The Electronic Castle: Managing Your Home With Your Computer

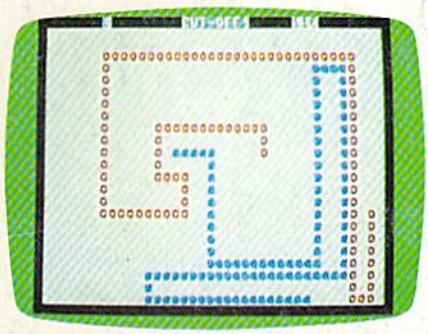
COMPUTE!'s GAZETTE

1984
Issue 9 Vol. 2, No. 3
02220 £1.95 UK $3.25 Canada

For Owners And Users Of **Commodore VIC-20**™ And **64**™ Personal Computers

CUT-OFF!

A fast-action two-player game written in machine language. For the VIC and 64.



The Data Base As A Home Information Center

A look at this powerful new software for personal computers.

Educational Games For The 64

Sea Route To India: A Historical Simulation.

A colorful and exciting recreation of the fifteenth-century Portuguese voyages to India.

Guess America.

Travel across the country in a covered wagon by answering questions about U.S. history, geography, and current events. A valuable learning tool.

Also In This Issue

A Guide To Commodore User Groups—Part 1

Computing For Families

Machine Language For Beginners

MAKING MORE READABLE LISTINGS

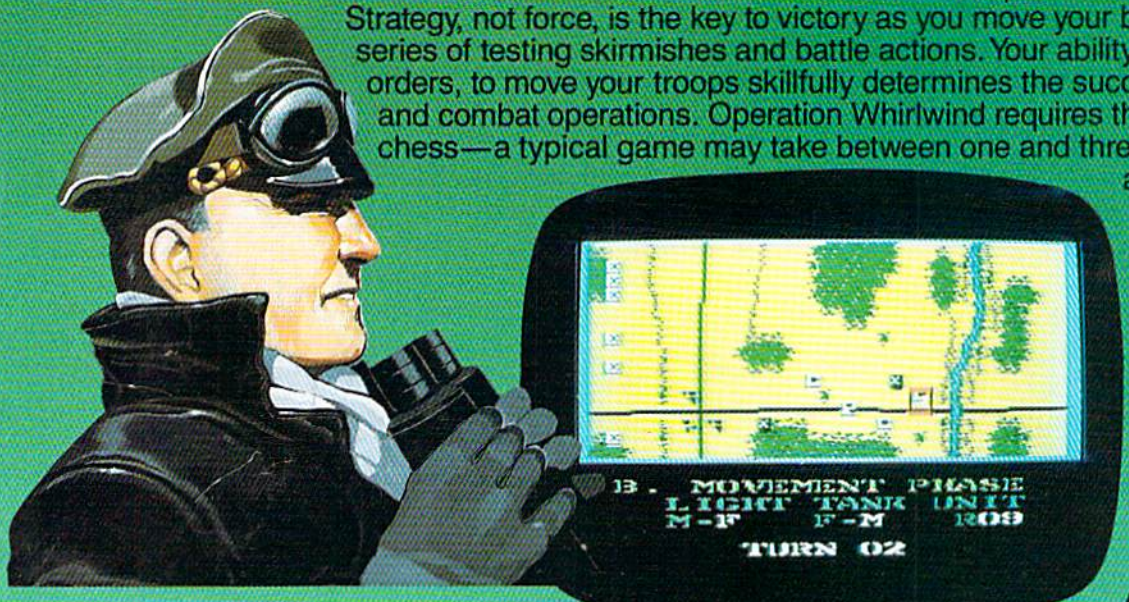
BASIC editing techniques for unique listing formats. For the VIC and 64.

0 71486 02220 03

The Challenge:
Match Wits with the Mind Games from Broderbund!

OPERATION WHIRLWIND™

Your mind is the ultimate weapon in this unique war game. Strategy, not force, is the key to victory as you move your battalion through a series of testing skirmishes and battle actions. Your ability to command, to give orders, to move your troops skillfully determines the success of your assault and combat operations. Operation Whirlwind requires the concentration of chess—a typical game may take between one and three hours—and the ability to master the many tactics of waging a full scale war. How well you can focus your strategic energies will decide whether your victory is Questionable, Marginal, Tactical, Strategic or a Breakthrough. A great game for the thinking game player. Available on disk.



MATCHBOXES™

Pit your concentration against another player or the computer. Here's a puzzle game that will keep the whole family bemused, befuddled and playing happily for hours. A grid of 36 numbered boxes conceals an animated menagerie of colorful characters, creatures and objects. The object of the game is to match identical squares and then solve a hidden word puzzle. There are many game variations with puzzles that are frontward, backward, or scrambled. Matchboxes. It's the most memorable memory game you've ever played! Available on disk and cassette.*

OPERATION WHIRLWIND AND MATCHBOXES ARE AVAILABLE FOR THE COMMODORE 64 AND ATARI HOME COMPUTERS. COMMODORE 64 and ATARI are trademarks of Atari, Inc., and Commodore Electronics, Ltd., respectively.

*Cassette on Atari computers only.

Broderbund Software

Discover the Difference

17 Paul Drive San Rafael, CA 94903

These are the hands of a master typist. (Jonathan Pandolfi, age 7.)

MasterType™—the best-selling program that turns learning into child's play.

Given the choice of learning a skill or playing a game, most kids go for the game.

So how has MasterType™ gotten so many young kids to sit still long enough to learn to type?

By being fun. By bringing the fast action of video games to each of MasterType's lesson program segments.

Kids get so caught up in zapping spaceships, they hardly realize they've mastered the keyboard.

Warning: Parents like it, too. And may find themselves unwittingly becoming expert typists before they know it.

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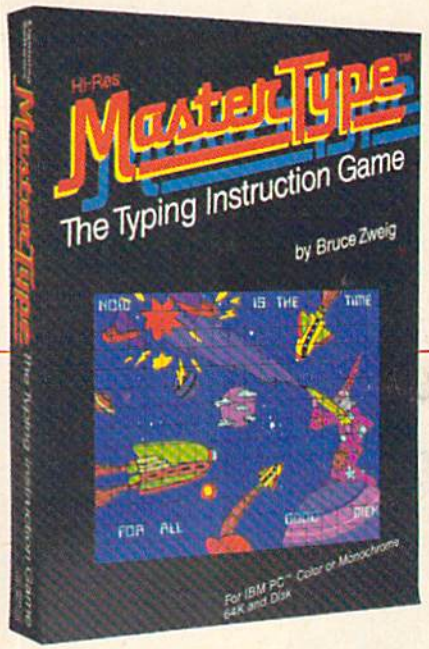
IBM-PC $49.95
Cartridges: Atari®, Commodore 64® $39.95



Try the other programs in the Scarborough System—Songwriter™, PictureWriter™, Phi Beta Filer™, PatternMaker™ and Run for the Money™. All Scarborough software utilizes your computer's capabilities to the fullest. And perhaps more importantly, all are easy to use.

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The Scarborough System.

You'll grow with us.

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IF YOU'RE LIKE MOST BUY A SINGLE

YOU'LL BUY LOTS OF SPINNAKER GAMES.

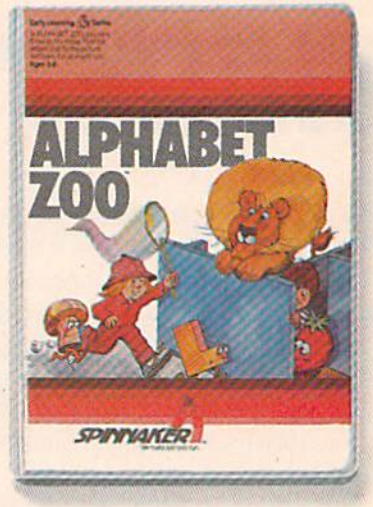
And not just because they're educational, but also because they happen to be a lot of fun to play.

In fact, they're so much fun, parents have been known to sneak in a few hours of play when the kids are asleep.

After all, if your kids are actually enjoying a learning game, there must be something to it. And there is: Fun, excitement and real educational value. That's what sets Spinnaker games apart from all the rest. And what brings parents back for more.

We offer a wide range of learning games for a wide range of age groups: 3 to 14. One look at these two pages will show you how we carefully designed our line of learning games to grow right along with your child.

So if you're looking for a line of learning games that are as much fun to play as they are to buy, consider Spinnaker Games. They're compatible with **Apple, Atari, IBM PC, PCjr, Commodore 64, Coleco Adam** and parents who don't mind their kids having fun while they learn.



A trip through ALPHABET ZOO.™ Ages 3 to 8.

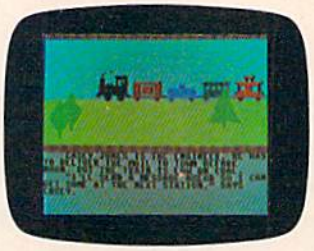
It's a race. It's a chase. It's Alphabet Zoo, a game that sends your kids zipping through the maze, after letters that fit the picture on the screen.

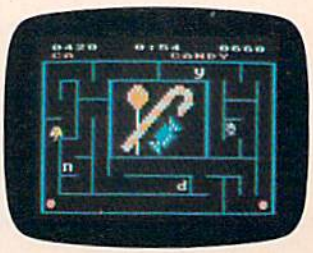
Your kids will have fun learning the relationship of letters and sounds, and sharpening their spelling skills. They'll be laughing at every turn.

It's new! KIDWRITER™ lets kids make their own storybook. Ages 6 to 10.

KIDWRITER gives children a unique new format for creating their own stories. With KIDWRITER, kids make colorful scenes, then add their own story lines. It's as versatile and exciting as your child's imagination!

Best of all, while it encourages children to create word and picture stories, it also introduces them to the fundamentals of word processing. KIDWRITER will bring out the storyteller in your children—and in you!





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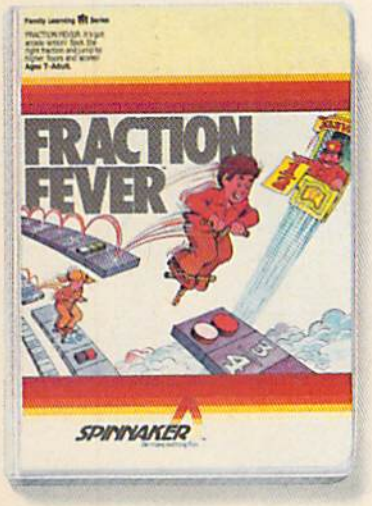
PARENTS, YOU WON'T SPINNAKER GAME.



FRACTION FEVER™ brings fractions into play.
Ages 7 to Adult.

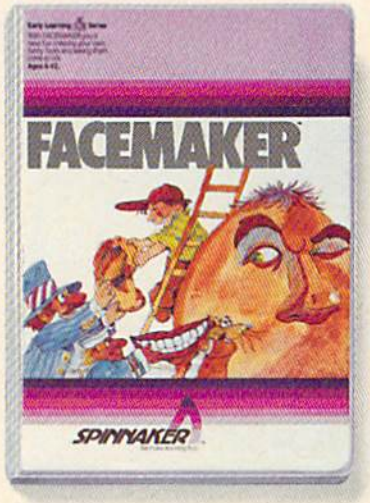
FRACTION FEVER is a fast-paced arcade game that challenges a child's understanding of fractions. As kids race across the screen in search of the assigned fraction, they're actually learning what a fraction is and about relationships between fractions.

All in all, FRACTION FEVER encourages kids to learn as much as they can about fractions—just for the fun of it!

DELTA DRAWING.™ Have fun creating pictures and computer programs.
Ages 4 to Adult.

Kids love to draw. And DELTA DRAWING Learning Program lets them enjoy creative drawing and coloring while they learn computer programming concepts.

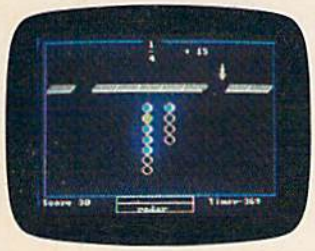
With DELTA DRAWING, even kids who have never used a computer before can learn to write programs and build an understanding of procedural thinking. It's easy, clear, and lots of fun!



FACEMAKER™ makes faces fun.
Ages 3 to 8.

FACEMAKER lets children create their own funny faces on the screen, then make them do all kinds of neat things: wink, smile, wiggle their ears, and more.

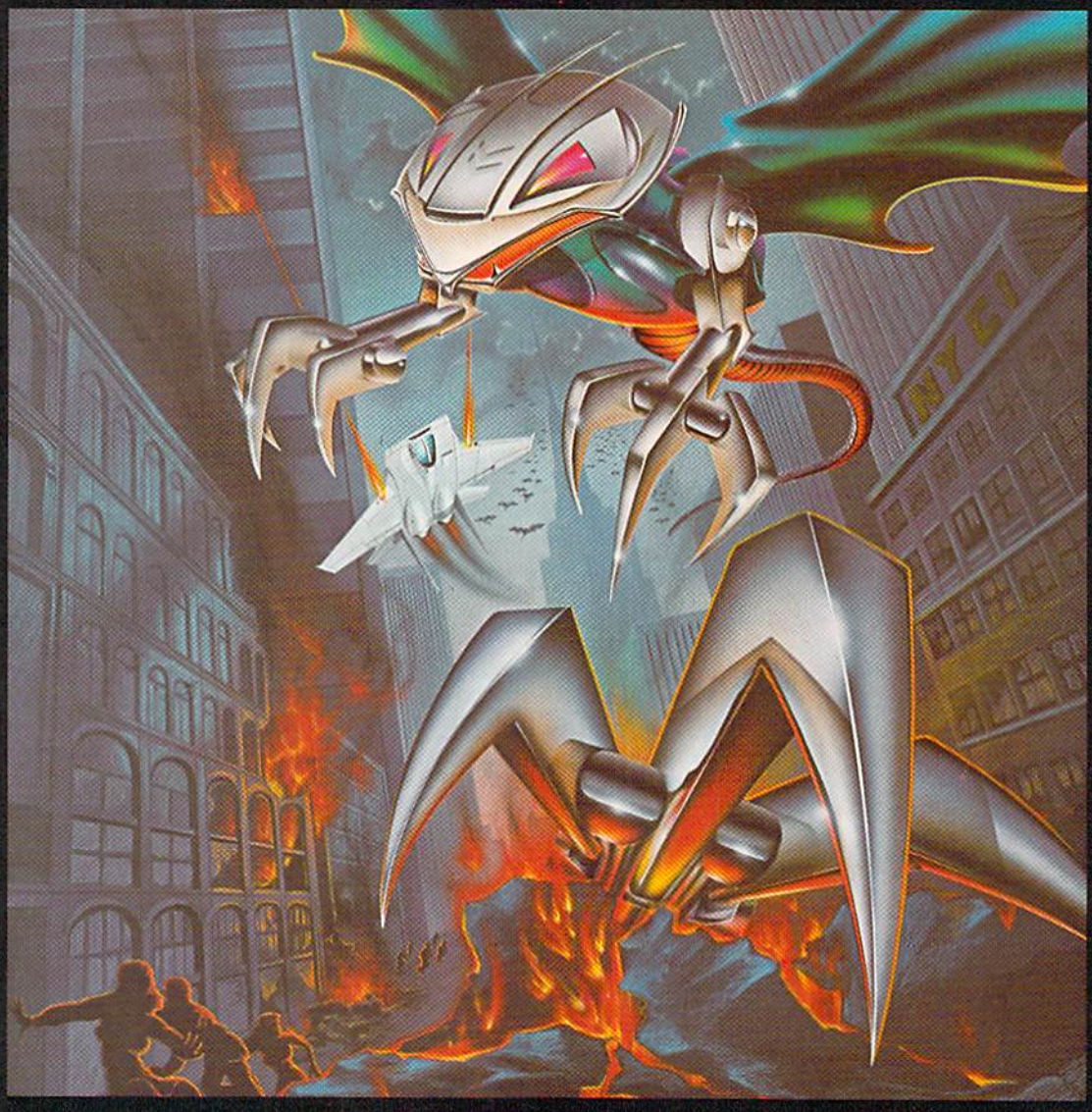
Plus, FACEMAKER helps familiarize children with such computer fundamentals as menus, cursors, simple programs, and graphics. FACEMAKER won't make parents frown because their children will have fun making friends with the computer.



SPINNAKER™
We make learning fun.

Disks for: Apple, Atari, IBM PC and PCjr, Commodore 64.
Cartridges for: Atari, IBM PCjr, Commodore 64, Coleco Adam.

Save New York!™



It was as peaceful a day as New York ever gets, when suddenly the sky went dark and a monstrous droning noise filled the air. Hordes of grotesque aliens were swooping down from all sides, biting into the Big Apple as if they hadn't eaten for days. They were laying eggs, too. Horrible slimy things that got down into the subway tunnels and began clawing their way up. If anyone was going to save the city, it would have to be me. I leapt into my rocket and began blasting away. I thought I stood a fighting chance, but fuel's running low… another wave of invaders on the horizon… signing off…

SAVE NEW YORK.™ For the Commodore 64.

C R E A T I V E S O F T W A R E

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March 1984 Vol. 2, No. 3

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THE EDITOR'S *notes*

GAZETTE On Disk!

Last issue, we announced that we would be beginning a subscription service through which you could receive a monthly disk containing all significant programs from each issue of COMPUTE!'s GAZETTE. We promised full details in this issue, and here they are. We've revised it a bit from the structure that we briefly outlined in our February issue.

Rather than begin the program by actually extending your GAZETTE subscription, we're going to treat the GAZETTE Disk as a separate entity. Thus, you may subscribe to COMPUTE!'s GAZETTE, for example, and later subscribe to COMPUTE!'s GAZETTE Disk. You could even subscribe to the GAZETTE Disk alone, but best make sure you can get your hands on a copy of that month's issue of the GAZETTE. All of the article text and explanations will still appear only in the magazine. The goal of GAZETTE Disk is to free you from the time and energy necessary to type all of these programs in every month. And the disk should save you debugging time as well.

Here's the information you'll need to begin your charter subscription to COMPUTE!'s GAZETTE Disk:

The disk service will begin with the May or June issue of the GAZETTE. The logistics of getting the service started require that these be the earliest possible issues.

Price for a single issue ordered by phone from COMPUTE!'s GAZETTE is $7.95 plus $1 shipping/handling.

Price for a six-month subscription is $39.95.

Price for a twelve-month subscription is $69.95.

Each issue of the GAZETTE Disk will contain all of the programs in the corresponding issue of the magazine (with the exception of short program examples or other programs that are only a few lines in length).

You'll receive each subscription issue by first class mail at approximately the same time you receive your copy of the magazine. If you order a single copy disk instead, you'll receive it approximately two weeks after you place your order.

Each issue's programs will arrive on a first quality disk, duplicated and tested to our specifications. Charter subscribers (those who subscribe prior to March 30), and those who order the first issue of the GAZETTE Disk, will receive as a bonus the excellent word processing program by Charles Brannon that appeared in our January 1984 issue.

We're rather excited here about the launch of our first disk service. You'll save time and typing headaches, and we'll be delivering the same excellent quality in a format you won't have to debug. And best of all, we've taken an aggressive pricing approach that allows us to deliver you a tremendous amount of first-rate software, *including disk and postage*, for less than $6 a month on a twelve-month basis. By the way, you won't need to specify whether you have a VIC or a 64... each issue will be designed to have the programs for both.

Enjoy your GAZETTE this month, and we'll look forward to sending you the first issue of the GAZETTE Disk.

Robert Lock

Editor In Chief

To reserve your charter disk, write to COMPUTE!'s GAZETTE Disk, P.O. Box 5406, Greensboro, NC 27403. Indicate whether you wish to order (1) a twelve-month disk subscription for $69.95, (2) a six-month disk subscription for $39.95, or (3) a single issue for $7.95 plus $1 shipping/handling. Outside the United States and Canada, please add an additional $3 per individual disk ordered for shipping/handling. For a six-month subscription add an additional $18. For a twelve-month subscription, an additional $36. All prices are in US funds.

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Others have done it ... so can you.

Dr. Harper Roehm, the author of ***Spending Less and Enjoying It More*** (the McGraw-Hill book that provides the basis for this system), designed **Lifestyle Budgeting** when his income was cut in half due to a career change from corporate auditor to university professor. As a result, his family has lived comfortably, fulfilling their "wants" as well as their "needs" for over 20 years.

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Planning is the key.

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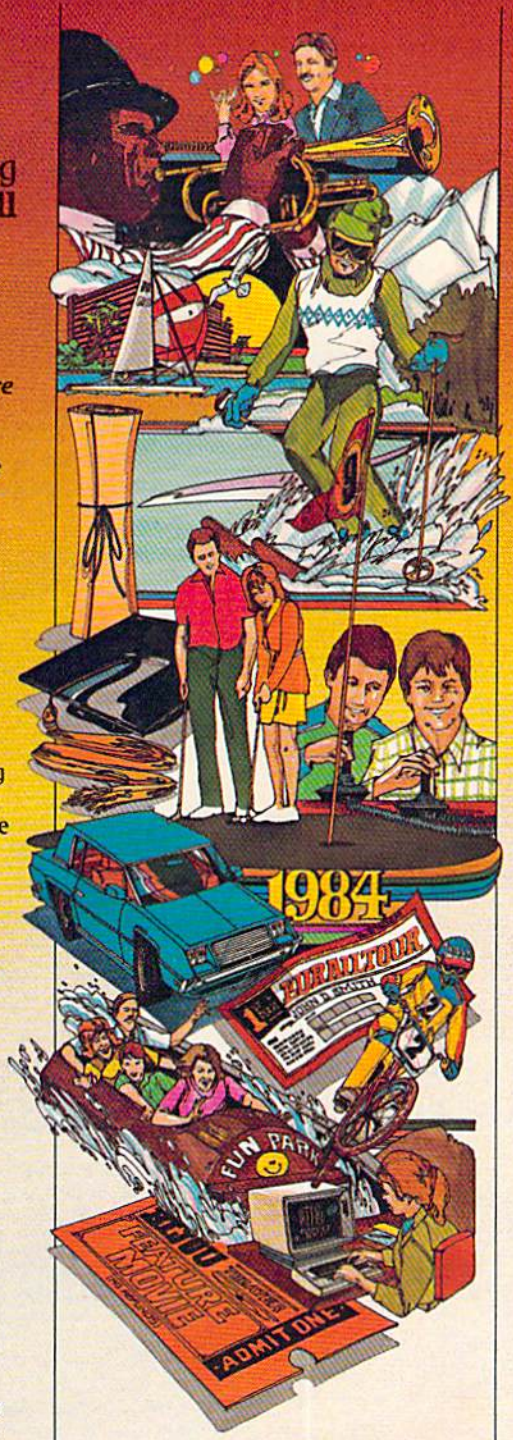
Unlike most budgeting systems, **Lifestyle Budgeting** does not require detailed expense records. It will only take a couple of nights to set up and then only one or two hours a month to monitor. And ... a big plus ... **Lifestyle Budgeting** is written for you, not your accountant.



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Since **Lifestyle Budgeting** is something everyone needs, versions are available for IBM, Apple, Commodore, Atari and Coleco personal computers.

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GAZETTE FEEDBACK

EDITORS AND READERS

Do you have a question or a problem? Have you discovered something that could help other VIC-20 and Commodore 64 users? Do you have a comment about something you've read in COMPUTE!'s GAZETTE? We want to hear from you. Write to Gazette Feedback, COMPUTE!'s GAZETTE, P.O. Box 5406, Greensboro, NC 27403.

Restoring DATA

I am writing an educational program for my 2½-year-old, but I've run into a small problem. I want to play a short tune when a correct answer is given, but after running the program once, I get an OUT OF DATA error message. My question is this: How do I get the program to reread DATA statements?

Jeff Nicholas

When running a program, BASIC uses memory locations 63–66 as "data pointers." These pointers act as a checklist. Whenever the program READs an item from a DATA statement, it also updates the pointers. The next READ looks at the next item, based on what is in the pointers. If there are more READs than DATA items, the computer prints the error message and stops the program.

In answer to your question, the pointers can easily be reset with the RESTORE command. This command can be placed anywhere within a BASIC program, and will reset the pointers to the beginning of the DATA items. For example, the following BASIC program would continuously READ the first DATA number and never get to the second.

```
10 READ A: PRINT A: RESTORE: GOTO 10
20 DATA 1, 2, 3
```

Another command, more drastic than RESTORE, is CLR. When a BASIC program sees CLR, it resets the data pointers (so you can READ the DATA statements again) and all variables are CLeaRed. Numeric variables are set to zero and string variables are erased. It also clears the variables and pointers for FOR/NEXT loops and GOSUB/RETURNs.

In addition, anytime you LOAD, RUN, or NEW a program, the data pointers are automatically reset.

Bad Disk Saves

I have a Commodore 64 with a 1541 disk drive, and have encountered a problem that perhaps you can help with. When saving and replacing programs on disk, sometimes certain programs will replace the wrong programs on disk. For instance, I SAVEd a program using the *save with replace* command, following the procedures in the 1541 instruction manual. The program SAVEd OK, but it messed up another unrelated program on the disk. Is there anything I can do to solve this problem other than always maintaining a backup disk? What's to stop the same thing happening to the backup disk?

Davin Dahlgren

We have covered this problem before, but because we still receive a large volume of mail about this bug, it's worth covering again.

Creating a backup disk is not the solution to your bad saves. The problem is with the save with replace *(SAVE "@0:filename") command itself; it is sometimes prone to error. This problem has popped up in Commodore disk drives throughout the years. Although the 1540s and 1541s were supposed to have an updated DOS that solved this problem, it apparently still exists.*

The answer to your question is simple: Don't use the save with replace command. We recommend you either scratch (PRINT#15, "S0:filename") the old program before SAVEing, or SAVE the program using a different filename.

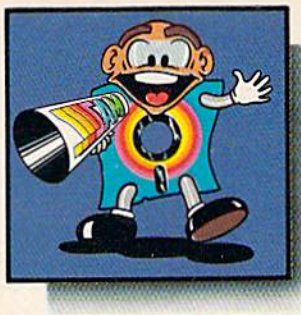
Colorful Sprites

I recently purchased a Commodore 64. I have read the book which comes with the computer. In the chapter that deals with sprites, it doesn't mention how to change the colors of the sprites. Can you tell me how?

I would also like to know how to tell if two sprites collide.

Glenn Yellico

The memory locations you POKE to change the colors of sprites 0 through 7 are addresses 53287 to 53294. The POKE values to change colors are 0 through 15,



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corresponding to the 16 colors available on the 64. Below you'll find a chart of some of the more useful sprite control memory locations.

Sprite collision is defined by the Programmer's Reference Guide *as occurring "... when a non-zero part of a sprite overlaps a non-zero portion of another sprite or characters on the screen." The byte you PEEK to detect a sprite-to-sprite collision is 53278. For a sprite-to-background collision, PEEK 53279.*

These bytes normally have a value of zero. The eight bits in these memory locations correspond to the eight sprites. When a collision is detected, the corresponding bit is set to 1. The bits will remain set until the bytes are PEEKed. Once PEEKed, the bytes are automatically reset to zero. It should also be noted that sprite collisions can occur even if the sprite is off the screen.

Function	*Location(s)*
turn on sprite	*53269*
sprite data pointers	*2040–2047*
sprite color	*53287–53294*
expand sprite X	*53277*
expand sprite Y	*53271*
turn on multicolor	*53276*
multicolor one	*53285*
multicolor two	*53286*
sprite/sprite collision	*53278*
sprite/data collision	*53279*

For more information on sprite programming and what values to POKE into the above locations, consult your Programmer's Reference Guide.

MLX Techniques

I used MLX to enter a machine language program from COMPUTE!'s GAZETTE, but I entered the wrong ending address. When MLX reached that address, it turned off and I could not add any more lines to the program. How can I finish my program? Is there any way I can LIST an ML program from MLX?

Roger C. Fitch

When machine language programs are published in COMPUTE!'s GAZETTE, *the MLX program can be found in the listings section. The short explanatory article about MLX (usually found in the gray pages preceding the program listings) is very helpful.*

In addition to its main function of entering machine language programs, MLX recognizes four commands:

SHIFT-S (Save) will save a copy of the machine language program to tape or disk.

SHIFT-L (Load) will load a previously saved program.

SHIFT-D (Display) will display the machine language program currently in memory. This is the equivalent of BASIC's LIST.

SHIFT-N (New Address) allows you to begin typing at a different address. The addresses appear as line numbers in the MLX listing.

If you entered the wrong ending address, use SHIFT-S to save what you've typed, then reRUN the MLX program, entering the correct starting and ending addresses. You can then use SHIFT-L to load what you've already typed. To continue with the listing, use SHIFT-N to skip ahead to the line number where you need to start. Be sure to read the MLX article in this issue for more details.

Musical Power Supplies

I own a Commodore 64, and I have a question about the power supply. When I plug it in, it starts to hum. The humming noise seems to get lower the longer the machine is on. Is this something I should be worried about? Could you please explain the noise?

Todd Blecher

According to a representative at Commodore, this is nothing to be concerned about with either the VIC-20 or the 64. It is quite common for small transformers such as the one inside your power supply to hum. This is caused by the metal plates in the transformer vibrating as the 60 cycle per second electric current passes through it. You've probably heard the same hum from the transformers in fluorescent lights.

The thing to watch out for in all power supplies is heat. If your power supply is operating at an excessively high temperature, take it back to your dealer and have it checked.

Heat, Humidity, And The Computer

I recently purchased a Commodore 64, and I have two questions. First, I'd like to put the computer downstairs where I have room for it, but in the summer it gets very muggy and damp down there. Is this atmosphere bad for a computer? Second, can I use my own tape recorder with my 64 or do I have to buy the Commodore Datassette?

Robert Zarriello

Environment can be an important factor for your computer. The moist atmosphere you describe could be harmful. If the humidity is so high that water condenses in the computer casing, it could result in permanent damage.

Extremes of heat and humidity are also enemies of tapes and disks. A program saved on a hot day when the tape or disk is very flexible might not load properly on a cold day when the plastic material used in tapes and disks is much stiffer.

Another thing to watch out for is ventilation. The computer and its peripherals should be in a place where they are well ventilated and can be kept cool. Also, watch out for rooms that are heavily carpeted, especially those with wool carpets. The static electricity created as you shuffle across the room could bring the computer down (lock it up), or it might even permanently damage the chips in the computer, or erase data stored on magnetic media.

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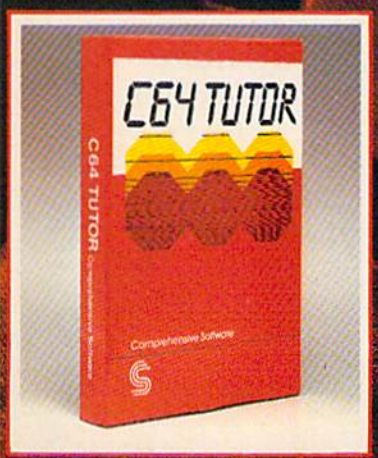

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Yes, you can use a standard tape cassette recorder with the 64 and the VIC-20, but you will need a special interface not made by Commodore. You can expect to pay between $20 and $30. Contact your local computer equipment dealer for information on the available interfaces.

However, we believe that the Datassette is a very durable and reliable recorder.

Crunching To Save Memory

Occasionally, when I am writing a program, I abbreviate BASIC keywords. However, when I list the program on my VIC-20, all the keywords are displayed full length, and I can't remember which ones I've abbreviated and which ones I haven't. Is there some technique by which I may disable this and crunch my programs faster?

Ted Targosz

Your programs are crunched. BASIC command keywords are stored internally as one-byte tokens. Whether you enter them in the "crunched" form (for example, ? for PRINT) or type in the full word version, the machine still uses a one-byte token.

When you enter a line in the crunched form then LIST the program, it will print the whole BASIC keyword. This is simply a convenience of the screen editor, and does not use any additional memory.

For example, turn off your VIC or 64, turn it back on, then enter the following BASIC line:

```
10 PRINT "ABC"
```

Now type PRINT FRE(0) (this is the command that tells you how much unused BASIC memory is left). Jot down this number, then turn your machine off and on again.

Now enter the same BASIC program in the following crunched form:

```
10 ?"ABC"
```

Again, type and enter PRINT FRE(0). You'll now see that the amount of memory left is the same, even in the crunched form.

For even more proof, LIST the program. The BASIC line is now uncrunched. Again enter PRINT FRE(0). The amount of unused memory still has not changed.

If you're looking for ways to make your BASIC programs use less memory, there are many. The most common and most useful is to simply get rid of unneeded spaces within the BASIC program lines. But don't worry about those BASIC command keywords; they use up only one byte no matter which way you enter them initially.

Using An 8-Pin Plug With The 64

I have a question concerning the Commodore 64. In your article on improving the TV quality on the 64, all of the information refers to the 5-pin plug on the back. I have one of the new models with the new 8-pin plugs, and have yet to see a pinout diagram for it. I would like to make the changes indicated in the article, but I don't know which pins do what. Can you help?

Mark Poole

Here is a list of the eight pin connections on the new Commodore 64s, and what they do:

Pin	*Purpose*
1	*LUMINANCE same as 5-pin*
2	*GROUND same as 5-pin*
3	*AUDIO OUT same as 5-pin*
4	*COMPOSITE VIDEO same as 5-pin*
5	*AUDIO IN same as 5-pin*
6	*CHROMINANCE without luminance*
7	*UNUSED*
8	*CHROMINANCE without luminance*

Disk Drive Solution Update

In December's "Gazette Feedback," we printed a letter from Sieg Deleu, president of Kobetek Systems Limited, stating that his firm had the ROM kits for converting the 1540 disk drive to a 1541. Several readers have written asking for Kobetek's address. Here it is:

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Computer Show And Tell

Fred D'Ignazio, Associate Editor

In a recent issue of COMPUTE! (October 1983), I wrote about educational computing at home and at school as isolated "islands" of computer learning. I expressed the fear that unless bridges were built between these islands, much of the computer's educational potential would never be realized.

In the article, I suggested some home-school bridges that Kenneth Komosky (Educational Director of the Educational Products Information Exchange—EPIE) and I had come up with, including:

- Community-wide training of parents, teachers, and children.
- Community-wide computer cooperatives in which computer vendors work with schools and families to disseminate information about computers and offer discounts to families (especially low-income families).
- Communication—A Parents and Teachers Computer Association could be formed. It could hold monthly meetings and publish a monthly newsletter that evaluates new computer products and educational software, and spreads the word about educational computing activities going on in homes, classrooms, and libraries in the community.
- Opportunities for Action—The community could organize computer faires, computer flea markets, and "brag nights" to show what the kids are doing with computers at home and at school.
- Sharing—The community could begin collecting old computers and software and set up a "computer library" (perhaps as a section of the public or school library). The library could keep review materials on the latest hardware and software; it could help increase the ratio of computers to kids in school; and it could make computers available for low-income members of the community. A library could serve an especially valuable purpose by collecting information on the ways computers can help special children who are learning disabled, or physically or mentally handicapped.

Starting Simple

The program to link home and school computing is extremely ambitious. It is not something that can be implemented overnight. It is a good idea to start simple with one or two bridge-building activities, then add new activities gradually. I have found this out from personal experience.

In my hometown, Roanoke, Virginia, I am trying to put some of these ideas into practice. In the last few weeks I have learned that building computer bridges between home and school is a major undertaking. All we have set up, so far, is a swaying, rickety footbridge made up of popsicle sticks. But it's a start.

A Warm Reception

I have a five-year-old son (Eric) in a local kindergarten and an eight-year-old daughter (Catie) in third grade.

I began my bridge-building project by calling Catie's teacher, Mrs. Albertson, and volunteering to loan the school an extra computer we had sitting around the house.

I was nervous about calling Mrs. Albertson and offering her the computer. I was afraid that she might not want a computer in her class. I was worried that she would think I was an uppity parent bent on interfering with her teaching.

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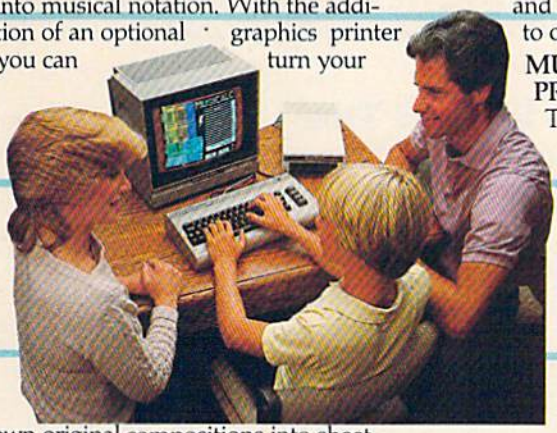

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I told Mrs. Albertson that we didn't have a TV set or monitor for the computer. She would have to scavenge one somewhere. Also, I told her that the class would need a table for the computer and a six-foot-square space in the room next to an electrical outlet. Mrs. Albertson said she'd talk to the lower-school principal and see what she could do.

The Project Grows

Two weeks later, Mrs. Albertson called and told me that she had talked with the lower-school principal, the headmaster of the whole school, and the head of student government. Everyone had gone looking for funds and had put together enough money to enable Mrs. Albertson to buy a new 20-inch color TV for the computer.

After hearing about the TV, I didn't even ask about the table, the space, and the electric outlet. I was sure that they, too, had been taken care of. When I visited the classroom a week later, I found they had.

Mrs. Albertson said that everyone at the school was excited about the project because they hoped that the computer could become a resource for the entire third grade, and, secondarily, for the whole lower school. It was to be the first computer for kindergarten through grade three.

Enlisting The Local Computer Store

I was so encouraged by the school's response that I drove over to the local computer store and proposed that they get involved, too. I showed them my "Islands Of Learning" article in COMPUTE!, and I asked them what they would like to contribute to our bridge-building project.

The computer store owners' response was amazing. They said they would be happy to donate two disk-based computers to the school for a trial, two-month period. They also offered a discount on all computers purchased by parents if the school handled the purchases.

I volunteered to act as educational software consultant to the store and to tell the store owners about the most popular programs that we used over at the school. We would test the programs in school, then let the store know which ones were best.

Where Should The Computers Go?

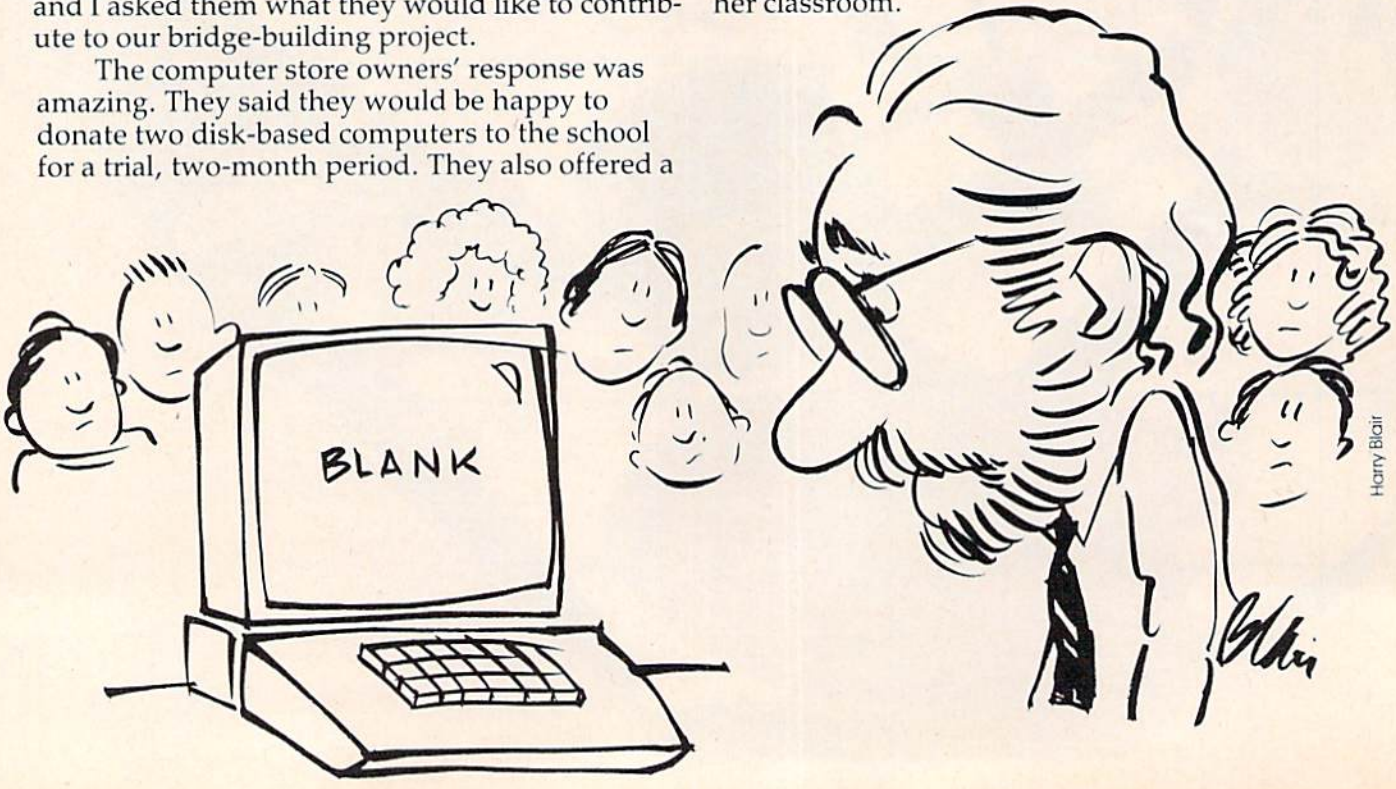
I spent the next few nights on the phone with Mrs. Albertson and with Eric's two teachers, Mrs. Paitsell and Mrs. Carling.

I proposed that the second computer go into Eric's kindergarten class. That would make computers available in the kindergarten and third grades. The first and second graders could try out the programs that would be running on the third-grade computer. Their teachers could also take them to the kindergarten and let them try the programs for younger children that would be running on the kindergarten computer.

I liked this approach because we could experiment with using the computer at two distinct developmental levels. It would be interesting to see what programs would work best with the different age groups.

A Sneak Preview

Catie and Eric's teachers felt that I should bring a computer to the school for a visit before we permanently installed the computers in the classrooms. Mrs. Albertson had a table, a space, an electrical outlet, and a big color TV, so we used her classroom.



An educational ad about educational software.

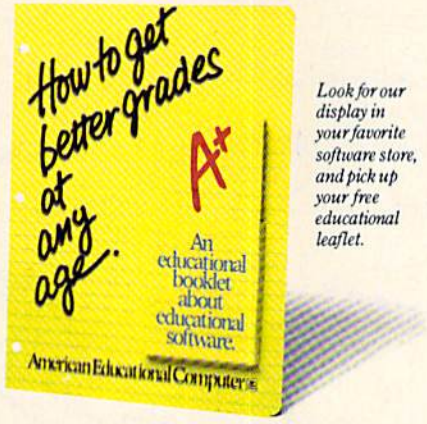
YOU studied all the computers and finally chose the one your family found most useful. One of the main reasons you wanted a computer in the first place is to help your children in school. Not just to teach them how to use a computer, but also to help them get good grades in basic school subjects like reading or geography.

That's why you should know about AEC, American Educational Computer – one of the country's most important developers and publishers of educational software.

You can help your child all the way through school and beyond.

AEC grew up on education.

The management of AEC started in educational publishing, with collectively over 100 years of experience in the field. AEC knows curriculum and how American education is practiced in the classroom. That's important because children should learn at home the same way they learn at school. Otherwise, you'll have a very confused child, and confusion is not the way to better grades or better learning.



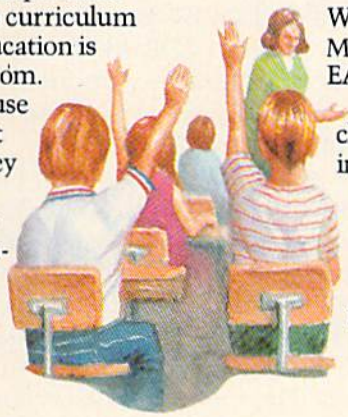
Look for our display in your favorite software store, and pick up your free educational leaflet.

AEC knows that good grades are important.

Any educational software could help school performance in some way. That's because the computer is such a patient teacher, giving instant feedback to questions and allowing children to learn at their own pace.

But AEC software has an important advantage. Our approach has been student tested under actual classroom conditions. So we know it keeps the child's interest while it teaches.

AEC gets parents involved in the learning process.



With either AEC's MATCHMAKER™ or EASYREADER™ Series, you can take your child through the grades in subjects such as Phonics, Word Attack Skills, Reading Comprehension, Spanish, World or US Geography, and Grammar. Our teacher tested system allows parents to enter material into a lively, interactive format. And because AEC's programs are grade-level oriented, you can help your child all the way through school.

AEC doesn't play games with education.

AEC programs do contain games, but only as rewards for learning achievement. For example, once your child successfully completes the objective in the Matchmaker Geography program, he or she can play an exciting, action-packed game.

Sure, the games are fun. But they're not the basis, and certainly not the primary focus, of any AEC software. Our focus is strictly on learning. And isn't that what you buy educational software for?

If you have more questions about educational software, contact your nearest AEC educational software center. And thanks for being a concerned parent.

A+

American Educational Computer

2450 Embarcadero Way, Palo Alto, CA 94303

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I selected Catie and Eric's best educational programs to show off at school. I drove to the computer store and picked up a computer like the two that would be donated to the school. Then I drove to the school.

Foiled By Murphy's Law

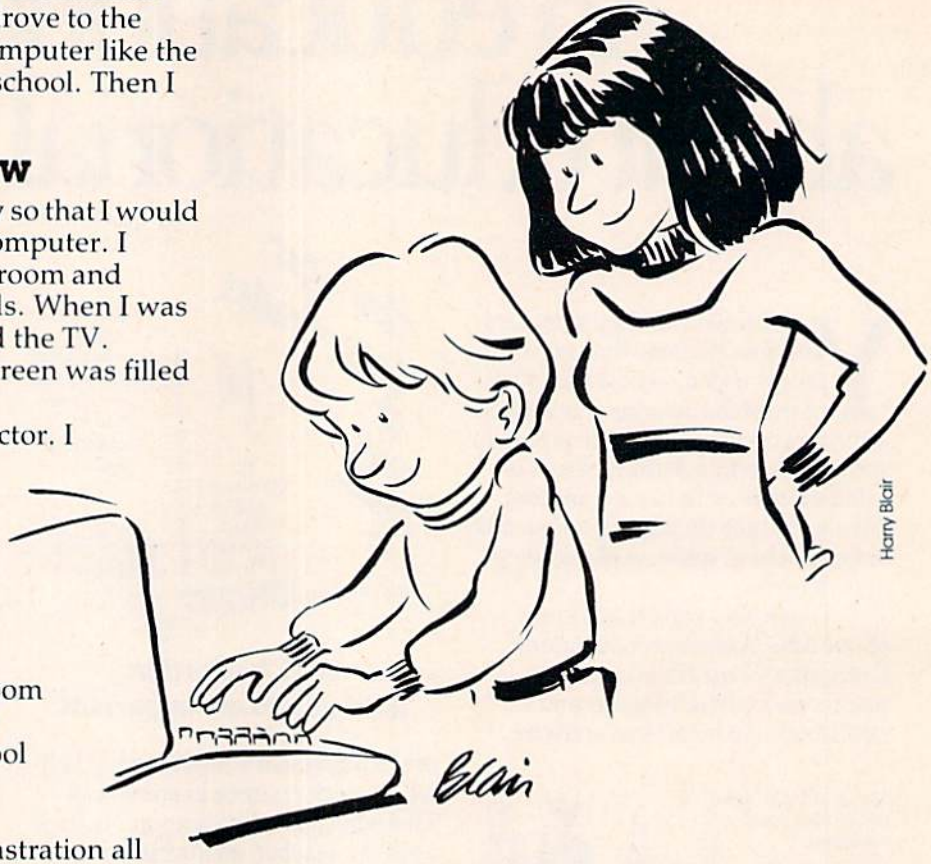
I got to the school half an hour early so that I would have plenty of time to set up the computer. I lugged the computer into the classroom and started plugging in cables and cords. When I was done I turned on the computer and the TV.

Nothing happened. The TV screen was filled with static.

I fiddled with the channel selector. I checked all the connections. I took everything apart and plugged it back in.

Still nothing.

I turned around to face the class. I was going to tell the kids about finicky computers and Murphy's law. At the rear of the room I spotted about eight adults. While my back had been turned, the school principal and several teachers had slipped into the room for the demonstration. Instead of a demonstration all they got to see was me fussing and fuming at the dumb computer.



I was so embarrassed. There I was, a computer expert, and I couldn't even get a picture on the display screen.

I was afraid to look at my two kids' faces. I knew what they must have been thinking: If daddy's going to humiliate us this way in front of our teachers and friends, it looks like it's time to put him up for adoption.

Culture Shock

After a desperate phone call and a whirlwind trip back to the computer store for extra parts, I finally got the computer to work. Once it decided to work, the computer didn't embarrass me any further. It behaved itself the rest of the afternoon.

I finally relaxed. I popped disks into the disk drive and started showing off some of Catie and Eric's favorite programs—*Delta Drawing* (from Spinnaker), *KoalaPainter* on the Koala Pad (from Koala Technologies), *Rocky's Boots* (from The Learning Company), *Early Music* (from Counterpoint Software), *Math Maze* (from Design-Ware), and *Bank Street Writer* (from Scholastic and Brøderbund).

I put the disks into the computer, and Catie and Eric demonstrated the programs.

We whisked through the programs at high speed. I was hoping to show about 20 programs in two hours. The kids in the class were "oohing" and "aaahing" appreciatively. Everything was going smoothly.

Then I ran into a brick wall.

"Those programs are all very impressive," a teacher called from the back of the room (the *very* back of the room). "But they are obviously intended for older children. Don't you have anything for the children in this room and for our kindergartners?"

Whoops ....

I didn't know how to answer her. I wanted to be flip and say, "Dear lady, both of my children use these programs without any supervision. Eric has been using some of these programs since he was only two years old."

I wanted to say that, but I didn't. It had begun to dawn on me that the computer programs I was demonstrating may have looked like fun to me and the kids, but to the teachers they looked like a cram course in calculus or electrical engineering.

The teacher who had spoken walked up to the front of the room. She pointed to the display screen. The menu to *KoalaPainter* was on the screen. "There must be dozens of different options on this screen," she said. "How can we teach our kindergartners to operate a program that is this complex?"

I explained to the teacher that little kids didn't think the program was complex. Eric, for example, pretended that the menu boxes were "doors." He

* Popular Computing, November, 1982
† Apple Softalk, April, 1982

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opened a door just by pointing to it on the KoalaPad. Then he went through the doors into different "drawing" worlds where he made multicolored rubber bands, grew circles and squares, and drew shapes and pictures.

"Show her, Eric," I said. I picked him up and plopped him down in front of the computer. Eric showed her.

The teacher was unimpressed. "He can do all those things because you taught him," she said. "You're a computer expert. But you won't be in my classroom with me and my kids. Who's going to teach me? And how am I going to teach the kids?"

First Things First

At that moment everything became clear to me. I realized that, in my idealistic fervor, I was rushing in the wrong direction. I was trying to create new educational structures, but I was forgetting the basics. The first item on my agenda wasn't bridge building, it was *teacher training*. It would be pointless to stick computers in Catie and Eric's classrooms unless their teachers knew how to operate them and were comfortable with them.

What the teacher had said was true. The kids couldn't learn on the computers unless she taught them. And before she could teach them, somebody had to teach her.

That somebody was me.

The Prime Mover

Before I took the computer to my kids' school, I had thought that I was going to act as liaison between two ongoing computer learning centers. I saw the home as one learning center and the school as the other. The way I saw it, my job was to get the two centers communicating, sharing, and trading information and resources.

After my experience in the classroom with the kids and the teachers, I realized that, for a while, my job would be much more limited. Before I could coordinate the activities of the two learning centers, I would have to *create* them.

I realize now that I'll have to spend a considerable amount of time with the teachers to get them started using computers in the classroom. And I'll probably have to work with the parents to get them started using computers to help their children learn at home.

Before I begin building the bridge between the two islands of learning, I'm going to have to build the foundations.

Show And Tell At Home And At School

I've started inviting teachers from my children's school over to our house on evenings and weekends. We are conducting an informal teacher training workshop, and we are screening the software that we plan to use in the classroom.

I'm learning a lot.

My next goal is to create a newsletter that the kids can take home to their parents. I hope that there are a lot of parents out there who know something about computers and who read the newsletter and get enthusiastic about my bridge-building plans.

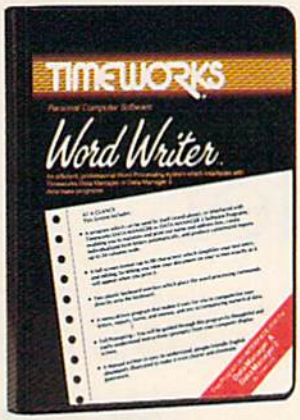
I can use their help. They can work with the teachers and help train them on the computers. They can bring their computers to school for show and tell. They can share their software with the school.

Once the teachers are trained and we have a nucleus of committed parents, we can think about organizing a Parents and Teachers Computer Association.

For the moment, though, I've got my hands full training Eric's teacher on the *KoalaPaint* program. Like the other teacher, she is boggled by the screen menu with all its boxes.

Eric is helping me train his teacher. He is very understanding and very patient. Two nights ago, during a session, he pointed at the screen with the *KoalaPaint* menu. "These are doors into the computer," he told his teacher. "Which door do you want to open first?"

IF YOU CAN FIND A BETTER WORD PROCESSOR OR DATA BASE SYSTEM WE'LL BUY IT FOR YOU.



Outrageous offer? Not really. For your Commodore 64, we're putting our money where our mouth is, because the Timeworks Word Writer and Timeworks Data Manager 2 are so complete—so extremely easy to use, we think nothing beats them at any price. (Our suggested retail prices are: $49.95 for Word Writer. $49.95 for Data Manager 2.)

Word Writer

This menu-driven system includes:

A program which can be used by itself (stand-alone), or interfaced with Timeworks' Data Manager or Data Manager 2, enabling you to maintain and print out name and address lists, create individualized form letters automatically, and produce customized reports up to 20 columns wide, which can be incorporated into any text produced by the Word Writer.

Two plastic keyboard overlays which place the word processing commands directly onto the keyboard.

A full screen format (up to 80 characters) which simplifies your text entry and editing.

All the essential features—plus some exclusive Timeworks extras—making this system completely functional for most home & business requirements.

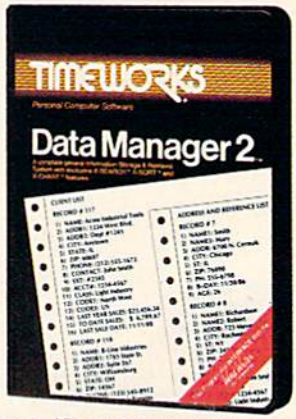
Data Manager 2

This system includes:

A menu-driven program that easily lets you store information on a wide variety of subjects—from general name and address lists, to research data. This program will also calculate and store any corresponding numerical data.

Quick access to important information. Items can be easily retrieved and printed by category, name, index code, date range, amount range, or any category of information stored in the system.

Timeworks exclusive X-Search,™ X-Sort™ and X-Chart™ features allow you to easily cross-search any of the categories. Or arrange your stored items in increasing or decreasing order, alphabetically, numerically or by date. Break down statistical information by up to ten indexed categories of your choice—and graphically review your results.



Arithmetic calculation of your mathematical data is possible, allowing you to perform Payroll calculation, cost estimates and more. Data Manager 2 also produces the Sum, Average and Standard Deviation of statistical data entered into the system, along with Frequency Charts.

When interfaced together, these programs:

Generate customized data reports, which can be incorporated into any written text produced.

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Print your name and address file onto standard mailing labels.

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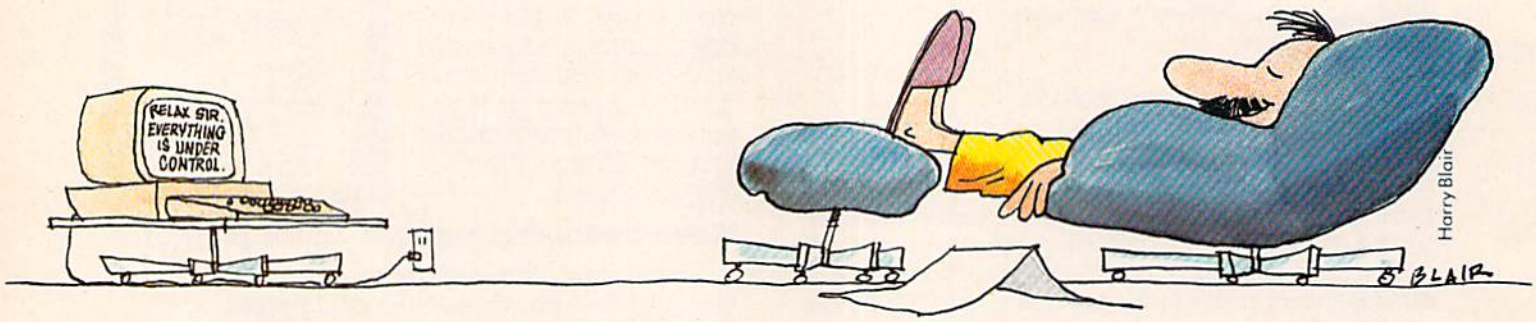
The Electronic Castle: Managing Your Home With Your Computer

Selby Bateman, Assistant Editor



When friends and relatives begin asking you what practical uses your personal computer has, let your answers start right at home. Software producers, spurred by consumers, are creating a wide array of home applications. And with the advent of such home transaction services as computer banking and shopping, the future looks even brighter.

What do you see when you look at your home computer? A game-playing machine? An educational toy? A learning tool? Sure, your computer is all of these, but it's much more.

As Elliot Dahan says, "My basic premise is that if you don't look at your computer as a home appliance, then don't even buy one. It's as simple as that. When you see the computer as an appliance, then you start looking at what it will do as an appliance."

Dahan is vice president for marketing at Creative Software, a company that has had great success with its line of educational, home management, and computer game programs. His sentiments are echoed by other software producers, many of whom are marketing home management programs which address everything from the family budget to home heating.

In order to better understand the multitude of home-oriented computer applications now on the market, let's divide them into three basic categories.

First, there are the home control programs which allow you to regulate the heating, cooling, and lighting of your house or apartment. Home security packages let your computer become a sentinel against intruders by monitoring doors and windows, setting off alarms, and even automatically calling the police if necessary.

Second, there are household management programs for word processing, family budgeting, checkbook balancing, and a host of other related functions.

The third broad category is home transaction services. With a modem, two-way transactions—at-home banking and shopping, for example—are now possible. These transaction applications are being tested in several major metropolitan markets. If the experiments prove commercially feasible, other transaction service developers are waiting in the wings with similar systems.

Do people really buy home computers for these kinds of home applications? Tricia Parks, a research director for Future Computing, a company

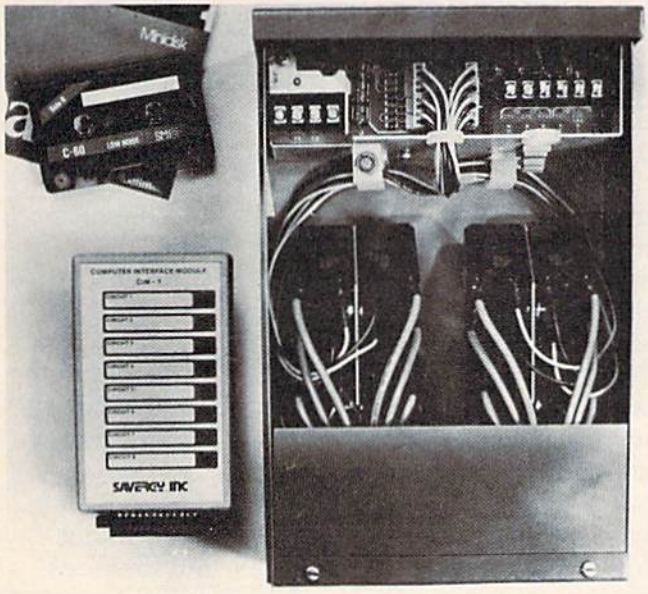
that analyzes trends in the personal computing industry, says her company is in the midst of a major psychographic and demographic analysis of buying patterns among home and business computer users.

"We have found that people generally have a dual motivation when they purchase computers. The first reason is to play games. But that's not the only reason. Otherwise, they would buy a game system for the home, not a computer," notes Parks.

People with children usually buy computers in order to further the education of the youngsters and for home management, she adds. Those without children generally cite self-education and home management as reasons for their computer purchases.

"The home management reason has been lesser in the past, but it is growing," says Parks. "That's reflected in the kind of machines that are coming out, such as the Commodore 64."

Last year, the increasing interest in home control applications came to the attention of Savergy, Inc., a Colorado firm which creates and manufactures equipment and software for energy management applications. In response to customer interest, the company has developed and is now marketing a home energy control device for use with Commodore computers.



Savergy's CIM 112 home-control package includes the computer interface module (lower left), the wall-mount unit (right), and software.

Called the Computer Interface Module 112 (CIM 112), the unit will regulate lights and appliances—turning on and off everything from a sprinkler system to a water heater—when coupled with a computer. The $450 unit can save energy through its scheduling capabilities and through a timing control method called duty cycling. The package includes a computer interface module (about the size of a paperback book) which plugs into the computer, a wall-mounted unit (the size of a thick phone book), and program software on disk or tape. (For more information, contact Savergy, Inc., 1404 Webster Ave., Fort Collins, CO 80524.)

One major drawback to this type of personal computer use immediately becomes apparent when you realize that you can't use your computer if it's tied up sprinkling the lawn, running the thermostat, or monitoring your home's security.

John Helwig of Wescoville, Pennsylvania, has developed a solution to that problem: Purchase a VIC-20 computer, now selling for well under $100, and use it as a machine dedicated to home control. This way, you have your original computer for personal use and a home control machine costing far less than many of the security, lighting, and temperature control systems.

Helwig became interested in a home security system when a neighbor's house was burglarized. He shopped around at commercial firms and found that the costs usually amounted to several thousand dollars. "People would like to have a system, but they just can't afford it. Three thousand dollars is a lot of money."

He has since developed a home control package which he is marketing through his own company, Jance Associates, Inc. It sells for under $200 and can be used with a VIC-20 or Commodore 64. With instructions written for the home computer user, the Jance system includes a computer interface card and all the alarms, switches, and wire necessary to set up the product.

Helwig has added BSR switch modules to his own system so that the security function is just one component of home control. BSR modules connect to the electrical plugs in a home and react to commands from the computer. The system can be used to control the temperature in the hot water heater, to monitor heat pump activity, and to keep tabs on the computer's realtime clock so that Helwig's home thermostat can be raised or lowered at certain times and on designated days. There are dozens of related applications possible for the innovative computer owner, Helwig adds.

"I'm in the process of negotiating with several home construction companies that are interested in building the systems into houses. Every switch would be BSR oriented," he notes. "According to the builders I've talked to, there is a real demand for this. The whole concept of using home computers is expanding. There are all kinds of things that can be done." (For more information, contact Jance Associates, P.O. Box 234, East Texas, PA 18046.)

Closely related to the home control category of computer applications is household management. Balance your checkbook. Chart your monthly electric bills. Use a word processor to handle correspondence.

Think of a household chore that needs to be listed, written, graphed, or analyzed, and you can find computer software that will attempt it. (See "The Data Base As A Home Information Center" elsewhere in this issue.)

Let's say that you have set up a thermostat control package using your computer. To complement that, there are programs which allow you to plot energy usage from month to month and calculate savings from use of insulation, storm doors, weatherstripping, and other energy efficiency improvements. (See COMPUTE! Books' *Home Energy Applications On Your Personal Computer*.) Energy programs are but one example of household management.

One computer executive who has looked carefully at these applications is Vic Schiller, vice president of development for Timeworks, an industry leader in the field of home management software. His company has produced several popular programs, such as *Money Manager*, *Electronic Checkbook*, and *Data Manager*.

"The theory we promote here is that people will not buy something they don't understand. That's very important to us," he explains.

The success of the company's home management line of software has occurred, he adds, because of adherence to that principle.

