",FP:PRINT "Format:
";GOSUB 878:IF G="" THEN G=FP:GS="" ELSE IF
G="E" THEN J=0:F(0)=FP:GOSUB 252:FP=F(0):GOTO
822 ELSE GS=G
824 FOR I=1 TO R:IF ASC(A(I)) GOSUB 832:IF
INKEY$="M" I=R
826 NEXT I:C="":IF LEN(GS) PRINT "Keep format?
";GOSUB 868:IF L ELSE FP=GS
828 LPRINT " ":IF PEEK(U)<=SL RETURN ELSE LPRINT
CHR$(11):IF PF ELSE GOSUB 868' /
830 KS=K:D=G: G=C:GOSUB
832:G=D:K=KS:RETURN
832 FOR K=1 TO LEN(G):ON INSTR(
FT/U'LR-BH<",MID$(G,K,1)) GOSUB
4,842,846,828,848,844,
836,850,834,852,838,840:NEXT:RETURN
834 LPRINT CHR$(15) STRING$(NC-1,32)
CHR$(14):GOTO 828' -
836 LPRINT FT(FNV(K)):RETURN' filename
838 C=LEFT$(G,K-1)
840 G=MID$(G,K+1):I=I-1:K=999:RETURN ' <
842 J=FNW(K):GOSUB 2:LPRINT
MID$(A(I),N,P):RETURN' fld
844 K=K-1:GOSUB 856: LPRINT B:RETURN' litrl
846 LPRINT TAB(FNV(K)):RETURN' tab
848 J=FNW(K):K=K+1:GOSUB 2:GOSUB 856:IF
INSTR(B,"#") LPRINT USING
B:VAL(MID$(A(I),N)):RETURN ELSE LPRINT USING
B:MID$(A(I),N,P):RETURN
850 IF I=R THEN K=999:RETURN ELSE I=I+1:IF
ASC(A(I)) RETURN ELSE 850'next rec
852 GOSUB 856
854 GOSUB 828:LPRINT CHR$(27) CHR$(14)
TAB((NC/4+2)-LEN(B)/2) B:GOTO 828'banner

```

```

856 L=K+2:K=INSTR(L,G,""):IF K ELSE K=LEN(G)+1
'litrl decode
858 B=MID$(G,L,K-L):RETURN
860 CLS:J=0:FOR I=1 TO
R:J=J+LEN(A(I))-S:NEXT:PRINT "Mem" MEM:IF R
PRINT "Data bytes" J,"Avg. len" INT(J/R+.5)
862 PRINT"Stored fmt",FP:IF INSTR(G,"F") PRINT "Free
space",FRE(A)
864 PRINT:FOR I=1 TO S:IF INT(I/2)=I/2 PRINT
TAB(32) I" " FT(I) ELSE PRINT I" " FT(I);
866 NEXT:PRINT:PRINT, " ";
868 E=INKEY$:IF E="" THEN 868 ELSE
Q=VAL(E):PRINT E:GOTO 874
870 PRINT "ABORTED":I=0
872 PRINT "—":FOR L=0 TO 250:E=INKEY$:IF E=""
NEXT:RETURN
874 IF E>"1" LSET E=CHR$(ASC(E)-32)
876 L=89-ASC(E):RETURN
878 LINE INPUT G:IF G="" THEN RETURN ELSE FOR
I=1 TO LEN(G):L=ASC(MID$(G,I)):IF L>95
MID$(G,I)=CHR$(L-32)
880 NEXT:RETURN
882 IF FO>" " PRINT FO " Is open. Close? ";GOSUB
868:IF L RETURN ELSE CLOSE 2:FO=""
884 CLS:PRINT @540,"End? ";GOSUB 868:IF L RETURN
ELSE END
900 CLEAR 25500:DEFINT I-Z:DEFSTR A-H:DEFFN
P(J)=INSTR(A(I),D(J))+1:DEFFN
V(I)=VAL(MID$(G,I+1)):LINE INPUT "Filespec or est.
record size: ";A:P=VAL(A):IF P INPUT "Fields
(2-9)":LR=25000/(P+1) ELSE GOSUB 645:INPUT
#1,LR,I
905 CMD "T":DEFUSR=&HFF00:DIM D(I),
A(LR),F(I),FP(I),FT(I),C(I), G(12),PT(I),S(I):DEFFN
W(A) =FNW(INSTR(G,A)):FOR J=1 TO
I:D(J)=CHR$(J+13):IF P PRINT "Field title"J:INPUT
FT(J) ELSE INPUT #1,FT(J)
The exact value of M$ in line 910 is critical!
Below, the spaces have been replaced with periods.
Count periods, type spaces, LEN(M$) should be 63,
910 G=FT(J):PT(J)=FN W("M$"):NEXT:S=I:M$="..Constant;
.....Prefix!.....Suffix!.....Offset!..SCP!NSCPXKS!!!!"
915 U=1:D(0)=CHR$(1):CLS:PRINT R " records
full",LR-R" empty A Add",G(1)," L Load file E
Edit",G(2)," W Write file D Display",G(3)," I
Inform",G(9)" P LPrint",G(4)," O Other K Kill", / Set
option S Sort", " Q Quit"
920 PRINT @176,FI:PRINT @240,FO:PRINT
@502,G="":GOSUB 864:IF E="" PRINT
TAB(18):GOSUB 878:E=LEFT$(G,1)
925 Z=INSTR("AEDPKSLWIOQ",E):IF LEN(G)
G(Z)=MID$(G,2)
930 G=G(Z):ON Z GOSUB 100,200,400,800,300,
500,600,700,860,1000,882:GOTO 915
1000 PRINT "Dir :";GOSUB 868:IF E<"0" OR E>"2"
THEN E=""
1010 CMD "DIR "+E:PRINT,":GOTO 868

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All BASIC's are pretty much the same. In fact, they have far more similarities than they do differences. The greatest diversity is in graphics. If the program you desire to convert does not use graphics, it is just possible that it may work with no conversion needed at all.

The statements which may require some conversion are presented in Table 1. Any statement not listed in Table 1 may be included in the converted program without modification.

The statement that requires your attention most often is PRINT. The screen on a Model I/III machine has 64 by 16 print positions, as opposed to the Color Computer's 32 by 16. You may have to reformat text so that words are not split between two lines. It also means that Model I/III screens have 1024 PRINT@ positions, compared to the Color Computer's 512. The simplest solution to this is to divide all PRINT@ locations by 2. This will preserve the spatial relationship of text on the screen. Dividing by 2 is most effective when there is only a small amount of text on the screen. For large amounts of text, you will probably have to reformat it and use more than one Color Computer screen for each Model I/III screen.

Graphics are likely to consume the majority of your time spent on a conversion effort. You should be able to let your creative juices flow freely. At least you will be able to choose your own colors!

The best we can do with Model I/III graphics is a close approximation. Each print position on the Model I/III is subdivided into six blocks for a resolution of 6144 blocks

per screen (1024×6). This compares to only 2048 (512×4) with text screen graphics on the Color Computer. When special characters are used (ASCII codes zero through 31 and 192 through 255), considerably better resolution is achieved. These special characters are displayed with the same dot matrix resolution used for text on the screen. The only way to approximate these is with Color Computer high resolution graphics. See Table 2 for the special characters.

Some of the graphics you will have to deal with will be composed of the standard Model I/III graphic characters. These correspond to ASCII codes 128 through 191. It will take one or, in most cases, two Color Computer text screen graphic characters to duplicate these.

Table 3 illustrates which Color Computer characters are required to duplicate the Model I/III characters. The codes given in the table are for green graphics blocks. You can use the formula on the bottom of the second page of the reference card you got with your machine to adjust the code for the color you need. Note that characters 128 through 144, 160 and 176 can be duplicated with only one Color Computer character. The remaining characters are duplicated by the use of a base character plus one other character. Model I/III characters 145 through 159 use the Color Computer character 136 as a base. Model I/III characters 161 through 175 use the Color Computer character 132 as a base and Model I/III characters 177 through 191 use the Color Computer character 140.

To construct a character using two Color Computer characters, determine the proper print location on the screen, then place the top Color Computer character at that location. Place the base character at the current print location, plus 32. In other words, the top half of a converted character should go in the screen location corresponding to its location in the Model I/III program, and the base character should go directly below it. For example, suppose you want to convert the statement, 560 PRINT@ 900, CHR\$(166). The first thing to do is to

determine the print position for Color Computer. Dividing 900 by 2 gives 450. Thus, the print position for the top half of the converted character is 450. The statement is now partially converted: 560 PRINT@ 450, . Table 3 shows that code 166 can be duplicated by Color

Computer codes 134 over 132. If you want to use another color of graphics instead of green (let's say orange), use the formula on the Color BASIC reference card. You should obtain the codes 246 over 244. The top half of the figure can now be plugged into the converted statement,

Table 1
Model I/III Command and Color Computer Conversion

CDBL— Not available. Returns the double-precision representation of the expression in parenthesis. Double-precision is not an option on Color Computer, but you will find single-precision (the default on Color Computer) adequate for most applications. Model I/III double-precision allows up to seventeen significant digits, whereas, single-precision on Color Computer allows up to eight significant digits. Delete statement.

CINT— Not available. Returns the largest integer which is not greater than the value in parenthesis. Use INT.

CLOAD?—Not available. Verifies that a program in memory is exactly (bit for bit) the same as one on tape. Used to insure that a CSAVE worked properly. Not likely to be found in a program but might be mentioned in a magazine article or program narrative.

CLS—Same as CLS on Color Computer except you get to choose a color.

CSNG— Not available. Returns the single-precision representation of the expression in parenthesis. Delete statement. See CDBL.

DEFDBL— Not available. Makes a variable double-precision. Delete statement. See CDBL.

DEFINT— Not necessary in Color Computer. Delete statement.

DEFSNG— Not available. Makes variable single-precision. Delete statement. See CDBL.

DEFSTR— Not available. Makes any variable beginning with the specified letters, or range of letters, a string variable. Change all such variables to string variables by the addition of \$ after the variable name. Delete statement.

DELETE— Same as DEL.

ERL— Not available. Returns the line number of the most recent error. This, and similar error-handling statements, are not available on the Color Computer. Delete all associated code and let your errors fall where they may.

ERR— Not available. Returns a value equal to: ((current error code -1) * 2). Delete statement. See ERL.

ERROR— Not available. Used to simulate a particular error. Delete statement. See ERL.

FRE— When used in conjunction with a string, it returns the amount of memory remaining for string storage. When used in conjunction with a number, it works the same as MEM.

INP— Not available. Returns a value from a CPU port. Unless you know the function of the port specified, these statements are very difficult to convert.

LPRINT— Same as PRINT#-2.

ON ERROR GOTO— Not available. Causes a branch to the specified line when an error occurs. Delete statement. See ERL.

OUT— Not available. Directs the specified value to the specified CPU port. See INP.

PEEK— Same function. Address and value returned may change depending on purpose of PEEK. See memory map in Table 4.

POINT— Similar function. Both machines return a value depending on the status of the graphics block at the specified X/Y coordinates. Models I/III return -1 if the block is on, and zero if the block is off. Color Computer returns -1 if the block contains a text character, zero if the block is off, and the color code of the block if it is on. Depending on the application, as little work as modifying the X/Y coordinates to as much as adding code to react to the color of the block may be required to convert this statement.

POKE— Same function. Address and value may have to change, depending on the purpose of the POKE. See memory map in Table 4.

POS— Similar function. POS(0) function is identical. Color Computer has addition of POS(-2) for printer positions.

PRINT— Same function. Text may have to be reformatted to avoid splitting words because Model I/III screen line is 64 positions long, as opposed to the Color Computer's 32. Two Color Computer screens may be required to accommodate some text.

PRINT@— Same function. Model I/III has 1024 print positions to the Color Computer's 512. Divide Model I/III print position by 2. See PRINT.

RANDOM— Not available. Seeds random number generator to insure a truly random number. May be duplicated by X = RND (1-TIMER).

RESET— Same function. X/Y coordinates may differ.

RESUME— Not available. Used in conjunction with ON ERROR GOTO. Delete statement. See ERL.

SET— Same function. The Color Computer has additional parameter to determine color of point set. X/Y coordinates may vary because Model I/III can have an X coordinate of from zero to 127 and a Y coordinate of from zero to 47. The Color Computer is limited to an X value of from zero to 64 and a Y of from zero to 32. To maintain spatial relationships, convert by dividing the X coordinate by 2 and the Y by .66 and rounding. See discussion above.

SYSTEM— Not available. This statement is not likely to be used in a program. The Color Computer is in the counterpart of system mode whenever it is not running a program.

TIMERS— Not available. Returns the current date and time. Depending upon its use in the program, this function may be duplicated through use of the TIMER statement.

giving: 560 PRINT@ 450, CHR\$(246). The base of the figure must be printed directly below the top, so add 32 to that print position. Your finished code will look like this:
 560 PRINT@ 450, CHR\$(246)
 561 PRINT@ 482, CHR\$(244)

Table 2
Special Color Computer Characters
Text Mode

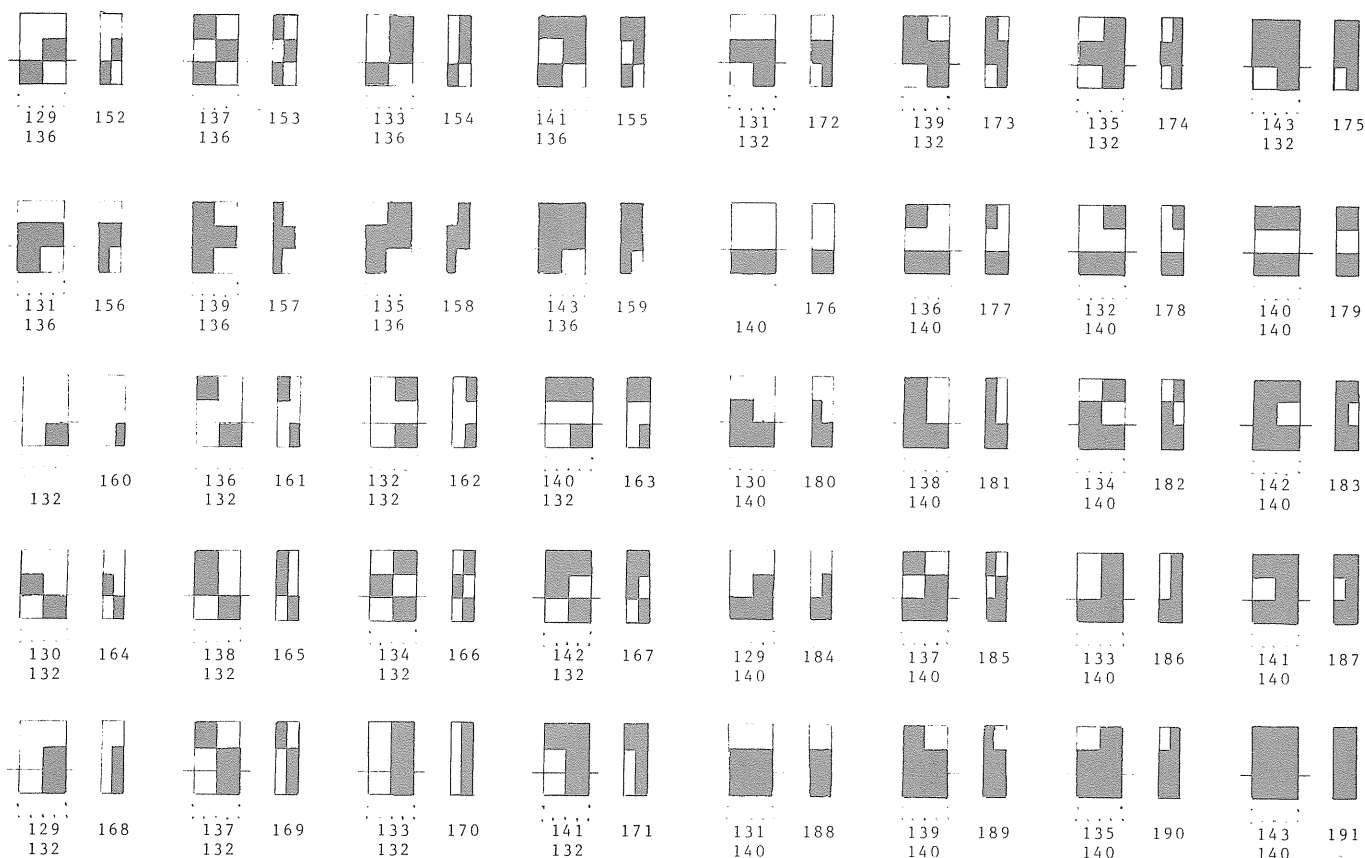
0	1	2	3	4	5	6
7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31	192	193	194
195	196	197	198	199	200	201
202	203	204	205	206	207	208
209	210	211	212	213	214	215
216	217	218	219	220	221	222
223	224	225	226	227	228	229
230	231	232	233	234	235	236

237	238	239	240	241	242	243
244	245	246	247	248	249	250
251	252	253	254	255		

Note: The characters in Tables 2 and 3 are not illustrated in the same scale. All graphics characters in both tables use only one print position.

Table 3
Color Computer Equivalents to
Model I/III Graphics Codes

128	128	136	129	136	144	132	130
132	160	140	131	140	176	130	132
138	133	134	134	142	135	129	136
137	137	133	138	141	139	131	140
139	141	135	142	143	143		
136	144	136	145	132	146	140	147
130	148	138	149	134	150	142	151



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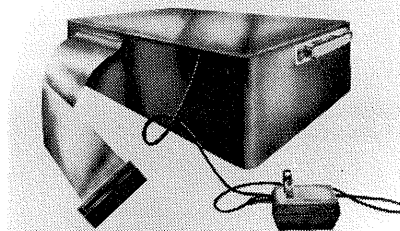
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What if the print position is a variable? Just include the formula in the statement like this:

```
560 PRINT@ X/2, CHR$(246)
```

```
561 PRINT@ X/2+32, CHR$(244), where X is the variable name.
```

What if the graphics code is a variable? That's a tough one and I'm afraid that I don't have an easy answer for you. The easiest solution is probably to change the formula that generates the value for the graphics variable so that it generates a valid Color Computer graphics code (128-255). If you want to retain a Model I/III-type character, and it's randomly generated, use $RND(128) + 127$ to generate the code for the top half of the figure. The base of the figure is a little more difficult. Use this formula to generate the graphics code for the base in the same color as the top (you do want the top and bottom to be the same color, don't you?): $C = 128 + 16 * ((INT(X-112) / 16) - 1) + INT(9 / (RND(3) - 1) - 1)$, where C is the random graphics code and X is the graphics code for the top half of the character.

Set graphics are those graphics generated through use of the SET statements. They pose a conversion problem because of the difference in resolution between the Model I/III and the Color Computer. The problems and their solutions in set graphics are similar to the PRINT@. Start with the fact that the Model I/III screen has twice as many print positions as the Color Computer. Also note that each of those print positions is divided into six blocks, as opposed to the Color Computer's four. You are again presented with the possibility of more graphics on a Model I/III screen than you can fit on a Color Computer screen. If you are faced with a fairly full Model I/III screen, you may have to redesign the graphics so that they fit on one screen, or a series of screens.

When you are converting graphics that fill less than half of the Model I/III screen, and they are not contiguous, you can usually achieve an accurate conversion by dividing the X and Y coordinates. Divide the X coordinate by 2 and the Y coordinate by .66. Then, round both results. Use the Color Computer's SET statement to turn on the block at the indicated location.

When graphics codes are POKEd into video memory, you have two conversions to make. First, you need to convert the graphics code. Use Tables 2 and 3 for this. Next, the location should be converted.

On the Model I/III, video memory starts at location 15360 decimal. The Color Computer's video memory starts at 1024 decimal. To convert a location from one to the other, subtract 15360 from the location in the Model I/III program. This gives the displacement into the screen of the character. Divide the displacement by two, to allow for the reduced size of the Color Computer's screen, and add 1024. Don't forget to include the base of your character if it requires one. Just add 32 to the location of the top half and POKE in the base character.

The methods described so far should be adequate for most conversion projects. However, there will be times when the complexity of the graphics pattern, its proximity to the edge of the screen or to another figure, etc., makes text screen low resolution graphics unsatisfactory. You may have to resort to higher resolution

Color Computer graphics.

Try to develop a good understanding of the graphics in the program you are converting before starting to rewrite the graphics routine. Don't feel constrained by the original code. As long as you have been forced into a rewrite, you might as well let your imagination go and do things the way you want them. Just try to keep in mind that any changes you make to the graphics may effect the non-graphics code.

Don't forget sound! Most programs that you convert won't have any sound or, if they do, the routine will most likely be in machine language. I can't tell you what to do in either case except to use your imagination and the capabilities of the Color Computer.

What about PEEKs and POKEs? See Table 4 for a memory map of the Model III. The Model I map is very similar to the Model III. I wasn't able to determine all of the similarities to my satisfaction. Therefore, addresses marked with an asterisk (*) are the same on both the Model I and the Model III. For those left unmarked, you'll just have to take your chances.

Converting a Model I/III program may not always be easy, but you can bet that it will always be rewarding. In addition to vastly expanding the potential software available to your Color Computer, the exercise will probably make you a better programmer. ■

Table 4
Model III Memory Map

Decimal Address	Contents
*0-12287	BASIC ROM
*12288-14335	System ROM
*14336-15359	Keyboard Matrix
*15360-16383	Video Display
16384-16395	System Use
16396-16398	BREAK Jump Vector
*16399-16408	System Use
16409	Caps Lock Switch
*16410-16411	System Use
16412	Cursor Blink Switch
*16413-16415	System Use
16416-16417	Cursor Address
*16418	System Use
16419	Cursor Character
*16420-16423	System Use
*16424	Lines Per Page (Printer)
*16425	Line Counter (Printer)
*16426-17384	System Use
*17385-End mem	User Memory
* Same value for Model I.	

Exploring VisiCalc

How to sort your results

Models I/II/III, PMC-80, LNW80

Timothy K. Bowman, Spokane, WA

A common question asked by VisiCalc¹ users is how can the VisiCalc-produced results be sorted. To illustrate a very simple way of sorting results, load your VisiCalc program and type in the investment template example shown in Figure 1. Although the listing looks long, remember that before entering the actual data, many of the cell positions can be entered once and then replicated using the "/R" command. For example, the integer format in column F, the \$ format in columns D and E, and the actual formulas in column F can all be easily entered using the Replicate command. Figure 2 shows a printed result of the listing of Figure 1.

As you can observe, the template is a basic stock portfolio investment analysis. Its purpose is to track security costs, market values and a computed gain or loss for each investment as well as the total investment portfolio. Incidentally, all of the values are hypothetical and bear no resemblance to real investments. If you care to, there is enough room in columns A through E so that you can insert your own stock names and values.

A Simple Sort

Once the data is entered, it is time to sort it. To accomplish this, we'll use the Move "/M" command. First, let's assume that we want the data sorted in descending order by the size of gain (largest gain first and smallest gain last). Position the cursor on the line with the largest gain and type "/M" (without the quotes). Type a period and, using the uparrow, move the cursor to line 6 and press ENTER. After a short pause, you should see the screen go through some contortions as VisiCalc moves the original line to the

line on which the cursor was formerly positioned. Now, find the stock with the second largest gain and position the cursor on that line, type "/M", a period, and position the cursor in the same column but on line 7, and press ENTER. Repeat this process until the list of stocks is sorted in descending order.

Although the preceding paragraph may seem cumbersome in its description, I have experienced that after a little practice, you will find it quite easy to apply. Speaking of practice, why don't you try resorting the list in alphabetical order?

Caveats

You can move either one row to another row (as shown in the example above) or you can move one column to another column. If your cursor is in cell location A9 and you wish to move the entire row to row 5, you may not position the cursor at D6. It must be in cell position A6. Don't move a row or column that contains circular or forward references (there are none in the example). If you are unsure of the meaning of circular, or forward, references, consult your VisiCalc manual. While moving a row, the cursor can be in any column within that row. Similarly, while moving a column, the cursor can be positioned within any row within that column. After typing the period in the execution of the Move command, instead of using the cursor to indicate a destination row or column, you may type the destination position. Although the VisiCalc program can't accommodate the problem of forward references, rest assured that it changes all of the value references to reflect the new locations.

Enhancements

The simple program presented above can be enhanced to provide a significant stock-holding record-keeping system. Although in this brief description I won't provide a listing of the enhancements, let me describe them for you. First, you could insert a column between the present column B and C using the "/I" command. That column could be labeled "Purchase Date" on lines 4 and 5. On line 4, starting in column H, you could type the months in a year (January, February, etc.) and use line 5 for specific dates. Then, using the material on fixing titles from last month's Exploring VisiCalc column, you could insure that the stock name does not disappear from the screen. Monthly market prices could then be entered for each stock in columns H, I, J, etc. Each month, when the stock is priced, use the Replicate command to copy the stock price from columns H, I, J, etc., to column F to compute the gain or loss. The stock price in those right-hand columns then becomes historical information.

A Second Method

This method involves saving the unsorted VisiCalc spreadsheet in DIF² format, reading that DIF file with a BASIC program, sorting it, resaving it in DIF format and reloading it back into the VisiCalc template. For most sort applications, that probably will be too cumbersome. However, if you are interested in such a program and would like me to present one in this column, or have already created one you would be willing to share with other readers, write to me in care of 80-U.S. Journal. Although I haven't yet gained enough experience with Profile III Plus, it may also be

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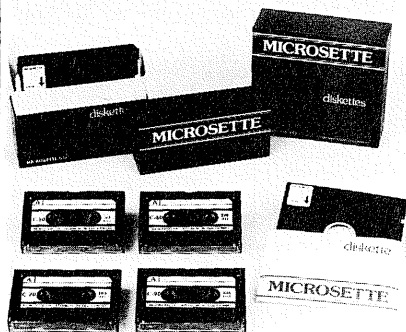
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VisiCalc

possible to read a DIF file with that program, sort it and store it in DIF format to be reloaded into the template. That's a topic I'll be exploring and possibly report on later.

I hope that the above enhancements can start your creative juices flowing because that's what the column is about — encouraging you to explore the use of VisiCalc. If you would like a listing of the stock program with the enhancements as well as a sample printout, write to me in care of 80-U.S. Journal and I will be happy to send one to you. Please enclose a self-addressed, stamped, business-size envelope.

Correction

As I indicated in my first column, I draw upon my experience in using the enhanced VisiCalc on a Model III. In the November, 1982 issue, I presented the use of convergence to solve internal rate of return calculations. Unfortunately, that routine will only run on a Model III with the enhanced VisiCalc. I will clearly identify future programs that will run only on the enhanced version.

That's all for this month. Keep exploring VisiCalc. ■

¹ VisiCalc is a registered trademark of VisiCorp.

² DIF is a trademark of Software Arts, Inc.