"The whole key to this thing is that it is so easy to use. Mom and Dad can use our *Money Manager* when they pick it up without even reading the instructions. I'm such a stickler for user-prompted formats. If I can run software without opening a manual, that's a good piece of software," says Schiller.

Early in 1984, Timeworks began marketing *The Word Writer*, a word processing program which interacts with the other home management packages produced by the company. "It's totally user-prompted, with two keyboard overlays. And there are no commands to memorize," Schiller points out.

Elliot Dahan at Creative Software agrees that home management programs should be easy to use. The company's household finance program has sold over 150,000 copies on cassette for the VIC. And this year Creative Software is selling an integrated series of household management programs called The People's Choice. Included are *Joe's Writer*, *Fred's Filer*, and *Jack's Calc*, all targeted for the home user who wants to combine easy use with low cost. The programs each cost $49.95 and allow you to integrate mailings with word processing, for example, as a part of their format.

Timeworks, Creative Software, and other software producers continue to improve household management programs, looking for the magical mix of low price and easy use.

Home transaction services, less common than the types of applications we've seen so far, are on the threshold of a breakthrough. With your computer, you should soon be able to make shopping purchases, buy stocks and bonds, deposit and withdraw funds from your bank, conduct personal business, buy theater tickets, and much more. This two-way home computer market is an outgrowth of the burgeoning news, information, and entertainment services you may now be using with your modem. But with the interactions soon to be available, home management by computer enters a new realm.

This may be the year when home transaction services are established in selected large metropolitan markets. Major companies like the Knight-Ridder newspaper chain, the Times Mirror Co. (owners of the *Los Angeles Times*), Field Enterprises (owners of the Chicago *Sun-Times*), and Chemical Bank are closely watching home transaction experiments in Miami, the Chicago area, and other cities, to see if they attract enough subscribers to make mass market systems feasible.

The gamble here is not so much whether the concept will work; it appears to be an idea whose time is overdue. Rather, the anxiety among these companies stems from which mix of services will catch on and at what price.

One of the more interesting experiments is the Keyfax Interactive Information Service, scheduled to go on-line this spring in Chicago.

Tom Ray, manager of advertising and public relations for the system's owner, Keycom Electronic Publishing, hopes to have some 20,000 subscribers in the Chicago area by the end of the first year. Keyfax should be accessible by virtually all home computers, says Ray, for a $10–$15 monthly base rate. Not included in that will be a one-time purchase of the necessary software at about $40 or a software-modem package at about $150.

Keyfax will offer a full range of general data base information, shopping services, banking functions, educational packages, and financial options. Ray notes that customers will have access to Ticketron, the national ticket-buying service, and even to an electronic edition of the *World Book Encyclopedia*.

How will these initial mass market experiments in computer transaction services be accepted? "It's hard to guess," says Ray. "We'll see what happens those first couple of years. Quite honestly, I think that everyone is taking guesses."

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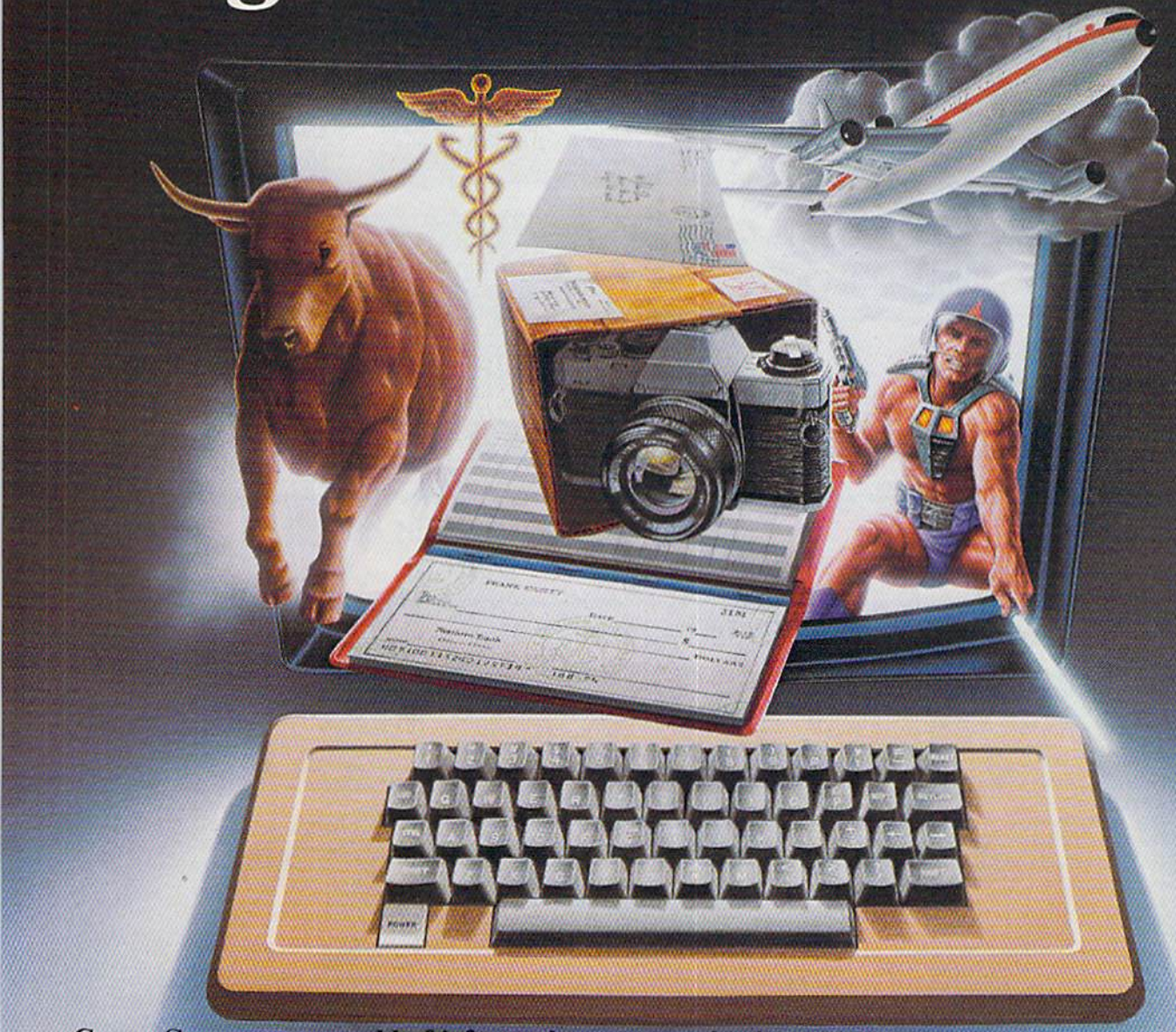

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If experiments like Keyfax in Chicago, Citibank's HomeBase, and Knight-Ridder's Viewtron in Miami do well, plans are already under way to make access available nationally.

Gone are the days when a personal computer owner might feel the need to apologize while fielding well-meant but skeptical inquiries about the machine's practical uses. Whether the application is household control, management, or two-way transactions, the computer owner's home can clearly become an electronic castle.

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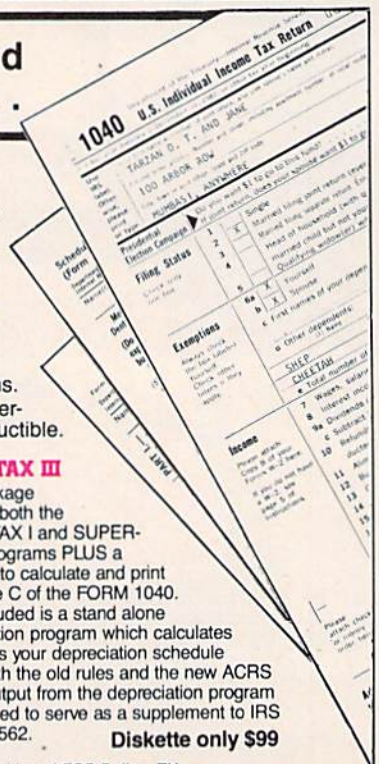

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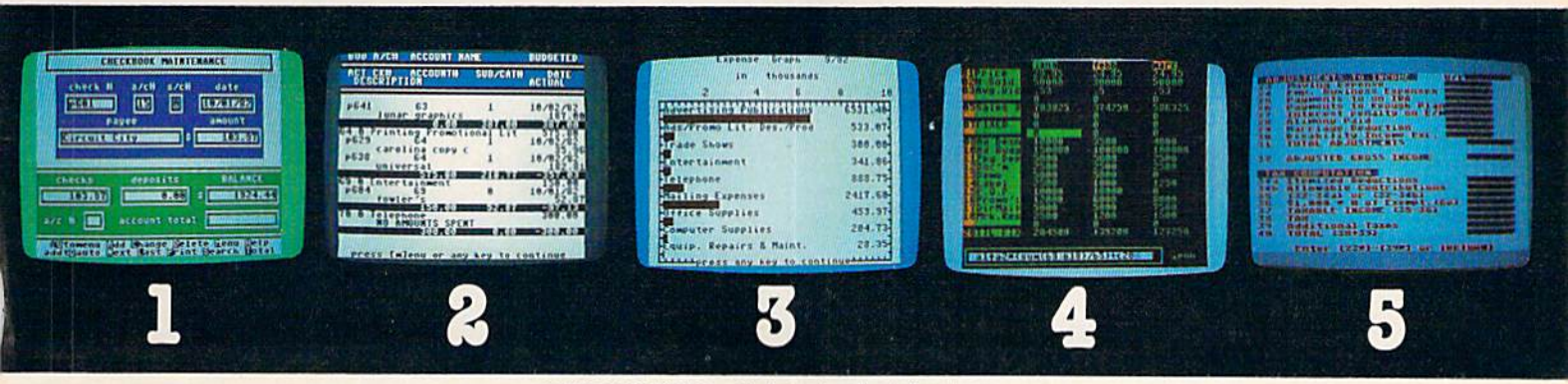

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The Data Base As A Home Information Center

Kathy Yakal, Editorial Assistant

Perhaps one of the reasons you bought a home computer was to help you "get organized." You might have a spreadsheet for your financial calculations and a word processing program for correspondence and other writing. But there's another kind of software that can be valuable for many types of home record keeping: a data base program.

I have this friend who, in her early days of computing, was asked to alphabetize and type a list of volunteer groups. It would be simpler, she thought, to perform such a task using a personal computer.

Having become familiar with word processing, knowing that she could just type in all the names and addresses and phone numbers and print them out, she decided that a word processing program would work. Even if she needed to change or add or delete records, she figured she could go back to her file and use the built-in text-editing functions.

But first, she had to alphabetize the 200 pieces of paper containing the group information. Then she remembered that they were supposed to be separated by state before being alphabetized, so she started over again.

After typing in all the information and printing it out, she found a stack of a dozen or so that she had missed. She typed in and printed them out separately and began to cut and paste her original list to fit them in.

About that time, a coworker who had heard of her plight wandered in with a disk in his hand. "This is a data base program that you can use for your list," he said.

"I'm already finished with it," she replied, pointing to her rather unsightly stack of work.

"Oh, I see you used a word processing program for it," he said, trying unsuccessfully to hide a grin. "Well, why don't you take a look at this program. Maybe it will make your job easier next time."

She did. And it did.

The Same Thing, But Smaller

A data base is exactly what its name implies. It is a base, or storehouse, for your data. You create and maintain your data base by using software specifically designed to let you enter, store, and retrieve data in a format that you designate.

Large systems, mini- and mainframe computers, have used data bases for years. Many businesses store data base files in their central computers. Employees may then have access to that information through their own individual terminals.

Data base software for Commodore computers, though perhaps not as sophisticated as

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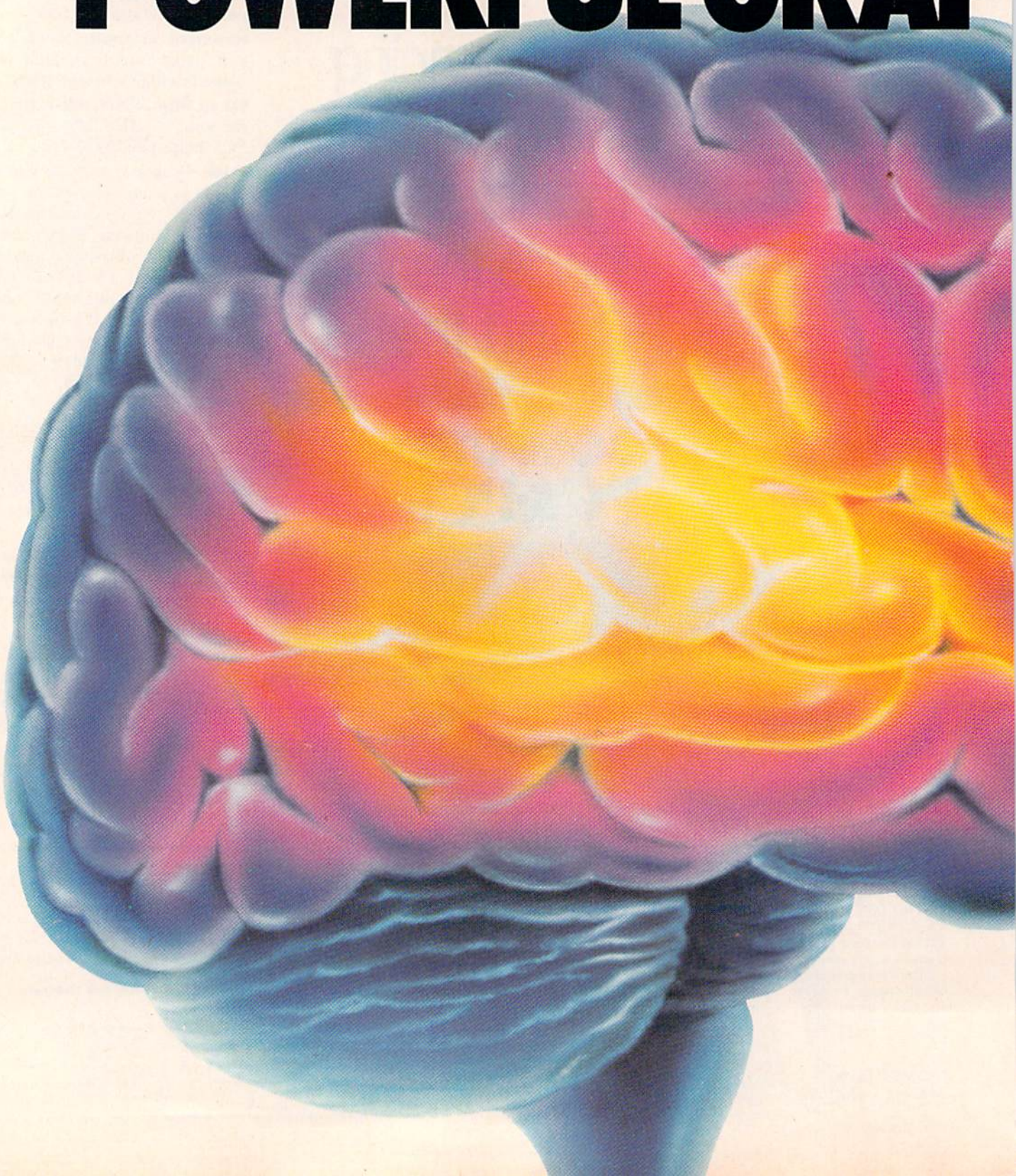

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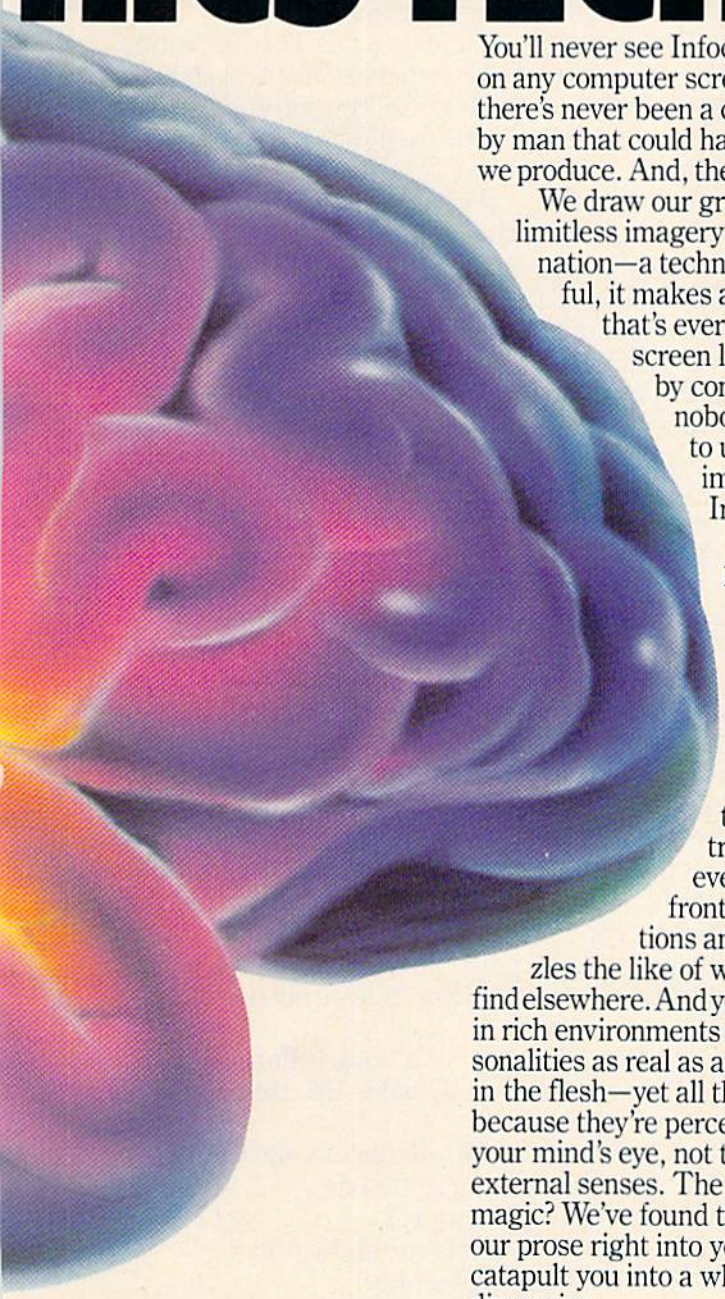

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systems used by larger computers, consists of the same basic components. A bank's computer may have millions of words and figures to keep straight, while your VIC-20 has only to organize a 75-name Christmas list, but they can both use data base programs to do it.

Getting The News By Data Base

Let's say it's 8:00 and your morning newspaper hasn't yet arrived. If your local newspaper's circulation records are stored in a computerized data base, and the computer happens to be working at the moment that you call, the conversation might go like this:

> Phone Clerk: "Circulation department. This is Dan Sullivan speaking."
>
> You: "8:00. No paper."
>
> Clerk: "I'm sorry. May I have your phone number, please?"
>
> You: "Why do you need my phone number? My paper is supposed to be delivered to my front porch, not my telephone."
>
> Clerk: "We access your records through your phone number, not your address. If you'll give me your phone number, I'll get your record up on the screen and see what route you're on. Then I can check to see if there's a problem with that route."

The record that the phone clerk needs to access is a small part of a file, which is a small part of a large data base, and probably contains a lot of information that can help him track down your newspaper. It will list your name, address, and telephone number. It will identify what route you are on, and maybe even give the name and phone number of the newspaper carrier. It will, of course, show the clerk whether or not you actually subscribe to the morning newspaper. And, unless billing records are kept on a separate data base that the circulation department cannot access, it may show when you paid your last bill.

Of course, the phone clerk can't use the data base to deliver your newspaper. But it allows him to get enough information quickly so he can solve the problem and get you your newspaper.

Starting Out

When you first subscribed to the newspaper, you gave information about yourself that had to be entered into the circulation department's data base. But before that, when the department's records were being transferred to a computer, someone had to decide what information this new filing system needed to contain.

Just as businesses must define their needs for information storage, you will need to do the same thing when you use a data base on your home computer.

Any data base software that you buy should include documentation, instructions explaining how to use it. The documentation might be long and complicated, but it's important to read through and understand it before you get started.

Though commands and capabilities vary from one program to another, all data base programs consist of the same basic elements.

The first step is to create a *file*. This file is not to be confused with the data base itself. A data base can hold many files, and the software should allow you to define your own files based on what you need.

You may be used to thinking of a file as a little manila folder that goes in a drawer. It means the same thing in terms of a data base. Instead of typing a label to put at the top of a file folder, you type the name of the file into the computer.

Let's say you bought a data base program to catalog your books. We'll call the file "Book Collection."

This file contains a number of *records*, one for each book. Though the actual content of each record differs, the type of information is the same.

Each record consists of several *fields*. This is the real meat of your file, for these are the lines in which the individual information for each record is stored. You are asked to give each field a name, and also decide on the maximum number of characters and numbers each field can hold. Further, you'll need to decide whether that field can hold letters only (alpha), numbers only (numeric), or both.

It is extremely important to define your fields carefully. If you don't allow enough room for the information you need to enter, you'll have to go back and redefine your file. And if you allow for more information than you'll ever need, you'll be wasting memory.

Using the example of a book collection, you might want to name your fields like this:

1. NAME OF BOOK (50 characters maximum; both alpha and numeric allowed)
2. AUTHOR (35; alpha only)
3. COPYRIGHT DATE (4; numeric only)
4. PUBLISHER (35; alpha only)
5. PUBLISHER'S ADDRESS (30; both)
6. CITY, STATE, ZIP (40; both)
7. SUBJECT OF BOOK (25; both)

Once you've defined and saved a format like this, you can call up that format to add, change, or delete records. Data base programs vary in procedures for saving an updated file. Some save

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each record as it is entered, while others require you to enter a SAVE command every few records.

All Sorts Of Sorts

Beyond storing information in a user-defined format, a data base program can not only retrieve it, but retrieve it in a certain order. Or retrieve only certain records and put them in order. Each program has its own variety of ways to sort and organize information.

In order to do that, you must define the criteria by which you want to sort. You need to specify some of your fields as *key fields*. In our imaginary phone call to the newspaper, the phone clerk knew that the customer's phone number was a key field, that he could access the whole record by typing in the phone number and letting the program match it to your subscriber record.

In your book collection file, suppose you define fields 2, 3, and 7 as key fields. You would be able to find out how many books you have by a given author or publisher, and which books you have on a certain subject.

Or, if you are planning to visit a city and want to look for a job with a book publisher, you could set up a separate field for CITY, do a sort, and come up with names and addresses of book publishers in that city. Deciding which fields to designate as key fields will depend on how you will later want to sort them.

A Few Warnings

Before you create a file, be sure to note the storage capacity of your data base program. Most commercial programs available for Commodore computers have adequate space for home data storage, but it's a good idea to plan ahead for future file expansion.

Reading the documentation carefully may save you a lot of headaches later on. Anyone who defines a file and discovers a major flaw in its design 30 records later learns that lesson in a hurry. Some programs allow you to go back and redefine a record's fields, but you can't count on that unless you read the documentation.

Most programs are particular about punctuation, and will not allow you to use certain marks, or any punctuation marks at all, in some fields. Be sure you are aware of any punctuation quirks your program may have.

If you plan to alphabetize, beware of such things as state abbreviations. Whenever you specify a key field, you will at some point be asked for the depth of sort, how many characters into the line you want the program to sort. If you want to sort a file by state, then alphabetize, you could run into a couple of problems.

You would probably set the depth of sort at two. This would seem to suffice for state abbreviations. But take Maryland (MD) and Massachusetts (MA), for example. If it sorts by those abbreviations, they would be in the wrong order when you spell out the state's name. In addition, if you have records from places outside the United States, Canada will come between California and Florida, and Mexico will show up in the middle of the M's. You need to think through the kinds of sorts you'll want to do before defining files.

If you plan to print specialized reports from your compiled and sorted data, you will find that many programs let you designate which section of the file, even which fields in each record, should be printed. However, some programs print line and record numbers along with the data. Be sure to consult the documentation if you need to print a polished report with no extraneous information.

Some Home Applications

Perhaps you can't think of any uses for a data base in your home. Or maybe you bought a data base program for a specific purpose and are wondering how else you could use it. Here are some suggestions.

- Cataloging personal belongings. You can use a data base to keep track of records, books, tapes, software, and other items you have amassed. If you have a hobby like stamp collecting, you may find that the program's sort capabilities enable you to catalog your collection more fully.
- Recording gifts and cards for special occasions. Giving and receiving gifts and cards for weddings, birthdays, Christmas, and other holidays can create some organizational problems. A data base may be helpful.
- Keeping track of subscription expiration dates. If you subscribe to several magazines, newspapers, or other periodicals, you might want to use a data base to remind you when each is coming up for renewal.
- Computerize your address book. If you have to buy a new address book every other month because you keep scratching out and adding names and addresses, a data base could provide a simpler way to track down mobile friends and relatives.
- Making bibliographies for work- or school-related projects. If you're preparing a major report, a data base might be a better way of organizing sources than a stack of file cards.

A data base will not organize your life for you. That still takes some time and effort on your part. But if you have a personal computer, and are looking for ways to make it a practical part of your home life, you might find a data base a very useful tool.

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Dieter Demmer
The Programmer Behind *Delphi's Oracle*

Kathy Yakal, Editorial Assistant

Your home computer with a disk drive or cassette recorder can store a great deal of information. But if you want to use your computer for record keeping, that information needs to be easily entered and retrieved, and probably in some sort of logical order. Data bases meet that need. Here's a look at one of the most popular data bases for Commodore computers, *Delphi's Oracle*, and the man who designed it, Dieter Demmer.

In explaining what a data base is, people often compare it to a box containing index cards. Let's say you use such a filing system to keep track of addresses. The box itself is the *file*. Each card is a *record* of information about one person. Every record consists of several entries, or *fields*, like name, street address, city, state, and telephone number. To be useful, a file like this would need to be in some kind of order, probably alphabetical, and require periodic revision.

A data base is set up the same way. Basically, it is a program that allows you to set up a filing system, enter data, then order and revise those files. Some data bases are designed for specific purposes, like mailing lists; others let you define your own files.

Delphi's Oracle is an example of the latter. Published by a Canadian software company, Batteries Included, it's a powerful data base with a storage capacity limited only by hardware. "Using a Commodore 64 and a 1541 disk drive, you could fill an entire disk with records and still have room," says program designer Dieter Demmer.

A Technical Background

Programming and modifying *Delphi's Oracle* took almost a year, but Demmer's many years of technical experience paid off. Born in Cologne, Germany, he received a Bachelor of Science degree from the University of Cologne and began a 15-year stint with Litton Industries in research and development. He spent another three years with Control Data in Minneapolis as a program analyst, then returned to Litton as a field service representative.

"I pretty much taught myself how to use computers," says Demmer. "I started learning

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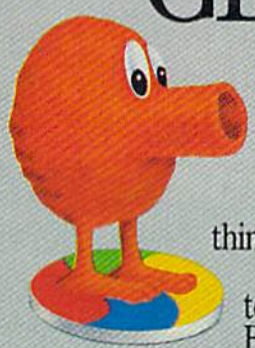

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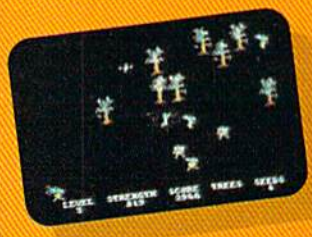

Spellbinding
Only you can restore the forest through ancient spells. Then you must march your army of enchanted trees into battle against the Troglodytes and the evil Necromancer. Who will emerge triumphant from the final conflict? **NECROMANCER.***

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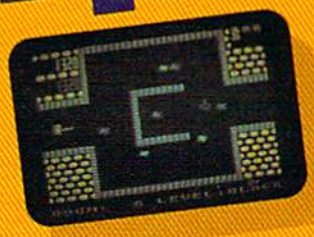

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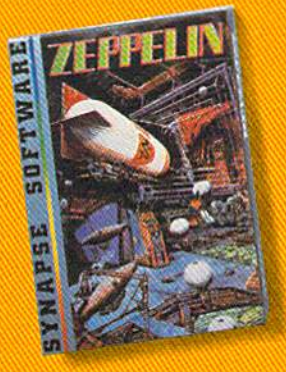

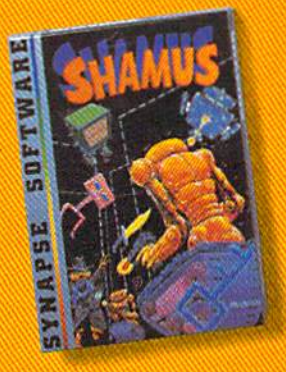

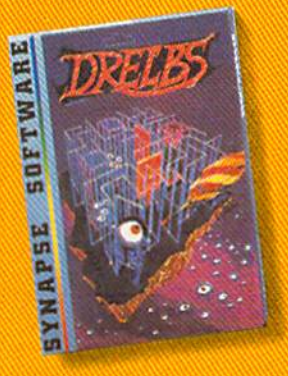

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back in the late sixties on the big vacuum tube computers."

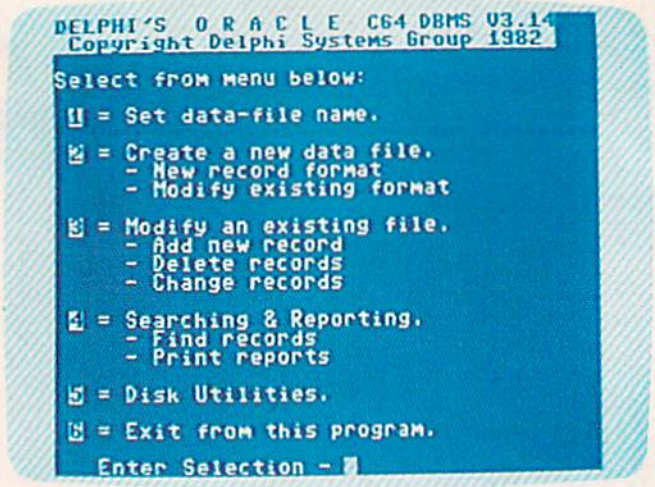
Tired of all the travel involved in his job at Litton, Demmer started exploring other possibilities. He had purchased an 8K Commodore PET several years before and started programming. It wasn't his first experience with home computers, though. In 1968, he built his own 16-bit microcomputer with 32K of memory. "It never did have much of an operating system," says Demmer. "It's kind of a joke now, with all of the modern languages available. I still use it as a terminal, though."

Saving Time And Space

Demmer left Litton and joined Batteries Included in 1982. *Delphi's Oracle* was his first project. It runs on all Commodore equipment, though it was designed on the 8000 series.

"Information storage on the *Oracle* is limited by the disk drive," says Demmer. "The 1541 disk system was never meant to handle relative files. You have to coax it into doing it."

Once files are entered into a data base, the computer must perform "housekeeping" functions. Every bit of available space must be used, so the data must be constantly sorted and resorted. And it can be very irritating if your record entry is interrupted by those functions.



The main menu in Delphi's Oracle *provides easy access to the main program sections which allow you to create and update data base records and files.*

"There are two ways to do the sorting," says Demmer. "Since it takes a considerable amount of time, I programmed the *Oracle* to sort after the user has finished updating. So there are no more time delays after you've entered 6000 records than there are after you've entered three."

Not For The Novice

Good, clear documentation is essential to using a data base successfully. Without it, even the most experienced computer user may waste hours recreating files or, worse yet, lose them.

The instructions accompanying *Delphi's Oracle* run more than 200 pages. Demmer was closely involved in preparing this document, and says it is easy to understand, but takes time. "The *Oracle* is rather complex for the novice user," he says.

But, he continues, there are many home applications for which his data base is well suited, like personal property inventory, keeping track of investments, and correspondence lists.

The *Oracle*'s output files are compatible with *PaperClip*, a word processing package that is also published by Batteries Included. "In conjunction with a word processor, the *Oracle* becomes a very powerful package," says Demmer. "It could be used very well by someone with a small business."

More On The Way

Demmer believes that part of the reason for the *Oracle*'s initial success was its early arrival in the home applications software market. "There just wasn't anything else available," he says. "We don't expect it to stay that way, though."

Besides updating his first versions and translating them for use on other home computers, Demmer has been working on "mini-data bases": programs designed for one specific kind of record keeping.

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A Mutated Wonderwhisk whisks by. The Spinning Top almost topples him!

Close. But Pogo Joe bounces back. Bouncing from cylinder to cylinder, screen to screen, Pogo Joe racks up point after point.

You guide him from cylinder to cylinder, changing the color on top of each. Change the top of each cylinder on a screen, then you're on to the next.

The more screens you complete, the nastier the monsters you face, and the faster they attack.

Press the fire button! Jump two cylinders to safety. Hop into a transport tube, and then whoosh! Pogo Joe appears across the screen. Jump on an escaping monster. Blam! It's gone in a flash! Only to reappear out of thin air.

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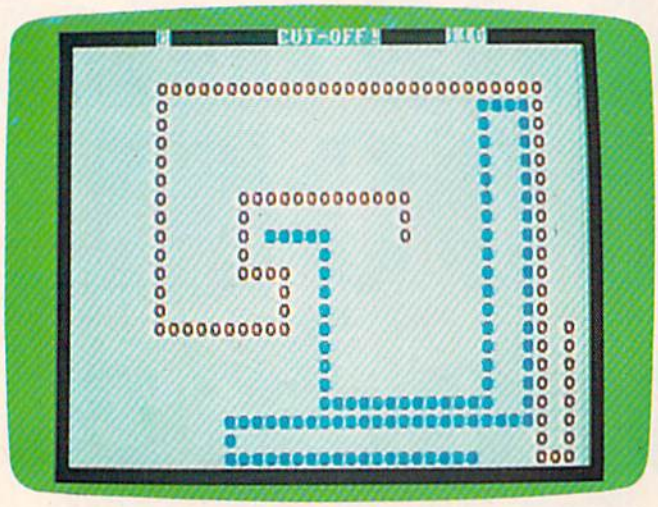
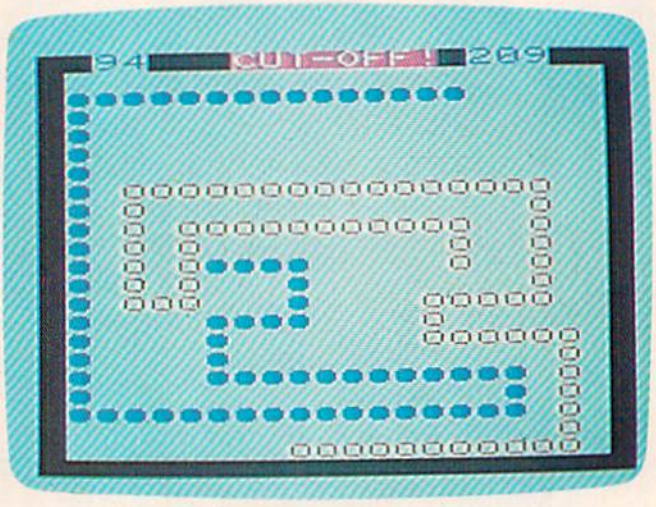
CUT-OFF!

All-Machine-Language Game For Commodore 64 And VIC-20



In the 64 version, some tricky maneuvering has the blue player nearly cut off.



The red player is almost trapped at the bottom, but may be able to escape (VIC version).

Tom R. Halfhill, Editor
COMPUTE!'s PC & PCjr Magazine

"CUT-OFF!" is a fast-paced two-player game for the Commodore 64 and unexpanded VIC-20. Programmed entirely in machine language, it has ten levels of difficulty—ranging in speed from moderately slow to impossibly fast. The VIC version requires one joystick and the 64 version requires two. Users of expanded VICs should unplug or switch off their memory expanders before typing in or running the game.

Some computer games over the years have become classics. Usually they are simple in concept, yet universal in appeal, and general enough to be translated for almost any computer. Some examples are *Pong*, the granddaddy of all videogames, *Breakout*, *Lunar Lander*, and the venerable *Space Invaders*. For legal reasons they may be disguised by different names, but there probably isn't a home computer or videogame machine anywhere for which some version of these all-time favorites isn't available.

Another classic game is *Blockade*. Again, it goes by different names (sometimes *Surround*), but the basic concept remains the same: Two players square off against each other by steering a moving line around the screen, trying to head off the other player or force him to crash into a wall or his own trail. This concept dates back to the early days of videogames. In fact, the very first videogame I ever played was a *Blockade*-style game. It was during the mid-1970s, and a friend and I encountered the machine in a dimly lit cafe. By today's standards the game was downright primitive. No color, crude sound effects, and slow action. Yet we had never played anything like it before. (We thought it would never catch on, because it cost 25 cents per play at a time when a quarter bought you three plays on most pinball machines.)

Years later, the basic concept of *Blockade* was revived and updated in the 1982 film *TRON*. In this Walt Disney production, humans trapped inside a bizarre computer world were forced to become gladiators on "light cycles"—space-age motorcycles which left walls in their wakes, counterparts of the lengthening trails in *Blockade*.

Anyway, that's the story behind the latest incarnation of this popular game, now dubbed "CUT-OFF!" It preserves all the traditional concepts and includes color, sound, and the broad range of speed levels possible only in a program written entirely in machine language.

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Notes On VIC Tiny MLX

Charles Brannon, Program Editor

There's just enough room in a 5K (unexpanded) VIC to hold MLX. Unfortunately, there isn't room for anything else, such as the machine language program you need to type in. It might seem you need to use a memory expander. This would be unfortunate, though, because the machine language for the VIC version of "CUT-OFF!" will fit in an unexpanded VIC.

Rather than leaving out some readers, we decided to see if MLX could be shortened enough to hold both the MLX machine language editor and the machine language for CUT-OFF! The only way to do this is to remove parts of MLX. This means you have fewer commands at your disposal than in the complete VIC MLX program.

Specifically, these things were cut out to save memory:

- the MLX logo
- the INPUT statements for starting and ending address, and their appropriate error checks. Instead, the values you would normally use are just assumed in line 210.
- the New Address command. This means that you have to type in CUT-OFF! all in one sitting, since there is no way to change the address your typing is POKEd into. Correspondingly, you cannot SAVE your program until you've finished typing, and there is no way to LOAD in a previously typed version of CUT-OFF!
- the Display command
- as mentioned, the Load command

What does that leave you? Well, you can still flawlessly enter the program on an unexpanded VIC. All the error checking with checksums remains, as well as a tape or disk Save when you finish your typing. Although this is a big trade-off, at least you don't need an additional memory expander to type in and play CUT-OFF!

Typing CUT-OFF!

Pure machine language programs are usually more difficult to enter than BASIC programs because they consist of seemingly endless streams of numbers. To make typing CUT-OFF! easier, we've listed the programs in MLX format.

You may already be familiar with MLX if you've typed in some of the machine language programs published in earlier issues. If you're not familiar with MLX, it's a utility designed by Program Editor Charles Brannon to make typing errors almost impossible. To learn how to use MLX, see the article describing it elsewhere in this issue. Commodore 64 users who have previously typed in MLX can use it again for CUT-OFF! VIC users, however, must use a new version of MLX adapted especially for CUT-OFF! This stripped-down version of MLX (dubbed "Tiny MLX") allows you to enter the game on an unexpanded VIC, something not possible with the full-length MLX. (See accompanying article, "Notes On VIC Tiny MLX.")

Here's the information you'll need to enter CUT-OFF!:

Commodore 64 CUT-OFF!
Starting address—49152
Ending address—50663
To run, enter SYS 49152
To stop, press RUN/STOP—RESTORE

VIC-20 CUT-OFF!
(The starting and ending addresses are "built into" Tiny MLX.)
Starting address—6063
Ending address—7658
To run, enter SYS 6063
To stop, press RUN/STOP—RESTORE

Remember, to load a machine language program from disk or tape, you must use this special form of the LOAD command:

```
LOAD"filename",8,1   (for disk)
LOAD"filename",1,1   (for tape)
```

If you forget to append the ,1 to the command, the program loads into the wrong area of memory and will not work.

Starting The Game

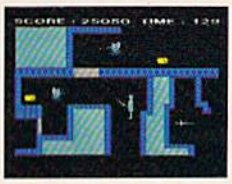
After you enter the proper SYS command, the game screen appears instantly. (One of the best things about machine language is that you don't have to wait around for programs to initialize.)

The opening screen allows you to select a skill level ranging from 0 (the slowest speed, suitable for youngsters) to 9 (recommended for superhumans only). The skill levels are spaced equally apart, so you might want to start at 3 or 4. The level you select remains the same for the entire game. To change levels in the middle of a game, press RUN/STOP—RESTORE and restart the program with the SYS command. (Of course, this cancels the game in progress.)

To choose a skill level, move the joystick up or down (joystick 1 on the 64 version). You'll see the number on the screen change and "wrap around" if you go below 0 or above 9. To lock in your choice and begin the game, press the fire button (joystick 1 on the 64 version).

The game starts with the players aimed at

WELCOME TO APSHAI. YOU'RE JUST IN TIME FOR LUNCH.



Boy, have you taken a wrong turn. One moment you're gathering treasure and the next you're being eyed like a side of beef.

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They'll be eaten.

One player; Temple of Apshai, disk/cassette; Gateway to Apshai, cartridge, joystick control.

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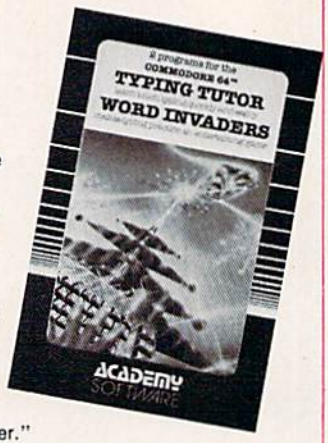

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each other head-on. With the 64 version, joysticks 1 and 2 control the left and right players, respectively. To steer, move the joystick up, down, right, or left. Diagonal motion is not allowed.

Since the VIC has only one joystick port, the right-hand player must use the keyboard for control. Don't assume that this compromise necessarily puts the keyboard player at a disadvantage. With a little practice, some people seem to adapt to the keyboard and gain more control than the person with the joystick. This is due partly to the arrangement of the control keys, an arrangement sometimes seen in Apple games:

(up)
I
(left) J K L (right)
(down)

Notice how this differs from the usual I-J-K-M diamond pattern. Although the diamond seems the most logical way to go for four-way movement, in practice it's clumsy compared to this I-J-K-L arrangement. Try it. Rest your right index finger on the J key, your fourth finger on the L key, and then move your middle finger up and down on the I and K keys to control vertical movement. You may want to adopt this pattern for your next keyboard-controlled game.

The joystick buttons toggle a pause feature. To freeze the action, quickly press and release the button (either joystick button works with the 64 version). This leaves you free to answer the phone or do other things. To restart the action, press and release the button again. (The keyboard player in the VIC version cannot activate this feature.)

Scoring And Winning

There are four ways you can crash: hitting a wall, running into the other player's trail, crossing your own trail, or backing into yourself by trying to reverse your direction.

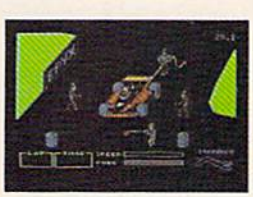
After a crash, the surviving player is awarded points equal to the number of segments in the crashed player's trail. This means that the longer the players last before crashing, the more points are at stake. Thus, it's possible to catch up even if you're way behind.

Each time you crash, you lose one "life." Each player starts with ten lives, and the game ends when one player runs out. After each crash, the screen updates the score and reminds you how many lives each player has left. To restart each round, press the joystick fire button.

When the game is over, you get a chance to change the skill level for the next game. Just to get a peek at how fast machine language can be, try a game at level 9. You'll be lucky if you can make one turn before crashing into a wall. Yet even this level had to be slowed down with delay loops!

See program listings on page 165.

PITSTOP.™
WHERE WINNING IS THE PITS.



You'll never make Grand Prix champion just driving in circles.

You've got to stop sometime. The question is when. Right now you're in the lead. But the faster you go, the more gas you consume. And the quicker your tires wear down.

If you do pull into the pits, though, you lose precious seconds. So it's up to you to make sure the pit crew is quick with those tires. And careful with that gas. Otherwise, poof! you're out of the race.

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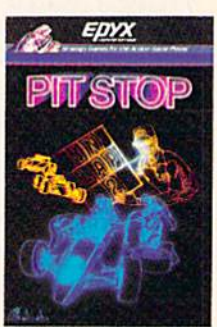
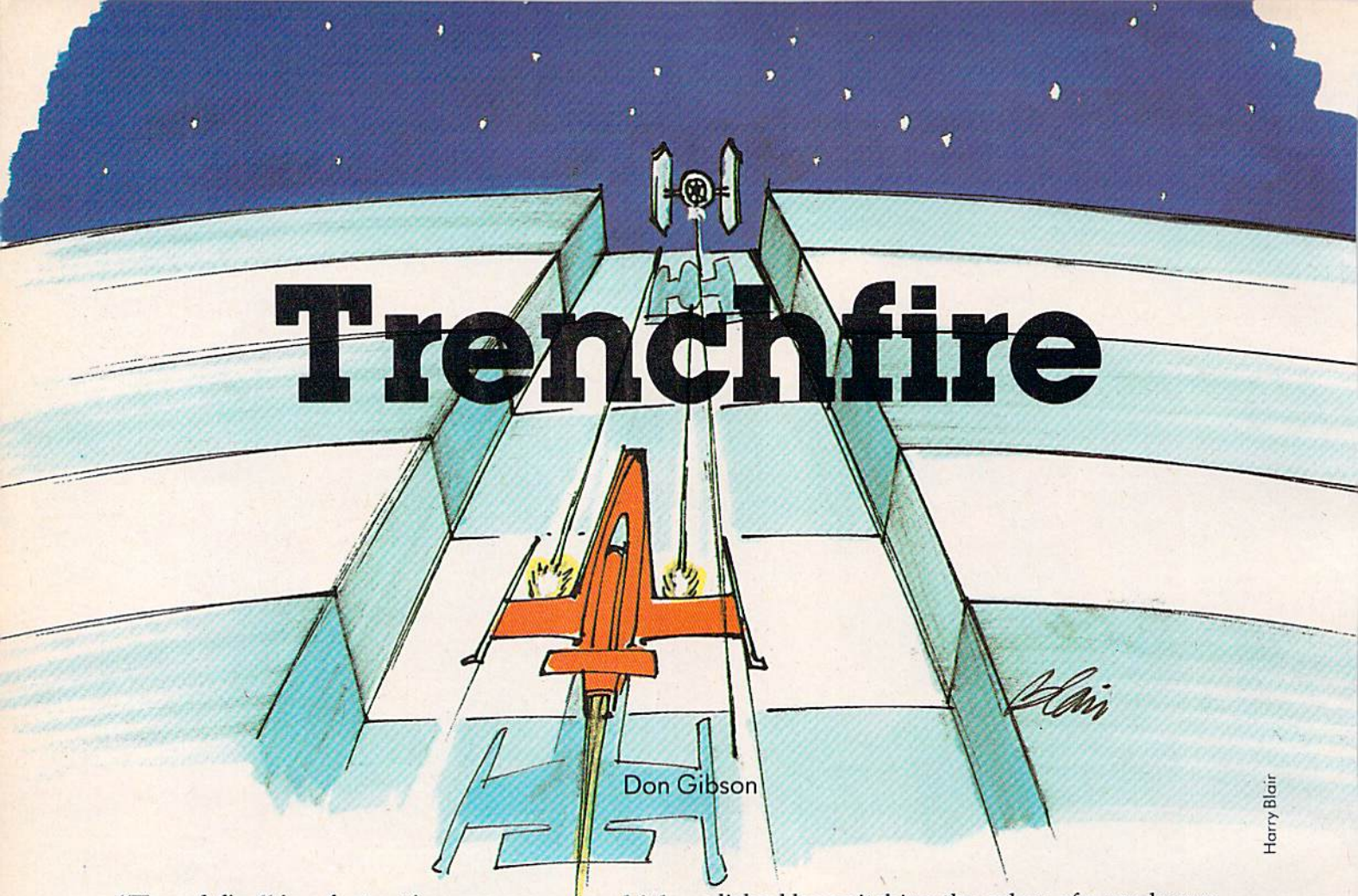


Trenchfire

Don Gibson



Harry Blair

"Trenchfire" is a fast-action space game which uses the speed of machine language (ML), the power of sprite graphics, and a special trick to simulate motion. Originally written for the 64, we've added an all-ML version for the VIC.

As the game begins, you find yourself on a distant planet, speeding through a trench formed by an earthquake fault. You are in your trusty craft, attempting to infiltrate evil King Krypos' lair, where he holds your king captive. But first you must face King Krypos' deadly kamikaze drone ships. The battle never seems to end—you blast and dodge debris only to encounter another wave of enemy ships. Only total concentration and quick reflexes bring success in "Trenchfire."

The 64 Version

Written in BASIC, with several ML subroutines, Program 1 (the 64 version) requires simply typing RUN after entering and SAVEing the program. Using a joystick in port 1, you must shoot and destroy the drone ships before they get too close. You can also avoid them by dodging left or right.

You begin the game with three ships. However, a new ship is awarded for every 1000 points (a total of seven ships is possible).

Simulating motion in Trenchfire is accomplished by switching the colors of a predrawn trench. The process uses custom characters in multicolor character mode and a short ML routine to switch background color registers. Another ML routine controls joystick reading and ship movement to provide fast response.

The VIC Version

The VIC version requires an 8K expander to enter and save Trenchfire. You must also use the abbreviated version of MLX found elsewhere in this issue (see "CUT-OFF!").

Follow these procedures carefully:

1. Insert the 8K expander, turn on your computer, and enter this line:

```
POKE 44,24:POKE 24*256,0:NEW
```

2. Enter the short version of MLX.

3. Delete line 100 from the MLX program, and change the following line:

```
210 S=4352:E=6079
```

4. Type RUN.

5. Type in the VIC version (Program 2) of Trenchfire.

6. SAVE what you typed into MLX to tape or disk.

7. Turn your computer off and remove the 8K expander. Turn it back on.

BRISTLES™

Starring Peter the Painter

designed by Fernando Herrera

C-64 conversion by Adam Bellin

From the creator of **ASTRO CHASE™** (Sci-Fi/Fantasy COMPUTER GAME OF THE YEAR, 1984)[1] and My First Alphabet™ (winner of the Atari® Star Award) comes BRISTLES.

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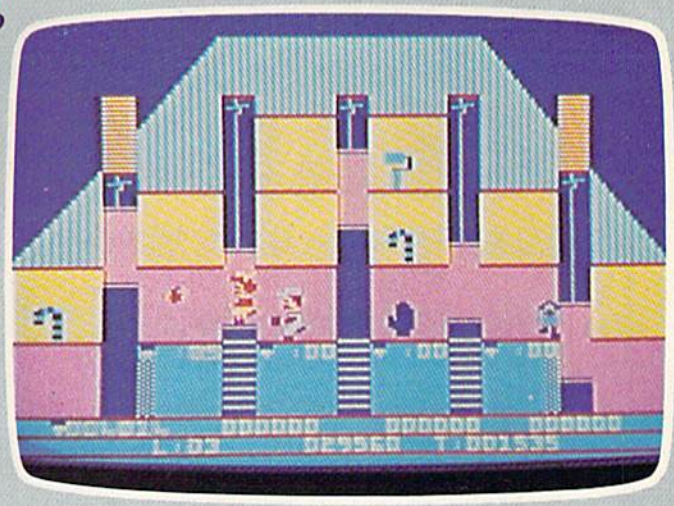
☐ Systems: **COMMODORE 64™** & **ATARI HOME COMPUTERS™**



Actual Game Screens

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C-64 conversion by Paul Kanevsky

This number one Best Seller is Jim's first game for First Star. Here's what the reviewers say about this award winning designer's first computer game.

☐ Reviews: "The audio-visuals are excellent ... A definite HOTLINE picked hit."[4] ★★★★ (highest rating) ... "quite a different game"[5] "... super graphics, first class sound effects and challenging game play"[6]

☐ Features: 7 different animated intermissions, game screen actually *flips upside down*, 36 levels, 13 different scrolling screens, arcade sounds and music, solo or 2 player option.

☐ Systems: **COMMODORE 64** & **ATARI HOME COMPUTERS**

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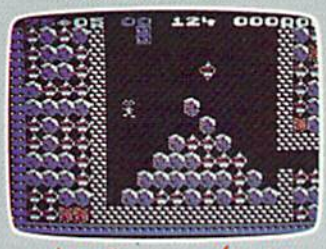

Peter Tieryas and Chris Gray

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PC/PC jr.™ conversion by Peter Tieryas

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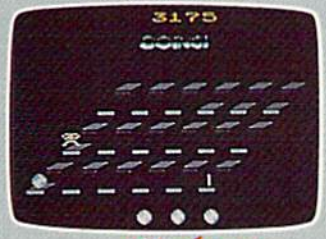

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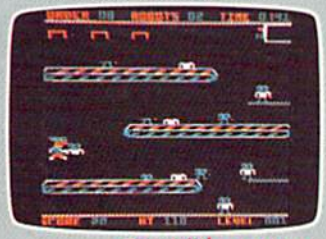

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You must act quickly to defend yourself against the attacking spaceships (64 version).

8. Now LOAD "TRENCHFIRE",1,1 for tape. For disk, LOAD "TRENCHFIRE",8,1.

9. Enter SYS 4352 to run the program.

The VIC version, which is all ML, plays almost identically to the 64 version, but has added features. You start with three ships, earn a bonus ship for every 1000 points, and can achieve a maximum of seven ships. Extra features include a pause function (press SHIFT/LOCK) for freezing

In the VIC version of "Trenchfire," the player has just launched two missiles.

the game at any time, and four levels of play. Press one of the function keys to choose a level:

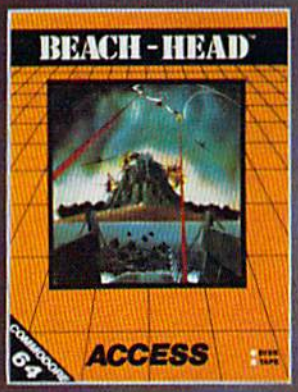
f1 beginner	**f5 advanced**
f3 intermediate	**f7 expert**

If you don't choose a level of play, the program defaults to the intermediate level. The expert level is only for the strong of heart. You also go up one level for every 250 points scored.

See program listings on page 151.

ACCESS

NOTHING BUT THE BEST



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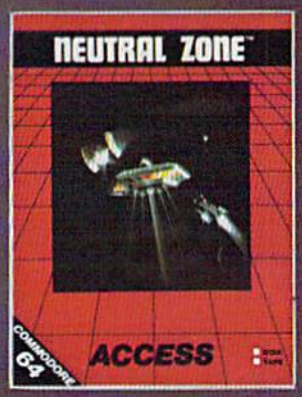

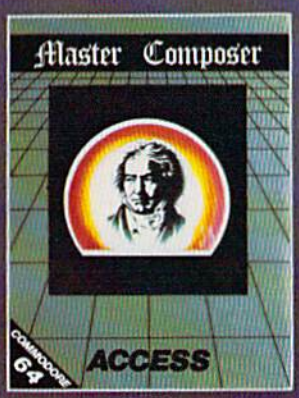

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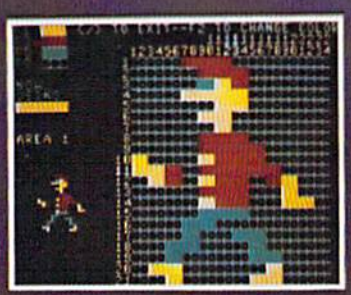

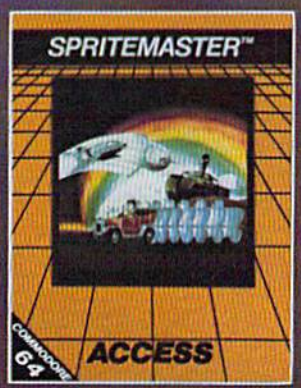

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POKER

August J. Kwitowski

"Poker" is an original color and sound version of the classic card game of draw poker. The format and style of play are similar to those of commercial poker machines. Written for the VIC with at least 3K memory expansion, we've added a version for the 64.

"Poker" opens with a dynamic introduction featuring color, sound, and horizontal text scrolling. The number of each round is announced, and five cards are dealt at random. You build your hand by choosing which cards to keep or exchange (up to three cards can be drawn). The computer ranks your hand and announces the payoff, if any. Your cumulative winnings (or losses) are displayed at the top of the screen. The higher the hand, the more you win. For example, you break even on a pair of jacks or better, but a royal flush brings you $250.

Program Features

The program itself (VIC version) contains several interesting features:

1. The short routine in lines 230 and 240 scrolls single lines of text horizontally across the screen.
2. To conserve memory, lines of text used in the introduction are reused in the routine that announces the rank and value of the hand.
3. A machine language (ML) routine POKEd into the cassette buffer is used to create a colorful border. The routine is accessed by the SYS 828 statement in line 350.

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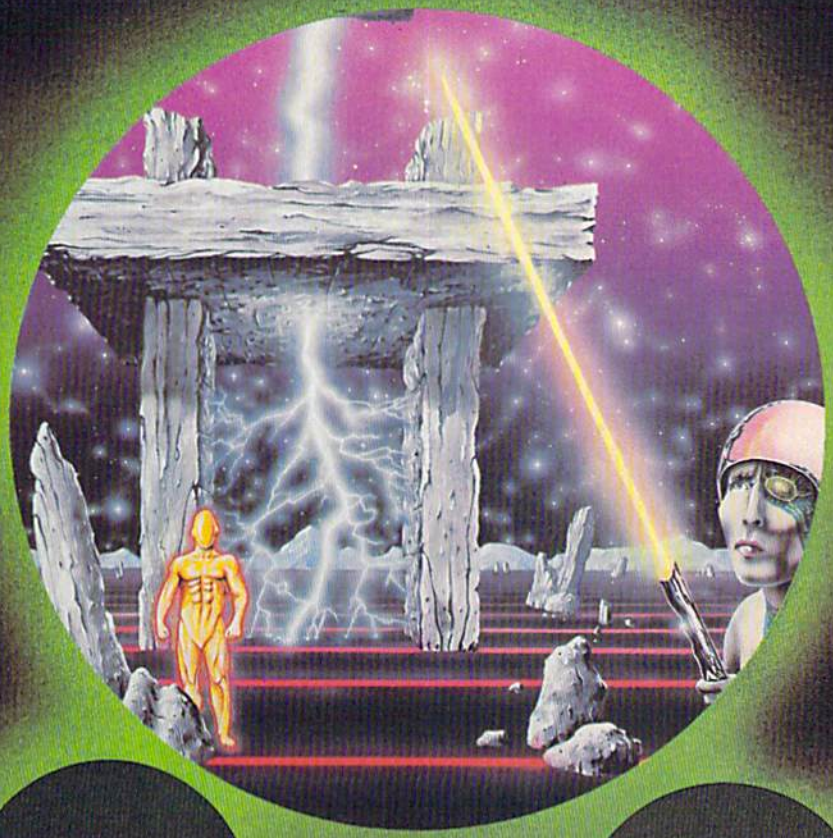

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SKYHAWK
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Attacking raiders scream out of the sky at you, you check your radar as an explosion blossoms at your side, you return their fire sending one of the attackers plummetting, the fuel gauge flashes a low fuel warning... SKYHAWK runs in 3K or 8K with a Joystick.

QUINTIC WARRIOR
COMMODORE 64 SOFTWARE

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Are you warrior enough to stand by his side in this MEGA- Arcade Game.

TORNADO
VIC20 SOFTWARE

Suddenly attacking Colony Fighters leap at me, I dive into their midst firing and still bombing the ground installations below, the sound of explosions rumbles away over the landscape... TORNADO runs on an unexpanded VIC20 + Joystick.

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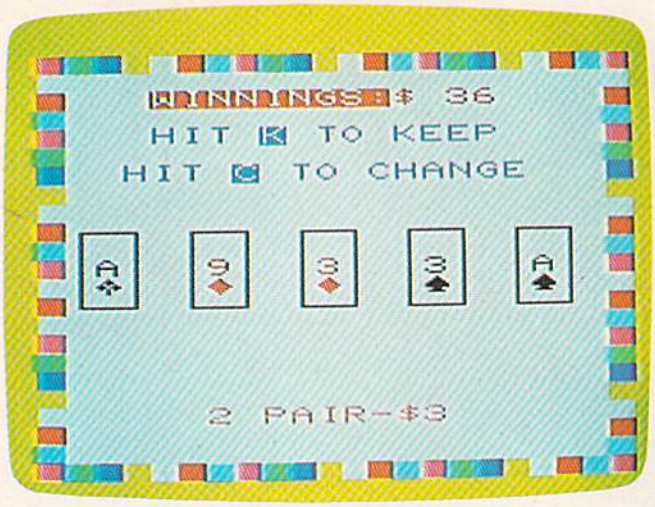

Like real poker, you can keep your hand or draw up to three new cards (VIC version).

Are three of a kind worth keeping? The decision is yours (64 version).

4. Lines 30 and 40 (VIC version) check for a 3K memory expander. Line 50 then alters the ML routine to conform to the screen and color memory configuration of a VIC-20 with less than 8K of expansion memory.

5. A hand's rank and value is determined by using ML and IF-THEN statements in lines 2110–2210. The machine language performs a bubble sort (ranking) of the card values and determines which cards are duplicates (two kings, three jacks, etc.). The ML routines are POKEd into the cassette buffer and are accessed in lines 2020 and 2130.

REM statements are omitted so the game will fit in the 6655 bytes provided by a 3K memory expander. Those of you with 3K memory expansion must type Poker exactly as listed. There is *no* extra memory available for spaces within and between commands.

Program Description (VIC Version)

Line	
20	POKE machine language in buffer.
30–50	Detect memory configuration; alter machine language if 3K expansion.
60–210	Read constants.
220–300	Scroll lines of text with sound.
310	Set text lines to null strings if they're not used again.
350–370	Hand number routines; create card screen.
500–630	Select cards; determine display characters and colors.
640–800	Deal cards.
810–1550	Keep or change each of the five cards.
2000–2170	Determine rank of hand.
2180–2220	Determine value and correct line of text.
3030–3100	Display determination with sound.
4030–4050	Subroutine for hand number.
5000	Subroutine to flash border, colors.
5050	Subroutine to display winnings.

For those who would rather not type it in, I will be glad to make a copy of the VIC version. Such requests should include a blank cassette or disk, a self-addressed, stamped envelope, and $3. Mail to:

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See program listings on page 172.

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Tree Tutor For Tots

Janet Arnold

This educational program uses custom characters and lively graphics to teach addition to young children. Correct answers are rewarded; there are no penalties for guessing wrong. Originally written for the VIC-20, we've added a version for the Commodore 64.

Arithmetic is for the birds—if your youngster plays "Tree Tutor For Tots." This math program is suitable for small children (preschool through second grade) who are just learning to add. It is a tutor, not simply a drill, because it illustrates addition concepts using colorful, attention-getting graphics.

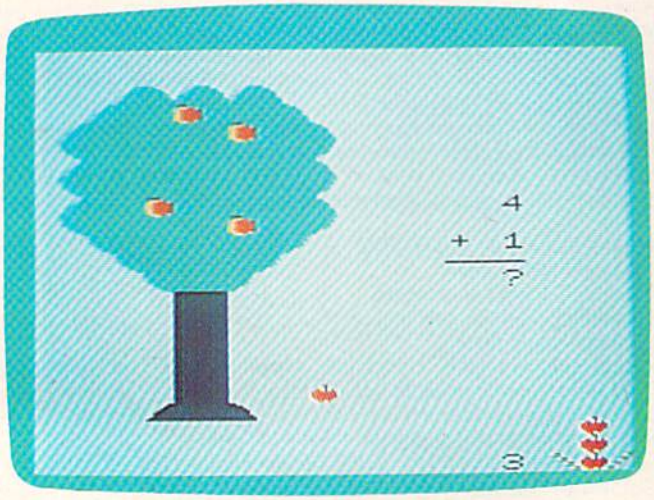
The child adds the apples hanging in a tree to those scattered on the ground. A correct answer brings a bird swooping from the sky to pluck an apple from the tree. The bird then drops it into a basket and flies off the screen. After ten right answers—and ten apples stacked in the basket—the game ends.

Choosing Levels Of Play

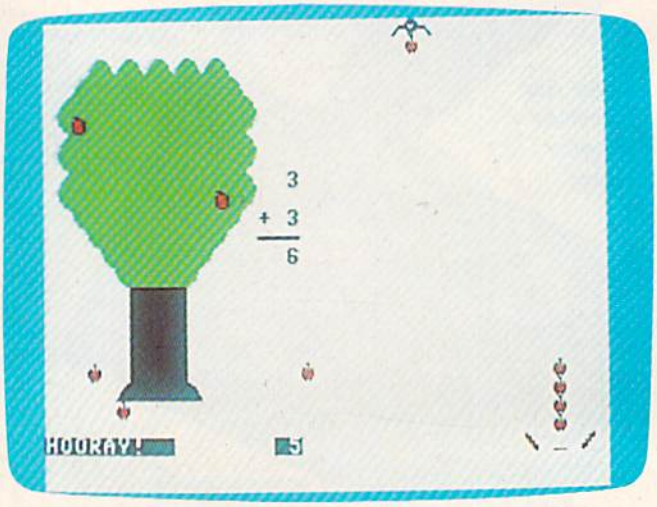
LOAD the program and RUN it. After a short wait, the title appears and you are asked to "Choose highest sum (2–9)." Hitting a 7, for instance, generates problems with answers no higher than seven. A beginner should choose 2, proceeding to the harder problems as the easier ones are mastered.

Next you are given an option for displaying the fruit. A beginner should hit 1; this tells the computer to show the apples when the problem is first printed. A 2 causes the fruit to appear only if the child gives a wrong answer.

When the tree and the problem are displayed, guide your child to discover the correct answer by



Four apples in the tree plus one on the ground. What does it add up to? (VIC version)



In the 64 version, the child has answered correctly. The bird is carrying an apple to the basket.

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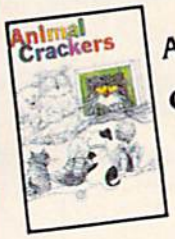

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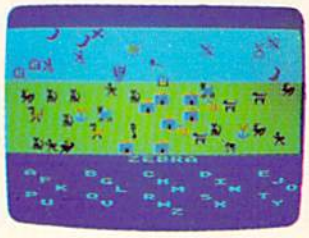

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saying something like, "There are two apples in the tree and one more on the ground. See this problem? It says 2 plus 1. How much is two and one? Let's count the apples and find out." Point out that the number of apples in the tree is the same as the top number of the combination, and that the number of apples on the ground matches the bottom number. Your child will learn that the apples are a *picture* of the addition problem.

When you think your youngster is ready, suggest trying to answer without counting the apples, using fruit option 2. If the answer is wrong, the apples appear on the screen; your child can count them to discover the correct sum.

An apple is dropped into the basket for every right answer, even if it took several guesses, as an incentive to keep trying. After collecting ten apples, you receive a message stating the total tries, although a preschooler probably won't care. He or she will, however, enjoy seeing the bird fly down to land on the message, which is a further incentive to complete ten problems.

Incorrect Keys Are Ignored

Because tots often hit the keyboard accidentally, I set up lines 10, 14, and 78 (VIC version) to accept only numerals in the stated range. Every other key will be unresponsive (except for the RUN/STOP key). The program uses a GET statement, so the child need not hit RETURN after entering an answer. Line 76 resets the number of characters in the keyboard buffer to zero, in case a key was pushed between problems.

Here is a program description of Tree Tutor (line numbers for the 64 version are in parentheses):

Lines	Description
2–6 (100–180)	Title, custom characters created, variables set.
8–14 (190–240)	GET highest number desired; GET fruit option.
16 (250–260)	POKE basket.
18 (270)	Main loop—count ten correct answers.
20–22 (280–290)	Choose problem (see paragraph following).
24 (300)	Erase former tree, problem, and message.
26–38 (310–410)	PRINT tree and problem.
40–74 (420–590)	POKE fruit.
76–80 (600–620)	GET and judge answer.
82–84 (630–650)	Routine for wrong answer.
86–106 (660–800)	Reward correct answer.
108–122 (810–920)	Reward ten correct answers; "play again" option.
124–126 (930–940)	Subroutine for falling apple.
128–138 (950–1000)	Data for custom characters.

When the computer chooses an addition problem in lines 20–22 (280–290 in 64 version), it first generates a random top number anywhere from one to the highest number family (F) selected by the user. The bottom addend is never greater than F minus the top addend, so that the sum will never be greater than F. T1 and B1 hold the values of T and B, the top and bottom addends, from the last displayed problem. This is to insure that an identical problem does not follow immediately.

One oddity you will notice—my children discovered it right away—is that the apples in the tree are different than the apples elsewhere on the screen. The program POKEs the tree apples in multicolor mode, which causes some loss of horizontal resolution. This results in a boxier-looking apple, but it does fill in the empty spaces around the apples with green, the border color, rather than with white, the screen color.

My older son strongly dislikes seeing two shapes of apples, so I devised the following program change for those who share his idiosyncrasy:

Line

128 (950 in 64 version) Change first eight numbers to 240,60,255,255,255,255,255,60

This program uses up most of the memory in an unexpanded VIC, so don't add any unnecessary spaces.

I will make a copy of Tree Tutor for Tots (VIC version only) if you send a blank tape, a self-addressed, stamped envelope, and check for $3 to:

Janet Arnold
620 Alger
Owosso, MI 48867

See program listings on page 148.

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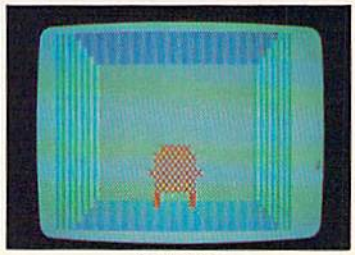

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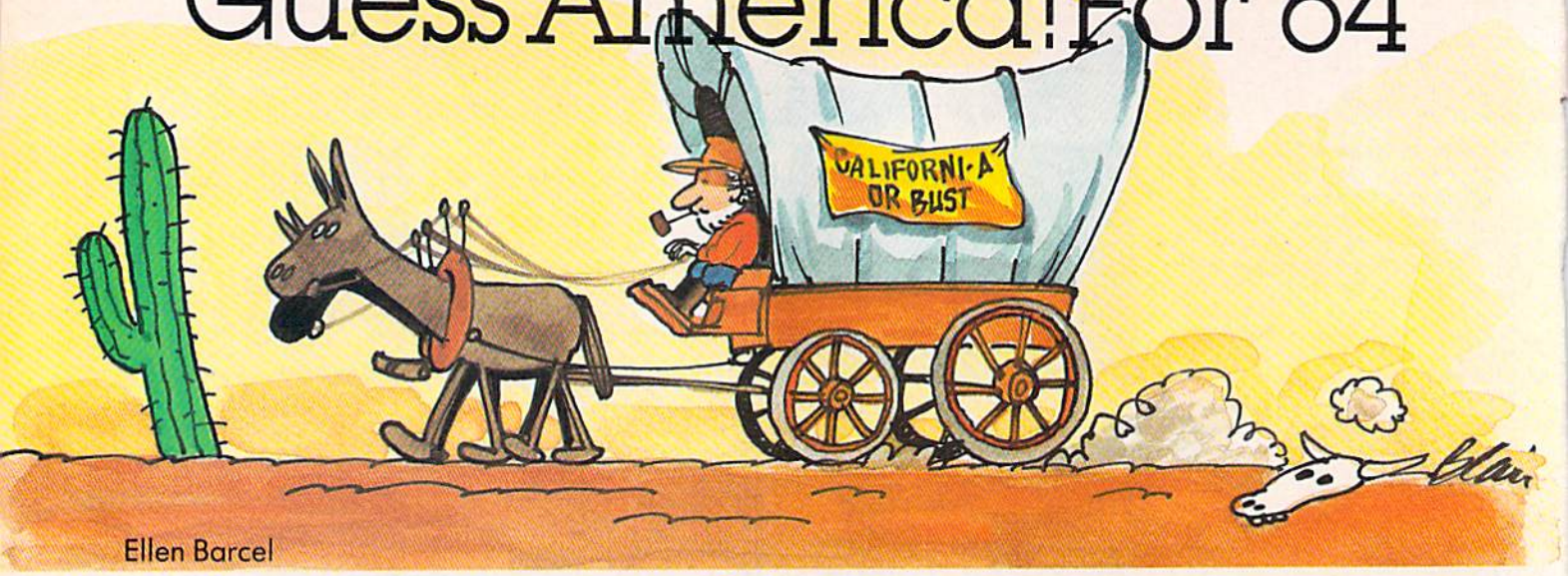
Guess America! For 64



Ellen Barcel

"Guess America!" is a historical game, and it's fun. The goal is to travel across the U.S. in a covered wagon by answering questions about history, geography, and current events. Questions can be added or modified, making it possible to create a customized quiz or review for children at any learning level.

"Guess America!" is an educational program that uses the 64's sprite and graphics capabilities. After randomly selecting a key word, the program scrambles and displays it. You have 15 seconds to type in your guess with the correct spelling. If you cannot answer correctly, you are given a clue. A second and then third clue (each a little easier than the one before) are given if you still don't have the correct answer.

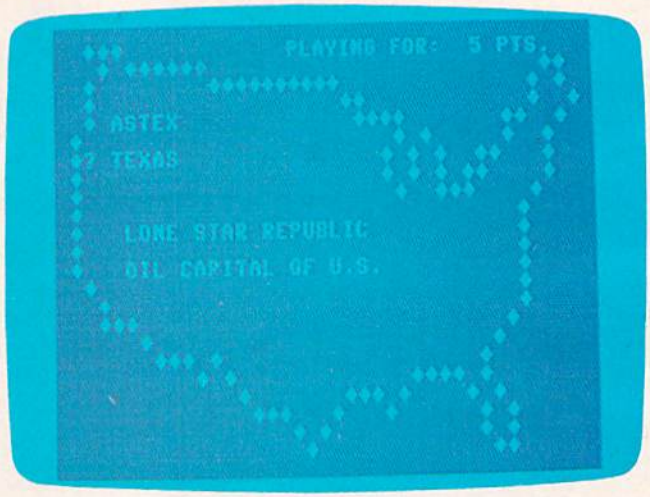
After five words have been selected, the game is over. A covered wagon then travels westward across a map of the U.S., and the higher your score, the farther the wagon travels. A high score will get you all the way to California.

The game may be repeated as many times as you wish. Each new game, the computer will randomly select five words from a list of 31. If a key word happens to be selected more than once, the second scramble will usually be different than the first.

Modifying The Program

The game can always remain fresh because you can very easily modify or add key words and clues. Your only limit is the computer's memory. (As written, the program uses about 11K.)

Terms can also be changed so that they represent a single topic—U.S. presidents, or inventors, for example. To delete a key word and clues permanently, omit the entire DATA statement when typing in the program. You can also simply insert a REM after the line number if you wish to temporarily delete a DATA statement. Just remove the REM if you wish to use the DATA statement before running the program.



A series of clues is given if you can't unscramble the word the first time in Guess America.

To add words and clues, use this format:

Line number, DATA, key word to be scrambled, clue 1, clue 2, clue 3

Be sure to always include commas between words and clues. If clues are long, two line numbers and DATA statements may be used. The key word may also include a hyphen or space (as in New York), but not commas, colons, or double quotation marks. Make sure that the line DATA *,*,*,* is the last DATA statement in the program.

If you'd rather not type in the program, I'll make copies on tape. Send a blank cassette, $3, and a self-addressed, stamped mailer to:

Ellen Barcel
P.O. Box 39
East Setauket, NY 11733

See program listing on page 155.

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It teaches me more about my Commodore 64 than any other magazine. Explanatory articles on how programs work. The Gazette is the best magazine for Vic-20 owners. Good writers! Your program listings are outstanding. The Gazette Feedback column. I rate it the best magazine for my needs. The interviews with professional programmers. I'M NEW AT COMPUTING; THE GAZETTE IS VERY HELPFUL. Plain language articles for beginners. It helps me learn the essentials and excitement of computing. The articles on Machine language. Educational programs in basic. It's not too technical for the average person. The advanced programming techniques. The ads and reviews. ARTICLES ABOUT DISK DRIVES AND MODEMS. The large number of programs. The programming tips and reviews. Information on things the manuals do not explain. Your professional writing; you have very knowledgeable authors. I like learning how computers work. It tells me about current events in the computer industry.

The above comments are from The Editor's Feedback Cards, a monthly part of our continuing dialogue with the readers of COMPUTE!'s GAZETTE.

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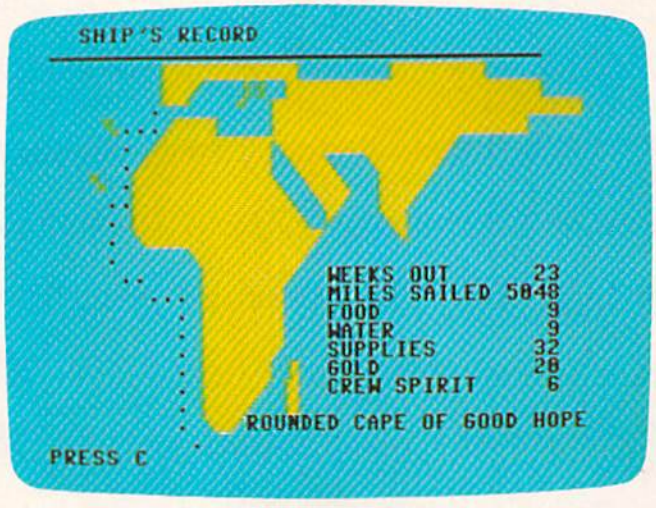
Sea Route To India:

A Historical Simulation For The 64

M. J. Winter



Rounding the Cape of Good Hope in "Sea Route To India."

Here's your chance to make history on the "Sea Route to India." Following in the wake of Portuguese explorers, you can find gold and adventure, if you don't starve, or get sunk by pirates, or capsize in a terrible storm.

One of the earliest games for PET computers was *Westward Ho*, in which the player becomes a turn-of-the-century pioneer, trying to cross the country in a covered wagon. Decisions must be made about purchasing food, supplies, and ammunition. Various experiences—hunting, Indian attacks, settlements—occur on each leg of the journey. By repeatedly playing the game, the user learns where to spend money, how to hunt, and whether to trust strangers. Luck, however, is a major factor in success. PET users of all ages played the game over and over until they finally reached the West Coast.

Westward Ho was an abbreviated version of *Oregon Trail*, in which the game's designers took pains to produce an accurate simulation. They used prices from contemporary catalogs, and calculated frequencies and likely locations of Indian attacks by studying historical accounts. The result was a game that was both interesting and informative.

Sail The Bounding Main

"Sea Route To India" uses a similar technique, drawing on the voyages made by Protuguese explorers in the fifteenth century.

The subroutine beginning at line 15000 introduces the game and gives you the rules.

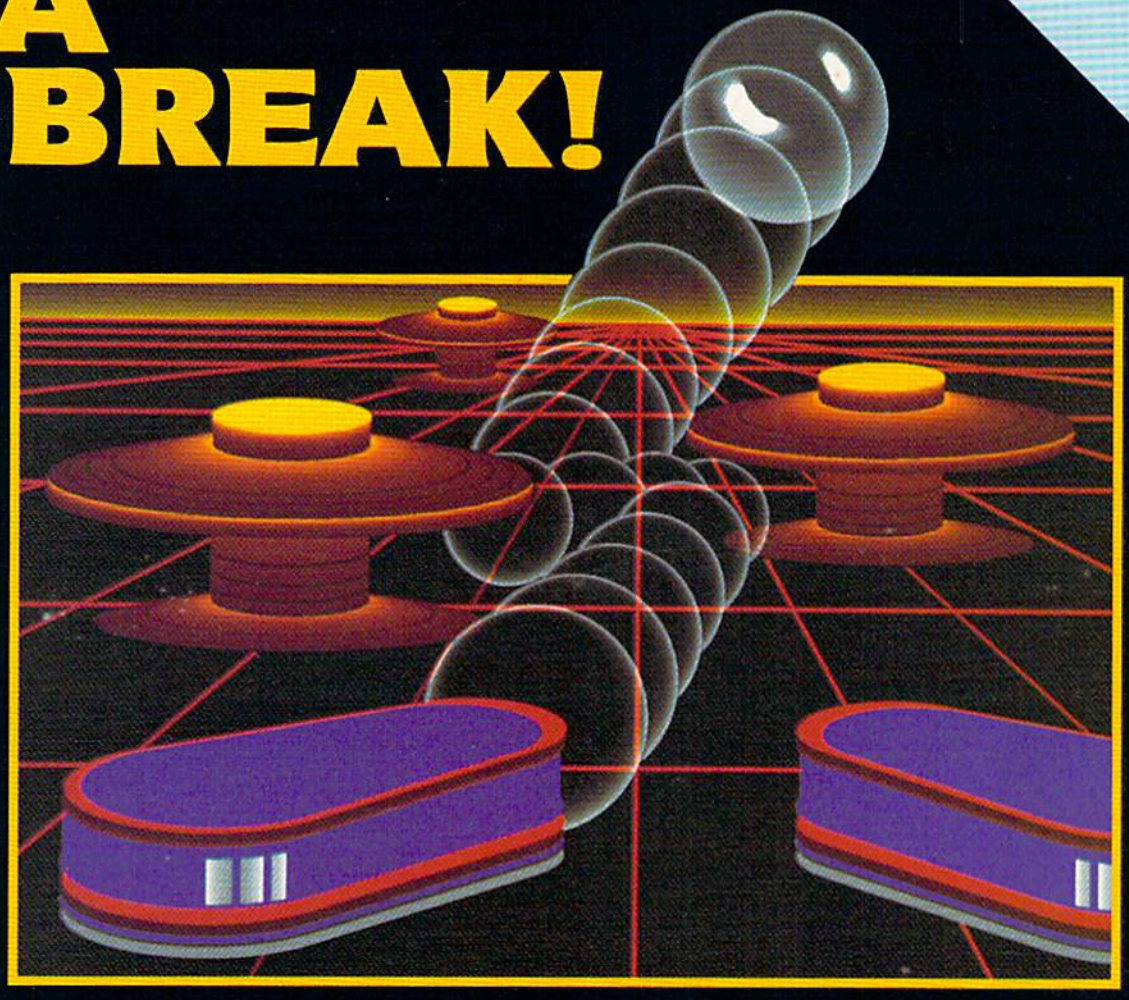
Your goal is to sail from Lisbon around Africa to India. During the voyage, you encounter the same dangers faced by the real explorers: hunger, thirst, pirates, natives, weather, mutiny, and attack by Arab traders.

Your journey is charted in weeks on a map displayed on the screen. Lines 500–800 contain the loop for each week. The miles you sail depend on the weather. Each week your store of water, food, and supplies decreases by one unit. If your voyage lasts more than 30 weeks, the crew's happiness also decreases by 1.

Each week you have a new experience; line 560 sends the program to the appropriate event.

TAKE A BREAK!

For Commodore 64



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In the early part of the voyage, you sight whales and other ships, and sail into terrible storms. But after you pass the Cape of Good Hope and pick up your Indian pilot, you might be attacked at any time by Arab dhows.

Check Your Progress Every Week

At the end of each week, the program assesses your situation. If you sailed far enough to visit the Canary or Cape Verde Islands, then your water, food, supplies, and crew happiness are restored. The ship's log is updated, and the game map shows your progress. Lines 91–93 define DT$ (dots); three characters are needed for each dot. One dot on the map represents 200 miles (line 1002). Then, if there have been no fatal shortages, the voyage continues for another week.

Your ship "sails" across the screen in line 15155. In the race (lines 3093, 3096), the ships are placed at the right of the screen and a string of DELETEs is printed several times. (If you win the race, the crew is happier; they become disgruntled by a loss.)

Lines 1000–1250 contain the whale hunting routine. The whales are within a long string (F$) of *shifted spaces*, which are cyclically rearranged (line 1210) and the leftmost 40 characters printed each time. The program checks the keyboard, then moves the whales until you press H, which drops the harpoon. The program then alternately moves the whales and lowers the harpoon.

To check whether the harpoon hits a whale, the screen is opened for INPUT (line 1100). The entire row of the screen to the right of the harpoon is input. If the first character is not a shifted space, a whale has been hit.

Landfall To Gather Supplies

The subroutine beginning at line 4000 describes the sighting of a river mouth. Landing offers you a chance to get food and water, and to cheer up the crew. Sometimes (line 4060) natives appear. As many early explorers discovered, they are unpredictable. Sometimes they are friendly and trade gold for trinkets (cheering up the crew); sometimes they attack.

If they attack, you must type RUN and press RETURN quickly. The clock is set to 0 in line 4320, to time how fast you typed in RUN. After you press RETURN, the program looks at the clock. If more than 200 jiffies have passed (line 4340), the natives attack and kill you.

The same timing technique is used when the Arab dhows attack. The Arabs are fiercely determined to protect their trading routes. Vasco da Gama himself was nearly trapped by them more than once.

The program as written will run on a Commodore 64 or PET.

Readers who do not want to type in the program can obtain a copy by sending a blank tape or disk, a stamped, self-addressed mailer, and a check for $3 to:

M. J. Winter
Math Department, Michigan State University
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See program listing on page 159.

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Data Manager For The Commodore 64

Dale F. Brown

Simplicity, versatility, and low cost are the attractions of *Data Manager*, an information collection and retrieval system from Timeworks. It's not the most sophisticated data base system around, but *Data Manager* is a good solution for those seeking a simple, easy-to-run, computerized index card system for home or personal applications.

The program, while not endowed with blazing speed or a lot of fancy options, can bring some organization to your Christmas lists, club membership records, bowling team scores, addresses, or account numbers.

If your goal is to crunch a lot of information, process long columns of keywords, or do extensive cross referencing, *Data Manager* might fall short of your expectations.

Have A Plan From The Beginning

Data Manager initializes a disk and formats it when you start up the system. Before formatting, however, you must decide how many lines per record you want. Once the data disk is formatted, you cannot change it.

Records can have from one to eight lines, with up to 30 characters per line. A normal data disk will hold 1040 five-line records.

When new information is entered, the program automatically moves to the end of the data file. You enter information for each line of the record, then you can correct your entry. If everything is correct, the program writes your record to disk.

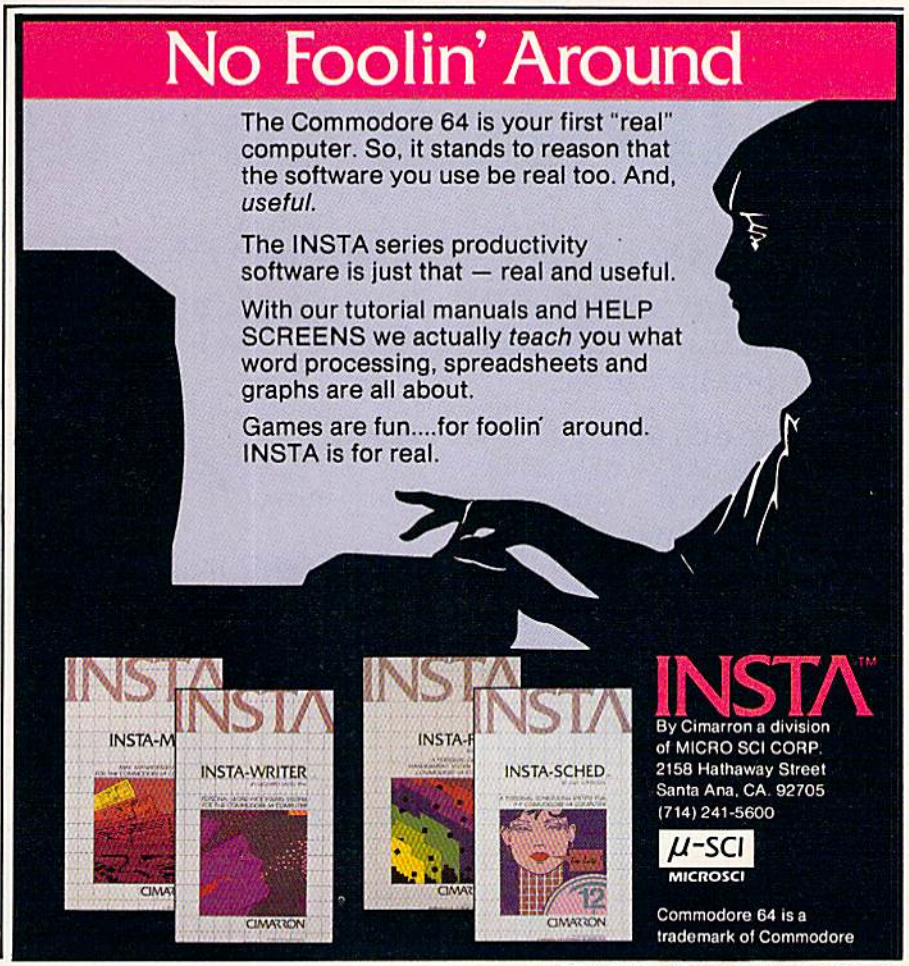
When you replace a record, each replacement line is written to disk as you enter it, so this process can be a bit slow.

Retrieving Data

Once all your records are entered, you have several ways to recall and display the data. You can search and recall by exact name, by data pointers, or by index codes.

Data pointers are references to lines within the records—b› might be used to search for birthdates, or tpsc› might be used to find top scores in your bowling records. The index code might be (R) or (F) entered into your address records to differentiate between relatives and friends.

If, for example, you wish to find the names of everyone in your records with a birthday in June, you could use the b› data pointer and specify a range of 06/01/00 to 06/30/00.



The X-Search Function

Data Manager includes an X-Search feature that allows you to perform secondary searches on your data. In the example above, you asked for the names of everyone with a birthday in June. You could take it a step further and use X-Search to search that data subset for records that contained an (R) index code. The result would be a list of your relatives who had birthdays in June.

After using X-Search, you can print out the results and then use X-Search again and again to search for different index codes or data pointers.

The program also allows you to retrieve and analyze numerical data within records. For example, if you used tpsc› in each record to display the top bowling score of each member of your bowling club, you could retrieve that data, add it, average it, compute a standard deviation, and draw a bar chart of the information.

Data Manager includes a 20-page manual that takes a bit of study to fully understand. But once you learn the basics of record entry and retrieval, you'll find the program a good tool for organizing and maintaining personal and household records.

Data Manager
Timeworks, Inc.
405 Lake Cook Road
Deerfield, IL 60015
(312) 291-9200
$24.95

Purple Turtles

Lance Elko, Editor

Quicksilva, an established British software house, has entered the U.S. market. One of its initial offerings is *Purple Turtles*—a unique and charming arcade-style game. Written by Mark and Richard Moore for the Commodore 64, *Purple Turtles* uses the 64's sound, color, and graphics to great advantage.

At first, *Purple Turtles* might strike you as one of the most colorful and lively games you've ever seen on the 64. But, you might also jump to the conclusion that it's a game just for children. After playing for a few minutes, though, you might

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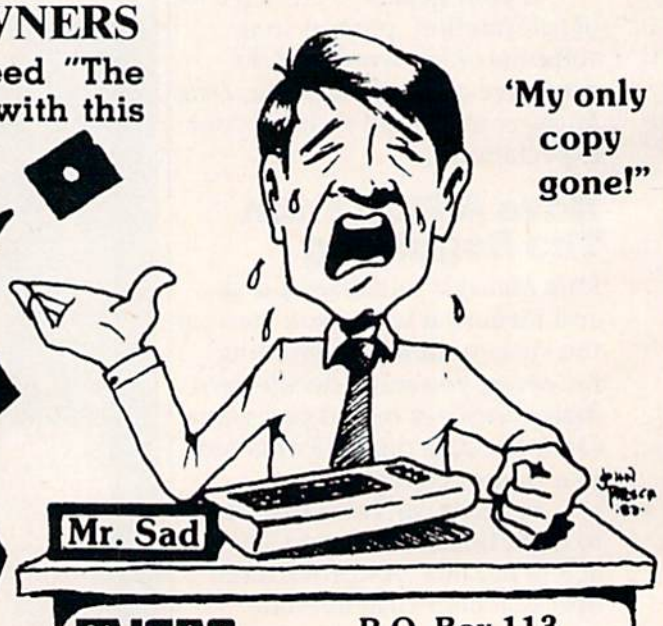

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well change your mind.

The game's instructions are concise and clear. The opening scenario, complete with a game demonstration screen and a delightful melody that's somehow vaguely familiar, scrolls options across the screen center—press the space bar to start, I for instructions, and H for high scores.

Selecting I gives you all the information you need to play the game effectively. The game options are spelled out. You can choose to play using the joystick or keyboard. You can press RUN/STOP—RESTORE to reset the game. Or select one of ten levels for game speed or skill level. And the ever-welcome pause function is included. Pressing P freezes the game until you're ready to resume by pressing it again.

More Than Meets The Eye

The object of the game is to cross a pond by hopping on the backs of four very fickle turtles, gather fruit, and return. Sounds easy, but it's not. The harmless looking turtles float on the water's surface and bob. But, one or more of them will submerge unpredictably. If you're in the middle of a jump and the turtle you're about to land on decides to take a dive, you're in the drink. This costs one life (you start with three, and receive a bonus life every time you advance a level).

Assuming you start at the default speed and level (Level 0 for both), the first couple of rounds are not terribly difficult. Only one turtle at a time will descend. But you're soon into the next round and possibly a little overconfident. You now have to contend with two diving

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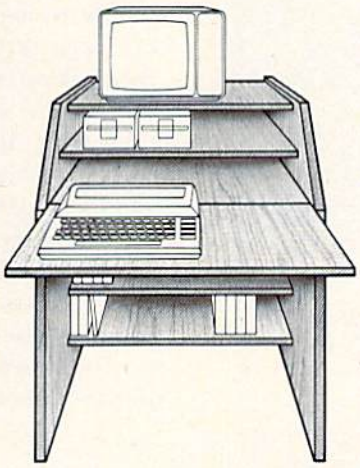

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A turtle begins his descent in Purple Turtles. *The pause feature is one of many extras in this lively game for the Commodore 64.*

turtles. This pattern continues until you're at a point where all four are acting undependably. After a few blunders, you'll soon learn that there's more to the game than meets the eye. You must develop a strategy.

Another tendency for first-time players will be to play cautiously and deliberately. This will get you nowhere, as there's another obstacle to overcome: the timer. You must successfully return five pieces of fruit within a fixed amount of time to get to the next level. The timer, placed somewhat inconspicuously at the top of the screen, moves along deceptively slowly. The more you concentrate on the treachery of the turtles, the more likely GAME'S OVER will flash on the screen.

The Frenzied Owl

There are a lot of nice surprises and pleasant distractions in *Purple Turtles*. Besides very appealing color combinations, the authors have provided an extremely active screen by taking full advantage of the 64's sprite capabilities. The blue sky is filled with various colored clouds and hot-air balloons which float happily across the screen, unaware of your plight below.

The trees on each side of the pond are interesting, too. The tree on the left, your starting position, is home to an owl that blinks and twitches his ears throughout the game. When you return successfully with your fruit, the owl goes into a frenzy, shrieking hysterically. This provides a not so gentle reminder that your score has increased.

The tree on the other side of the pond bears a different fruit for each new level achieved. Before you start across the pond each time, one piece drops to the ground. You collect it automatically by crossing the pond.

Purple Turtles is quite well designed. It's innocent and enchanting, yet you'll not quickly master any of the higher levels. If Quicksilva can produce more games of this quality, it is sure to find a niche in the U.S. software market.

Purple Turtles
Quicksilva, Inc.
426 West Nakoma
San Antonio, TX 78216
$29.95 disk $24.95 tape

COMvoice: Voice Synthesizer For The VIC-20

Todd Heimarck, Assistant Editor

COMvoice, a voice synthesizer for the VIC-20, gives your computer the ability to talk, and it's remarkably easy to use.

The COMvoice package contains a cartridge, a speaker with cord, and a 20-page instruction manual. The cartridge plugs into your VIC, and the speaker plugs into the cartridge.

If you don't like reading instruction manuals, all you need to know is that COMvoice adds one new BASIC command: SPEAK. This command works almost like PRINT, but instead of putting words on the screen, the computer talks to you. You must enclose the words to be spoken in double quotation marks. A dial on the cartridge controls the volume.

It Knows The Tough Words

COMvoice will pronounce 95 percent of English words correctly. It has a fairly sophisticated method of figuring out the connection between spelling and speech. For example, it correctly pronounces *tough, rough, though, although, bought,* and *brought*. It does very well, considering the different sounds *ough* can represent.

Occasionally a strange word pops up. COMvoice has problems pronouncing *pizza* (piz-ah), *women* (woh-men), *integer* (int-eej-er), and certain other words. This usually happens because a word is spelled one way but pronounced another. If you run into a problem word, you can correct it by deliberately misspelling it (so it looks like the way it is spoken).

COMvoice can also speak letters and numbers. The voice is somewhat mechanical and monotonous; if you've heard computers talk in movies (*WarGames*) or on television (*Whiz Kids*), you can get a good idea of the sound quality. But you can add four levels of inflection, to stress certain words or to make questions sound more natural.

Victree™ The Mighty Oak

created for COMMODORE 64 and VIC-20 users by a programmer named Robin.

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42 Added Commands

Like AUTO, which automatically numbers your lines when you are writing a program. DELETE, which removes program lines and sections. And LCOPY and LMOVE (you can probably figure these out!).

The *VICTREE* lets you take fuller advantage of the Disk Operating System in your 1541 Disk Drive. It gives you key BASIC disk and file commands that you could not otherwise get without much greater expense. Here's a small sample:

The DIR command immediately reads the disk directory while leaving the computer's memory completely untouched, and without disturbing whatever program you're working on.

HEADER formats an old or a blank disk for use.

CONCAT links (concatenates) disk files. And the *VICTREE* also has SAVE, LOAD, SCRATCH, and INITIALIZE file command capabilities.

Other Popular Features

EXECUTE, MERGE, and CHAIN are features which will run programs off disk, let you merge two programs off a disk, or add one after the other.

VICTREE has 14 commands that permit the greatest program writing and fixing ease. For writing, the toolkit of commands includes FIND and CHANGE (the programmer's search and replace), which simplifies making changes in your program. The RENUMBER command offers helpful timesaving, by removing the drudgery of line renumbering.

For debugging, TRACE lets you execute the program under *your* control, letting you see the next line that will come up. DUMP lists the names of your variables and their value.

The *VICTREE* allows most BASIC 4.0 programs, especially those for the older PET machines, to work on your *COMMODORE 64* or *VIC-20*. And for only $20 extra, *VICTREE* comes with a cable that roots you into almost any of the popular Centronics/parallel standard printers on the market today. And this carefully protected cartridge even has a very simple text editor that allows brief documents to be entered, printed out, or chained together and stored from tape of disk.

The VICTREE Keeps Growing

We recently grafted a "Print Using" BASIC command onto it. Bob calls it "The command that Commodore forgot." It lays out the format of your printout line. The 1983 *VICTREE* features a new switch, too, that turns the cartridge off and tells the computer that central memory is back in place.

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String Variables Spoken Here

You can set up string variables for pronunciation, for example, A$="WELCOME HOME": SPEAK A$. And there are several options for controlling pauses. A single space will cause a slight pause. Commas and periods will result in longer pauses.

The SPEAK command works in immediate mode (without a program line number) or within programs. The instruction manual also includes a list of over 60 sounds you can access with POKEs directly into memory. You can program speech either in BASIC or in machine language.

The most impressive thing about COMvoice is how easy it is to use. You don't have to learn a phonetic code that translates words into special numbers and symbols which only the computer recognizes, as with some other speech devices.

There are a variety of interesting applications you could develop with COMvoice. Imagine an arcade game that talks, warning you of sneak attacks or suggesting strategy. Or educational software for preschoolers who are just learning the alphabet. The computer could draw a picture of a bee next to the letter B and say it to the child. COMvoice might also be useful in data entry; the computer could tell you what you just typed.

Some Minor Faults

There are a few minor faults in this voice synthesizer. It has problems with the *ng* sound. It is difficult to tell the difference between *thin* and *thing*. And leaving off the closing quotation mark results in a ?SYNTAX ERROR. Programmers who regularly omit the final quote on PRINT statements (to save a bit of memory) may find this feature somewhat annoying.

If you are used to PRINTing multiple variables separated by commas or semicolons, you will have to remember that you cannot do this with the SPEAK command. SPEAK accepts only single string variables and it does not recognize string arrays. You can get around the single string limitation by converting arrays with a line such as A$=B$(1,6):SPEAK A$.

The four levels of intonation are based on (musical) tone rather than volume. The voice would sound more realistic if you could stress some words by making them louder than others. The only way to control volume is to turn the dial on the cartridge; you cannot do it from within a program.

And, finally, the RUN/STOP key is disabled while the voice is on. That means you cannot rudely interrupt the computer while it is talking; you have to wait for it to finish before you STOP the program.

Considering the overall effectiveness and ease of use, these flaws are merely quirks. Once you get used to programming with COMvoice, you'll learn to ignore them.

COMvoice uses a VOTRAX SC-01 chip and is sold with a one-year warranty. A Commodore 64 version is also available.

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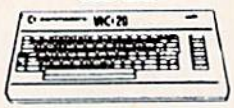

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Seafox For The VIC-20

Tony Roberts, Assistant Managing Editor

Far beneath the surface of some distant ocean is a submarine awaiting your command. Your mission is to prevent the freighters from passing while allowing hospital ships to sail through.

The game is *Seafox*, an underwater action game adapted for the VIC-20 from the Apple and Atari versions. It is available on cartridge from Brøderbund Software. At its simplest levels, *Seafox* is challenging. At its most difficult, it's an undersea nightmare.

Seafox is a shoot-em-up game. There's plenty of action, but the pace is slower than you might be used to in a space game. This accurately reflects the medium in which the game is set—water. Your submarine, the enemy subs, the torpedoes, and mines all move through the water in a deliberate, liquidlike fashion.

You usually have time to see the dangers around you, but you don't always have time to react. The game realistically reflects the differences between maneuvering a bulky submarine in the dense undersea world and piloting a sleek spaceship in the vacuum of outer space.

Three Subs And A Chantey

As *Seafox* begins, you are supplied with three submarines, and you are treated to the opening bars of "Sailor's Hornpipe." This melody, though a bit out of tune, serves to warn you that the action is about to begin.

Your sub roams the depths while the freighters and hospital ships use the shipping lanes above. To complete your first mission, you must sink ten of the blue freighters while fending off attacks by a fleet of enemy subs.

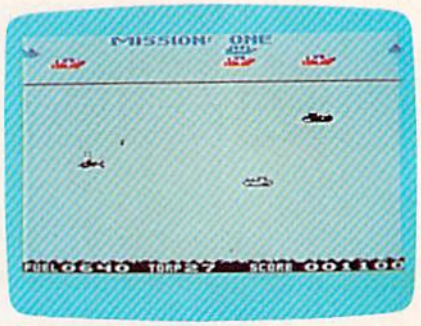
To fire at a freighter, give the joystick button a quick tap and a torpedo is launched toward the surface. If you hold down the joystick button, you launch a torpedo from your forward tubes. This weapon is used against your underwater foes, and also can be used to detonate depth charges and magnetic mines. Only one torpedo of each type can be active at a time.

Your mission is further hampered by your limited supply of fuel and torpedoes. You have 30 torpedoes and 1200 units of fuel when you begin. You burn fuel at an alarming rate and must always keep an eye out for your supply ship.

Supply Ships And Undersea Creatures

The supply ship appears at intervals at the bottom of the screen. It releases a trained dolphin which carries fuel and torpedoes. You must make contact with the dolphin's pack in order to take on new supplies. If you miss connections with the dolphin, you have barely enough fuel to hold you until the next supply ship arrives. If you fail to resupply your sub a second time, you inevitably sink to the bottom of the sea.

The sea abounds with giant clams that seem to enjoy feasting on dolphins. They gobble up your supplies as well, so it's best to refuel as quickly as possible. If you lose a dolphin to a clam,



A dolphin carrying an unclaimed supply pack swims off in Sea Fox.

you simply have to wait for the next supply ship, but if any other woe befalls your friendly dolphin, you pay dearly. Should a torpedo, mine, or depth charge destroy the undersea mammal, you have only sedconds before your entire ship is swallowed by a giant whale.

While your main mission is to sink freighters, you do receive points for blowing up enemy subs, mines, and depth charges—something which must be done anyway, just to survive.

Should one of your torpedoes hit a hospital ship, you'll do no damage. However, the weapon will bounce off the heavily armed ship and head back your way. Besides presenting you with an added peril, this also deprives you of your ability to fire another surface torpedo until the first one explodes on the sea bottom.

On To Advanced Assignments

As you begin play, your only danger is a fleet of enemy submarines. As you advance to higher levels, the complications increase. On level two, a fleet of destroyers is added to the shipping lane. These ships drop depth charges to make your life miserable. In the third level, the enemy subs begin firing torpedoes at you, and what happens

after that I've never been able to discover. The game includes five levels, and the instructions make reference to magnetic mines, so I assume they're part of the finale.

A nice feature of *Seafox* is that the depth charges, mines, enemy subs, torpedoes, etc., have the ability to home in on you. When you take evasive action, you must be evasive. It doesn't do to simply move aside and let them go past.

Seafox requires that you develop strategies, and it requires that you keep your submarine in constant motion. Take it up to get a clean shot at a freighter, descend for refueling, reverse engines to avoid an explosive charge. It takes concentration to stay alive, and you'll find that it's carelessness that most often does you in.

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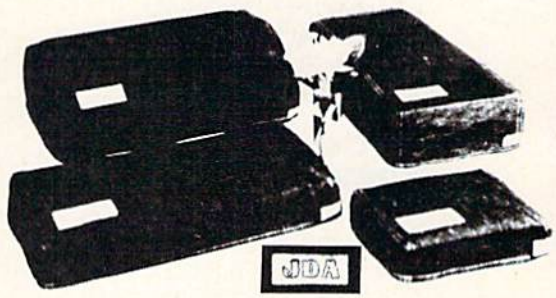

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HOTWARE

A Look At This Month's Best Sellers And The Software Industry

Kathy Yakal, Editorial Assistant

Commodore 64 Entertainment

This Month		Last Month
1	*Temple Of Apshai* (Epyx)	2
2	*Jumpman* (Epyx)	1
3	*Frogger* (Sierra On-Line)	3
4	*Choplifter* (Bróderbund)	5
5	*Beach-Head* (Access)	–
6	*Neutral Zone* (Access)	7
7	*Fort Apocalypse* (Synapse)	4
8	*Gridrunner* (HesWare)	6
9	*Enchanter* (Infocom)	–
10	*Telengard* (Avalon Hill)	9

Commodore 64 Home/Business/Utility

This Month		Last Month
1	*WordPro 3 Plus/64* With *SpellRight* (Professional)*	1
2	*Quick Brown Fox* (Quick Brown Fox)	2
3	*Paper Clip* (Batteries Included)	6
4	*Management Systems 64* (Entech)	8
5	*Electronic Checkbook* (Timeworks)	–
6	*Money Manager* (Timeworks)	7
7	*Data Base 64* (Entech)	9
8	*Delphi's Oracle* (Batteries Included)	4
9	*Data Manager* (Timeworks)	–
10	*HES Mon* (HesWare)	10

Commodore 64 Educational

This Month		Last Month
1	*Dungeons of the Algebra Dragons* (Timeworks)	5
2	*Facemaker* (Spinnaker)	1
3	*Spellbound* (Timeworks)	–
4	*Delta Drawing* (Spinnaker)	–
5	*Studio 64* (Entech)	3
6	*Primary Math Tutor* (Comm*Data)	6
7	*Pipes* (Creative Software)	7
8	*Up For Grabs* (Spinnaker)	5

VIC-20 Entertainment

This Month		Last Month
1	*Shamus* (HesWare)	2
2	*Choplifter* (Creative)	4
3	*Gridrunner* (HesWare)	1
4	*Temple of Apshai* (Epyx)	3
5	*Crush, Crumble and Chomp* (Epyx)	5
6	*Protector* (HesWare)	–
7	*Attack of the Mutant Camels* (HesWare)	7

VIC-20 Home/Business/Utility

This Month		Last Month
1	*Quick Brown Fox* (Quick Brown Fox)	1
2	*HES Writer* (HesWare)	–
3	*Household Finance* (Creative Software)	3
4	*TOTL Time Manager* (TOTL)	5
5	*TOTL Text* (TOTL)	6
6	*HES Mon* (HesWare)	4

VIC-20 Educational

This Month		Last Month
1	*Touch Typing Tutor* (Taylormade)	1
2	*Primary Math Tutor* (Comm*Data)	5
3	*Square Pairs* (Scholastic)	–
4	*Word Search* (T & F)	3

**Word Pro 3 Plus/64* was written by Steve Punter. *SpellRight* was written by Joe Spatfora and Dwight Huff. The two programs can be purchased separately or as a package.

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Commodore 64 owners are buying more home applications software than games, and VIC-20 owners are moving in that direction, too. This month we'll look at some home applications products which are doing well, some which are not, and a few you can expect to see in the near future.

As the home computer movement gathers momentum, it's important for people in the industry to know why consumers are buying computers. Hundreds of surveys have been conducted by market research firms, hardware and software manufacturers, and computer publications. Though the results vary, some general trends have emerged.

- Before purchasing a computer, many people claim that they want or need a home computer for educational purposes, and to simplify record keeping. Playing videogames is often low on their list of priorities.
- *After* buying a computer, the first type of software actually purchased is, in many cases, games.
- A few weeks or months down the road, the computer owner starts searching for practical applications other than entertainment.

Though this is not true for everyone, this kind of pattern emerges in the software sales we have tracked in HOTWARE. Last spring, when the Commodore 64 was fairly new to the market, and the VIC-20's price was dropping rapidly, the type of software that sold best was games. As demand increased and more home business software became available, it began to outdistance games both in unit sales and in numbers of programs being published.

Granted, the Commodore 64 is seen as more suitable than the VIC-20 as a business computer, due to its greater amount of memory. But the increase in availability of home and business applications cannot be traced solely to the 64. Equivalent software for the VIC-20 is also starting to catch up, although VIC-20 games are still selling in greater volume.

Identifying The Leaders

If we go back to the first HOTWARE list in the August 1983 issue of COMPUTE!'s GAZETTE, we see several types of home/business software represented. For the Commodore 64, it looked like this:

1. *HES Writer* (HesWare)
2. *Calc Result* (Handic)
3. *Word Pro 3 Plus/64* (Professional)
4. *HES Mon* (HesWare)
5. *TOTL Text* (TOTL Software)
6. *TOTL Label* (TOTL Software)

Three word processing programs appeared here: *HES Writer, Word Pro 3 Plus/64,* and *TOTL Text.* Many more word processing packages have been introduced since that time, and word processing continues to be one of the most popular home applications for personal computers.

Electronic spreadsheets do not seem to be as popular as other types of business software, at least among Commodore owners. *Calc Result* leads the field of the few available.

HES Mon, a machine language monitor, and *TOTL Label,* a mailing list program, also appeared on the first HOTWARE list.

New Products Join The List

Since we first published that list, several new products have entered the home applications market.

Data bases. These electronic filing systems allow you to enter records, sort them, and print out specialized reports. (See "The Data Base As A Home Information Center" elsewhere in this issue.) *Data Manager,* by Timeworks, and *Delphi's Oracle,* by Batteries Included, are examples. Data base software is beginning to appear almost as often as word processors on our HOTWARE list.

Home finance software. Though some of the personal financial records that you have to keep may be more easily done with pencil and paper, many can be simplified with your computer. *Personal Finance Assistant,* by Rainbow, and *Household Finance,* by Creative Software, have been best sellers.

Other home applications exist, but don't yet have as much software support as word processing, data management, and personal finance record keeping. They include time management, inventory control, and checkbook balancing. Software is also available to help figure out income taxes and keep track of stock portfolios. You may see more of these kinds of specialized applications as the software market continues to mature.

A Question Of Suitability

Are there home applications that do not translate well to computers? Yes, says Douglas Adams, president of Orbyte Software. "There are some things that you can do just as quickly and easily by hand," he says. "Take a recipe file, for example.... I don't know how useful a computer can be in the kitchen at this time."

Adams believes the Commodore 64 is capable of handling more useful home financial applications, including home budgeting, data management, and word processing.

Orbyte's data base filing system, *Comfile,* allows you to access files you have created using another program (a word processor for example), even if that software was not published by Orbyte.

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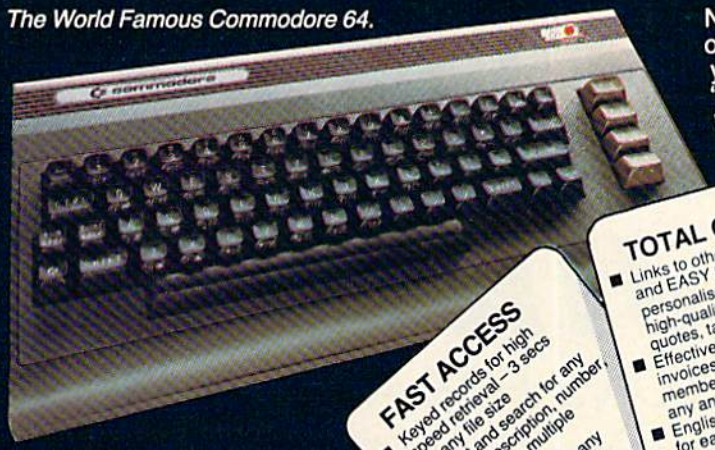

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"People are looking for versatility in home business software," says Adams. "If I can enhance another company's software with my own, that's great."

Know Your Needs Before You Buy

"The Commodore 64 owner has a lot of variety at this point in terms of software for home applications," Adams says. "But many people that are buying that kind of software don't know what the programs are about. Also, this software tends to be more expensive than games. It's very important to make sure the software you're buying will truly meet your needs."

Correction

Two software manufacturers were incorrectly identified in January HOTWARE. *Temple of Apshai* and *Crush, Crumble and Chomp* are products of Epyx Software, not HesWare. The Commodore 64 version of *Choplifter* is published by Bróderbund Software. The Commodore 64 version of *Shamus* is published by Synapse Software.

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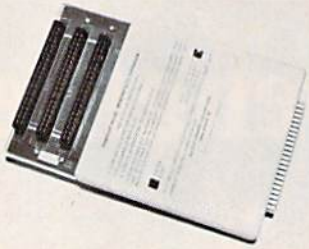

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Preventing An Input Crash

This month we'll look at a few ways to "dummy-proof" (maybe a better term is "user-proof") your programs. In other words, how do you write your programs so that other people can use them and not get error messages? How do you prevent your program from "crashing" with a fatal error?

Any program that another person will use should have "user-friendliness" built in. When you work on a program you have written yourself, you know what constraints the program has and what types of input are necessary. If you want other people to use your program, they need to be able to do so without your constant help.

The GET Statement

The most likely place for errors is when the user must enter something—when the program requires a response. You may use either the GET or INPUT statement to put information into the computer. If you allow for yes and no or multiple-choice answers requiring one keystroke instead of a typed answer as the user input, there is less chance for error. To detect which key is pressed, use GET.

Here is a sample:

```
100 PRINT "START"                    :rem 240
200 PRINT "TRY AGAIN? (Y/N)"          :rem 40
210 GET A$                           :rem 216
220 IF A$="Y" THEN 100                :rem 34
230 IF A$<>"N" THEN 210               :rem 87
```

Line 200 prints the question asking for a response. Line 210 scans the keyboard and gets a key when it is pressed. Line 220 says if the key pressed was Y, then transfer to line 100. Line 230 says if the key pressed is not N (or if no key is pressed), then go back to the GET statement, otherwise continue. You can see that only the Y or N keys are accepted.

Here is another example offering a choice of several items.

```
100 PRINT "{2 DOWN}CHOOSE:"          :rem 127
110 PRINT "1 FIRST GAME"              :rem 54
120 PRINT "2 SECOND GAME"            :rem 108
130 PRINT "3 THIRD GAME"              :rem 45
140 PRINT "4 END PROGRAM{DOWN}"      :rem 154
150 GET A$:IF A$="" THEN 150          :rem 79
160 IF A$<"1" THEN 150                 :rem 1
170 IF A$>"4" THEN 150                 :rem 7
180 ON VAL(A$) GOTO 1000,2000,3000,4000
                                     :rem 150
1000 PRINT "FIRST GAME"               :rem 52
1010 GOTO 100                        :rem 140
2000 PRINT "SECOND GAME"             :rem 105
2010 GOTO 100                        :rem 141
3000 PRINT "THIRD GAME"               :rem 41
3010 GOTO 100                        :rem 142
4000 PRINT "END PROGRAM{2 DOWN}"     :rem 166
4010 END                             :rem 156
```

Lines 100–140 print the menu screen. You could use an INPUT statement to require the user to choose a number and then press RETURN, but the user would need two keystrokes and could enter many characters other than the four numbers and cause all kinds of errors. A better approach is to use GET (line 150). Here we're scanning the keyboard for a key A$. If A$="" (that's two double quote marks with nothing between), no key has been pressed. Lines 160 and 170 indicate that the key pressed must be from 1 to 4.

Line 180 is an example of an ON-GOTO statement, which causes the program to branch depending on the value of A$. Lines 160–170 check to make sure the key pressed will be a number from 1 to 4, so the ON-GOTO statement needs four line numbers. If the value of A$ is 1, the program goes to line 1000; 2 goes to 2000; 3 goes to 3000; and 4 goes to 4000. An ON-GOTO statement is often the most efficient way to transfer control without using several IF-THEN statements. The rest of this sample program illustrates the program flow—of course, you would write actual program segments for the options.

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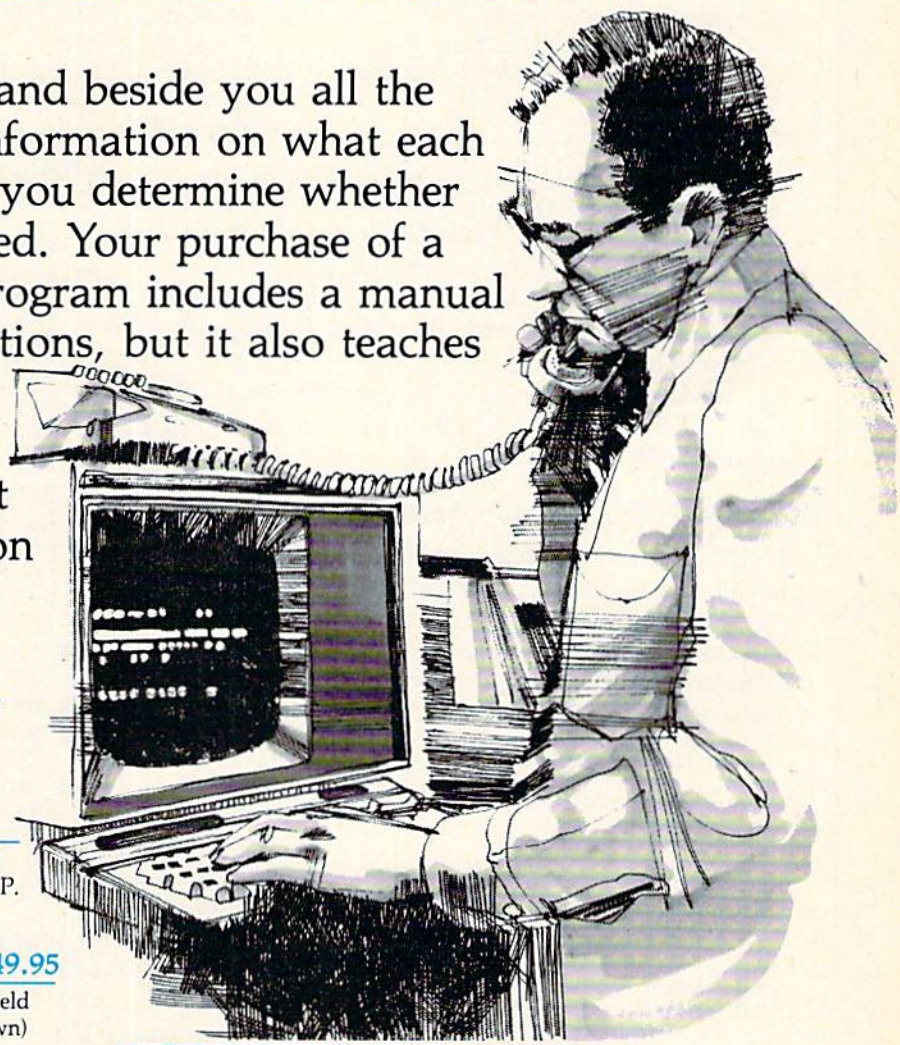

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Freezing The Program

Another use for GET is to "freeze" the program as long as the user wishes. For example, perhaps you have an instruction screen. If the user has seen the program before, he or she may wish to skip over the instruction screen quickly and not have to wait a certain amount of time. A first-time user may need plenty of time to read the screen. A GET loop can freeze the screen until the user presses a certain key. Another use may be to hold a graphics screen until the user is ready to go on. Here is a sample:

```
100 PRINT "PRINT INSTRUCTIONS HERE."
                                    :rem 246
110 PRINT "{DOWN}PRESS F1 TO CONTINUE."
                                    :rem 174
120 GET A$                          :rem 216
130 IF A$<>"{F1}" THEN 120          :rem 141
140 PRINT "{DOWN}PROGRAM WOULD CONTINUE."
                                    :rem 173
150 END                             :rem 109
```

To type line 130, press the f1 key (the top function key) between the quote marks. You will see a printed symbol. Line 120 detects the key pressed. Line 130 determines that if the key pressed is not the f1 key, the program loops back to line 120. The program will not continue until f1 is pressed.

If you are writing a game program, you can use GET to detect the function keys or arrow keys, then branch appropriately.

The INPUT Statement

INPUT is unavoidable in many cases. The INPUT statement may ask for either a number or a string. You can use a "prompt" with INPUT so the user knows exactly what to enter. PRINT a message before the INPUT value. It is also wise to ask for only one item at a time.

```
200 INPUT "NAME AND ADDRESS";N$,A$
```

may be more difficult to use than the following series of questions:

```
200 INPUT "LAST NAME";L$            :rem 102
210 INPUT "FIRST NAME";F$           :rem 181
220 INPUT "STREET ADDRESS";A$       :rem 229
230 INPUT "CITY";C$                  :rem 68
240 INPUT "STATE";S$                :rem 157
250 INPUT "ZIP CODE";Z               :rem 14
```

This program asks for exactly what is needed, one entry at a time. The first example may be unclear as to how data should be entered.

In more technical programs, you may assume some knowledge on the part of the user in inputting values for calculations. However, to avoid a fatal program crash, you may wish to check limits of numbers entered. Problems could arise with very large numbers, negative numbers, and zero (especially if fractions are involved or if there is a possible division by zero).

The following program for parallel resistance illustrates how input values can be tested. First the user is asked how many resistors there are in the calculation (only three are shown, but a number up to nine may be chosen). The GET function is used since the answer is one digit. Line 150 also makes sure the key pressed is a number from 2 to 9.

The formula for total resistance of several resistors in parallel is

$$\frac{1}{R_t} = \frac{1}{R_1} + \frac{1}{R_2} + \frac{1}{R_3} \ldots$$

Since the equation involves fractions, we need to be careful of a division by zero. Line 200 makes sure that each resistance entered is greater than zero.