Figure 1

```
>F10:@SUM(F5...F9)
>C10:"n
>B10:"Total Gai
>F9:/FI(C9*E9)-(C9*D9)
>E9:/F$49.95
>D9:/F$49.95
>C9:/FL500
>A9:"Tandy
>F8:/FI(C8*E8)-(C8*D8)
>E8:/F$110
>D8:/F$100
>C8:/FL400
>A8:"ITT
>F7:/FI(C7*E7)-(C7*D7)
>E7:/F$16.23
>D7:/F$14.25
>C7:/FL300
>A7:"IBM
>F6:/FI(C6*E6)-(C6*D6)
>E6:/F$22
>D6:/F$23.19
>C6:/FL200
>A6:"DEF Inc.

>F5:/FI(C5*E5)-(C5*D5)
>E5:/F$49.95
>D5:/F$45.5
>C5:/FL100
>B5:"ny
>A5:"ABC Compa
>F4:"Gain
>E4:"Share
>D4:"Share
>C4:"Shares
>B4:"Name
>A4:"Security
>E3:"Market/
>D3:"Cost/
>D2:" Analysis
>C2:"Portfolio
>D1:"Investor
>C1:"Typical
/W1
/GOC
/GRA
/GC9
/X>A1:>A1:
```

Figure 2

Typical Investor Portfolio Analysis				
Security Name	Shares	Cost/Share	Market/Share	Gain
ABC Company	100	45.50	49.95	445
DEF Inc.	200	23.19	22.00	-238
IBM	300	14.25	16.23	594
ITT	400	100.00	110.00	4000
Tandy	500	49.95	49.95	0
Total Gain				4801

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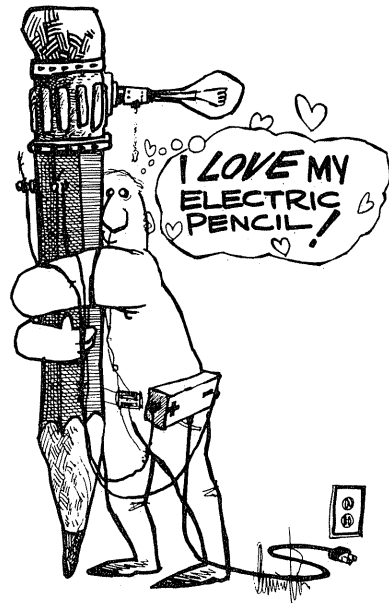
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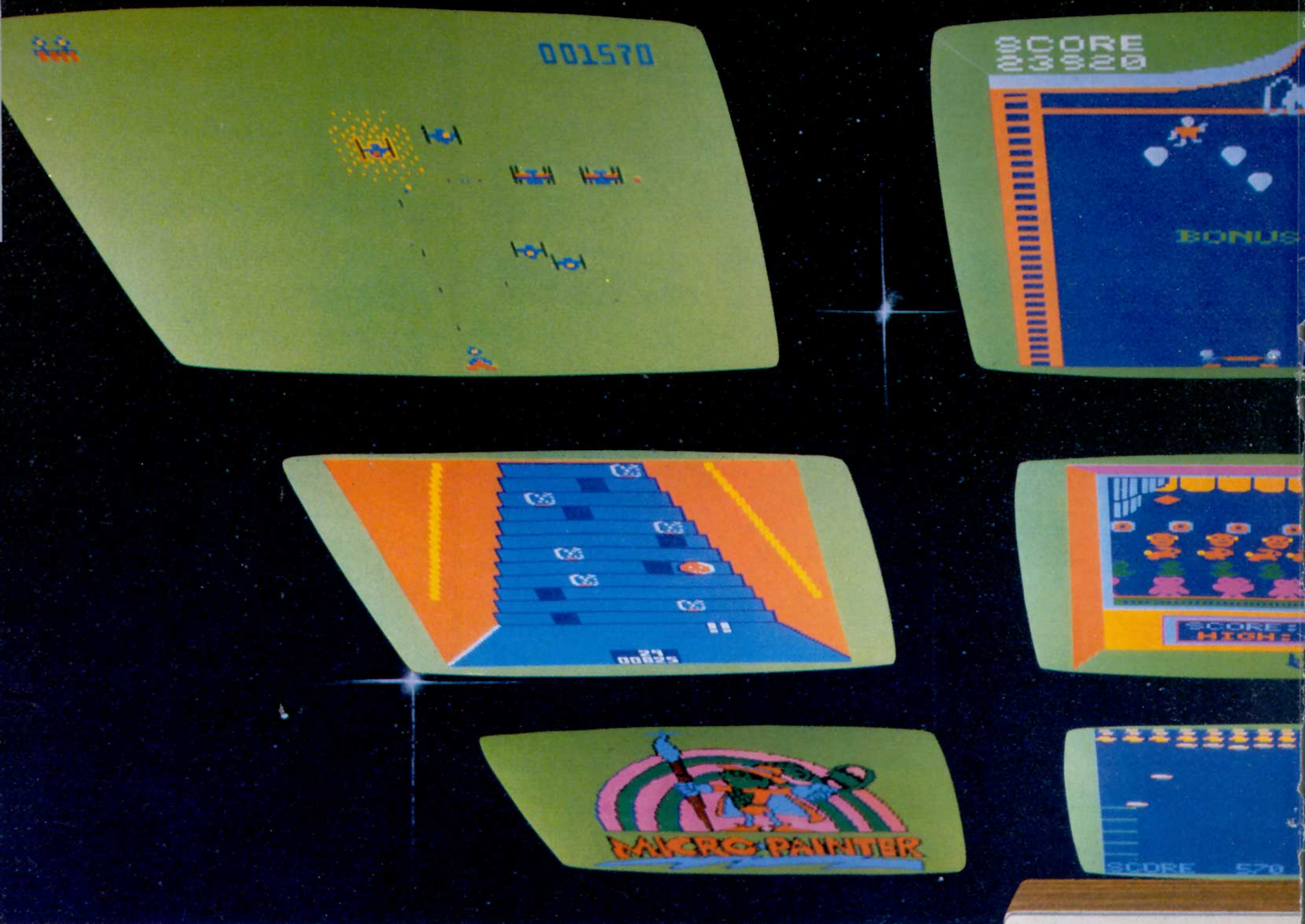
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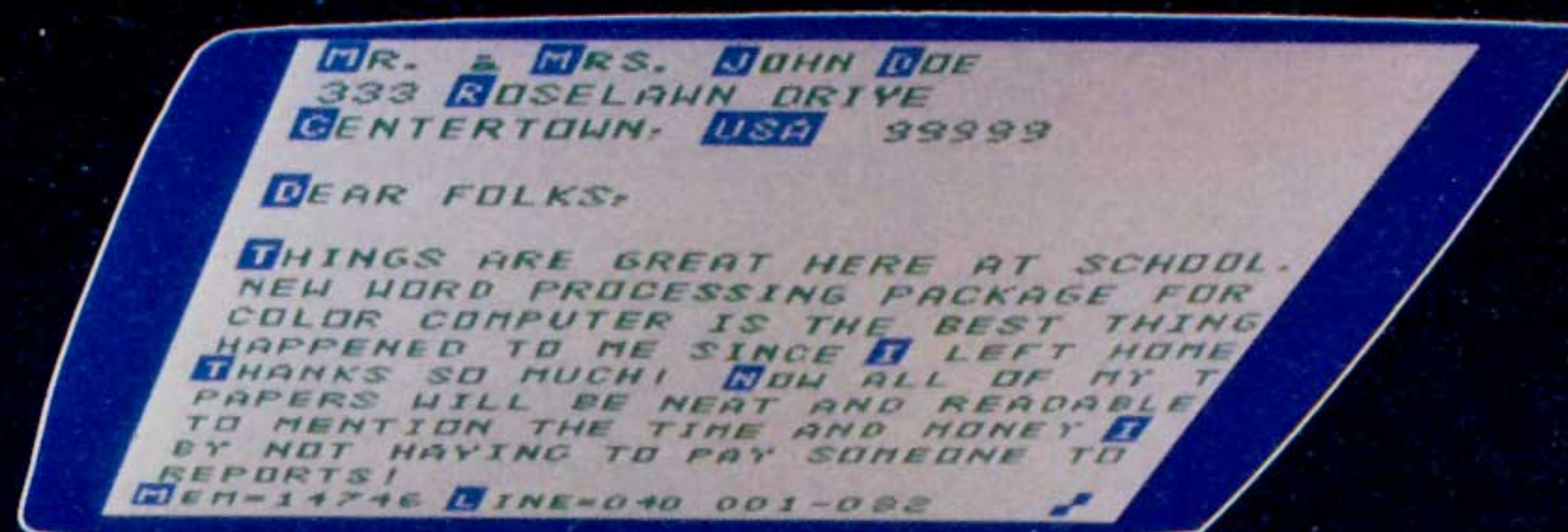
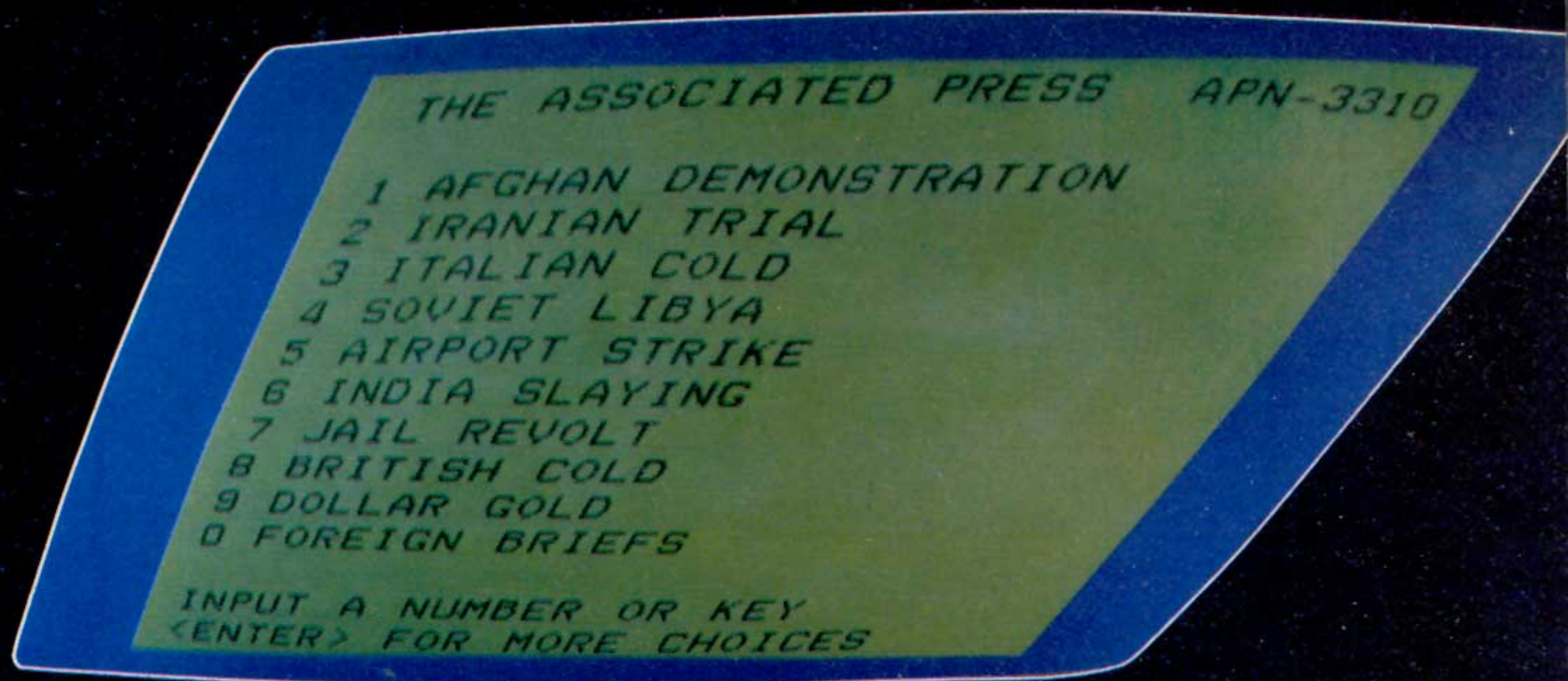
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Supervisor calls

Part III: Model II disk directory program

Model II

T. R. Dettmann, Associate editor

Model II service routines give a programmer an immense amount of flexibility if he only knows how to use them. Over the last two months, I've dealt with different ways to use them. One of our major uses will be to get a comprehensive directory of Model II disks.

Looking at many magazines, it's apparent that Model I & III owners have numerous directory programs available, some of them quite good. Model II owners don't. With the programs listed here, we now have the basis of a system for automatically cataloguing Model II diskettes.

The whole system is very complex and too involved to go into detail here. The two programs accompanying this article will give you a starting point for developing your own system. It does provide a workable inventory program as it now stands.

There are two programs. The first, DIRECT/BAS, is the program that reads disks, assigns names to them, and builds the data base. The second program, PDIRECT/BAS, uses the data base to print out listings of the disk files.

The data base is a binary tree that allows rapid searching and sorting. Even so, the overhead time when entering new files is significant. I have over one hundred disks catalogued with this system and I find it easy enough to use but it does take time.

You will need to add some additional programs if you want to do more than print the listing. For example, you might want to develop routines to delete files or disks easily, or even edit the entries. You might want to expand the information in the file to include creation date, last modified date, file size, etc. Presently, all of that is ignored by the system but it's readily available in memory after going through the service routine call for the directory information.

All in all, the main point simplicity. To understand the first program in depth, read the Supervisory Call article in the February issue. For those who entered the directory program from that article, just add the extra code that is included in the updated DIRECT/BAS listing. The second program, which gives you the printed listing, is simply an extension of the first one.

Listing 1 — Supervisor Calls

```
10 REM
20 REM
30 REMMODEL II DISK DIRECTORY
40 REM(C) 1982 BY TERRY R. DETTMANN
50 REM
60 REMVERSION 0.210/82
```

```
70 REMFILENAME: DIRECT/BAS
80 REMBE SURE YOU GO TO BASIC WITH 2 FILES
OPEN
90 REM
100 CLEAR 1000
105 DEFINT A-Z
110 DIM BUF(1636),SV(5),CD(32),CV(10),NM$(96)
120 FOR I=1 TO 18: READ CD(I): NEXT I
130 DATA 94,35,86,235,6,0,14,0,62,53,207,201
131 DATA 6,0,62,27,207,201
160 DEFFNHDR$(X$) =
STRING$((78-LEN(X$))/2,150) + " "+X$+" "+
STRING$((77-LEN(X$))/2,150)
161 DEFFNCTR$(X$)=STRING$((80-LEN(X$))/2,"
")+X$
170
OPEN"R",1,"FILES/DAT",27:OPEN"R",2,"FILSTACK/DAT",
2
171 FIELD1,8 AS NF$,3 AS EX$,10 AS ND$,2 AS L1$,2
AS L2$,2 AS L3$
172 FIELD2,2 AS STK$
180 IF LOF(1)=0 THEN GOSUB1200
200 REM - - - - - MAIN LOOP -
210 CLS:PRINTFNHDR$("DISK
DIRECTORY"):PRINT:PRINT
220 LINEINPUT"DISK NAME & NUMBER (DEFAULT 0,
MAX 10 CHARACTERS) ==> ";DN$
225 IF DN$="END" THEN CLOSE:END
230 L=INSTR(DN$,".")
240 IF L=0 THEN DN=0 ELSE
DN=VAL(MID$(DN$,L+1)): DN$=MID$(DN$,1,L-1)
245 IF DN=0 THEN PRINT"DISK NUMBER 0, ARE YOU
SURE";INPUTYN$:IF YN$="N" THEN 200 ELSE IF
YN$="Y" THEN 250 ELSE 245
250 IF DN<0 OR DN>3 THEN PRINT"DISK NUMBER
ERROR":GOTO220
255 IF LEN(DN$)>10 THEN PRINT"DISK NAME TOO
LONG":GOTO220
260
GOSUB1000:GOSUB1100:GOSUB1300:GOSUB1700
300 GOTO200
999 END
1000 REM - - - - - SETUP DIRECTORY
CALL -
1010 CD(6)=DN:J=0
1020
FOR I=1 TO 12 STEP 2:SV(J)=CVI(CHR$(CD(I))+CHR$
(CD(I+1))):J=J+1:NEXT I
```


Supervisor calls

```

1030 RETURN
1100 REM — — — — — GET DISK
DIRECTORY —
1110
Y=0:DEFUSRO=VARPTR(SV(0)):Y=USRO(VARPTR(BUF
(0)))
1120 RETURN
1200 REM — — — — — INITIALIZE DATA
FILES —
1210 LSETNF$="MMMMMMMM":LSETL1$=MKI$(0):
LSETL2$=MKI$(0):LSETL3$=MKI$(0):PUT1,1
1220 LSETSTK$=MKI$(1):PUT2,1
1230 RETURN
1300 REM — — — — — PULL OUT
NAMES—
1305 NM=0:PRINTFNCTR$("EXTRACTING
FILENAMES")
1310 FORI=1TO96
1320 X$="":FORJ=1TO8:K=(I-1)*17+J-1
1330 XI=BUF(K):IF XI<0 THEN XI=65535-XI
1340 X1=INT(XI/256):X2=XI-X1*256
1350 X$=X$+CHR$(X2)+CHR$(X1)
1360 NEXTJ
1362 IF MID$(X$,1,1)<>"." THEN 1390
1365 Z=INSTR(2,X$,".")
1370 NM$(I)=MID$(X$,2,Z-2):NM=NM+1
1380 NEXTI

```

```

1390 RETURN
1700 REM — — — — — SAVE DIRECTORY
ENTRIES —
1705 CLS:PRINTFNHDR$("SAVING DIRECTORY
ENTRIES"):PRINTFNCTR$("DISK: "+DN$):PRINT
1706 CD(14)=3:GOSUB3000
1710 FORI=1TONM
1720 GOSUB1800:GOSUB1900:GOSUB2000
1730 NEXTI
1740 RETURN
1800 REM — — — — — ALLOCATE SPACE
FOR ENTRY —
1810 GET2,1:IF CVI(STK$)<=1 THEN
RN=LOF(1)+1:RETURN
1820 X=CVI(STK$):LSETSTK$=MKI$(X-1):PUT2,1
1830 GET2,X:RN=CVI(STK$):RETURN
1900 REM — — — — — STORE ENTRY —
1910 L=INSTR(NM$(I),"/"):IF L=0 THEN
FE$="":FF$=NM$(I) ELSE
FF$=MID$(NM$(I),1,L-1):FE$=MID$(NM$(I),L+1)
1920 LSETNF$=FF$:LSETEX$=FE$:LSETND$=DN$
1925 LSETL1$=MKI$(0):LSETL2$=MKI$(0):
LSETL3$=MKI$(0)
1930 PUT1,RN
1940 RETURN
2000 REM — — — — — ADD TO BINARY
TREE —

```



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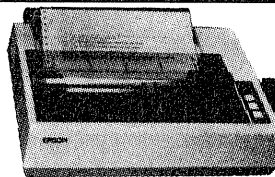
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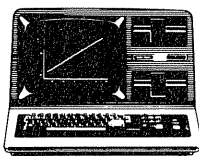
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```

2005 IF FE$="" THEN TL$=FF$ ELSE TL$=FF$+"/"+FE$
2006 PRINTFNCTR$(TL$)
2010 SR=1:FF$=LEFT$(FF$+STRING$(8," "),8)+FE$
2020 GET1,SR
2030 FC$=NF$+EX$
2035 IF FF$=FC$ AND MID$(DN$+STRING$(10,"
"),1,10)=ND$ THEN RETURN
2040 IF FF$<FC$ THEN GOSUB2100 ELSE GOSUB2200
2050 IF EF=1 THEN RETURN ELSE 2020
2100 REM - - - - - GO DOWN LEFT
SIDE OF TREE -
2110 LK=CVI(L1$):IF LK=0 THEN 2150
2120 SR=LK:EF=0:RETURN
2150 REMLINK INTO LEFT SIDE
2160 LSET L1$=MKI$(RN):PUT1,SR:EF=1:RETURN
2200 REM - - - - - GO DOWN RIGHT
SIDE OF TREE -
2210 LK=CVI(L2$):IF LK=0 THEN 2250
2220 SR=LK:EF=0:RETURN
2250 REMLINK INTO LEFT SIDE OF TREE
2260 LSET L2$=MKI$(RN):PUT1,SR:EF=1:RETURN
3000 REM - - - - - SCROLL
PROTECT -
3010 J=0: FORI=13TO18STEP2: CV(J)=CVI
(CHR$(CD(I)) + CHR$(CD(I+1))): J=J+1: NEXTI
3020 Y=0: DEFUSRO=VARPTR (CV(0)): Y=USRO(0)
3030 RETURN

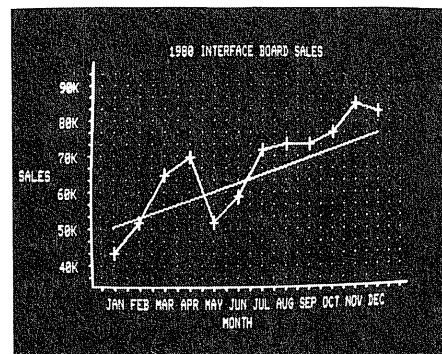
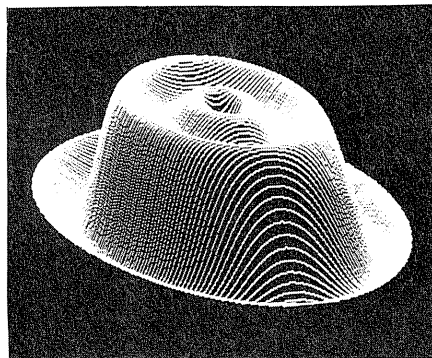
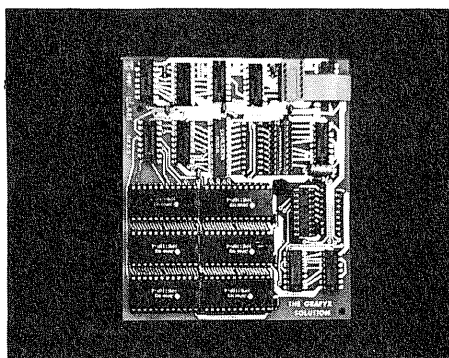
```

Listing 2 — Supervisor Calls

```

10 REM
20 REM
30 REMMODEL II DISK DIRECTORY
40 REM(C) 1982 BY TERRY R. DETTMANN
50 REM
60 REMVERSION 0.010/82
70 REMFILENAME: PDIRECT/BAS
80 REM
90 REM
100 CLEAR 10000
105 DEFINT A-Z
110 DIM
SV(5),CD(32),CV(10),STK(100),DN$(52),NM$(52),
EX$(52)
120 FORI=1TO18:READCD(I):NEXTI
130 DATA 94,35,86,235,6,0,14,0,62,53,207,201
131 DATA 6,0,62,27,207,201
160 DEFFNHDR$(X$) =
STRING$((78-LEN(X$))/2,150)+" "+X$ + "
"+STRING$((77-LEN(X$))/2,150)
161 DEFFNCTR$(X$)=STRING$((80-LEN(X$))/2,"
")+X$
162 DEFFNDT$(X$)=MID$(X$,4,3) + "
"+MID$(X$,7,2)+" " + MID$(X$,9,4)

```



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Supervisor calls

```

170 OPEN"R",1,"FILES/DAT",27:OPEN"R",2,"FILSTACK/
DAT", 2
171 FIELD1,8 AS NF$,3 AS EX$,10 AS ND$,2 AS L1$,2
AS L2$,2 AS L3$
172 FIELD2,2 AS STK$
180 IF LOF(1)=0 THEN GOSUB1200
190 DT$=FNDDT$(DATE$)
200 REM ----- MAIN LOOP-----
210 CLS:PRINTFNHDR$("DISK
DIRECTORY"):PRINT:PRINT
215 DN$="":XT$="":LD$=""
216 PF=0:NL=99:SP=0:PG=0:GF=0:CT=0
220 LINEINPUT"FILENAME MASK (FILE/EXT:DISK)
====> ",FF$
225 RQ$=FF$:IF FF$="END" THEN CLOSE:END
226 L0=INSTR(FF$,""):IF L0<>0 THEN
CM$=MID$(FF$,1,L0): FF$=MID$(FF$,L0+1) ELSE
CM$=""
227 IF CM$="!PRINT)" THEN PF=1 ELSE PF=0
230 L1=INSTR(FF$,"/"):L2=INSTR(FF$,".")
240 IF L2<>0 THEN
DN$=MID$(FF$,L2+1):FF$=MID$(FF$,1,L2-1)
250 IF L1<>0 THEN
XT$=MID$(FF$,L1+1):FF$=MID$(FF$,1,L1-1)
255 PRINT"DISK NAME",,"FILE NAME",,"EXTENSION"
260 CD(14)=5:GOSUB3000
270 SR=1
280 GET1,SR
290 IF CVI(L1$)<>0 THEN SP=SP+1:STK(SP)=SR:
SR=CVI(L1$): GOTO280
300 GOSUB1000:IF EF=1 THEN GOSUB1100 ELSE IF
EF=2 THEN 400
310 IF CVI(L2$)<>0 THEN
SP=SP+1:STK(SP)=SR:SR=CVI(L2$):GOTO280
320 IF SP=0 THEN 400
330 SR=STK(SP):SP=SP-1
340 IF SR<0 THEN 320
350 GET1,SR:GOTO300
400 IF PF=1 AND CT>0 THEN GOSUB1500
405 LINEINPUT"PRESS ENTER TO CONTINUE":IN$
410 GOTO200
999 END
1000 REM ----- DOES THE FILENAME
MATCH THE MASK? -----
1005 EF=0
1010 IF SR=1 THEN EF=0:RETURN
1012 C$=INKEY$:IF C$<>"" THEN IF ASC(C$)=1
THEN EF=2:RETURN
1015 'IF FG=1 AND FF$<>"" AND FF$<NF$ THEN
EF=2:RETURN
1020 IF DN$="" OR DN$=MID$(ND$,1,LEN(DN$))
THEN EF=1
1030 IF (XT$="" OR XT$=MID$(EX$,1,LEN(XT$))) AND
EF=1 THEN EF=1 ELSE IF XT$<>"" THEN EF=0
1040 IF (FF$="" OR FF$=MID$(NF$,1,LEN(FF$))) AND
EF=1 THEN EF=1 ELSE IF FF$<>"" THEN EF=0
1045 IF EF=1 THEN FG=1

```