At the end of the program the user is given the option to try another problem or end the program. Again, the GET function is used to see whether the user presses 1 or 2, and all other keys pressed are ignored.

```
10 REM FOR VIC DELETE LINE 20       :rem 75
20 POKE 53281,1                     :rem 241
30 PRINT "{CLR}{BLK} PARALLEL RESISTANCE
   {DOWN}"                          :rem 166
40 PRINT "{2 SPACES}{2 Y}{O}{6 Y}{O}
   {6 Y}{O}{2 Y}"                   :rem 18
50 PRINT "{4 SPACES}{G}{6 SPACES}{G}
   {6 SPACES}{G}"                   :rem 37
60 FOR I=1TO3                       :rem 218
70 PRINT "{4 SPACES}M{6 SHIFT-SPACE}M
   {6 SHIFT-SPACE}M"                :rem 31
80 PRINT "{4 SPACES}N{6 SHIFT-SPACE}N
   {6 SHIFT-SPACE}N"                :rem 35
90 PRINT "{3 SPACES}N{6 SHIFT-SPACE}N
   {6 SHIFT-SPACE}N"                :rem 36
100 PRINT"{3 SPACES}M{6 SHIFT-SPACE}M
    {6 SHIFT-SPACE}M"               :rem 73
110 NEXT I                          :rem 26
120 PRINT "{4 SPACES}{G}{6 SHIFT-SPACE}
    {G}{6 SHIFT-SPACE}{G}"    :rem 211
130 PRINT"{2 SPACES}{2 P}{L}{6 P}{L}
    {6 P}{L}{2 P}"                  :rem 185
140 PRINT "{DOWN}HOW MANY RESISTORS? ";
                                    :rem 226
150 GETA$:IF(A$<"2")+(A$>"9")THEN150
                                    :rem 109
160 PRINTA$:N=VAL(A$):T=0           :rem 226
170 FOR I=1TON                       :rem 39
180 PRINT"R"+RIGHT$(STR$(I),1)+" =";
                                    :rem 213
190 INPUT R                         :rem 124
200 IF R>0 THEN 220                 :rem 164
210 PRINT"{2 SPACES}R MUST BE GREATER":PR
    INT"{2 SPACES}THAN ZERO.{DOWN}":GOTO1
    80                               :rem 81
220 T=T+1/R                          :rem 86
230 NEXT                            :rem 212
240 PRINT "TOTAL RESISTANCE ="       :rem 25
250 PRINT 1/T                       :rem 216
260 PRINT "{2 DOWN}{GRN}PRESS:"     :rem 112
270 PRINT " 1 ANOTHER PROBLEM"      :rem 189
280 PRINT " 2 END PROGRAM"          :rem 140
```

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```
290 GETA$:IF A$="1"THEN30          :rem 82
300 IF A$<>"2"THEN 290             :rem 65
310 PRINT"{BLU}{CLR}":END          :rem 40
```

One more program is presented here to illustrate the uses of GET and INPUT. "Averages" is an educational program that instructs the user on how to calculate the average of several numbers, then random problems are given with multiple-choice answers.

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The VIC and 64 versions are essentially the same, but have different line numbers (and combined lines in the VIC version). In the 64 version, the first line (POKE 53281,1) changes to blue printing on a white screen. The VIC version combines lines to save memory, but if you have questions about program flow, the 64 version may be easier to read.

When you are typing the VIC version, leave out all unnecessary spaces. If you prefer to save typing time, you may have a copy of the program by sending me $3, a blank cassette, and a self-addressed, stamped envelope. Please be sure to specify the name of the program and which computer version. Mail to:

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See program listings on page 170.

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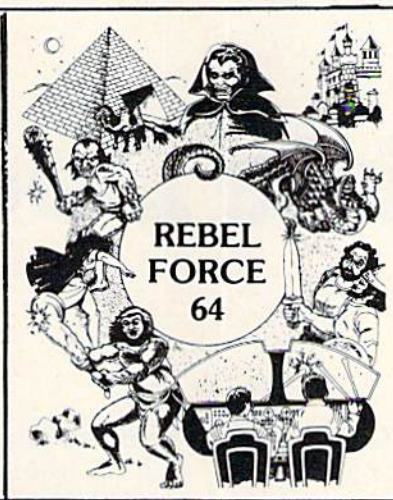

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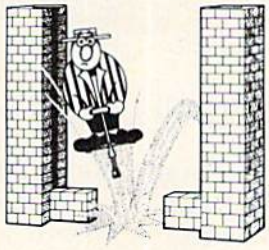

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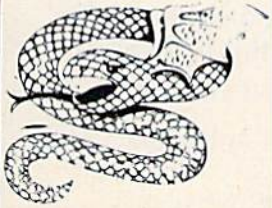

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Double Decker

The action begins. We've filled color RAM, drawn the screen borders, and set up some random enemies. Now we're ready to add some arcade action to our all-machine-language game. (The entire game we've built so far is contained in the BASIC loader, Programs 2 and 3.)

The section to be constructed this month will control the player, accepting input from the keyboard and moving a paddle back and forth on the screen. It's so fast in machine language (ML) that a delay loop has to be added so we can see the paddle move. Without this delay, the paddle simply reappears on the other side of the screen when you press a key.

Let's look at the program flow of the 64 version disassembly (Program 1); it's functionally identical to the VIC version. As always, the first thing to do is to set up some preliminary information—the equivalent of assigning values to variables in BASIC. At 49249, the first address in the program (or first *line*, if you prefer), we LoaD the Accumulator with 169 and store it at 251, a zero page location. Then, we do it again, putting 7 into 252. Recall that the 6502 chip looks at two-byte addresses in a peculiar way: the higher one in memory (at 252) is going to be multiplied by 256. Then the other one (at 251) is added to that, to give us the address we're after. So, by adding 169 to (7 × 256), we get 1961, an address within the screen RAM where we want our paddle to start off.

Printing The Paddle

Notice that we will be referring to this two-byte address pointer several times in the program: lines 49279, 49283, 49296 and so on. It will always hold the current position of the paddle on the screen. Anyway, we've set up our paddle position pointer, so now we JSR (Jump to SubRoutine) at 49345, which prints the paddle on the screen (wherever it's supposed to be, governed by what's in our pointer at 251). We load Y with 5, load A with 120 (the screen POKE value of our paddle symbol), store A using the Indirect Y addressing mode, DEY (reduce Y by one), test to see if Y is equal to zero yet (BNE), and, if not, branch back to 49349, the start of our print paddle subroutine's loop. When we've POKEd all five paddle characters into the right position on screen, we RTS (ReTurn from Subroutine).

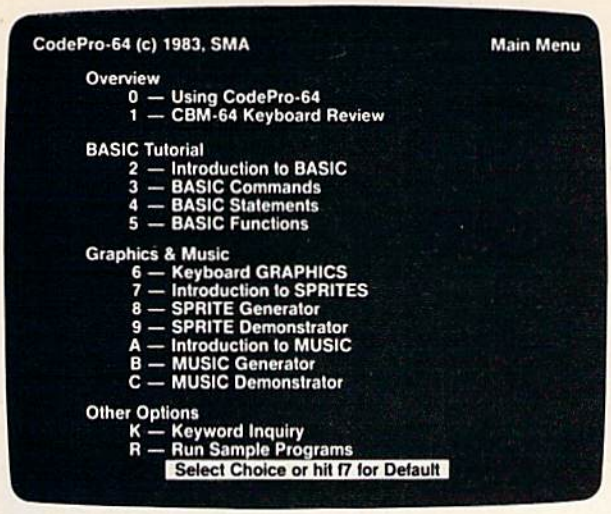
Following that RTS, we fly back to 49260, only to bounce away again to another subroutine, our delay. This is a do-nothing subroutine; it just takes up time by LoaDing the Y register with zero (line 49355), counting down with DEY, until it goes from 255 down to zero again and then we RTS. If something starts with zero and is decremented (lowered by one, like the DEY, DEX, or DEC instructions), it clicks down to a 255, then 254, and so on down. Remember that zero clicks down into 255 in these situations; it doesn't freeze at zero. We can find out when it hits zero by using BNE. BNE always branches *unless the most recent action caused a zero.* (Many instructions will alert BNE to zero: LDA 155 would set off a branch, a BNE, if address 155 contained anything other than zero.)

Which Key Pressed?

Once finished with the delay, we return to 49263 and load the accumulator with whatever number is currently in address 197. That's a special address in our computers: It always holds the value of the key currently being pressed. Try this in BASIC:

```
FOR I=1 TO 5000 : ? PEEK (197);: NEXT
```

Then press some keys. You'll notice that each key has its own value. This is an easy way to get input from the user. For our game, we're just going to have the user move a paddle back and forth so we need to test for only two direction



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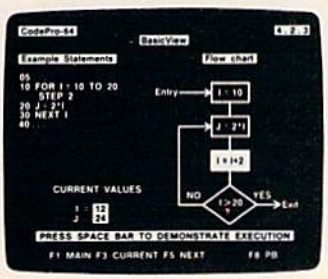

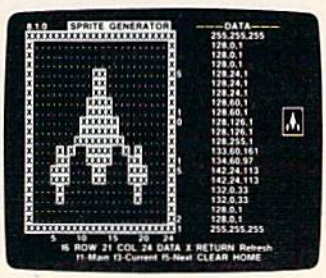

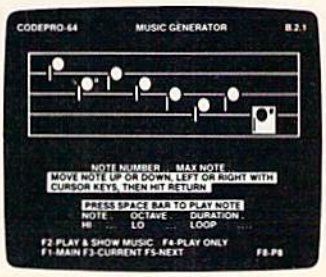

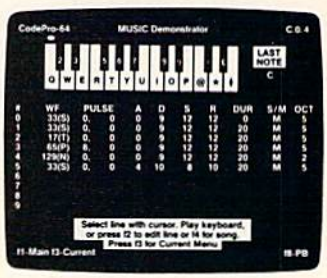

SMA SYSTEMS MANAGEMENT ASSOCIATES

Program 1: Paddle Routine

```
INITIALIZATION
49249  LDA   # 169
49251  STA   251
49253  LDA   # 7
49255  STA   252
49257  JSR   49345

MAIN LOOP
49260  JSR   49355
49263  LDA   197
49265  CMP   # 56
49267  BEQ         49279
49269  CMP   # 8
49271  BEQ         49294
49273  CMP   # 35
49275  BEQ         49361
49277  BNE         49260

GO LEFT?
49279  DEC   251
49281  LDY   # 0
49283  LDA ( 251 )Y
49285  CMP   # 32
49287  BEQ         49305
49289  INC   251
49291  JMP    --->   49260

GO RIGHT?
49294  LDY   # 7
49296  LDA ( 251 )Y
49298  CMP   # 32
49300  BEQ         49327
49302  JMP    --->   49260

MOVE LEFT
49305  INC   251
49307  LDY   # 6
49309  LDA   # 32
49311  STA ( 251 )Y
49313  LDA   251
49315  BNE         49319
49317  DEC   252
49319  DEC   251
49321  JSR   49345
49324  JMP    --->   49260

MOVE RIGHT
49327  LDY   # 0
49329  LDA   # 32
49331  STA ( 251 )Y
49333  INC   251
49335  BNE         49339
49337  INC   252
49339  JSR   49345
49342  JMP    --->   49260

DRAW PADDLE
49345  LDY   # 5
49347  LDA   # 120
49349  STA ( 251 )Y
49351  DEY
49352  BNE         49349
49354  RTS

DELAY
49355  LDY   # 0
49357  DEY
49358  BNE         49357
49360  RTS
49361  RTS
```

keys. Let's use the 1 and 3 keys, for left and right movement. Try pressing 1. You'll see 56's on screen. (VIC gives 0.) Press 3 and you'll get 8's. (VIC gives 1.)

Since this is an all-ML game, we'll need a way to get out of it, to return to BASIC. For that, we'll use the 0 key as an escape. When you press it, you'll get 35 as your value. So, lines 49265 through 49275 simply compare what we found in address 197 against 56, 8, and 35 and branch to the appropriate subroutines further down in the program. If we got some other value, line 49277 sends us up to another delay and then another try for a pressed key.

All of this multiple comparing should remind you of the ON-GOTO command in BASIC. This is ML's version of that common computer technique for branching to several alternative actions.

To move the paddle left (the routine starting at 49279), we've got to first check to see if we *can* move any further left. Obviously, we don't want to move the paddle into the border of our screen and come popping out the other side. So we DEC 251 temporarily, to check if the next character to the left of our paddle is a blank (character #32). If not, it must be a wall, so we're sent back to our get-a-keystroke routine at 49260.

However, if we find a blank, we can go ahead and redraw the paddle one space to the left of its current position. So, at 49305, we INC the pointer to restore it to its correct value. (Recall that we DECed it to check for a blank.) Then we want to blank out the paddle character six over from the current address (to get rid of the rightmost paddle character). Load Y with #6, load A with the blank character, #32, and store A.

These next four lines are an important ML technique: double DEC. We need to lower our pointer address by 1 because we're sliding the whole paddle over 1 to the left on screen. We can't just DEC 151 because we might be crossing a page boundary (256) and need to *also lower 152*, the more significant byte of the two-byte pointer. Remember that we said LDA would affect a BNE instruction? We LDA the lower, less significant byte. If it's a zero, we "fall through" the BNE to address 49317 and also lower 252. If not zero, we branch to 49319 and just lower 151. Notice that

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That's what we said when our new "invention" solved all our VIC-20™ and Commodore-64™ programming problems

We had a problem. So we invented PC-DocuMate™ to solve it. The problem was how to quickly master the VIC-20 and CBM-64 keyboards and easily start programming in BASIC on our new personal computers. First we went through the manuals.

INCONVENIENT MANUALS

The user's guide was a nuisance and the programmer's reference manual was just plain inconvenient to use. We found the control key combinations confusing and the introduction to BASIC to be too "basic" for our needs. We needed a simple solution to our documentation problems.

So we decided to surround the keyboard of each PC with the information we wanted. We decided to print whatever we needed on sturdy **plastic templates** which would fit the keyboard of either the VIC-20 or Commodore 64.

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This was the simple solution to our problem. Now we could have the essential information right at our fingertips.

On the left side and top of the templates we put **BASIC** functions, commands, and statements. On the lower left we used **key symbols** to remind us of how to use SHIFT, RUN/STOP, CTRL and the "Commodore" key. Over on the bottom right side we put some additional keys to help remember about CLR/HOME and RESTORE. But we were still a little confused.

STILL CONFUSED

We found we were confused about music programming, color graphics, and sprites. On both the VIC-20 and the CBM-64 templates we carefully organized and summarized the essential reference data for **music** programming and put it across the top—showing notes and the scale. All those values you must POKE and where to POKE them are listed.

Then to clarify **color graphics** we laid out screen memory maps showing character and color addresses in a screen matrix. (We got this idea from the manuals.)

For the VIC-20 we added a complete memory address map for documenting where everything is in an expanded or unexpanded VIC.

For the Commodore 64 we came up with a really clever summary table for showing almost everything you ever need to know for **sprite** graphics.

GETTING EASIER

Now we had organized the most essential information for our VIC and 64 in the most logical way. BASIC, music, color graphics, and sprites all seemed a lot easier. Our initial problem was solved by PC-DocuMate™.

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falling through the BNE has the effect of lowering both bytes. Finally, we JSR to the paddle drawing routine and then JMP (jump) back up to our main loop of the program.

The method for redrawing the paddle to the right is quite similar, the primary distinction being a double increment instead of double DEC (see lines 49333 through 49337).

If you have any comments or questions, please send them to: Machine Language For Beginners, P.O. Box 5406, Greensboro, NC 27403.

ML Mailbag

Here's a letter we recently received:

> *In your article "Safe Places" (December 1983), you were starting an ML game. And you started at address 12288 with the 8K expansion. I have VICMON which is on tape and so I need the 8K for it. Is there another place to put this game? I was thinking of putting it in the cassette buffer starting at 828.*
>
> *Jeff Cutcher*

VIC memory can be a problem. You might want to use the Simple Assembler (November 1983) in a VIC with 8K expansion memory to create this ML game. Shorter ML routines can be stashed away into the cassette buffer if you aren't using the cassette drive at the time. However, the ML game has outgrown the space available in this buffer with the addition of this month's paddle routines.

To summarize, both VIC and 64 have a few safe zones in zero page: address 2 is unused by the computer, addresses 163–177 are largely used by the cassette operating system and can be employed when you're not using cassette, and 251–252 are free (we're using them this month to hold our paddle pointer).

Above zero page, you can use 679–767 and 828–1019 (the cassette buffer). On the 64 only, there is a nice zone from 49152–53247. To make enough space for the game on the VIC, we first POKE 56,48 (to keep BASIC below this area) and then can use addresses 12288 and above.

See program listings on page 172.

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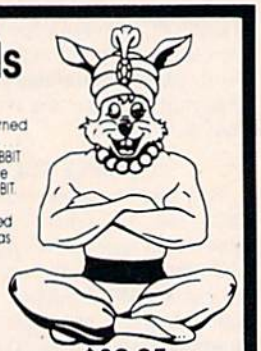

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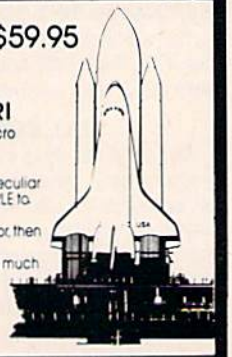

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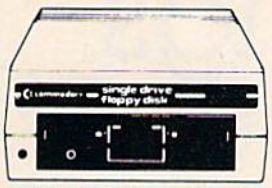

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Making More Readable Listings

Brent Dubach

Have you ever tried to find a key subroutine or loop in a long BASIC listing? If you have, you know how tedious it can be. This tutorial demonstrates some very sneaky BASIC editing techniques that you can use for more readable listings. For the VIC and 64.

A few carefully chosen variable names can help make the difference between a readable program and an unintelligible mess. But BASIC does not make these choices easy. Did you ever want to use a BASIC keyword like TO or FN within a variable name, such as LET TOP = 10 or PRINT FN$?

Commodore BASIC won't allow it. But by fooling a couple of BASIC routines, you can use these illegal variable names and do even more to improve the appearance of your listings. Let's see how to use this technique and then consider what makes it work.

Illegal Variable Names

The key is to use graphics characters where they normally don't belong. You're probably used to using a graphics character as the last character in the abbreviation of a BASIC keyword. For example, if you type a P followed by a SHIFTed O, BASIC understands that you intend an ordinary POKE command. But let's see how BASIC will handle a graphics character in the middle of a variable name.

```
10 LET NJUMBER = 50
20 PRINT NJUMBER
```

To get the graphics character between N and U, type a SHIFTed J. You can use any graphics character that will not result in an abbreviation of a BASIC keyword. (For example, an N and a *SHIFT*ed E combine to form the keyword NEXT.)

Now LIST the program

```
10 LET NUMBER = 50
20 PRINT NUMBER
```

and RUN it.

```
50
READY.
```

Nothing too impressive here. All we have is a program that LISTs and RUNs exactly as it would if we left out the graphics characters. Now let's do something that is downright illegal.

```
10 LET TOP = 65
20 LET BOTTOM = 90
30 PRINT BOTTOM - TOP + 1
```

If you enter and RUN this program, you'll get a syntax error. The sequence *TO* may not appear anywhere within a variable name as it does here in *TO*P and in BOT*TO*M. It is reserved for use as a BASIC keyword only (as in FOR J = 1 TO 5).

Let's try to fool BASIC. We'll place a graphics character (the SHIFTed J) just before the offending last character that completes the BASIC keyword—that is, before the O in each TO.

```
10 LET TJOP = 65
20 LET BOTTJOM = 90
30 PRINT BOTTJOM - TJOP + 1
```

Here's what you see when you LIST it:

```
10 LET TOP = 65
20 LET BOTTOM = 90
30 PRINT BOTTOM - TOP + 1
```

These lines appear identical to the illegal program you entered a moment ago. Now RUN the program:

```
26
READY.
```

It works, with an illegal variable name in every

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Those icons, - you know, like the Apple Lisa - are a lot of fun. I also like the menus, function keys, highlights, help tables - great for a newcomer like me. And with the many options there isn't a computer I can't talk to.

What's really neat is that Softlaw has a whole VIP Library of interactive programs, including a word processor, spreadsheet and database, which will be out soon. Sis promised me the whole set for my birthday.

I see by the built-in "old clock" on the screen that long-distance rates are down. Got to call that L.A. B B S. Yep, there goes the alarm. Later.

- Lone

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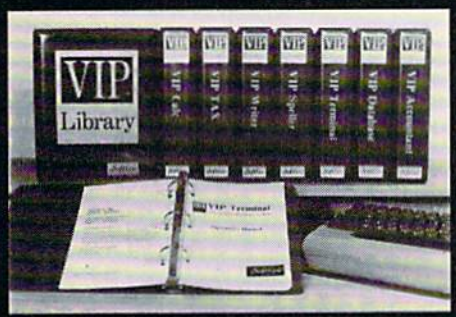

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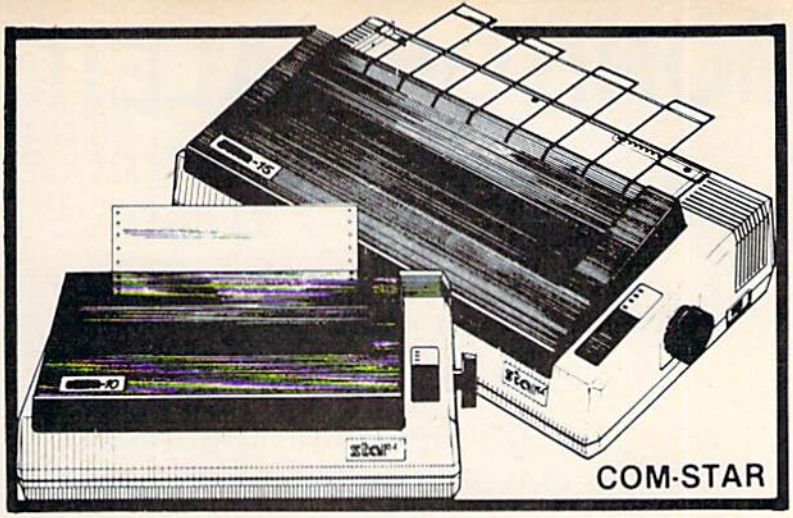

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line. Try it with LETTER, FN$, EFFORT, SEND, or your own favorite forbidden variable name.

A word of caution, though. ST, TI, and TI$ are *reserved variable names*, not *keywords* like LET, PRINT, and other BASIC commands or functions. You will not be able to use variable names whose first two letters match these (like START or TIME) even with the technique described in this article. Since they are just variable names, however, you may embed them elsewhere within longer names of your own (FIRST and ATTIC, for example) without any special editing tricks.

Indented Listings And Blank Lines

Besides preventing the selection of certain variable names, BASIC also seems to prevent the entry of blank lines as well as spaces at the beginning of a line. Thus we cannot neatly frame the blocks of code—loops, or IF/THEN options, or subroutines—that occur in a program. If you have programmed only in BASIC, you may not be concerned about such things. But anyone who has used a structured language like Pascal appreciates being able to see a listing like this:

```
10 FOR I = 1 TO 10
20    PRINT "WE INDENT EVERY STATEMENT"
30    PRINT "THAT LIES WITHIN"
40    PRINT "THE FOR-NEXT 'BLOCK'"
50 NEXT I
60
70 PRINT "AND LEAVE A BLANK LINE BETWEEN
   BLOCKS"
```

Try entering and LISTing the program above. Here's what you should see:

```
10 FOR I = 1 TO 10
20 PRINT "WE INDENT EVERY STATEMENT"
30 PRINT "THAT LIES WITHIN"
40 PRINT "THE FOR-NEXT 'BLOCK'"
50 NEXT I
70 PRINT "AND LEAVE A BLANK LINE BETWEEN
   {SPACE}BLOCKS"
```

The blank line and all the indentations have disappeared. Of course, Commodore BASIC lets you place a single colon at the start of each line and then indent as much as you wish. But that's not the same as a nice, clean blank line.

Once again, we can type an extra graphics character and fool BASIC. When typing in a program, many people type a space after the line number for readability. But instead of the space, you can type the SHIFTed J. Reenter the preceding program this way:

```
10JFOR I= 1 TO 10
20J   PRINT "WE INDENT EVERY STATEMENT"
30J   PRINT "THAT LIES WITHIN"
40J   PRINT "THE FOR-NEXT 'BLOCK'"
50JNEXT I
```

Now when you LIST, you see an indented format identical to the one you first tried to enter.

Fooling BASIC into giving you a blank line is a little trickier. A single SHIFTed J will not do the job. If you add a line 99, say, to your program and put only the graphics character on that line, line 99 will not show up in the LISTing. But try entering this (note the space in between the two SHIFTed Js):

```
99 J J
```

Now LIST the program and you'll see a blank line 99.

Paying The Price

There is a price to pay for all this. The most obvious (and painful for those with unexpanded VICs) is memory consumption. Long variable names and indentation gobble up a lot of bytes. A final version of a routine, though, can be condensed by a good list-crunching program, while the original remains a very readable version for later examination or revision.

Another penalty is simply the bother of remembering to type extra characters. Be careful whenever you try to edit a line. To preserve any indentation, you must enter a SHIFTed J in place of the space following the line number each time you change the line. And it's easy to forget to "legalize" a variable name by inserting a graphics character within an embedded BASIC keyword. If you do forget, you will be reminded when you get a syntax error in the program. So watch your editing steps carefully.

The hunt-and-peck typist (with a large hunt-to-peck ratio) might find that all these extra characters are a nuisance. But a little irritation can lead to a lot of satisfaction when you get a more readable program listing.

How Does It Work?

There are BASIC routines that RUN and LIST a program. If you've experimented with the short listings here, or with your own, you have proved to yourself that RUN apparently doesn't mind using keywords in variable names, and LIST seems to accept leading spaces in indented lines. If these key routines are so tolerant, what is it that requires us to be so sneaky in achieving them? The answers lie in the behavior of several other parts of BASIC.

Are They Really Illegal?

First, let's consider illegal variables and a BASIC routine we'll call TOKENIZE.

We usually think of BASIC commands as words like INPUT or LET or GOTO. But the RUN

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routine does not see it that way. By the time RUN sees a program, BASIC keywords have been replaced by single-byte numeric codes, or *tokens*. TOKENIZE is the part of BASIC that translates the keywords we type into these codes. For example, when we type the word INPUT, TOKENIZE will collect the characters in that word from the five bytes of memory they occupy, match them with a word in the computer's list of BASIC keywords, and then replace them with the token for INPUT (the number 133), which takes up only one byte. This saves some space in BASIC memory.

But TOKENIZE also discards any out-of-place graphics characters as it crunches a BASIC command into the computer's memory. This is what allows us to enter forbidden variable names. When we insert a graphics character (like the SHIFTed J) in the middle of what would otherwise be a keyword, imagine how TOKENIZE must react. Does it ever find the word INPUT? Not quite. As it is collecting characters, it is interrupted before finding a perfect match with the BASIC word INPUT. The match is a failure, but the character which foiled it is eventually discarded. When RUN gets at the program, it now finds a plain INPUT (five bytes worth) instead of the single-byte token that represents the INPUT command. Any such character string is treated as a variable name.

Our illegal variable names, then, are not illegal at all. We just have to be sneaky enough in entering and editing them to prevent TOKENIZE from doing its job.

Finding The Right Routine

And what of the graphics character used at the beginning of an indented line?

TOKENIZE is involved again, this time because it does just what we want done: It keeps spaces right where we put them. Some other parts of BASIC use a routine that discards spaces. One of these is the part that translates the characters in a line number we type into the numeric form in which it is stored. Try leaving a space between two digits in a line number. No problem—the spaces are discarded and the line number appears in a listing just as if you had not inserted them.

BASIC continues to throw away spaces until a nondigit character which eliminates all indented lines is found. The rest of the line is turned over to the TOKENIZE routine. But by then it is too late: All indentations have already been stripped.

Our strategy must be to place a character immediately after the line number so that the following spaces will be handled by the right routine for our purposes—by TOKENIZE. A graphics character, first recognized as a nondigit character in the collection of a line number and then neatly discarded by TOKENIZE, is the perfect choice.

Guarding The Blanks

Finally, you may recall that in order to create a line completely blank except for its number, we needed first a graphics character, then a space, then a second graphics character. The reason for the first was just discussed. We need the space so there will be something on the line for TOKENIZE to accept. Remember that entering a completely blank line just results in its elimination from the program. But what of the second graphics character? If TOKENIZE doesn't mind spaces, why shouldn't it accept a whole line full of them following the initial graphics character?

In the first place, we probably want only one space—just enough to create a blank line. And second, TOKENIZE never gets to look at those trailing spaces anyway. The very first part of BASIC involved in handling a new line, the part that collects characters off the screen, discards these spaces. Both graphics characters are needed to protect lone blanks from the space-killing habits of a couple of parts of BASIC. If you want blank lines with a lot of spaces, though, there is no reason why you couldn't enter one with, say, 70 of them. Just be sure they have graphics "bodyguards" on either end.

A Do-Nothing Program

It has been said that no programming language can prevent the writing of bad programs. To prove that this is also true of editing tricks designed to promote readable listings, type in the following program. It's not good for much except sneaky-editing practice—and perhaps confounding a few BASIC programming friends with the fact it runs without error.

```
100 LET BEGINNING = 1
110 LET END = 10
120
130 FOR POSITION = BEGINNING TO END
140   INPUT NOTHING
150   PRINT NOTHING
160   GET NOTHING
170 NEXT POSITION
180
199 END
```


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Part 5: Questions And Answers

Charles Brannon, Program Editor

In the conclusion of this series, we answer several common questions about disk drives and disk files.

Q: Can you use CMD with disk files?

A: Yes. CMD is used to divert output from the screen to another device. It is usually used with a printer to make listings (OPEN 4,4:CMD4:LIST). After a CMD, everything that would go to the screen ends up going to the device you OPENed. For example, a series of PRINTs can be sent either to the screen or to the printer with CMD.

Many people don't know that CMD has the same syntax as PRINT#. For example, you can use:

```
CMD 4,"THIS IS A MESSAGE"
```

CMD 4 by itself will, therefore, send a blank line, as well as direct output away from the screen. If you have a disk file opened for writing, you can use CMD to have all PRINT statements write to this file. Just remember that the blank line put out by CMD will give you problems if you try to read the file with INPUT#.

To cancel a CMD (highly recommended before you CLOSE a file), use PRINT#, as in PRINT#4:CLOSE 4. This also insures that every last drop of your file is written out.

Q: What do I do if a program crashes and the red "busy" light is still on?

A: Be careful. The program may have OPENed a file for writing. You need to properly CLOSE the file to prevent a bad directory entry. Use this one line to make sure all files are closed:

```
CLOSE 15:OPEN 15,8,15:CLOSE 15
```

Be aware that OPENing or CLOSEing the command channel will disrupt any OPEN files, forcing them CLOSEd.

If a file isn't closed properly, it appears on the directory with an asterisk next to the filename. To clear it up, enter:

```
OPEN 15,8,15,"V":CLOSE 15
```

Do not attempt to scratch such a file.

Q: Why can't I read my friend's disk on my 1541?

A: Even though Commodore drives 4040, 1540, and 1541 are supposed to be read/write compatible, differences exist. First, most drives deviate from the ideal speed of 300 RPM (revolutions per minute). Depending on the extent of the deviation, this can cause either trivial problems, such as a retry (the head attempts to reread a sector that it

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couldn't read on the first try), or it can make a disk totally unreadable.

A sector on a disk can hold 256 bytes, and has a finite area on the disk's surface. The head has to be synchronized with the speed of the disk in order to write to a selected sector. It is aided in this by timing information written to the disk when it was formatted (NEWed). The physical area of a sector is determined by the speed at which the disk turns.

If the disk turns faster than it should, the data overflows the sector, overwriting nearby sectors and the timing data. If the disk turns too slowly, it does not fill up the sector. The data may also be written too compactly to be readable.

You may not notice if your drive is too fast or too slow, since the speed at which it reads or writes usually matches the speed at which the disk was formatted. "Fast" and "slow" are relative to individual drives, not to 300 RPM.

A fast drive may miss the more compact information written by a slower drive. It goes so fast the slower data is seen as a "blur." The faster drive may also have trouble writing to the disk, since the timing (formatting) information is similarly compacted. If you do manage to write to the slow-formatted disk, the faster drive cannot squeeze its information into the sectors created on the slower drives. In the worst case, the faster drive overwrites the timing information, making one or more sectors totally unreadable on either drive.

Now, if you bring a disk formatted on a fast drive to a slower drive, things aren't as bad. The slower drive can easily read the longer sectors created by the fast drive. When it writes to the disk, it just doesn't use all the physical space allocated by the fast drive. But when you bring the disk back to the fast drive, it may not be able to read the sectors written by the slower drive.

There are other potential variations, such as head alignment and DOS versions. In theory, most Commodore drives should be compatible, but beware of the variations. It's always safe to try to *read* any disk on any drive, but beware of writing. If you're not sure, try to write with your friend's drive on a disk formatted on your drive. Then try out the file on your drive again. This way, you can confirm if disk-swapping is safe for both of you.

Q: How many files can I have OPEN at once?

A: The operating system (OS) permits you to have up to ten files open simultaneously. However, each file must use a different disk buffer in the OPEN statement. The disk buffer is internal to the disk drive, and accumulates data until it holds a block (256 bytes) of data. The buffer then transfers data to a disk sector (in a write operation) or to the computer (for reading).

The OPEN command specifies the disk buffer to be used as the secondary address:

OPEN *filenum,devnum,buffer*

filenum – File number used in INPUT#, GET#, PRINT#, and CLOSE commands.
devnum – Hardware device number (8 for a single disk drive)
buffer – A secondary address from 2–14 specifying which buffer to use. Buffer number 1 is reserved for program saves and loads. Secondary address 15 is reserved for the command channel.

If you have more than one disk file open simultaneously, each file must use a unique buffer, or data will become garbled.

Q: How do I make a backup copy of a disk?

A: It's important to make a backup copy of commercial software. That way, you can use the copy, and store the original in a safe place. If anything goes wrong, you can just make another working copy. Unfortunately, most software is copy-protected, to prevent illegitimate copies from being made.

Even if the software isn't protected, there are no built-in commands to copy an entire disk. It's easy enough to LOAD, then reSAVE BASIC programs, but machine language programs, sequential data files, relative files, and mysterious USR files are far more difficult. Your best bet is to use a backup program. For your convenience, we have reprinted Harvey Herman's single drive backup program. It works on both an expanded VIC and the 64.

See program listing on page 163.

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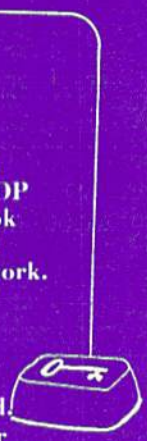

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The Inner World Of Computers

Part 5: Small Is Beautiful

Tom Prendergast

In this final installment, an old programming trick is combined with the new skills developed in the previous four installments. The author includes a powerful technique that demonstrates how so much can be achieved in one of the smallest computers—the VIC-20.

I think the VIC-20 is the greatest thing since ELFS (the tiny ELectronic FingerS that toggle the even tinier bit-switches inside your computer). It's inexpensive, easy to use, and fantastic for games and graphics.

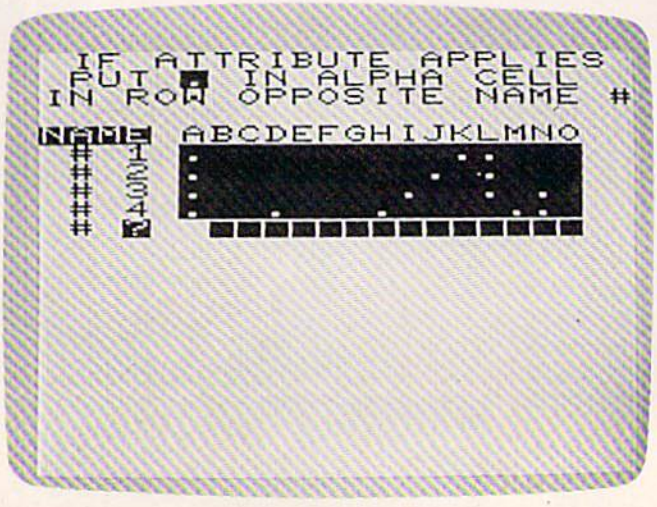
The VIC does have its limits, though. For one thing, the large screen characters and short lines (22 characters across) make word processing an awkward task. A few lines on a typewritten page fill up the VIC screen.

Another handicap is the small amount of memory. You get only 3583 bytes on the unexpanded VIC. This is still a couple of thousand more bytes than the fabled Univac and ENIAC—the big mainframes of 30 and 40 years ago that filled up whole buildings and brought on the age of computing. But unless you're sentimental about such things, you're not going to be happy for long with only 3.5K of memory.

After I'd run out of memory on too many programs that I considered very small, I bought a Super Expander. Not only does this cartridge make it easy to do HIRES (HIgh RESolution graphics) by adding commands like DRAW, PAINT, POINT, and CIRCLE, but Commodore also adds another 3K of memory to give you a total of 6519 RAM bytes.

But despite its shortcomings, the VIC is a powerful computer. Big isn't necessarily better, and you can't always measure a program's value by its length alone. There are few things that you can do on expensive machines that you can't do on a VIC. It takes some doing, maybe, and it may not be as easy, but it can be done.

If you counted every letter of every word on this page, including spaces, you'd find there were about 6000. That's 6000 bytes (every letter or space uses a byte of memory)—not counting pointers



"Binamite" gives you several options for displaying data. Here the information is shown in the table format.

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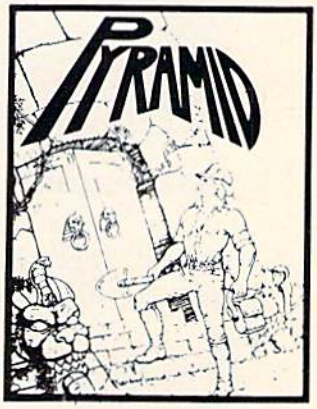

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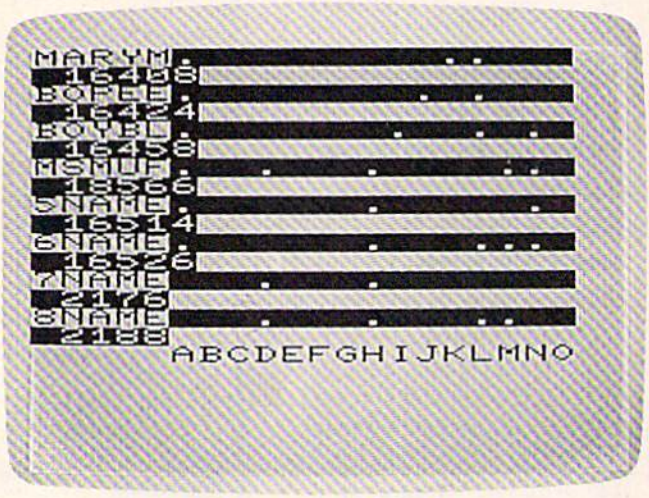
and such—just to store this page in RAM. That's a lot more memory than you have on the unexpanded VIC. How can you even begin to process that much data?

You could feed the data in from tape a few bytes at a time, I suppose, process it, and then pull in some more data. But that would take a lot of time and tape. You'd also be using up most of your memory for tape handling and "overhead." So what can you do?

For an answer, let's look back at the small memories on the early mainframes. One reason for those small memories was the cost—something like $10 a bit (not a byte, a bit). This meant it often was cheaper to pay people to file things manually rather than to use expensive computer memory to store it. So, early on, a technique called *bit indexing* was developed, in which one bit did the work of a byte—or even hundreds of bytes.

Computers have added a lot of memory since then, but the basic way a computer works hasn't



Creating a data table with "Binamite."

changed. That's why this old trick works as well today as it did then.

Bit indexing is a kind of shorthand, with each bit representing some unit of information, like a name on a list. If the bit is turned on, that name is on the list. And since we already have our list on paper, why not keep it on that same piece of paper and use a form of bit indexing to process it on the VIC. By doing this, we can handle the equivalent of thousands of bytes of data without eating up precious memory.

This isn't a big deal so long as the data we want to process is in an organized list already and we just have to write some numbers beside the items on the list.

Let's say you're in the mail order business and want to send catalogs or a special mailing to customers, but you want to rank them by the amount of money spent with you, by credit rating, your best customers. You have a list of all your and so on. You probably have all the information you need in the customer file, along with the amounts billed and to be collected (accounts receivable). Of course, you don't want to disturb that file, but going through it can tell you what items your customers usually order, their frequency of ordering, and how fast they pay or don't pay.

The files are probably in alphabetical order. Later on, you can arrange the list for mailing by zip code or some other way, but to demonstrate the program we're using, "Binamite," let's just take the first 15 names out of the file, write them on a sheet of paper, and number them. (Remember, by using paper instead of the computer, we save a byte for every letter.)

1. Mary Contrary
2. Mary Lamb
3. Little Boy Blue
4. Ms Muffit
5. Fifth Name
6. Sixth Name
7. Seventh Name

and so on until we have 14 names.

Next, we want to know the type of items they've bought, so we'll know what to put in our catalog. Let's call these items "attributes" and assign letters of the alphabet as labels, like this:

A) Sports Clothing
B) Bats and Balls
C) Caps
D) Down-Filled Jackets
E) Extra-Large Sizes
F) Feminine Finery
G) 10-Gallon Hats
H) Helmets
I) Insulated Boots
J) Junior Sizes
K) Skis
L) Lambswool Jackets
M) Muffs
N) Notions
O) Ozoneware

These can be any length since we're keeping them on paper instead of in VIC memory. They don't have to match the letters alphabetically, either: B doesn't have to stand for Bats and Balls, or C for Caps. It just makes it easier to remember what letters we've assigned to what items when we ask Binamite later to match them against the names on the list.

Now, with all the paperwork out of the way, let's build the program up bit by bit.

As you might expect from the name, Binamite works on a binary system. You may remember a short program in last month's installment that

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converted binary numbers (1's and 0's) to decimal. That program was an exercise for this month's program, because we're using basically the same algorithm for Binamite.

In last month's program, we input the binary digits in that conversion program as a *string* instead of a number. Ordinarily, the computer can't use a string to do arithmetic because the digits are seen as characters, not as numbers.

However, if you ask for the VALue of a string, the computer will start from the left and convert the string digits to a number. (If it finds a letter or a graphic that's not a number, it stops.) Suppose you have a string like this:

```
B$="101B"
```

If you ask the computer for the VALue of B$, you'll get this:

```
? VAL(B$)
  101  [the letter B is ignored]
```

We still have to convert the binary, because the computer treats that 101 as a decimal number 101, not as a binary 5. So we use the MID$ function to extract one digit at a time and multiply the VALue of the 1 or 0 by its power of two. All of the place values are then added together to get the decimal equivalent of the binary string, B$:

```
MID$(B$,1,1)="1"
MID$(B$,2,1)="0"
MID$(B$,3,1)="1"

Place power: 2↑2   2↑1   2↑0
        B$:  1     0     1

1*2↑2=4  (1 multiplied by the second power of 2)
0*2↑1=0  (0 multiplied by the first power of 2)
1*2↑0=1  (1 multiplied by the zero power of 2)
4+0+1=5
```

In the program, we use a FOR/NEXT loop for MID$ manipulation and multiplication of the powers.

To give you some hands-on experience this month, we will take you through the creation of a program step by step. So we're going to type in just the bare bones of the program at first, and explain each line's function as we go. Some of these lines will be out of order as we type them in, but the VIC will automatically rearrange them in the proper numeric order.

Here's the first line to type in:

```
110 PRINT"{RVS}NAME{RVS}ABCDEFGHIJKLMNO"
```

The letters ABCD...up to O identify the columns for the "alpha cells" (rows of little boxes), which correspond to our list of attributes. By processing these cells instead of long data strings, Binamite saves you lots of memory. Each name has a row of alpha cells, and when we INPUT a dot—one byte—into a cell, we attach that column's attribute A, or B, or whatever, to the name. (Rows read across, columns read down.) The arrangement will become clear after we've typed in the necessary lines for a trial run.

Line 120 is where we INPUT the dots (periods) to fill the alpha cells. We skip a cell, leaving it empty (no attribute), with the space bar. We can also delete a dot with the delete key, or go back and fill in a dot with the cursor left key.

Line 120 is probably the trickiest line in the whole program because we have to first print a row of alpha cells (using 15 shifted L graphics), then bring the cursor left 17 places so that it will be flashing and ready for INPUT at the first alpha cell (Column A).

```
120 INPUT" #{3 SPACES}{RVS}LLLLLLLLLLLLL
    L{17 LEFT}";B$:L=LEN(B$)
```

Now we get to the real meat of the program—converting the string of dots we've just INPUT, B$, to binary, then to a decimal VALue we can AND later:

```
130 XP=L-1:FOR I=1 TO L:DM$=MID$(B$,I,1):
    IF DM$ > "1"THEN PRINT "{UP}":DM$="":
    GOTO 120
```

Note that we've created a temporary *holding string*, DM$, in line 130. This makes DM$ the equivalent of MID$(B$,I,1)—that is, one digit of binary string B$, in place I, whatever I is at the moment—and saves us line space because we don't have to keep typing "MID$(B$,I,1)" all the time. That's DM$'s only function—a temporary string.

If you input anything but a period or a space, the IF throws you back to INPUT (line 120).

```
140 IF DM$="." THEN DM$="1"
```

Line 140 converts a dot (period) to the binary digit 1. Skipping a cell, or wiping out a dot (with the space bar or delete key), gives the empty space a value of zero, the binary digit 0.

```
150 D=D+(VAL(DM$))*2↑XP:XP=XP-1:NEXT
```

Line 150 multiplies each binary digit by the power of its place, then adds all the place values together for a decimal value given to D.

When the FOR/NEXT loop is completed, we GOSUB 300 in line 160 to deposit the row value into an array, then line 170 sends us back to line 120 to process another row:

```
160 GOSUB 300:T=T+1
170 PRINT"{UP}"TAB(2)T:B$="":D=0:IFT<TT T
    HEN 120
```

When we've completed our input to the alpha cells—assigning the attributes—line 240 will give us a number which we jot down beside each name on our list. With this encoded number, later we can analyze our list of names almost any way we want.

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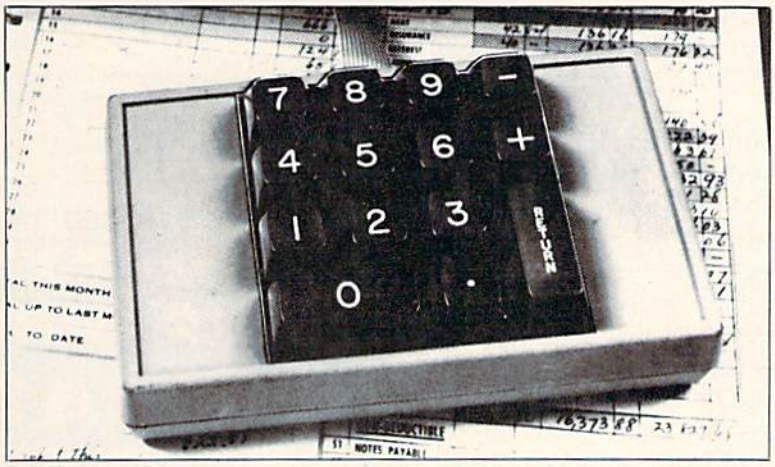

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```
240 FOR I=0 TO TT:PRINT"#"I+1"{3 SPACES}"
    D(I):NEXT
```

We're almost finished with our stripped-down version of the program except for typing in line 10:

```
10 PRINT CHR$(147):TT=14:DIM D(TT),B$(TT)
```

But don't forget our GOSUB. Notice that we've got to fence off our GOSUB routine from the rest of the program so that the VIC won't run into it and generate an UNDEF'D STATEMENT ERROR. So, actually, line 260, with its END, is part of GOSUB 300:

```
260 END:REM*SAVE DATA*
300 B$(T)=B$:D(T)=D
310 IF LEN(B$(T))<15 THEN B$(T)=LEFT$("
    {15 SPACES}",15-LEN(B$(T)))+B$(T)
320 RETURN
```

Now let's LIST what we've done and check the screen for obvious errors. If you don't spot any bugs, let's do a RUN.

Does the VIC display look anything like the photo on page 110? If it doesn't, LIST line 120 and check all the cursor moves to make sure you've got them in the right place.

You can use this stripped-down version to practice your dot input. Just be sure you're at the very end of the line—but not past column O—before you hit RETURN. If you don't, you'll land back at cell A to try again.

Other than that, Binamite is easy to work, once you're familiar with it.

When you're comfortable with your trial run, type in the complete program. Lines 10 and 240 are different, but you've got the hard part out of the way.

The beauty of Binamite is its flexibility. You can plug almost any kind of data into it to produce various graphic relationships between persons and items. For instance, if we want to find out the most popular item among our list of best customers, we can quickly spot it by noting the column with the most dots.

Binamite isn't very impressive right now because we're only processing a list of 14 names. After you get the hang of it, though, you can easily process hundreds of items—as many strings as you can squeeze into VIC memory. (I've been able to process as many as 500 items with the Super Expander's extra 3K of memory, by abbreviating the names to five characters plus the encoded number, making a maximum of ten characters per string.)

And you're not limited to names for your list processing, either. You could use the name column for items and the attitribute columns for a range of prices, for instance. The A attribute column could be a range of wholesale prices from $1 to $5, the B column a range from $6 to $10, and so on.

Or you could use Binamite to keep track of the books in your library. The name column would be the title of the book, and the letter column the book's location—on shelves A, B, C, in bookcase D downstairs.

See program listing on page 163.

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ASCII/POKE Printer
For VIC And 64

Todd Heimarck, Assistant Editor

This month's "Power BASIC"—a continuing series of helpful utilities and routines—provides a short machine language routine that automatically calculates ASCII and POKE values. It's a handy utility you can use while writing a BASIC program.

Reference Tables

Chances are, PRINTing to the screen was one of the first things you learned to do in BASIC. You probably also learned how to control where the computer prints by putting cursor commands within strings or by using SPC and TAB commands. The PRINT command is common, primarily because it is so easy to use. But in certain situations, you may need to find out a character's ASCII number. And sometimes it is quicker to simply POKE a character onto the screen.

But before you can POKE, you have to know the character number. Let's put a row of hearts at the top of the screen. So, we need to POKE a bunch of 81s. Wait, those are solid circles. What's the number for hearts? I know that list is somewhere in this book.

If you use POKEs or ASCII values in programming, you know how annoying it is to flip back and forth through the reference book, losing time and patience. Even worse, you could lose the book and end up typing the character and PEEKing screen memory to get the POKE value.

Let The Computer Do The Work

Your computer already knows the POKE values and ASCII numbers, so why not let it do the work?

This short machine language program, "ASCII/POKE Printer," does not use any BASIC memory. Its 52 bytes remain in the cassette buffer, ready to convert letters and graphics characters to POKE and ASCII numbers whenever you want.

Note that if you write a program that POKEs any of the address locations of the cassette buffer (828-1019), you may lose ASCII/POKE Printer. Also, if you use a cassette player for SAVEs, LOADs, or tape files, you will erase the machine language program. Fortunately, it is entirely relocatable, so if you want to use the cassette buffer, you can change line 10 to move it to another part of memory. On the 64, it is usually safe to use any of the memory locations from 49152 to 53247. If you have a VIC-20, you will have to protect part of BASIC RAM (52 bytes worth) with POKEs to 51, 52, 55, and 56.

LOADing And Using The Program

If you have a 64, type in Program 1. If you have a VIC, use Program 2, but if your VIC has 8K or more of expansion memory, change line 23 to read:

```
23 DATA169,0,133,212,174,0,16,32,205,221
   ,232,208,204
```

Make sure the DATA statements are exactly as printed. SAVE it to tape or disk and VERIFY (if you have a cassette drive). RUN the program and type NEW. The program is now in your cassette buffer. BASIC memory was cleared when you typed NEW, but it did not touch the cassette buffer.

Anytime you want to use ASCII/POKE Printer, type SYS 828. The computer will wait for you to type a character and then display that character in the upper-left corner with the ASCII value to the right and the POKE value below. Type another character and you get two new values.

To exit (back to BASIC), hold down SHIFT and press RETURN. This returns you to your program. SYS 828 will send you back to ASCII/POKE Printer,

and so on. You can toggle back and forth as the need arises.

Special Cases

There are some ASCII numbers that have no equivalent POKE. For example, adding CHR$(13) to a string will force a RETURN after the string is printed. But ASCII 13 cannot be POKEd to the screen (what would a RETURN look like?). ASCII/POKE Printer will give you the correct ASCII numbers, but for certain characters, like RETURN, it will print a blank space and list a POKE of 32 (which is the number for a blank space). In the case of function keys, CLR/HOME, INST/DEL, and color commands, it will print a reverse video character, as if in quote mode, and the correct ASCII number. But the POKE number will be wrong. Keys that perform a function—clearing the screen, for example—are not characters that can be POKEd to the screen.

Also note that you cannot get values for inverse video characters, which do not have separate ASCII numbers. To program a reverse character, precede it with a CHR$(18). To POKE an inverse video character, add 128 to the POKE value of the regular character.

This machine language utility will be most helpful when you are writing BASIC programs. By letting the computer tell you ASCII and POKE values, you can really save time. The program was written to be short and simple, but if you are familiar with machine language, you could modify it to do much more.

Program 1:

ASCII/POKE Printer—64 Version

```
10 FORJ=828TO879:READK:POKEJ,K:NEXT
15 READY:IFY<>999THENSTOP
20 DATA32,228,255,240,251,170,201,141,208
   ,1,96,169,147
21 DATA32,210,255,169,255,133,212,138,32,
   210,255,169,32
22 DATA32,210,255,169,0,32,205,189,169,13
   ,32,210,255
23 DATA169,0,133,212,174,0,4,32,205,189,2
   32,208,204
25 DATA999
```

Program 2:

ASCII/POKE Printer—VIC Version

```
10 FORJ=828TO879:READK:POKEJ,K:NEXT
15 READY:IFY<>999THENSTOP
20 DATA32,228,255,240,251,170,201,141,208
   ,1,96,169,147
21 DATA32,210,255,169,255,133,212,138,32,
   210,255,169,32
22 DATA32,210,255,169,0,32,205,221,169,13
   ,32,210,255
23 DATA169,0,133,212,174,0,30,32,205,221,
   232,208,204
25 DATA999
```


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Dynamic SAVE For VIC And 64

Stephen S. Leven

These short programs, for the VIC or 64, can take the tedium out of frequently SAVEing and VERIFYing your BASIC programs. For disk and tape users.

When you are typing in a long program, it's a good idea to SAVE portions of it frequently, and to make backup copies. But it is tedious to continually type SAVE "PROGRAM NAME", wait until the program is saved, retype SAVE "PROGRAM NAME", then wait again. "Dynamic SAVE" will do this work for you, whether you use tape or disk, using a technique known as the dynamic keyboard.

Why You Should SAVE Periodically

A sudden loss of power—during a thunderstorm or when you accidentally knock the power cord from the wall socket—can instantly wipe out all your hours of hard work. Even something as simple as turning on the dishwasher or garbage disposal can cause a voltage drop that garbles the program in memory.

These four bits of advice will minimize the consequences of a sudden power failure or electrical glitch:

1. SAVE your program every 15 minutes or so, or whenever the changes you have made will cause you a serious setback if they are lost.
2. If you use tape, SAVE two copies of the program, one after the other, to reduce the chance of losing the program due to accidental damage to one section of the tape.
3. Use two tapes (or disks). For tape, first SAVE on one tape, then SAVE on a second. The third time you SAVE, use the first tape again. Continue to alternate tapes, so that if something happens during the SAVE, or your tape is damaged, you still have your previous version on the other tape. (Follow this same procedure for disk backup.)
4. Finally, when you have finished debugging your program and it runs perfectly, make one or two backup copies. It is a good idea to keep an archive tape (or disk) for emergencies. If your working copy of the program fails, you can retrieve your program from the archive tape (or disk).

The Dynamic Keyboard Technique

The term *dynamic keyboard* basically means that you have your program display certain screen instructions which are executed after the program ends. You do this by inserting program lines which CLEAR the screen and PRINT the instructions on the screen just before the END line, and then load the keyboard buffer with the cursor controls and RETURNs necessary to execute those instructions.

When the program comes to the END instruction, it goes into immediate mode. The first thing it checks is the keyboard buffer, which contains your RETURNs and cursor controls. It then executes them just as if you were typing them in. As the cursor moves across the commands printed on the screen, they are automatically executed.

Tape And Disk Versions

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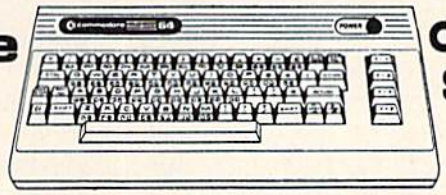

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disk users. It is a good idea to LOAD Dynamic SAVE before you start working on your program. You can change the line numbers if you wish, but, by using the line numbers I've used, you can easily remember that RUN 60000 will perform your SAVE.

Program 1 SAVEs two consecutive copies of your program, including Dynamic SAVE, to tape. When the SAVEs are completed, the screen will be set up to perform a VERIFY of each copy. Just rewind the tape and press RETURN.

Line 60010 defines the character for the quote mark, since using the CHR$ equivalent is the best way to PRINT it on the screen. This line also defines the name of the program to be SAVEd, which is stored in the variable N$. Change the contents of N$ to the name of the program you wish to save.

Line 60019 is a REM line, reminding you to use *either line 60020 or line 60021*, depending on whether you have a VIC or a 64. These two lines set the screen and border to their default colors, and define the character colors for use in line 60030. These colors are selected so that program operation on the screen is invisible. It's a good way to avoid screen clutter. If you want to see what the computer is doing, simply change the value of C1$ to that of C2$ in line 60020 or 60021.

Line 60030 changes the character color to that of the screen color by printing C1$. Then it clears the screen and displays the following message:

```
FORQ=1TO2:SAVE"DYNAMIC SAVE":NEXT
```

After printing, the character color is restored to normal by printing C2$.

Line 60040 loads the keyboard buffer with a HOME (ASCII 19) and RETURN (ASCII 13), just as though they had been typed in.

Line 60050 POKEs the following characters to the keyboard buffer: V, SHIFTed E, a colon, another V, and another SHIFTed E. (V-SHIFT-E is the Commodore abbreviation for the BASIC command VERIFY.)

The keyboard buffer (memory locations 631–640) can be loaded with up to ten characters. The first character to be executed should be POKEd into location 631, the second into location 632, and so on. (The character codes may be found in the appendices of *VIC-20 User's Manual, VIC-20 Programmer's Reference Guide, Commodore 64 User's Manual*, or *Commodore 64 Programmer's Reference Guide*.) Location 198 must be POKEd with the *number* of characters in the keyboard buffer, in this case seven. The END statement assures that the program will end at this point and pass control to the keyboard buffer.

Program 2 is similar to Program 1. The main differences are in line 60030 and in the characters POKEd into the keyboard buffer. In the disk version, line 60030 PRINTs, at the top of the screen, the disk command to SAVE and Replace the program, followed by a colon and the command to VERIFY the program on disk. Since the user does not need to take any action (such as rewinding a tape) in the disk version, verification can begin immediately after the SAVE. For that reason, the additional keyboard buffer POKEs in line 60050 of Program 1 are not needed in the disk version, so the program ENDs after POKEing a 2 in location 198 to indicate two characters in the keyboard buffer.

How To Use The Program

To use this program for saving to tape:

1. Type or LOAD Program 1 into your VIC-20 or Commodore 64 before you start writing your program. Substitute your program name in place of DYNAMIC SAVE in line 60010.

2. When you're ready to SAVE your program, place your tape into the recorder and type RUN 60000. The screen will clear, then the message PRESS RECORD AND PLAY ON TAPE will appear.

3. Press RECORD and PLAY. The computer will supply its typical response, OK, followed by SAVING and whatever program name you supplied.

4. After the first copy of the program is saved, the response SAVING and the program name will be repeated to indicate that the second copy is being SAVEd. When the second SAVE is finished, the familiar READY message will be displayed, followed by the flashing cursor, positioned on the line with the double VERIFY command (V-:V-).

5. *Be sure to rewind your tape to the beginning of the program.* Then press RETURN. The computer will respond with PRESS PLAY ON TAPE. After you press PLAY, the normal VERIFY routine will take place: OK, SEARCHING, FOUND and your program name, VERIFYING, OK. The process then repeats for the second copy. If you choose not to VERIFY, use the cursor controls to move the cursor off the V-:V- line before pressing RETURN.

If you use disk, type or LOAD Program 2, making sure to substitute your program name in place of DYNAMIC SAVE in line 60010. When you're ready to SAVE, simply type RUN 60000. The computer will then display SAVING and VERIFYING messages at the appropriate time.

Once Dynamic SAVE is in place, you can face the possibility of a power failure with a little less dread.

See program listings on page 165.

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Dan Carmichael, Submissions Editor

The Indexer

This month's offering presents a small data base program, "The Indexer." Designed as an index for COMPUTE!'s GAZETTE articles, it can be used for a variety of purposes. It runs on any size VIC-20 and the Commodore 64.

If you're like me, you probably keep your back issues of COMPUTE!'s GAZETTE. There's a wealth of reference material in each issue. The only problem is remembering just what issue contains that article you so desperately need.

This month, we'll look at a small data base program that allows you to keep an index of articles or books that are of interest to you. "The Indexer" stores such information as magazine (or book) name, subject matter, article title, month and year of issue, page number, and the type of computer the article applies to. It can also search for that article by subject, article name, magazine name, and type of computer.

Storing Data In The Program

The Indexer is *machine independent*—it does not store data on a peripheral device such as a tape cassette or disk drive. Information is read into the program from DATA statements and is stored within the program in an array. If you study it carefully, you'll see some useful array and table look-up techniques.

Each DATA statement you enter must include the following six elements in order, and each entry should be separated by a comma.

DATA *magazine name, article title, subject, month.year, page number, type of computer*

Be careful when entering the DATA statements—a misplaced or forgotten comma will cause errors when the program is run. Be sure not to use commas or colons when typing in the article titles.

How To Use The Indexer

Type in the program, carefully watching all cursor control characters, and save it to tape or disk before running. The five DATA statements at the end of the program are optional, included only as examples of the DATA statement format. If you wish to begin your own data base, you can replace the DATA statements from line 901 on.

Each time you add or delete DATA statements from the program, change the value of the variable N in line 900. This variable represents the exact number of DATA statements included. If you number consecutively, beginning at line 901, it will be easy to figure out how many DATA statements there are. And anytime you update your program, you should SAVE a copy to tape or disk.

Once the program is running, you'll be prompted to select the target of your search. You can search for article subject, article name, name of magazine, or type of computer. To start the search, press the indicated function key. You'll then be asked for the target of your search. Just enter the search keyword, press RETURN, and the program will perform the table search.

If you're using the program with an unexpanded VIC, memory will become a problem as you add DATA statements. String arrays—the kind used in this program to store data—use a lot of memory. In addition, the DATA statements take up six bytes plus one byte per character. If you accumulate a lot of data, an expander cartridge will come in handy. The Indexer is written to run on a VIC with any memory configuration, as well as on the Commodore 64.

Tips For Data Entry

Subject: Your searches will usually be done by article subject, so keep this category as broad as possible. For example, let's say you want to index various articles about game paddles. Enter all of them with the subject "paddles," even if some are about drawing with paddles and others about using them in games. That way, when you enter "paddles" as the target of your search, the index of *all* articles on this subject will be displayed.

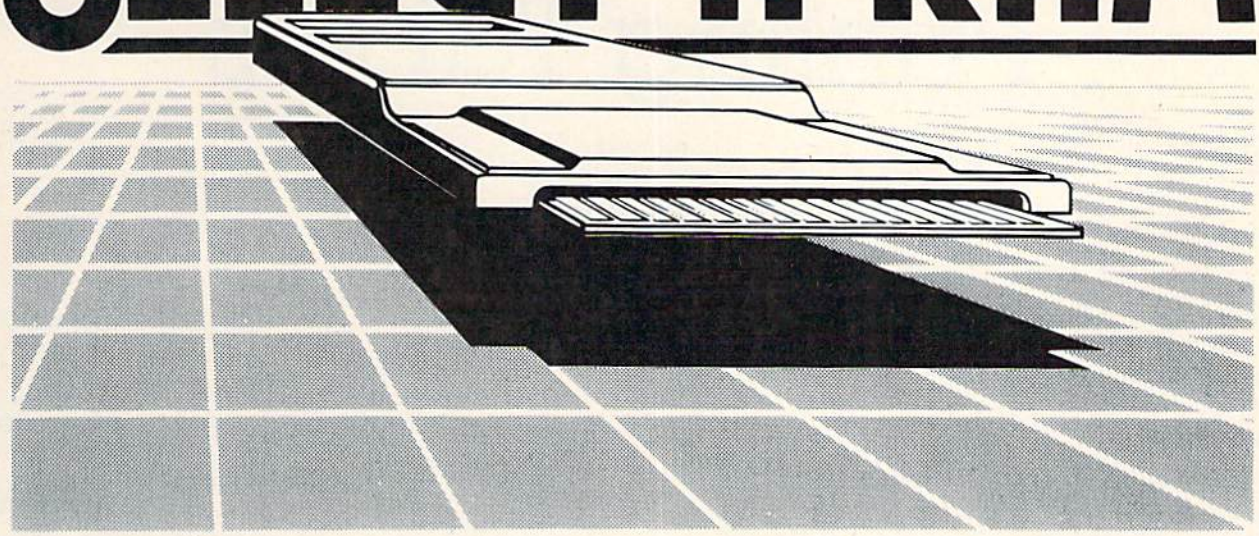
Spelling: Watch your spelling, and be consistent with your subject category names. For example, don't enter one subject as "paddle" and another as "paddles." The computer will see these as two completely different categories.

Memory: As stated before, The Indexer can use a lot of memory, so you might want to abbreviate article titles. For example, the GAZETTE column "Machine Language For Beginners" could be entered as "ML For Beginners" or even "Beg ML."

Although this program was written as an article index, it can be adapted for other uses. The data base has six elements and can search by any of four variables. It could be easily adapted for other uses such as a birthday reminder or an electronic phone book. The applications are up to you.

See program listing on page 151.

64K for VIC 20
SELECT·A·RAM



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Printing Tables

Pat Slater

If you've discovered a clever, time-saving technique, or a brief but effective programming shortcut, send it to "Hints & Tips," c/o COMPUTE!'s GAZETTE. *If we use it, we'll pay you $35.*

One of the limitations of Commodore BASIC is the total lack of formatted PRINT statements. If you're used to PRINT with format or PRINT USING, it may seem impossible to print neatly aligned tables with Commodore BASIC.

The language does provide TAB and SPC functions for screen displays, but both simply space over when used to print to a printer or a file with PRINT#. The programs I've included will format for screen or printer, depending on your input. They're especially helpful for use with formatting printed output. Let's look at an example:

```
PRINT A$;TAB(20);B$
```

prints B$ starting in column 20 regardless of the size of A$, but

```
PRINT#4,A$;TAB(20);B$
```

prints A$, skips 20 spaces from the end of A$, then prints B$. There's no telling where B$ will end up unless you know the size of A$. This being the case, you must find a way to count spaces when doing formatted printout.

One way to count spaces is to use the LEN function. For example, the statement below will place A$ in column 1, B$ in column 15, and C$ in column 30:

```
PRINT#4,A$;TAB(14-LEN(A$));B$;TAB(14-LEN
  (B$));C$
```

The following program uses the LEN function to align rows of names:

```
3 PRINT"{CLR}SCREEN OR PRINTER S OR P":IN
  PUT I$                              :rem 151
4 IF I$<>"S"AND I$<>"P"THEN3          :rem 241
5 IFI$="S"THENJ=3:GOTO8               :rem 153
6 J=4                                 :rem 241
8 OPEN4,J                              :rem 20
10 FOR I=1 TO 5                       :rem 215
20 READ A$,B$:IFI$="S"THEN35           :rem 22
30 PRINT#4,A$;TAB(10-LEN(A$));B$:GOTO40
                                      :rem 214
35 PRINT#4,A$;SPC(10-LEN(A$));B$      :rem 19
40 NEXT I                             :rem 236
50 DATA WATTS, SORENSON, MATTHEWS, NG, JO
   NES                                :rem 186
60 DATA BURL, YATES, RUVALDS, KING, REDLA
   SIK                                :rem 132
```

When executed, the program prints:

```
WATTS       SORENSON
MATTHEWS    NG
JONES       BURL
YATES       RUVALDS
KING        REDLASIK
```

If you use this method to align numbers (along with STR$ to convert the numbers to strings), several problems pop up as shown in the next example:

```
3 PRINT"{CLR}PRINTER OR SCREEN P OR S":IN
  PUTI$                               :rem 151
4 IF I$<>"P"ANDI$<>"S"THEN 3          :rem 241
5 IF I$="S"THENK=3:GOTO8              :rem 154
6 K=4                                 :rem 242
8 OPEN4,K                              :rem 21
10 FOR N=1 TO 5                       :rem 220
20 READ I,J:IFI$="S"THEN35            :rem 222
30 PRINT#4,I;TAB(8-LEN(STR$(I)));J:GOTO40
                                      :rem 199
35 PRINT#4,I;SPC(8-LEN(STR$(I)));J :rem 4
40 NEXT N                             :rem 241
50 DATA 78.66, 40.00, 139.30, -77.22, 200
   0.00                               :rem 213
60 DATA -142.91, 6.56, 12.50, 521.12, 9.9
   9                                   :rem 83
```

This program prints:

```
 78.66        40
 139.3       -77.22
 2000        -142.91
 6.56         12.5
 521.12       9.99
```

Notice that the numbers are aligned on the left (at the sign position) rather than by decimal point, and that trailing zeros are lost after the decimal point. To make the individual numbers appear in the correct format (40 as 40.00, for example) you can convert them to strings as follows:

```
I$=STR$(INT(I))+"."+RIGHT$(STR$(I*100),2)
```

The first term gets the integer part of the number, next the decimal is added, and finally it is necessary to multiply by 100 and grab the last two digits to keep from losing trailing zeros.

Once you have the number in correct format, use the LEN function to count spaces and tab *before* printing each number as shown in the example below:

```
3 PRINT"{CLR}SCREEN OR PRINTER S OR P":IN
  PUT U$                              :rem 163
4 IF U$<>"S"ANDU$<>"P"THEN3           :rem 9
5 IF U$="S"THENK=3:GOTO8              :rem 166
6 K=4                                 :rem 242
8 OPEN4,K                             :rem 21
10 FOR N=1 TO 5                       :rem 220
20 READ I,J                           :rem 61
22 I$=STR$(INT(I))+"."+RIGHT$(STR$(I*100)
  ,2)                                 :rem 140
24 J$=STR$(INT(J))+"."+RIGHT$(STR$(J*100)
  ,2)                                 :rem 145
30 PRINT#4,""TAB(8-LEN(I$));I$;TAB(17-LEN
  (J$));J$                            :rem 200
40 NEXT N                             :rem 241
50 DATA 78.66, 40.00, 139.30, -77.22, 200
  0.00                                :rem 213
60 DATA -142.91, 6.56, 12.50, 521.12, 9.9
  9                                   :rem 83
```

Now you get the printed numbers aligned by decimal position:

78.66	40.00
139.30	−78.22
2000.00	−143.91
6.56	12.50
521.12	9.99

Using LEN to count spaces this way allows you to print neat-looking tables of words and/or numbers. Though a lot of functions are involved, it doesn't take nearly as much time as the printout process, so it won't slow down your program.

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HORIZONS: 64

CHARLES BRANNON
PROGRAM EDITOR

Apple recently reduced the price of its Lisa to around $8000. Lisa, whose acronym supposedly stands for Local Integrated Software Architecture, was actually just the in-house code name for the machine (insiders claim it was named after a girlfriend of Steve Wozniak, Apple co-founder). The name of the machine was leaked so extensively that Apple was forced to market with the code name, hence the apocryphal acronym.

Lisa is a dedicated workstation with a mouse, ultra-high resolution graphics, and icons (pictorial diagrams). "Dedicated workstation" means that there is one user per computer, rather than many users sharing a large computer via separate terminals. The advantage of a dedicated workstation is its exclusivity, privacy, and speed of access. The entire power of the computer can be dedicated to one user, rather than spread out among many. This is the primary concept behind so-called personal computers.

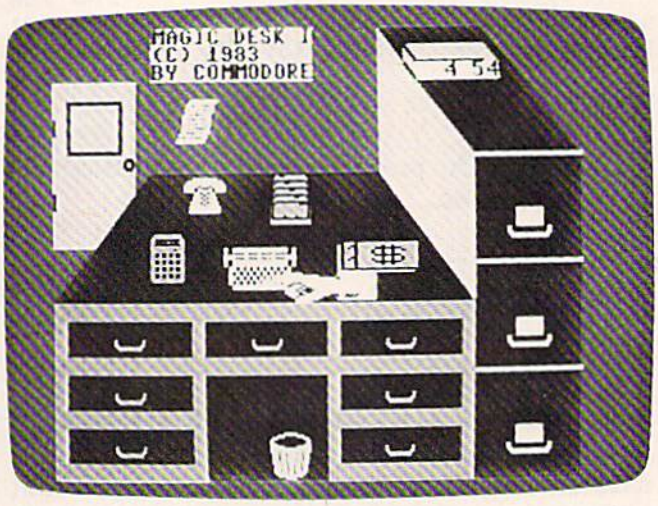
The disadvantage of dedicated systems surfaces in environments where people need to share and exchange information. That is why Local Area Networks (LANs) are hooking up these small computers, usually to a central hard disk. A LAN doesn't violate the concept of personal computers; it just broadens their communication capabilities. Some companies are going too far, though, and we are seeing expensive business microcomputers which are mediocre mimics of the large, powerful, but impersonal minicomputers and mainframes.

Apple claims you can start using Lisa within 20 minutes, without any instruction manuals. If you remember your first experience with a computer, you may be inclined to doubt this. Yet there's something new here. Apple has drawn on the experience of research at Xerox's Palo Alto Research Center (PARC). The Lisa is an intuitively understandable system.

Most of this "user-friendliness" (to use a term that has become banal in the industry) comes from Lisa's linked menus. The menus lead you from one option to another and are primarily pictorial, drawing on the Lisa's very high resolution capability (pun somewhat intended).

A highly visible characteristic of the Lisa is the mouse, used to make selections as you move the cursor about. The idea is the same as a joystick or trackball (some mouses are merely upside-down trackballs). Using the mouse is supposed to be more natural than pressing cursor control keys. Many people complain that the mouse is a gimmick, taking up extra desk space and requiring you to take your hands away from the keyboard to move the cursor.

Both hardware and software companies were impressed by and envious of the Lisa. Lisa was really a new product, an innovation in an industry of "me, too" computers and software. Well, the copycats didn't waste any time. Companies began developing their own integrated software, complete with icons, windows, and even mouses. The effort is Promethean, as companies try to bring the $8000 capability of the Lisa to your $2000 micro (of course, they charge you only $800 to $1000 for the software).



Preparing to type with Magic Desk I.

Commodore's Reaction: Magic Desk I

Commodore also caught icon-fever. At the January 1983 Consumer Electronics Show (CES), they introduced Magic Desk I, a software package for the 64 which was not available until around November. The price is down-to-earth, with a suggested retail of $60–$70. What Commodore and others (Microsoft [Windows], VisiCorp [Visi On], Quarterdesk Software [DesQ]) seem to forget is that Apple spent the equivalent of a hundred man-years developing Lisa. Some integrated pro-

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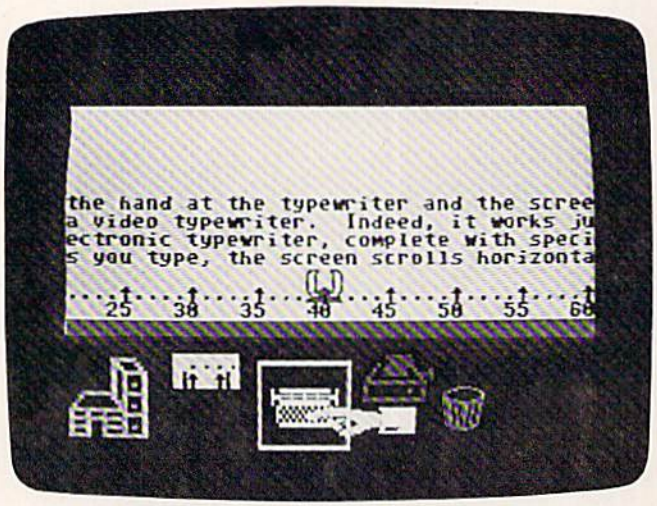
grams may be capable, others might just copy Lisa's gimmicks.

Magic Desk may be right for some people, but it's not for everyone. When you plug in the Magic Desk cartridge and turn it on, a picture of a desk appears. On top of the desk are several icons: pictures of a typewriter, telephone, calculator, card file, and ledger. Under the desk is a wastebasket, and to the right is a filing cabinet. A digital clock on top of the filing cabinet keeps time. A door to the left "opens" the way to new applications. Above this scene hovers a ghostly hand, your cursor.



Creating text in the typewriter mode.

With the joystick, you move the hand to the appropriate picture and press the fire button to select it. Magic Desk I supports only a few of the icons: the typewriter, wastebasket, filing cabinet, and digital clock. Magic Desk II will support the ledger (spreadsheet) and the calculator. Presumably, the phone will be used with a modem, and the card-file as a simple data base manager.

Point the hand at the typewriter and the screen transforms into a video typewriter. Indeed, it works just like a modern electronic typewriter, complete with special effects. As you type, the screen scrolls horizontally. The margins are always visible, and you can change them at any time. With the function keys you can set, clear, and move to tab stops. When you press RETURN, the paper pops up a line and the typeball whirs to the beginning of the next line, complete with sound effects. This is perhaps a bit too cute.

After you type your letter, you can return to the desk and file the letter. With the hand, you can open one of the three file cabinets. Each cabinet holds ten file folders, each of which can hold ten pages of text. What you are really doing is loading and saving your files to disk, but this is supposedly transparent. You just select a folder, name it if you like, put your typing into it, or retrieve a page from it. Any of these operations will cause a picture of the disk drive to appear, and the actual drive will whir and click a surprisingly long time, considering that you are only trying to file one page. I found this quite frustrating.

This is also where Magic Desk gets confusing. None of the icons are labeled, so it's like reading those pictorial traffic signs in a foreign country. If you get stuck, you can press the Commodore logo key and a help screen will appear. The icons you are using will be named; you can select any of them with the hand to get a more complete description.

I found Magic Desk novel and rather easy to use, though the pictures are both a blessing and a curse (I would prefer an English menu of choices). What you gain in ease of use and intuitive operation, you lose in power, speed, and efficiency. Compared with the "old way" of doing things, Magic Desk is limited once you're no longer a beginner. It slows you down as you pursue a task through a chain of menus. The video typewriter has almost none of the advantages of a true word processor. It's just like an IBM Selectric. You don't have to learn anything, but you don't have a tenth of the flexibility and power of even a mild-mannered word processor. Apparently, this is not a problem in Commodore's eyes. Indeed, the press release sells this similarity, emphasizing a typewriter is not a word processor, and implies you're better off that way.

Nonetheless, Magic Desk can be an excellent nonintimidating way to learn to use a computer. Magic Desk may change the mind of anyone who "hates computers." It lets you perform basic computer tasks with a minimum of fuss, and can lead you into more powerful applications later. Despite its limitations, Magic Desk points the way to the future of home computer software.

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SIMPLE ANSWERS TO COMMON QUESTIONS

TOM R. HALFHILL, EDITOR,
COMPUTE!'s PC & PCjr Magazine

Q A

Each month, COMPUTE!'s GAZETTE *will tackle some questions commonly asked by new VIC-20/Commodore 64 users and by people shopping for their first home computer.*

Q. ***I've heard about emulators available for the Commodore 64 that allow it to run all Apple software and software for other computers, too. I've seen some magazine advertisements by mail-order companies for emulators. Do you plan to review any of these emulators?***

A. We haven't reviewed any emulators because, at this writing, they simply don't exist. Furthermore, we urge readers to be cautious about emulators—a lot of misinformation is circulating.

We, too, have heard all the stories about Apple emulators for the Commodore 64, and have seen the ads in magazines. Usually we telephone the company advertising the emulator and try to obtain one for testing and review purposes. Almost always the response is something like, "They'll be ready for delivery within a few weeks." Then several months go by, and still no emulator. Some companies have been promising to deliver emulators for more than a year. We have yet to see one.

Heed this advice: *Do not order or buy an emulator unless you first see an actual, working model.* Otherwise, you will probably be disappointed.

Why are we so emphatic? Because true emulation of another computer is not something that is easily accomplished. There are hundreds of problems to be overcome, especially when designing something like an Apple emulator for the Commodore 64. Yet, some companies persist in promising—and even advertising—Apple emulators.

Nearly all these emulator rumors can be indirectly traced to a statement made by Commodore back in early 1982. At that time, Commodore hinted that it intended to introduce a personal computer that could emulate other popular computers on the market, such as the Apple and Atari. A widely read article to this effect was published in the *Wall Street Journal*. Everyone was excited by the prospect, but eventually Commodore quietly shelved the idea—probably because it was too hard to accomplish at an affordable price.

In the meantime, the Commodore 64 was introduced. Unfortunately, some people jumped to the conclusion that this was the "chameleon computer" Commodore had hinted about. Within a few months, independent companies began announcing and even advertising Apple emulators for the 64. The idea of an Apple emulator was very attractive to new 64 owners because almost no software was available for the computer. But there are formidable obstacles to making an Apple emulator for the 64.

It's true that the computers are superficially similar—both are 40-column color computers with 64K Random Access Memory (RAM), Microsoft BASIC, and compatible microprocessor chips (the 6502/6510). But the memory maps are quite different, and the Apple lacks many of the 64's special features (sprites, 16-color high-resolution graphics, polyphonic synthesized sound, etc.). This is important because much commercial software these days is written entirely in machine language, including almost all games. ML programs are specific to the memory configuration of the machine on which they were written. Even seemingly slight changes to the native computer's operating system or memory layout (such as adding expanders to a VIC-20) can render some ML programs unusable. The problems of emulating a totally foreign computer are infinitely greater.

Even if an Apple emulator were developed, there would be one more problem. Almost all Apple software is published on floppy disks. The Commodore Disk Operating System (DOS) is incompatible with the Apple DOS. And the data is stored in different formats. An Apple emulator would do you no good unless you also had an Apple disk drive emulator. This would almost certainly require that you buy a separate disk drive and compatible interface cables.

In the meantime, let the buyer beware. We heard of one person who paid more than $100 for an "Apple emulator" for his 64 and got nothing more than a cable which allowed BASIC programs to be transferred between the computers. The task of translating the programs so they would run on the 64 was left up to him, of course.

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A Guide To Commodore User Groups

Part 1

Kathy Yakal, Editorial Assistant

Here is an updated list of Commodore user groups throughout the world. If you have a group that you would like listed here, or if your listing needs to be changed or deleted, please contact us so that we may keep our records current.

In most cases, contact people have chosen to list their home addresses and telephone numbers. When writing to them for information, please enclose a self-addressed, stamped envelope.

ALABAMA

Birmingham Commodore Computer Club
Harry Jones
4845 Ave. B, Lot 7B
Birmingham, AL 35208
205/923-9260

Huntsville Alabama Commodore Komputer Society (HACKS)
Hal Carey
9002 Berclair Rd.
Huntsville, AL 35802
205/883-0223

Shoals Commodore User Group
Warren Pratt
809 W. 6th St.
Sheffield, AL 35660
205/381-1561

Walker Area Computer Club (WACC)
Daniel McGuire
89 McCrory St.
Cordova, AL 35550
205/483-7833

ALASKA

COMPOOH-T
Paul Mercer
P.O. Box 118
Old Harbor, AK 99643
907/286-2253

ARIZONA

Arizona VIC and 64 Users
Tom Monson
904 W. Marlboro Cir.
Chandler, AZ 85224
602/963-6149

Catalina Commodore Computer Club
George A. Pope
2012 Ave. Guillermo
Tucson, AZ 85710

Commodore User Group
Michael Stephany
4578 Monarch Dr.
Sierra Vista, AZ 85635

Commodore User Group of Arizona
Doug Peters
P.O. Box 21291
Phoenix, AZ 85036
602/831-1534

AUSTRALIA

Australian Computer Education Association
P.O. Box 194
Corinda 4075, Old Australia

CALIFORNIA

B & S 64-PET User Group
Bryan Goldschlag
46 Banbridge Pl.
Pleasant Hill, CA 94523
415/938-0764

California Area Commodore Terminal User Society (CACTUS)
Darrell L. Hall
P.O. Box 1277
Alta Loma, CA 91701
714/947-0742

Central Coast Commodore User Group
Gilbert Vela
4237 Plumeria Ct.
Santa Maria, CA 93455
805/937-4174

C-64 Users E & R
215 W. 1st St., Suite 10548
Tustin, CA 92680

Commodore 64 West
Don Campbell
2917 Colorado Ave.
Santa Monica, CA 90404
213/828-9308

Diablo Valley Commodore User Group
Ben Braver
762 Ruth Dr.
Pleasant Hill, CA 94523
415/671-0145

DUG (Danville User Group)
Kent E. Davis
185 Front St., Suite 106
Danville, CA 94526
415/820-1222

Napa Valley Commodore Computer Club
Mick Winter
P.O. Box 2935
Yountville, CA 94599
707/944-2797

PALS
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886 S. K
Livermore, CA 94550

Peninsula Commodore User Group
Timothy Avery
549 Old County Rd.
San Carlos, CA 94070
415/593-7697

PET-On-The-Air
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525 Crestlake Dr.
San Francisco, CA 94132

Sacramento Commodore Computer Club
Robyn W. Graves
8120 Sundance Dr.
Orangevale, CA 95662

San Fernando Valley Commodore User Group (SFVCUG)
Thomas Lynch
21208 Nashville
Chatsworth, CA 91311
213/709-4736

San Francisco Commodore Users Group
Roger Tierce
278-27th Ave. #103
San Francisco, CA 94121
415/387-0225

San Luis Obispo VIC-20/64 Computer Club
1766 9th St.
Los Osos, CA 93402
805/528-3371

So. Cal. 20/64 Users Group
Star Route Box 1-C
Pine Valley, CA 92062
619/473-8087

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P.O. Box 3193
San Ysidro, CA 95073

South Orange County User Group
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2314 Monte Cristo
San Clemente, CA 92672

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415/325-0127

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San Jose, CA 95158
408/264-2064

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Turlock, CA 95380

VIC-20 Owners Resource Computer Enthusiasts (V.O.R.C.E.)
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Petaluma, CA 94952
707/763-8552

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58 Steel St.
Barrie, Ontario
Canada L4M 2E9

Calgary Commodore User Group
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37 Castleridge Dr. N.E.
Calgary, Alberta,
Canada T3J 1P4

Calgary Commodore Computer Club
Radu Olanson
47 Coachwood Pl. N.W.
Calgary, Alberta,
Canada T3H 1E1

Commodore Computer Club
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P.O. Box 91164
West Vancouver, B.C.,
Canada V7V 3NG
604/738-3311

Commodore 64 User Group
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1322 Naples St.
Oshawa/Whitby,
Ontario, Canada L1K 1J6

Nova Scotia Commodore Computer User Group
John Robinson
66 Landrace Cres.
Dartmouth, Nova Scotia
Canada B2W 2P9
902/434-1524

Sarnia Commodore-64 User Group
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1122 Wilson Dr.
Sarnia, Ontario,
Canada N7S 3J6
519/542-2534

Toronto PET Users Group
1912A Avenue Rd., Suite 1
Toronto, Ontario,
Canada M5M 4A1
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BBS 416/223-2625 (7:30 p.m.-9:00 a.m. Eastern Time)

Utilisateurs De Commodore (Commodore User Group)
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Canada H3G 2MG

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Chris Brown
Canada
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Stratford, CT 06497
203/378-8258

Computer Users Group
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Halls Hill Rd.
Colchester, CT 06415
203/537-2117

New London Area Commodore Users
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P.O. Box 1608
Groton, CT 06340
203/887-0238

VIC User Group
Carol Doyle
1070 S. Colony Rd.
Wallingford, CT 06492
203/269-7595

ENGLAND

PET User Group
Barry Miles
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London, England N7 8DB

FLORIDA

Bits and Bytes Computer Club
Frank H. Topping
1859 Neptune Dr.
Englewood, FL 33533
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Brandon User Group
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108 Anglewood Dr.
Brandon, FL 33511
813/685-5138

Central Florida Commodore User Club
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P.O. Box 15949
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Central Florida Commodore User Group
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6321 Ridgeberry Dr.
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Commodore Computer Club
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St. Petersburg, FL 33742
813/391-5219
BBS 5-10 p.m. 7 days a week

Commodore Computer Club
David Phillips
P.O. Box 9726
Jacksonville, FL 32208
904/764-5457

Commodore Users Group of Tallahassee
Dave Lang
2501 Debden Ct.
Tallahassee, FL 32308
904/893-6749

El Shift O (VIC 20/64 Commodore Users)
Mike Schnoke
P.O. Box 548
Cocoa, FL 32922

Gainesville Commodore User Group
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OTog Users Group for Commodore 64 VIC 20 Users
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Kissimmee, FL 32741

VIC/64 Heartland User Group
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C.C.S. User Groups
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Newman, GA 30264

Commodore User Group of Augusta
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Augusta, GA 30909
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Data Swappers
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1773B Alabama Ave.
Albany, GA 31705
912/431-0031

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Hinesville, GA 31313

Middle Georgia Commodore User Group
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309/454-1061

Commodore 64 User Group
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312/790-4320

Fox Valley PET User Group
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PAPUG Peoria Area PET Users' Group
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Peoria, IL 61605
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PET VIC Club (PVC)
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Mundelein, IL 60060
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Regional Association of Programmers (RAP 64/20)
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7358 W. 108th Pl.
Worth, IL 60482
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Southern Illinois Commodore User Club
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1707 E. Main St.
Olney, IL 62450

The Kankakee Hackers
Rich Westerman
RR #1, Box 279
St. Anne, IL 60964
815/933-4407

VIC-20 Commodore-64 User Support Group
David R. Tarvin, Sr.
114 S. Clark St.
Pana, IL 62557
217/562-4568

Western Illinois PET User Group (WIPUG)
Edward L. Mills
Rt. 5 Box 75
Quincy, IL 62301
217/656-3671

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3814 Terra Trace
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812/477-0739

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Indianapolis, IN 46229
317/899-2003

Commodore User Group/ The National Science Clubs of America-Commodore Users Division
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Manchester User Group (MUG)
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The CBM 64 Club
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812/332-6645

VIC Indy Club
Fred Imhausen
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Indianapolis, IN 46201
317/357-6906

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Terre Haute, IN 47803
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BBS 867-6950

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Joplin, MO 64801

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Kansas City, MO 64111
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BBS 257-2502

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The Commodore User Group of St. Louis, Inc.
Dan Weidman
P.O. Box 6653
St. Louis, MO 63125
314/968-4409

NEWS & PRODUCTS

New Printer From Commodore

Commodore has released a new printer, the MPS-801, which will replace the 1525. According to a source at Commodore, the MPS-801 is slightly faster than the 1525, features a cartridge ribbon, paper advance knob and button, and supports full-size paper. The printer also includes two serial ports to enable daisy chaining, and the printing mechanism has been relocated for a quieter sound. Price was not set at press time.

Quick Reference Guides For VIC And 64

John Wiley & Sons has published *Quick Reference Guides* for the VIC, 64, and Timex 1000 computers, similar to the guides the company previously published for the IBM PC, Apple II, and Atari 800.

The 6 × 12-inch four-panel guides list and define such items as BASIC statements, system controls, memory statements, video and graphic controls, and other topics.

The guides are available for $2.95 each.

John Wiley & Sons, Inc.
605 Third Avenue
New York, NY 10158
(212) 850-6000

VIC-20 Typing Tutorial

Mastertype, a typing tutorial from Bróderbund, is now available for the VIC-20 in a cartridge format.

The tutorial consists of 18 progressive lessons set within a game format. You defend a spaceship from a barrage of letters or words by correctly typing them as rapidly as possible.

Lessons may be saved on either disk or cartridge for future use. Included are an illustrated instruction manual, hints for winning the game, and directions for creating your own customized lessons to improve typing and spelling.

The VIC-20 cartridge version of *Mastertype* sells for $39.95.

Bróderbund Software, Inc.
17 Paul Drive
San Rafael, CA 94903
(415) 479-1170

Twin-Disk Adventure Game For 64

Cyberworld, a two-disk, interactive keyboard/joystick adventure game for the Commodore 64, has been produced by Progressive Peripherals & Software.

The player's mission is multilayered, set on the planet Cyber, and includes full use of the 64's sprite capabilities. There are three subadventures, which begin with the hijacking of a Drokon warship and advance to a defense of the planet. The final mission is a hunt-and-tracking game.

Available only on diskettes, the program is available for $39.95.

Progressive Peripherals & Software
2186 South Holly, Suite 2
Denver, CO 80222
(303) 759-5713

Music, Business, Personal Programs For 64

M'Soft has developed several new programs for the Commodore 64 on disk.

Smart ($79.95) features five different programs, all of which load from one main menu: word processing, money management, amortization, record keeping, and time management.

Wallstreet Microscope ($99.95) offers price and financial analysis of common stocks, with each stock rated against ten criteria. It is available with a ten-year history of Fortune 500 companies.

Musicwriter-64 ($69.95) is a music-composing, editing, and playing program that also prints sheet music for compositions created using the system.

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VIC And 64 Spreadsheet

BEC, a spreadsheet analysis program for the entrepreneur, has been developed by Lawco, Ltd., for the VIC and 64.

The program computes the break-even point for new products by using the product's expense data. It also uses the product's sales price to compute a break-even sales quantity or the quantity produced to figure a break-even sales price.

Total fixed costs, total variable costs, and sales revenue at the break-even point are also computed. Multiple break-even points can be produced by varying the sales price, the production quantity, and/or the cost figures.

BEC is available at $79.95 on tape and $89.95 on disk.

Lawco, Ltd.
P.O. Box 1337
Cupertino, CA 95015
(408) 733-0739

Action Game For 64 With Disk Drive

Crazy Conveyors, produced by Bytes and Bits, is a machine language action game for the Commodore 64 with disk drive.

The game uses multicolor sprites, custom characters in 11 different colors for building blocks, ladders, fire poles, rotating pulleys, moving conveyors, and bonus boxes. *Crazy Conveyors* also uses three-part harmony and is playable with joystick or keyboard.

The game contains the Screen Creator which expands the game disk and other disks for additional screens.

The price for the game is $29.95.

Bytes and Bits
524 East Canterbury Lane
Phoenix, AZ 85022
(602) 942-1475

Cassette Copier For VIC And 64

T & M Products has produced a Data Cassette Copier, which allows all cassettes to be duplicated by interfacing two Datassette recorders with a Commodore 64 or a VIC-20 computer.

The Data Copier will duplicate all programs and load machine language programs without using VICMON. A Micro-speaker plus LED allows you to monitor the data by sight and sound.

The Data Copier is available for $24.95 plus $2 shipping and handling. Power is supplied by the computer at the cassette port, so no batteries are required.

T & M Products
P.O. Box 1172
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Math Drill Program

Let's Learn Math, a menu-driven addition and subtraction drill program for the Commodore 64,

has been released by Micro-Systems Software.

The program has four levels of difficulty and is designed for youngsters age 6 to 12. All problems are solved column by column. The need for pencil and paper is eliminated. Right and wrong answers are flagged, and the correct answer is displayed if the entry was wrong. At the end of each session, a report of the number of correct and incorrect entries is displayed.

Let's Learn Math is available on tape for $12.95.

Micro-Systems Software
4017 Adams #263
Indianapolis, IN 46205

COMPUTE!'s GAZETTE *welcomes announcements of new products for VIC-20 and Commodore 64 computers, especially products aimed at beginning to intermediate users. Please send press releases and photos well in advance to: Tony Roberts, Assistant Managing Editor,* COMPUTE!'s GAZETTE, *P.O. Box 5406, Greensboro, NC 27403.*

New product releases are selected from submissions for reasons of timeliness, available space, and general interest to our readers. We regret that we are unable to select all new product submissions for publication. Readers should be aware that we present here some edited version of material submitted by vendors and are unable to vouch for its accuracy at time of publication.

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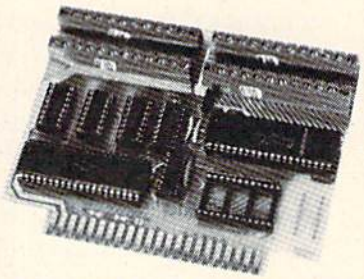

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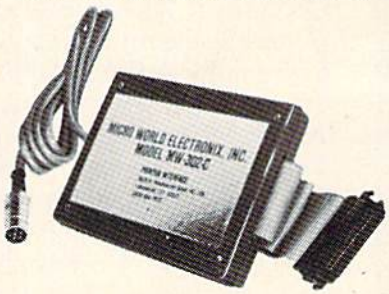

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A Beginner's Guide To Typing In Programs

What Is A Program?

A computer cannot perform any task by itself. Like a car without gas, a computer has *potential*, but without a program, it isn't going anywhere. Most of the programs published in *COMPUTE!'s Gazette* for Commodore are written in a computer language called BASIC. BASIC is easy to learn and is built into all VIC-20s and Commodore 64s.

BASIC Programs

Each month, *COMPUTE!'s Gazette* for Commodore publishes programs for both the VIC and 64. To start out, type in only programs written for your machine, e.g., "VIC Version" if you have a VIC-20. Later, when you gain experience with your computer's BASIC, you can try typing in and converting certain programs from another computer to yours.

Computers can be picky. Unlike the English language, which is full of ambiguities, BASIC usually has only one "right way" of stating something. Every letter, character, or number is significant. A common mistake is substituting a letter such as "O" for the numeral "0", a lowercase "l" for the numeral "1", or an uppercase "B" for the numeral "8". Also, you must enter all punctuation such as colons and commas just as they appear in the magazine. Spacing can be important. To be safe, type in the listings *exactly* as they appear.

Brackets And Special Characters

The exception to this typing rule is when you see the curved bracket, such as "{DOWN}". Anything within a set of brackets is a special character or characters that cannot easily be listed on a printer. When you come across such a special statement, refer to "How To Type In *COMPUTE!'s Gazette* Programs."

About DATA Statements

Some programs contain a section or sections of DATA statements. These lines provide information needed by the program. Some DATA statements contain actual programs (called machine language); others contain graphics codes. These lines are especially sensitive to errors.

If a single number in any one DATA statement is mistyped, your machine could "lock up," or "crash." The keyboard and STOP key may seem "dead," and the screen may go blank. Don't panic – no damage is done. To regain control, you have to turn off your computer, then turn it back on. This will erase whatever program was in memory, *so always SAVE a copy of your program before you RUN it*. If your computer crashes, you can LOAD the program and look for your mistake.

Sometimes a mistyped DATA statement will cause an error message when the program is RUN. The error message may refer to the program line that READs the data. *The error is still in the DATA statements, though.*

Get To Know Your Machine

You should familiarize yourself with your computer before attempting to type in a program. Learn the statements you use to store and retrieve programs from tape or disk. You'll want to save a copy of your program, so that you won't have to type it in every time you want to use it. Learn to use your machine's editing functions. How do you change a line if you made a mistake? You can always retype the line, but you at least need to know how to backspace. Do you know how to enter inverse video, lowercase, and control characters? It's all explained in your computer's manuals.

A Quick Review

1) Type in the program a line at a time, in order. Press RETURN at the end of each line. Use backspace or the back arrow to correct mistakes.

2) Check the line you've typed against the line in the magazine. You can check the entire program again if you get an error when you RUN the program.

3) Make sure you've entered statements in brackets as the appropriate control key (see "How To Type *COMPUTE!'s Gazette* Programs" elsewhere in the magazine.)

We regret that we are not able to respond to individual inquiries about programs, products, or services appearing in COMPUTE!'s Gazette *for Commodore due to increasing publication activity. On those infrequent occasions when a published program contains a typo, the correction will appear in the magazine, usually within eight weeks. If you have specific questions about items or programs which you've seen in* COMPUTE!'s Gazette *for Commodore, please send them to Gazette Feedback, P.O. Box 5406, Greensboro, NC 27403.*

How To Type In *COMPUTE!'s Gazette* Programs

Many of the programs which are listed in *COMPUTE!'s Gazette* contain special control characters (cursor control, color keys, inverse video, etc.). To make it easy to know exactly what to type when entering one of these programs into your computer, we have established the following listing conventions.

Generally, any VIC-20 or Commodore 64 program listings will contain bracketed words which spell out any special characters: {DOWN} would mean to press the cursor down key. {5 SPACES} would mean to press the space bar five times.

To indicate that a key should be *shifted* (hold down the SHIFT key while pressing the other key), the key would be underlined in our listings. For example, S would mean to type the S key while holding the shift key. This would appear on your screen as a "heart" symbol. If you find an underlined key enclosed in braces (e.g., {10 N}), you should type the key as many times as indicated (in our example, you would enter ten shifted N's).

If a key is enclosed in special brackets, ⟨⟩, you should hold down the *Commodore key* while pressing the key inside the special brackets. (The Commodore key is the key in the lower left corner of the keyboard.) Again, if the key is preceded by a number, you should press the key as many times as necessary.

Rarely, you'll see a solitary letter of the alphabet enclosed in braces. These characters can be entered on the Commodore 64 by holding down the CTRL key while typing the letter in the braces. For example, {A} would indicate that you should press CTRL-A. You should never have to enter such a character on the VIC-20, but if you do, you would have to leave the quote mode (press RETURN and cursor back up to the position where the control character should go), press CTRL-9 (RVS ON), the letter in braces, and then CTRL-0 (RVS OFF).

About the *quote mode*: you know that you can move the cursor around the screen with the CRSR keys. Sometimes a programmer will want to move the cursor under program control. That's why you see all the {LEFT}'s, {HOME}'s, and {BLU}'s in our programs. The only way the computer can tell the difference between direct and programmed cursor control is the quote mode.

Once you press the quote (the double quote, SHIFT-2), you are in the quote mode. If you type something and then try to change it by moving the cursor left, you'll only get a bunch of reverse-video lines. These are the symbols for cursor left. The only editing key that isn't programmable is the DEL key; you can still use DEL to back up and edit the line. Once you type another quote, you are out of quote mode.

You also go into quote mode when you INSerT spaces into a line. In any case, the easiest way to get out of quote mode is to just press RETURN. You'll then be out of quote mode and you can cursor up to the mistyped line and fix it.

Use the following table when entering cursor and color control keys:

When You Read:	Press:	See:	When You Read:	Press:	See:	When You Read:	Press:	See:
{CLEAR}	SHIFT + CLR/HOME		{CYN}	CTRL + 4		⟨7⟩	C= + 7	
{HOME}	CLR/HOME		{PUR}	CTRL + 5		⟨8⟩	C= + 8	
{UP}	SHIFT + CRSR ↕		{GRN}	CTRL + 6		{F1}	f1	
{DOWN}	CRSR ↕		{BLU}	CTRL + 7		{F2}	SHIFT + f1	
{LEFT}	SHIFT + CRSR ↔		{YEL}	CTRL + 8		{F3}	f3	
{RIGHT}	CRSR ↔		⟨1⟩	C= + 1		{F4}	SHIFT + f3	
{RVS}	CTRL + 9		⟨2⟩	C= + 2		{F5}	f5	
{OFF}	CTRL + 0		⟨3⟩	C= + 3		{F6}	SHIFT + f5	
{BLK}	CTRL + 1		⟨4⟩	C= + 4		{F7}	f7	
{WHT}	CTRL + 2		⟨5⟩	C= + 5		{F8}	SHIFT + f7	
{RED}	CTRL + 3		⟨6⟩	C= + 6				

MLX Machine Language Entry Program

For Commodore 64 And VIC-20

Charles Brannon, Program Editor

MLX is a labor-saving utility that allows almost failsafe entry of machine language programs published in COMPUTE!'s GAZETTE. You need to know nothing about machine language to use MLX—it was designed for everyone. There are separate versions for the Commodore 64 and expanded VIC-20 (at least 8K). MLX was conceived and written by Program Editor Charles Brannon. Important: MLX is required to type in the machine language programs in this issue.

MLX is a new way to enter long machine language (ML) programs with a minimum of fuss. MLX lets you enter the numbers from a special list that looks similar to BASIC DATA statements. It checks your typing on a line-by-line basis. It won't let you enter illegal characters when you should be typing numbers. It won't let you enter numbers greater than 255 (forbidden in ML). It won't let you enter the wrong numbers on the wrong line. In addition, MLX creates a ready-to-use tape or disk file. You can then use the LOAD command to read the program into the computer, as with any program:

```
LOAD "filename",1,1   (for tape)
LOAD "filename",8,1   (for disk)
```

To start the program, you enter a SYS command that transfers control from BASIC to machine language. The starting SYS number always appears in the appropriate article.

Using MLX

Type in and save the correct version of MLX for your computer (you'll want to use it in the future). When you're ready to type in an ML program, run MLX. MLX asks you for two numbers: the starting address and the ending address. These numbers are given in the article accompanying the ML program.

You'll see a prompt corresponding to the starting address. The prompt is the current line you are entering from the listing. It increases by six each time you enter a line. That's because each line has seven numbers—six actual data numbers plus a *checksum number*. The checksum verifies that you typed the previous six numbers correctly. If you enter any of the six numbers wrong, or enter the checksum wrong, the computer rings a buzzer and prompts you to reenter the line. If you enter it correctly, a bell tone sounds and you continue to the next line.

MLX accepts only numbers as input. It you make a typing error, press the INST/DEL key; the entire number is deleted. You can press it as many times as necessary back to the start of the line. If you enter three-digit numbers as listed, the computer automatically prints the comma and goes on to accept the next number. If you enter less than three digits, you can press either the comma, SPACE bar, or RETURN key to advance to the next number. The checksum automatically appears in inverse video for emphasis.

MLX Commands

When you finish typing an ML listing (assuming you type it all in one session) you can then save the completed program on tape or disk. Follow the screen instructions. If you get any errors while saving, you probably have a bad disk, or the disk is full, or you've made a typo when entering the MLX program itself.

You don't have to enter the whole ML program in one sitting. MLX lets you enter as much as you want, save it, and then reload the file from tape or disk later. MLX recognizes these commands:

SHIFT-S: Save	**SHIFT-N: New Address**
SHIFT-L: Load	**SHIFT-D: Display**

When you enter a command, MLX jumps out of the line you've been typing, so we recommend you do it at a new prompt. Use the Save command to save what you've been working on. It will save on tape or disk as if you've finished, but the tape or disk won't work, of course, until you finish the typing. Remember what address you stop at. The next time you run MLX, answer all the prompts as you did before, then insert the disk or tape. When you get to the entry prompt, press SHIFT-L to reload the partly completed file into memory. Then use the New Address command to resume typing.

To use the New Address command, press SHIFT-N and enter the address where you previously stopped. The prompt will change, and you can then continue typing. Always enter a New Address that matches up with one of the line numbers in the special listing, or else the checksum won't work. The Display command lets you display a section of your typing. After you press SHIFT-D, enter two addresses within the line number range of the listing. You can abort the listing by pressing any key.

The special MLX commands may seem a bit confusing, but as you work with MLX, they will become valuable. For example, what if you forgot where you stopped typing? Use the Display command to scan memory from the beginning to the end of the program. When you reach the end of your typing, the lines will contain a random pattern of numbers. When you see the end of your typing, press any key to stop the listing. Use the New Address command to continue typing from the proper location.

You can use the Save and Load commands to make copies of the completed program. Use Load to reload the tape or disk, then insert a new tape or disk and use Save to make a new copy.

Be sure to save MLX; it will be used for future ML programs in COMPUTE!'s GAZETTE.

See program listings on page 177.

The Automatic Proofreader

"The Automatic Proofreader" will help you type in program listings from COMPUTE!'s Gazette without typing mistakes. It is a short error-checking program that hides itself in memory. When activated, it lets you know immediately after typing a line from a program listing if you have made a mistake. Please read these instructions carefully before typing any programs in COMPUTE!'s Gazette.

Preparing The Proofreader

1. Using the listing below, type in the Proofreader. The same program works on both the VIC-20 and Commodore 64. Be very careful when entering the DATA statements — don't type an l instead of a 1, an O instead of a 0, extra commas, etc.

2. SAVE the Proofreader on tape or disk at least twice *before running it for the first time.* This is very important because the Proofreader erases this part of itself when you first type RUN.

3. After the Proofreader is SAVEd, type RUN. It will check itself for typing errors in the DATA statements and warn you if there's a mistake. Correct any errors and SAVE the corrected version. Keep a copy in a safe place — you'll need it again and again, every time you enter a program from COMPUTE!'s Gazette.

4. When a correct version of the Proofreader is RUN, it activates itself. You are now ready to enter a program listing. If you press RUN/STOP-RESTORE, the Proofreader is disabled. To reactivate it, just type the command SYS 886 and press RETURN.

Using The Proofreader

All VIC and 64 listings in COMPUTE!'s Gazette now have a *checksum number* appended to the end of each line, for example ":rem 123". *Don't enter this statement when typing in a program.* It is just for your information. The rem makes the number harmless if someone does type it in. It will, however, use up memory if you enter it, and it will confuse the Proofreader, even if you entered the rest of the line correctly.

When you type in a line from a program listing and press RETURN, the Proofreader displays a number at the top of your screen. *This checksum number must match the checksum number in the printed listing.* If it doesn't, it means you typed the line differently than the way it is listed. Immediately recheck your typing. Remember, don't type the rem statement with the checksum number; it is published only so you can check it against the number which appears on your screen.

The Proofreader is not picky with spaces. It will not notice extra spaces or missing ones. This is for your convenience, since spacing is generally not important. But occasionally proper spacing *is* important, so be extra careful with spaces, since the Proofreader will catch practically everything else that can go wrong.

There's another thing to watch out for: if you enter the line by using abbreviations for commands, the checksum will not match up. But there is a way to make the Proofreader check it. After entering the line, LIST it. This eliminates the abbreviations. Then move the cursor up to the line and press RETURN. It should now match the checksum. You can check whole groups of lines this way.

Special Tape SAVE Instructions

When you're done typing a listing, you must disable the Proofreader before SAVEing the program on tape. Disable the Proofreader by pressing RUN/STOP-RESTORE (hold down the RUN/STOP key and sharply hit the RESTORE key). This procedure is not necessary for disk SAVEs, *but you must disable the Proofreader this way before a tape SAVE.*

SAVE to tape erases the Proofreader from memory, so you'll have to LOAD and RUN it again if you want to type another listing. SAVE to disk does not erase the Proofreader.

Replace Original Proofreader

If you typed in the original version of the Proofreader (October 1983 issue), you should replace it with the improved version below. We added a POKE to the original version to protect it from being erased when you LOAD another program from tape. The POKE does protect the Proofreader, and the Proofreader itself was not affected. However, a quirk in the VIC-20's operating system means that programs typed in with the Proofreader and SAVEd on tape cannot be LOADed properly later. If you LOAD a program SAVEd while the Proofreader was in memory, you see ?LOAD ERROR. This applies only to VIC tape SAVEs (disk SAVEs work OK, and the quirk was fixed in the Commodore 64).

If you have a program typed in with the original Proofreader and SAVEd on tape, follow this special LOAD procedure:

1. Turn the power off, then on.

2. LOAD the program from tape (disregard the ?LOAD ERROR).

3. Enter: POKE 45,PEEK(174):POKE 46,PEEK(175):CLR

4. ReSAVE the program to tape.

The program will LOAD fine in the future. We strongly recommend that you type in the new version of the Proofreader and discard the old one.

Automatic Proofreader For VIC And 64

```
100 PRINT"{CLR}PLEASE WAIT...":FORI=886TO
    1018:READA:CK=CK+A:POKEI,A:NEXT
110 IF CK<>17539 THEN PRINT"{DOWN}YOU MAD
    E AN ERROR":PRINT"IN DATA STATEMENTS.
    ":END
120 SYS886:PRINT"{CLR}{2 DOWN}PROOFREADER
     ACTIVATED.":NEW
886 DATA 173,036,003,201,150,208
892 DATA 001,096,141,151,003,173
898 DATA 037,003,141,152,003,169
904 DATA 150,141,036,003,169,003
910 DATA 141,037,003,169,000,133
916 DATA 254,096,032,087,241,133
922 DATA 251,134,252,132,253,008
928 DATA 201,013,240,017,201,032
934 DATA 240,005,024,101,254,133
940 DATA 254,165,251,166,252,164
946 DATA 253,040,096,169,013,032
952 DATA 210,255,165,214,141,251
958 DATA 003,206,251,003,169,000
964 DATA 133,216,169,019,032,210
970 DATA 255,169,018,032,210,255
976 DATA 169,058,032,210,255,166
982 DATA 254,169,000,133,254,172
988 DATA 151,003,192,087,208,006
994 DATA 032,205,189,076,235,003
1000 DATA 032,205,221,169,032,032
1006 DATA 210,255,032,210,255,173
1012 DATA 251,003,133,214,076,173
1018 DATA 003
```

Bug-Swatter:
Modifications And Corrections

• In "Hardhat Climber" (January), the climber may accidentally jump when the joystick is pushed diagonally. Thanks to reader Stephen A. Ohayon for discovering this correction:

```
105 IF(JVAND16)=16THENJV=1:GOTO109:rem 62
```

If you want the climber to jump only when the joystick is in the neutral position, change the first 16 to a 31.

• The program listing of "Cave-In For VIC-20" (January) was inadvertently labeled "Cave-In For 64." The program will run only on the VIC-20.

• The Commodore 64 version of "MLX: Machine Language Entry Program" (December 1983) contained lines which were longer than the 80-character limit. Lines 160, 210, and 230 should be entered with abbreviated BASIC commands (P Shift-O for POKE, ? for PRINT). If you abbreviate, you will be able to type these lines within 80 characters, but the Proofreader rem numbers will appear to be incorrect. The program listing was corrected in the January version of MLX (see below).

• In correcting the problem described above, line 210 of MLX—64 Version (January) was split into two lines. But when line 215 was added, a closing parenthesis was omitted. To correct this, add a closing parenthesis to the end of line 215.

• Some readers have had difficulty using "The Assembler" (November 1983 "Machine Language For Beginners") to enter Programs 1 and 2 (December 1983), encountering ?EXTRA IGNORED errors on lines using indexed addressing. This is because Commodore BASIC will not accept commas in the middle of INPUT. Programs 1 and 2 were disassembled using the comma convention; readers who want to use The Assembler should type the program lines *without* commas. For example, instead of *STA 1024,Y* use *STA 1024Y*.

In addition, line 200 of The Assembler should have included an Automatic Proofreader rem number of 0.

• The printer used to generate GAZETTE program listings still places an occasional random question mark. Line 1018 of "Disk File Manager" (December 1983) contains one such superfluous character. To correct this, delete the question mark after FILE=. The program runs as listed, but the Proofreader checksum number will not be correct if the question mark is included.

• "Thinking" (December 1983) contains a minor typographical error. If the REM is removed from line 2 to convert Thinking to Thinking Harder, there are nine switches instead of six. But the prompt in line 132 says there are six. To correct this, change YOUR NUMBER (1–6) to YOUR NUMBER (1–"G$").

• "Foolproof INPUT" ("PowerBASIC," December 1983) as published does not solve the problems caused by commas and colons. It disables the cursor keys and certain other function keys, but commas will still cause an ?EXTRA IGNORED error. The solution is to POKE 198,1: POKE 631,34 before each INPUT. In a program with many INPUT statements, these two POKEs could be put into a subroutine. After the POKEs, the computer will be in quote mode, which allows entry of commas and colons.

• Readers who bowled a perfect game (300) in "Bowling Champ" (December 1983) may have been disappointed to find 290 as their score. Our thanks to reader David McDonnell, Jr., for finding this bug. To correct it, change these lines:

```
209 J=0:GOSUB430:GOSUB550:T(Z9)=T(Z9)+J
                                    :rem 83
210 K=J+176:IFK=186THENK=152:T(Z9)=T(Z9)-
    J*(U=0)                         :rem 8
211 PRINTC$(Z9);T(Z9):POKEL(Z9),K:POKEL(Z
    9)+CO,4:L(Z9)=L(Z9)+1           :rem 216
```

• "Spelling Bee For VIC" (December 1983) contains a minor error. Line 360 includes a PRINT color which is accessible on the Commodore 64, but not on the VIC. To remedy this, change Commodore-5 to CTRL-5 (purple).

• Readers Wesley Evans and Dick Sloss both discovered an error in the program "Sprite BASIC" from "Sprites Made Easy" (December 1983). The problem occurs in the colors of sprites 1–7. To correct this, make the following changes:

```
170 FOR I=49152 TO 49384:READN:POKE I,N:A
    =A+N:NEXT I                     :rem 189
180 IF A<>30780 THEN PRINT "ERROR IN DATA
     STATEMENTS"                    :rem 40
280 DATA 138,164,2,145,251,32,253,174,32,
    227,192,224,16,176,146,138,153
                                    :rem 179
300 DATA 23,208,32,253,174,32,227,192,224
    ,4,176,223,134,2,70,2,144       :rem 160
340 DATA 32,158,183,164,2,96        :rem 104
```

In addition, some readers have run into problems with the "Tie Fighter" program in the same article. The program runs as listed, but only if "Sprite BASIC" is loaded and run first.

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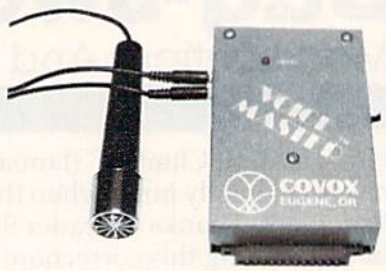

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Tree Tutor For Tots

(Article on page 60.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: Tree Tutor For VIC

```
2 PRINT"{CLR}{8 DOWN}{RVS}{5 RIGHT}*{UP}
  {LEFT}*TREE{RIGHT}TUTOR*{DOWN}{LEFT}*
  {DOWN}{12 LEFT}*{RIGHT}FOR{RIGHT}TOTS
  {RIGHT}*"                          :rem 121
4 POKE36869,255:POKE52,28:POKE56,28:CLR:F
  ORI=7168TO7679:POKEI,PEEK(I+25600):NEXT
                                     :rem 97
6 FORI=7168TO7263:READN:POKEI,N:NEXT:POKE
  36879,29:V=36878:M=36876:C=30720
                                    :rem 173
8 X=0:PRINT"{CLR}{BLU}{RVS}{2 SPACES}CHOO
  SE HIGHEST SUM"SPC(10)"(2-9)"    :rem 83
10 GETF$:F=VAL(F$):IFF<2ORF>9THEN10
                                    :rem 113
12 PRINT"{CLR}{RVS}WHEN DO YOU WANT TO
   {3 SPACES}SEE FRUIT?{2 DOWN}{4 LEFT}(1
   ) ALWAYS"SPC(12)"{DOWN}(2) IF WRONG"
                                    :rem 149
14 GETI$:I=VAL(I$):IFI<1ORI>2THEN14
                                    :rem 128
16 PRINT"{CLR}":POKE8183,205:POKE8184,228
   :POKE8185,206:FORB=38903TO38905:POKEB,
   10:NEXT                          :rem 216
18 FORL=1TO10:Q=240:IFI$="2"THENI=2
                                    :rem 60
20 T=INT(RND(.)*F)+1                :rem 94
22 B=INT(RND(.)*((F+1)-T)):IFT=T1ANDB=B1T
   HEN20                            :rem 166
24 PRINT"{HOME}{2 DOWN}";:FORY=1TO20:PRIN
   T"{18 SPACES}":NEXT:PRINT"{9 SPACES}";
                                    :rem 94
26 FORZ=38796TO38883:POKEZ,2:NEXT :rem 66
28 PRINT"{HOME}{2 DOWN}{GRN}{3 SPACES}HFH
   FHF":PRINT"{2 SPACES}HJJJJJJF":PRINT"
   {SPACE}HJJJJJJJJF":PRINT" GJJJJJJJJI"
                                    :rem 97
30 PRINT" HJJJJJJJJF":PRINT" GJJJJJJJJI":
   PRINT" HJJJJJJJJF":PRINT" GJJJJJJJJI"
                                    :rem 209
32 PRINT"{2 SPACES}GJJJJJJI":PRINT"
   {3 SPACES}GJJJJI":PRINT"{4 SPACES}GJJI
   ":PRINT"{5 SPACES}{BLK}JJ{DOWN}
   {2 LEFT}JJ{DOWN}{2 LEFT}JJ{DOWN}
   {2 LEFT}JJ";                     :rem 123
34 PRINT"{DOWN}{2 LEFT}JJ{DOWN}{2 LEFT}JJ
   {DOWN}{3 LEFT}HJJF"               :rem 0
36 X=X+1:PRINT"{HOME}{8 DOWN}{16 RIGHT}
   {BLK}"T"{4 LEFT}{2 DOWN}+"B"{4 LEFT}
   {DOWN}{RVS}***":PRINTSPC(17)"?
   {2 LEFT}";                       :rem 204
38 IFI=2THEN76                      :rem 78
40 POKE7751,11:POKE7751+C,10:IFT=1THEN58
                                    :rem 84
42 POKE7860,11:POKE7860+C,10:IFT=2THEN58
                                    :rem 89
```

```
44 POKE7885,11:POKE7885+C,10:IFT=3THEN58
                                    :rem 106
46 POKE7775,11:POKE7775+C,10:IFT=4THEN58
                                    :rem 105
48 POKE7815,11:POKE7815+C,10:IFT=5THEN58
                                    :rem 98
50 POKE7820,11:POKE7820+C,10:IFT=6THEN58
                                    :rem 84
52 POKE7903,11:POKE7903+C,10:IFT=7THEN58
                                    :rem 91
54 POKE7840,11:POKE7840+C,10:IFT=8THEN58
                                    :rem 94
56 POKE7928,11:POKE7928+C,10        :rem 64
58 IFB=0THEN76                      :rem 71
60 POKE8086,0:IFB=1THEN76           :rem 220
62 POKE8078,0:IFB=2THEN76           :rem 224
64 POKE8123,0:IFB=3THEN76           :rem 218
66 POKE8150,0:IFB=4THEN76           :rem 221
68 POKE8106,0:IFB=5THEN76           :rem 225
70 POKE8146,0:IFB=6THEN76           :rem 223
72 POKE8126,0:IFB=7THEN76           :rem 224
74 POKE8152,0                       :rem 198
76 POKE198,0                        :rem 154
78 GETA$:AN=VAL(A$):IFAN<1ORAN>9THEN78
                                    :rem 93
80 PRINTAN:FORZ=1TO500:NEXT:IFAN=T+BTHEN8
   6                                :rem 17
82 PRINT"{RVS}{9 DOWN}TRY AGAIN";:POKEV,5
   :POKEM,231:FORZ=1TO200:NEXT:POKEM,225
                                    :rem 42
84 FORZ=1TO200:NEXT:POKEV,0:I=0:GOTO36
                                    :rem 176
86 PRINT"{RVS}{9 DOWN}HOORAY!{2 SPACES}"S
   PC(7)L;:T1=T:B1=B:A=7700         :rem 212
88 PRINT"{HOME}{2 SPACES}";:FORB=1TO3:PRI
   NT"{BLK}{OFF}CAE{3 LEFT}";:FORZ=1TO75:
   NEXT:PRINT"BAD{3 LEFT}";         :rem 147
90 FORZ=1TO75:NEXT:PRINT"{3 SPACES}
   {2 LEFT}{DOWN}";:NEXT            :rem 170
92 FORB=1TO2:PRINT" {RED}{UP}@{UP}
   {2 LEFT}{BLK}CAE{3 LEFT}";:IFB=2THENPO
   KE7730,6:POKE7730+C,5:GOTO96     :rem 251
94 POKE7751,10:POKE7751+C,5:POKE7728,6:PO
   KE7728+C,5:POKE7729,8:POKE7729+C,5
                                    :rem 115
96 FORZ=1TO75:NEXT:PRINT"BAD{3 LEFT}";:FO
   RZ=1TO75:NEXT:PRINT"{3 SPACES}{DOWN}
   {2 LEFT}";:NEXT                  :rem 5
98 FORB=1TO13:PRINT" {RED}@{UP}{3 LEFT}
   {BLK}CAE{3 LEFT}";:FORZ=1TO75:NEXT:PRI
   NT"BAD{3 LEFT}";                 :rem 158
100 FORZ=1TO75:NEXT:PRINT"{3 SPACES}
    {DOWN}{2 LEFT}";:NEXT           :rem 210
102 PRINT"{UP}{LEFT}";:PRINT" CA{2 LEFT}"
    ;:GOSUB124:PRINT"BA{2 LEFT}";:GOSUB12
    4:PRINT" C{LEFT}";:GOSUB124     :rem 237
104 PRINT"B{LEFT}";:GOSUB124:PRINT" ";
                                    :rem 23
106 FORB=1TO(15-L):POKEM,Q:POKEA,32:A=A+2
    2:POKEA,0:POKEA+C,2:Q=Q-5:NEXT:POKEV,
    0:NEXT                          :rem 251
108 PRINT"{HOME}{8 DOWN}{11 RIGHT}
    {11 SPACES}{DOWN}{10 LEFT}{RVS}{BLK}Y
    OU GOT 10{DOWN}{10 LEFT}APPLES IN"
                                    :rem 240
110 PRINT"{RVS}{11 RIGHT}"X"TRIES.{DOWN}
    {4 LEFT}{2 SPACES}":FORZ=1TO300:NEXT
                                    :rem 34
112 PRINT"{HOME}{21 RIGHT}{BLK}U{LEFT}";:
    FORZ=1TO75:NEXT:PRINT"B{LEFT}";:FORZ=
    1TO75:NEXT                      :rem 157
114 PRINT" {DOWN}{2 LEFT}CA{2 LEFT}";:FOR
    Z=1TO75:NEXT:PRINT"BA{2 LEFT}";:FORZ=
    1TO75:NEXT                      :rem 144
116 FORB=1TO7:PRINT"{3 SPACES}{4 LEFT}
    {DOWN}CAE {4 LEFT}";:FORZ=1TO75:NEXT:
    PRINT"BAD{3 LEFT}";:FORZ=1TO75:NEXT
                                    :rem 215
118 NEXT:PRINT"{RVS}{6 DOWN}{LEFT}{BLU}HI
    T *{DOWN}{5 LEFT}TO PLAY{DOWN}
    {7 LEFT}AGAIN."                 :rem 12
120 GETP$:IFP$<>"*"THEN120          :rem 206
122 GOTO8                           :rem 6
124 POKEV,9:FORB=1TO2:POKEM,Q:POKEA,32:A=
    A+22:POKEA,0:POKEA+C,2:Q=Q-5:FORZ=1TO
    15:NEXT                         :rem 127
126 NEXT:RETURN                     :rem 242
128 DATA24,8,106,255,255,255,126,52,60,12
    6,187,199,239,126,40,40         :rem 147
130 DATA0,0,0,15,31,48,96,192,240,120,12,
    7,3,0,0,0,0,0,0,240,248,12,6,3
                                    :rem 137
132 DATA15,30,48,224,192,0,0,0,192,240,24
    8,252,252,254,255,255           :rem 18
134 DATA255,255,127,127,63,31,15,3,3,7,15
    ,31,63,63,127,255               :rem 84
136 DATA255,254,254,252,252,248,224,192,2
    55,255,255,255,255,255,255,255
                                    :rem 254
138 DATA245,105,170,170,170,170,170,105
                                    :rem 169
```

Program 2: Tree Tutor For The 64

```
100 POKE53281,1:POKE53270,PEEK(53270)OR16
    :POKE53282,5:POKE53283,2        :rem 207
110 PRINT"{CLR}{11 DOWN}{12 RIGHT}";
                                    :rem 72
120 PRINT"{BLK}*{UP}{LEFT}*TREE{2 RIGHT}T
    UTOR*{DOWN}{LEFT}*{DOWN}{13 LEFT}*
    {2 RIGHT}FOR{RIGHT}TOTS{RIGHT}*"
                                    :rem 131
130 PRINT"{4 DOWN}{11 RIGHT} LOADING
    {2 SPACES}DATA"                 :rem 0
140 POKE56334,PEEK(56334)AND254:POKE1,PEE
    K(1)AND251                      :rem 182
150 POKE56,48:CLR:FORI=12288TO16383:POKEI
    ,PEEK(I+40960):NEXT             :rem 123
160 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334
    )OR1                            :rem 134
170 FORI=12288TO12383:READN:POKEI,N:NEXT:
    POKE53281,1:C=54272             :rem 126
180 FORQ=CTOC+24:POKEQ,0:NEXT:POKEC+24,15
    :POKEC+5,17:POKEC+6,245         :rem 154
190 X=0:PRINT"{CLR}{BLK}{2 SPACES}{RVS} C
    HOOSE HIGHEST SUM "SPC(10)"(2-9)"
                                    :rem 38
200 GETF$:F=VAL(F$):IFF<2ORF>9THEN200
                                    :rem 211
210 PRINT"{CLR}{4 RIGHT}{RVS}WHEN DO YOU
    {SPACE}WANT TO SEE FRUIT?{4 DOWN}"
                                    :rem 6
220 PRINTSPC(12)"(1) ALWAYS{4 DOWN}"
                                    :rem 150
230 PRINTSPC(12)"(2) IF WRONG"      :rem 159
240 GETI$:I=VAL(I$):IFI<1ORI>2THEN240
                                    :rem 226
250 PRINT"{CLR}":POKE1938,77:POKE1940,100
    :POKE1942,78                    :rem 155
260 FORB=56210TO56214:POKEB,10:NEXT
                                    :rem 82
270 FORL=1TO10:Q=240:IFI$="2"THENI=2
                                    :rem 108
```

```
280 T=INT(RND(.)*F)+1                    :rem 150
290 B=INT(RND(.)*((F+1)-T)):IFT=T1ANDB=B1
    THEN280                              :rem 21
300 PRINT"{HOME}{2 DOWN}";:FORY=1TO21:PRI
    NT"{19 SPACES}":NEXT:PRINT"
    {12 SPACES}";                        :rem 140
310 FORZ=56016TO56176:POKEZ,2:NEXT:POKE53
    272,29                               :rem 93
320 PRINT"{HOME}{2 DOWN}{GRN}{3 SPACES}HF
    HFHFHFHF":PRINT"{2 SPACES}HJJJJJJJJJJ
    F"                                   :rem 252
330 PRINT" HJJJJJJJJJJJJF":PRINT" GJJJJJJ
    JJJJJJI"                             :rem 128
340 PRINT" HJJJJJJJJJJJJF":PRINT" GJJJJJJ
    JJJJJJI"                             :rem 129
350 PRINT" HJJJJJJJJJJJJF":PRINT" GJJJJJJ
    JJJJJJI"                             :rem 130
360 PRINT"{2 SPACES}GJJJJJJJJJJI":PRINT"
    {3 SPACES}GJJJJJJJJI":PRINT"
    {4 SPACES}GJJJJJJI"                  :rem 32
370 PRINT"{5 SPACES}GJJJJI{DOWN}{5 LEFT}
    {BLK}JJJJ{DOWN}{4 LEFT}JJJJ{DOWN}
    {4 LEFT}JJJJ";                       :rem 146
380 PRINT"{DOWN}{4 LEFT}JJJJ{DOWN}
    {4 LEFT}JJJJ{DOWN}{5 LEFT}HJJJJF"
                                         :rem 158
390 X=X+1:PRINT"{HOME}{8 DOWN}{16 RIGHT}
    {BLK}"T"{4 LEFT}{2 DOWN}+"B"{4 LEFT}
    {DOWN}***"                           :rem 143
400 PRINTSPC(17)"?{2 LEFT}";             :rem 184
410 IFI=2THEN600                         :rem 161
420 POKE1151,11:POKE1151+C,10:IFT=1THEN51
    0                                    :rem 151
430 POKE1226,11:POKE1226+C,10:IFT=2THEN51
    0                                    :rem 159
440 POKE1396,11:POKE1396+C,10:IFT=3THEN51
    0                                    :rem 177
450 POKE1196,11:POKE1196+C,10:IFT=4THEN51
    0                                    :rem 175
460 POKE1269,11:POKE1269+C,10:IFT=5THEN51
    0                                    :rem 179
470 POKE1278,11:POKE1278+C,10:IFT=6THEN51
    0                                    :rem 181
480 POKE1429,11:POKE1429+C,10:IFT=7THEN51
    0                                    :rem 179
490 POKE1314,11:POKE1314+C,10:IFT=8THEN51
    0                                    :rem 167
500 POKE1474,11:POKE1474+C,10:IFT=5THEN51
    0                                    :rem 170
510 IFB=0THEN600                         :rem 153
520 POKE1762,0:IFB=1THEN600               :rem 48
530 POKE1747,0:IFB=2THEN600               :rem 53
540 POKE1829,0:IFB=3THEN600               :rem 56
550 POKE1878,0:IFB=4THEN600               :rem 62
560 POKE1798,0:IFB=5THEN600               :rem 65
570 POKE1871,0:IFB=6THEN600               :rem 59
580 POKE1834,0:IFB=7THEN600               :rem 60
590 POKE1882,0                           :rem 252
600 POKE198,0:                           :rem 253
610 GETA$:AN=VAL(A$):IFAN<1ORAN>9THEN610
                                         :rem 173
620 PRINT(AN):FORZ=1TO500:NEXT:IFAN=T+BTH
    EN660                                :rem 192
630 PRINT"{RVS}{9 DOWN}TRY AGAIN{OFF}";:P
    OKEC,5:POKEC+1,5:FORZ=1TO200:NEXT
                                         :rem 78
640 POKEC+4,33:FORZ=1TO200:NEXT:POKEC+4,3
    2                                    :rem 48
650 I=0:GOTO390                          :rem 96
660 PRINT"{RVS}{8 DOWN}{RVS}{DOWN}HOORAY!
    {2 SPACES}"SPC(7)L;:T1=T:B1=B:A=1060
                                         :rem 13
670 PRINT"{HOME}{4 RIGHT}";:FORB=1TO3:PRI
    NT"{BLK}{OFF}CAE{3 LEFT}";:FORZ=1TO75
    :NEXT:PRINT"BAD{3 LEFT}";            :rem 52
680 FORZ=1TO75:NEXT:PRINT"{3 SPACES}
    {2 LEFT}{DOWN}";:NEXT                :rem 223
690 FORB=1TO3:PRINT" {RED}{UP}@{UP}
    {2 LEFT}{BLK}CAE{3 LEFT}";:IFB=2THENP
    OKE1112,6:POKE1112+C,5:GOTO720:rem 66
700 POKE1151,10:POKE1151+C,5:POKE1110,6:P
    OKE1110+C,5:POKE1111,8               :rem 53
710 POKE1111+C,5                         :rem 90
720 FORZ=1TO75:NEXT:PRINT"BAD{3 LEFT}";:F
    ORZ=1TO75:NEXT:PRINT"{3 SPACES}{DOWN}
    {2 LEFT}";:NEXT                      :rem 47
730 FORB=1TO27:PRINT" {RED}@{UP}{3 LEFT}
    {SPACE}{BLK}CAE{3 LEFT}";:FORZ=1TO75:
    NEXT:PRINT"BAD{3 LEFT}";             :rem 204
740 FORZ=1TO45:NEXT:PRINT"{3 SPACES}
    {DOWN}{2 LEFT}";:NEXT                :rem 217
750 PRINT"{UP}{LEFT}";:PRINT" CA{2 LEFT}"
    ;:GOSUB930:PRINT"BA{2 LEFT}";:GOSUB93
    0                                    :rem 137
760 PRINT"{2 SPACES}{LEFT}";:GOSUB930
                                         :rem 156
770 PRINT"{2 SPACES}{LEFT} ";:GOSUB930:PR
    INT"{DOWN}{3 LEFT}{3 SPACES}":rem 144
780 POKEC+4,17                            :rem 4
790 FORB=1TO14-L:POKEC+1,Q/4:POKEC,Q/4:PO
    KEA,32:A=A+40:POKEA,0:POKEA+C,2:Q=Q-5
                                         :rem 230
800 NEXT:POKEC+4,16:NEXT                 :rem 238
810 PRINT"{HOME}{8 DOWN}{22 RIGHT}
    {11 SPACES}{DOWN}{10 LEFT}{RVS}{BLK}
    {SPACE}YOU GOT 10";                  :rem 219
820 PRINT"{RVS}{DOWN}{11 LEFT}{3 SPACES}A
    PPLE{3 SPACES}";                     :rem 250
830 PRINT"{RVS}{DOWN}{11 LEFT}IN"X"{LEFT}
     TRIES.";:FORZ=1TO300:NEXT           :rem 166
840 PRINT"{OFF}{DOWN}{11 LEFT}{11 SPACES}
    "                                    :rem 207
850 PRINT"{HOME}{31 RIGHT}{BLK}U{LEFT}";:
    FORZ=1TO75:NEXT:PRINT"B{LEFT}";
                                         :rem 87
860 FORZ=1TO75:NEXT                      :rem 213
870 PRINT" {DOWN}{2 LEFT}CA{2 LEFT}";:FOR
    Z=1TO75:NEXT:PRINT"BA{2 LEFT}";:FORZ=
    1TO75:NEXT                           :rem 153
880 FORB=1TO7:PRINT"{3 SPACES}{4 LEFT}
    {DOWN}CAE {4 LEFT}";:FORZ=1TO75:NEXT:
    PRINT"BAD{3 LEFT}";                  :rem 110
890 FORZ=1TO75:NEXT                      :rem 216
900 NEXT:PRINT"{RVS}{6 DOWN}{LEFT}{BLU}HI
    T *{DOWN}{5 LEFT}TO PLAY{DOWN}
    {7 LEFT}AGAIN."                      :rem 11
910 GETP$:IFP$<>"*"THEN910               :rem 220
920 POKE53272,21:GOTO190                 :rem 105
930 FORB=1TO2::POKEA,32:A=A+40:POKEA,0
                                         :rem 11
940 FORZ=1TO15:NEXT:NEXT:RETURN          :rem 97
950 DATA24,8,106,255,255,255,126,52,60,12
    6,187,199,239,126,40,40              :rem 150
960 DATA0,0,0,15,31,48,96,192,240,120,12,
    7,3,0,0,0,0,0,0,240,248,12,6,3
                                         :rem 148
970 DATA15,30,48,224,192,0,0,0,192,240,24
    8,252,252,254,255,255                :rem 28
980 DATA255,255,127,127,63,31,15,3,3,7,15
    ,31,63,63,127,255                    :rem 93
990 DATA255,254,254,252,252,248,224,192,2
    55,255,255,255,255,255,255,255 :rem 6
1000 DATA245,105,170,170,170,170,170,105
                                         :rem 206
```

VICreations

(Article on page 124.)