```

1050 RETURN
1100 REM ----- PRINT THE FILENAME
1105 IF LD$=ND$ THEN PD$="" ELSE
LD$=ND$:PD$=ND$
1106 IF PF=1 THEN GOSUB1300
1110 PRINTPD$,,NF$," ";EX$
1120 RETURN
1200 REM ----- INITIALIZE DATA
FILES -----
1210 LSETNF$="MMMMMMMM":LSETL1$=MKI$(0):
LSETL2$=MKI$(0): LSETL3$=MKI$(0):PUT1,1
1220 LSETSTK$=MKI$(1):PUT2,1
1230 RETURN
1300 REM ----- LINE PRINT -----
1302 CT=CT+1:IF CT<53 THEN
DN$(CT)=PD$:NM$(CT)=NF$:EX$(CT)=EX$:RETURN
1310 IF CT=53 THEN GOSUB1400
1320 LPRINTDN$(CT-52),NM$(CT-52),"
";EX$(CT-52),PD$,,NF$," ";EX$
1330 IF CT=104 THEN CT=0
1340 RETURN
1400 REM ----- LINE PRINTER
HEADING -----
1410 LPRINTCHR$(12):STRING$(132,"="):PG=PG+1
1420 LPRINT"MASTER DIRECTORY
LISTING";TAB(120)"PAGE: ";LPRINTUSING"####";PG
1430 LPRINT"PREPARED: ";DT$," FROM REQUEST:
";RQ$
1440 LPRINTSTRING$(132,"-")
1450 LPRINT"DISK NAME",,"FILE
NAME",,"EXTENSION",,"DISK NAME",,"FILE
NAME",,"EXTENSION"
1460 LPRINTSTRING$(132,"-")
1470 NL=6:RETURN
1500 REM ----- LINE PRINT THE END
OF THE LIST -----
1505 IF EF=2 THEN MSG$="**** PRINTOUT
TERMINATED BEFORE FILE END ****" ELSE MSG$=""
1510 IF CT>=52 THEN 1550
1520 GOSUB1400:LPRINTDN$(1),NM$(1),"
";EX$(1),MSG$
1525 IF CT=1 THEN RETURN
1530 FORI=2TOCT:LPRINTDN$(I),NM$(I),"
";EX$(I):NEXTI
1540 RETURN
1550 CS=CT-51:LPRINTDN$(CS),NM$(CS),"
";EX$(CS),MSG$
1555 IF CS=52 THEN RETURN
1560 FORI=CS+1TO52:LPRINTDN$(I),NM$(I),"
";EX$(I):NEXTI
1570 RETURN
3000 REM ----- SCROLL
PROTECT -----
3010 J=0: FORI=13TO18STEP2: CV(J)=CVI
(CHR$(CD(I)) + CHR$( CD(I+1))): J=J+1: NEXTI
3020 Y=0:DEFUSR3=VARPTR(CV(0)):Y=USR3(0)
3030 RETURN ■

```


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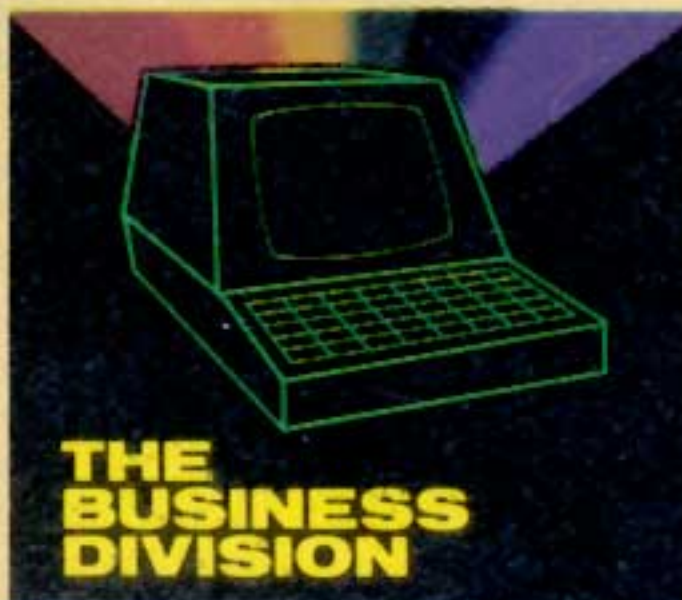
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Captain 80

... and the magic software machine

Bob Liddil

Max, the sentient program who has become my sidekick over these many months of software reviewing, has been kidnapped by parties unknown, and stashed away in location also unknown. He is depending on me to rescue him and my success depends on the slideslip codes he left imbedded in the TRS-80 before I was downloaded into the complex, mysterious world of programs.

To complicate matters, I have discovered an archvillain lurking in the shadows. He is called Twitch. He is sincerely evil, nasty and low down.

Professor Megabyte, creator of Max and lost for two years in this strange dimension, has joined the quest to discover and free Max, but he just mutters a lot and punches equations into the funny-looking pocket computer he carries. He seems to be able to exert some control over our surroundings but as often as not, he wanders away leaving me to fend for myself.

Confused? You won't be after this edition of "As The CPU Turns" or "The Rover Boys Visit Madame Rosa's Massage Parlor And Lend Muscle To The Tale."

I know this place. Madame Rosa's Massage Parlor is a tongue-in-cheek (mis)adventure written and produced by Bob Krotts of the Softcore Software Company near Dayton, Ohio. I stand under the glare of a blue porchlight with my hand on the ornate knocker on the door. I hesitate. Something seems wrong. Then I knock. The sound reverberates throughout the building, echoing as if in a cavern. The door opens and a huge lady appears, dressed in satin, wearing combat boots and a painted smile on her unshaven face, smoking a cigar and packing an UZI submachine gun. She takes advantage of my being

momentarily stunned by such an unexpected sight, by grabbing me, dragging me inside, and forcing me to dine Italian.

Actually, the dinner is quite tasty, but shortly after the main course I begin to get dizzy. The food was spiked. I am being led away as everything starts getting dark. Mama mia, Madame, that's a spicy meat sauce.

Madame Rosa's Massage Parlor is a mildly adolescent romp through powers of suggestion. Its theme is mature and suggests that maybe parental guidance might be in order. Still, it is not much more than just naughty. And then, just barely.

Remember Interlude? It is now a resident of the Old Program's Retirement and Senior Citizen Center. It is human nature to poke fun at life's little indelicacies, and author Krotts does this with wit and flair that leaves me slightly envious. The program will entertain its user within the boundaries of its intended theme. If you desire to have a little chuckle within the scope of an adult topic, Madame Rosa's Massage Parlor will rub you the right way. However, if you are under 16 or offended in any way by this sort of stuff, skip this one and find something a little more to your liking. For what it is, it's not bad. As satire, it's not bad at all.

I woke up in a bricked-up room in a company with a guy about my own age. He looked human but there was something about him...

"Well, I see you found me," he said with Max's voice.

My head was lead, but I managed to sit up.

"Max, is that you?" I asked weakly.

"Sure is, and it looks like we're both caught."

I shook myself fully awake. My whole body felt like a freshly-

manufactured car pounded, painted, priced, processed and permanently prepared for planned obsolescence. I examined myself and I didn't look like me at all.

"What's happening here?" I wanted to know. "Madame Rosa can't possibly look like that and look like us. We're all decked out like slaves... to... umm... auction... Say, you don't suppose... You don't mean to say... Ohhh brother..."

Max nodded his head in affirmation — strange to see, rather than hear, him.

Max told me the whole story. It seems that Twitch, the intelligent but malformed and incomplete arcade game, had gathered strength among the lesser denizens of high RAM, all program fragments and incomplete routines like himself. Then he'd hit upon a plan to elevate himself to power and take over the entire combined dimensions of software by kidnapping key personalities such as Max, Madame Rosa, and Irv, the keyboard control program — replacing them with look-alikes. The users would not know the difference since they could not see the programs, only use them. As long as the programs worked like originals it would make no difference to the users at all.

The plan then called for the real programs to be shipped out via RS-232 to a remotely located IBM Personal Computer where the final imprisonment would take place. In alien RAM, no program designed for TRS-80 could function or escape. The prisoners could be sold as laborers in IBM byte mines, never to be seen again. It was, to say the least, a workable plan.

"So, this is a piece of IBM software we're trapped in, eh?" I commented after hearing his story.

"You've got it, and there's no way to get out."

Now, a software secret agent is trained to deal with deadly situations and, certainly, there can be nothing worse than being held prisoner in an unmarked memory location of an alien computer. So, I put my head to working. Thinking logically, I concluded illogic was the only thing that could save us.

I'd been eyeing the small table that was the sole furniture within the room.

"I've got it, Max!" I exclaimed

I entered my special Software Secret Service karate stance. (I learned it at the Academy for Advanced Studies in Applied Violence, Big Bear, California.) With an explosive blow and very expressive "Keeyaa!" I rendered the table in two halves.

"Always with the temper tantrums," muttered Max

"Observe," I said triumphantly.

Placing the two halves of the table together at the west end of the room created a (w)hole. Applied illogic in action, we climbed through the (w)hole and escaped into the corridor.

"Do you expect me to believe that we just did that?" Max demanded. The logical mind simply cannot grasp illogic, even when confronted with the reality the illogic has created.

"Of course not," I replied. "Simply adjust yourself to what your senses tell you and string along."

Quickly, we opened the door that held Irv prisoner. He was a massive muscleman who looked much like the picture on his little box. Opening three other doors, we found Zork, whom I met earlier in the year, and a furtive-looking little guy by the name of Timequest, whose debut in the adventure genre was foiled by the sudden massive onslaught of arcade games. Last, we found Madame Rosa.

She was a vision of loveliness — not at all like the unfemale who'd captured me. With cheeks slightly red, and long blonde hair, she was truly exquisite. I think I am in love.

"No time for that," barked Max as a whistle blew in the distance. "We have to go."

Leaving Timequest to free the other prisoners, we raced for the station.

We caught the last data train back across the RS-232 link and arrived safely in TRS-80 land. Madame Rosa, after a long and sumptuous goodbye kiss, took Irv and set off to reclaim her world. Max and I took a bus to the outskirts of high RAM.

High RAM was a wasteland. There were discarded bits and bytes everywhere. There was the presence of awesome power as well. I'd recovered my magical items from the stable behind Madame Rosa's so at least I was armed. Even so, as we approached the gateway to Twitch's abode, I was scared.

The portcullis was up.

It dropped with a clang behind us as we entered the courtyard.

The mighty and most evil Twitch was waiting for us. He was head and body taller than me or Max and looked to be ten stones heavier. Dressed all in black, with a crooked sneer across his face, he was the picture of villainy.

He loosed a brilliant blue fireball with such blinding speed that I barely had time to raise my shield. It exploded with such force that it shattered my magic shield to dust. The second fireball caught Max squarely in the chest, dropping him like rock. I squared off with the Sword of Zedek (the only defense I had left) but the wave of Twitch's hand disarmed me. He slung another fireball, this one red, which crackled like lightning around me, freezing every muscle in my body. He walked over and took me by the throat.

"Did you really think you could fight me?" he sneered as his grip tightened. "In everything, I am the supreme being in this world and no interloper can ever hope to stay the tide of my power."

Just as the hope of continued life began to fade with my consciousness, the sky turned red. Jagged forks of green lightning darted everywhere and thunder shook the courtyard.

"Poor little Twitch," came a musing voice from the heavens, so loud that it boomed, yet soft and gentle in its tone.

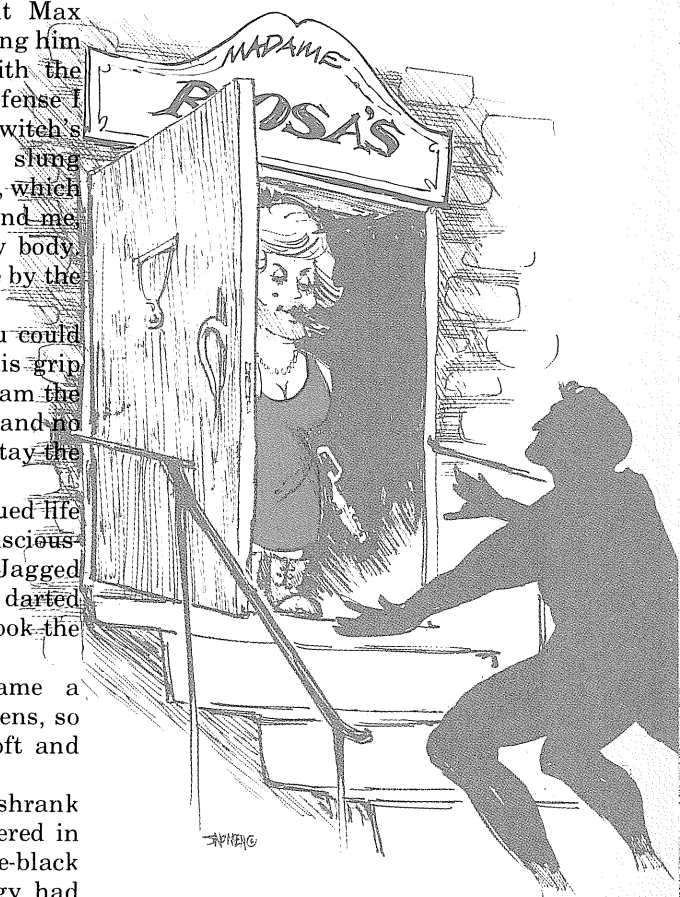
Twitch dropped me and shrank back in horror. There, gathered in the sky above, a massive blue-black swirling cloud of raw energy had

formed into the shape of a Viking warrior. When it fully solidified, it dwarfed not only us but the castle as well.

Twitch loosed a hail of fireballs into the cloud but they were absorbed harmlessly. He frantically summoned a horde of ragged, one-winged dragons and demons, ordering them to attack the spectre. The creatures took one look at their foe and split in the opposite direction.

The dark apparition laughed — a deep, booming chuckle that echoed through the valleys of high RAM like pealing thunder. Then it reached out with a gigantic hand and scooped up the beaten, frightened archvillain even with its massive face.

"You have disturbed the order of the world and committed crimes that must be punished," it said. "You will be imprisoned forever in ROM in a memory location unknown even to the original users. Poor, incomplete, twisted little Twitch, your power was an illusion. Now be gone."



So saying, the spectre loosed a mini-tornado of swirling blue-black clouds that bore Twitch within its funnel to his new prison.

Then turned his attention to Max and me.

"Who are you?" I asked in awe.

It chuckled again, seemingly in great amusement.

"I am the spirit of adventure," it said. "I am the composite life force of all the adventure programs that have ever been written on micros or mainframes. I was summoned by the circles of anguish uttered by Timequest, Earthquake, Curse of Crowley Manor, Madness and the Minitaur, Dragonquest and the countless other text-style programs that suffered at the hands of the merciless Twitch. With the help of your friend Professor Megabyte and the equations he fed me, I was able to come to your aid."

I was overwhelmed. Max was hurt and the Professor was nowhere to be found.

"I sense your concern, crusader,"

the Viking said. "Max will recover once he is safely returned to EPROM. The professor is locking the ROM cell imprisoning Twitch, and I must be going. But, one warning, user." (The clouds began to swirl and seethe in preparation for its departure.) "Do everything you can to keep adventure alive. Without the spirit of adventure guarding the realms of the universe, more Twitches will come forth, and yet more, until the very essence of computing will be swallowed in a sea of flickering pictures. Farewell!"

It departed in a massive rumble of thunder and the sky became a multi-colored whirlpool degenerating into black.

"Remember..." said the voice as it faded away to a whisper, "Remember..."

I closed my eyes for just a second to the intensity of the remaining light. When I opened them I was back in the lab, in my chair. Outside my window there was an intense thunderstorm, rare for New

Hampshire. Max's expando bow was lit, announcing him as being in residence. In the center of the room, in partial rez, like a snowy video picture, the professor was entering realtime.

A bolt of lightning struck a light pole about thirty yards from my window. The power dropped out completely, plunging the lab into inky darkness except for the green glow of the TRS-80 which we keep on emergency battery backup.

The snowy image of Professor Megabyte faded. As it did so, I could see that he was smiling. The disk drive booted and I saw the familiar image of the U.S.S. Enterprise flicker across the screen.

The lights came back on and the printer activated. I tore off the paper. The message read: Thanx for everything. Klingons beware. — P.M.

I looked at the label on the disk. It was Lance Micklus's Star Trek 3.5.

I smiled and gazed at the blank screen — upgraded at last. ■

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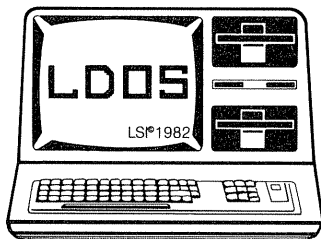
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The BASIC Answer

*You'll think you've made the DOS strike of the decade when you turn your micro on to LDOS. You'll find a bonanza of features like full keyboard type-ahead; a true background spooler; file backup by date, class, and between different drive types; hard disk support; data transportability between Model I and III; and a complete communications utility including disk file send and receive. Support for Radio Shack's Doubler and selected others is also provided.

With our Job Control Language, you get true "hands off" running of your application programs — give a single command and then walk away. The 400 page manual includes examples of all commands and utilities. The Operator's Guide gives you step by step instructions on how to use LDOS with your applications. Stop running with only "half" a computer! Let LDOS provide the missing features to speed up and simplify your TRS-80 computer system! Visit a dealer or contact LSI for more information on the most popular sophisticated operating system for your TRS-80.

LDOS is available worldwide through thousands of dealers for just \$129.

The BASIC Answer is a BASIC text processing utility. It is designed to allow the BASIC programmer to build code in a structured manner. "Source" code is written with a word processor or text editor which allows the user to exploit the powerful editing and movement features characteristic to those types of editors. Source code can even be created by your own BASIC interpreter. The BASIC Answer is then used to process these files into normal interpretive BASIC code.

Free Yourself from Line Numbers

The BASIC Answer allows substitution of labels for line numbers! This means that your BASIC code now can read like a novel. Instead of the typically un-descriptive "GOSUB 1000", a label such as "GOSUB @Search.Name" is used. Imagine yourself reading code filled with such descriptive branches and understanding it at a glance, even years later. This feature even allows totally relocatable BASIC routines without the renumbering problems.

TRS-80 is a trademark of Tandy Corporation. LDOS is available for the TRS-80 Model-I and Model-III. Prices and specifications subject to change without notice. LDOS and The BASIC ANSWER are products of Logical Systems, Inc.

```
ORLP:=2TOHA!PRINT@32,"primes found
FHA!/LP:=INT(HA!/LP!)THENGOTO48"CH
EXTLP:=IFVAL(FAS)=LO!THENFAS="* Pr
R!(CO%):=LO! on this scan"USING###
RS(CO%):=FAS LEN(FAS)-1)FORLO:=STIT
O%:=CO%:PS%:=PS%+1ELSEFAS=LEFTS(FAS
ORLP:=@TO10PRINT@,"factoring "US
RINT@64*LP!+192,PR!(LO%),PR$(LO%):
O%:=LO%-INPUT"ORIGIN OF SCAN":INS@
FLO%:=1IFVAL(INS)<2THENING###
EXTLP: ST:=INT(VAL(INS))###:PS%:R
O%:=CO%:INPUT " END OF SCAN":INS@
FCO%:=1LEN:=INT(VAL(INS))IMPR!(10),
FHA!/LP:=INT(HA!/LP!)THENGOTO48"CH
EXTLP:=IFVAL(FAS)=LO!THENFAS="* Pr
R!(CO%):=LO! on this scan"USING###
RS(CO%):=FAS LEN(FAS)-1)FORLO:=STIT
O%:=CO%:PS%:=PS%+1ELSEFAS=LEFTS(FAS
ORLP:=@TO10PRINT@,"factoring "US
RINT@64*LP!+192,PR!(LO%),PR$(LO%):
O%:=LO%-INPUT"ORIGIN OF SCAN":INS@
FLO%:=1IFVAL(INS)<2THENING###
EXTLP: ST:=INT(VAL(INS))###:PS%:R
O%:=CO%:INPUT " END OF SCAN":INS@
ORLP:=2TOHA!PRINT@32,"primes found
FHA!/LP:=INT(HA!/LP!)THENGOTO48"CH
```

A New Concept in Variable Usage

The BASIC Answer allows variable names to be as long as 14 characters and ALL 14 are significant. Imagine reading:

```
"IF ACCNT.OVERDUE #>
0 THEN GOSUB
@PRINT.DUN"
rather than
"IFA0#>0THEN
GOSUB52130"
```

Which would you rather read? It also introduces to BASIC the concept of Global and Local variables. This feature circumvents the tedious problem of variable tracking because a Local variable is only viable in its own subroutine!

NOW AVAILABLE
LDOS 5.1 Quick
Reference Card
- \$5.95.

End the Multiple Machine Hassle

The BASIC Answer introduces the concept of "Conditional Translation." This feature allows the programmer to place different "machine dependent" code simultaneously into the same Source Code.

The BASIC Answer can be "switched" when processing to ignore the unwanted or include extra code! No more multiple master programs to confuse maintenance. All the masters could now be rolled into the same program. Modify the one master and you've modified them all. Process the same code with different switches set, and get two or more versions from the same source.

The BASIC Answer combines the self-documenting power of COBOL with the relative ease of BASIC together with the power of a word processor.

The BASIC Answer is available for just \$69.00.

* The BASIC Answer requires the LDOS Operating System.



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*Certain features of LDOS require specific hardware.

Super

Data base management and more

Models I/II/III/16, or any CP/M system

Sal Navarro, East Rutherford, NJ

Super™ is the Institute for Scientific Analysis, Inc.'s (ISA's) version of a data base utilization system. The reason I did not use the term data base management system is that it is much more than that. It is a combination of a spreadsheet calculator, report generator, card filing system, journal, ledger book and all around general purpose business program rolled into one. Super makes full use of the computer power, storage capabilities and utilizes today's programming techniques to free you from the drudgery of old-fashioned filing. This is how I came up with my definition for Super, which is: scientifically designed user's program for the employment of records.

Any type of record that can be put into a form of one type or another can be stored, retrieved or manipulated by Super to give you the exact type of output that the operator desires. It was designed to be user friendly not only for the secretary or clerk, but a powerhouse of information at the fingertips of any top executive in any organization.

System Requirements

Super can run on any TRS-80 Model I, II, III and 16 or any CP/M based system. The Models I and III require 48K of memory, one disk drive and either TRSDOS, LDOS, DOSPLUS or NEWDOS/80. If you have one of the CP/M boards (such as the Freedom) installed, you can also use the CP/M version. The Model II requires 64K of memory, one disk drive and either TRSDOS or CP/M. Model 16 requires 128K of memory, one disk drive and TRSDOS. CP/M systems require 48K of memory below the operating system and a cursor-addressable terminal, one disk drive and MBASIC 5.21. At present, all the versions are

written in BASIC and cost \$250 for the TRS-80 models and \$295 for the CP/M versions.

Documentation

Super's documentation comes in a standard looseleaf binder with eighty pages of information on the how to's, what to's and the why's of the system. The clearly-written, user-oriented documentation takes into consideration that many users have no prior computer experience or programming knowledge. There are numerous examples in each section to help the beginner. Sample data bases, reports and suggestions are detailed so that you will get the most out of this program. Besides the standard table of contents in the front, there is an index report in the back, complete with item and page number. Throughout the manual, references are made to the different examples and figures in the book. For someone with prior data base experience, this may prove to be a little boring.

After reading the manual once, I pulled out the page listing the different field types and set up my data base for a trial run. The entire program is menu driven and it is almost impossible to make an error. In most cases, even if you did, the error trapping is so extensive that it wouldn't be a disaster since you still get a chance to go back to the main menu. I was amazed at how much I could fit into 255 bytes using Super's compression code. There are some typographical errors in the manual, but they are nothing that will give you any false, or missing, information.

The Program

Super, in its present form, will allow you to have up to forty fields with a record length of 255 bytes

that can span up to four drives per file. The 255 bytes does not mean that you can only have 255 characters in each record. By taking advantage of some unique programming methods, you can actually get up to 300-500 characters when printed or displayed. An example of this is that dollars, up to plus-or-minus 9,999,999.99, take up only four bytes of disk space and a phone number takes up 13 characters to display, but only four bytes of disk space. By this means of compression, you can theoretically have a maximum number of 131,068 records on four disks of a Model III.

The maximum file size is 32,767 records. Each field name can have up to twenty characters, with the exceptions of the Model I and III which are limited to seventeen characters. There are twenty field types in Super which are selectable by the operator. They are shown in Table 1.

Startup

The first thing that must be done, as with any program you buy, is to back it up and only use the backups. That lesson I learned a long time ago when I owned a Model I. With a data base, you should have at least two copies of your files. This is to insure that if Murphy decides to pay you a visit, you will still have most of your files intact and only have to add what was lost from his visit. The next thing should be to plan ahead as to what information you want stored in the files. You will need to know how many fields you will need, what type of fields they are to be and how long they are to be. You are now ready to set up your data base.

Form

After you have entered the fields that you will be using, you will be asked if they are correct. If you say

yes, you can start to lay out the screen input. If, for some reason, at a later date you find that you have left out some information that should be there, all is not lost. You can open a new file with the missing field added and then copy your present file across to the new one and add the missing information instead of having to reenter all of the data.

The screen inputs ask the operator if he wants to use the header. If you answer yes, you must place it where you want it on the display. You are asked if you want a printed report of all your fields and the type of input,

number of characters, and what the display will look like. You can get a complete printout of what you have designed and what it looks like on paper. You are now ready to enter what you want, or to set up a new data base for later use.

Highlights

Super is completely menu driven. Even after you activate something from the menu, you are still given a chance to change your mind, especially if it involves editing or deleting. By use of a machine language routine, Super will sort any

file (by any field) numerically, in ascending order — even files that are too large for your computer's memory. The files that are too large will be automatically merged when the sort is completed.

Production input is a single key entry when activated. Just press ENTER and the information is carried forward to the new record without any more input from the keyboard. You only have to enter data to the fields that are not designated production input fields. The user is able to access records for editing, review by record number, key field or binary search. Imagine having forty fields and you can key in on, and search for, any one of them. Selecting by last record, previous record, next record, field criteria, comparison and more than one criteria are also allowed.

You have the ability to mass edit and purge the files. You are still given a second chance to change your mind in case you hit the wrong key. Assume that even after the second chance is gone and the record has been deleted, you decide that you shouldn't have done it. All is not lost. There is a restore process that will bring that record back from never never land if you have not condensed the records. That is another sleeper hidden in Super. You can search, edit or delete through (or to) a particular record. When you are entering into the fields, there is an automatic character rejection if it does not conform to what you have set up the data base to accept. Super can not only add, subtract, multiply and divide any number of constants, but can set up to ten sets of forty equations in a calculations file. The file can be stored on disk, ready to be used with the appropriate selectors.

The ability to merge files, or append them, is another nice feature of Super. If you decide to use Super in connection with an accounts receivable package, for example, you should set up a key field that possesses the same type and length so that you can make use of the posting transactions feature which is a part of Super. While printing, the users can use any specified page title and headers they wish, including an additional line of comments limited

Table 1

#	Field Name	Type/Bytes	Comments
1	1 Digit	1/1	
2	2 Digit	2/1	Numbers one through nine are for numbers of fixed length which can be used to make custom fields by the use of the dash which will enable you to combine one or more fields separated with a dash. This can be very useful when recording social security numbers and inventory numbers. It can also be linked to a previous field for the purpose of printing and/or triggering subtotals or totals.
3	3 Digit	3/2	
4	4 Digit	4/2	
5	5 Digit	5/4	
6	6 Digit	6/4	
7	7 Digit	7/4	
8	8 Digit	8/4	
9	9 Digit	9/4	
10	Byte	B/1	Any number from 0-255.
11	Integer	I/2	Any number from -32768 to +32767.
12	Floating Point #	F/4	Six-place accuracy.
13	Dollars	\$/4	+/-9,999,999.99
14	Percent	%/1	0 to 100%
15	Alphabetic	A/2	Length must be even. Packs 3 to 2.
16	Printable	P/3	Must be divisible by three. Packs 4 to 3.
17	Any Literal String	L/1	Anything for speed.
18	Date MM/DD/YY	D/2	Only real dates and 00/00/00.
19	Telephone #	T/4	Checks for area code.
20	Codes	C/1	Eight on/off codes.

to eighty characters. The user can define the horizontal format (with, or without totals) and which fields they want printed. If what you have selected comes to more than 255 columns, it will not be printed and the screen will display "oversized report" and return to the report format menu to start over. We all have a tendency to get greedy sometimes.

Super can also print standard one-up labels. All reports can include the math functions including totals and subtotals.

A shortcoming of the print routine is that you cannot save file formats for later recall. There is no option for a footer, or special printer codes. As of this writing, Super has been interfaced with Scripsit, SuperScripsit and WordStar. I am told that they are working perfectly with Super, but I have not seen them.

Upcoming Features

By the time you read this, ISA has told me, it will have some

improvements to Super. You will be able to set up to ten indices for each data base. These will include either a complete index of records or selected records to be accessed. Store formats for later use and also access them from the indices. Super will be interfaced with some other popular programs, such as VisiCalc, Supercalc, Newsprint, and some of the popular data base managers. It will have the ability to read and write random and sequential files for later use with your BASIC programs.

A new report generator will allow headers and footers to be in free form format, while the column format fills the body of the report. The headers and footers will come from one record of a master file and the detailed column information will come from another file. This will give the operator additional freedom to create invoices, bills of lading, statements, and so on.

There will be a revised routine to allow you to insert, or delete, a field

even in the middle of the data base structure. The record size will be virtually unlimited.

Super is the first data base system that I was able to use (not fully) without a long, drawn out learning process. The display prompts are a valuable asset when you have to change from program to program. Another great feature is that I can use it on a number of different systems, with different operating systems, and still be at home with it.

For a program that is so powerful, it is amazing that it is so simple to use. With a little studying, I have been able to do things with one program that used to require many. With the added features that are coming, I feel that Super will fast become the data base system to top. Like they say on television, "Try it. You'll like it." ■

Super is available from the Institute for Scientific Analysis, Inc., P.O. Box 7187, Wilmington, Delaware 19803, (215) 358-3735. \$250 for TRSDOS. \$295 for CP/M.

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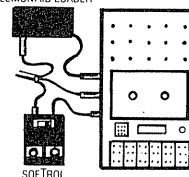
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FAST - To demonstrate SUPER's speed, ISA retained a professional dBASE programmer to benchmark SUPER vs. the acknowledged leader. A simple mailing list application was chosen to minimize dBASE programming cost. The results:

Task	SUPER Time	dBASE II Time
Set up/Program	5:20	12:18:00
Input 100 records	50:29	1:27:50
Sort & Print Labels	6:41	4:18
Totals	1:02:30 hrs.	13:50:08 hrs.

Notice that SUPER was faster at every task where *your time* is involved—and saving your time is probably the whole reason you bought a computer.

EASY TO USE - SUPER won because of its ease of use. Since it is menu-driven, office personnel can easily learn to use SUPER to set up their own applications, speeding and simplifying dozens of tasks without the need of programmer support.

VERSATILE - SUPER, unlike other business programs, doesn't dictate how to run your business. With SUPER the computer does what *you* want, when *you* want, the way *you* want it. **SUPER may be the only business program you'll ever need.** It can handle customer files, payables, receivables, depreciation, appointments, cost accounting, time charges, commissions, inventory, manufacturing control, and even matrix accounting systems!

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That SUPER beats the \$700 dBASE program may surprise you, but in terms of price vs. performance SUPER has no competitors. Among its features are: production input, data compression, multiple databases on line, transaction posting, file reformatting, stored arithmetic files, flexible report formats, hierarchical sort and multi-disk files for up to 131, 068 records. It can select by ranges, sub-strings, and field comparisons. It interfaces to word processors such as WordStar™, SuperSCRIPTSIT™, Model II/16 SCRIPTSIT™, and NEWSRIPT™. In fact SUPER has so many features that

it takes a six-page product description to cover them all. Write or call and we'll send you one.

SUPER is available for TRS-80™ Models I & III under NEWDOS™, LDOS™, and DOSPLUS; for TRS-80 Models II, III and 16 under TRSDOS™; and CP/M™ systems.

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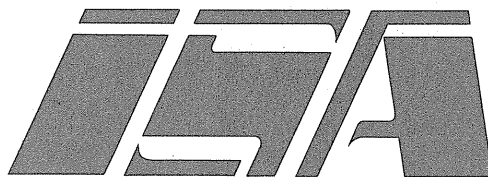
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March, 1983 **79**

Tandy topics

The new Model 12

Ed Juge, Director, Computer Merchandising
1500 One Tandy Center, Fort Worth, TX 76102

Well, it's time for the news I wanted to tell you last month, but couldn't because the magazine mailed a few days too early. By now, I suppose, most of you will have seen the news. The TRS-80 Model 12 is a work-alike and somewhat of a look-alike to the very popular Model II. The most obvious differences are the new style keyboard, green video screen, the double-sided slim drives, and 80K RAM[†] (the extra 16K required to use TRSDOS 4.X, our double-sided drive operating system.) Of course, every existing Model II program will operate on the Model 12. You've heard me forecast a long life for the single user Z-80 computer, specifically Model II, with the caveat that we reserve the right to make cosmetic changes or enhancements. Well, here's the proof! The one drive, 80K price is \$3,199, the two-drive model is \$3,999, and the 12 does replace the Model II.

The 12 is still a single CPU, Z-80A, single-user computer. It's fully upgradable to a Model 16. I'm also pleased to say that we've changed to Model 16's "fawn gray" color, since it was so well received by owners and the press.

Externally, aside from color, the 12 has a new lower-profile look. Internally, the computer is a two-board system, with a main board and a video board. Expansion is via an optional internal expansion card cage, at \$199. The cage allows seven boards to be plugged in by the user, through an access panel on the back of the computer. So far, we expect only the hard disk and Arcnet boards to require in-shop installation. (By the way, that seven is up from four open slots in Model II.) Model II expansion cards will also work in the Model 12. The rear panel of the 12 carries the connectors as in

the II; printer, expansion bay, and two RS-232 ports.

The computer will be delivered with two versions of TRSDOS, 2.OB and 4.X. I say "X" because we're not sure what the release version will be called, probably 4.2. You can boot under 2.OB, remove the disk and run any Model II, 2.OA program. The difference is a utility called "Thinline" which makes 2.OB work in the thinline drives *although still single-sided only*.

If you prefer, and disk space isn't at a premium, you can simply copy "Thinline" to your applications disk and execute it. It will turn a TRSDOS 2.OA disk into 2.OB.

So, why a Model 12? Well, obviously, the slim double-sided drives had become available. By incorporating them and gaining some cost advantages from two-board configuration, we were able to offer double disk space of the \$3,495 Model II for \$3,199. And, the equivalent of a four-drive Model II system becomes \$3,999 instead of \$5,849. In the process, we gained a slightly lower profile (better looking) package, the new low-profile sculptured keyboard, and the Model 16's green screen everyone likes so well. When you upgrade your 12 to a 16, you'll have a 16, thinline drives, green screen and all. But, we've retained the ability to run all Model II software as is and we think that's really important! We expect the one-drive models to be used by hard disk owners. Non-hard disk systems should contain two floppy drives.

Double-sided drives aren't a panacea. You get more space and, in general, you can "FCOPY" single-sided programs to TRSDOS 4.X for double-sided use. But, if your application called for a three-drive



Model II and swapping disks during execution of the program, you may still need three since you can't swap one side of a double-sided disk.

We plan to continue software distribution on TRSDOS 2.0B, as there are lots of Model II owners, and II's upgraded to 16's with single-sided drives. We intend to continue to support those folks fully.

12MB Hard Disk Drives

Our other new product is an all new 12-MB hard disk drive. It's a 5 1/4" drive, externally identical to the 5MB drive we have found for Model III. Unformatted, these drives are 14MB, and formatted, the primary drive is just under 12MB and the secondaries are 12. The first drive will sell for \$3,495, with the secondaries for \$2,495. We will continue to offer 8MB secondaries for some time, for those owners who want to add additional hard disks. The 8 and 12 are not interchangeable in the system.

Both of these exciting new products were formally introduced

on the 19th of January.

Color Computer


Color Computer owners: Did you see the Stephen Spielberg movie, Poltergeist? Those who have, agree it's one of the scariest and best thrillers to come down the pike in a while! As you probably know, we've cooperated with MGM to bring you a program pak game based on the movie. It's been out for some months, so why bring it up now? To make the point that it's one of the most exciting and challenging games we have. Talking to our avid game players here in Tandy Center (and some in the field), I haven't found anyone who has completed all three levels. I came within one single "shot" in level three once, but wasn't able to make it. I guarantee, Poltergeist isn't one you'll master and put away! If you haven't tried it, do!

And while you're at it, look at our sale on color disk drives. There's never been a better time to expand your system. We now have Pilot, and

Logo on disk, along with Spectacular, Scripsit, and more. Disk Scripsit allows you to display upper- and lowercase letters on the screen. "Sands of Egypt" is a new disk adventure game for CC owners, and it's outstanding. Rather than just a description of your surroundings, the scene is pictured on your screen! Shades of things to come.

If you haven't bought your Color Computer yet, now's the time! All Color Computer models have been permanently reduced to \$100 below our RSC-8 catalog prices. Yep, you can find some cheaper color machines, but when you add up all the facts (power, cost of expansion, features), we still think TRS-80 is your best buy! Before you spring for a cheaper razor, check the cost of those blades.

Throughout 1983 we'll continue to bring you new and innovative hardware and software products. If you think TRS-80 is an outstanding family of computer products now, it's gonna get even better this year! See you next month. ■



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Basically BASIC

User-defined string functions

For all models

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In the last issue, we discussed how user-defined functions work and experimented with numeric functions using single variable arguments. Now, we'll go a step further and discuss multiple variable arguments and user-defined string functions. First, as a review, let's look at a function that rounds to the nearest cent. If you have trouble understanding it, you should probably read last month's Basically BASIC before proceeding.

Using a Function for Rounding

A standard formula for rounding to the nearest cent (for non-negative numbers) is $RN = INT(A * 100 + 0.5) / 100$. We can define this as a function: `DEF FN RN(A) = INT(A * 100 + 0.5) / 100`.

Now, any time we want to round a number to the nearest cent, we just call the function and use it as a variable. For example, suppose the program has calculated the dollar sum of 26.3278 into variable K7. The PRINT statement: `PRINT FN RN(K7)` would give us the rounded number 26.33.

Multiple Variable Arguments

We will frequently want a function to use a number of variables to perform a calculation. In this case, we first name (in the definition argument) the variables we want passed to the definition expression. Secondly, we write the definition expression to use these variables to perform the calculations, and last, we make sure that our calling argument contains the proper infor-

mation (in the proper position) to pass to the function for calculation.

Here's an easy example. The formula for the area of a rectangle is $A = L * W$. Let's write a function to calculate the area and name it AR. We define the function with the statement: `DEF FN AR(L,W) = L * W`. Read this "define function AR of L and W equals L times W."

Let's assume we are working with a rectangle which has a length of 10 and a width of 5 (the area will be 50). When calling the function, we can use in the calling argument: (1) Any variables to which we have assigned the length and width values. If they were L and W, we could call and print the value of the function (50) with the statement: `PRINT FN AR(L,W)`. But the calling argument variables don't have to be the same variables we used in the definition. For example, if our program assigned the length to variable J and the width to variable Q, we could call the function and print its value with the statement: `PRINT FN AR(J,Q)`. (2) We can also use constants for the values of length and width. Printing `FN AR(10,5)` will give us the result 50.

User-defined String Functions

The TRS-80 also allows us to write user-defined string functions. This gives us a lot of power in manipulating strings.

Let's define a string function as `DEF FN A$(X$) = X$`. We read this "define function A\$ of X\$ as (or equal to) X\$."

Suppose we have a number of strings assigned to variables S1\$,

etc., as follows: S1\$="STRING 1", S2\$="STRING 2", S3\$="STRING 3".

To illustrate the use of a single variable argument, we can print these strings by calling our function and using the variable of the string we want to print as the function's argument.

For example, to print "STRING 2" we use the statement: PRINT FN A\$(S2\$). (Just printing S2\$ would have been simpler, of course, but then we wouldn't be learning about functions.)

What happened? When we defined our function (DEF FN A\$(X\$)=X\$), we told it, in effect, "Whenever we call this function (FN A\$), take the value we assign to the argument in the call and use it as we have specified in the definition expression." In this example, the definition expression is the same as the argument (X\$); so, whenever we call the function, it will return the string we specify (name) in the argument of the call.

Now, let's modify this example slightly to print the elements out of a string array. Let's use the array B\$ and assume we have assigned the strings: "ELEMENT 1", "ELEMENT 2", . . . "ELEMENT 9" to elements 1-9. Using a FOR...NEXT loop, we can print these strings as follows:

```
110 DEF FN A$(X$) = X$
120 FOR N = 1 to 9
130 PRINT FN A$(B$(N))
140 NEXT N
```

This prints a column starting with "ELEMENT 1", and ending with "ELEMENT 9". We called the function from a PRINT statement and by using the variable B\$(N) in the call argument, we asked the function to return the value of B\$(N).

String Manipulation

One of the most common uses of user-defined string functions is the manipulation of strings. The Microsoft people were nice enough to give us several predefined functions to do this, such as LEFT\$, MID\$, VAL, LEN, STR\$, etc. Let's start with an easy example of manipulating strings in user-defined functions. We'll define our function to return the first character on the left of a string. For this, we will use the

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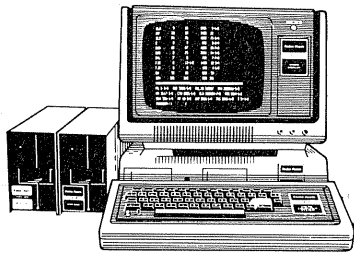
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Basically BASIC

LEFT\$ function: LEFT\$(ANY\$, 1).

Now, let's put this into our own user function: DEF FN UF\$(ANY\$) = LEFT\$(ANY\$, 1). Read this as "define the function UF\$ of ANY\$ as the first character on the left of ANY\$." If we have the variable FI\$ = "FRANK," printing FN UF\$(FI\$) will give us "F," the first letter of FI\$.

Multiple Variable Arguments

The process by which we combine strings has the fancy title "concatenation." It combines strings using the "+" sign to join them. For example, if we have FI\$ = "FRANK" and LA\$ = "SMITH," we can concatenate and get "FRANK-SMITH" (one word —Ed.) as the variable NA\$ by stating NA\$ = FI\$ + LA\$. To put in a space, we can add the string " " (note that this space is a string) in the middle as follows: NA\$ = FI\$ + " " + LA\$. In this example, we have concatenated three strings (FI\$, the string " ", and LA\$, into NA\$, which becomes

"FRANK SMITH".

Now, let's define a function to do this: DEF FN C\$(A\$, B\$) = A\$ + " " + B\$. We defined function C\$ of A\$ and B\$ as A\$, plus space, plus B\$. To call and print the function, we: PRINT FN C\$(FI\$, LA\$) and we get "FRANK SMITH".

Now that we have used both the predefined LEFT\$ function and the concatenation process, let's define a function to combine them and print Frank's first and last initials, separated by a period. Again, we'll use the variables FI\$ = "FRANK" and LA\$ = "SMITH": DEF FN I\$(X\$, Y\$) = LEFT\$(X\$, 1) + "." + LEFT\$(Y\$, 1).

Here, we have defined function I\$ of X\$ and Y\$ as the first character on the left of X\$, plus a period, plus the first character on the left of Y\$.

When we call and print the function "PRINT FN I\$(FI\$, LA\$)" we get "F.S." A small step for man, perhaps, but a big step for someone who knew very little about user-defined functions. ■

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In the chips

It's all done with switches

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Spencer Hall, Associate editor

Last month, we described how easy it is to represent any number from 0 to 255 with eight wires that either did, or did not, carry a small electric current. Our last thought was a puzzling one, to wit: Your TRS-80 does everything simply by using combinations of these 256 numbers (don't forget zero!). If you were interested and ambitious, you copied a simple BASIC program which gave you an excellent "feel" for the bits in a byte. We also introduced you to many other things you should know.

This month, there's another BASIC program to key in. You'll discover that copying machine language programs from a magazine is a whole lot easier than copying BASIC programs. First, however, let's discuss the most powerful computer in the whole world . . . the human brain.

The brain, if I remember Psychology 101 correctly, has three major modules which probably appeared, one after the other, in the evolution of homo sapiens. These were, in order of their appearance, the medulla oblongata, the cerebellum, and the cerebrum. It's the cerebrum which distinguishes man from the lower animals. This rather recent add-on to the system gave man power to respond to sensory input by making decisions and plans. It gave him the power to think thoughts and to express these thoughts in external symbols.

It was after this latest upgrade arrived via angelic UPS from the Heavenly Hardware House that man learned to write. One man could paint pictures on cave walls, poke patterns into clay tablets or ink strings of alphabet characters on vellum. Another man could then look at these symbols and read their meaning.

The latest of many advances in man's use of writing

has occurred during our lifetime. Using only numbers, we now write with electricity. Electronic circuits translate these bytes into the symbols they represent and display them on a cathode ray tube, a dot-matrix printer or what have you. Using bytes as the numbers which they are, and not as letters, other circuits can perform any conceivable kind of arithmetic with them.

All this is possible because we have a "thinker" in our heads capable of handling symbols and a memory in which to store them. To use numbers, a computer needs two similar pieces of equipment. The "thinker" of a computer is called a processor. This is nothing more than a massive array of switches (how else do you turn bits on and off?) arranged in a complex pattern. One switch can turn another switch on or off, producing endless on-off patterns. In this way, a processor can create bytes, consult memory, read bytes coming in along data lines from other pieces of equipment, etc. In a microcomputer, the processor is, naturally, a microprocessor. Its many switches and the intricate network of lines which connect them are laid out on huge drawing boards and reduced photographically to microscopic size. This tiny image is photo-etched on special material in such a way that the image of a switch actually becomes a switch and the image of a "wire" actually becomes a path for current. The whole thing can then be encased in plastic to create what we call a chip.

A memory chip, on the other hand, contains thousands of different paths through which electric current can either pass or not pass. Just as it takes an eight-wire bus to carry eight-bit bytes, it's common to use eight memory chips in a row to store them. A bank of eight memory chips can store as many bytes as each chip has current paths for single bits. If each of the

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In the chips

paths through the chip are simply connected or disconnected, it is a ROM (read-only-memory) chip. The connections or disconnections (high or low, one or zero) are always there and can't be changed.

The kind of memory chip in which these paths can be turned on or off has a switch for each location and is called a RAM (random access memory) chip. That's a misleading name. The microprocessor can, and does, access any location in a ROM, so ROMs could also be properly called RAMs. A better name would be RAWM (read and write memory). Too bad it doesn't sound so good!

All these switches operate hundreds of thousands of times every second! But what mysterious force causes them to operate? Every device for processing letters or numbers must have some kind of motion. Something has to happen over time. Why don't all those switches just lie there set in a certain pattern? The answer is a little sliver of quartz. When a current is passed through the quartz, it "oscillates." It sends out electrical pulse millions of times a second. It's basically the same as that gadget which beats time in your electronic wristwatch. Each pulse operates the switches, which operates the switches, etc., etc.

For convenience let's call the microprocessor a CPU. This means Central Processing Unit. That's an old term from the world of huge multi-million dollar computers. By itself, the CPU can't do a thing. There must be a string of bytes in memory which tell the CPU what to do. It switches to these bytes one after another and does what the bytes tell it to. The location of the current instruction byte is kept in a special memory inside the CPU called the program counter or PC register. It's increased by one after each instruction byte is read. This location is a number called an address and it switches the computer to a location in memory.

With thousands of memory bytes, it's obvious that numbers larger than 255 are needed. For such purposes, the CPU can put two bytes together and treat them as one number. The PC register is a two-byte register. Bit values go right on doubling across the second eight-bit byte. From right to left in the first byte, we learned the bit values were 1, 2, 4, 8, 16, etc., through 128. In the second byte, bit values go 256, 512, 1024, and on up to 32768. Add all sixteen of these bit values and you get the largest number, 65535, which an eight-bit microprocessor can handle. Just as the two halves of an eight-bit byte can be thought of as four-bit bytes with maximum value of 15 each, we can break this second byte in two and represent each half by a digit from 1 to F. The letters A through F, remember, represent numbers 10 through 15. Two byte numbers can be represented by four hexadecimal digits. That's a lot easier than writing all those zeroes!

Two Byte Hex, this month's BASIC listing, is a routine to help you understand what we have just said. Use Two Byte Hex to see any number you choose converted first into bits and then into hexadecimal representation of those bits. The display will make the logic of two-byte hexadecimal numbers very clear. Experiment until you are at home with hex notation... it won't take very long!

Loading Those Machine Language Programs

Now you're ready to copy machine language programs from what are called side-by-side printed listings. Why not try the program on page 87 of the October, 1982 issue of *80-U.S.*? You'll need a monitor. A monitor is a program which lets you type in hexadecimal code and then store the resulting program on tape or disk. The best monitor for copying machine language, object code, is the TRS-80 classic, TBUG. Since you can't buy it any more we'll use DEBUG. The tape version of DEBUG is readily available in Radio Shack computers centers and the disk version is part of TRSDOS.

The hexadecimal digits in the two columns at the left of the listing are all you need to consider. Ignore everything else. You should also ignore any line which does not have hex digits in the second column. The four digits in the leftmost column are addresses where instruction bytes should be placed. The variable length hex numbers in the second column are actually pairs, although it is not customary to separate them. Each pair represents a byte. The first pair goes in the address printed at its left. The next byte on the same line, if there is one, goes in the next sequential address (not the next address printed in the first column). You'll note that when there is only one pair of digits (one byte) at an address, the next printed address is the next hex number. If there are four digits (two bytes) then the next printed address is two numbers higher, etc.

Get into DEBUG by following the instructions in the front of the manual. Press "D" and type the four digit hex address of the first line of the listing which contains hex code. Now press the space bar. The area of memory in which your program should go will appear on the screen. Ignore the stuff in the bottom half of the screen. Press "M" and enter the first address again using the space bar. In place of the "M = ADDRESS" you'll see a two-digit hex number. This is the byte which is now at that address. It is followed by an equal sign. Type the first two digits of code from the second column and use the space bar to enter them. Like a miracle, your two hex digits appear above . . . exactly where they belong. Now the next two digits appear below, ready to be replaced by the next two digits from your listing. Just keep on until you're done.

Remember, every entry you make must consist of exactly two hex digits . . . no more and no less. Be sure to proofread your work from time to time. Get used to using the space bar to enter bytes, not the ENTER key. If you slip up, proceed as follows: Re-enter "M" and enter, from the screen display, the first address of the line on which you were working. Now, enter "D" and enter that address again. Using the space bar without changing correct bytes, simply "walk" down the line to where you left off. Messy! That's why TBUG is better. The current address is always shown! In all fairness, though, we must admit that for many of DEBUG's more serious purposes, it is far better than TBUG. We'll learn more about that in later articles.

Tape DEBUG resides at 4332H (the H means hexadecimal) to 493FH, so you can't enter a machine language program in this part of memory without

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Program Listing for Two Byte Hex

```

5 CLS: CLEAR 1000: GOTO 200
9 Z$=INKEY$: IF Z$="" THEN 9 ELSE RETURN
10 '--- CONSTRUCT "" AND 1/0 VERSIONS OF
    BINARY NUMBERS ---
20 T=128
30 A=B/T
40 IF A<1 THEN B$=B$+"-"+STRING$(
    (4,32):BT$=BT$+"0":GOTO 60
50 B$=B$+"*"+STRING$(4,32):BT$=BT$+"1":B=B-T
60 T=T/2: IF T<1 THEN RETURN ELSE 30
80 '--- CONVERSIONS
    (D=DEC: H$=HEX: LS/MS=(8-BIT NOTATION)) ----
100 DEFINIT H: H1=D/4096: I=D-H1*4096
    :H2=I/256: I=I-H2*256: H3=I/16: H4=I-H3*16
110 IF H1>9 H1=H1+55 ELSE H1=H1+48
120 IF H2>9 H2=H2+55 ELSE H2=H2+48
130 IF H3>9 H3=H3+55 ELSE H3=H3+48
140 IF H4>9 H4=H4+55 ELSE H4=H4+48
150 H$=CHR$(H1)+CHR$(H2)
    +CHR$(H3)+CHR$(H4): IF LEFT$(H$,2)="00" THEN
    H$=RIGHT$(H$,2)
170 MS%=D/256: MS=MS%: LS=D-256*MS: RETURN
200 CLS: INPUT "ENTER A POSITIVE INTEGER (65535
    MAXIMUM)"; D
210 IF D>65535 THEN 200 ELSE GOSUB 100
230 B=LS: GOSUB 20 : BL$=BT$
240 BT$=""
250 B=MS: GOSUB 20 : BM$=BT$
260 BT$=""
270 B1$=RIGHT$(H$,2): B2$=LEFT$(H$,2)
280 PRINT: PRINT: PRINT TAB(41)"MSB" TAB(54)"LSB"
285 PRINT "BINARY REPRESENTATION OF "D" IS: ";
287 PRINT BM$: CHR$(197): BL$
290 PRINT "SPLIT INTO HALVES, THESE
    ARE: "; CHR$(201);
300 PRINT LEFT$(BM$,4): " ";
    RIGHT$(BM$,4): CHR$(196);
    LEFT$(BL$,4): " "; RIGHT$(BL$,4)
305 PRINT TAB(0)"HEX. VALUES FOR EACH FRAGMENT
    ARE: " TAB(40) LEFT$(B2$,1) TAB(45) RIGHT$(B2$,1)
    TAB(53) LEFT$(B1$,1) TAB(58) RIGHT$(B1$,1)
310 PRINT TAB(0)"DECIMAL VALUES OF THESE BYTES
    ARE: " TAB(41) MS TAB(54) LS
320 PRINT TAB(0)"HEX VALUES FOR EACH BYTE ARE:
    " TAB(42) B2$: CHR$(203): B1$
330 PRINT "HEXADECIMAL EQUIVALENT OF "D"
    IS: "; CHR$(204): H$
340 GOSUB 9
350 GOTO 200
    