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```
1 REM REMEMBER TO CHNG{2 SPACES}"N", LINE
   #900 WHEN{3 SPACES}ADDING/DELETING DAT
  A{2 SPACES}STATEMENTS                :rem 63
10 PRINT"{CLR}{DOWN} DO YOU WISH TO SEE":
   PRINT" THE MENU?":PRINT"{DOWN} (PRESS
   {SPACE}Y OR N)"                      :rem 195
20 GETY$:IFY$=""THEN20                  :rem 23
21 IFY$="Y"THEN800                      :rem 16
25 PRINT"{2 DOWN} LOADING DATABASE...":PR
   INT" PLEASE WAIT.":GOSUB900          :rem 146
30 S=0:PRINT"{CLR}{DOWN}ENTER SEARCH"SPC(
   4)"PRESS":PRINT"ARGUMENT"SPC(8)"F-KEY
   {2 DOWN}"                            :rem 225
31 PRINT"{DOWN}ARTICLE SUBJECT{3 SPACES}1
   {DOWN}":PRINT"ARTICLE NAME"SPC(6)"3
   {DOWN}"                              :rem 193
32 PRINT"MAGAZINE NAME"SPC(5)"5"        :rem 136
33 PRINT"{DOWN}TYPE OF COMPUTER{2 SPACES}
   7":PRINT"{DOWN}END PROGRAM"SPC(7)"8"
                                        :rem 186
40 GETX$                                :rem 192
41 IFX$="{F1}"THENS=3                   :rem 104
42 IFX$="{F3}"THENS=2                   :rem 105
43 IFX$="{F5}"THENS=1                   :rem 106
44 IFX$="{F7}"THENS=6                   :rem 113
45 IFX$="{F8}"THENPRINT"{CLR}{DOWN} END P
   ROGRAM":CLR:END                      :rem 64
46 IFS=0THEN40                          :rem 76
60 PRINT"{CLR}{DOWN} ENTER SUBJECT OF
   {DOWN}":PRINT" SEARCH:{2 DOWN}":INPUTS
   $                                    :rem 109
65 FORZ=1TON:IFA$(Z,S)=S$THENGOSUB300
                                        :rem 89
70 NEXTZ                                 :rem 0
75 PRINT"{CLR}{DOWN} END OF DATA OR{DOWN}
   ":PRINT" SUBJECT NOT FOUND{DOWN}"
                                        :rem 178
76 PRINT" (CHECK SPELLING){2 DOWN}"
                                        :rem 109
77 GOSUB600:GOTO30                       :rem 90
300 PRINT"{CLR} SUBJECT FOUND:{2 DOWN}":P
    RINT"MAGAZINE:":PRINTA$(Z,1)        :rem 164
301 PRINT"{DOWN}ARTICLE:":PRINTA$(Z,2)
                                        :rem 233
302 PRINT"{DOWN}SUBJECT:":PRINTA$(Z,3):PR
    INT"{DOWN}DATE:":PRINTA$(Z,4):PRINT"
    {DOWN}PAGE NO.:"                    :rem 224
303 PRINTA$(Z,5):PRINT"{DOWN}COMPUTER:":P
    RINTA$(Z,6)                         :rem 146
305 GOSUB600:RETURN                     :rem 200
600 PRINT"{DOWN} (PRESS RETURN)"         :rem 54
601 GETY$:IFY$=""THEN601                :rem 129
602 RETURN                              :rem 120
800 PRINT"{CLR}{DOWN} RECORD FORMAT:
    {DOWN}":PRINT"1) MAGAZINE NAME{DOWN}"
    :PRINT"2) ARTICLE NAME{DOWN}"       :rem 95
801 PRINT"3) SUBJECT OF ARTICLE{DOWN}":PR
    INT"4) MONTH.YEAR{DOWN}":PRINT"5) PAG
    E NO.{DOWN}"                        :rem 64
802 PRINT"6) COMPUTER TYPE":PRINT"
    {2 DOWN} SEPARATE EACH ENTRY{DOWN}":P
    RINT" BY A COMMA{DOWN}"             :rem 26
803 GOSUB600                            :rem 177
804 PRINT"{CLR}{DOWN}WHEN PROMPTED TO":PR
    INT"{DOWN}ENTER SEARCH ARGUMENT,"
                                        :rem 48
805 PRINT"PRESS F-KEY FOR":PRINT"{DOWN}DE
    SIRED FUNCTION.{2 DOWN}"            :rem 16
806 GOSUB600                            :rem 180
807 PRINT"{CLR}{DOWN}WHEN PROMPTED TO
    {DOWN}":PRINT"ENTER SUBJECT OF{DOWN}"
                                        :rem 164
808 PRINT"SEARCH, ENTER NAME,{DOWN}":PRIN
    T"THEN PRESS RETURN.{2 DOWN}":GOSUB60
    0                                   :rem 118
809 GOTO10                               :rem 59
900 N=5:DIMA$(N,6):FORR=1TON:FORC=1TO6:RE
    ADA$(R,C):NEXTC:NEXTR:RETURN        :rem 190
901 DATA GAZETTE,SPEEDSCRIPT,WORD PROCESS
    ING,1.84,38,VIC/64                  :rem 212
902 DATA GAZETTE,CAVE-IN,GAME,1.84,80,VIC
                                        :rem 183
903 DATA GAZETTE,ELECTRONIC NOTEPAD,UTILI
    TY,1.84,112,64                      :rem 150
904 DATA GAZETTE,HORIZONS 64,GENERAL,1.84
    ,136,64                             :rem 90
905 DATA GAZETTE,MLX,M/L,1.84,171,VIC/64
                                        :rem 64
```

Trenchfire

(Article on page 52.)

Program 1: 64 Version

```
5 PRINT"{CLR}":POKE214,10:PRINT:PRINTTAB(
  13)"{RVS}TRENCH FIRE":FORJ=1TO999:NEXT
                                        :rem 32
10 POKE53281,11:POKE53282,12:POKE53283,13
   :Z=53270:POKEZ,PEEK(Z)OR16           :rem 180
20 POKE52,56:POKE56,56:CLR:POKE56334,PEEK
   (56334)AND254:POKE1,PEEK(1)AND251
                                        :rem 112
30 IFPEEK(14336)<>60THENFORI=0TO511:POKEI
   +14336,PEEK(I+53248):NEXT            :rem 194
35 POKE1,PEEK(1)OR4:POKE53280,0:V=53248
                                        :rem 10
40 POKE56334,PEEK(56334)OR1:POKE53272,(PE
   EK(53272)AND240)+14:POKE54296,0:rem 59
50 FORJ=0TO7:POKE14336+27*8+J,170:POKE143
   36+29*8+J,85:READQ:POKE14848+J,Q
                                        :rem 241
55 POKE14336+28*8+J,255:POKE14336+31*8+J,
   255-PEEK(14336+46*8+J):NEXT          :rem 239
57 DATA255,243,243,192,243,243,255,255
                                        :rem 142
60 FORJ=0TO15:READQ:POKE14856+J,Q:NEXT:DA
   TA254,254,252,240,232,156,235,247
                                        :rem 231
61 DATA127,127,63,15,23,57,215,239
                                        :rem 191
85 D=55296-1024:FORJ=1024TO1503:IFRND(1)>
   .9THENPOKEJ,31:POKEJ+D,8:J=J+1:rem 193
87 POKEJ,28:POKEJ+D,8:NEXT:Q$="SCORE"
                                        :rem 41
88 FORJ=1TO5:POKE1023+J,ASC(MID$(Q$,J,1))
   -64:POKE1023+J+D,0:NEXT:POKE1029,58
                                        :rem 195
```

```
89 FORJ=1029TO1035:POKEJ+D,0:NEXT:NS=3:GO
   SUB5000:SC=0:GOSUB5010          :rem 149
90 FORJ=1TO10:READQ:POKEQ-47,64:NEXT
                                   :rem 20
95 DATA1087,1090,1165,1212,1251,1290,1331
   ,1297,1371,1413                 :rem 6
110 FORJ=1TO16                     :rem 59
113 G=0                            :rem 73
115 IFJ>5THENIFJ/2=INT(J/2)THENF=F+40:G=4
   0                               :rem 25
120 READC                          :rem 242
130 T=1+J                          :rem 203
140 FORX=0TO18-T:M=1344+J*40+X:N=1344+J*4
   0+39-X                          :rem 148
150 Q=M:GOSUB500:Q=N:GOSUB500      :rem 37
160 NEXTX                          :rem 46
170 FORI=1364+J*40TO1444+J*40+FSTEP40
                                   :rem 90
180 Q=I-T-1:GOSUB500:Q=I+T:GOSUB500
                                   :rem 125
190 NEXT:I=I-40                    :rem 115
200 FORH=I-T-1 TOI+T               :rem 145
210 Q=H:GOSUB500:Q=H-G:GOSUB500:NEXT:NEXT
   :GOTO700                        :rem 135
300 DATA32,27,29,32,27,29,29,32,32,27,27,
   29,29,29,32,32                  :rem 197
500 IFQ<2024THENPOKEQ,C:POKEQ+D,8  :rem 36
501 RETURN                         :rem 118
700 IFPEEK(832)=33THEN800          :rem 163
705 FORJ=0TO2:FORI=0TO62:READQ:POKE832+J*
   64+I,Q:NEXT:NEXT                :rem 138
710 DATA33,0,0,64,128,0,140,64,0,158,64,0
   ,243,192,0,158,64,0,140,64,0    :rem 80
720 DATA64,128,0,33,0,0,0,0,0,0,0,0,0,0,0
   ,0,0,0,0,0,0                    :rem 238
730 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
   ,0,0,0,0                        :rem 20
735 DATA0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
   ,0,0,0,0                        :rem 25
740 DATA0,8,0,0,8,0,0,28,0,0,28,0,1,255,1
   92,3,255,224,127,127,127        :rem 135
750 DATA30,62,60,3,99,96,1,193,192,0,0,0,
   0,0,0,0,0,0,0,0,0               :rem 21
770 DATA0,128,0,32,32,0,0,2,0,10,128,2,40
   ,2,0,152,130,128,96,128,130     :rem 8
780 DATA128,150,136,0,1,215,64,215,64,128
   ,125,10,0,20,130,0,0,128,96,105,0
                                   :rem 67
785 DATA0,128,128,130,128,128,41,0,64,6,0
   ,64,10,2,128,128,8,2,0,8,0      :rem 248
790 FORJ=15232TO15296:POKEJ,0:NEXT:FORJ=1
   5253TO15273:READQ:POKEJ,Q:NEXT
                                   :rem 218
792 DATA0,112,0,0,136,0,1,36,0,1,116,0,1,
   36,0,0,136,0,0,112,0            :rem 149
800 V=53248:POKEV+21,0:POKE2040,14:POKEV+
   39,1:POKEV+28,0:POKEV+46,0      :rem 173
805 POKE2047,238:POKEV+16,0:POKEV+23,0:PO
   KEV+29,0:FORJ=1TO6:POKE2040+J,13
                                   :rem 81
810 POKEV+39+J,INT(RND(1)*3)+5:NEXT
                                   :rem 46
815 FORJ=54272TO54299:POKEJ,0:NEXT:rem 72
900 IFV<>53248THEN STOP            :rem 115
910 X=160:POKEV,X:POKEV+1,200:POKEV+29,1:
   POKEV+23,1:POKEV+21,1:LV=1:W=4:E=8
                                   :rem 42
920 POKE2047,238:IFPEEK(49172)<>206THENGO
   SUB2000                         :rem 41
925 POKE49152,6:POKE49153,6:POKEV+46,0
                                   :rem 183
930 SYS53000                       :rem 147
933 S=54272:POKES+24,15:POKES+5,1:POKES+6
   ,128:POKES+4,129:POKES+1,12     :rem 249
980 A=0                            :rem 79
990 IFA>11+LV*3THEN6000            :rem 49
995 IF(PEEK(56321)AND16)=0THENGOSUB6200
                                   :rem 28
1000 FORJ=1TO6:IFRND(1)<(1-LV/20)ORX(J)<>
   0THEN1050                       :rem 185
1005 POKE2040+J,13:X(J)=180:Y(J)=120:A=A+
   1                               :rem 22
1010 M%(J)=RND(1)*(5+LV/2)-2-LV/4:POKEV+3
   9+J,INT(RND(1)*3+0):R(J)=W      :rem 237
1020 POKEV+J*2,X(J):POKEV+1+J*2,Y(J):POKE
   V+21,PEEK(V+21)OR(2↑J):GOTO1080
                                   :rem 31
1050 NEXT                          :rem 5
1080 FORJ=1TO6:IFX(J)=0THENNEXT:GOTO1110
                                   :rem 14
1085 IFY(J)<160ORR(J)=ETHEN1095    :rem 50
1090 POKEV+29,PEEK(V+29)OR(2↑J):POKEV+23,
   PEEK(V+23)OR(2↑J):R(J)=E:M%(J)=M%(J)
   *2                              :rem 120
1092 FORN=S+7TOS+13:POKEN,0:NEXT   :rem 4
1093 POKES+24,15:POKES+12,207:POKES+13,0:
   POKES+8,10:POKES+11,33          :rem 175
1095 Y(J)=Y(J)+R(J):X(J)=X(J)+M%(J)
                                   :rem 161
1100 POKEV+J*2,X(J):POKEV+1+J*2,Y(J)
                                   :rem 67
1104 IFY(J)<222ANDPEEK(2040+J)=13THEN1107
                                   :rem 56
1105 X(J)=0:POKEV+21,PEEK(V+21)AND(255-2↑
   J)                              :rem 193
1106 POKEV+29,PEEK(V+29)AND(255-2↑J):POKE
   V+23,PEEK(V+23)AND(255-2↑J)     :rem 214
1107 NEXT                          :rem 8
1110 IF(PEEK(V+30)AND1)<>1THEN990:rem 125
1111 POKEV+21,1:POKES+11,0         :rem 217
1120 POKES+1,4:FORI=1TO10:POKES+24,15-ABS
   (6-I):FORJ=0TO7:POKEV+39,J      :rem 59
1130 FORH=1TO10:NEXT:NEXT:NEXT:POKES+24,1
   5:POKES+1,12                    :rem 87
1140 GOSUB5020:K=PEEK(V+30):GOTO1000
                                   :rem 93
2000 J=0:READT:IFT<999THENSTOP     :rem 156
2002 READQ:IFQ>=0THENPOKEJ+T,Q:J=J+1:GOTO
   2002                            :rem 56
2004 IFQ<>-99 THENGOTO2000         :rem 233
2006 RETURN                        :rem 168
2020 DATA49172,206,0,192,173,0,192,240,3,
   76,100,192                      :rem 247
2030 DATA173,1,192,141,0,192,162,1,254,32
   ,208,189,32,208,41,255,233,253,48,9
                                   :rem 202
2040 DATA222,32,208,222,32,208,222,32,208
                                   :rem 255
2050 DATA232,224,4,208,230,76,100,192,-1
                                   :rem 203
2080 DATA49252,173,1,220,41,4,208,15,173,
   0,208                           :rem 0
2090 DATA233,105,48,8,173,0,208,233,4,141
   ,0,208                          :rem 44
3000 DATA173,1,220,41,8,208,15,173,0,208
                                   :rem 203
3010 DATA233,218,16,8,173,0,208,105,4,141
   ,0,208,76,49,234,-1             :rem 164
3050 DATA53000,120,169,20,141,20,3,169,19
   2,141,21,3,88,96,-99            :rem 232
5000 IFNS>6THENNS=6:SC=SC+375:GOSUB5010
                                   :rem 153
```

```
5001 FORJ=1062TO1065-NS*3STEP-3:POKEJ,65:
     POKEJ+1,66:POKEJ+D,0:POKEJ+1+D,0:NEX
     T                              :rem 245
5002 RETURN                         :rem 167
5010 S$=STR$(SC):FORJ=1TOLEN(S$):POKE1029
     +J,ASC(MID$(S$,J,1)):NEXT      :rem 177
5013 O=INT(SC/1000):IFO>PTHENP=O:NS=NS+1:
     GOSUB5000:GOSUB5050            :rem 224
5016 RETURN                         :rem 172
5020 FORI=1TO2:POKE1064-NS*3+I,28:NEXT:NS
     =NS-1:IFNS>=0THENRETURN        :rem 87
5030 PRINT"{CLR}{10 DOWN}{14 RIGHT}GAME O
     VER"                           :rem 194
5031 POKE56334,PEEK(56334)AND254    :rem 18
5032 POKE788,49:POKE789,234         :rem 15
5033 POKE56334,PEEK(56334)OR1:POKE198,0:P
     OKE53249,0:POKE54296,0         :rem 122
5034 FORI=1TO2000:NEXT:SYS2048      :rem 79
5050 FORN=S+14TOS+20:POKEN,0:NEXT   :rem 46
5051 POKES+24,15:POKES+19,61:POKES+15,30:
     POKES+18,17:RETURN             :rem 46
6000 POKEV+21,1:FORJ=5TO1STEP-1:POKE49153
     ,J:FORI=132-J*20TO142-J*20:POKES+1,I
                                    :rem 112
6010 FORH=1TO40:NEXT:NEXT:NEXT:SC=SC+LV*7
     5:GOSUB5010:FORJ=1TO3000:NEXT:LV=LV+
     1                              :rem 43
6020 FORJ=2TO6:POKE49153,J:FORI=142-J*20T
     O132-J*20STEP-1:POKES+1,I:FORH=1TO40
                                    :rem 168
6030 NEXT:NEXT:NEXT:W=W+1:E=E+2     :rem 217
6040 GOTO980                        :rem 164
6200 M%=(166-PEEK(V))/7:POKEV+14,PEEK(V)+
     12+M%:POKEV+15,195:I=3         :rem 68
6210 POKEV+21,PEEK(V+21)OR128:FORJ=195TO1
     30+LV*2STEP-3                  :rem 225
6220 POKEV+15,J:I=I+1:IFI=5THENI=0:POKEV+
     14,PEEK(V+14)+M%               :rem 152
6230 K=PEEK(V+30):IF(KAND128)=0THENNEXT:G
     OTO6300                        :rem 151
6234 FORN=S+14TOS+20:POKEN,0:NEXT   :rem 51
6235 POKES+24,15:POKES+19,14:POKES+15,2:P
     OKES+18,129                    :rem 26
6240 FORJ=1TO6:IF(KAND(2↑J))=0THENNEXT
                                    :rem 130
6250 POKE2040+J,15:SC=SC+25:GOSUB5010
                                    :rem 126
6300 POKEV+21,PEEK(V+21)AND127:RETURN
                                    :rem 233
```

Program 2: VIC Version

(Use only with short MLX version and 8K expander.)

```
4352 :169,147,032,210,255,169,214
4358 :008,141,015,144,169,032,003
4364 :162,000,157,242,030,232,067
4370 :224,242,208,248,169,032,117
4376 :162,000,157,228,031,232,066
4382 :224,022,208,248,162,000,126
4388 :189,162,017,157,242,150,185
4394 :232,224,242,208,245,162,075
4400 :000,189,148,018,157,228,020
4406 :151,232,224,022,208,245,112
4412 :169,000,141,060,003,169,090
4418 :064,141,046,145,169,141,004
4424 :141,020,003,169,017,141,051
4430 :021,003,169,192,141,046,138
4436 :145,076,170,018,162,000,143
4442 :189,242,150,041,015,201,160
4448 :000,240,009,168,200,152,097
4454 :201,008,208,002,169,005,183
4460 :157,242,150,232,224,242,075
4466 :208,230,162,000,189,228,107
4472 :151,041,015,168,200,152,079
4478 :201,008,208,002,169,005,207
4484 :157,228,151,232,224,022,122
4490 :208,234,096,238,060,003,209
4496 :172,060,003,192,010,208,021
4502 :008,032,088,017,160,000,199
4508 :141,060,003,076,191,234,093
4514 :007,007,007,007,007,007,204
4520 :007,007,007,007,000,000,196
4526 :007,007,007,007,007,007,216
4532 :007,007,007,007,006,006,220
4538 :006,006,006,006,006,006,222
4544 :006,007,000,000,007,006,218
4550 :006,006,006,006,006,006,234
4556 :006,006,005,005,005,005,236
4562 :005,005,005,005,006,007,243
4568 :007,007,007,006,005,005,253
4574 :005,005,005,005,005,005,252
4580 :007,007,007,007,007,007,014
4586 :007,005,006,006,006,006,014
4592 :006,006,005,007,007,007,022
4598 :007,007,007,007,006,006,030
4604 :006,006,006,006,007,005,032
4610 :006,006,006,006,006,006,038
4616 :005,007,006,006,006,006,044
4622 :006,006,006,006,006,006,050
4628 :006,006,007,005,005,005,054
4634 :005,005,005,005,005,007,058
4640 :006,006,006,006,006,006,068
4646 :005,005,005,005,005,006,069
4652 :007,005,005,005,005,005,076
4658 :005,005,005,007,006,005,083
4664 :005,005,005,005,005,005,086
4670 :005,005,005,006,007,007,097
4676 :007,007,007,007,007,007,110
4682 :007,007,006,005,005,005,109
4688 :005,005,007,007,007,007,118
4694 :005,006,007,007,007,007,125
4700 :007,007,007,007,007,007,134
4706 :006,005,007,007,007,007,137
4712 :007,007,007,007,005,006,143
4718 :006,006,006,006,006,006,146
4724 :006,006,006,006,006,005,151
4730 :007,007,007,007,006,006,162
4736 :007,007,005,006,006,006,165
4742 :006,006,006,006,006,006,170
4748 :006,006,006,005,007,007,177
4754 :006,006,006,006,007,007,184
4760 :005,005,005,005,005,005,182
4766 :005,005,005,005,005,005,188
4772 :005,005,007,007,006,006,200
4778 :169,010,141,065,003,169,215
4784 :008,141,066,003,169,014,065
4790 :141,067,003,169,004,141,195
4796 :069,003,169,002,141,070,130
4802 :003,169,008,141,071,003,077
4808 :169,015,141,014,144,169,084
4814 :170,141,013,144,169,050,125
4820 :141,128,022,162,000,169,066
4826 :037,157,000,030,232,224,130
4832 :242,208,248,162,000,189,249
4838 :000,128,157,000,028,232,007
4844 :224,000,208,245,189,000,078
4850 :129,157,000,029,232,224,245
4856 :000,208,245,189,131,023,020
4862 :157,000,029,232,224,064,192
4868 :208,245,169,255,141,005,003
4874 :144,169,000,141,072,003,027
4880 :141,073,003,032,118,019,146
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4886 :162,000,169,037,157,000,035
4892 :030,232,224,242,208,248,188
4898 :162,000,189,086,023,142,124
4904 :062,003,170,169,046,157,135
4910 :000,030,169,001,157,000,147
4916 :150,174,062,003,232,224,129
4922 :015,208,231,162,000,189,095
4928 :079,023,157,000,030,169,010
4934 :004,157,000,150,232,224,069
4940 :007,208,240,169,003,141,076
4946 :074,003,032,078,021,162,196
4952 :005,169,005,141,061,003,216
4958 :170,169,033,157,212,031,098
4964 :169,232,141,075,003,169,121
4970 :003,141,076,003,169,000,242
4976 :141,078,003,076,195,019,112
4982 :162,006,160,006,024,032,252
4988 :240,255,162,000,189,099,045
4994 :023,032,210,255,232,224,082
5000 :011,208,245,162,008,160,162
5006 :001,024,032,240,255,162,088
5012 :000,189,110,023,032,210,200
5018 :255,232,224,021,208,245,059
5024 :169,000,141,072,003,141,174
5030 :073,003,173,017,145,041,106
5036 :032,240,249,032,010,022,245
5042 :032,010,022,032,010,022,050
5048 :032,010,022,173,017,145,071
5054 :041,032,208,249,096,162,210
5060 :000,142,068,003,032,065,250
5066 :020,174,068,003,032,025,012
5072 :022,032,117,022,162,170,221
5078 :142,013,144,032,243,019,039
5084 :173,135,003,201,000,240,204
5090 :003,032,196,020,238,068,015
5096 :003,174,068,003,224,003,195
5102 :208,213,076,195,019,173,098
5108 :141,002,041,001,201,001,119
5114 :240,054,165,198,201,000,084
5120 :240,047,169,000,133,198,019
5126 :173,119,002,201,133,208,074
5132 :006,169,100,141,128,022,066
5138 :096,201,134,208,006,169,064
5144 :050,141,128,022,096,201,150
5150 :135,208,006,169,025,141,202
5156 :128,022,096,201,136,208,059
5162 :006,169,010,141,128,022,006
5168 :096,096,120,032,159,255,038
5174 :173,141,002,041,001,201,101
5180 :001,240,244,088,096,169,130
5186 :127,141,034,145,173,032,206
5192 :145,162,255,142,034,145,187
5198 :041,128,208,021,174,061,199
5204 :003,169,032,157,212,031,176
5210 :232,224,010,144,002,162,096
5216 :009,142,061,003,076,221,096
5222 :020,173,017,145,041,016,002
5228 :208,021,174,061,003,169,232
5234 :032,157,212,031,202,224,204
5240 :255,208,002,162,000,142,121
5246 :061,003,076,221,020,173,168
5252 :135,003,201,001,240,082,026
5258 :173,017,145,041,032,208,242
5264 :075,173,061,003,010,010,220
5270 :010,141,133,003,162,001,088
5276 :142,135,003,174,133,003,234
5282 :024,105,008,141,134,003,065
5288 :189,255,022,170,189,242,211
5294 :030,201,032,240,008,169,086
5300 :000,141,135,003,076,109,132
5306 :021,169,035,157,242,030,072
5312 :142,132,003,096,174,132,103
5318 :003,169,032,157,242,030,063
5324 :238,133,003,174,133,003,120
5330 :236,134,003,144,209,162,074
5336 :000,142,135,003,096,189,013
5342 :212,031,201,032,208,008,146
5348 :169,033,157,212,031,076,138
5354 :131,020,206,074,003,032,188
5360 :078,021,032,210,022,174,009
5366 :061,003,169,032,157,212,112
5372 :031,169,033,162,005,157,041
5378 :212,031,142,061,003,173,112
5384 :065,003,170,169,032,157,092
5390 :008,031,173,066,003,170,209
5396 :169,032,157,008,031,173,078
5402 :067,003,170,169,032,157,112
5408 :008,031,169,010,141,065,200
5414 :003,169,008,141,066,003,172
5420 :169,014,141,067,003,169,095
5426 :004,141,069,003,169,002,182
5432 :141,070,003,169,008,141,076
5438 :071,003,173,074,003,201,075
5444 :000,240,001,096,032,118,043
5450 :019,076,022,019,162,007,123
5456 :169,037,236,074,003,240,071
5462 :007,157,014,030,202,076,060
5468 :082,021,224,000,240,010,157
5474 :169,036,157,014,030,202,194
5480 :224,000,208,248,096,032,144
5486 :243,021,142,062,003,189,002
5492 :065,003,170,169,038,157,206
5498 :008,031,160,255,140,011,215
5504 :144,032,241,022,136,192,127
5510 :080,208,245,169,000,141,209
5516 :011,144,032,132,022,174,143
5522 :062,003,189,065,003,170,126
5528 :169,032,157,008,031,174,211
5534 :062,003,165,162,041,007,086
5540 :024,105,001,157,069,003,011
5546 :024,105,005,157,065,003,017
5552 :238,078,003,173,078,003,237
5558 :201,025,240,001,096,206,183
5564 :128,022,169,000,141,078,214
5570 :003,173,128,022,201,007,216
5576 :208,003,238,128,022,120,151
5582 :169,234,141,149,017,141,033
5588 :150,017,088,032,229,022,238
5594 :032,010,022,032,010,022,090
5600 :032,010,022,032,235,022,065
5606 :120,169,208,141,149,017,010
5612 :169,008,141,150,017,088,041
5618 :096,138,056,233,022,205,224
5624 :065,003,208,003,162,000,177
5630 :096,205,066,003,208,003,067
5636 :162,001,096,162,002,096,011
5642 :162,000,160,000,200,192,212
5648 :000,208,251,232,224,000,163
5654 :208,246,096,142,063,003,012
5660 :189,065,003,170,169,032,144
5666 :157,008,031,174,063,003,214
5672 :173,061,003,221,069,003,058
5678 :176,009,222,065,003,222,231
5684 :069,003,076,063,022,254,027
5690 :065,003,254,069,003,189,129
5696 :065,003,024,105,022,170,197
5702 :224,220,144,020,165,162,237
5708 :041,007,174,063,003,024,132
5714 :105,001,157,069,003,024,185
5720 :105,005,170,076,104,022,058
5726 :189,008,031,201,033,208,252
5732 :003,076,236,020,169,034,126
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5738 :157,008,031,138,174,063,165
5744 :003,157,065,003,096,162,086
5750 :000,160,000,200,192,000,158
5756 :208,251,232,224,030,208,253
5762 :246,096,173,072,003,024,232
5768 :105,010,141,072,003,144,099
5774 :003,238,073,003,162,000,109
5780 :160,006,024,032,240,255,097
5786 :173,073,003,174,072,003,140
5792 :032,205,221,173,072,003,098
5798 :205,075,003,208,038,173,100
5804 :073,003,205,076,003,208,228
5810 :030,173,075,003,024,105,076
5816 :232,141,075,003,173,076,116
5822 :003,105,003,141,076,003,009
5828 :173,074,003,201,007,240,126
5834 :006,238,074,003,032,078,121
5840 :021,096,162,255,142,013,129
5846 :144,032,241,022,202,224,055
5852 :080,208,245,169,170,141,209
5858 :013,144,096,162,220,142,235
5864 :013,144,096,162,170,142,191
5870 :013,144,096,140,077,003,199
5876 :160,000,200,192,000,208,236
5882 :251,172,077,003,096,204,029
5888 :182,161,139,118,096,075,003
5894 :054,205,183,162,140,119,101
5900 :097,076,054,206,184,163,024
5906 :141,119,098,076,054,207,201
5912 :185,163,142,120,098,076,040
5918 :054,208,186,164,142,120,136
5924 :098,076,054,209,187,165,057
5930 :143,121,099,077,055,210,235
5936 :188,166,143,121,099,077,074
5942 :055,211,189,166,144,122,173
5948 :099,077,055,212,190,167,092
5954 :145,122,100,077,055,213,010
5960 :191,168,146,123,101,078,111
5966 :055,019,003,015,018,005,193
5972 :037,048,027,048,077,099,164
5978 :118,142,167,181,197,210,081
5984 :221,234,240,159,084,082,092
5990 :069,078,067,072,070,073,019
5996 :082,069,030,080,082,069,008
6002 :083,083,037,066,085,084,040
6008 :084,079,078,037,084,079,049
6014 :037,080,076,065,089,255,216
6020 :255,255,255,255,255,255,126
6026 :255,231,231,231,195,066,067
6032 :066,000,126,126,126,102,178
6038 :000,000,102,126,126,255,247
6044 :255,126,126,126,126,255,146
6050 :255,024,024,024,060,189,226
6056 :189,255,129,000,000,000,229
6062 :000,000,000,000,000,126,044
6068 :165,219,165,165,219,165,254
6074 :126,013,013,013,013,013,121
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Guess America!

(Article on page 64.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

```
40 DIME$(25):REM # OF LETTERS      :rem 88
50 GOSUB 20000                     :rem 215
60 PRINT"{HOME}{6 RIGHT}{8 DOWN}GUESS AME
   RICA!"                          :rem 26
70 FOR X=1TO2000:NEXT X            :rem 74
80 PRINT"{CLR}"                    :rem 204
90 REM WAGON ACROSS SCREEN"        :rem 118
95 GOSUB20000                      :rem 224
100 PRINT"{HOME}"                  :rem 117
110 FOR X=24 TO 5 STEP -1{2 SPACES}
                                   :rem 230
120 PRINT"{9 DOWN}{24 RIGHT}"{27 SPACES}
                                   :rem 181
130 PRINT TAB(X)"{5 SPACES}UIII"
    {6 SPACES}                     :rem 21
140 PRINT TAB(X)"{B}III{@}GH H"
    {6 SPACES}                     :rem 251
150 PRINT TAB(X)" H H {Y}Q{T}Q";
                                   :rem 174
160 FOR A= 1 TO 90:NEXT A          :rem 243
170 PRINT"{10 LEFT}{10 SPACES}";   :rem 198
180 PRINT"{10 LEFT}{UP}{10 SPACES}";
                                   :rem 88
190 PRINT"{10 LEFT}{UP}{10 SPACES}"
                                   :rem 30
200 FOR A=1 TO 20:NEXT A           :rem 231
210 PRINT"{HOME}"                  :rem 119
220 NEXT X                         :rem 43
230 PRINT"{10 DOWN}{5 RIGHT}{5 SPACES}UII
    I"                             :rem 209
235 PRINT"{5 RIGHT}{B}III{@}GH H
                                   :rem 239
240 PRINT"{5 RIGHT} H H {Y}Q{T}Q"
                                   :rem 132
250 PRINT"{HOME}{7 DOWN}{4 RIGHT}CALIFORN
    IA'S GOLD"                     :rem 222
260 FOR X=1TO3000:NEXT X           :rem 124
1500 REM - GAME DIRECTIONS         :rem 229
1505 PRINT"{CLR}"                  :rem 47
1510 PRINT"{6 SPACES}G U E S S{3 SPACES}A
     M E R I C A !"                :rem 50
1520 PRINT:PRINT                   :rem 28
1530 PRINT"{2 SPACES}THE GAME YOU ARE GOI
     NG TO PLAY IS "               :rem 83
1540 PRINT"BASED ON THE WORD GAME 'JUMBLE
     '.{2 SPACES}YOU"              :rem 6
1550 PRINT"WILL HAVE 15 SECONDS TO UNSCRA
     MBLE THE"                     :rem 221
1560 PRINT"JUMBLED LETTERS AND ENTER YOUR
      ANSWER."                     :rem 97
1570 PRINT:PRINT                   :rem 33
1580 PRINT"{2 SPACES}IF YOU ARE CORRECT Y
     OU WILL BE GIVEN"             :rem 74
1590 PRINT"10 POINTS.{2 SPACES}IF YOU ARE
      WRONG CLUES WILL"            :rem 177
1600 PRINT"BE GIVEN BUT YOU WILL RECEIVE
     {SPACE}FEWER"                 :rem 52
1610 PRINT"POINTS FOR A CORRECT ANSWER."
                                   :rem 174
1620 PRINT:PRINT                   :rem 29
1630 PRINT"{10 SPACES}0 CLUES - 10 PTS."
                                   :rem 250
1640 PRINT"{10 SPACES}1 CLUE{2 SPACES}-
     {2 SPACES}7 PTS."             :rem 127
1650 PRINT"{10 SPACES}2 CLUES -{2 SPACES}
     5 PTS."                       :rem 210
1660 PRINT"{10 SPACES}3 CLUES -{2 SPACES}
     2 PTS."                       :rem 209
1670 PRINT:PRINT                   :rem 34
1680 PRINT"{10 SPACES}PRESS 'C' TO CONTIN
     UE"                           :rem 198
```

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1690 GET Z$:IF Z$=""THEN1690          :rem 245
1695 IF Z$<>"C" THEN 1690              :rem 226
1700 PRINT"{CLR}"                      :rem 44
1710 PRINT:PRINT                       :rem 29
1720 PRINT"{2 SPACES}YOUR TOTAL NUMBER OF
     POINTS AT THE END";               :rem 49
1721 PRINT"OF THE GAME WILL DETERMINE HOW
     FAR"                              :rem 200
1722 PRINT"ACROSS THE UNITED STATES YOUR
     {SPACE}WAGON"                     :rem 177
1723 PRINT"WILL TRAVEL."               :rem 210
1724 PRINT:PRINT                       :rem 34
1725 PRINT"WILL YOU MAKE IT TO CALIFORNIA
     'S GOLD?"                         :rem 234
1726 PRINT:PRINT                       :rem 36
1727 PRINTSPC(10)"PRESS 'C' TO CONTINUE"
                                       :rem 96
1728 GET Z$:IFZ$="" THEN 1728          :rem 249
1729 IF Z$<>"C" THEN 1728              :rem 226
1731 PRINT "{HOME}{11 DOWN}{16 RIGHT}
     {5 SPACES}":FOR A=1TO150:NEXT A
                                       :rem 254
1735 GOSUB 20000                       :rem 66
1736 PRINT"{HOME}{20 RIGHT}{DOWN}MAXIMUM
     {SPACE}SCORE: 50 "                :rem 67
1739 PRINT"{HOME}{17 DOWN}"            :rem 217
1740 PRINT"{32 RIGHT}10 PTS.":FOR X=1TO50
     0:NEXT X                          :rem 179
1750 PRINT"{UP}{21 RIGHT}20 PTS.":FOR X=1
      TO 500:NEXT X                    :rem 7
1760 PRINT"{UP}{12 RIGHT}30 PTS.":FOR X=1
     TO500:NEXT X                      :rem 4
1770 PRINT"{UP}{2 SPACES}40 PTS.":FOR X=1
     TO500:NEXT X                      :rem 170
1771 FOR X=24 TO 5 STEP -1             :rem 36
1772 PRINT"{HOME}{11 DOWN}{24 RIGHT}"
                                       :rem 40
1773 PRINT TAB(X)"{5 SPACES}UIII"      :rem 83
1774 PRINT TAB(X)"{B}III{@}GH H"
                                       :rem 57
1775 PRINT TAB(X)" H H {Y}Q{T}Q";
                                       :rem 236
1776 FOR A= 1 TO 90:NEXT A             :rem 49
1777 PRINT"{10 LEFT}{10 SPACES}";      :rem 4
1778 PRINT"{10 LEFT}{UP}{10 SPACES}";
                                       :rem 150
1779 PRINT"{10 LEFT}{UP}{10 SPACES}"
                                       :rem 92
1780 FOR A=1 TO 20:NEXT A              :rem 37
1781 PRINT"{HOME}"                     :rem 181
1782 NEXT X                            :rem 105
1783 PRINT"{11 DOWN}{5 RIGHT}{5 SPACES}UI
     II"                               :rem 32
1784 PRINT"{5 RIGHT}{B}III{@}GH H
                                       :rem 41
1785 PRINT"{5 RIGHT} H H {Y}Q{T}Q"
                                       :rem 195
1790 FOR X=1TO1500:NEXT X              :rem 184
2900 PRINT "{CLR}{2 RIGHT}{2 DOWN}REMEMBE
     R..."                             :rem 100
2903 PRINT"{5 RIGHT}{6 DOWN}PRESS {RVS}RE
     TURN{OFF} AFTER TYPING IN"        :rem 139
2905 PRINT"{2 DOWN}{12 RIGHT}YOUR ANSWER.
     "                                 :rem 108
2906 PRINT"{5 DOWN}{3 RIGHT}PRESS {RVS}DE
     L{OFF} KEY TO CORRECT SPELLING."
                                       :rem 126
2910 FOR X=1TO 2000:NEXT X             :rem 175
3000 REM INFORMATION                   :rem 237
3001 DATA GUESS                        :rem 101
3005 DATAWORD,CLUE,CLUE CLUE           :rem 241
3010 DATA FLORIDA,IN THE SOUTH,BOUGHT FRO
     M SPAIN FOR $5 MILLION            :rem 14
3015 DATA GROWS CITRUS FRUIT           :rem 217
3020 DATA LOUISIANA,GREATEST LAND DEAL IN
      HISTORY,COST $15 MILLION         :rem 16
3030 DATA BOUGHT FROM FRANCE IN 1803
                                       :rem 239
3040 DATA CALIFORNIA,GOLD RUSH - 1849,ON
     {SPACE}WEST COAST, MOVIE CAPITAL OF
     {SPACE}U.S.                       :rem 25
3050 DATA ALAMO, OLD SPANISH MISSION, WAR
      WITH MEXICO,REMEMBER THE...:rem 140
3060 DATA JEFFERSON, BOUGHT LOUISIANA TER
     RITORY,PRESIDENT                  :rem 205
3065 DATA DECLARATION OF INDEPENDENCE
                                       :rem 5
3070 DATA OREGON,TRAIL,IN THE NORTHWEST,F
     ROM ENGLAND IN 1846 BY TREATY
                                       :rem 255
3080 DATA TEXAS, LONE STAR REPUBLIC, OIL
     {SPACE}CAPITAL OF U.S., DALLAS
                                       :rem 216
3090 DATA FRONTIER, MOVED WEST,PLACE WHER
     E SETTLEMENT ENDS, WILDERNESS BEGINS
                                       :rem 88
3100 DATA ALASKA,EXTREME NORTH,ESKIMOS LI
     VE HERE,BOUGHT FROM RUSSIA IN 1867
                                       :rem 100
3110 DATA HAWAII, HAD A MONARCHY, TROPICA
     L PACIFIC PARADISE, PEARL HARBOR
                                       :rem 77
3120 DATA INDIANS,WARS AGAINST SETTLERS,A
     MERICAN NATIVES,FOUGHT WITH ARROWS
                                       :rem 101
3130 DATA WASHINGTON,GENERAL,CITY NAMED A
     FTER HIM,FIRST PRESIDENT          :rem 137
3140 DATA JACKSON, PRESIDENT,FOR THE COMM
     ON MAN, FROM THE WEST             :rem 226
3150 DATA PIONEER,1ST PERSON INTO AN AREA
     , MOVED WEST, FOUGHT INDIANS:rem 155
3160 DATA GOLD,FOUND AT SUTTERS MILL -
     {2 SPACES}CA.,DISCOVERED IN 1849, PR
     ECIOUS METAL                      :rem 24
3170 DATA MISSISSIPPI,WESTERN BORDER OF U
     .S. IN 1783,BETWEEN U.S. AND LOUISIA
     NA                                :rem 9
3180 DATA RIVER                        :rem 110
3190 DATA LINCOLN, IN NEBRASKA, BORN IN L
     OG CABIN, PRESIDENT DURING CIVIL WAR
                                       :rem 55
3210 DATA SLAVERY,NORTH OPPOSED IT,SOUTH
     {SPACE}FAVORED IT,CIVIL WAR ENDED IT
                                       :rem 97
3230 DATA KENNEDY, 20TH CENTURY PRESIDENT
     , CUBAN MISSILE CRISIS, ASSASSINATED
                                       :rem 25
3240 DATA PILGRIMS,EARLY SETTLERS,IN MASS
     ACHUSETTS,STARTED THANKSGIVING
                                       :rem 228
3260 DATA COLUMBUS, SAILED FOR SPAIN,THOU
     GHT EARTH WAS ROUND,DISCOVERED AMERI
     CA                                :rem 203
3270 DATA REVOLUTION,WAR,FOUGHT AGAINST E
     NGLAND,1776                       :rem 13
3280 DATA CROCKETT,HERO WHO DIED AT THE A
     LAMO,COONSKIN CAP,DAVY            :rem 72
3290 DATA ROOSEVELT, PRESIDENT DURING WOR
     LD WAR II, RELATED TO TEDDY :rem 156
3295 DATA MOST TERMS                   :rem 187
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3300 DATA GETTYSBURG,IN CIVIL WAR,BATTLEF
     IELD,LINCOLN'S FAMOUS ADDRESS
                                   :rem 230
3310 DATA STATES,U.S. IS MADE UP OF THEM,
     POLITICAL UNITS, THERE ARE 50:rem 65
3320 DATA AMENDMENT, THERE ARE 26 OF THEM
     ,ADDITIONS TO CONSTITUTION    :rem 67
3325 DATA ERA DIDN'T MAKE IT       :rem 20
3330 DATA FRANKLIN,COLONIAL STATESMAN,INV
     ENTOR,BENJAMIN                :rem 118
3340 DATA EISENHOWER, FAMOUS GENERAL,IN W
     ORLD WAR II, PRESIDENT BEFORE KENNED
     Y                             :rem 52
3350 DATA MORMONS,RELIGIOUS GROUP,LED BY
     {SPACE}BRIGHAM YOUNG,SETTLED IN UTAH
                                   :rem 174
3360 DATA CARTER,20TH CENTURY PRESIDENT,F
     ROM GEORGIA,FAMOUS FOR PEANUTS:rem 5
3365 DATA BUFFALO,ANIMAL,HUNTED BY INDIAN
     S,HIDE USED FOR TENTS         :rem 73
3370 DATA SCOTT,U.S. GENERAL IN MEXICAN W
     AR,CAPTURED MEXICO CITY,WINFIELD
                                   :rem 40
3800 DATA *,*,*,*                  :rem 17
3995 P=0                           :rem 151
3999 C=0                           :rem 142
4000 REM RANDOM GENERATION OF DATA :rem 4
4005 C=C+1:REM WORD COUNTER        :rem 98
4010 DM=0                          :rem 195
4020 DM=DM+1                       :rem 129
4030 READ A$,A$,A$,A$              :rem 251
4040 IF A$<>"*" THEN 4020          :rem 153
4050 DM=DM-1                       :rem 134
4060 RESTORE                       :rem 238
4070 R=INT(RND(1)*DM)+1            :rem 19
4080 FOR T=1TOR-1                  :rem 200
4090 READ A$,A$,A$,A$              :rem 1
4100 NEXT T                        :rem 88
4110 READ W$,C$(1),C$(2),C$(3)     :rem 159
5000 REM SCRAMBLED WORD ROUTINE    :rem 152
5010 FL=0                          :rem 197
5020 L=LEN(W$):S$=""               :rem 45
5040 FOR M=1TOL                    :rem 90
5050 E$(M)=MID$(W$,M,1)            :rem 174
5060 NEXT M                        :rem 87
5080 FOR M=1TOL                    :rem 94
5090 R=INT((L-M+1)*RND(1)+1)       :rem 248
5100 S$=S$+E$(R)                   :rem 40
5110 H$=E$(R)                      :rem 124
5120 E$(R)=E$(L-M+1)               :rem 237
5130 E$(L-M+1)=H$                  :rem 78
5140 NEXTM                         :rem 86
5150 IFL=1 THEN 6000               :rem 9
5160 IFS$<> W$ THEN 6000           :rem 188
5170 FL=FL+1                       :rem 138
5180 IFFL>=5 THEN 6000             :rem 148
5190 GOTO5020                      :rem 207
6000 REM INITIALIZE SCREEN VARIABLE
     {6 SPACES}LOCATION            :rem 251
6010 SS$="{HOME}{4 RIGHT}{5 DOWN}":REM SC
     RAMBLED                       :rem 153
6020 WW$="{HOME}{2 RIGHT}{7 DOWN}":REM CO
     RRECT WORD                    :rem 75
6030 CC$(1)="{HOME}{5 RIGHT}{11 DOWN}":RE
     M CLUE 1                      :rem 77
6040 CC$(2)="{HOME}{5 RIGHT}{13 DOWN}":RE
     M CLUE 2                      :rem 114
6050 CC$(3)="{HOME}{5 RIGHT}{15 DOWN}":RE
     M CLUE 3                      :rem 151
6060 REM BEGIN GAME                :rem 47
6070 GOSUB 20000                   :rem 63
6075 PRINT"{HOME}{DOWN}{17 RIGHT}PLAYING
     {SPACE}FOR: 10 PTS.           :rem 77
6080 PRINTSS$S$                    :rem 156
6100 PRINT WW$;                    :rem 97
6111 GOSUB 7000                    :rem 16
6115 IF LEFT$(X$,LEN(W$))=W$ THEN P=P+10:
      REM SCORE                    :rem 57
6120 IFLEFT$(X$,LEN(W$))=W$GOTO8000:rem 4
6125 PRINT"{HOME}{DOWN}{30 RIGHT} 7"
                                   :rem 96
6130 PRINTCC$(1)C$(1)              :rem 108
6140 PRINTWW$;                     :rem 101
6150 REM INPUT X$                  :rem 188
6151 GOSUB 7000                    :rem 20
6155 IF LEFT$(X$,LEN(W$))=W$ THEN P=P+7
                                   :rem 121
6160 IF LEFT$(X$,LEN(W$))=W$GOTO8000
                                    :rem 8
6165 PRINT"{HOME}{DOWN}{30 RIGHT} 5"
                                   :rem 98
6170 PRINTCC$(2)C$(2)              :rem 114
6180 PRINTWW$;                     :rem 105
6191 GOSUB 7000                    :rem 24
6200 IF LEFT$(X$,LEN(W$))=W$ THEN P=P+5
                                   :rem 110
6205 IF LEFT$(X$,LEN(W$))=W$ GOTO 8000
                                    :rem 8
6207 PRINT"{HOME}{DOWN}{30 RIGHT} 2"
                                   :rem 92
6210 PRINTCC$(3)C$(3)              :rem 111
6220 PRINTWW$;                     :rem 100
6231 GOSUB 7000                    :rem 19
6235 IF LEFT$(X$,LEN(W$))=W$ THEN P=P+2
                                   :rem 115
6240 IF LEFT$(X$,LEN(W$))=W$ GOTO 8000
                                    :rem 7
6245 FOR X=1TO1000:NEXT X          :rem 179
6249 PRINT"{HOME}{DOWN}{30 RIGHT} 0"
                                   :rem 96
6250 PRINT"{HOME}{4 RIGHT}{7 DOWN}"W$" ←
     ← ←"                          :rem 120
6260 PRINT"{HOME}{RIGHT}{20 DOWN}PRESS"
                                   :rem 176
6261 PRINT"{RIGHT}'C' TO"          :rem 241
6262 PRINT"{RIGHT}CONTINUE"        :rem 35
6270 GET Z$:IFZ$=""THEN 6270       :rem 243
6280 IF C=5 THEN GOTO{2 SPACES}9000:REM T
     O END                         :rem 221
6290 IF C<5 THEN 4000:REM NEXT QUES.
                                   :rem 208
7000 REM 15 SEC. TIME DELAY FOR ANS.
                                   :rem 175
7005 PRINTWW$ "? ";                :rem 233
7010 POKE204,0:REM TURNS CURSOR ON:rem 30
7020 X$=""                         :rem 198
7030 FOR T=1 TO 1000 :REM 15 SEC.:rem 100
7040 GET R$:IFR$=CHR$(13) THEN 7090:REM R
     ETURN KEY BEING HIT           :rem 131
7050 IF R$=""THEN 7080:REM NO ANSWER BEIN
     G ENTERED                      :rem 71
7055 IF R$=CHR$(20) THEN 7005      :rem 194
7056 IF R$=CHR$(157) THEN 7005     :rem 254
7060 X$=X$+R$:REM ACCUMULATES INPUTS
                                   :rem 219
7070 PRINTR$;:REM EACH LETTER AS INPUT
                                   :rem 47
7080 NEXT T:REM TIME COUNT         :rem 56
7090 POKE 204,1:REM TURNS OFF CURSOR
                                   :rem 101
7105 PRINT " "                     :rem 158
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7120 RETURN                              :rem 170
8000 REM CORRECT RESPONSE SEQUENCE
                                         :rem 134
8010 GOSUB 20000                          :rem 59
8030 PRINT"{HOME}{3 RIGHT}{3 DOWN}CORRECT
     "                                   :rem 75
8034 FOR X= 5 TO 28 STEP 2               :rem 251
8041 PRINT TAB(X)"CORRECT"                :rem 48
8050 NEXT X                              :rem 100
8060 PRINT"{HOME}{5 RIGHT}{12 DOWN}
     {5 SPACES}UIII"                      :rem 63
8070 PRINT"{5 RIGHT}{B}III{@}GH
     {SHIFT-SPACE}H"                     :rem 230
8080 PRINT"{5 RIGHT} H H {Y}Q{T}Q"
                                         :rem 190
8090 PRINT"{HOME}{RIGHT}{20 DOWN}PRESS"
                                         :rem 179
8100 PRINT"{RIGHT}'C' TO"                :rem 235
8110 PRINT"{RIGHT}CONTINUE"               :rem 29
8120 GET Z$:IFZ$="" THEN8120             :rem 235
8125 IF Z$<>"C" THEN 8120                :rem 216
8130 IF C<5 THEN 4000:REM NEXT QUES.
                                         :rem 203
9000 REM GAME ENDING AND SCORE           :rem 203
9010 GOSUB 20000                          :rem 60
9015 F=F+1:REM FLASHING SCORE            :rem 218
9020 PRINT"{HOME}{2 DOWN}{24 RIGHT} "P" P
     TS."                                :rem 66
9040 FOR X=1 TO 200:NEXT X               :rem 128
9050 PRINT"{HOME}{2 DOWN}{24 RIGHT}
     {10 SPACES}"                        :rem 140
9060 FOR X=1TO200:NEXT X                 :rem 130
9070 IF F<5 THEN GOTO 9015                :rem 77
9080 PRINT"{HOME}{2 DOWN}{24 RIGHT} "P" P
     TS."                                :rem 72
9090 IF P>=40 THEN 9640                  :rem 146
9100 IF P>=30 THEN 9450                  :rem 136
9110 IF P>=20 THEN 9280                  :rem 137
9120 IF P<20 THEN 9130                    :rem 69
9130 REM P<20                            :rem 159
9140 FOR X=24 TO 23 STEP -1               :rem 82
9150 PRINT"{HOME}"                       :rem 179
9160 PRINT"{9 DOWN}{24 RIGHT}"           :rem 242
9170 PRINT TAB(X)"{5 SPACES}UIII"        :rem 82
9180 PRINT TAB(X)"{B}III{@}GH H"
                                         :rem 56
9190 PRINT TAB(X)" H H {Y}Q{T}Q";
                                         :rem 235
9200 FOR A= 1 TO 90:NEXT A                :rem 39
9210 PRINT"{10 LEFT}{10 SPACES}";:rem 250
9220 PRINT"{10 LEFT}{UP}{10 SPACES}";
                                         :rem 140
9230 PRINT"{10 LEFT}{UP}{10 SPACES}"
                                          :rem 82
9240 FOR A=1 TO 20:NEXT A                 :rem 36
9250 PRINT"{HOME}"                       :rem 180
9260 NEXT X                              :rem 104
9261 PRINT"{HOME}"                       :rem 182
9262 PRINT"{9 DOWN}{24 RIGHT}"           :rem 245
9263 PRINT TAB(X)"{5 SPACES}UIII"        :rem 85
9264 PRINT TAB(X)"{B}III{@}GH H"
                                          :rem 59
9265 PRINT TAB(X)" H H {Y}Q{T}Q";
                                         :rem 238
9270 PRINT"{HOME}{16 DOWN}{13 RIGHT}STUCK
      ON EAST COAST."                     :rem 59
9272 FOR X=1 TO 5000:NEXT X              :rem 186
9275 GOTO 13000                           :rem 4
9280 REM P=20-29                         :rem 62
9290 PRINT"{HOME}"                       :rem 184
9300 FOR X=24 TO 16 STEP -1               :rem 82
9310 PRINT"{9 DOWN}{24 RIGHT}"           :rem 239
9320 PRINT TAB(X)"{5 SPACES}UIII"        :rem 79
9330 PRINT TAB(X)"{B}III{@}GH H"
                                         :rem 53
9340 PRINT TAB(X)" H H {Y}Q{T}Q";
                                         :rem 232
9350 FOR A= 1 TO 90:NEXT A                :rem 45
9365 PRINT"{10 LEFT}{10 SPACES}";         :rem 5
9370 PRINT"{10 LEFT}{UP}{10 SPACES}";
                                         :rem 146
9380 PRINT"{10 LEFT}{UP}{10 SPACES}"
                                          :rem 88
9390 FOR A=1 TO 20:NEXT A                 :rem 42
9400 PRINT"{HOME}"                       :rem 177
9405 NEXT X                              :rem 105
9410 PRINT"{HOME}"                       :rem 178
9411 PRINT"{9 DOWN}{24 RIGHT}"           :rem 241
9412 PRINT TAB(X)"{5 SPACES}UIII"        :rem 81
9413 PRINT TAB(X)"{B}III{@}GH H"
                                          :rem 55
9414 PRINT TAB(X)" H H {Y}Q{T}Q";
                                         :rem 234
9420 PRINT"{HOME}{15 DOWN}{8 RIGHT}ALMOST
      TO THE MISSISSIPPI."               :rem 121
9430 FOR X=1TO5000:NEXT X                :rem 182
9440 GOTO 13000                          :rem 254
9445 REM 30-39 PTS.                      :rem 219
9446 PRINT"{HOME}"                       :rem 187
9450 FOR X =24 TO 11 STEP -1              :rem 83
9451 PRINT"{HOME}"                       :rem 183
9455 PRINT"{9 DOWN}{24 RIGHT}"           :rem 249
9460 PRINT TAB(X)"{5 SPACES}UIII"        :rem 84
9470 PRINT TAB(X)"{B}III{@}GH H"
                                          :rem 58
9480 PRINT TAB(X)" H H {Y}Q{T}Q";
                                         :rem 237
9490 FOR A=1TO90:NEXT A                   :rem 50
9500 PRINT"{10 LEFT}{10 SPACES}";:rem 252
9510 PRINT"{10 LEFT}{UP}{10 SPACES}";
                                         :rem 142
9520 PRINT"{10 LEFT}{UP}{10 SPACES}"
                                          :rem 84
9530 FOR A=1 TO 20:NEXT A                 :rem 38
9540 PRINT"{HOME}"                       :rem 182
9550 NEXT X                              :rem 106
9560 PRINT"{HOME}"                       :rem 184
9570 PRINT"{9 DOWN}{24 RIGHT}"           :rem 247
9580 PRINT TAB(X)"{5 SPACES}UIII"        :rem 87
9590 PRINT TAB(X)"{B}III{@}GH H"
                                          :rem 61
9600 PRINT TAB(X)" H H {Y}Q{T}Q";
                                         :rem 231
9610 PRINT"{HOME}{15 DOWN}{3 RIGHT}MADE I
     T TO THE ROCKIES"                    :rem 82
9620 FOR X=1TO5000:NEXT X                :rem 183
9630 GOTO 13000                          :rem 255
9640 REM 40 OR MORE                      :rem 239
9650 FOR X=24 TO 5 STEP -1                :rem 40
9660 PRINT"{HOME}"                       :rem 185
9670 PRINT"{9 DOWN}{24 RIGHT}"           :rem 248
9680 PRINT TAB(X)"{5 SPACES}UIII"        :rem 88
9690 PRINT TAB(X)"{B}III{@}GH H"
                                          :rem 62
9700 PRINT TAB(X)" H H {Y}Q{T}Q";
                                         :rem 232
9710 FOR A= 1 TO 90:NEXT A                :rem 45
9720 PRINT"{10 LEFT}{10 SPACES}";  :rem 0
9730 PRINT"{10 LEFT}{UP}{10 SPACES}";
                                         :rem 146
9740 PRINT"{10 LEFT}{UP}{10 SPACES}"
                                          :rem 88
```

```
9750 FOR A=1 TO 20:NEXT A          :rem 42
9760 PRINT"{HOME}"                 :rem 186
9770 NEXT X                        :rem 110
9780 PRINT"{HOME}"                 :rem 188
9790 PRINT"{9 DOWN}{24 RIGHT}"     :rem 251
9800 PRINT TAB(X)"{5 SPACES}UIII"  :rem 82
9810 PRINT TAB(X)"{B}III{@}GH H"   :rem 56
9820 PRINT TAB(X)" H H {Y}Q{T}Q";
                                   :rem 235
9825 PRINT"{HOME}{6 DOWN}{4 RIGHT}HOORAY!
     !!!"                          :rem 236
9830 PRINT"{HOME}{16 DOWN}{3 RIGHT}CALIFO
     RNIA AND GOLD!"               :rem 17
9840 FOR X=1TO5000:NEXT X          :rem 187
9850 GOTO 13000                    :rem 3
13000 PRINT"{CLR}{2 DOWN}DO YOU WANT TO P
      LAY AGAIN?"                  :rem 188
13010 PRINT:PRINT:PRINT:PRINT:PRINT:PRINT
                                   :rem 101
13020 PRINT"{11 RIGHT}TYPE {RVS}P{OFF} TO
       PLAY":PRINT:PRINT           :rem 163
13025 PRINT"{11 RIGHT}TYPE {RVS}Q{OFF} TO
       QUIT"                       :rem 40
13030 GET Z$:IF Z$="" THEN 13030   :rem 67
13040 IF Z$="P" THEN 2900          :rem 208
13060 IF Z$<> "P" AND Z$ <> "Q" THEN 1303
      0                            :rem 155
14500 REM BYE!                     :rem 223
14510 GOSUB 20000                  :rem 109
14520 PRINT"{HOME}{5 DOWN}{4 RIGHT}BYE!
                                   :rem 136
14530 PRINT"{5 DOWN}{4 RIGHT}SEE YOU IN C
      ALIFORNIA!"                   :rem 1
14540 FOR X=1TO5000:NEXT X         :rem 228
14550 PRINT"{HOME}{22 DOWN}"       :rem 89
14999 END                          :rem 231
19999 REM MAP SUBROUTINE           :rem 231
20000 PRINT"{CLR}"                 :rem 86
20010 PRINT SPC(2)"ZZZ"            :rem 187
20020 PRINT SPC(3)"Z"SPC(1)"ZZZZZZ"SPC(25
      )"ZZ"                        :rem 103
20030 PRINT SPC(2)"Z"SPC(8)"ZZZZZZZZZZ"SP
      C(14)"Z"SPC(1)"Z"            :rem 128
20040 PRINT SPC(2)"Z"SPC(18)"ZZ"SPC(12)"Z
      "SPC(2)"Z"                   :rem 225
20050 PRINT SPC(2)"Z"SPC(19)"ZZZZ"SPC(7)"
      ZZ"SPC(2)"Z"                 :rem 69
20060 PRINT SPC(1)"Z"SPC(23)"Z"SPC(1)"Z"S
      PC(5)"Z"SPC(2)"Z"            :rem 92
20070 PRINT SPC(1)"Z"SPC(22)"Z"SPC(1)"Z"S
      PC(1)"Z"SPC(2)"ZZ"SPC(3)"Z":rem 186
20080 PRINT SPC(1)"Z"SPC(22)"Z"SPC(1)"Z"S
      PC(1)"Z"SPC(1)"ZZ"SPC(4)"Z":rem 187
20090 PRINT SPC(1)"Z"SPC(23)"Z"SPC(2)"ZZZ
      "SPC(4)"Z"                   :rem 140
20100 PRINT SPC(1)"Z"SPC(32)"Z"    :rem 192
20110 PRINT SPC(1)"Z"SPC(32)"Z"    :rem 193
20120 PRINT SPC(1)"Z"SPC(32)"Z"    :rem 194
20130 PRINT SPC(1)"Z"SPC(32)"Z"    :rem 195
20140 PRINT SPC(2)"Z"SPC(31)"Z"    :rem 196
20150 PRINT SPC(3)"Z"SPC(30)"Z"    :rem 197
20160 PRINT SPC(3)"ZZZ"SPC(27)"Z":rem 128
20170 PRINT SPC(6)"Z"SPC(25)"Z"    :rem 206
20180 PRINT SPC(7)"ZZZ"SPC(1)"Z"SPC(19)"Z
      "                            :rem 13
20190 PRINT SPC(10)"Z"SPC(1)"Z"SPC(13)"ZZ
      ZZ"SPC(1)"Z"                 :rem 146
20200 PRINT SPC(13)"Z"SPC(7)"ZZZ"SPC(1)"Z
      "SPC(4)"Z"SPC(1)"Z"          :rem 15
20210 PRINT SPC(14)"ZZZ"SPC(3)"Z"SPC(3)"Z
      "SPC(6)"Z"SPC(1)"Z"          :rem 17
20220 PRINT SPC(17)"Z"SPC(1)"Z"SPC(11)"Z"
      SPC(1)"Z"                    :rem 3
20230 PRINT SPC(18)"Z"SPC(13)"ZZ":rem 213
20500 RETURN                       :rem 215
```

Sea Route To India

(Article on page 66.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

```
70 DIM M%(7),M$(6):X=RND(-TI)      :rem 45
71 FG=1.6:KB=151:HP=72:PRINT"{CLR}":IF PE
   EK(1024)=32THENKB=197:HP=29     :rem 52
72 M$(0)="":M$(1)="STOPPED AT CANARY ISLA
   NDS":M$(5)="SIGHTED CALCUTTA"   :rem 21
73 DH$="{2 SPACES}{L}{DOWN}{3 LEFT}
   {*}{RVS}{3 SPACES}{*}{DOWN}
   {4 LEFT}{4 SPACES}{DOWN}{4 LEFT}
   {4 SPACES}{DOWN}{5 LEFT}{RVS}£
   {3 SPACES}{OFF}£{DOWN}{3 LEFT}{L}
   {DOWN}{4 LEFT}{*}{RVS}{6 SPACES}
   {OFF}£"                         :rem 122
74 M$(2)="CAPE VERDE ISLANDS":M$(3)="ROUN
   DED CAPE OF GOOD HOPE"          :rem 65
76 M$(4)="PICKED UP INDIAN PILOT":rem 116
77 YS$=" -{DOWN}{LEFT}{RVS}+{DOWN}{LEFT}
   {OFF}-{DOWN}{2 LEFT}{*}{RVS} {OFF}£
   ":HS$="{RED} -{DOWN}{LEFT}{RVS}Z{OFF}
   {DOWN}{LEFT}-{DOWN}{2 LEFT}{*}{RVS}
   {SPACE}{OFF}£"                  :rem 108
78 MS$="{RIGHT}"+CHR$(20)+"{DOWN}":MS$=MS
   $+MS$:MS$=MS$+MS$               :rem 12
80 WH$(1)="NO WIND AT ALL":WH$(2)="VERY C
   ALM":WH$(3)="FAIR WINDS"        :rem 120
82 WH$(4)="GOOD WINDS":WH$(5)="GOOD WINDS
   ":WH$(6)="STRONG WINDS"         :rem 250
84 M%(1)=50:M%(2)=100:M%(3)=150:M%(4)=200
   :M%(5)=250:M%(6)=300:M%(7)=50   :rem 225
90 GOSUB16000                      :rem 224
91 DT$="{2 LEFT}.{DOWN}{LEFT}.{2 LEFT}.
   {2 LEFT}.{DOWN}{LEFT}.{DOWN}{LEFT}.
   {DOWN}{LEFT}.{DOWN}{LEFT}.{2 LEFT}.
   {DOWN}{LEFT}.{DOWN}{LEFT}.{DOWN}{LEFT}
   .{DOWN}{OFF}.{RVS}{OFF}.{DOWN}{OFF}.
   {RVS}{OFF}.{RVS}{OFF}.{DOWN}{LEFT}.
   {DOWN}{LEFT}.{DOWN}{LEFT}.{DOWN}{LEFT}
   .{DOWN}{LEFT}."                 :rem 139
92 DT$=DT$+"{DOWN}{LEFT}.{DOWN}{LEFT}.
   {DOWN}{OFF}.{DOWN}{OFF}.{RVS}{OFF}.
   {RVS}{OFF}.{RVS}{OFF}.{UP}{LEFT}.{UP}
   {OFF}.{UP}{OFF}.{UP}{LEFT}.{UP}{OFF}.
   {UP}{LEFT}.{UP}{LEFT}.{UP}{LEFT}.{UP}
   {OFF}.{UP}{OFF}.{RVS}{OFF}.{RVS}{OFF}.
   {RVS}{OFF}."                    :rem 54
93 DT$=DT$+"{RVS}{OFF}.{UP}{OFF}.{UP}
   {LEFT}."                        :rem 15
104 DEF FNR(X)=INT(RND(1)*X+1)     :rem 176
105 F$="{2 SHIFT-SPACE}<.{2 @}V
    {13 SHIFT-SPACE}(.{2 I}N
    {34 SHIFT-SPACE}"              :rem 17
106 F$=F$+"{28 SHIFT-SPACE}"       :rem 151
107 F$=F$+"<.{2 +}V{40 SHIFT-SPACE}(,
    {2 +}N{15 SHIFT-SPACE}"        :rem 114
```

```
108 F$=F$+"{28 SHIFT-SPACE}"          :rem 153
110 D$="{HOME}{32 DOWN}"              :rem 174
120 S$="{3 SPACES}{M}{2 SPACES}{M}
    {DOWN}{5 LEFT}{3 +} {2 +}{DOWN}
    {6 LEFT}{3 £} {2 £}{DOWN}
    {6 LEFT}{3 +} {2 +}{DOWN}{4 LEFT}
    {G} {M} {DOWN}{6 LEFT}{*}{RVS}
    {SPACE}ZZZ {OFF}£"                :rem 135
122 SS$="{3 SPACES}{M}{2 SPACES}{M}
    {DOWN}{5 LEFT}{3 +} {2 +}{DOWN}
    {6 LEFT}{3 £} {2 £}{DOWN}
    {6 LEFT}{3 +} {2 +}{DOWN}{4 LEFT}
    {G} {M} {DOWN}{6 LEFT}{*}{RVS}
    {5 SPACES}{OFF}£                  :rem 44
125 GOSUB15000                        :rem 14
130 GOTO500                           :rem 98
500 ML=8:GOSUB10000:FORWK=1TO52:Z=FRE(0):
    FORI=1TO10:GETA$:NEXT             :rem 140
510 GOSUB14000:POKE53281,3:REMWEATHER,MIL
    ES                                :rem 170
520 GOSUB10000:REM LOG                 :rem 8
530 GOSUB11000:REM SITUATION          :rem 232
550 X=FNR(GG):IFGG=6THENX=2*FNR(4)-1
                                      :rem 167
555 IFML<1200ANDX=4THENX=1             :rem 87
560 ONXGOSUB1000,2000,1000,4000,5000,6000
    ,6000                             :rem 113
790 FD=FD-1:SP=SP-1:WT=WT-1:IFWK>30THENCH
    =CH-1                             :rem 129
800 NEXTWK                            :rem 121
1000 REM CATCH WHALE ROUTINE          :rem 159
1002 DZ=17+INT(8*RND(1))               :rem 53
1005 PRINT"{CLR}WHALES SIGHTED"       :rem 246
1006 PRINT"{DOWN}TRY YOUR LUCK? Y OR N"
                                      :rem 173
1007 A$="":GETA$:IFA$="N"THEN 1155:rem 37
1008 IFA$<>"Y"THEN1007                :rem 203
1010 PRINT"{CLR}{DOWN}{11 SPACES}W{DOWN}
    {LEFT}{+}*-{DOWN}{3 LEFT}{+}V"
                                      :rem 227
1020 PRINT"{8 SPACES}{*}{RVS}{3 SPACES}
    {OFF}£"                           :rem 192
1030 PRINT"{5}JK{SHIFT-SPACE}JKJKJKJKKJ
    KJKJKJKJKJKJK{BLK}"               :rem 36
1040 PRINT"{HOME}PRESS H{OFF} "       :rem 16
1050 GOSUB1200                         :rem 9
1055 IFPEEK(KB)<>HPTHEN1050           :rem 100
1058 DC=0:PRINTLEFT$(D$,3)TAB(13)" {DOWN}
    {LEFT}-{DOWN}{LEFT}V{DOWN}{LEFT}";
                                      :rem 56
1060 DC=DC+1:GOSUB1200:PRINTLEFT$(D$,3+DC
    )TAB(13)" {DOWN}{LEFT}-{DOWN}{LEFT}V
    {DOWN}{LEFT}";:GOTO1070           :rem 78
1070 IFDC<>DZ-6THEN1060               :rem 79
1100 B$="*":OPEN3,3:INPUT#3,B$:CLOSE3:IFL
    EFT$(B$,1)<>"{SHIFT-SPACE}"THEN1150
                                      :rem 230
1110 PRINTLEFT$(D$,3+DC)TAB(13)" {DOWN}
    {LEFT}-{DOWN}{LEFT}V{LEFT}{UP}
    {DOWN}{LEFT}-{DOWN}{LEFT}V {2 UP}MIS
    SED";:GOTO1155                    :rem 230
1150 PRINT"{7 UP}GOOD SHOT":FD=FD+2
                                      :rem 222
1155 PRINTLEFT$(D$,23) "{4 UP}PRESS {RED}
    RETURN{BLK}"                      :rem 147
1157 A$="":GETA$:IFA$<>CHR$(13)THEN1157
                                      :rem 142
1159 RETURN                           :rem 176
1200 PRINTLEFT$(D$,DZ)LEFT$(F$,39)
                                      :rem 196
1210 F$=MID$(F$,2)+LEFT$(F$,1)        :rem 20
1245 REM{4 SPACES}A$="":GETA$:IFA$<>"L"TH
    EN1245                            :rem 72
1250 RETURN                           :rem 168
2000 REMFOREIGN SHIPS                 :rem 55
2010 PRINT"{CLR}{RED}"TAB(25)S$       :rem 73
2020 PRINT"{BLK}SHIP SIGHTED"         :rem 97
2030 PRINT"{RVS}A{OFF}PPROACH OR {RVS}F
    {OFF}LEE"                         :rem 233
2040 A$="":GETA$:IFA$<>"A"ANDA$<>"F"THEN2
    040                               :rem 137
2050 IFA$="A"ANDRND(1)>.2THEN3000     :rem 70
2060 ES=.5:IFA$="F"THENES=.8:GOTO2100
                                      :rem 149
2070 PRINT"{DOWN}IT'S A PIRATE SHIP!":PRI
    NT"{DOWN}YOU TURN AND FLEE"       :rem 110
2100 REMFLEE ROUTINE                  :rem 233
2110 IFRND(1)>ESTHENPRINT"{2 DOWN}ALAS.":
    PRINT"{DOWN}THEY CATCH AND SINK YOU"
    :GOTO17000                         :rem 41
2199 GOTO3140                         :rem 214
3000 FL=0:REM RACE                    :rem 251
3001 PRINT"{CLR}ITS CAPTAIN CHALLENGES YO
    U TO A RACE{DOWN}":IFRND(1)>.5THEN30
    03                                :rem 192
3002 PRINT"3 PIECES OF HIS GOLD FOR 3
    {2 SPACES}BARRELS OF{2 SPACES}YOUR S
    UPPLIES.":GOTO3005                 :rem 8
3003 FL=1:PRINT"3 BARRELS OF HIS SUPPLIES
     AGAINST"                          :rem 4
3004 PRINT"3 PIECES OF YOUR GOLD."
                                      :rem 188
3005 PRINT"{DOWN}DO YOU ACCEPT? {RVS}Y
    {OFF} OR {RVS}N{OFF}?"            :rem 248
3006 A$="":GETA$:IFA$="Y"THEN3017     :rem 48
3007 MS$="{RIGHT}"+CHR$(20)+"{DOWN}":MS$=
    MS$+MS$:MS$=MS$+MS$               :rem 103
3008 IFA$="N"THENRETURN               :rem 157
3009 GOTO3006                         :rem 206
3010 YS$="{BLK} -{DOWN}{LEFT}{RVS}+{DOWN}
    {LEFT}{OFF}-{DOWN}{2 LEFT}{*}T{RVS}
     {OFF}£":HS$="{RED} -{DOWN}{LEFT}
    {RVS}ZT{OFF}{DOWN}{LEFT}-{DOWN}
    {2 LEFT}{*}{RVS} {OFF}£"  :rem 82
3017 MS$="{RIGHT}"+CHR$(20)+"{DOWN}":MS$=
    MS$+MS$:MS$=MS$+MS$               :rem 104
3050 PRINT"{CLR}{BLK}";               :rem 247
3060 PRINTTAB(36)YS$:PRINT"{2 DOWN}"TAB(3
    6)HS$                              :rem 52
3070 FORT=1TO1000:NEXT                :rem 80
3075 YX=INT(RND(1)*10)+25:HX=INT(RND(1)*9
    )+25:IFHX=YXTHENYX=YX+1           :rem 171
3080 MX=YX:W$="YOUR":IFYX<HXTHENMX=HX:W$=
    "HIS"                              :rem 4
3090 FORJ=1TOMX                       :rem 179
3092 IFYX<JTHEN3095                   :rem 148
3093 PRINT"{HOME}"MS$                 :rem 119
3095 IFHX<JTHEN3100                   :rem 121
3096 PRINT"{HOME}{6 DOWN}"MS$         :rem 224
3100 NEXTJ                            :rem 77
3110 PRINT"{BLK}{HOME}{15 DOWN}"W$" SHIP
    {SPACE}WINS"                      :rem 108
3120 IFMX=YXTHENGP=GP-(FL=0)*3:SP=SP+3*FL
    : CH=CH+2                         :rem 29
3130 IFMX=HXTHENGP=GP-FL*3:SP=SP+3*(FL=0)
    : CH=CH-2                         :rem 15
3140 PRINTLEFT$(D$,23) "PRESS {RED}RETURN
    {BLK}"                            :rem 75
3145 A$="":GETA$:IFA$<>CHR$(13)THEN3145
                                      :rem 140
3150 RETURN                           :rem 169
4000 REMRIVER                          :rem 48
```

```
4010 IFRND(1)>.7THEN RETURN       :rem 108
4020 PRINT"{CLR}YOU SPY A RIVER.":PRINT"
     {DOWN}WILL YOU GO ASHORE FOR FOOD AN
     D WATER?"                    :rem 103
4025 PRINT"{DOWN}{RVS}Y{OFF} OR {RVS}N
     {OFF}"                       :rem 61
4030 A$="":GETA$:IFA$<>"Y"ANDA$<>"N"THEN4
     030                          :rem 171
4040 IFA$="N"THEN CH=CH-2:RETURN :rem 134
4050 PRINT"{2 DOWN}YOU LAND AND REPLENISH
     ."                           :rem 131
4060 IFRND(1)>.5THEN4800          :rem 91
4070 PRINTLEFT$(D$,23) "PRESS {RED}RETURN
     {BLK}"                       :rem 78
4075 A$="":GETA$:IFA$<>CHR$(13)THEN4075
                                  :rem 146
4080 PRINT"{CLR}NATIVES APPEAR{3 SPACES}O
     {3 SPACES}O{DOWN}{6 LEFT}J{RVS}{RED}
      {BLK}{OFF}K {Z}{RVS}{GRN} {OFF}
     {BLK}{X}{DOWN}{6 LEFT}V{3 SPACES}V
     "                            :rem 108
4082 PRINT"{DOWN}{RVS}A{OFF}PPROACH OR
     {RVS}F{OFF}LEE?"             :rem 66
4083 A$="":GETA$:IFA$<>"A"ANDA$<>"F"THEN4
     083                          :rem 155
4085 IFA$="F"THEN4800             :rem 135
4090 IFRND(1)>.5THEN4300          :rem 89
4100 PRINT"{3 DOWN}THE NATIVES TRADE GOLD
      FOR YOUR TRINKETS"           :rem 4
4110 GP=GP+10:CH=CH+1:GOTO4800    :rem 229
4300 PRINT"{CLR}{2 SPACES}O{3 SPACES}O
     {DOWN}{6 LEFT}J{RVS}{YEL} {BLK}{OFF}
     K{Z}{RVS}{RED} {OFF}{BLK}{X}
     {DOWN}{6 LEFT}V - V";        :rem 138
4302 PRINT"{2 UP}{5 SPACES}O{3 SPACES}O
     {DOWN}{6 LEFT}J{RVS}{GRN} {BLK}{OFF}
     K{Z}{RVS}{1} {BLK}{OFF}{X}
     {DOWN}{6 LEFT}V - V"         :rem 197
4305 PRINT"{3 DOWN}MORE NATIVES APPEAR!":
     PRINT"{DOWN}RUN FOR THE SHIP!"
                                  :rem 37
4310 PRINT"{DOWN}TYPE {BLU}RUN{BLK} AND P
     RESS RETURN"                 :rem 208
4320 TI$="000000"                 :rem 43
4330 INPUTA$:IFA$<>"RUN"THEN4330  :rem 153
4340 IFTI<200THEN4500             :rem 189
4350 PRINT"{DOWN}TOO SLOW. YOU'RE DEAD.":
     GOTO17000                    :rem 117
4500 PRINT"{DOWN}WHEW! YOU SAVED YOUR SKI
     N BUT LOST YOUR"             :rem 119
4505 PRINT"FOOD AND WATER":CH=CH-1 :rem 8
4510 GOTO4810                     :rem 208
4800 FD=10:WT=10:CH=CH+1          :rem 96
4810 PRINTLEFT$(D$,23) "PRESS {RED}RETURN
     {BLK}"                       :rem 80
4820 A$="":GETA$:IFA$<>CHR$(13)THEN4820
                                  :rem 142
4840 RETURN                       :rem 176
5000 REMSTORRM                    :rem 144
5010 IFRND(1)>.5THENRETURN        :rem 107
5015 POKE53281,12                 :rem 140
5020 PRINT"{CLR}TERRIBLE STORM"   :rem 25
5025 IFRND(1)>.9THEN PRINT"{DOWN}SHIPWREC
     K AND PERISH":GOTO17000      :rem 48
5030 PRINT"{DOWN}YOU RIDE IT OUT, BUT LOS
     E SUPPLIES":PRINT"{DOWN}OVERBOARD."
                                  :rem 13
5040 SP=SP-4                      :rem 173
5050 PRINTLEFT$(D$,23) "PRESS {RED}RETURN
     {BLK}"                       :rem 77
5060 A$="":GETA$:IFA$<>CHR$(13)THEN5060
                                  :rem 136
5070 POKE53281,3:RETURN           :rem 119
6000 REM ARAB DHOWS               :rem 69
6010 PRINT"{CLR}HOSTILE WATERS"   :rem 25
6020 PRINT"{DOWN}ARAB TRADERS WILL TRY TO
      KEEP YOU OUT"               :rem 201
6030 PRINTLEFT$(D$,23) "PRESS {RED}RETURN
     {BLK}"                       :rem 76
6040 A$="":GETA$:IFA$<>CHR$(13)THEN6040
                                  :rem 134
6045 IFRND(1)>.5THENRETURN        :rem 116
6050 PRINT"{CLR}{DOWN}";TAB(8)DH$:PRINT"
     {HOME}{DOWN}"TAB(20)DH$      :rem 244
6060 PRINT"{HOME}{9 DOWN}ARAB DHOWS APPEA
     R"                           :rem 157
6070 PRINT"{DOWN}TYPE {BLU}FLEE{BLK} AND
     {SPACE}PRESS RETURN"         :rem 252
6072 TI$="000000"                 :rem 49
6074 INPUTA$:IFA$<>"FLEE"THEN6074:rem 206
6076 IFTI<200THEN6090             :rem 203
6080 PRINT"{DOWN}THEY SINK YOU.":GOTO1700
     0                            :rem 181
6090 PRINT"{DOWN}YOUR PILOT ESCAPES THEM.
     "                            :rem 232
6100 PRINTLEFT$(D$,23) "PRESS {RED}RETURN
     {BLK}"                       :rem 74
6110 A$="":GETA$:IFA$<>CHR$(13)THEN6110
                                  :rem 130
6120 RETURN                       :rem 169
10000 REM LOG BOOK                :rem 226
10002 GOSUB16000:Q=INT(ML/200)    :rem 200
10003 IFQ>1THENPRINTLEFT$(D$,5);"
     {9 RIGHT}";LEFT$(DT$,3*Q)    :rem 93
10005 PRINT"{HOME}{BLK}{2 SPACES}SHIP'S R
     ECORD"                       :rem 215
10006 WK$=RIGHT$("{2 SPACES}"+STR$(WK),4)
                                  :rem 204
10007 ML$=RIGHT$("{2 SPACES}"+STR$(ML),4)
                                  :rem 187
10008 FD$=RIGHT$("{2 SPACES}"+STR$(FD),4)
                                  :rem 158
10009 SP$=RIGHT$("{2 SPACES}"+STR$(SP),4)
                                  :rem 209
10010 GP$=RIGHT$("{2 SPACES}"+STR$(GP),4)
                                  :rem 177
10011 CH$=RIGHT$("{2 SPACES}"+STR$(CH),4)
                                  :rem 154
10012 WT$=RIGHT$("{2 SPACES}"+STR$(WT),4)
                                  :rem 219
10020 PRINTLEFT$(D$,14)TAB(20)"WEEKS OUT
     {4 SPACES}";WK$              :rem 95
10030 PRINTTAB(20)"MILES SAILED ";ML$
                                  :rem 115
10040 PRINTTAB(20)"FOOD{9 SPACES}";FD$
                                  :rem 97
10042 PRINTTAB(20)"WATER{8 SPACES}";WT$
                                  :rem 223
10045 PRINTTAB(20)"SUPPLIES{5 SPACES}";SP
     $                            :rem 204
10050 PRINTTAB(20)"GOLD{9 SPACES}";GP$
                                  :rem 109
10060 PRINTTAB(20)"CREW SPIRIT{2 SPACES}"
     ;CH$                         :rem 72
10070 PRINT"{DOWN}"TAB(14)M$(G)   :rem 112
10073 IFG=1ORG=2THENPRINTTAB(14)"TOOK ON
     {SPACE}FOOD & WATER";        :rem 9
10074 IFG=4THENPRINTTAB(14)"AT MALINDI"
                                  :rem 99
```

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10075 IFG=5THENPRINTTAB(10)"{DOWN}{RVS}YO
      U MADE IT!";:PRINT" {RVS}CONGRATULA
      TIONS!{HOME}";                  :rem 7
10077 IFG=5THEN PRINT"HISTORY WAS WRONG."
      :END                            :rem 48
10080 PRINTLEFT$(D$,24)"PRESS C"      :rem 52
10090 A$="":GETA$:IFA$<>"C"THEN10090
                                      :rem 183
10095 RETURN                          :rem 223
11000 REM EVAL SITUATION              :rem 190
11010 IFFD<1THENPRINT"{CLR}OUT OF FOOD":P
      RINT"{DOWN}YOU DIE OF STARVATION.":
      GOTO17000                       :rem 229
11020 IFSP<1THENPRINT"{CLR}OUT OF SUPPLIE
      S":PRINT"{DOWN}YOU DIE":GOTO17000
                                      :rem 126
11030 IFCH<2THENPRINT"{CLR}CREW MUTINIES.
      ":PRINT"{DOWN}THEY FORCE YOU TO TUR
      N BACK."                        :rem 202
11035 IFCH<2THEN17000                 :rem 169
11100 RETURN                          :rem 211
14000 POKE53281,7: REM WEATHER        :rem 184
14002 WH=FNR(7):G=0:GG=5:CM=M%(WH)*FG
                                      :rem 137
14005 PRINT"{CLR}{6 DOWN}WEATHER":rem 212
14010 IFWH=7THEN14140                 :rem 193
14030 PRINTWH$(WH):IFWH<3THENCH=CH-1
                                      :rem 239
14034 IFML<800ANDML+CM>800THENG=1:WT=10:F
      D=FD+3:SP=SP+6:IFFD<10THENFD=10
                                      :rem 170
14036 IFML<1500ANDML+CM>1500THENG=2:WT=10
      :FD=FD+3:SP=SP+6:IFFD<10THENFD=10
                                      :rem 9
14038 IFML<5000ANDML+CM>5000THENG=3
                                      :rem 57
14039 IFML<6600ANDML+CM>6600THENG=4
                                      :rem 73
14040 IFML>6600THENGG=6               :rem 91
14042 ML=ML+CM:Q=INT(ML/2+.5):IFML>9000TH
      ENG=5                           :rem 2
14045 GOTO14155                       :rem 55
14140 PRINT"{DOWN}STEADY RAIN":PRINT"
      {DOWN}YOU REFILL WATER TANKS":WT=10
                                      :rem 46
14155 PRINTLEFT$(D$,23) "PRESS {RED}RETUR
      N{BLK}"                         :rem 131
14157 A$="":GETA$:IFA$<>CHR$(13)THEN14157
                                      :rem 246
14200 RETURN                          :rem 215
15000 POKE53281,13:{3 SPACES}REM SETUP
                                      :rem 103
15010 PRINT"{CLR}HENRY THE NAVIGATOR, PRI
      NCE OF PORTUGAL,"               :rem 137
15015 PRINT"BELIEVES THERE MUST BE A SEA-
      ROUTE TO "                      :rem 221
15017 PRINT"{DOWN}INDIA. HE HAS OFFERED A
       PRIZE FOR"                     :rem 137
15018 PRINT"{DOWN}FINDING IT. VASCO DA GA
      MA IS GOING TO"                 :rem 117
15019 PRINT"{DOWN}TRY. HIS SHIPS WILL BE
      {SPACE}READY SOON. BUT"         :rem 6
15020 PRINT"{DOWN}YOU HAVE A SHIP THAT CA
      N LEAVE TODAY."                 :rem 143
15021 PRINT"{2 DOWN}YOU DECIDE TO TRY YOU
      R LUCK."                        :rem 213
15022 PRINTLEFT$(D$,23) "PRESS {RED}RETUR
      N{BLK}"                         :rem 125
15023 A$="":GETA$:IFA$<>CHR$(13)THEN15023
                                      :rem 232
15025 WT=10:GP=20                     :rem 182
15030 PRINT"{CLR}OTHERS HAVE TRIED. SOME
      {SPACE}DIED IN STORMS,"         :rem 241
15031 PRINT"{DOWN}SOME OF THIRST OR STARV
      ATION. SOME WERE"               :rem 196
15032 PRINT"{DOWN}MURDERED BY PIRATES, OT
      HERS BY NATIVES."               :rem 204
15033 PRINT"{DOWN}UNHAPPY CREWS MUTINIED.
       ARAB TRADERS"                  :rem 63
15034 PRINT"{DOWN}HAVE KILLED TO PROTECT
      {SPACE}THEIR ROUTES."           :rem 8
15035 PRINT"{DOWN}ALL THESE COULD HAPPEN
      {SPACE}TO YOU."                 :rem 51
15036 PRINT"{2 DOWN}{RVS}WORDS OF ADVICE
      {OFF}: NOT ALL STRANGE SHIPS":rem 5
15037 PRINT"{DOWN}HOLD PIRATES. NATIVES C
      AN BE FRIENDLY."                :rem 77
15038 PRINT"{DOWN}FRESH FOOD, GOOD WEATHE
      R, AN INCREASE"                 :rem 237
15039 PRINT"{DOWN}IN GOLD WILL KEEP YOUR
      {SPACE}CREW HAPPY."             :rem 46
15050 PRINTLEFT$(D$,23) "PRESS {RED}RETUR
      N{BLK}"                         :rem 126
15060 A$="":GETA$:IFA$<>CHR$(13)THEN15060
                                      :rem 234
15130 PRINT"{CLR}{DOWN}"TAB(30){2 SPACES}
      SS$                             :rem 196
15140 PRINT"{3 DOWN}PRESS {RVS}L{OFF} TO
      {SPACE}SET SAIL FROM LISBON":rem 47
15150 A$="":GETA$:IFA$<>"L"THEN15150
                                      :rem 196
15155 FORI=1TO30:PRINT"{HOME}"MS$:PRINT"
      {UP}"MS$"{12 SPACES}":NEXT      :rem 96
15160 SP=50:CH=10:FD=10               :rem 7
15180 PRINTLEFT$(D$,23) "PRESS {RED}RETUR
      N{BLK}"                         :rem 130
15185 A$="":GETA$:IFA$<>CHR$(13)THEN15185
                                      :rem 250
15200 RETURN                          :rem 216
16000 POKE53281,3:PRINT"{CLR}":IFML=0THEN
       PRINT"{CLR}{BLK} SEA ROUTE TO INDI
      A":POKE53280,3                  :rem 82
16004 PRINT"{BLK}RRRRRRRRRRRRRRRRRRRRRRR
      RRRRRRRRRRR{YEL}"               :rem 130
16005 REM PRINT"{YEL}"                :rem 79
16010 PRINTTAB(8)"{RVS}{10 SPACES}{OFF}
      {7 SPACES}{RVS}{7 SPACES}" :rem 223
16012 PRINTTAB(8)"{RVS}{2 SPACES}{OFF}£
      {3 SPACES}[2 J] {RVS}{19 SPACES}"
                                      :rem 244
16014 PRINTTAB(8)"[2 U]{3 SPACES}[C]
      {2 SPACES}{RVS}{23 SPACES}":rem 107
16016 PRINTTAB(4)"[B]{3 SPACES}{RVS}£
      {3 SPACES}{OFF}{4 SPACES}{RVS}
      {19 SPACES}"                    :rem 73
16018 PRINTTAB(7)"{RVS}£{8 SPACES}{OFF}
      [*]{RVS}{12 SPACES}{OFF}£"
                                      :rem 169
16020 PRINTTAB(6)"{RVS}£{9 SPACES}{OFF}
      {SPACE}[*]{RVS}{2 SPACES}[*]
      {OFF}{2 SPACES}[*]{RVS}{4 SPACES}
      {OFF}£"                         :rem 3
16022 PRINTTAB(3)"[B]{2 SPACES}{RVS}
      {10 SPACES}[*]{OFF} [*]{RVS}
      {2 SPACES}[*]{OFF}{2 SPACES}{RVS}
      {3 SPACES}{OFF}£"               :rem 24
16024 PRINTTAB(6)"{RVS}{11 SPACES}[*]
      {OFF} [*]{RVS} {OFF}£{2 SPACES}
      {RVS}{2 SPACES}{OFF}£"          :rem 40
16026 PRINTTAB(6)"{RVS}{12 SPACES}[*]
      {OFF} £{3 SPACES}[*]{RVS} "
                                      :rem 75
```

```
16028 PRINTTAB(6)"{*3}{RVS}{12 SPACES}
      {OFF}£{5 SPACES}{*3}"          :rem 59
16030 PRINTTAB(10)"{*3}{RVS}{7 SPACES}
      {OFF}£"                        :rem 128
16032 PRINTTAB(11)"{RVS}{6 SPACES}{OFF}£
      "                              :rem 164
16034 PRINTTAB(11)"{RVS}{6 SPACES}{OFF}"
                                     :rem 253
16036 PRINTTAB(11)"{RVS}{6 SPACES}{OFF}"
                                     :rem 255
16038 PRINTTAB(11)"{RVS}{6 SPACES}{OFF}"
                                      :rem 1
16039 PRINTTAB(11)"{RVS}{5 SPACES}{OFF}£
      "                              :rem 171
16040 PRINTTAB(11)"{RVS}{5 SPACES}{OFF}
      {RVS}{H}"                      :rem 192
16042 PRINTTAB(11)"{RVS}{4 SPACES}{OFF}£
       {RVS} "                       :rem 183
16044 PRINTTAB(11)"{RVS}{3 SPACES}{OFF}£
      {2 SPACES}{RVS} "              :rem 185
16046 PRINTTAB(11)"{*3}{RVS} {OFF}£"
                                     :rem 136
16048 IFML>0THENPRINT"{BLK}";:RETURN
                                     :rem 126
16050 PRINTTAB(20)"{DOWN}{BLK}PRESS B
      {OFF} TO BEGIN";               :rem 156
16060 A$="":GETA$:IFA$<>"B"THEN16060
                                     :rem 188
16070 RETURN                         :rem 222
17000 PRINTLEFT$(D$,23) "PRESS {RED}RETUR
      N{BLK}"                        :rem 123
17010 A$="":GETA$:IFA$<>CHR$(13)THEN17010
                                     :rem 228
17020 PRINT"{CLR}{2 DOWN}ON MAY 20, 1498"
      :PRINT"{DOWN}VASCO DA GAMA REACHED
      {SPACE}CALCUTTA ON THE"        :rem 86
17025 PRINT"{DOWN}WEST COAST OF INDIA, AF
      TER{2 SPACES}"                 :rem 54
17030 PRINT"{DOWN}A VOYAGE OF 11 MONTHS A
      ND 9500 MILES.{4 DOWN}"        :rem 70
17040 PRINT"{DOWN}PLAY AGAIN? Y OR N"
                                     :rem 251
17050 A$="":GETA$:IFA$="Y"THENRUN:rem 142
17060 IFA$<>"N"THEN17050             :rem 42
17070 PRINT"{CLR}BETTER LUCK ANOTHER TIME
      ."                             :rem 198
17080 END                            :rem 215
```

The Inner World Of Computers

(Article on page 110.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

```
10 PRINT"{CLR}{BLK} TO CREATE {RVS}BINAMI
   TE"                               :rem 7
20 PRINT" PERSON/ITEM PROFILE"    :rem 121
30 PRINT" PUT {RVS}.{OFF} IN ALPHA CELL"
                                     :rem 28
40 PRINT"{5 SPACES}{RVS}ABCDEFGHIJKLMNO":
   DIMD(16),NA$(16),B$(16)        :rem 112
50 PRINT"{5 SPACES}{RVS}PPPPPPPPPPPPPPP"
                                     :rem 120
60 PRINT"HOW MANY NAME/ITEMS":INPUTTT:IFT
   T>14THENTT=14                     :rem 43
70 FORI=0TOTT-1:READNA$(I):NEXT  :rem 201
80 PRINT"{CLR} IF ATTRIBUTE APPLIES"
                                     :rem 29
90 PRINT" PUT {RVS}.{OFF} IN ALPHA CELL"
                                     :rem 34
100 PRINT"IN ROW OPPOSITE NAME #":rem 168
110 PRINT"{RVS}NAME{OFF} ABCDEFGHIJKLMNO"
                                     :rem 96
120 INPUT" #{3 SPACES}{RVS}OOOOOOOOOOOOO
   O{17 LEFT}";B$:L=LEN(B$)          :rem 36
130 XP=L-1:FORI=1TOL:DM$=MID$(B$,I,1):IFD
   M$>"1"THENPRINT"{2 UP}{2 SPACES}":DM$
   ="":GOTO120                       :rem 102
140 IFDM$="."THENDM$="1"             :rem 30
150 D=D+(VAL(DM$))*2↑XP:XP=XP-1:NEXT
                                     :rem 192
160 GOSUB300:T=T+1                   :rem 37
170 PRINT"{UP} "TAB(2)T:B$="":D=0:D$="":I
   F T<TT THEN 120                   :rem 154
180 PRINT"{5 SPACES}ABCDEFGHIJKLMNO":PRIN
   T"TO FIND ATTRIBUTES":PRINT"TYPE NAME
    #'S"                             :rem 131
190 PRINT"( 1..."TT") ANY ORDER" :rem 199
200 PRINT:INPUT"#";AL:AL=AL-1:PRINT"{UP}"
   :IFAL<0ORAL>TTTHEN240             :rem 62
210 FORJ=0TO14                       :rem 57
220 IF(D(AL)AND2↑J)=2↑J THENPRINTCHR$(79-
   J);                               :rem 138
230 NEXT:GOTO200                     :rem 217
240 FORI=0TOTT-1:PRINTLEFT$(NA$(I),5)"
   {RVS}"B$(I):PRINT"{RVS}"D(I):NEXT
                                     :rem 187
250 PRINT"{5 SPACES}ABCDEFGHIJKLMNO"
                                     :rem 160
260 END:REM*SAVE DATA*               :rem 42
300 B$(T)=B$:D(T)=D:                 :rem 31
310 IFLEN(B$(T))<15THENB$(T)=LEFT$("
   {16 SPACES}",15-LEN(B$(T)))+B$(T)
                                     :rem 139
320 RETURN                           :rem 117
400 DATAMARYMARY,BOPEEP,BOYBLUE,MSMUFFIT,
   5NAME,6NAME,7NAME,8NAME,9NAME,10NAME
                                     :rem 30
410 DATA11NAME,12NAME,13NAME,14NAME,15NAM
   E,16NAME                          :rem 172
```

Getting Started With A Disk Drive

(Article on page 106.)

```
1 FORI=828TO883:READA:POKEI,A:NEXTI
                                     :rem 254
10 REM"D=DSAVE"@BACK2",D0:?DS$:CATALOGD0
                                     :rem 159
20 BB=PEEK(44)+27:POKE995,BB         :rem 85
30 POKE998,PEEK(55):POKE999,PEEK(56):POKE
   55,0:POKE56,BB:CLR                :rem 55
40 BB=PEEK(995)                      :rem 66
50 N=PEEK(999)-BB-1:BA=BB*256:MA=828
                                     :rem 12
60 DIMBM%(35,24)                     :rem 63
70 FORJ=0TO7:TA(J)=2↑J:NEXT         :rem 217
80 PRINT"{CLR}{3 RIGHT}{RVS}BACKUP 1541
   {OFF}"                            :rem 72
90 PRINT"{DOWN}'GOTO10000' IF PROGRAM QUI
   TS ABNORMALLY"                    :rem 241
```

```
100 PRINT"{DOWN}"N"BUFFERS AVAILABLE"
                                    :rem 147
110 OPEN1,8,15                      :rem 235
200 REM *** MAIN FUNCTIONS ****     :rem 122
210 GOSUB1000                       :rem 212
220 D$="S":GOSUB3200:I2$=IR$        :rem 36
230 IFDR$<>"2A"THENPRINT"{RVS}ILLEGAL DOS
    1.0 DISK{OFF}":GOTO10000        :rem 177
240 IFI2$=I1$THENPRINT"{RVS}SOURCE AND DE
    STINATION HAVE SAME ID CODE{OFF}":GOT
    O10000                          :rem 127
250 GOSUB2500                       :rem 222
260 T=TS:S=0:NU=1:T1=T:S1=S         :rem 179
270 PRINT#1,"I0":OPEN3,8,3,"#"      :rem 88
280 PRINT"READING BLOCK #";         :rem 46
290 IFBM%(T1,S1)=0THENGOSUB2000:NU=NU+1:I
    FNU>NTHEN320                    :rem 23
300 S1=S1+1:IFS1>20THENS1=0:T1=T1+1
                                    :rem 30
310 IFT1<TF+1THEN290                :rem 164
320 PRINT"{DOWN}"                   :rem 119
330 CLOSE3                          :rem 63
340 D$="D":GOSUB3200:IFIR$<>I1$THENGOTO34
    0                               :rem 226
350 PRINT#1,"I0":OPEN3,8,3,"#"      :rem 87
360 PRINT"WRITING BUFFER #";        :rem 166
370 NU=1:T1=T:S1=S                  :rem 73
380 IFBM%(T1,S1)=0THENGOSUB2200:NU=NU+1:I
    FNU>NTHEN410                    :rem 25
390 S1=S1+1:IFS1>20THENS1=0:T1=T1+1
                                    :rem 39
400 IFT1<TF+1THEN380                :rem 164
410 PRINT"{DOWN}"                   :rem 119
420 CLOSE3                          :rem 63
430 S=S1+1:IFS>20THENS=0:T1=T1+1    :rem 143
440 T=T1:IFT>TFTHEN500              :rem 103
450 D$="S":GOSUB3200:IFIR$<>I2$THEN450
                                    :rem 189
460 NU=1:T1=T:S1=S:GOTO270          :rem 85
500 REM FINISHED XFERS              :rem 75
510 CLOSE1                          :rem 61
520 POKE55,PEEK(998):POKE56,PEEK(999):CLR
                                    :rem 184
530 PRINT"{2 DOWN}BACKUP COMPLETE"
                                    :rem 154
540 OPEN1,8,0,"$0"                  :rem 128
550 GET#1,A$:IFA$<>"{RVS}"THEN550   :rem 38
560 PRINTA$;:GOTO610                :rem 210
570 GET#1,A$:SS=ST:A=LEN(A$):IFATHENA=ASC
    (A$)                            :rem 182
580 GET#1,B$:SS=ST:B=LEN(B$):IFBTHENA=ASC
    (B$)                            :rem 188
590 IFSSTHEN660                     :rem 158
600 IFA=1ANDB=1THENGOSUB630         :rem 159
610 GET#1,A$:IFA$=""THENPRINT:GOTO570
                                    :rem 214
620 PRINTA$;:GOTO610                :rem 207
630 GET#1,A$:SS=ST:A=LEN(A$):IFATHENA=ASC
    (A$)                            :rem 179
640 GET#1,B$:SS=ST:B=LEN(B$):IFBTHENB=ASC
    (B$)                            :rem 186
650 N=B*256+A:PRINTN;:RETURN        :rem 5
660 CLOSE1                          :rem 67
670 END                             :rem 116
1000 REM HEADER DEST DISK           :rem 169
1010 PRINT"{DOWN}INSERT DESTINATION DISK
     {SPACE}TO BE FORMATTED"        :rem 182
1020 INPUT"{2 DOWN}DISK NAME{3 RIGHT}
     {SHIFT-SPACE}{16 SPACES}{19 LEFT}";D
     N$                             :rem 148
1030 IFDN$="{SHIFT-SPACE}"THENPRINT"
     {3 UP}";:GOTO1020              :rem 78
1040 IFLEN(DN$)>16THENCLR:GOTO40    :rem 198
1050 F=0:FORJ=1TOLEN(DN$):S1$=MID$(DN$,J,
     1)                             :rem 210
1060 IFS1$="{SHIFT-SPACE}"ORS1$=CHR$(34)T
     HENF=1                         :rem 65
1070 NEXTJ:IFFTHENPRINT"{3 UP}";:GOTO1020
                                    :rem 132
1080 INPUT"{DOWN}UNIQUE DISK ID{3 RIGHT}
     {SHIFT-SPACE}{20 SPACES}{23 LEFT}";I
     1$                             :rem 40
1090 IFI1$="{SHIFT-SPACE}"THENPRINT"
     {2 UP}";:GOTO1080              :rem 177
1100 IFLEN(I1$)<>2THENPRINT"{2 UP}";:GOTO
     1080                           :rem 100
1110 PRINT#1,"N0:"+DN$+","+I1$      :rem 17
1120 GOSUB3000                      :rem 7
1130 IFERTHENPRINTER$:GOTO10000     :rem 198
1140 RETURN                         :rem 166
2000 REM READ BLOCK T1,S1 TO BUFFER # NU
                                    :rem 133
2010 C=.                            :rem 113
2020 PRINT#1,"U1";3;0;T1;S1         :rem 243
2030 GOSUB3000:IFNOTERTHEN2060      :rem 80
2040 C=C+1:IFC<3GOTO2020            :rem 93
2050 PRINTER$:FORJ=(BB+NU)*256TO(BB+NU)*2
     56+255:POKEJ,.:NEXTJ:GOTO2100
                                    :rem 251
2060 PRINT#1,"B-P";3;0              :rem 177
2070 IFNU<>0THENPRINT"{3 SPACES}{3 LEFT}"
     ;RIGHT$("{2 SPACES}"+STR$(NU),3);"
     {3 LEFT}";                     :rem 26
2080 POKE996,PEEK(3):POKE997,PEEK(4):POKE
     4,BB+NU:SYSMA                  :rem 64
2085 POKE3,PEEK(996):POKE4,PEEK(997)
                                    :rem 99
2090 IFST<>.ANDST<>64THENGOSUB3000:GOTO20
     50                             :rem 179
2100 RETURN                         :rem 163
2200 REM WRITE BLOCK T1,S1 FROM BUFFER #
     {SPACE}NU                      :rem 135
2210 C=.                            :rem 115
2220 PRINT#1,"B-A";0;T1;S1:PRINT#1,"B-P";
     3;0                            :rem 212
2230 PRINT"{3 SPACES}{3 LEFT}";RIGHT$("
     {2 SPACES}"+STR$(NU),3);"{3 LEFT}";
                                    :rem 13
2240 POKE996,PEEK(3):POKE997,PEEK(4):POKE
     4,BB+NU:SYSMA+3                :rem 156
2245 POKE3,PEEK(996):POKE4,PEEK(997)
                                    :rem 97
2250 IFST<>.ANDST<>64THENPRINT"{RVS}IEEE
     {SPACE}WRITE ERROR"ST"{OFF}":GOTO100
     00                             :rem 37
2260 PRINT#1,"U2";3;0;T1;S1         :rem 250
2270 GOSUB3000:IFNOTERTHEN2300      :rem 83
2280 C=C+1:IFC<3THEN2260            :rem 95
2290 PRINT"{RVS}UNRECOVERABLE WRITE ERROR
     "ER$:GOTO10000                 :rem 177
2300 RETURN                         :rem 165
2500 REM GET BAM TO BM%(T,S)        :rem 214
2510 TS=1:TF=.                      :rem 28
2520 PRINT#1,"I0":OPEN3,8,3,"#"     :rem 136
2530 S9=0                           :rem 195
2540 PRINT"{DOWN}TRACK #{3 SPACES}BLOCKS
     {SPACE}TO XFER"                :rem 219
2550 PRINT"[24 T]"                  :rem 229
2560 NU=0:T1=18:S1=0:C0$=CHR$(.):GOSUB200
     0                              :rem 119
2570 BY=4                           :rem 218
2580 T%=(BY-4)/4+1                  :rem 145
```

```
2590 PRINT"{2 SPACES}";T%;          :rem 144
2600 IFPEEK(BA+BY)=.THENFORJ=.TO20:BM%(T%
     ,J)=.:NEXT:BY=BY+4:GOTO2650 :rem 175
2610 S=0                            :rem 137
2620 BY=BY+1:A0=PEEK(BA+BY):FORJ=.TO7:BM%
     (T%,S)=A0ANDTA(J):S=S+1:NEXT:rem 202
2630 IFS<22THEN2620                 :rem 70
2640 BY=BY+1                        :rem 155
2650 ES=21:IFT%>17THENES=19         :rem 91
2660 IFT%>24THENES=18               :rem 231
2670 IFT%>30THENES=17               :rem 228
2680 FORJ=ESTO24:BM%(T%,J)=-1:NEXT:rem 33
2690 SM=.:FORJ=.TO20:IFBM%(T%,J)=.THENSM=
     SM+1                           :rem 231
2700 NEXT:PRINTTAB(12);SM:S9=S9+SM
                                    :rem 143
2710 IFSM=.ANDTS=T%THENTS=TS+1:GOTO2730
                                    :rem 233
2720 IFSM<>.THENTF=T%               :rem 33
2730 IFBY<143THEN2580               :rem 200
2740 CLOSE3                         :rem 118
2750 PRINT"START =";TS;" FINISH =";TF
                                    :rem 158
2760 PRINT"{DOWN}A TOTAL OF";S9;"BLOCKS T
     O XFER"                        :rem 231
2770 S8=90+25+(.650+.980)*S9        :rem 136
2780 S7=INT(S8/60):PRINT"APPROX";S7":"INT
     (S8-S7*60);"FOR COPY"          :rem 203
2790 RETURN                         :rem 178
3000 REM READ ERR CH TO ER,ER$      :rem 88
3010 INPUT#1,E0$,E1$,E2$,E3$:ER$=E0$+","+
     E1$+","+E2$+","+E3$            :rem 176
3020 ER=LEN(E0$):IFERTHENER=VAL(E0$)
                                    :rem 146
3030 RETURN                         :rem 166
3200 REM INSTRUCT TO SWAP TO DISK GIVEN I
     N D$                           :rem 73
3210 IFD$="D"THENS1$="DESTINATION":GOTO32
     30                             :rem 87
3220 S1$="SOURCE"                   :rem 193
3230 PRINT"{DOWN}INSERT ";S1$;" DISK, PRE
     SS {RVS}SPACE{OFF}"            :rem 213
3240 GETA$:IFA$<>" "THEN3240        :rem 242
3250 OPEN2,8,0,"$0"                 :rem 178
3260 GOSUB3000:IFER>0THEN10000      :rem 252
3270 FORJ=1TO26:GET#2,A$:NEXTJ      :rem 57
3280 GET#2,A$:GET#2,B$:IR$=A$+B$    :rem 192
3290 GET#2,A$:GET#2,A$:GET#2,B$:DR$=A$+B$
                                    :rem 188
3300 CLOSE2:RETURN                  :rem 136
10000 REM DROP OUT                  :rem 2
10010 POKE55,PEEK(998):POKE56,PEEK(999):C
      LR:STOP                       :rem 147
15000 DATA 76,66,3,76,91,3,162,3,32,198,2
      55,160,0,132,3,32,207,255,145
                                    :rem 113
15010 DATA 3,165,144,208,3,200,208,244,32
      ,204,255,96,162,3,32,201,255,160
                                    :rem 245
15020 DATA 0,132,3,177,3,32,210,255,165,1
      44,208,3,200,208,244,32,204,255,96
                                    :rem 87
```

BEFORE TYPING...

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Dynamic SAVE For VIC And 64

(Article on page 120.)

Program 1: Dynamic SAVE For Tape

```
60000 REM TAPE SAVER                :rem 133
60010 Q$=CHR$(34):N$="DYNAMIC SAVE"
                                    :rem 195
60019 REM USE EITHER 60020 OR 60021
                                    :rem 36
60020 POKE36879,27:C1$="{WHT}":C2$="{BLU}
      ":REM FOR VIC-20              :rem 14
60021 REM POKE53280,14:POKE53281,6:C1$="
      {BLU}":C2$="{7}":REM FOR COMMODOR
      E 64                          :rem 225
60030 PRINTC1$"{CLR}FORQ=1TO2:SAVE"Q$N$Q$
      ":NEXT"C2$                    :rem 139
60040 POKE631,19:POKE632,13         :rem 237
60050 POKE633,86:POKE634,101:POKE635,58:P
      OKE636,86:POKE637,101:POKE198,7:END
                                    :rem 172
```

Program 2: Dynamic SAVE For Disk

```
60000 REM DISK SAVER                :rem 134
60010 Q$=CHR$(34):N$="DYNAMIC SAVE"
                                    :rem 195
60019 REM USE EITHER 60020 OR 60021
                                    :rem 36
60020 POKE36879,27:C1$="{WHT}":C2$="{BLU}
      ":REM FOR VIC-20              :rem 14
60021 REM POKE53280,14:POKE53281,6:C1$="
      {BLU}":C2$="{7}":REM FOR COMMODOR
      E 64                          :rem 225
60030 PRINTC1$"{CLR}SAVE"Q$"@0:"N$Q$",8:V
      ERIFY"Q$N$Q$",8"C2$           :rem 194
60040 POKE631,19:POKE632,13:POKE198,2:END
                                    :rem 103
```

CUT-OFF!

(Article on page 46.)

Program 1:
Tiny MLX—Special VIC Version

```
100 POKE55,174:POKE56,23:CLR:POKE788,194
                                    :rem 76
210 S=6063:E=7658                   :rem 136
300 PRINT"{CLR}";CHR$(14):AD=S      :rem 56
310 PRINTRIGHT$("0000"+MID$(STR$(AD),2),5
    );":";:FORJ=1TO6                :rem 234
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                    :rem 228
480 IFN<0THENPRINT:GOTO310          :rem 168
490 A(J)=N:NEXTJ                    :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT     :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(20)
                                    :rem 234
515 IFN=CKSUMTHEN530                :rem 255
520 PRINT:PRINT"LINE ENTERED WRONG":PRINT
    "RE-ENTER":PRINT:GOSUB1000:GOTO310
                                    :rem 129
530 GOSUB2000                       :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:rem 80
550 AD=AD+6:IFAD<ETHEN310           :rem 212
560 GOTO710                         :rem 108
```

```
570 N=0:Z=0                                :rem 88
580 PRINT"[+]";                            :rem 79
581 GETA$:IFA$=""THEN581                   :rem 95
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                          :rem 229
590 IFA>128THENN=-A:RETURN                 :rem 137
600 IFA<>20 THEN 630                       :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {LEFT} {LEFT}";:GOTO690                :rem 172
620 GOTO570                                :rem 109
630 IFA<48ORA>57THEN580                    :rem 105
640 PRINTA$;:N=N*10+A-48                   :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                           :rem 229
660 Z=Z+1:IFZ<3THEN580                     :rem 71
670 IFZ=0THENGOSUB1000:GOTO570             :rem 114
680 PRINT",";:RETURN                       :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                           :rem 149
692 FORI=1TO3:T=PEEK(S%-I)                 :rem 68
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                           :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                           :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                           :rem 236
720 INPUT"{DOWN} FILENAME";F$              :rem 228
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
    {RVS}D{OFF}ISK: (T/D)"                 :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                           :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                           :rem 158
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                       :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                           :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                     :rem 69
765 POKE254,S/256:POKE253,S-PEEK(254)*256
    :POKE780,253                           :rem 12
766 POKE782,E/256:POKE781,E-PEEK(782)*256
    :SYS65496                              :rem 124
770 IF(PEEK(783)AND1)OR(ST AND191)THEN780
                                           :rem 111
775 PRINT"{DOWN}DONE.":END                 :rem 106
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720               :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720                   :rem 103
782 GOTO720                                :rem 115
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                     :rem 70
1000 REM BELL TONE                         :rem 250
1001 POKE36878,15:POKE36874,190            :rem 206
1002 FORW=1TO300:NEXTW                     :rem 117
1003 POKE36878,0:POKE36874,0:RETURN
                                           :rem 74
2000 REM BELL SOUND                        :rem 78
2001 FORW=15TO0STEP-1:POKE36878,W:POKE368
     76,240:NEXTW                          :rem 22
2002 POKE36876,0:RETURN                    :rem 119
```

Program 2: CUT-OFF!—VIC Version

```
6063 :032,081,025,076,181,023,081
6069 :173,066,003,024,105,001,041
6075 :141,066,003,173,067,003,128
6081 :105,000,141,067,003,174,171
6087 :060,003,032,020,027,169,254
6093 :001,141,065,003,032,078,013
6099 :027,162,002,161,247,201,243
6105 :032,240,032,032,029,027,097
6111 :032,143,029,032,090,026,063
6117 :173,068,003,201,000,240,146
6123 :080,173,069,003,201,000,249
6129 :240,073,032,097,024,032,227
6135 :092,028,076,181,023,032,167
6141 :029,027,169,000,141,065,172
6147 :003,032,227,027,162,000,198
6153 :161,247,201,032,240,032,154
6159 :032,029,027,032,143,029,051
6165 :032,090,026,173,068,003,157
6171 :201,000,240,029,173,069,227
6177 :003,201,000,240,022,032,019
6183 :097,024,032,092,028,076,132
6189 :181,023,032,029,027,173,254
6195 :031,145,041,032,240,006,034
6201 :076,181,023,076,007,029,193
6207 :173,031,145,041,032,240,213
6213 :249,162,250,032,020,027,041
6219 :173,031,145,041,032,208,193
6225 :249,173,031,145,041,032,240
6231 :240,249,162,250,032,020,016
6237 :027,076,181,023,169,147,204
6243 :032,210,255,169,025,141,163
6249 :015,144,162,000,169,160,243
6255 :157,000,030,169,000,157,112
6261 :000,150,232,224,022,208,185
6267 :241,162,000,169,160,157,244
6273 :228,031,169,000,157,228,174
6279 :151,232,224,022,208,241,189
6285 :169,000,133,253,169,030,127
6291 :133,254,169,000,133,251,063
6297 :169,150,133,252,162,000,251
6303 :169,160,160,000,145,253,022
6309 :169,000,145,251,160,021,143
6315 :169,160,145,253,169,000,043
6321 :145,251,024,165,253,105,096
6327 :022,133,253,165,254,105,091
6333 :000,133,254,024,165,251,248
6339 :105,022,133,251,165,252,099
6345 :105,000,133,252,232,224,123
6351 :023,208,205,169,004,162,210
6357 :007,157,000,150,232,224,215
6363 :015,208,248,162,000,189,017
6369 :072,025,240,006,157,007,220
6375 :030,232,208,245,169,006,097
6381 :141,248,150,169,002,141,064
6387 :001,151,169,081,141,248,010
6393 :030,169,087,141,001,031,196
6399 :169,000,141,066,003,141,007
6405 :067,003,169,007,141,075,211
6411 :003,169,020,141,074,003,165
6417 :169,001,141,070,003,169,058
6423 :031,141,071,003,169,248,174
6429 :141,072,003,169,030,141,073
6435 :073,003,024,162,000,160,201
6441 :002,032,240,255,174,061,037
6447 :003,173,062,003,032,205,013
6453 :221,024,162,000,160,016,124
6459 :032,240,255,174,063,003,058
6465 :173,064,003,032,205,221,251
6471 :096,131,149,148,173,143,143
6477 :134,134,161,000,169,000,163
6483 :141,061,003,141,062,003,238
6489 :141,063,003,141,064,003,248
6495 :169,081,141,077,003,169,223
6501 :087,141,076,003,032,097,025
6507 :024,169,004,162,002,157,113
6513 :154,150,232,224,020,208,077
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6519 :248,162,002,157,198,150,012
6525 :232,224,020,208,248,141,174
6531 :018,151,162,000,189,052,191
6537 :026,240,006,157,156,030,240
6543 :232,208,245,162,000,189,155
6549 :071,026,240,006,157,200,081
6555 :030,232,208,245,169,048,063
6561 :141,060,003,141,018,031,043
6567 :162,100,032,020,027,173,169
6573 :031,145,041,012,201,008,099
6579 :240,033,201,004,240,010,139
6585 :173,031,145,041,032,240,079
6591 :063,076,167,025,173,060,243
6597 :003,056,233,001,201,047,226
6603 :240,028,141,060,003,141,048
6609 :018,031,076,167,025,173,187
6615 :060,003,024,105,001,201,097
6621 :058,240,020,141,060,003,231
6627 :141,018,031,076,167,025,173
6633 :169,057,141,060,003,141,036
6639 :018,031,076,167,025,169,213
6645 :048,141,060,003,141,018,144
6651 :031,076,167,025,173,031,242
6657 :145,041,032,240,249,162,102
6663 :250,032,020,027,173,060,057
6669 :003,056,233,048,170,169,180
6675 :050,141,060,003,224,000,241
6681 :240,013,173,060,003,056,058
6687 :233,005,141,060,003,202,163
6693 :076,023,026,032,097,024,059
6699 :169,010,141,068,003,141,063
6705 :069,003,096,013,015,022,011
6711 :005,032,019,020,009,003,143
6717 :011,032,021,016,047,004,192
6723 :015,023,014,000,020,015,154
6729 :032,016,009,003,011,032,176
6735 :004,009,006,006,009,003,116
6741 :021,012,020,025,000,173,080
6747 :070,003,205,072,003,240,172
6753 :003,076,230,026,173,071,164
6759 :003,205,073,003,208,121,204
6765 :173,075,003,174,074,003,099
6771 :201,014,240,012,201,007,022
6777 :240,015,201,013,240,018,080
6783 :201,011,240,021,224,044,100
6789 :240,024,076,230,026,224,185
6795 :020,240,017,076,230,026,236
6801 :224,012,240,010,076,230,169
6807 :026,224,021,240,003,076,229
6813 :230,026,173,061,003,024,162
6819 :109,066,003,141,061,003,034
6825 :173,062,003,105,000,141,141
6831 :062,003,173,067,003,024,251
6837 :109,062,003,141,062,003,049
6843 :174,068,003,202,142,068,076
6849 :003,173,063,003,024,109,056
6855 :066,003,141,063,003,173,136
6861 :064,003,105,000,141,064,070
6867 :003,173,067,003,024,109,078
6873 :064,003,141,064,003,174,154
6879 :069,003,202,142,069,003,199
6885 :096,173,065,003,010,170,234
6891 :189,061,003,024,109,066,175
6897 :003,157,061,003,189,062,204
6903 :003,105,000,157,062,003,065
6909 :173,067,003,024,125,062,195
6915 :003,157,062,003,174,065,211
6921 :003,189,068,003,056,233,049
6927 :001,157,068,003,096,160,244
6933 :000,200,208,253,202,208,068
6939 :248,096,174,065,003,188,033
6945 :076,003,138,010,170,181,099
6951 :247,157,070,003,181,248,177
6957 :157,071,003,152,129,247,036
6963 :181,248,024,105,120,149,110
6969 :248,224,002,208,008,169,148
6975 :006,129,247,032,180,029,174
6981 :096,169,002,129,247,032,232
6987 :180,029,096,162,127,142,043
6993 :034,145,173,032,145,041,139
6999 :128,074,074,141,078,003,073
7005 :162,255,142,034,145,173,236
7011 :031,145,041,028,013,078,179
7017 :003,074,074,174,065,003,242
7023 :201,014,240,018,201,007,024
7029 :240,038,201,013,240,058,139
7035 :201,011,240,078,189,074,148
7041 :003,076,111,027,157,074,065
7047 :003,138,010,170,056,189,189
7053 :070,003,233,022,149,247,097
7059 :189,071,003,233,000,149,024
7065 :248,076,226,027,157,074,193
7071 :003,138,010,170,024,189,181
7077 :070,003,105,001,149,247,228
7083 :189,071,003,105,000,149,176
7089 :248,076,226,027,157,074,217
7095 :003,138,010,170,024,189,205
7101 :070,003,105,022,149,247,017
7107 :189,071,003,105,000,149,200
7113 :248,076,226,027,157,074,241
7119 :003,138,010,170,056,189,005
7125 :070,003,233,001,149,247,148
7131 :189,071,003,233,000,149,096
7137 :248,096,174,065,003,165,208
7143 :197,201,012,240,018,201,076
7149 :021,240,038,201,044,240,253
7155 :058,201,020,240,078,189,005
7161 :074,003,076,232,027,157,050
7167 :074,003,138,010,170,056,194
7173 :189,070,003,233,022,149,159
7179 :247,189,071,003,233,000,242
7185 :149,248,076,091,028,157,254
7191 :074,003,138,010,170,024,186
7197 :189,070,003,105,001,149,034
7203 :247,189,071,003,105,000,138
7209 :149,248,076,091,028,157,022
7215 :074,003,138,010,170,024,210
7221 :189,070,003,105,022,149,079
7227 :247,189,071,003,105,000,162
7233 :149,248,076,091,028,157,046
7239 :074,003,138,010,170,056,010
7245 :189,070,003,233,001,149,210
7251 :247,189,071,003,233,000,058
7257 :149,248,096,162,000,189,165
7263 :231,028,240,006,157,159,148
7269 :030,232,208,245,162,000,210
7275 :189,244,028,240,006,157,203
7281 :203,030,232,208,245,162,169
7287 :000,189,000,029,240,006,071
7293 :157,054,031,232,208,245,028
7299 :162,000,189,000,029,240,239
7305 :006,157,064,031,232,208,067
7311 :245,169,004,162,000,157,112
7317 :155,150,232,224,020,208,114
7323 :248,162,000,157,199,150,047
7329 :232,224,020,208,248,162,231
7335 :000,157,053,151,232,224,216
7341 :020,208,248,024,162,014,081
7347 :160,008,032,240,255,174,024
7353 :069,003,169,000,032,205,151
7359 :221,024,162,014,160,018,022
7365 :032,240,255,174,068,003,201
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7371 :169,000,032,205,221,173,235
7377 :031,145,041,032,208,249,147
7383 :173,031,145,041,032,240,109
7389 :249,162,000,032,020,027,199
7395 :032,097,024,096,016,018,254
7401 :005,019,019,032,002,021,075
7407 :020,020,015,014,000,020,072
7413 :015,032,003,015,014,020,088
7419 :009,014,021,005,000,012,056
7425 :009,022,005,019,061,000,117
7431 :032,097,024,162,000,189,255
7437 :106,029,240,006,157,160,199
7443 :030,232,208,245,162,000,128
7449 :189,116,029,240,006,157,250
7455 :203,030,232,208,245,162,087
7461 :000,189,129,029,240,006,118
7467 :157,056,031,232,208,245,204
7473 :169,004,162,000,157,155,184
7479 :150,232,224,020,208,248,113
7485 :162,000,157,199,150,232,193
7491 :224,020,208,248,162,000,161
7497 :157,053,151,232,224,020,142
7503 :208,248,173,031,145,041,157
7509 :032,208,249,173,031,145,155
7515 :041,032,240,249,162,250,041
7521 :032,020,027,032,081,025,058
7527 :076,181,023,007,001,013,148
7533 :005,032,015,022,005,018,206
7539 :000,016,018,005,019,019,192
7545 :032,002,021,020,020,015,231
7551 :014,000,020,015,032,016,224
7557 :012,001,025,032,001,007,211
7563 :001,009,014,000,169,220,040
7569 :141,013,144,169,015,141,000
7575 :014,144,162,000,032,020,011
7581 :027,173,014,144,056,233,036
7587 :001,141,014,144,162,100,213
7593 :032,020,027,201,000,208,145
7599 :238,141,013,144,096,173,212
7605 :065,003,201,000,240,022,200
7611 :169,200,141,012,144,169,254
7617 :015,141,014,144,174,060,229
7623 :003,032,020,027,169,000,194
7629 :141,012,144,096,169,180,179
7635 :141,012,144,169,015,141,065
7641 :014,144,174,060,003,032,132
7647 :020,027,169,000,141,012,080
7653 :144,096,013,013,013,013,009
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Program 3: CUT-OFF! 64 Version