```


DOSPLUS II

A powerful alternative for the Model II

Model II, II/16, 12

Pete Carr, Port Orange, FL

When I received DOSPLUS II the first obvious difference was speed. It boots up much faster than TRSDOS. After booting, you are greeted with the DOSPLUS II logo followed by the Date and Time prompts. DOSPLUS II allows use of the shorter 01/01/82 date format or the 01/01/1982 format of TRSDOS. You are even allowed to enter the date like 1/1/82 if you want, or just press ENTER if you don't care to enter any date. If that's not versatile enough, 1,1-82 1:1:82 are all legal. The DOSPLUS II command line evaluation is much less constraining. If you reset the system you can keep the date in memory by pressing <BREAK> in response to the DATE prompt. For those special programs where the DATE and TIME don't matter you can use the SYSTEM command to disable the prompts from appearing. A versatile command evaluation is used throughout the system and is a strong point of DOSPLUS II.

At DOSPLUS II Ready, I typed: `dir :0` to give me a list of the files on the disk. Notice that 'dir' was entered in lowercase. Unlike TRSDOS, DOSPLUS II allows you to use upper/lower case or even a mix for DOS commands. For example, I could have entered the command like `DIR`, `dir`, or `Dir`, etc. Multiple commands are allowed on the same line by inserting a semicolon (;) between them. The semicolon acts as an ENTER. Example: `DIR :1;DIR :2<ENTER>` would execute both commands without any further user action.

DOSPLUS II gives you more disk space than TRSDOS 2.0. It still uses 76 cylinders per single-sided floppy, but each cylinder has more sectors. A nonsystem-formatted DOSPLUS

II single-sided disk has a total of 568K available compared to TRSDOS 2.0b's 480K. I also appreciate the fact that DOSPLUS II will let me use both sides of my double-sided slimline drives.

A Format and Backup test forced both systems to do a full disk backup by using the CREATE file feature found in both systems. The reason for my doing this is that if both disks were not full the backup times wouldn't have been representative. Even after doing this, the format backup comparison test is still slanted in TRSDOS 2.0's favor. DOSPLUS II gives the user more sectors per cylinder and DOSPLUS II has 88k (single-sided floppy) more user disk space than TRSDOS 2.0b to format and backup. Even so, DOSPLUS II turned in a great performance.

Test 1: A DO file which does full disk backup after a format. DOSPLUS II = 3:34 in which 1:14 was for FORMAT and TRSDOS 2.0b = 11:13 in which 2:50 was for FORMAT

Test 2: RESET TO DATE PROMPT (Bootup speed). DOSPLUS II = 6 sec. and TRSDOS 2.0b = 26 sec.

Test 3: WRITE then READ 2000 records of 16 byte logical record length. DOSPLUS II = 1:13 and TRSDOS 2.0b = 2:03 minutes.

Test 4: COPY a file 200 records long (256 byte logical record length) from drive 0 to drive 1. DOSPLUS II = 12 sec. and TRSDOS 2.0b = 2:17 minutes.

The COPY speed test (test 4) is particularly noteworthy. At first, I thought something was wrong. I mean, really, 12 sec. versus 137! DOSPLUS II is faster, but it couldn't

be that much faster! Just to make sure, I listed the file and it was all there. The faster speed of DOSPLUS II will obviously put a smile on the face of someone who spends a lot of time at the computer.

The DOSPLUS II system is completely "Device Independent". All input and output (I/O) of the computer usually goes to some kind of "Device". A printer is an output device. The keyboard is an input device, the video display is an output device, etc. Files saved on your disk can also be looked at as devices. Device independent means it is possible to exchange, substitute or redirect the I/O direction of one device with another. With the Model II/16 being RAM based, the authors were able to implement complete device independence without the problems the ROM based Model I/III machines have given system designers.

New Library Commands

LINK and ROUTE allow you to change the I/O patch of the system's devices from their default settings. You may reroute the I/O of a logical device to another system device, a user-defined device, or to a disk file, if you wish. For a useful application in a business environment let's say you really needed to run a printed paper report but your printer had just broken. With some accounting programs this could be truly frustrating because you can't move on to the next step in the process without first running a printed report. By doing a `ROUTE @PR TO Report/prt` all data that would normally go to the printer device would be saved in a disk file called `Report/prt`. This would allow you to

configuration and system parameters are changed they can be saved on disk, along with any active filters or drivers. You may save different configuration files on a disk for different purposes. For example, let's say I just CONFIGed my system for a two drive Model 16 and had a MX80 printer filter installed. I would type SYSTEM S="MX16" and my configuration would be saved to a disk file called MX16. Anytime I needed to use that configuration I would just type MX16 <enter> and it would load into memory.

The SYSTEM save command lets you chain another command to be executed after the config file is loaded into the computer. To run a payroll program after the config file was loaded you would do this: SYSTEM S="MX16;BASIC PAYROLL -F:6". With this option, you can power up, load a config file and then execute a user program without any input from the user. If you don't need a config file loaded at bootup the AUTO command will work for

this, but in this case AUTO has to be used to first load the config file. Other SYSTEM parameters are BREAK=Y/N, LOMEM, HIMEM, ALIVE, TRACE, SAVE, DATE, TIME, LOGO. With these you can disable the Time and/or Date and/or Logo prompt at bootup, set Hi and Lo memory limits, enable/disable the BREAK key at bootup, etc.

BUILD allows you to create an automatic command-chaining file on the disk to be executed with the DO command. It works just fine, but I miss the editing capability of the TRSDOS 2.0 BUILD command. Sometimes I have a file of patches and perhaps I want to change the eighth line. TRSDOS allows me to edit just the eighth line without having to retype the whole patch file. The DOSPLUS II BUILD command doesn't have this edit capacity and I miss it. For the majority of people who will be running application programs it won't be missed. These people will be more concerned that DOSPLUS II

gets the job done quicker so they can get on to the next project, which it will do. Kim Watt did say they would be offering a utility disk for DOSPLUS II that would include an editor for this purpose, but could also be used for other files on the disk such as filter files, etc. Other support utilities planned are MEMDISK (a disk drive in memory), PMOD (a RAM/file/disk modification utility), SORT (a disk file sort/merge utility), and a KSM type of keystroke multiplier utility.

The FORMS command is extended from the TRSDOS FORMS command. The biggest innovation is the SPOOL option and its related parameters. The DOSPLUS II spooler is much more adaptable in that you can define the buffer size, turn it on and off and reclaim the memory buffer it was using.

BASIC Enhancements

Included on the DOSPLUS II disk is a patch file which gives TRSDOS 2.0 BASIC a few more capabilities. A DO file automates this whole

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DOSPLUS II

process for you. After BASIC is patched you will have shorthand capacities like "S" for SAVE, "L" for LOAD, "E" for edit, "I" for SYSTEM, "C" for edit current line, along with a host of others. These features were previously only available to Model I/III users or SNAPP extended BASIC users. The patched DOSPLUS II BASIC also gives the user about 4000 bytes more available memory which is a valuable addition.

Another plus is LABEL addressing which allows you to GOSUB, GOTO, etc. subroutines by a name instead of a linenum (e.g. GOSUB RNDOFF instead of GOSUB 2200). This capability is really convenient, especially in long programs when it is hard to remember where a certain routine is located. No matter where a subroutine is located you can call it at anytime by its name or label.

There are also BASIC enhancement utilities that will do a multi-variable sort, search and/or replace a user-defined string in your BASIC program, a reference utility that will give a list of where and how variables, keywords, and line-numbers are used in your program. These new operations will be greatly appreciated by any Model II/16 user.

A big surprise is the Editor Assembler EDAS. This package is great for machine language programmers and its being included at no extra cost makes DOSPLUS II a real bargain. I've seen the EDAS advertised for about \$150.00 by itself. Other included utilities are: DISKZAP, a direct disk editor, DIRCHECK, which checks for directory errors and DIRFIX, which fixes directory errors. DRAW is a graphics editor program, MAP displays where a file(s) is located on disk, OFFSET relocates CMD files location in RAM and CONV copies files to and from TRSDOS 2.0.

DOSPLUS II comes with a very precise manual that fully explains its features and TRSDOS differences. It includes section tabs and about half of the manual is a technical section which covers system organization, directory structure, DCBs, SVCs and system address calls, etc. It is an excellent

addition that will help programmers develop software that can take advantage of the system's power.

The only real problem I find at this point with DOSPLUS II is that some of my Radio Shack machine language software does not work with it. To be fair, DOSPLUS II is brand new and like all other new systems, patches will have to be developed. RSBASIC, COBOL and Scripsit do not work at the time of this writing, but patches are in the plans for the first two. I use RSBASIC and would love to be able to utilize the extra speed that running it on DOSPLUS II would give me. Automated patches for Profile II+, VisiCalc and ST80II are included. Since the bulk of Model II software has been written in BASIC they should run just fine, only much faster. All the BASIC programs I tried worked just fine.

I find DOSPLUS II to be a very exciting and powerful addition. It fills a need previously unmet while adding new concepts to the Model II/16. With its true device independence, faster operating speed and generally more powerful features, it has a lot to offer to the serious programmer and user. Its hardware adaptability is farsighted and is to be commended. The EDAS and enhanced BASIC are a big bonus. DOSPLUS II should find an eager market; but how it does in the marketplace could rest upon the followup support. BASIC programmers should love it. When Radio Shack's compiler languages are made to run with it, and if the DOSPLUS II people provide the followup support, program compatibility and utility packages, it will become a very popular operating system. ■

DOSPLUS II is available for \$249.95 from Micro-Systems Software, Inc., 4301-18 Oak Circle, Boca Raton, FL 33431 (800) 327-8724 or PowerSoft, A Division of Breeze/QSD, Inc., 11500 Stemmons Fwy, Suite 125, Dallas, TX 75229 (800) 527-7432. Our latest information is that DOSPLUS II will not have a patch for Scripsit 2.0, but plans to support a new version of Scripsit whenever it becomes available on the Model II.

Files and foibles

Compacting BASIC programs

Models I/II/III, PMC-80, LNW80

T. R. Dettmann, Associate editor

A complaint I occasionally hear about my programs is that while they are reasonably clear and easy to follow, how could I possibly waste so much space with blanks in lines, remarks, and so forth? How can I hope to have a program that runs at all well?

That's a tricky question. Personally, I get very frustrated when someone calls me in to work with some other programmer's tight little BASIC program that has no comments except his copyright and all lines packed so tight that it makes a sardine can look spacious. With programs like this, I sometimes entertain thoughts of mayhem directed toward programmers whose sole object seems to be to frustrate me.

Other programmers feel that my style of programming leaves too much blank space within a program, all of which is wasted memory. True enough, but I think I could make a pretty good case for the long-term need for readability. Come back in six months and try to read a program you've written yourself. Unless it's readable, it will take you a while even though you designed it.

There's an easy way to pull together the two camps. Give the readability people their readable, structured code. Give the memory people their space saving, maximum compacted programming style. Let the computer do it!

A BASIC program is nothing more than a sequence of lines that have to maintain some acceptable format for the interpreter to understand. Since the format can be

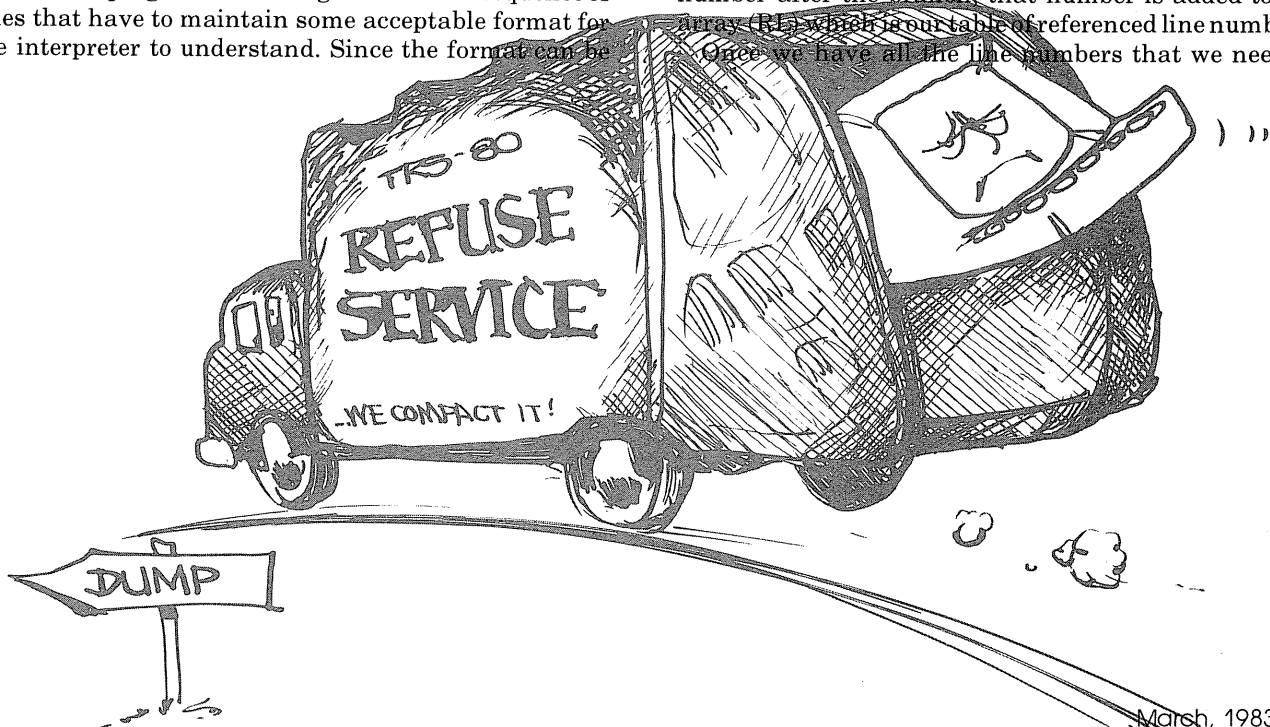
clearly explained, a program can be written that understands it. That's the basis for a simple compactor.

There are quite a few good machine language compactors around that take out all the remarks in a program, get rid of blanks, and all kinds of other good things. But, it's useful to write one that meets your particular specifications for what you want done to a program. While compacting to some given degree, special processing can also be done on the program if you want. In order to illustrate the technique, we've included a simple-minded compactor in BASIC that allows you to compact a program saved with the 'A' option (ASCII format). Its objectives are to compact lines to approximately 150 characters per line, and cut all remarks down to just the bare REM (but it doesn't attempt to eliminate them).

To make this work, the program had to recognize when lines could not be compacted because they were referred to by a GOTO, GOSUB, THEN, or ELSE. We've skipped ON...GOTO and ON...GOSUB, but they could be added with no great difficulty (as the textbooks say, left to the student as an exercise).

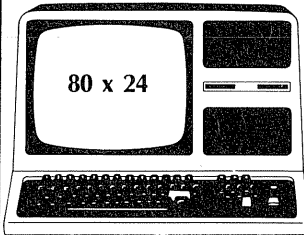
To tell when a line was referred to by one of the branching statements, the program is written to make two passes through the program we want to compact. The first pass (subroutine 1000) looks at each line for each of the four branching statements. If it finds a number after the branch, that number is added to the array (RL) which is our table of referenced line numbers.

Once we have all the line numbers that we need to



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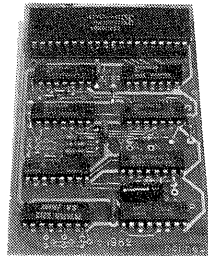
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Files and foibles

branch to, the array (RL) is sorted so we can find them quickly with a binary search routine. Then comes the second pass.

The second pass keeps a current line that it is compacting (PL\$). When a line is first put into PL\$, its line number is kept as is, no attempt is made to renumber them since the BASIC renumber function can do it so much faster.

If PL\$ already has something in it, then we first look at the old line to see if it has something in it which forces the line to end (GOTO, THEN, ELSE, REM, or DATA). If that doesn't force an end, then we get the line number of the new line. If that is in the table of lines referred to (checked by subroutine 3400), then we also force an end to the compacting. Finally, if the line is already 150 characters long or more we also end it.

Only if we don't need to end the line, do we then get rid of the line number of the new line, add a colon (":"), and then the rest of the line.

Repeating the same process line for line results in a very compact program. Possible extensions to the program would be to 1) get rid of all remarks that aren't referred to, 2) change the references whenever they refer to a remark, and 3) add in processing for ON...GOTO and ON...GOSUB. ■

Program Listing for Compact

```

10 REM **
20 REM
30 REMTRASH COMPACTOR
40 REMTERRY R. DETTMANN
50 REM
60 REM **
65 REMGET SOME SPACE FOR STRINGS
70 CLEAR 10000
75 REMINITIALIZE THE SYSTEM
80 GOSUB 200
85 REMGET THE FILE NAMES
90 GOSUB 300
95 REMTHE 1ST PASS THROUGH THE INPUT FILE IS TO
MAKE A LIST
96 REMOF WHAT LINE NUMBERS ARE REFERRED TO
BY GOTO'S,
97 REMGOSUB'S, IF'S, ETC.
100 PRINT"BEGINNING PASS 1"
110 GOSUB 1000
115 REMSORT THE TABLE OF LINE NUMBERS USED SO
WE CAN USE A
116 REMBINARY SEARCH
120 PRINT"SORTING"
130 GOSUB 2000
135 REMPASS 2 THROUGH THE FILE WILL COMPRESS
ALL LINES UNTIL A
136 REMLINE IS HIT WHICH IS IN THE TABLE OF LINES
OR THE
137 REMCOMPRESSED LINE GETS TOO LONG
140 PRINT"BEGINNING PASS 2"
    
```



By Brian Shoken

for TRS 80 I/III
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```

150 GOSUB 3000
160 END
200 REM ----- INITIALIZATION -----
205 REMDEFINE ALL VARIABLES TO BE INTEGERS TO
CONSERVE SPACE
206 REMAND INCREASE SPEED
210 DEFINT A-Z:CLS
215 REMN WILL BE THE NUMBER OF LINES ACTUALLY
REFERRED TO
216 REMMX IS THE MAXIMUM NUMBER OF LINES
REFERRED TO
220 N=0:MX=300
225 REMRL IS THE ARRAY OF LINE REFERENCES
226 REMKEY$ IS AN ARRAY OF BASIC KEYWORDS
THAT REFER
227 REMTO OTHER LINES
230 DIM RL(MX),KEY$(9)
235 REMREAD THE KEYWORDS
240 FOR I=1TO9: READ KEY$(I): NEXTI
250 PRINT"COMPACT FILES":PRINT:PRINT
260 DATA GOTO, GOSUB, THEN, ELSE, THEN, ELSE,
GOTO, REM, DATA
270 RETURN
300 REM ----- GET FILENAMES -----
-----
310 LINE INPUT"INPUT FILENAME: ";FI$
320 LINE INPUT"OUTPUT FILENAME: ";FO$
330 RETURN
1000 REM ----- FIRST PASS THROUGH
FILE -----
1005 REMFI$ IS THE INPUT FILE
1010 OPEN"1",1,FI$
1015 REMSTOP WHENEVER WE GET TO THE END OF
THE FILE
1020 IF EOF(1) THEN 1110
1025 REMGET A LINE FROM THE FILE (LN$)
1030 LINE INPUT#1,LN$
1035 REMPRINT THE LINE, TM$ IS THE LINE WITHOUT
THE LINE
1036 REMNUMBER. WE FIND IT BY LOOKING FOR
THE 1ST SPACE
1037 REMON THE LINE SINCE BASIC ALWAYS WRITES
IT THIS WAY
1040 PRINT LN$: L=INSTR(LN$," "):
TM$=MID$(LN$,L+1)
1045 REMIF IT'S A REMARK OR DATA STATEMENT,
THEN IGNORE IT
1050 IF LEFT$(TM$,3)="REM" OR
LEFT$(TM$,4)="DATA" THEN 1020
1055 REMLOOK FOR THE 1ST 4 KEYWORDS
1056 REMTHESE ARE GOTO, GOSUB, THEN, & ELSE
1060 FOR I=1 TO 4
1070 KW$ = KEY$(I)
1075 REMSUBROUTINE 3300 LOOKS FOR THE
KEYWORD
1076 REMAND ADDS TO THE LIST IF FOUND IN THIS
LINE

```

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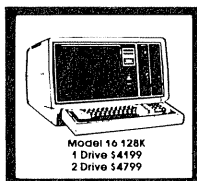
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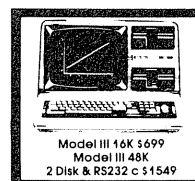
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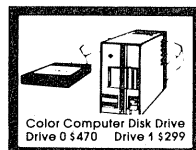
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Files and foibles

1080 GOSUB 3300

1090 NEXT I

1095 REMGO BACK FOR ANOTHER LINE

1100 GOTO 1020

1105 REMCLOSE THE FILE AND END THE PASS

1110 CLOSE

1120 RETURN

2000 REM — — — — — SHELL SORT — — —

2005 REMINITIALIZE THE GAP TO THE NUMBER OF ITEMS

2010 GAP = N

2015 REMCUT THE GAP IN HALF EACH TIME AROUND

2020 GAP = INT(GAP/2)

2025 REMFLG MARKS WHETHER A SWAP HAS OCCURRED

2030 FLG = 0

2035 REMLOOP OVER THE ITEMS COMPARING THEM

2036 REM1 GAP APART

2040 FOR I = 1 TO N-GAP

2045 REMIF THE ITEMS 1 GAP APART ARE OUT OF ORDER, THEN

2046 REMSWAP THEM

2050 IF RL(I) <= RL(I+GAP) THEN 2080

2055 REMTHEN SWAP IS WRITTEN FOR MODEL II, FOR MODEL

2056 REMI, III, OR COLOR, WRITE IT LIKE THIS:

2057 REMT=RL(I):RL(I)=RL(I+GAP):RL(I+GAP)=T

2060 SWAP RL(I),RL(I+GAP)

2065 REMSET FLG=1 TO INDICATE A SWAP HAS OCCURRED

2070 FLG = 1

2080 NEXT I

2085 REMIF ANY SWAPS OCCURRED, THEN REPEAT AT THIS GAP

2090 IF FLG <> 0 THEN 2030

2095 REMIF NO SWAPS, AND GAP IS >1 THEN CUT THE GAP IN HALF

2100 IF GAP > 1 THEN 2020

2105 REMIF NO SWAPS AT A GAP OF 1 THEN WE'RE DONE

2110 RETURN

3000 REM — — — — — 2ND PASS SCAN FOR COMPACTION — — — — —

3005 REMFI\$ IS THE INPUT FILE

3006 REMFO\$ IS THE OUTPUT FILE

3010 OPEN "I",1,FI\$

3020 OPEN "O",2,FO\$

3025 REMKEEP GOING AS LONG AS THE FILE HAS MORE IN IT

3030 IF EOF(1) THEN 3250

3035 REMGET A LINE AND ELIMINATE BLANKS, TABS, & DEAL WITH

3036 REMREMARKS

3040 LINE INPUT#1,LN\$: GOSUB3500: GOSUB3600:

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GOSUB3700

3045 REMPL\$ IS THE LINE WE'RE BUILDING, IF IT'S
EMPTY,
3046 REMPUT THE CURRENT LINE THERE
3050 IF PL\$="" THEN 3230
3055 REMKF IS THE MARKER TO INDICATE A
KEYWORD HAS BEEN FOUND
3060 KF = 0
3070 FOR I=5TO9:IF INSTR(PL\$,KEY\$(I))<>0 THEN
KF=1 ELSE NEXTI
3075 REMIF NO KEYWORD HAS BEEN FOUND THEN
SKIP TO 3130
3080 IF KF<>1 THEN 3130
3085 REMIF THERE'S A KEYWORD IN THE NEW LINE,
THEN THE LINE
3086 REMWE'RE BUILDING IS OUTPUT AND A NEW
LINE IS STARTED
3090 PRINT #2,PL\$
3100 PRINT PL\$
3110 PL\$ = LN\$
3115 REMGO BACK FOR ANOTHER LINE
3120 GOTO 3030
3125 REMGET THE LINE NUMBER OF THE NEW LINE
AND SEE IF IT
3126 REMWAS REFERRED TO BY A GOTO, GOSUB,
ETC.

3130 LN = VAL(LN\$)

3140 GOSUB 3400

3145 REMIN ORDER TO COMPACT, LF HAS TO BE
ZERO (THE LINE NUMBER

3146 REMWASN'T REFERRED TO) AND THE LINE
WE'RE BUILDING HAS TO

3147 REMBE LESS THAN 150 CHARACTERS ALREADY

3150 IF LF<>0 OR LEN(PL\$)>=150 THEN 3190

3155 REMFIND THE END OF THE LINE NUMBER AND
GET RID OF IT,

3156 REMTHEN ADD THE REST OF THE LINE TO THE
LINE WE'RE

3157 REMBUILDING

3160 L=INSTR(LN\$," ")

3170 PL\$ = PL\$ + " " + MID\$(LN\$,L+1)

3175 REMGO BACK FOR ANOTHER LINE

3180 GOTO 3030

3185 REMIF THE LINE WE'RE BUILDING IS TOO LONG
OR

3186 REMTHE LINE WE READ IN IS REFERRED TO,
THEN

3187 REMPRINT IT AND SET A NEW LINE TO BUILD


3190 PRINT #2,PL\$

3200 PRINT PL\$

3210 PL\$ = LN\$

3215 REMGO BACK FOR ANOTHER LINE

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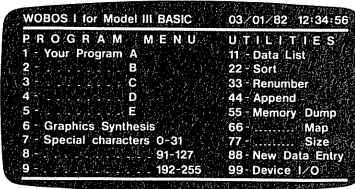
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3220 GOTO 3030
3225 REMIF THE LINE WE'RE BUILDING IS EMPTY,
START IT
3226 REMWITH THE CURRENT LINE AND GO BACK
FOR MORE
3230 PL$ = LN$
3240 GOTO 3030
3245 REMAT THE END OF THE FILE, WE HAVE TO
PRINT OUT THE
3246 REMLAST LINE WE'RE BUILDING IF THERE IS ONE
3250 IF PL$ <> "" THEN PRINT#2, PL$: PRINT PL$
3255 REMCLOSE THE FILES, THE 2ND PASS IS OVER
3260 CLOSE
3270 RETURN
3300 REM ----- LOOK FOR KW$ IN LN$ &
ADD TO LIST -----
3305 REMTM$ IS A WORKING COPY OF THE
CURRENT LINE
3310 TM$ = LN$
3315 REMIF THE KEYWORD ISN'T IN THE LINE AT ALL
THEN
3316 REMFORGET IT
3320 IF INSTR(TM$, KW$) = 0 THEN RETURN
3325 REML IS THE CHARACTER RIGHT AFTER THE
KEYWORD
3330 L = INSTR(TM$, KW$) + LEN(KW$)
3335 REMIF L IS PAST THE END OF THE LINE THEN
SOMETHING IS
3336 REMSERIOUSLY WRONG
3340 IF L >= LEN(TM$) THEN PRINT "*** ERROR
***"; RETURN
3345 REMCUT THE WORKING COPY OF THE LINE
DOWN TO
3346 REMSTART JUST AFTER THE KEYWORD
3350 TM$ = MID$(TM$, L)
3355 REMIF THERE IS NO NUMBER AFTER THE
KEYWORD THEN
3356 REMTHEN IT MUST NOT HAVE BEEN USED AS A
KEYWORD
3357 REMSO LOOK AGAIN
3360 IF VAL(TM$) = 0 THEN 3320
3365 REMIF THERE IS A NUMBER THERE, THEN ADD IT
TO THE
3366 REMTABLE OF LINE NUMBERS REFERRED TO
3370 N = N + 1
3380 RL(N) = VAL(TM$)
3385 REMLOOK AT THE REST OF THE LINE
3390 GOTO 3320
3400 REM ----- BINARY SEARCH
FOR LN -----
3405 REMLF IS 0, IF WE FIND THE ITEM WE SET LF=1
3406 REMLO IS THE LOW LIMIT, HI THE HIGH LIMIT
FOR
3407 REMOUR CHECK
3410 LF = 0: LO = 1: HI = N
3415 REMMD IS THE MIDPOINT BETWEEN HI & LO
3420 MD = (HI + LO) / 2
100 80-U.S. Journal

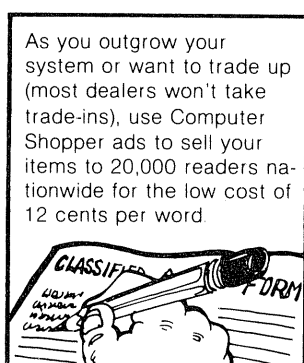
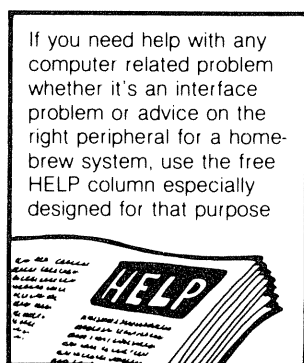
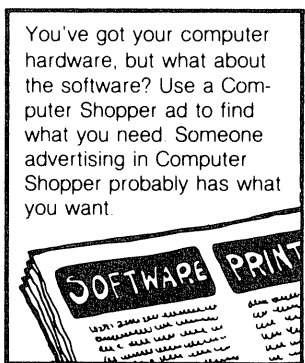
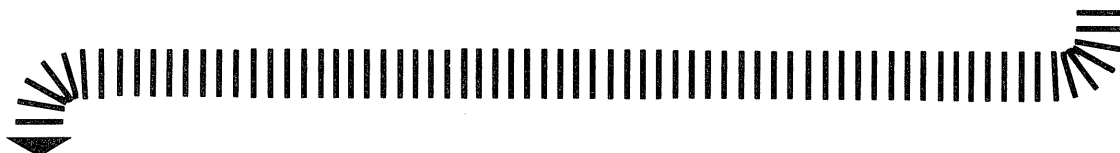
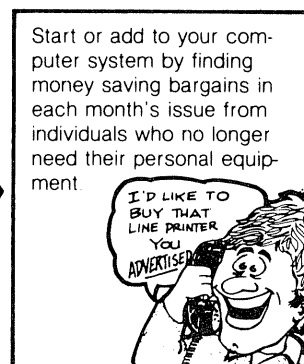
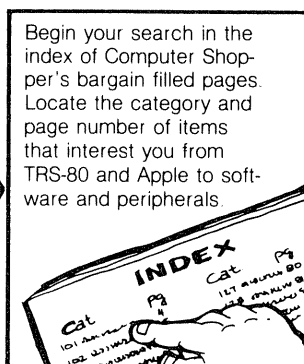
```

```

3425 REMIF THE DESIRED LINE NUMBER (LN) IS
GREATER THEN
3426 REMTHE MIDPOINT NUMBER, THEN INCREASE
THE LOW LIMIT
3430 IF (RL(MD) < LN) THEN LO = MD + 1
3435 REMIF THE DESIRED LINE NUMBER IS LESS, THEN
DECREASE
3436 REMTHE HIGH LIMIT
3440 IF (RL(MD) > LN) THEN HI = MD - 1
3445 REMIF WE FIND THE LINE NUMBER, SET LF=1
AND WE'RE DONE
3450 IF RL(MD) = LN THEN LF = 1: GOTO 3470
3455 REMIF WE HAVEN'T FOUND THE LINE, THEN AS
LONG AS
3456 REMTHE HIGH LIMIT IS STILL GREATER THAN THE
LOW LIMIT
3457 REMWE KEEP LOOKING
3460 IF HI >= LO THEN 3420
3470 RETURN
3500 REM ----- ELIMINATE DOUBLE &
TRAILING BLANKS -----
3505 REMELIMINATE TRAILING BLANKS
3510 IF LN$ = "" THEN RETURN
3520 IF MID$(LN$, LEN(LN$), 1) = " " THEN
LN$ = MID$(LN$, 1, LEN(LN$) - 1): GOTO 3500
3525 REMELIMINATE DOUBLE BLANKS
3530 LC = INSTR(LN$, " "): IF LC = 0 THEN 3570
3535 REMIF A DOUBLE BLANK OCCURS AFTER A
QUOTE, DON'T
3536 REMTAKE A CHANCE, JUST ASSUME IT MAY BE
IN A STRING
3537 REMAND FORGET IT
3540 L1 = INSTR(LN$, CHR$(34)): IF L1 = 0 THEN 3560
3550 IF L1 <= LC THEN 3570
3555 REMELIMINATE THE DOUBLE BLANK
3560 I1$ = MID$(LN$, 1, LC - 1): I2$ = MID$(LN$, LC + 1):
LN$ = I1$ + I2$: GOTO 3530
3570 RETURN
3600 REM ----- ELIMINATE ALL TABS -----
3605 REMTABS CHARACTERS ARE ASCII CODE 9
3610 LC = INSTR(LN$, CHR$(9))
3620 IF LC = 0 THEN RETURN
3630 I1$ = MID$(LN$, 1, LC - 1): I2$ = MID$(LN$, LC + 1):
LN$ = I1$ + I2$
3640 GOTO 3600
3700 REM ----- PROCESS REMARK
STATEMENTS -----
3705 REMIF 'REM' IS THE FIRST THING ON THE LINE
3706 REMTHEN MAKE IT THE ONLY THING ON THE
LINE
3710 IF INSTR(LN$, "REM") = 0 THEN RETURN
3720 L1 = INSTR(LN$, " ")
3730 LC = INSTR(LN$, "REM"): IF L1 + 1 <> LC THEN
RETURN
3740 LN$ = MID$(LN$, 1, LC + 2)
3750 RETURN

```


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March, 1983 101

BASIC bits

Debugging techniques and tips

For all models

Thomas L. Quindry, Burke, VA

Recently, a friend of mine had a problem with a program he had entered from a published listing. Though the listing looked the same as his input, he was getting an error from data statements which controlled the LPRINTing for computer graphics. He had spent a terribly long time trying to debug the program and, in desperation, asked me to see what I could do to help him. Fortunately, I also had the magazine that contained the listing, so I could help him over the telephone. It appeared that he had copied the program correctly and also that the program was listed correctly. So, what was the problem?

Before I tell you what was wrong, I think it would be a good time to discuss debugging techniques. I have several rules which I use when debugging a program. The first rule is: Don't spend more than fifteen minutes. If possible, get a knowledgeable friend to help you. Perhaps one small suggestion can lead you to the cause. If you have no friends (no knowledgeable friends, that is), leave it for a while. When you are riding the bus, eating lunch, or doing something else that gives you time to think about it, maybe you will realize what is wrong or figure out how to attack the problem in a different way. At least, the next time you go to your computer, you won't feel so frustrated and tired of the whole darned thing. You will also have a fresh outlook for the problem.

The most useful thing you can do is look at the error message table in your computer manual. Find out what type of error is occurring. If it helps, LLIST the program to a printer and examine the line (or lines) giving you the problem. Many syntax errors occur through inadvertent mistakes such as using

shifted letters instead of unshifted ones. In PRINT @, the shifted @ looks the same, but functions differently on the Model I. Using L? is not the same as LPRINT, although it lists the same.

The hardest problems to find are those which incur no error message. Then, your computer has one function which can help you immensely — the TRON function. TRON (not the movie) stands for "trace on." With this function activated by entering TRON while in the command mode, each BASIC program line is printed on the screen surrounded by brackets. Just follow your trail and you may know which lines are involved in the error. I say maybe, because TRON doesn't pick up data lines, and perhaps others, that are referenced by your program line. Look at the lines involved and see if they use other lines such as data statements. Here is where that printed listing helps. Incidentally, TROFF turns the trace function off. TRON and TROFF can also be implemented from within a BASIC program. If you have isolated your problem to a few lines of code, you can place the commands, TRON and TROFF, in your BASIC statements to eliminate unnecessary references being printed on the screen.

As I said, my friend's problem was in his data statement. This was especially hard to determine. It seems that these data statements provided codes which told the computer when to LPRINT characters, spaces, or linefeeds to get a graphic picture. The problem was that the first line of the LPRINTed display was offset from its planned position. I analyzed the BASIC code involved and determined to my satisfaction that the program was correct. He told me that his program agreed with the listing. Since the

error was in the first line of the picture to be printed, and this was the first DATA statement, it was relatively easy to focus in on the problem.

Even though the line looked okay, I instructed him to retype the entire line. Lo and behold, the program ran correctly. I can only surmise what had happened. Many times, when keying in characters, especially if the line has been edited previously, it is easy to get hidden characters in your code. This occurs mostly when using the "nC" command while in EDIT. If, after instructing that n number of characters to be replaced, you enter a backspace character or other strange control code within those n characters, it will be inserted in the line of code and you may not even know it. Characters may be overwritten by other characters.

Try the following: Enter a BASIC program line. Now, get into the EDIT mode. Go to some command in the line and get into the change command with 3C. Now, enter "A", backspace, "B", and <ENTER>. What did you get when you listed the line? You don't see the "A", do you? In my friend's data statement, the code for linefeed was not read properly, the next code read was not analyzed properly and thus, the next command was interpreted falsely.

Not all errors are that easy to find. If you have a problem with a line being LPRINTed and want to analyze the problem more easily, you may want to direct your output to the screen instead. It is faster and sometimes easier to look at. There are several ways to do this. I've discussed it in a previous column and there are other articles on the subject which have been published in *80-U.S. Journal* recently. A quick and dirty way is to do the following:

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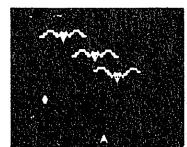
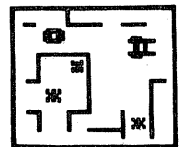
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For a Model I: POKE 16422,88:
POKE 16423,4

For a Model III: POKE 16422,115:
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This will direct your LPRINT codes to the screen instead of the printer. To return to normal:

For a Model I: POKE 16422,141:
POKE 16423,5

For a Model III: POKE 16422,194:
POKE 16423,3

This reinstates the TRS-80 printer driver routine. If data statements are involved in coding for the LPRINTs, as in my friend's program, count the linefeeds and when the error occurs, you will know approximately where it is by counting each code for linefeed in the data statements.

Use of the BREAK key can be helpful to tell you where your program is hanging up. Using this key stops your program and tells you the last line being processed by the computer. Your variable values are also preserved and you can enter PRINT or LPRINT statements while in the command mode to find out their values. To resume your program, you can enter the CONT command, or use a GOTO and specify a line number. With the GOTO, the line number does not necessarily have to be the same line where you left off. Suppose you wanted to run your program from line 500 rather than from the first line of the program or from where you ended up with the BREAK key. Using a GOTO 500 rather than a RUN 500 will preserve your variable values. If you want the values set to zero, use the RUN 500 command.

Adding STOP commands provides a good way of checking how far you get before an error occurs. It can even check to see if a set of statements is ever reached. The STOP command is practically the same as hitting the BREAK key, except it is done from within your program. Just like implementing BREAK, you can continue your program by entering CONT in the command mode. A STOP command in the middle of a FOR . . . NEXT loop in your program can be very effective. Entering a CONT command will take you to the next increment in your FOR . . . NEXT loop and the variables can be

checked again. If you don't get the results you expected, you can zero in on the problem.

If you don't want to keep entering a CONT command, put a command such as GOSUB 50000 at key points in your program and then, starting at line 50000, add statements like:
50000 ?"PRESS ANY KEY TO
CONTINUE"
50010 IF INKEY\$="" THEN 50010
50020 RETURN.

Another trick is to put in extra statements before the STOP or GOSUB 50000 or elsewhere in your program to tell you something about what is happening. These could be PRINT or LPRINT statements to print out the values of variables and perhaps the line number where that variable value is computed. You can also use temporary statements to define variables to a set value and bypass INPUT statements. You can remove all the extra statements later when your program is running correctly. You can make it easier on yourself by tacking on a REM statement to the end of each of these extra statements, such as: REM <===== REMOVE. Then, you can easily see which statements are extra.

Speaking of REM statements, if you temporarily want to skip over a line, instead of deleting it, place a REM command at the beginning of that statement using the EDIT mode. This avoids having to re-enter a line, especially if you are debugging your own program and don't have a listing. Also, you don't compound the problem by not being able to get back to where you were.

The downarrow can be used quite effectively while programming. At the end of a subset of program lines defining a routine, enter the downarrow. This will provide you with an extra line between that line and the next. It only costs one byte each time you use it. You might have to use a colon preceding it if you want to LLIST it. This use depends on your printer's characteristics.

When debugging, the most obvious should be done first. Check over your code, correct spelling errors, remove double keyed entries, keep track of your FOR . . . NEXT loops. It is a good idea to start your programming by writing a flow

chart. I never was good at this myself, but it can lay out a map of where your program is going. If I ever get in a jam, I try to map it out. Flow charting also forces you to write your program in modular fashion. Remember: A small program is easier to debug than a larger one. If you can separate your program into modules, you can check out each module as a separate program to some extent.

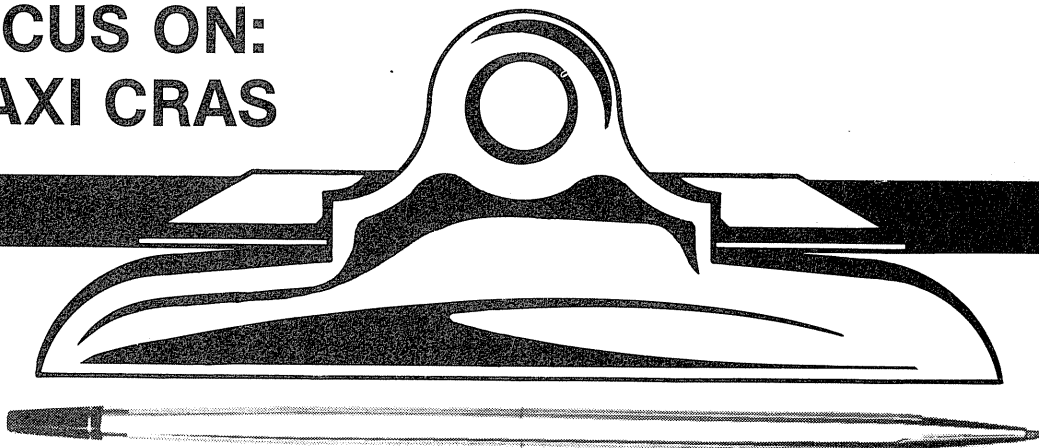
Watch your variables. A variable can only be defined with one or two letters. (The second "letter" can be alphanumeric.) You can use more letters but only the first two letters are interpreted. For instance, SC and SCAN would be interpreted as the same variable. Remember that a CLEAR command initializes your variables to zero. This also applies to DEFINT, DEFDBL and other operators which act on variables.

Know your computer. Some early Model I ROM chips have quirks that you must know about. With some chips, mine included, a READ command will not perform properly in reading data statements after execution of an INPUT# command, unless a POKE 16553,255 command follows the INPUT# command. The guy who wrote the program you are trying to use may not have that ROM problem so the program checks out all right for him. On any TRS-80, a PRINT# command can put no more than 248 bytes on the tape at any one time. Only the first 248 bytes will be saved. The rest will be lost and no error is flagged.

Oh, yes . . . One very good cardinal rule: Never key in a BASIC program from a magazine listing until at least two more issues of the magazine reach you. (*Ouch! —Ed.*) This rule allows you to get all the published mistakes corrected before you waste a lot of time debugging.

Remember to send your requests for future column topics, questions and tips to me, care of *80-U.S. Journal*, 3838 South Warner Street, Tacoma, WA 98409. For questions, send a self-addressed stamped envelope and I'll try to give you a personal, handwritten reply as long as the answer is not too long and involved. Problems of general interest may be included in a future BASIC bits column. ■

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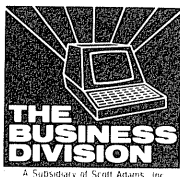
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Special characters

Use the hidden figures in your Model III

Model III

Dan Sitch, Pittsburg, NH

The TRS-80 Model III has many special characters that are well suited for graphics and allow us to fancy up our favorite programs. The special characters we will be concerned with in this article can be found on pages C/7 and C/8 of the early edition of the Operation Manual, and on pages 233 and 234 of the latest edition of the same manual. The characters have ASCII numbers 192 through 255.

The normal function of these characters is space compression, but we can turn the special characters loose by using a software switch, CHR\$(21), or by POKEing them into video RAM addresses 15360 to 16383.

We can observe these characters on the monitor by entering this small program:

```
10 CLS:PRINT CHR$(23); CHR$(21)
20 FOR L=192 TO 255
30 PRINT L; CHR$(L);
40 NEXT L
50 PRINT CHR$(21)
60 POKE 16328,244: POKE 16330,245: POKE 16332,246
70 PRINT @ 976, "PRESS BREAK TO END";
80 POKE 16362,196
90 GOTO 90
```

Lines 10 and 50 contain the software switch CHR\$(21) that allow us to observe the 64 special characters on the monitor. In lines 60 and 80 we used the special statement POKE to fancy up line 70 with a pointing finger and a smiling face in the word "to," instead of the letter "o."

One very important thing to keep in mind when working with these special characters is, unless you POKE them into the video RAM, you must switch them in and out of your program using the software switch CHR\$(21).

For example, take the above small program (deleting line 50) and run the program. The program runs fine and everything looks good. Now, press BREAK and RUN the program again, the results on the monitor no longer look good, except for the line "PRESS BREAK TO END."

What happened was, we did not switch out the special characters and when we ran the program a second time the computer saw the switch CHR\$(21) in line 10 and went back to the compression mode. It printed spaces behind its corresponding number, and as each number got larger the computer printed more spaces for each number, and therefore we got the messed up pattern of numbers on the monitor.

Now RUN the program again (line 50 still deleted). This time the program runs as it should. The computer saw the CHR\$(21) switch in line 10, and switched back to the special character mode.

Please re-enter line 50. PRINT CHR\$(21).

This same problem will present itself even if lines 10 and 50 contained the CHR\$(21) switches, and a syntax (or other) error occurred between the two CHR\$(21) switches. The program would be interrupted before it encounters the second CHR\$(21) switch. After correcting the error and running the program, we would get the same results as above.

If you encounter this problem:

(A) Correct the program error.

(B) Run the program, quickly press the BREAK key before the program encounters the second CHR\$(21) switch.

(C) Run the program again. The CHR\$(21) switches should now be in the proper sequence for the program to run correctly. To simulate a syntax error, run the program and quickly press the BREAK key, run the program again. No special characters appeared and all the character numbers are messed up on the monitor. Note the last line on the monitor was not affected, we used the POKE statement to produce the special characters in this line.

To get the program running properly, run the program and quickly press the BREAK key. The CHR\$(21) switches should now be in proper sequence, for the program to run properly.

Also, keep in mind if you branch your program to a subroutine or to another part of your program, you must return to switch out the special characters or arrange your program to properly switch out the special characters, otherwise, you will encounter the above problem.

The important thing to keep in mind is that the CHR\$(21) switches must be kept in proper sequence for the special characters to appear on the monitor each time your program is run.

As can be seen from the above program the possibilities for utilizing these special characters in your programs are endless. Let your imagination flow freely and give your programs a face lift.

To get you started and show you how easily the special characters can be inserted in your next program, enter the following program:


```

10 CLS: PRINT CHR$(23); CHR$(21)
20 A$ = CHR$(196); B$ = CHR$(197);
E$ = STRING$(2,32)
30 PRINT @ 850,"S RRY Y U L SE"
40 FOR L = 32 TO 800 STEP 64
50 GOSUB 130
60 PRINT @ L, CHR$(RND(64) + 192);
70 GOSUB 130
80 PRINT @ L, E$;
90 NEXT
100 PRINT @ 852,B$; @ 864,A$; @ 872,B$
110 FOR D = 1 TO 1000: NEXT
120 PRINT CHR$(28); CHR$(21): END
130 FOR D = 1 TO 20: NEXT: RETURN

```

The purpose of this article was to introduce you to the special characters the Model III has and to make you aware of the problems the CHR\$(21) switch can cause, when not properly used. It is by no means a comprehensive study of the subject, but with the tools introduced here, you should be well on your way to giving your programs a new look.

As stated in the beginning of the article, the Model III has many special characters. If you would like to see all of the characters the Model III has to offer, including the Japanese kana characters (not shown in the Operation Reference Manual) enter the following program.

```

10 CLS
20 FOR P = 0 TO 255

```

```

30 POKE 15360 + P * 4, P
40 NEXT P
50 IF PEEK(14400) = 128 THEN PRINT CHR$(23);
ELSE 50
60 FOR D = 1 TO 200: NEXT
70 IF PEEK(14400) = 128 THEN PRINT CHR$(22)
ELSE 70
80 GOTO 10

```

Run the program and note the special characters on the last four lines of your monitor are the ones covered in this article.

Press the SPACE BAR to get double size. Press the SPACE BAR again and note the last four lines on your monitor have changed. These are the Japanese kana characters, and were switched in by another software switch CHR\$(22), in line 70 of the above program. Press the SPACE BAR to get double size.

The top two lines are the special characters, 0 through 31 (refer to page C/7 in the old manual and page 233 of the new manual). These 32 special characters can only be displayed on the monitor by POKEing them into the video RAM (addresses 15360 through 16383).

As can be seen from the above program, the Model III gives us quite an array of special characters that we may choose from to fancy up our programs.

Keeping in mind the discussion about the CHR\$(21) switch should prevent a lot of head scratching and make the special characters a pleasure to work with. ■

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Richard Tangeman, State University, AR

The Extended Color BASIC interpreter is a powerful, easy-to-use language processor, but is very slow when compared with machine language. Larger computers combine the convenience of high-level languages with the speed of machine language by using compilers. A compiler, in its simplest form, is simply a program which converts statements in a high-level language such as BASIC or FORTRAN to directly-executable machine code.

The program presented here is a compiler, written in BASIC, for a language which is essentially a subset of Extended Color BASIC. The source program (the code in BASIC) is stored in string arrays using a simple built-in editor and may be saved to tape, compiled, and executed from the environment of the compiler itself. Those who have used the Color Computer assembler recently published in this magazine (September, 1982) will recognize the editor here as being almost the same.

After the compiler has been typed in and saved to tape, type RUN and enter your source program. You will be

prompted, line-by-line, for label, keyword, and operand. Labels are always optional and when present must be unsigned positive integers. A keyword is always required, and operands are sometimes necessary and sometimes optional. If a field is to be blank, just press ENTER in response to the appropriate prompt. The input sequence concludes when the operand following the keyword END is entered.

The program then enters a keyboard-scan routine from which your source program may be edited, compiled, executed, or saved. The active keys are shown in Table 1.

In Table 2, which gives operand syntax descriptions, V represents a scalar integer variable name (1 character A-Z). X and Y indicate that either a variable or a 2-byte unsigned integer constant may be used. Legal constants are 0-32767 decimal or 0-&H7FFF hex. L is an unsigned integer label, decimal or hex. Optional operands are always ignored and thus may be used as comment fields. Blanks may be added between operand characters but should be avoided in keywords including THEN, TO, and PEEK. Note that the operand on NEXT is ignored. The compiler will always know which variable is appropriate. FOR . . . NEXT loops may be nested in any legal manner up to ten deep. It is always legal to jump out of a FOR . . . NEXT structure, but use great care if jumping back in.

Runtime Notes

RETURN and END both produce the same object code, RTS. Thus, END will not work correctly if a GOSUB has been executed but the corresponding RETURN has not. To simplify address calculations, REM is compiled as the executable statement NOP. Thus, a REM statement may carry a label and be used as a branch target. Error checking is minimal at compile time and absolutely absent during execution. The biggest danger here is PRINT@ X,Y. If X is out of range, anything can happen! CLS X works as with the interpreter if X is 0 to 8, but if X is larger than 8, the screen may be filled with any of several characters.

Labels need not increase with line number. Execution is always in physical order except when modified by a branch.

The sample program in Listing 2 is a routine for a bouncing dot, and provides an example of legal statements. It contains an infinite loop, and the BREAK key will not work. To stop it, use the RESET button at the right rear of the keyboard. Then execute GOTO 20 from the command mode to reenter the editor with all values intact.

Note that the expected I = -I in line 220 must be done

Table 1
Compiler Commands

- L— Lists the program with line numbers.
- N— Lists the program without line numbers.
- I— Prompts for a line number and inserts a blank line after that line. To insert at the beginning, enter 0 in response to the prompt.
- D— Prompts for a line number and deletes that line.
- R— Allows replacement of label, keyword, or operand of any line.
- T— Allows the source program to be saved to tape, or old source to be loaded.
- S— Lists the source program with FOR . . . NEXT loop interiors indented. Also checks for proper matching of FOR and NEXT. This is not checked by the compiler itself.
- C— Compiles the program. Object code is written to the string array OC\$.
- O— Lists the object code to the screen.
- P— Pokes the object code into memory starting at decimal location 1608.
- E— Executes the compiled program. C and P must be done first.
- V— Lists the values of the variables.
- Z— Zeroes the variables. This is not done at runtime.
- CLEAR— Clears the screen.

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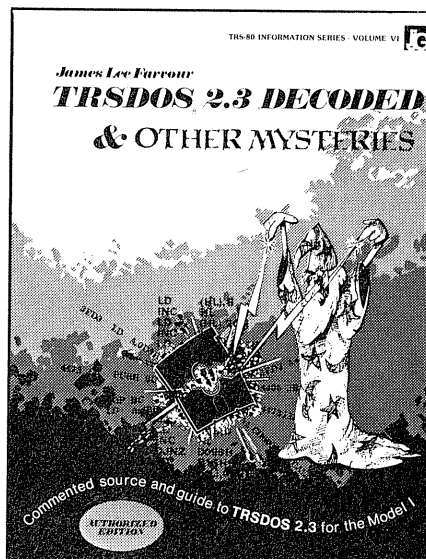
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with a subtraction. To set a variable to a negative value, a similar technique (LET X = 0-100) must be used, since constants are unsigned.

Table 2
Source Code Keywords and Operands

Keyword	Operand	Notes
CLS	X	Restrict operand values to 0-8.
GOTO	L	
GOSUB	L	
IF	X = Y THEN L X > Y THEN L	
FOR	V = X TO Y	Restrict Y here to the range 0-32766.
NEXT	Optional	
REM	Optional	
END	Optional	
RETURN	Optional	
PRINT@	X,Y;	The value printed will be 4-character unsigned hex. The semicolon is optional and ignored. Restrict X to the range 0-508.
LET	V = X V = X + Y V = X - Y V = PEEK(X) V = X * Y	X and Y must be unsigned byte values 0-255, variable or constant. Overflow is ignored.
POKE	X,Y	

Memory Usage

Variables A-Z are stored in decimal locations 1536 to 1587. 1588 to 1607 are not used. Object code starts at 1608 and builds upward. Addresses 4578 to 4607 hold a subroutine which is used by PRINT@ at runtime. The first constant is stored in 4576 to 4577, and these build downward. All these locations are in graphics, pages 1 and 2. ■

Listing 1 — Color Computer Compiler

```

5 PCLEAR2: CLEAR1500: S=50: DIM L$(S), M$(S),
O$(S), AD(S), OC$(S), F(3,10): GOSUB175:
AD=1608: GOSUB 710: I=0: V$=","+ "-" =>"
10 I=I+1: INPUT"LBL",L$(I): INPUT"KWD", M$(I):
LINEINPUT "OPD?"; O$(I)
15 IFM$(I)="END"THENN=I:ELSE10
20 X$=INKEY$: IFX$="L"OR X$="N"THEN85
25 IFX$="S"GOSUB795
30 IFX$=CHR$(12)THENCLS
35 IFX$="C"THEN285
40 IFX$="V"GOSUB620
45 IFX$="Z"GOSUB730
50 IFX$="E"THENE=USR1(0):CC=0
55 IFX$="I"THEN105
60 IFX$="T"THEN195

```

```

65 IFX$="O"GOSUB100
70 IFX$="P"THEN570
75 IFX$="D"THEN125
80 IFX$="R"THEN140ELSE20
85 FORI=1TON:IF X$="L" THENPRINT I;
90 PRINTTAB(3)L$(I)TAB(9)M$(I)TAB(16)O$(I)
95 NEXTI:GOTO20
100 PRINT:FOR I=1 TON:
PRINTHEX$(AD(I))TAB(7)OC$(I): NEXT:RETURN
105 INPUT"AFTER";K:N=N+1
110 FORQ=N+1TOK+1STEP-1
115 L$(Q)=L$(Q-1):M$(Q)=M$(Q-1):
O$(Q)=O$(Q-1)
120 NEXTQ:L$(K+1)="":M$(K+1)="":
O$(K+1)="":GOTO20
125 INPUT"#";K:FORI=K TON
130 L$(I)=L$(I+1):M$(I)=M$(I+1):O$(I)=O$(I+1)
135 NEXTI:N=N-1:GOTO20
140 INPUT"#";K
145 PRINT"L K O"
150 X$=INKEY$:IFX$=""THEN150
155 IFX$="L"THENPRINTL$(K):INPUTL$(K)
160 IFX$="K"THENPRINTM$(K):INPUTM$(K)
165 IFX$="O"THENPRINTO$(K):LINEINPUT"?";O$(K)
170 GOTO20
175 M=12:DIM MN$(M):FOR I=1TOM
180 READMN$(I):NEXT:RETURN
185 DATA LET, PRINT@, END, POKE, IF, GOTO, FOR,
NEXT, REM, CLS, GOSUB, RETURN
190 PRINT"ERR LINE":RETURN
195 GOSUB280
200 PRINT"S(AVE) L(OAD)"
205 X$=INKEY$:IF X$="" THEN 205
210 IF X$="S" THEN 250
215 IF X$<>"L" THEN200
220 OPEN "I",#-1,"CODES"
225 INPUT#-1,N
230 FOR I=1 TO N
235 INPUT#-1,L$(I),M$(I),O$(I)
240 NEXTI:GOTO275
245 GOSUB280
250 OPEN "O",#-1,"CODES"
255 PRINT#-1,N
260 FORI=1 TO N
265 PRINT #-1,L$(I),M$(I),O$(I)
270 NEXTI
275 PRINT"OK":CLOSE#-1:GOTO20
280 INPUT"READY TAPE";Q$:RETURN
285 DM=0:CC=0:FORI=1 TO N:FOR J=1 TOM
290 IF M$(I)=MN$(J) THEN 305
295 NEXTJ:GOSUB190:GOTO 20
300 NEXT I:PRINT:GOSUB605:PRINT"OK":GOTO 20
305 OC$(I)=" "
310 ON J GOSUB 325,385,450,455,475, 410, 740,
770, 405, 320, 415, 450
315 PRINTI:GOTO300
320 O$="A="+O$(I):GOSUB505: X=A2:GOSUB555:

```



```

OC$(I)="FC"+X$
+"5D2604C680200658585858CB7FBD A92A":
RETURN
325 O$=O$(I):IF INSTR(O$,">")>0 THEN
BT$="F3":GOTO 360
330 IF INSTR(O$,"-")>0 THEN BT$="B3":GOTO360
335 IF INSTR(O$,"PEEK")>0 THEN 420
340 IF INSTR(O$,"**")>0THEN 430
345 GOSUB505:OC$(I)="FC"
350 X=A2:GOSUB555:OC$(I)=OC$(I)+X$
355
X=A1:GOSUB555:OC$(I)=OC$(I)+"FD"+X$:RETURN
360 O$=MID$(O$,3):GOSUB505
365 X=A1: GOSUB555: OC$(I)="FC"+X$: X=A2:
GOSUB555: OC$ (I)=OC$ (I)+BT$ +X$
370 O$=LEFT$(O$(I),2)+"A"
375 GOSUB505:X=A1:GOSUB555
380 OC$(I)=OC$(I)+"FD"+X$:RETURN
385 O$=O$(I)
390 GOSUB505: X=A1: GOSUB555: OC$(I)= "FC"
+X$+"C304001F01FC"
395 X=A2: GOSUB555: OC$ (I)=OC$ (I)+X$+
"BD11E21F98BD11E2"
400 RETURN
405 OC$(I)="12":RETURN
410 OC$(I)="16????":RETURN

```

```

415 OC$(I)="17????":RETURN
420 O$=O$(I):GOSUB785:
O$=LEFT$(O$,2)+MID$(O$,8):
O$=LEFT$(O$,LEN(O$)-1):GOSUB505
425
X=A1:GOSUB555:O$="8600B7"+X$+"A69F":X=A2:
GOSUB555:O$=O$+X$+"B7":X=A1+1: GOSUB555:
OC$(I)=O$+X$: RETURN
430 GOSUB785:O$=MID$(O$,3):GOSUB505
435 X=A2+1:O$=LEFT$(O$(I),2)+"A"
440 A0=A1:GOSUB505:GOSUB555:
OC$(I)="F6"+X$:X=A0+1:GOSUB555:
OC$(I)=OC$(I)+"B6"+X$+"3DFD":X=A1:
GOSUB555: OC$(I)=OC$(I)+X$: RETURN
445 STOP
450 OC$(I)="39":RETURN 455 O$=O$(I):GOSUB505
460 X=A2+1:GOSUB 555:OC$(I)="B6"+X$
465 X=A1:GOSUB555
470 OC$(I)=OC$(I)+"A79F"+X$:RETURN
475 H$=O$(I):T=INSTR(H$,"THEN")
480 O$=LEFT$(H$,T-1):GOSUB505
485 X=A1:GOSUB555:OC$(I)="BE"+X$
490 X=A2:GOSUB555:OC$(I)=
OC$(I)+"BC"+X$+"1027?????"
495 IF INSTR(O$(I),">")>0 THEN
MID$(OC$(I),15)="2E"

```

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```

500 RETURN
505 GOSUB 785:FOR J=1 TO
6:W$=MID$(V$,J,1):K=INSTR(O$,W$):IF K>0 THEN 515
510 NEXT J:GOSUB 190:RETURN
515 F$=LEFT$(O$,K-1):S$=MID$(O$,K+1)
520 F=ASC(F$):S=ASC(S$)
525 A1=1536+2*(F-65):IF F<58
THENC$=F$:GOSUB 540:A1=CL
530 A2=1536+2*(S-65):IF S<58
THENC$=S$:GOSUB 540:A2=CL
535 RETURN
540 V=VAL(C$):CC=CC+1:HB=INT(V/256):
LB=V-256*HB:CL=SA-2*CC:POKE CL,HB: POKE
CL+1,LB:RETURN
545 X$=HEX$(X):IF LEN(X$)=1 THEN X$="0"+X$
550 RETURN
555 X$=HEX$(X)
560 IF LEN(X$)<4 THEN X$="0"+X$:GOTO 560
565 RETURN
570 AD=1608:DEFUSR1=AD
575 FOR I=1 TO N
580 O$=OC$(I):L=LEN(O$)
585 FOR J=1 TO L-1 STEP 2
590 H$="&H"+MID$(O$,J,2):PRINTMID$(H$,3);
595 POKE AD,VAL(H$):AD=AD+1
600 NEXT J:NEXT I:PRINT:GOTO 20
605 X=1608:FOR I=1 TO N
610 X=X+LEN(OC$(I-1))/2:AD(I)=X
615 NEXT I:GOSUB 640:RETURN
620 CLS:FOR I=65 TO 90
625 AD=1536+2*(I-65)
630 PRINTCHR$(I);="";256*PEEK(AD) + PEEK(AD+1),
635 NEXT I:RETURN
640 FOR I=1 TO N-1
645 T=INSTR(O$(I),"THEN"):IF T<>0 THEN
TL=17:TC=10:GOTO 660
650 IF M$(I)<>"GOTO" AND M$(I)<>"GOSUB" THEN
700
655 TL=3:TC=3:T=VAL(O$(I)):GOTO 665
660 T=VAL(MID$(O$(I),T+4))
665 FOR J=1 TO N
670 IF VAL(L$(J))<>T THEN 695
675 X=AD(J)-AD(I)-TC
680 IF X<0 THEN X=65536+X
685 GOSUB 555
690 MID$(OC$(I),TL,4)=X$:GOTO 700
695 NEXT J:GOSUB 190:GOTO 20
700 NEXT I
705 RETURN
710 X$="3402444444448D0BA7803502840F8
D03A78039810923028B078B308A4039"
715 A=&H11E2:SA=A
720 FOR I=1 TO 59 STEP 2
725 T$=MID$(X$,I,2):T=VAL("&H"+T$):POKE
A,T:A=A+1:NEXT I:RETURN
730 FOR V=1536 TO 1587
735 POKE V,0:NEXT:RETURN

```

```

740 DM=DM+1: O$=O$(I): T=INSTR(O$,"TO"):
O$=LEFT$(O$,T-1): GOSUB 505
745 F1=A1:F2=A2: O$="A"+MID$( O$(I),T+2):
GOSUB 785: GOSUB 505: F3=A2
750 X=F2: GOSUB 555: OC$(I)="FC"+X$: X=F1:
GOSUB 555: OC$(I)=OC$(I)+"FD"+X$
755 IF I=1 THEN NA=1614:GOTO 765
760 NA=1608:FOR J=1 TO I:
NA=NA+.5*LEN(OC$(J)): NEXT J
765 F(1,DM)=F1:F(2,DM)=F3:F(3,DM)=NA:RETURN
770
X=F(1,DM):GOSUB 555:O$="BE"+X$+"C6013ABF"+
X$
775
X=F(2,DM):GOSUB 555:O$=O$+"BC"+X$+"2E03"
780 X=F(3,DM): GOSUB 555: O$=O$+"7E"+X$:
DM=DM-1: OC$(I)=O$: RETURN
785 TH=INSTR(O$," "):IF TH=0 THEN RETURN
790 O$=LEFT$(O$,TH-1)+MID$(O$,TH+1):GOTO 785
795 CLS:S=0:FOR I=1 TO N:IF M$(I)="NEXT" THEN
S=S-2
800 PRINTL$(I)TAB(6+S)M$(I);" "O$(I)
805 IF M$(I)="FOR" THEN S=S+2
810 NEXT:IF S<>0 THENPRINT"ERROR"
815 RETURN

```

Listing 2 — Example Source Code

```

5 LET X = 0
7 LET Y = 0
10 LET S = 1024
20 CLS 0
30 LET I = 1
40 LET J = I
50 LET X = X + I
60 LET Y = Y + J
70 GOSUB 180
80 LET C = PEEK(P)
90 IF C = 191 THEN 120
100 POKE P, 191
110 GOTO 130
120 POKE P, 192
130 IF X = 0 THEN 220
140 IF X = 31 THEN 220
150 IF Y = 0 THEN 240
160 IF Y = 15 THEN 240
170 GOTO 50
180 LET Q = 32 * Y
190 LET P = S + X
200 LET P = P + Q
210 RETURN
220 LET I = 0 - I
230 GOTO 150
240 LET J = 0 - J
250 GOTO 50
260 END

```


Reviews

COPY-NOT

HPB Vector Company
130 Center Street
E. Stroudsburg, PA 18301
(717) 421-3061
Model I, 48K, 2 disks (min.)
\$275

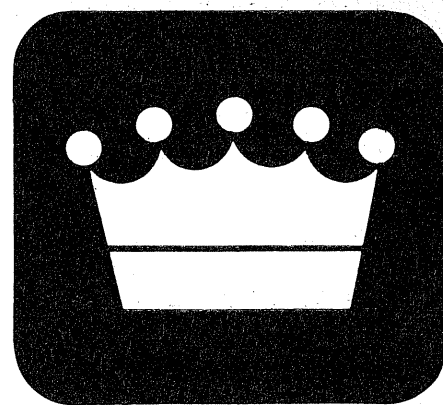
This program has the potential, I think, of becoming a landmark to the computer software industry. COPY-NOT allows the author or seller of any BASIC program to distribute his program while protecting it securely against theft.

COPY-NOT protects BASIC programs in several ways. The user disk contains a highly-modified form of TRSDOS 2.3, with three of its modules killed. There is no FORMAT, BACKUP or COPY function available. They are replaced with COPY-NOT functions. Of course, the user disk also contains the protected BASIC program, but it is stored on the disk in encrypted form. The net disk overhead for COPY-NOT is approximately 2565 bytes. Incidentally, even though the form of TRSDOS contained on the user disk is highly modified and inaccessible, a license for distribution of TRSDOS must be obtained. The present

license fee from Radio Shack, according to the COPY-NOT manual, is \$100 per year.

To run the protected program, the user places the disk in drive zero and presses <ENTER>. No other input is necessary, or possible. A sequence of DOS commands will now be executed automatically, up to nine commands in length. It is here that any necessary loading of machine language routines for later calling by the BASIC program's USR function is done automatically. Your "sign-on" message is displayed, and is followed by whatever further sequence of DOS commands has been pre-programmed (including a DIR command, if you feel that it is important for the user to see what files are available on the disk). Next, BASIC will initialize, with the number of files and memory size entered automatically. Now, the program itself begins to run.

There are some differences, though, between the COPY-NOT protected program and the more usual program running under disk BASIC. For example, there is no CMD"S" function available. That command is no longer valid. If,



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while the program is in memory, the computer is rebooted under a different operating system and the BASIC* command is issued, only garbage will be obtained — not the protected program.

As a matter of fact, if the highest level of protection was requested when the user copy was generated, the protected program itself is never present in the computer's memory! What does exist in memory is an encrypted version of the program, which must be decoded line-by-line as the program executes. Although I observed no significant difference in the programs I tested, the manufacturer points out that, where long loops are a factor, or in critical timing applications, an allowance must be made for the decrypting delay. Suggestions for minimizing the speed penalty are given in the manual.

Protecting a program with COPY-NOT was easy for me, even the first time I attempted it. The preparation of a master disk requires only following the menu, and the documentation which comes with the program is quite complete, and easy to understand. Briefly, it goes like this: You place the COPY-NOT disk supplied into drive zero, and boot up. A menu is displayed and you are asked whether you wish to make copies or generate a master disk. In this case, you are generating a master disk, and so choose.

Now, you are instructed to remove the COPY-NOT disk from drive zero and insert your own "object disk"—that is, a TRSDOS system disk containing the program you are seeking to protect. Next, you are asked to specify any "sign on" message you wish to display to the user when he boots up your disk. Following this, you specify any sequence of DOS commands you wish to have executed automatically when the user boots up, before BASIC is initialized. The number of files and memory size are requested next, and you are prompted for the name of the program which is to begin executing first.

More than one BASIC program can be included on your protected disk, but additional programs must be chained from the first program which executes, or from each other. For that matter, the first program may be nothing more than a menu program containing a listing of BASIC programs for the user to choose, all of which chain back to the menu. You are prompted to abort the program and make a backup copy of your program if you do not already have one. Once COPY-NOT reworks your object disk, there will be no backing up! When you choose "Make Master," the disk which you placed into drive zero will be converted to a master disk from which all

your copies will be made.

Making duplicate copies from the master disk is also quite easy, and up to three destination drives may be used. Each copy is given a ten-digit serial number, starting with the number you specify at the beginning of the copying session. Number of copies per serial number is also requested since the user cannot backup his program disk. You may wish to send him more than one disk bearing the same serial number.

The COPY-NOT manual is thirty-eight pages in length. The first section discusses the program and its theory of operation, and gives a step-by-step explanation of how it is used. The second section contains flow charts which allow quick reference to each of the choices COPY-NOT offers while preparing the master disk or making copies.

COPY-NOT offers a method of distributing a BASIC program which is relatively secure from unauthorized copying, and which cannot be penetrated with the pirating software presently on the market. No protection method is absolutely secure, but the manufacturer feels that several hundred hours of assembly language work would be required to gain access to a program contained on the protected disk. Only the most unusual programmer is likely to find it worth the effort — and then, I would imagine, only with the motive of selling the pirated program, not of giving it away.

R. G. Spindler

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The object of the game is to maneuver the worm, which starts out as a baby, around the playing field with the arrow keys and eat as many beasts as possible before running into a wall or touching its own tail. The beasts, known as Zansbards, appear randomly

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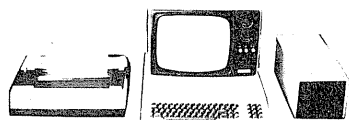
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on the screen for only a brief period of time. You must attempt to eat the Zansbard as soon as it appears by running into it. Sometimes it will disappear just as your worm is about to devour it. The reward for eating a Zansbard is a score that varies with each creature. The price for eating it is an increase in the size of the worm's tail. As more and more points accumulate, the worm's tail gets longer and longer. Eventually, the tail may get so long that it is next to impossible to maneuver without hitting it. Luckily, the tail sometimes develops a break in it, and the clever player can sneak through the separation to take a short cut or to avoid hitting it.

There are four skill levels to choose from, each with ten different speeds. This gives a continuous spectrum of difficulty levels, from the boring Granny Worm level to the ultimate test of reflexes — the Ultra Worm. The last one zips along at close to light speed. In between will lie the average player's level of competence. We found "Daddy 5" to be about right for us. One minor complaint is the necessity of having to enter the level and speed at the beginning of each new game.

The graphics, though simple, are good, with smooth animation. The sound effects, by way of the cassette output port, are also quite good. The game is well done and very entertaining. The high game is not saved from session to session, but is displayed continuously during each session. There is also an option at the start of the session which allows diagonal movement. It adds another challenging dimension to the game. The higher levels will test even the quickest of reflexes and Regilian Worm

should provide many hours of enjoyment for the arcade addict.

Jim Klaproth

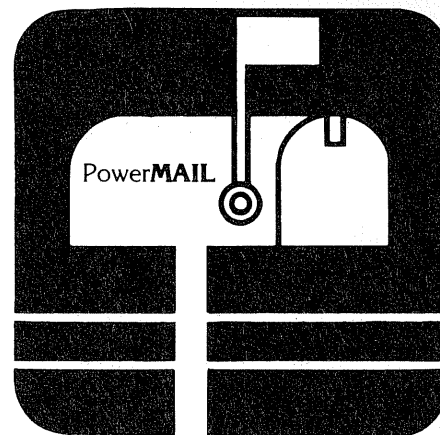
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During the past five years, I have heard many complaints and comments about the black and white screen that comes standard with TRS-80 Model I and III. Most people find it difficult to spend several hours in front of a black and white CRT (Cathode Ray Tube). Langley-St. Clair has recently introduced two replacements to help eliminate this problem. These CRT's incorporate slow phosphor to decrease eye strain and also leaded glass to stop X-ray emissions.

Langley-St. Clair offers two different types of phosphor — green and orange. The green CRT, \$79.95, is a slow-decay phosphor similar to the IBM or Apple III monitors. The orange, for \$89.95, is a medium-decay phosphor and is said to be the standard CRT in Europe. Either screen may have optional anti-glare frosted glass added for \$10.00.

The CRT I installed in my Model III was the orange phosphor type. The CRT comes with seven pages of clear, concise instructions and requires only a few simple tools to install.

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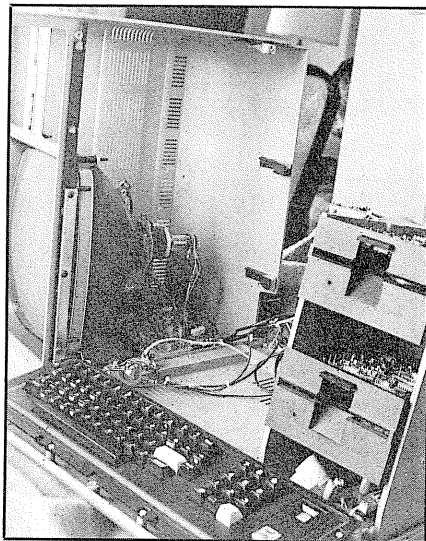
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have one left. The entire top case can then be detached from the bottom by sliding off two wires.

The video board is at the bottom of the case and attaches to the CRT by means of a socket at the rear of the CRT and a high voltage wire directly to the tube. The high voltage wire is the suction cup device near the top of the CRT. The yoke attaches to the tube and is removed by loosening one screw. The video board, yoke, and high voltage cable are then removed. The CRT is removed by loosening four screws.

The new CRT is installed by reversing the process above. With the case off, the computer is turned on and alignment of the raster lines is checked. If the picture is not square, the yoke must be rotated to compensate. Once things are aligned, the yoke is tightened down and the cover

replaced.

Remember that twenty to thirty thousand volts of electricity are roaming around your computer's CRT (or your TV) and Langley-St. Clair recommends waiting an hour between turning your computer off and working on it. This would seem to be a more than adequate precaution.

The entire installation took about an hour and a half. Depending on how long it takes to align the raster, it might take longer since you should wait an hour between alignments.

Anyone could easily install this replacement CRT. The instructions are clear, simple (if not over simplified) and complete. At no time during the installation was I confused or lost. It even worked the first time I turned it on.

The orange phosphor is a great improvement over the standard monitor. Often, I sit at my computer for several hours at a time and I can really tell the difference between the two monitors. There is no great detectable difference with the medium phosphor as far as program displays go. The green however, being a very slow decay, does leave a vapor trail on games or other programs with fast-changing screens.

Langley-St. Clair also offers a thirty day money back guarantee and a full, one-year warranty on the tubes. If you decide not to install the tube yourself, any local TV technician could easily do it. The CRT is an excellent product and makes the TRS-80 an even better computer.

(My thanks to Ray LaVerdure for the photographs and Gary Stephenson for the technical advice.)

Mark Renne

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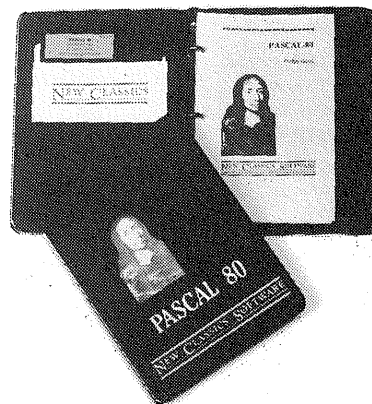
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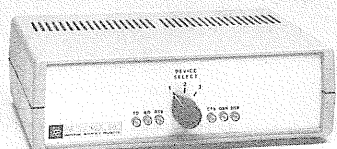
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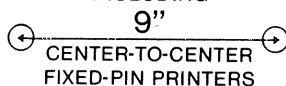
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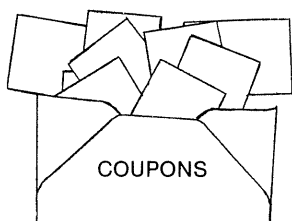
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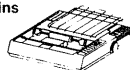
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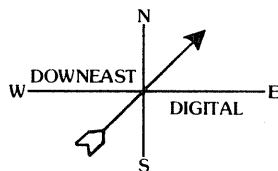
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Microvox

The Microvox provides a new high level of speech intelligibility and voice quality. Microvox translates ASCII characters into speech with an advanced text-to-speech algorithm. Simply type English text into your keyboard.

It provides a real time audio interface for data processing, telecommunications, automation, or education. Especially useful for the handicapped. Microvox can enunciate data that is transmitted over phone lines or serve as an audio interface. Sixty-four digitally programmable levels of inflection offer a unique high fidelity voice quality.

The package includes a speech synthesizer chip, crystal controlled inflection levels, a 6K text to phoneme algorithm, a 750 character buffer, full ASCII recognition, music and sound effects capability, amplifier, power supply and more for \$295. Contact The Micromint, Inc., 917 Midway, Woodmere, N.Y. or phone (516) 374-6793.

#200

Color Computer Multiport

Maple Leaf Systems has produced Multiport, the first multiple-slot expansion unit for the Color Computer. It allows for the simultaneous connection of up to four separate Color Computer peripherals.

The computer can switch between peripherals under software control, allow one program to access any or all of the peripherals at one time. For example, Multiport allows you to have a disk, modem, program cartridge, printer, and clock cartridge on-line all at once. It connects directly to the expansion port of all Color Computer versions and comes completely assembled for \$99.50. Available from Maple Leaf Systems, P.O. Box 2190, Station C, Downsview, Ontario Canada, M2N 2S9.

#201

Restaurant Analysis

Advanced Analytical Computer Systems offers a complete restaurant inventory and cost

management system for the TRS-80 Models II/III and 16. The packages feature perpetual inventory, food and liquor cost computations, theft detection, menu conception and analysis, sales analysis, inflation evaluation, automatic re-order of inventory, and inventory evaluation.

The programs require no previous computer experience and are menu-driven and error trapped. The programs may be used alone or in conjunction with optional accounting programs. They are designed to be used from data off of standard point-of-sale registers, no need for any equipment modification.

The Model III version requires 48K and two disks. The Model II/16 versions require 64K, and two disks are preferred. Works with the Line Printer V or VI. For more detail and complete price information contact Advanced Analytical Computer Systems, 330 S. Barrington Ave., Suite 109, Los Angeles, CA 90049 (213) 471-1134.

#202

Computer Camp

Those "How I Spent My Summer Vacation" essays will never be the same. The sixth annual National Computer Camp in Simsbury CT, Atlanta GA, and St. Louis MO, offer unique educational and recreational experience for kids between the ages of 9 and 18. Campers may select one, or two-week sessions from July 3 to August 5, 1983.

Over one hundred computer enthusiasts, including those with no experience whatsoever, enjoy sixty computers for ample hands-on experience. As does any good camp program, this one keeps the campers going morning, noon and night. Campers are divided into groups of twelve, with an instructor, an assistant, and several computers. The groups are formed according to experience and age.

The campers are encouraged, but not required, to participate in

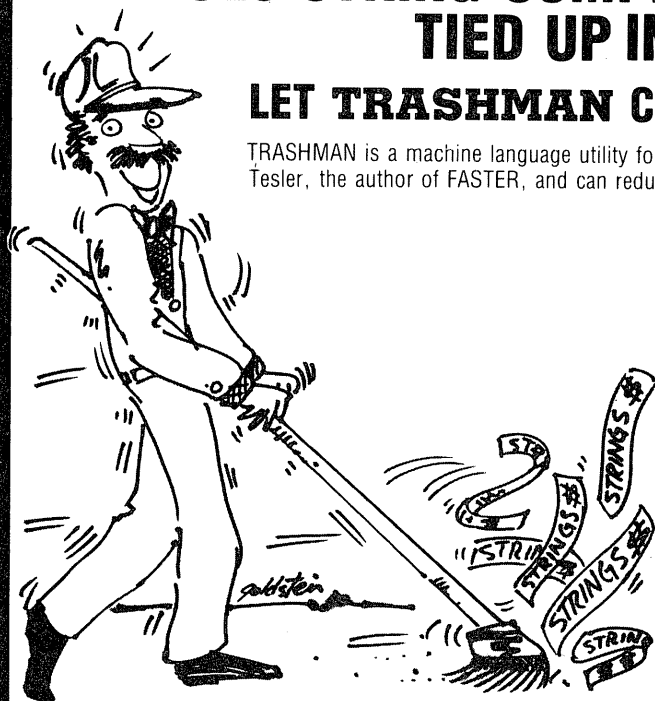
Computer Camp



DOES STRING COMPRESSION HAVE YOU TIED UP IN KNOTS?

LET TRASHMAN CLEAN UP THE MESS!

TRASHMAN is a machine language utility for the TRS-80 Models I and III. It was written by Glenn Tesler, the author of FASTER, and can reduce BASIC's string compression time by 95% (see table below).



WHAT'S STRING COMPRESSION?

When a BASIC program changes a string (words, names, descriptions), it moves it to a new place in memory, and leaves a hole in the old place. Eventually, all available memory gets used up and BASIC has to push the strings together to free up some space. This takes time. Lots of time. The computer stops running for seconds or minutes, and you may even think it's "crashed". The keyboard won't work, and until all the strings have been collected, you just have to sit and wait. Then things run for a while, until string compression is needed again. And again.

If you're using your computer for business, that wastes your money. If you're using it personally, it wastes your time.

WHAT'S THE SOLUTION?

As soon as you start using TRASHMAN, those delays almost disappear. It uses less than 600 bytes of memory, plus 2 bytes for each active string. It works with other machine language programs and with all major operating systems. It's easy to use, comes with complete instructions, and can be copied to your own disks.

WHAT'S THE CATCH?

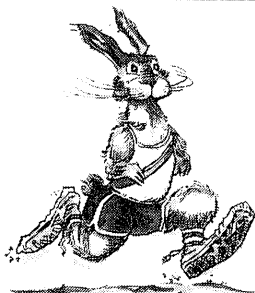
If a BASIC program uses only a few strings, very little time is wasted in string compression, and TRASHMAN won't be helpful. But, if hundreds of strings, including large string arrays, are used, TRASHMAN is just what you need.

# STRINGS	SECONDS DELAY NORMAL	SECONDS DELAY TRASHMAN	PERCENT IMPROVEMENT
250	11.8	0.7	94
500	45.8	1.6	96.5
1000	179.6	3.5	98
2000	713.2	7.8	98.9

**TRASHMAN is available on disk
for just \$39.95.**

(All timings done on TRS-80 Model I. Model III 15% faster, but pct. improvements identical. Listing of timing program available on request.)

SAVE TIME WITH FASTER



"FASTER" speeds up most TRS-80 BASIC programs by 20-50%. It's helped hundreds of satisfied people and it can help you. Detailed instructions make it easy to use. FASTER analyses your BASIC programs while they run, then displays a simple change, usually one line, that sequences program variables so the ROM will find them faster.

You can use FASTER to speed up programs you've bought, as well as programs of your own. Since it isn't a compiler, your BASIC programs can be read and changed afterwards. FASTER works on business programs, models, and games. The more complex your program, the better the results.

Does FASTER really work? Yes! Just check the reviews in *Personal Computing*, May, 1981, p. 116: "FASTER is effective and easy to use"; *80 U.S. Journal*, April, 1982, p. 106: "I recommend FASTER to everyone"; and *80 MICRO* (April, 1982, p. 40): "If you...would like a significant increase in the run-time speed, then buy FASTER."

FASTER runs on the TRS-80 Models I and III, 16-48K tape or disk, and all major operating systems. **\$29.95**

"QUICK COMPRESS" takes only 276 bytes of memory, and removes the blanks and remarks from even the largest BASIC program in less than 3 seconds. It produces smaller, faster programs without altering their logic. **\$19.95**

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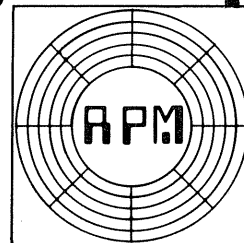
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RPM is supplied on diskette for the TRS-80 Models I and III. We suggest you order a copy before you need it.



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outdoor activities such as swimming, volleyball, tennis, water polo, and shuffleboard. In addition to open computer rooms, evenings bring Olympics, space adventure tournaments, Las Vegas night, and game-a-thons. For further information, contact Michael Zabinski, Ph.D., at (203) 795-9667 or write to National Computer Camp, Box 585, Orange, CT 06477.

#203

Educational Software Sourcebook

Radio Shack has set March 15, 1983 as the submission deadline for instructional software developers who want their packages to appear in the Second Edition of the Educational Software Sourcebook.

Forms for submission appear in the current edition (RS catalog #26-2756), which is still available at local stores or Computer Centers. Institutions, user groups and publishers desiring to appear in the new edition should submit a written profile of their organization that

describes resources and services they provide for the educational community. Profiles must be limited to two pages and specify the source as either a commercial or non-commercial enterprise. For more information contact Educational Software Sourcebook, Radio Shack Education Division, 1400 One Tandy Center, Ft. Worth, TX 76102 or call (817) 390-3523.

#204

Micon-80

Micon-80 is a comprehensive utility that is designed to convert all Microsoft BASIC programs into the multi-user Oasis BASIC language. Now the Oasis BASIC user has open to him the vast library of programs written in Microsoft BASIC. It allows for the specification of TRS-80 Model I/II/III or BASIC 80 as the source code. Micon-80 performs automatic source code syntax checking during the first pass of translation. It will flag and create a file of errors for correction. Select for file conversion from sequential to sequential, random to direct and random to ISAM. All variables are preserved. It does a complete conversion of Microsoft BASIC to Oasis BASIC with the exception of the WIDTH and OUT statements and machine dependent ROM and USR calls.

KCH Consulting, Inc., P.O. Box 40082, 12602 F.M. 528, Houston, TX 77240 (713) 466-3535 offers the complete package for \$995.

#205

TRASHMAN

Glenn Tesler, the author of FASTER, has created TRASHMAN, a machine language utility for the Models I and III. It can reduce BASIC's string compression time by 95% and requires only 578 bytes of memory (plus two bytes for each active string). The utility works with other machine language programs and with all major operating systems. TRASHMAN is available on diskette for \$39.95 from PROSOFT, Box 560, North Hollywood, CA 91603 (213) 764-3131.

#206

CHROMAtrs

CHROMAtrs brings high

resolution color video graphics to the TRS-80 Models I/III. It gives you a 256 by 192 dot addressable display, with up to fifteen simultaneous colors. Also included is an audio output and interfacing capability to all Atari controllers.

The CHROMAtrs peripheral connects the Model I/III to a color monitor (or TV, channels 3 or 4) via the computer's expansion interface. Fifteen assembly language routines are provided on tape for operation of the audio, video, and game controllers. All the routines are accessible from BASIC. You can obtain 3-D simulation by using the thirty-five different display planes. The peripheral includes 16K of RAM, independent of the TRS-80.

The CHROMAtrs comes with complete manual in either kit form for \$99, or assembled and tested for \$169. Connecting cables are extra. Contact South Shore Computer Concepts, Inc., 1590 Broadway, Hewlett, NY 11557 or phone (516) 569-4390.

#207

Universal Operating System

PCD Systems, Inc. has the UCSD P-System now available for the Model III. Tandy machines can now run the same software as IBM, DEC, Commodore, Xerox, H-P, Apple, and Osborne computers. The Universal Operating System allows a user to develop a program on any Radio Shack computer (Model II, III, or 16) and have the program run on any other model, without change or special hardware. The UCSD P-System also works on the IBM Displaywriter and dozens of other eight, sixteen, and thirty-two bit microcomputers.

The Universal Operating System for either the Model II or Model III is \$650, complete with Pascal compiler, screen editor, file manager, runtime system and documentation. The Model 16 version is available for the Z-80 side and implementation on the 68000 side of the machine is under development. Contact PCD Systems, Inc., P.O. Box 143, 163 Main Street, Penn Yan, NY 14527 or phone (315) 526-7428.

#208

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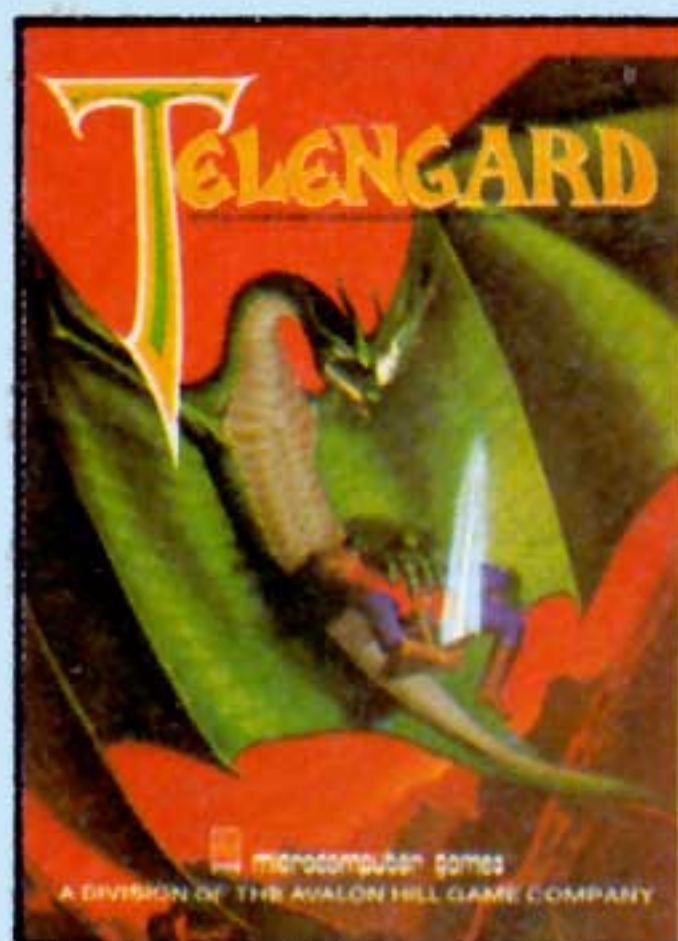
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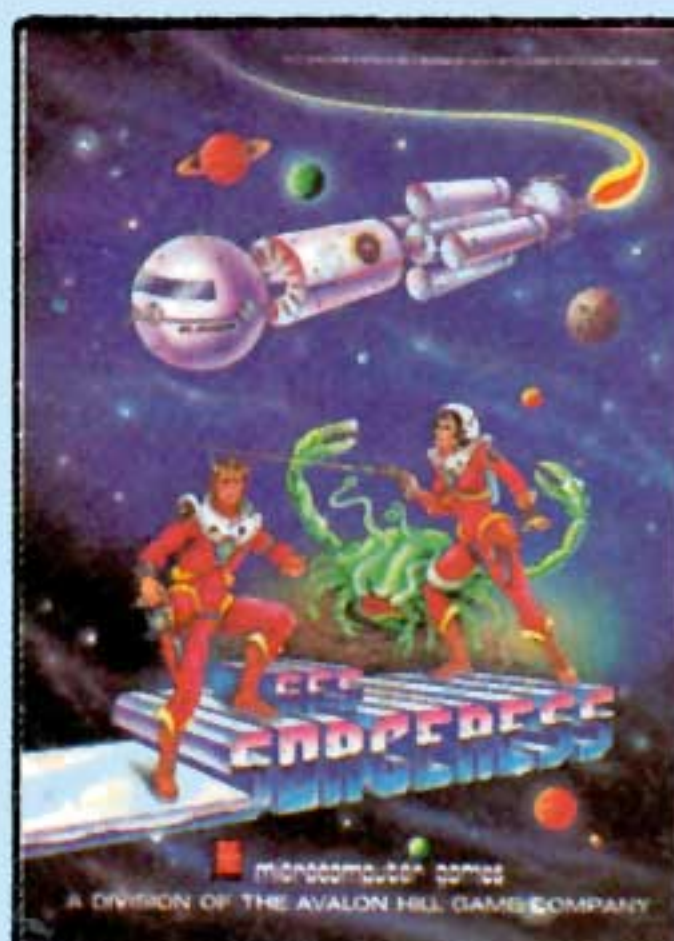


The Thinking Man's Gamemaker

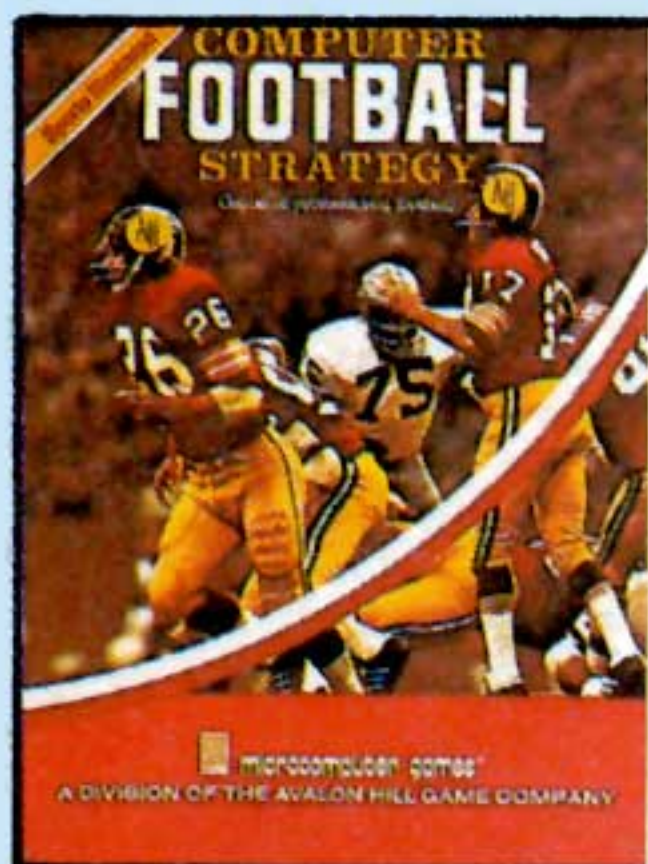
WARNING: Do not buy Avalon Hill Microcomputer Games unless you are above average!



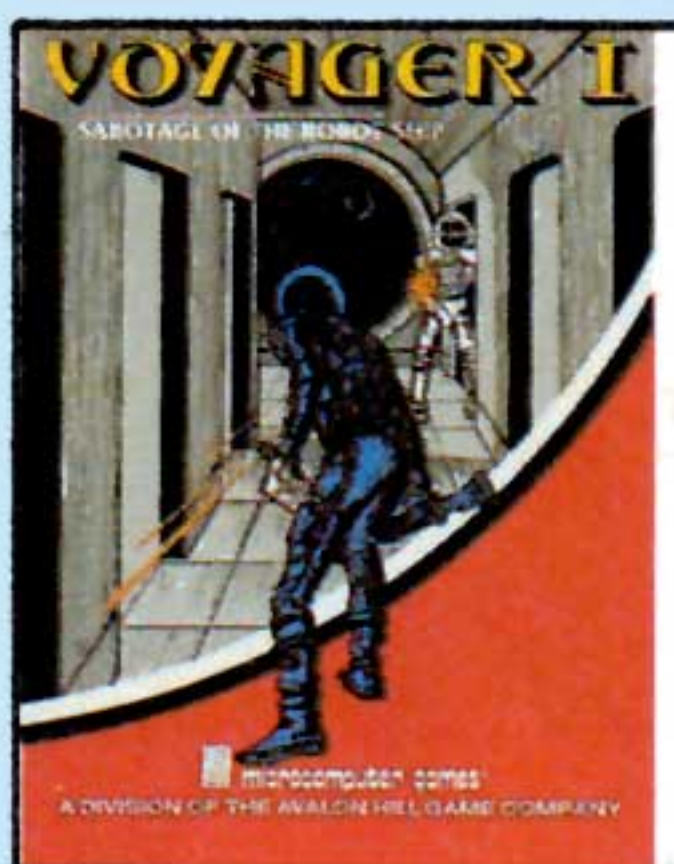
TELENGARD—Microcomputer Dungeon Adventure game. In the mysterious underworld of TELENGARD there are fifty levels of ever-more complex mazes for mighty adventurers to explore. Various means of survival tactics are at the adventurer's disposal and all of the necessary ingredients have been incorporated into this solitaire **real time fantasy and role-playing game**.



G.F.S. SORCERESS—The first **science-fiction adventure game** of the continuing saga of Joe Justin and Selena Sakarov aboard the Galactic Federation Starship Sorceress. In the game, the player takes the part of Joe Justin as he attempts to clear himself of a false charge of mutiny. Beautiful full-color manuals are included giving the player useful clues in his or her attempt to prove Joe Justin's innocence.



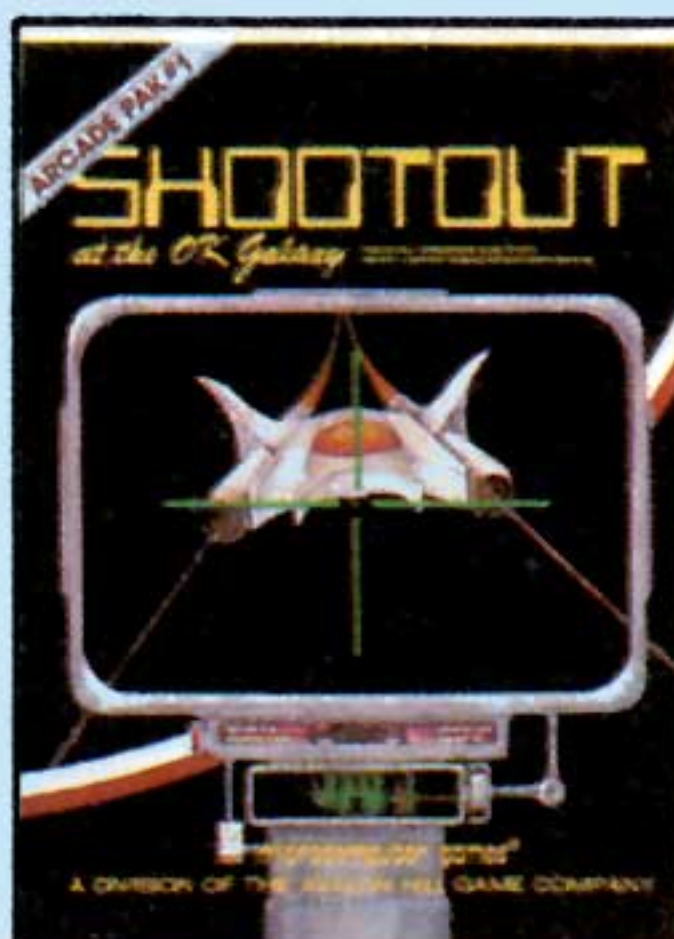
COMPUTER FOOTBALL STRATEGY—Thrilling computer version of Avalon Hill's famous board game. Based on the award-winning Sports Illustrated game of professional football, **Computer Football Strategy** forces the player to constantly make the right decisions about his team's offensive and defensive formations. Match wits against the computer or against a live opponent.



VOYAGER—A solitaire computer game that challenges the human player to explore the four levels of an alien spacecraft's maze-like corridors and rooms in 3-D simulated graphics, all the while avoiding robots programmed to blast any intruders. In order to win, the human must destroy all power generators and escape or hunt out and annihilate the killer robots. **VOYAGER** comes with color-animated graphics and sound capabilities.



V.C. (short for Viet Cong), is Avalon Hill's first game ever on the controversial Viet Nam War. Under your command is the chopper based air-mobile and heavily armed 1/509th Air Cavalry and 9/15th Field Artillery for fire support. It is an **un-conventional conflict**. You have the task of bringing the civilian population under your protection where the enemy (played by the computer) can hide amongst the people, and where the politics of terrorism and friendship can turn the people you want to save against you.



SHOOTOUT—30 ALIEN WARSHIPS HAVE ENTERED YOUR PATROL ZONE. OK, shields up?, energy level . . . check, azimuth set?, yup. This may sound like the latest summer space movie thriller but in fact it's the preparations YOU will make when playing Avalon Hill's new solitaire arcade strategy game **SHOOTOUT AT THE OK GALAXY**. Over 2 years in the making, **SHOOTOUT** is purely graphical combining arcade excitement with just the right touch of strategy.

These games are for the sly and clever. Check on the chart at right to see if the game is compatible with your home computer. Most Avalon Hill Microcomputer Games are also compatible with the following home computer systems: Apple II®; Atari 400 & 800®; IBM P.C.®, and Commodore VIC-20, PET CBM & 2001®. Available at finer computer stores everywhere! Or call TOLL FREE: 1-800-638-9292 for fast credit card purchase. Ask for Operator 80.

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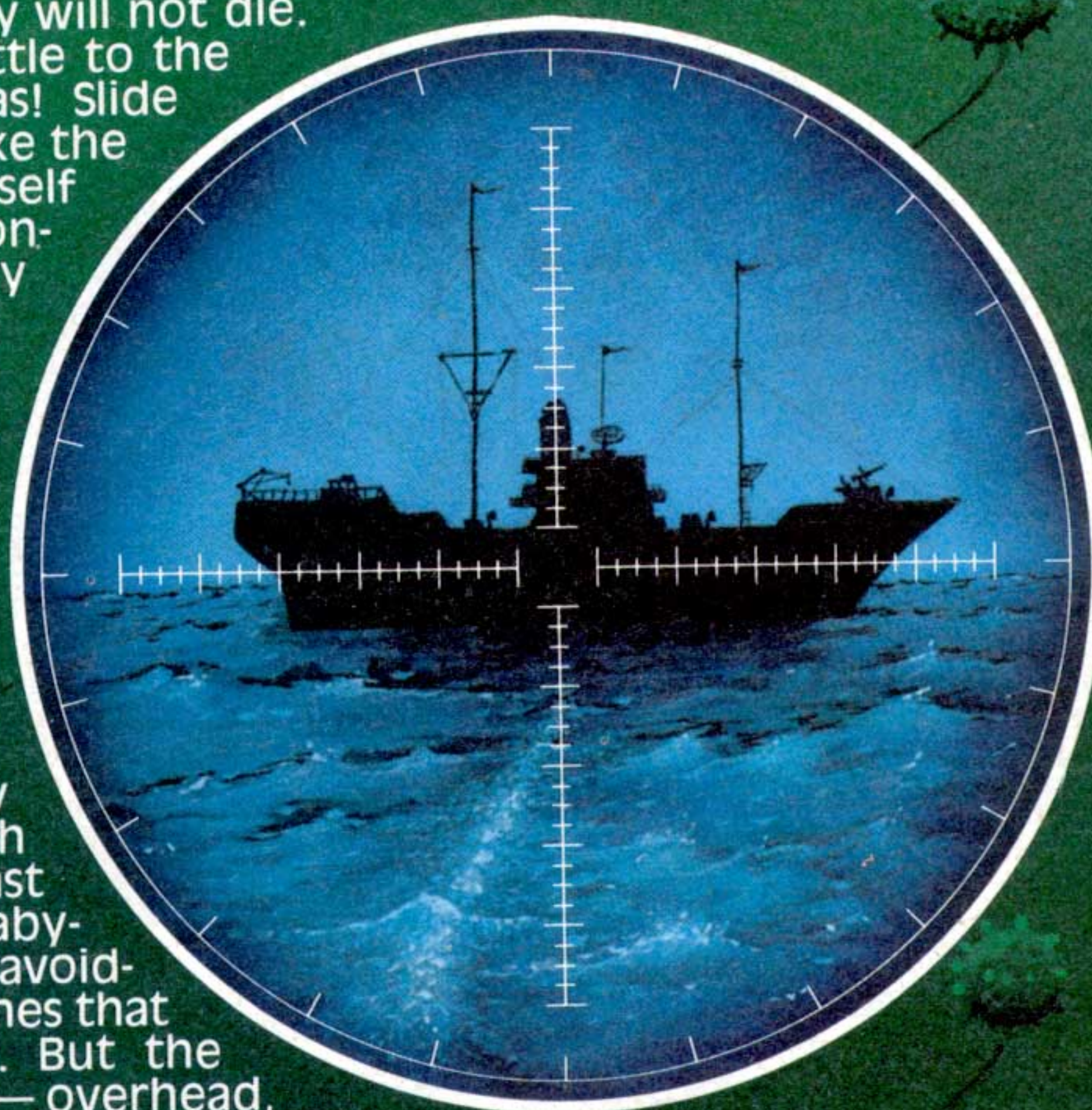
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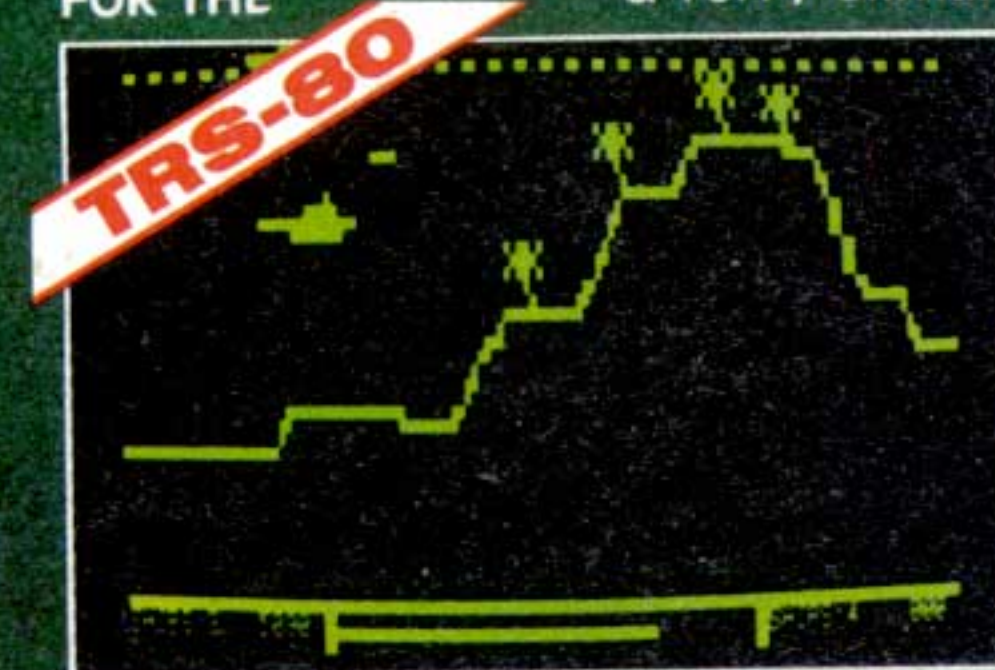
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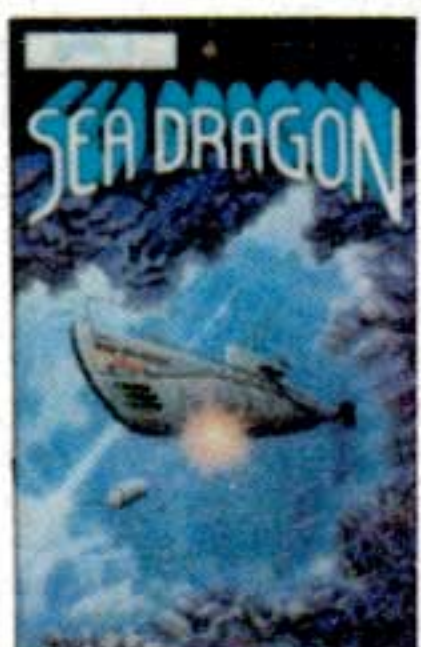
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