```
49152 :032,200,193,076,006,192,187
49158 :173,066,003,024,105,001,122
49164 :141,066,003,173,067,003,209
49170 :105,000,141,067,003,174,252
49176 :060,003,032,145,195,169,116
49182 :001,141,065,003,032,203,219
49188 :195,162,002,161,247,201,236
49194 :032,240,032,032,154,195,215
49200 :032,119,197,032,215,194,069
49206 :173,068,003,201,000,240,227
49212 :083,173,069,003,201,000,077
49218 :240,076,032,190,192,032,060
49224 :074,196,076,006,192,032,136
49230 :154,195,169,000,141,065,034
49236 :003,032,203,195,162,000,167
49242 :161,247,201,032,240,032,235
49248 :032,154,195,032,119,197,057
49254 :032,215,194,173,068,003,019
49260 :201,000,240,032,173,069,055
49266 :003,201,000,240,025,032,103
49272 :190,192,032,074,196,076,112
49278 :006,192,032,154,195,173,110
49284 :001,220,045,000,220,041,147
49290 :016,240,006,076,006,192,162
49296 :076,251,196,173,001,220,037
49302 :045,000,220,041,016,240,200
49308 :246,162,250,032,145,195,162
49314 :173,001,220,045,000,220,053
49320 :041,016,208,246,173,001,085
49326 :220,045,000,220,041,016,204
49332 :240,246,162,250,032,145,231
49338 :195,076,006,192,169,147,203
49344 :032,210,255,169,015,141,246
49350 :033,208,169,005,141,032,018
49356 :208,162,000,169,160,157,036
49362 :000,004,169,000,157,000,028
49368 :216,232,224,040,208,241,097
49374 :162,000,169,160,157,192,038
49380 :007,169,000,157,192,219,204
49386 :232,224,040,208,241,169,068
49392 :000,133,253,169,004,133,164
49398 :254,169,000,133,251,169,198
49404 :216,133,252,162,000,169,160
49410 :160,160,000,145,253,169,121
49416 :000,145,251,160,039,169,004
49422 :160,145,253,169,000,145,118
49428 :251,024,165,253,105,040,090
49434 :133,253,165,254,105,000,168
49440 :133,254,024,165,251,105,196
49446 :040,133,251,165,252,105,216
49452 :000,133,252,232,224,025,142
49458 :208,205,169,012,162,016,054
49464 :157,000,216,232,224,024,141
49470 :208,248,169,131,141,016,207
49476 :004,169,149,141,017,004,040
49482 :169,148,141,018,004,169,211
49488 :173,141,019,004,169,143,217
49494 :141,020,004,169,134,141,183
49500 :021,004,141,022,004,169,197
49506 :161,141,023,004,169,006,090
49512 :141,199,217,169,002,141,205
49518 :209,217,169,081,141,199,102
49524 :005,169,087,141,209,005,220
49530 :169,000,141,066,003,141,130
49536 :067,003,169,007,141,075,078
49542 :003,169,011,141,074,003,023
49548 :169,209,141,070,003,169,133
49554 :005,141,071,003,169,199,222
49560 :141,072,003,169,005,141,171
49566 :073,003,169,152,032,210,029
49572 :255,024,162,000,160,007,004
49578 :032,240,255,174,061,003,167
49584 :173,062,003,032,205,189,072
49590 :024,162,000,160,029,032,077
49596 :240,255,174,063,003,173,072
49602 :064,003,032,205,189,096,015
49608 :169,000,141,061,003,141,203
49614 :062,003,141,063,003,141,107
49620 :064,003,169,081,141,077,235
49626 :003,169,087,141,076,003,185
49632 :032,190,192,169,012,162,213
49638 :009,157,240,216,232,224,028
49644 :030,208,248,162,009,157,026
49650 :064,217,232,224,030,208,193
49656 :248,141,163,217,162,000,155
49662 :189,171,194,240,006,157,187
49668 :249,004,232,208,245,162,080
49674 :000,189,193,194,240,006,064
49680 :157,073,005,232,208,245,168
49686 :169,048,141,060,003,141,072
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49692 :163,005,162,100,032,145,123
49698 :195,173,001,220,041,015,167
49704 :201,014,240,033,201,013,230
49710 :240,010,173,001,220,041,219
49716 :016,240,063,076,030,194,159
49722 :173,060,003,056,233,001,072
49728 :201,047,240,028,141,060,013
49734 :003,141,163,005,076,030,232
49740 :194,173,060,003,024,105,123
49746 :001,201,058,240,020,141,231
49752 :060,003,141,163,005,076,024
49758 :030,194,169,057,141,060,233
49764 :003,141,163,005,076,030,006
49770 :194,169,048,141,060,003,209
49776 :141,163,005,076,030,194,209
49782 :173,001,220,041,016,240,041
49788 :249,162,250,032,145,195,133
49794 :173,060,003,056,233,048,191
49800 :170,169,050,141,060,003,217
49806 :224,000,240,013,173,060,084
49812 :003,056,233,005,141,060,134
49818 :003,202,076,142,194,032,035
49824 :190,192,169,010,141,068,162
49830 :003,141,069,003,096,013,235
49836 :015,022,005,032,010,015,015
49842 :025,019,020,009,003,011,009
49848 :032,021,016,047,004,015,063
49854 :023,014,000,020,015,032,038
49860 :003,008,015,015,019,005,005
49866 :032,019,011,009,012,012,041
49872 :032,012,005,022,005,012,040
49878 :000,173,070,003,205,072,225
49884 :003,240,003,076,099,195,068
49890 :173,071,003,205,073,003,242
49896 :208,121,173,075,003,174,218
49902 :074,003,201,014,240,012,014
49908 :201,007,240,015,201,013,153
49914 :240,018,201,011,240,021,213
49920 :224,013,240,024,076,099,164
49926 :195,224,011,240,017,076,001
49932 :099,195,224,014,240,010,026
49938 :076,099,195,224,007,240,091
49944 :003,076,099,195,173,061,119
49950 :003,024,109,066,003,141,120
49956 :061,003,173,062,003,105,187
49962 :000,141,062,003,173,067,232
49968 :003,024,109,062,003,141,134
49974 :062,003,174,068,003,202,054
49980 :142,068,003,173,063,003,000
49986 :024,109,066,003,141,063,216
49992 :003,173,064,003,105,000,164
49998 :141,064,003,173,067,003,017
50004 :024,109,064,003,141,064,233
50010 :003,174,069,003,202,142,171
50016 :069,003,096,173,065,003,249
50022 :010,170,189,061,003,024,047
50028 :109,066,003,157,061,003,251
50034 :189,062,003,105,000,157,118
50040 :062,003,173,067,003,024,196
50046 :125,062,003,157,062,003,026
50052 :174,065,003,189,068,003,122
50058 :056,233,001,157,068,003,144
50064 :096,160,000,200,208,253,037
50070 :202,208,248,096,174,065,119
50076 :003,188,076,003,138,010,062
50082 :170,181,247,157,070,003,222
50088 :181,248,157,071,003,152,212
50094 :129,247,181,248,024,105,084
50100 :212,149,248,224,002,208,199
50106 :008,169,006,129,247,032,009
50112 :170,197,096,169,002,129,187
50118 :247,032,170,197,096,174,090
50124 :065,003,189,000,220,041,210
50130 :015,201,014,240,018,201,131
50136 :007,240,038,201,013,240,187
50142 :058,201,011,240,078,189,231
50148 :074,003,076,211,195,157,176
50154 :074,003,138,010,170,056,173
50160 :189,070,003,233,040,149,156
50166 :247,189,071,003,233,000,221
50172 :149,248,076,073,196,157,127
50178 :074,003,138,010,170,024,165
50184 :189,070,003,105,001,149,013
50190 :247,189,071,003,105,000,117
50196 :149,248,076,073,196,157,151
50202 :074,003,138,010,170,024,189
50208 :189,070,003,105,040,149,076
50214 :247,189,071,003,105,000,141
50220 :149,248,076,073,196,157,175
50226 :074,003,138,010,170,056,245
50232 :189,070,003,233,001,149,189
50238 :247,189,071,003,233,000,037
50244 :149,248,076,073,196,096,138
50250 :162,000,189,219,196,240,056
50256 :006,157,255,004,232,208,174
50262 :245,162,000,189,232,196,086
50268 :240,006,157,079,005,232,043
50274 :208,245,162,000,189,244,122
50280 :196,240,006,157,017,006,214
50286 :232,208,245,162,000,189,122
50292 :244,196,240,006,157,033,224
50298 :006,232,208,245,169,012,226
50304 :162,009,157,240,216,232,120
50310 :224,030,208,248,162,009,247
50316 :157,064,217,232,224,030,040
50322 :208,248,162,001,157,008,162
50328 :218,232,224,037,208,248,039
50334 :024,162,013,160,015,032,052
50340 :240,255,174,069,003,169,050
50346 :000,032,205,189,024,162,014
50352 :013,160,031,032,240,255,139
50358 :174,068,003.169,000,032,116
50364 :205,189,173,001,220,045,253
50370 :000,220,041,016,208,246,157
50376 :173,001,220,045,000,220,091
50382 :041,016,240,246,162,000,143
50388 :032,145,195,032,190,192,230
50394 :096,016,018,005,019,019,135
50400 :032,002,021,020,020,015,078
50406 :014,000,020,015,032,003,058
50412 :015,014,020,009,014,021,073
50418 :005,000,012,009,022,005,039
50424 :019,061,000,032,190,192,230
50430 :162,000,189,082,197,240,100
50436 :006,157,000,005,232,208,100
50442 :245,162,000,189,092,197,127
50448 :240,006,157,071,005,232,215
50454 :208,245,169,012,162,001,051
50460 :157,240,216,232,224,030,103
50466 :208,248,162,001,157,064,106
50472 :217,232,224,037,208,248,182
50478 :173,001,220,045,000,220,193
50484 :041,016,208,246,162,250,207
50490 :032,145,195,173,001,220,056
50496 :045,000,220,041,016,240,114
50502 :246,162,250,032,145,195,076
50508 :032,200,193,076,006,192,007
50514 :007,001,013,005,032,015,155
50520 :022,005,018,000,016,018,167
50526 :005,019,019,032,002,021,192
50532 :020,020,015,014,032,020,221
50538 :015,032,016,012,001,025,207
```

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50544 :032,001,007,001,009,014,176
50550 :000,169,015,141,024,212,167
50556 :169,129,141,004,212,169,180
50562 :009,141,005,212,169,100,254
50568 :141,000,212,169,012,141,043
50574 :001,212,169,015,141,032,200
50580 :208,162,080,032,145,195,202
50586 :056,233,001,201,000,208,085
50592 :241,169,000,141,004,212,159
50598 :141,005,212,096,169,008,029
50604 :141,024,212,169,016,141,107
50610 :005,212,169,128,141,006,071
50616 :212,169,010,162,000,024,249
50622 :109,065,003,232,224,010,065
50628 :208,247,141,001,212,169,150
50634 :037,141,000,212,169,033,026
50640 :141,004,212,174,060,003,034
50646 :032,145,195,169,000,141,128
50652 :004,212,141,005,212,141,167
50658 :006,212,096,013,013,013,067
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Beginner's Corner

(Article on page 84.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: Averages—VIC Version

```
4 PRINT"{CLR}{3 DOWN}{BLU}":PRINT"
  {4 SPACES}************":PRINT"
  {4 SPACES}* AVERAGES *":PRINT"
  {4 SPACES}************"          :rem 157
6 FORI=1TO8:READN$(I):NEXT         :rem 138
8 DATASUE,ANN,RITA,JUNE,BOB,JOE,JOHN,BILL
                                   :rem 181
10 DEF FNF(X)=INT(X*RND(0)+1)      :rem 111
12 PRINT"{4 DOWN}CHOOSE:":PRINT"1 INSTRUC
   TIONS":PRINT"2 PROBLEMS"         :rem 5
14 GETC$:IFC$="2"THEN50            :rem 35
16 IFC$<>"1"THEN14                 :rem 224
18 PRINT"{CLR}{DOWN}TO CALCULATE THE":PRI
   NT"AVERAGE OF SEVERAL":PRINT"NUMBERS,
   {SPACE}FIRST ADD"               :rem 65
20 PRINT"THE NUMBERS THEN":PRINT"DIVIDE T
   HE TOTAL BY":PRINT"THE NUMBER OF ITEMS
   ."                              :rem 25
22 PRINT"{3 DOWN}{GRN}PRESS RETURN."
                                   :rem 33
24 GETR$:IFR$=""THEN24             :rem 17
26 IFASC(R$)<>13THEN24              :rem 8
28 PRINT"{CLR}{BLU}HERE IS AN EXAMPLE.
   {DOWN}":PRINT"{BLK}FIND THE AVERAGE OF
   ":PRINT"THESE NUMBERS:{DOWN}" :rem 159
30 GOSUB106:PRINT"{DOWN}{BLU}ADD FOR TOTA
   L":PRINT"{RED}SUM = ";T         :rem 209
31 PRINT"{2 DOWN}{BLU}DIVIDE BY NUMBER":P
   RINT"OF ITEMS"                  :rem 177
32 PRINTT;"/";N;" = ";T/N:PRINT"{2 DOWN}
   {GRN}PRESS F1 TO CONTINUE."     :rem 202
34 GETR$:IFR$<>"{F1}"THEN34        :rem 213
36 PRINT"{CLR}{BLU}NOW TRY A PROBLEM.":PR
   INT"{BLK}{DOWN}GIVEN THESE NUMBERS":GO
   SUB106                          :rem 106
38 INPUT"{BLU}TOTAL{RED}";S:IFS=T THEN42
                                   :rem 206
40 PRINT"{DOWN}{BLU}NO, THE TOTAL IS":PRI
   NTTAB(6);T                      :rem 227
42 PRINT"{DOWN}{BLU}NOW DIVIDE.":PRINT"
   {BLK}THE AVERAGE IS":INPUTA:IFABS(A-T/
   N)<.01THEN46                    :rem 239
44 PRINT"{DOWN}{BLU}NO, THE AVERAGE IS":G
   OTO32                           :rem 130
46 PRINT"{DOWN}{BLU}CORRECT!":PRINT"
   {DOWN}{GRN}PRESS F7 TO CONTINUE"
                                   :rem 234
48 GETR$:IFR$<>"{F7}"THEN48        :rem 226
50 P=FNF(3):ONP GOTO52,60,70        :rem 60
52 PRINT"{CLR}{BLU}A BOWLING TEAM HAD":PR
   INT"THE FOLLOWING SCORES":PRINT"FOR ON
   E GAME.{DOWN}":T=0              :rem 197
54 X=INT(2*RND(0))                 :rem 251
56 FORI=1TO4:S=115+FNF(40):T=T+S:PRINTN$(
   I+X*4);TAB(8)S:NEXT             :rem 179
58 PRINT"{DOWN}WHAT WAS THE TEAM'S"
                                   :rem 240
59 PRINT"AVERAGE SCORE FOR":PRINT"THE GAM
   E?":N=4:F=10:GOTO78             :rem 219
60 PRINT"{CLR}{BLU}A BASKETBALL TEAM WON"
   :PRINT"THE FOLLOWING NUMBER":PRINT"OF
   {SPACE}GAMES.{DOWN}":T=0        :rem 199
62 N=4+FNF(3):Y=1983-N             :rem 208
64 FORI=1TON:S=50+FNF(20):T=T+S:Y=Y+1:PRI
   NTY;TAB(9)S:NEXT                :rem 138
66 PRINT"{DOWN}WHAT WAS THE AVERAGE":PRIN
   T"NUMBER OF GAMES PER":PRINT"YEAR THE
   {SPACE}TEAM WON"                :rem 62
68 PRINT"DURING THESE YEARS?":F=6:GOTO78
                                   :rem 25
70 PRINT"{CLR}{BLU}A FULLBACK GAINED THE"
   :PRINT"FOLLOWING NUMBER OF":PRINT"YARD
   S IN SEVERAL"                   :rem 73
72 PRINT"FOOTBALL GAMES.{DOWN}":T=0:N=4+F
   NF(3)                           :rem 182
74 FORI=1TON:S=60+FNF(30):T=T+S:PRINTTAB(
   5)S:NEXT                        :rem 112
76 PRINT"{DOWN}WHAT WAS THE BACK'S":PRINT
   "AVERAGE YARDS GAINED":PRINT"PER GAME?
   ":F=10                          :rem 116
78 A=INT(T/N+.5):C=FNF(4):ONC GOTO80,82,8
   4,86                            :rem 36
80 PRINT"A";A:FORI=1TO3:A=A-FNF(F):PRINTC
   HR$(66+I);A:NEXT:GOTO88         :rem 12
82 PRINT"A ";A-FNF(F):PRINT"B ";A:A=A+FNF
   (F):PRINT"C ";A:A=A+FNF(F):PRINT"D ";A
   :GOTO88                          :rem 1
84 I=A-FNF(F):J=I-FNF(F):PRINT"A ";J:PRIN
   T"B ";I:PRINT"C ";A:PRINT"D ";A+FNF(F)
   :GOTO88                         :rem 47
86 I=A-FNF(F):J=I-FNF(F):K=J-FNF(F):PRINT
   "A ";K:PRINT"B ";J:PRINT"C ";I:PRINT"D
    ";A                            :rem 102
88 GETA$:IF(A$<"A")+(A$>"D")THEN88:rem 59
90 IFASC(A$)-64=C THEN98           :rem 60
92 PRINT"{DOWN}NO, THE ANSWER IS {RED}";C
   HR$(64+C):PRINT"{GRN}PRESS F3 TO CONTI
   NUE"                            :rem 27
94 GETA$:IFA$="{F3}"THEN50         :rem 123
96 GOTO94                          :rem 21
98 PRINT"CORRECT!":PRINT"{DOWN}{GRN}PRESS
   :":PRINT" F1 ANOTHER PROBLEM":PRINT" F
   7 END PROGRAM"                  :rem 145
100 GETA$:IFA$="{F1}"THEN50        :rem 158
102 IFA$<>"{F7}"THEN100            :rem 141
```

```
104 GOTO108                              :rem 103
106 N=FNF(3)+4:T=0:FORI=1TON:J=10+FNF(10)
    :PRINTTAB(6)J:T=T+J:NEXT:RETURN
                                         :rem 18
108 PRINT"{CLR}{BLU}":END                :rem 45
```

Program 2: Averages—64 Version

```
20 POKE 53281,1                          :rem 241
30 PRINT "{CLR}{3 DOWN}{BLU}"            :rem 25
40 PRINT "{4 SPACES}***********"         :rem 45
50 PRINT "{4 SPACES}* AVERAGES *":rem 216
60 PRINT "{4 SPACES}***********"         :rem 47
70 FOR I=1 TO 8:READ N$(I):NEXT          :rem 187
80 DATA SUE,ANN,RITA,JUNE,BOB,JOE,JOHN,BI
   LL                                    :rem 229
90 DEF FNF(X)=INT(X*RND(0)+1)            :rem 119
100 PRINT "{4 DOWN}CHOOSE:"              :rem 161
110 PRINT "1 INSTRUCTIONS"               :rem 73
120 PRINT "2 PROBLEMS"                   :rem 250
130 GET C$                               :rem 219
140 IF C$="2" THEN 500                   :rem 2
150 IF C$<>"1" THEN 130                  :rem 62
160 PRINT "{CLR}{DOWN}TO CALCULATE THE"
                                         :rem 30
170 PRINT "AVERAGE OF SEVERAL"           :rem 11
180 PRINT "NUMBERS, FIRST ADD"           :rem 3
190 PRINT "THE NUMBERS THEN"             :rem 151
200 PRINT "DIVIDE THE TOTAL BY"          :rem 24
210 PRINT "THE NUMBER OF ITEMS."         :rem 83
220 PRINT "{3 DOWN}{GRN}PRESS RETURN."
                                         :rem 81
230 GET R$:IF R$="" THEN 230             :rem 111
240 IF ASC(R$)<>13 THEN 230              :rem 101
250 PRINT "{CLR}{BLU}HERE IS AN EXAMPLE.
    {DOWN}"                              :rem 180
260 PRINT "{BLK}FIND THE AVERAGE OF"
                                         :rem 139
270 PRINT "THESE NUMBERS:{DOWN}"         :rem 74
280 GOSUB 1200                           :rem 221
290 PRINT "{DOWN}{BLU}ADD FOR TOTAL"
                                         :rem 208
300 PRINT "{RED}SUM = ";T                :rem 65
310 PRINT "{2 DOWN}{BLU}DIVIDE BY NUMBER"
                                         :rem 191
320 PRINT "OF ITEMS"                     :rem 125
330 PRINT T;"/";N;" = ";T/N              :rem 118
340 PRINT "{2 DOWN}{GRN}PRESS F1 TO CONTI
    NUE."                                :rem 226
350 GET R$:IF R$<>"{F1}" THEN 350 :rem 55
360 PRINT "{CLR}{BLU}NOW TRY A PROBLEM."
                                         :rem 143
370 PRINT"{BLK}{DOWN}GIVEN THESE NUMBERS"
                                         :rem 26
380 GOSUB 1200                           :rem 222
390 INPUT "{BLU}TOTAL{RED}";S            :rem 189
400 IF S=T THEN 420                      :rem 204
410 PRINT "{DOWN}{BLU}NO, THE TOTAL IS":P
    RINT TAB(6)T                         :rem 217
420 PRINT "{DOWN}{BLU}NOW DIVIDE."
                                         :rem 110
430 PRINT "{BLK}THE AVERAGE IS ";:rem 171
440 INPUT A                              :rem 105
450 IF A=T/N THEN 470                    :rem 65
460 PRINT "{DOWN}{BLU}NO, THE AVERAGE IS"
    :PRINT "TOTAL/NUMBER =";T/N:GOTO 340
                                         :rem 182
470 PRINT "{DOWN}{BLU}CORRECT!"          :rem 207
480 PRINT "{DOWN}{GRN}PRESS F7 TO CONTINU
    E"                                   :rem 174
490 GET R$:IF R$<>"{F7}" THEN 490 :rem 68
500 P=FNF(3)                             :rem 128
510 ON P GOTO 520,640,770                :rem 227
520 PRINT"{CLR}{BLU}A BOWLING TEAM HAD"
                                         :rem 97
530 PRINT  THE FOLLOWING SCORES"         :rem 202
540 PRINT "FOR ONE GAME.{DOWN}":T=0
                                         :rem 135
550 X=INT(2*RND(0))                      :rem 44
560 FOR I=1 TO 4                         :rem 16
570 S=115+FNF(40):T=T+S                  :rem 26
580 PRINT N$(I+X*4);TAB(8);S             :rem 64
590 NEXT I                               :rem 38
600 PRINT "{DOWN}WHAT WAS THE TEAM'S"
                                         :rem 25
610 PRINT "AVERAGE SCORE FOR"            :rem 198
620 PRINT "THE GAME?"                    :rem 163
630 N=4:F=10:GOTO 900                    :rem 130
640 PRINT "{CLR}{BLU}A BASKETBALL TEAM WO
    N"                                   :rem 78
650 PRINT "THE FOLLOWING NUMBER"         :rem 199
660 PRINT "OF GAMES.{DOWN}":T=0          :rem 169
670 N=4+FNF(3):Y=1983-N                  :rem 5
680 FOR I=1 TO N                         :rem 45
690 S=50+FNF(20):T=T+S:Y=Y+1             :rem 110
700 PRINT Y;TAB(9)S                      :rem 108
710 NEXT I                               :rem 32
720 PRINT "{DOWN}WHAT WAS THE AVERAGE"
                                         :rem 118
730 PRINT "NUMBER OF GAMES PER"          :rem 29
740 PRINT "YEAR THE TEAM WON"            :rem 153
750 PRINT "DURING THESE YEARS?"          :rem 114
760 F=6:GOTO 900                         :rem 98
770 PRINT "{CLR}{BLU}A FULLBACK GAINED TH
    E"                                   :rem 47
780 PRINT "FOLLOWING NUMBER OF"          :rem 127
790 PRINT "YARDS IN SEVERAL"             :rem 157
800 PRINT "FOOTBALL GAMES.{DOWN}":T=0
                                         :rem 99
810 N=4+FNF(3)                           :rem 225
820 FOR I=1 TO N                         :rem 41
830 S=60+FNF(30):T=T+S                   :rem 231
840 PRINT TAB(5)S                        :rem 217
850 NEXT I                               :rem 37
860 PRINT "{DOWN}WHAT WAS THE FULLBACK'S"
                                         :rem 62
870 PRINT "AVERAGE NUMBER OF YARDS"
                                         :rem 76
880 PRINT "GAINED PER GAME?"             :rem 89
890 F=10                                 :rem 133
900 A=INT(T/N+.5)                        :rem 178
910 C=FNF(4):ON C GOTO 920,950,1000,1040
                                         :rem 15
920 PRINT "A";A                          :rem 41
930 FOR I=1 TO 3:A=A+FNF(F):PRINTCHR$(65+
    I);A:NEXT                            :rem 146
940 GOTO 1060                            :rem 157
950 PRINT "A ";A-FNF(F)                  :rem 202
960 PRINT "B ";A                         :rem 46
970 A=A+FNF(F):PRINT "C ";A              :rem 197
980 A=A+FNF(F):PRINT "D ";A              :rem 199
990 GOTO 1060                            :rem 162
1000 I=A-FNF(F):J=I-FNF(F)               :rem 206
1010 PRINT"A ";J:PRINT"B ";I:PRINT"C ";A
                                         :rem 244
1020 PRINT "D{SHIFT-SPACE}";A+FNF(F)
                                         :rem 144
1030 GOTO 1060                           :rem 196
1040 I=A-FNF(F):J=I-FNF(F):K=J-FNF(F)
                                         :rem 124
1050 PRINT"A ";K:PRINT"B{SHIFT-SPACE}";J:
```

```
    PRINT"C ";I:PRINT"D ";A      :rem 109
1060 GET A$                      :rem 12
1070 IF (A$<"A")+(A$>"D") THEN 1060
                                 :rem 107
1080 IF ASC(A$)-64=C THEN 1130   :rem 240
1090 PRINT "{DOWN}NO, THE ANSWER IS {RED}
    ";CHR$(64+C)                 :rem 67
1100 PRINT "{GRN}PRESS F3 TO CONTINUE"
                                 :rem 191
1110 GET A$:IF A$="{F3}"THEN 500   :rem 1
1120 GOTO 1110                   :rem 192
1130 PRINT "CORRECT!"            :rem 201
1140 PRINT"{DOWN}{GRN}PRESS:"    :rem 141
1150 PRINT " F1 ANOTHER PROBLEM"  :rem 49
1160 PRINT " F7 END PROGRAM"       :rem 5
1170 GET A$:IF A$="{F1}" THEN 500  :rem 6
1180 IF A$<>"{F7}" THEN 1170     :rem 252
1190 GOTO 1240                   :rem 203
1200 N=FNF(3)+4:T=0                :rem 6
1210 FOR I=1 TO N                 :rem 83
1220 J=10+FNF(10):PRINT TAB(6)J:T=T+J
                                 :rem 103
1230 NEXT I:RETURN               :rem 104
1240 PRINT"{CLR}{BLU}":END        :rem 91
```

Machine Language For Beginners

(Article on page 90.)

Program 2:
Double Decker—VIC Version

```
10 I=12288                       :rem 236
20 READ A:CK=CK+A:IF A=256 THEN 40:rem 53
30 POKE I,A:I=I+1:GOTO 20        :rem 130
40 IF CK<>27447 THEN PRINT"ERROR IN DATA
   {SPACE}STATEMENTS":STOP       :rem 198
50 END                            :rem 60
12288 DATA 160,0,169,6,153,0      :rem 97
12294 DATA 148,153,0,149,200,208  :rem 40
12300 DATA 247,160,0,169,224,153  :rem 33
12306 DATA 0,16,153,228,17,200   :rem 184
12312 DATA 192,22,208,245,169,21  :rem 39
12318 DATA 133,71,169,16,133,72  :rem 251
12324 DATA 162,24,160,0,169,224  :rem 240
12330 DATA 145,71,200,145,71,202  :rem 25
12336 DATA 240,16,24,165,71,105  :rem 242
12342 DATA 22,133,71,165,72,105  :rem 240
12348 DATA 0,133,72,76,38,48     :rem 108
12354 DATA 169,20,133,204,32,155  :rem 36
12360 DATA 224,164,98,185,149,15  :rem 56
12366 DATA 201,224,240,244,169,90 :rem 92
12372 DATA 153,149,15,198,204,208:rem 100
12378 DATA 235,169,215,133,251,169
                                 :rem 156
12384 DATA 17,133,252,32,187,48    :rem 1
12390 DATA 32,197,48,165,197,201  :rem 55
12396 DATA 0,240,10,201,1,240    :rem 124
12402 DATA 21,201,60,240,84,208  :rem 231
12408 DATA 237,198,251,160,0,177  :rem 49
12414 DATA 251,201,32,240,16,230  :rem 20
12420 DATA 251,76,102,48,160,7   :rem 193
12426 DATA 177,251,201,32,240,25  :rem 33
12432 DATA 76,102,48,230,251,160  :rem 34
12438 DATA 6,169,32,145,251,165    :rem 1
12444 DATA 251,208,2,198,252,198  :rem 54
12450 DATA 251,32,187,48,76,102  :rem 251
12456 DATA 48,160,0,169,32,145   :rem 202
12462 DATA 251,230,251,208,2,230  :rem 27
12468 DATA 252,32,187,48,76,102    :rem 5
12474 DATA 48,160,5,169,120,145  :rem 253
12480 DATA 251,136,208,251,96,160 :rem 95
12486 DATA 0,136,208,253,96,256    :rem 5
```

Program 3:
Double Decker—64 Version

```
10 I=49152                       :rem 236
20 READ A:CK=CK+A:IF A=256 THEN 40:rem 53
30 POKE I,A:I=I+1:GOTO 20        :rem 130
40 IF CK<>29751 THEN PRINT"ERROR IN DATA
   {SPACE}STATEMENTS":STOP       :rem 198
50 END                            :rem 60
49152 DATA 160,0,169,8,153,0      :rem 99
49158 DATA 216,153,0,217,153,0   :rem 198
49164 DATA 218,153,0,219,200,208  :rem 42
49170 DATA 241,160,0,169,224,153  :rem 42
49176 DATA 0,4,153,192,7,200      :rem 99
49182 DATA 192,40,208,245,169,39  :rem 63
49188 DATA 133,71,169,4,133,72   :rem 215
49194 DATA 162,24,160,0,169,224  :rem 255
49200 DATA 145,71,200,145,71,202  :rem 31
49206 DATA 240,16,24,165,71,105  :rem 248
49212 DATA 40,133,71,165,72,105  :rem 246
49218 DATA 0,133,72,76,44,192    :rem 159
49224 DATA 169,20,133,204,32,158  :rem 45
49230 DATA 224,164,98,185,168,3   :rem 12
49236 DATA 201,224,240,244,169,90 :rem 98
49242 DATA 153,168,3,198,204,208  :rem 56
49248 DATA 235,169,169,133,251,169
                                 :rem 170
49254 DATA 7,133,252,32,193,192    :rem 3
49260 DATA 32,203,192,165,197,201 :rem 97
49266 DATA 56,240,10,201,8,240   :rem 196
49272 DATA 21,201,35,240,84,208  :rem 248
49278 DATA 237,198,251,160,0,177  :rem 64
49284 DATA 251,201,32,240,16,230  :rem 35
49290 DATA 251,76,108,192,160,7    :rem 6
49296 DATA 177,251,201,32,240,25  :rem 48
49302 DATA 76,108,192,230,251,160 :rem 94
49308 DATA 6,169,32,145,251,165    :rem 7
49314 DATA 251,208,2,198,252,198  :rem 60
49320 DATA 251,32,193,192,76,108  :rem 52
49326 DATA 192,160,0,169,32,145    :rem 0
49332 DATA 251,230,251,208,2,230  :rem 33
49338 DATA 252,32,193,192,76,108  :rem 62
49344 DATA 192,160,5,169,120,145  :rem 51
49350 DATA 251,136,208,251,96,160:rem 101
49356 DATA 0,136,208,253,96,96,256
                                 :rem 166
```

Poker

(Article on page 56.)

> BEFORE TYPING...
>
> Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: Poker—VIC Version

```
20 POKE36879,200:PRINT"{CLR}":FORA=828TO9
   98:READB:POKEA,B:NEXT         :rem 181
```

```
30 WK=4*(PEEK(36866)AND128)+64*(PEEK(3686
   9)AND112)                          :rem 223
40 CL=37888+4*(PEEK(36866)AND128)-WK
                                      :rem 220
50 IFWK=7680THENFORA=1TO12:READB:READC:PO
   KEB,C:NEXT                         :rem 55
60 DIMJ%(13,4):DIMG$(20):S1=36875:S2=S1+1
   :VL=S1+3:D1=0:SC=0:HD=0            :rem 97
70 G$(4)="{2 SPACES}*** POKER{2 SPACES}25
   6 ***{2 SPACES}"                   :rem 242
80 G$(7)=" IT'S YOU AGAINST VIC"      :rem 217
100 G$(9)="{2 SPACES}YOU WIN AS FOLLOWS:
    {SPACE}":G$(10)="{3 SPACES}ROYAL FLUS
    H-$250{2 SPACES}"                 :rem 175
120 G$(11)=" STRAIGHT FLUSH-$100
    {2 SPACES}":G$(12)="{3 SPACES}4 OF A
    {SPACE}KIND-$20{4 SPACES}"        :rem 185
140 G$(13)="{4 SPACES}FULL HOUSE-$10
    {4 SPACES}":G$(14)="{7 SPACES}FLUSH-$
    8{7 SPACES}"                      :rem 134
160 G$(15)="{5 SPACES}STRAIGHT-$5
    {5 SPACES}":G$(16)="{4 SPACES}3 OF A
    {SPACE}KIND-$4{4 SPACES}"         :rem 184
180 G$(17)="{6 SPACES}2 PAIR-$3{7 SPACES}
    ":G$(18)="{2 SPACES}PAIR, JACKS & UP-
    $1 "                              :rem 17
200 G$(20)="{2 SPACES}EACH HAND COSTS $1.
    ":N$="{HOME}{22 DOWN}"            :rem 34
210 B$=LEFT$(N$,20):JW$=LEFT$(N$,10)
                                      :rem 177
220 A=4:MM=220:G=50:PRINT"{BLK}":POKEVL,1
    5:D1=0                            :rem 98
230 FORB=1TO22:PRINTLEFT$(N$,A)RIGHT$(G$(
    A),B):POKES1,MM                   :rem 138
240 FORC=1TOG:NEXT:POKES1,0:NEXT:FORB=1TO
    D1:NEXT:IFA=20THENPOKEVL,0:GOTO310
                                      :rem 193
250 IFA=18THENA=20:MM=220:PRINT"{WHT}":G=
    50:D1=1500                        :rem 166
260 IFA>8ANDA<18THENA=A+1             :rem 225
270 IFA=7THENA=9:PRINT"{BLU}":G=40:D1=600
                                      :rem 145
280 IFA=5THENGOSUB5000:FORA=1TO600:NEXT:A
    =7:PRINT"{WHT}":MM=238:G=40:D1=600
                                      :rem 35
290 IFA=4THENA=5:PRINT"{RED}":MM=226
                                      :rem 144
300 GOTO230                           :rem 97
310 G$(4)="":G$(5)="":G$(7)="":G$(10)="":
    G$(20)=""                         :rem 16
320 AK$="{DOWN}{GRN}{RVS} {DOWN}{LEFT}
    {DOWN}{LEFT} ":D$=B$+"{21 SPACES}"
                                      :rem 23
340 E$=LEFT$(N$,15):F$=E$+"{21 SPACES}":X
    =RND(-TI)                         :rem 104
350 HD=HD+1:GOSUB4030:POKE36879,31:PRINTC
    HR$(147):SYS828                   :rem 100
360 PRINTLEFT$(N$,5)SPC(4)"{BLU}HIT {RVS}
    K{OFF} TO KEEP"                    :rem 3
370 PRINTLEFT$(N$,7)SPC(3)"HIT {RVS}C
    {OFF} TO CHANGE":GOSUB5050        :rem 227
500 X=INT(RND(1)*13)+1:Y=INT(RND(1)*4)+1:
    IFJ%(X,Y)=1THEN500                :rem 122
510 J%(X,Y)=1:K=K+1                    :rem 10
520 E=32:IFY=1THENG=88:H=0             :rem 32
530 IFY=2THENG=83:H=2                 :rem 254
540 IFY=3THENG=65:H=0                 :rem 254
550 IFY=4THENG=90:H=2                   :rem 0
560 IFX=10THENE=49:F=48:GOTO620       :rem 114
570 IFX>1ANDX<10THENF=X+48             :rem 91
580 IFX=11THENF=10                     :rem 54
590 IFX=12THENF=17                     :rem 63
600 IFX=13THENF=11                     :rem 50
610 IFX=1THENX=14:F=1                   :rem 3
620 IFK>5THENRETURN                   :rem 244
630 IFX=1THENX=14:F=1                   :rem 5
640 IFK=1THENCD=WK+199:PT(1)=X:ST(1)=G
                                       :rem 33
650 IFK=2THENCD=WK+203:PT(2)=X:ST(2)=G
                                       :rem 23
660 IFK=3THENCD=WK+207:PT(3)=X:ST(3)=G
                                       :rem 31
670 IFK=4THENCD=WK+211:PT(4)=X:ST(4)=G
                                       :rem 30
680 IFK=5THENCD=WK+215:PT(5)=X:ST(5)=G:GO
    SUB700:POKEVL,5:Z=250:GOTO810     :rem 87
690 GOSUB700:GOTO500                  :rem 190
700 POKECD,112:POKECD+CL,0:POKECD+1,64:PO
    KECD+1+CL,0:POKECD+2,110:POKECD+2+CL,
    0                                 :rem 197
710 FORA=(CD+24)TO(CD+68)STEP22:POKEA,93:
    POKEA+CL,0:NEXT                   :rem 149
720 FORA=(CD+22)TO(CD+66)STEP22:POKEA,93:
    POKEA+CL,0:NEXT                   :rem 146
730 POKECD+88,109:POKECD+88+CL,0:POKECD+8
    9,64:POKECD+89+CL,0:POKECD+90,125
                                      :rem 94
740 POKECD+90+CL,0:LF=1:WB=230        :rem 218
750 E1=E:F1=F:G1=G:H1=H:E=160:F=160:G=160
     :H=0                             :rem 33
760 LF=LF+1:POKES1,WB:POKEVL,14       :rem 168
770 POKECD+23,E:POKECD+23+CL,H:POKECD+45,
    F:POKECD+45+CL,H:POKECD+67,G:POKECD+6
    7+CL,H                            :rem 92
780 FORB=1TO100:NEXT:POKEVL,0:POKES1,0:IF
    LF=0THENRETURN                    :rem 106
790 IFLF=4THENLF=0:E=E1:G=G1:H=H1:F=F1:GO
    TO770                             :rem 69
800 H=H+3:WB=WB+5:GOTO760             :rem 220
810 POKE198,0:PRINTD$:PRINTB$;:PRINTTAB(3
    )CHR$(28)"KEEP OR CHANGE?":CT=0
                                      :rem 104
820 PRINTE$SPC(2)CHR$(30)"?":POKES1,Z
                                      :rem 164
830 FORA=1TO100:NEXT:PRINTE$SPC(2)" ":POK
    ES1,0:FORA=1TO50:NEXT             :rem 85
840 GETH$:IFH$=""THEN820              :rem 103
850 IFH$="C"ORH$="K"THEN870             :rem 3
860 GOTO820                           :rem 113
870 IFH$="K"THEN900                    :rem 46
880 IFH$="C"THENCT=CT+1:GOSUB500:PT(1)=X:
    ST(1)=G:E(1)=E:F(1)=F:G(1)=G:H(1)=H
                                      :rem 152
890 PRINTJW$SPC(2)AK$                  :rem 12
900 PRINTE$SPC(6)"?":FORA=1TO100:NEXT:PRI
    NTE$SPC(6)" ":FORA=1TO50:NEXT     :rem 46
910 GETI$:IFI$=""THEN900              :rem 102
920 IFI$="C"ORI$="K"THEN940             :rem 1
930 GOTO900                           :rem 110
940 IFI$="K"THEN970                    :rem 52
950 CT=CT+1:GOSUB500:PT(2)=X:ST(2)=G:E(2)
    =E:F(2)=F:G(2)=G:H(2)=H           :rem 174
960 PRINTJW$SPC(6)AK$                  :rem 14
970 PRINTE$SPC(10)"?":FORA=1TO100:NEXT:PR
    INTE$SPC(10)" ":FORA=1TO50:NEXT
                                      :rem 139
980 GETJ$:IFJ$=""THEN970              :rem 118
990 IFJ$="C"ORJ$="K"THEN1020           :rem 48
1000 GOTO970                          :rem 154
1020 IFJ$="K"THEN1050                 :rem 129
1030 CT=CT+1:GOSUB500:PT(3)=X:ST(3)=G:E(3
     )=E:F(3)=F:G(3)=G:H(3)=H         :rem 218
```

```
1040 PRINTJW$SPC(10)AK$:FORA=1TO1000:NEXT
     :IFCT=3THEN1500                :rem 209
1050 PRINTE$SPC(14)"?":FORA=1TO100:NEXT:P
     RINTE$SPC(14)" ":FORA=1TO50:NEXT
                                    :rem 185
1060 GETK$:IFK$=""THEN1050          :rem 196
1070 IFK$="K"ORK$="C"THEN1090       :rem 95
1080 GOTO1050                       :rem 200
1090 IFK$="K"THEN1120               :rem 135
1100 CT=CT+1:GOSUB500:PT(4)=X:ST(4)=G:E(4
     )=E:F(4)=F:G(4)=G:H(4)=H       :rem 222
1110 PRINTJW$SPC(14)AK$:IFCT=3THEN1500
                                    :rem 38
1120 PRINTE$SPC(18)"?":FORA=1TO100:NEXT:P
     RINTE$SPC(18)" ":FORA=1TO50:NEXT
                                    :rem 191
1130 GETL$:IFL$=""THEN1120          :rem 194
1140 IFL$="C"ORL$="K"THEN1160       :rem 93
1150 GOTO1120                       :rem 196
1160 IFL$="K"THEN1500               :rem 136
1170 CT=CT+1:GOSUB500:CD=WK+215:PT(5)=X:S
     T(5)=G:E(5)=E:F(5)=F:G(5)=G:H(5)=H
                                    :rem 78
1180 PRINTJW$SPC(18)AK$             :rem 108
1500 FORTV=1TO5:IFTV>5THEN1560      :rem 126
1510 IFE(TV)>0THEN1530              :rem 252
1520 NEXTTV:IFTV=5THEN1560          :rem 145
1530 E=E(TV):F=F(TV):G=G(TV):H=H(TV)
                                    :rem 139
1540 CD=WK+195+TV*4:IFCD>WK+215THEN1560
                                    :rem 27
1550 GOSUB700:IFTV<5THENNEXTTV      :rem 222
1560 FORA=1TO5:E(A)=0:F(A)=0:G(A)=0:H(A)=
     0:NEXTA                        :rem 242

2000 PRINTD$F$:FORA=1TO5:POKE(1015+A),PT(
     A):NEXT                        :rem 145
2010 FORA=1TO5:POKE(1015+A),PT(A):NEXT
                                    :rem 249
2020 SYS908:FORA=1TO5:PT(A)=PEEK((1015+A)
     ):NEXT                         :rem 44
2110 IFPT(5)-PT(4)=1THENIFPT(4)-PT(3)=1TH
     ENIFPT(3)-PT(2)=1THENIFPT(2)-PT(1)=1
     THENSS=1                       :rem 124
2120 IFST(1)=ST(2)THENIFST(2)=ST(3)THENIF
     ST(3)=ST(4)THENIFST(4)=ST(5)THENFL=1
                                    :rem 9
2130 SYS960:XE=PEEK(1011):ZQ=PEEK(1012)
                                    :rem 13
2160 IFPT(1)=PT(2)THENIFPT(1)=PT(3)THENIF
     PT(1)=PT(4)THENFR=1            :rem 170
2170 IFPT(5)=PT(4)THENIFPT(5)=PT(3)THENIF
     PT(5)=PT(2)THENFR=1            :rem 183
2180 IFSS=1THENIFFL=1THENIFPT(5)=14THENSC
     =SC+249:Z$=G$(10):GOTO3030     :rem 99
2190 IFSS=1THENIFFL=1THENSC=SC+99:Z$=G$(4
     ):GOTO3030                     :rem 128
2200 IFFR=1THENSC=SC+19:Z$=G$(12):GOTO303
     0                              :rem 211
2210 IFZQ=4THENIFFR<>1THENSC=SC+9:Z$=G$(1
     3):GOTO3030                    :rem 187
2220 IFFL=1THENSC=SC+7:Z$=G$(14):GOTO3030
                                    :rem 158
2230 IFSS=1THENSC=SC+4:Z$=G$(15):GOTO3030
                                    :rem 177
2240 IFZQ=3THENSC=SC+3:Z$=G$(16):GOTO3030
                                    :rem 185
2250 IFZQ=2THENSC=SC+2:Z$=G$(17):GOTO3030
                                    :rem 185
2260 IFZQ=1ANDXE>=11THENZ$=G$(18):GOTO303
     0                              :rem 7
2270 SC=SC-1:Z$="{6 SPACES}LOUSY HAND!
     {5 SPACES}":QP=1               :rem 236
3030 GOSUB5050:PRINTCHR$(156):IFQP=1THENP
     RINTCHR$(144)                  :rem 68
3040 FORA=1TO5:PRINTB$;Z$:UA=20:FORB=135T
     O243STEP12                     :rem 158
3050 IFQP=1THENFORB=243TO135STEP-12:UA=32
                                    :rem 14
3060 POKEVL,15:POKES1,B:POKES2,B:FORC=1TO
     UA:NEXT:NEXT                   :rem 224
3070 POKEVL,0:POKES1,0:POKES2,0:PRINTD$:F
     ORD=1TO100:NEXT:NEXT           :rem 178
3080 FORX=1TO13:FORY=1TO4:J%(X,Y)=0:NEXT:
     NEXT:K=0                       :rem 102
3090 FORA=1TO5:PT(A)=0:ST(A)=0:NEXT:SS=0:
     FL=0:ZQ=0:FR=0:K=0:XE=0:QP=0   :rem 5
3100 FORA=1TO1500:NEXT:GOTO350      :rem 71
4030 POKE36879,120:PRINT"{CLR}"LEFT$(N$,1
     1)SPC(8)"{BLK}{RVS}HAND";HD    :rem 59
4040 D=231:POKEVL,15:FORA=1TO3:FORB=120TO
     127:POKE36879,B:POKES1,D       :rem 215
4050 POKES2,D:FORC=1TO40:NEXT:D=D+1:NEXT:
     NEXT:POKES1,0:POKES2,0:RETURN:rem 57
5000 FORA=1TO3:FORB=200TO207:POKE36879,B:
     FORC=1TO50:NEXT:NEXT:NEXT:POKE36879,
     200:RETURN                     :rem 30
5050 PRINTLEFT$(N$,3)SPC(4)CHR$(28)CHR$(1
     8)"WINNINGS:"CHR$(146)"$";SC;"
     {2 SPACES}":RETURN             :rem 84
6000 DATA160,5,162,22,169,160,157,255,15,
     157,227,17,136,208,3,32,131,3,152,15
     7,255,147                      :rem 188
6010 DATA157,227,149,202,208,232,160,5,16
     2,220,169,160,157,22,16,157,43,16,15
     7,8,17,157                     :rem 245
6020 DATA29,17,136,208,3,32,131,3,152,157
     ,22,148,157,43,148,157,8,149,157,29,
     149,32,134                     :rem 254
6030 DATA3,208,218,96,160,7,96,138,56,233
     ,22,170,96,162                 :rem 216
6040 DATA4,142,246,3,174,246,3,160,0,140,
     247,3,185,249,3,217,248,3,176,16,72,
     185,248                        :rem 98
6050 DATA3,153,249,3,104,153,248,3,169,1,
     141,247,3,200,202,208,228,173,247,3,
     240,5,206                      :rem 171
6060 DATA246,3,208,210,96,162       :rem 198
6070 DATA 0,142,245,3,172,245,3,185,248,3
     ,217,249,3,208,4,232,141,243,3,200,1
     92,4,208                       :rem 74
6080 DATA242,238,245,3,173,245,3,201,4,20
     8,226,142,244,3,96             :rem 138
6090 DATA836,29,839,31,849,149,852,151,86
     4,30,867,30,870,31,873,31,883,150,88
     6,150,889                      :rem 26
6100 DATA151,892,151                :rem 10
```

Program 2: Poker—64 Version

```
20 POKE53281,1:POKE53280,14 :PRINT"{CLR}"
   :FORA=908TO998:READB:POKEA,B:NEXT
                                    :rem 65
30 WK=1024                          :rem 9
40 CL=54272                         :rem 52
60 DIMJ%(13,4):DIMG$(20):WA=CL+4:VL=CL+24
   :D1=0:SC=0:HD=0                  :rem 184
65 FOR T=CLTOCL+24:POKET,0:NEXT     :rem 199
70 G$(4)="{10 SPACES}*** POKER{2 SPACES}2
   56 ***{2 SPACES}"                :rem 242
80 G$(5)="{7 SPACES}IT'S YOU AGAINST THE
   {SPACE}64"                       :rem 64
```

```
100 G$(9)="{10 SPACES}YOU WIN AS FOLLOWS:
    ":G$(10)="{11 SPACES}ROYAL FLUSH-$250
    "                                  :rem 175
120 G$(11)="{9 SPACES}STRAIGHT FLUSH-$100
    ":G$(12)="{11 SPACES}4 OF A KIND-$20"
                                       :rem 185
140 G$(13)="{12 SPACES}FULL HOUSE-$10
    {2 SPACES}":G$(14)="{15 SPACES}FLUSH-
    $8"                                :rem 134
160 G$(15)="{13 SPACES}STRAIGHT-$5":G$(16
    )="{12 SPACES}3 OF A KIND-$4":rem 184
180 G$(17)="{14 SPACES}2 PAIR-$3":G$(18)=
    "{9 SPACES}PAIR, JACKS & UP-$1"
                                       :rem 17
200 G$(20)="{10 SPACES}EACH HAND COSTS $1
    .":N$="{HOME}{26 DOWN}"            :rem 102
210 B$=LEFT$(N$,20):JW$=LEFT$(N$,10)
                                       :rem 177
220 A=4:MM=60:G=10:PRINT"{BLK}":D1=0:POKE
    CL,MM:POKECL+1,MM:POKECL+4,17 :rem 86
230 FORB=1TO40:PRINTLEFT$(N$,A)RIGHT$(G$(
    A),B)                              :rem 215
234 IFLEFT$(RIGHT$(G$(A),B),2)="
    {2 SPACES}"THEN240                 :rem 202
235 POKEVL,9:POKECL+5,17:POKECL+6,129:POK
    EVL,0                              :rem 68
240 NEXT:FOR I=1TOG:NEXT:FORB=1TOD1:NEXT:
    IFA=20THENPOKECL+4,16:GOTO310  :rem 1
250 IFA=18THENA=20:MM=90:PRINT"{RED}":G=3
    0:D1=300:GOTO 300                  :rem 99
260 IFA>8ANDA<18THENA=A+1          :rem 225
270 IFA=7THENA=9:PRINT"{BLU}":G=40:D1=200
                                       :rem 141
280 IFA=5THENGOSUB5000:FORA=1TO200:NEXT:A
    =9:PRINT"{BLU}":G=40:D1=200    :rem 137
290 IFA=4THENA=5:PRINT"{RED}":MM=90
                                       :rem 95
300 GOTO230                            :rem 97
310 G$(4)="":G$(5)="":G$(7)="":G$(10)="":
    G$(20)=""                          :rem 16
320 AK$="{2 DOWN}{GRN}{2 LEFT}{RVS}
    {2 SPACES}{DOWN}{LEFT}{RVS}{2 SPACES}
    {DOWN}{LEFT}{RVS}{2 SPACES}":D$=B$+"
    {40 SPACES}"                       :rem 134
340 E$=LEFT$(N$,16):F$=E$+"{21 SPACES}":X
    =RND(-TI)                          :rem 105
350 HD=HD+1:GOSUB4030:POKE53281,1 :PRINTC
    HR$(147):GOSUB 5100                :rem 200
360 PRINTLEFT$(N$,5)SPC(13)"{BLU}HIT
    {RVS}K{OFF} TO KEEP"               :rem 51
370 PRINTLEFT$(N$,7)SPC(12)"HIT {RVS}C
    {OFF} TO CHANGE":GOSUB5050     :rem 19
500 X=INT(RND(1)*13)+1:Y=INT(RND(1)*4)+1:
    IFJ%(X,Y)=1THEN500                 :rem 122
510 J%(X,Y)=1:K=K+1                     :rem 10
520 E=32:IFY=1THENG=88:H=0              :rem 32
530 IFY=2THENG=83:H=2                  :rem 254
540 IFY=3THENG=65:H=0                  :rem 254
550 IFY=4THENG=90:H=2                    :rem 0
560 IFX=10THENE=48:F=49:GOTO620    :rem 114
570 IFX>1ANDX<10THENF=X+48              :rem 91
580 IFX=11THENF=10                      :rem 54
590 IFX=12THENF=17                      :rem 63
600 IFX=13THENF=11                      :rem 50
610 IFX=1THENX=14:F=1                    :rem 3
620 IFK>5THENRETURN                    :rem 244
630 IFX=1THENX=14:F=1                    :rem 5
640 IFK=1THENCD=WK+397:L=1:PT(1)=X:ST(1)=
    G                                  :rem 21
650 IFK=2THENCD=WK+405:L=9:PT(2)=X:ST(2)=
    G                                  :rem 23
660 IFK=3THENCD=WK+413:L=17:PT(3)=X:ST(3)
    =G                                 :rem 73
670 IFK=4THENCD=WK+421:L=25:PT(4)=X:ST(4)
    =G                                 :rem 75
675 POKE CL+1,15                       :rem 78
680 IFK=5THENCD=WK+429:L=33:PT(5)=X:ST(5)
    =G:GOSUB700:POKEVL,15:Z=250:GOTO810
                                       :rem 184
690 GOSUB700:GOTO500                   :rem 190
700 PRINT"{HOME}{10 DOWN}";            :rem 96
701 PRINT TAB(L)"{BLK}{A}****{S}"
                                       :rem 203
703 PRINTTAB(L)"-{4 SPACES}-"          :rem 153
704 PRINTTAB(L)"-{4 SPACES}-"          :rem 154
705 PRINTTAB(L)"-{4 SPACES}-"          :rem 155
706 PRINTTAB(L)"{Z}****{X}"            :rem 76
740 LF=1:WB=55                         :rem 21
750 E1=E:F1=F:G1=G:H1=H:E=160:F=160:G=160
    :H=0                               :rem 33
760 POKE VL,8:LF=LF+1:POKECL+1,WB:POKECL,
    WB:POKECL+4,17                     :rem 138
770 POKE CD+46,E:POKE CD+46+CL,H:POKECD+4
    5,F:POKECD+45+CL,H                 :rem 181
775 POKE CD+86,G:POKECD+86+CL,H:POKECD+87
    ,G:POKE CD+87+CL,H                 :rem 209
777 IF F<> 49 THENPOKE CD+128,F:POKECD+CL
    +128,H                             :rem 98
778 IF F<> 49 THEN POKE CD+127,E:POKE CD+
    CL+127,H:GOTO780                   :rem 114
779 F=49:POKE CD+127,F:POKECD+127+CL,H:PO
    KE CD+128,48:POKE CD+128+CL,H:rem 211
780 FORB=1TO100:NEXT:POKECL+4,16:IFLF=0TH
    ENRETURN                           :rem 164
790 IFLF=4THENLF=0:E=E1:G=G1:H=H1:F=F1:GO
    TO770                              :rem 69
800 H=H+8:WB=WB+5:GOTO760              :rem 225
810 POKE198,0:PRINTD$:PRINTB$;:PRINTTAB(1
    3)CHR$(28)"KEEP OR CHANGE?":CT=0
                                       :rem 153
820 PRINTE$SPC(4)CHR$(30)"?":POKECL+1,Z:P
    OKECL,Z                            :rem 139
830 FORA=1TO100:NEXT:PRINTE$SPC(4)" ":POK
    ECL+4,16:FORA=1TO50:NEXT           :rem 248
840 GETH$:IFH$=""THEN820               :rem 103
850 IFH$="C"ORH$="K"THEN870              :rem 3
860 GOTO820                            :rem 113
870 IFH$="K"THEN900                     :rem 46
880 IFH$="C"THENCT=CT+1:GOSUB500:PT(1)=X:
    ST(1)=G:E(1)=E:F(1)=F:G(1)=G:H(1)=H
                                       :rem 152
890 PRINTJW$SPC(4)AK$                  :rem 14
900 PRINTE$SPC(12)"?":FORA=1TO100:NEXT:PR
    INTE$SPC(12)" ":FORA=1TO50:NEXT
                                       :rem 136
910 GETI$:IFI$=""THEN900               :rem 102
920 IFI$="C"ORI$="K"THEN940              :rem 1
930 GOTO900                            :rem 110
940 IFI$="K"THEN970                     :rem 52
950 CT=CT+1:GOSUB500:PT(2)=X:ST(2)=G:E(2)
    =E:F(2)=F:G(2)=G:H(2)=H            :rem 174
960 PRINTJW$SPC(12)AK$                  :rem 59
970 PRINTE$SPC(20)"?":FORA=1TO100:NEXT:PR
    INTE$SPC(20)" ":FORA=1TO50:NEXT
                                       :rem 141
980 GETJ$:IFJ$=""THEN970               :rem 118
990 IFJ$="C"ORJ$="K"THEN1020             :rem 48
1000 GOTO970                           :rem 154
1020 IFJ$="K"THEN1050                  :rem 129
1030 CT=CT+1:GOSUB500:PT(3)=X:ST(3)=G:E(3
     )=E:F(3)=F:G(3)=G:H(3)=H          :rem 218
```

```
1040 PRINTJW$SPC(20)AK$:FORA=1TO1000:NEXT
     :IFCT=3THEN1500                    :rem 210
1050 PRINTE$SPC(28)"?":FORA=1TO100:NEXT:P
     RINTE$SPC(28)" ":FORA=1TO50:NEXT
                                        :rem 195
1060 GETK$:IFK$=""THEN1050              :rem 196
1070 IFK$="K"ORK$="C"THEN1090            :rem 95
1080 GOTO1050                           :rem 200
1090 IFK$="K"THEN1120                   :rem 135
1100 CT=CT+1:GOSUB500:PT(4)=X:ST(4)=G:E(4
     )=E:F(4)=F:G(4)=G:H(4)=H           :rem 222
1110 PRINTJW$SPC(28)AK$:IFCT=3THEN1500
                                        :rem 43
1120 PRINTE$SPC(36)"?":FORA=1TO100:NEXT:P
     RINTE$SPC(36)" ":FORA=1TO50:NEXT
                                        :rem 191
1130 GETL$:IFL$=""THEN1120              :rem 194
1140 IFL$="C"ORL$="K"THEN1160            :rem 93
1150 GOTO1120                           :rem 196
1160 IFL$="K"THEN1500                   :rem 136
1170 CT=CT+1:GOSUB500:CD=WK+215:PT(5)=X:S
     T(5)=G:E(5)=E:F(5)=F:G(5)=G:H(5)=H
                                        :rem 78
1180 PRINTJW$SPC(36)AK$                 :rem 108
1500 FORTV=1TO5:IFTV>5THEN1560          :rem 126
1510 IFE(TV)>0THEN1530                  :rem 252
1520 NEXTTV:IFTV=5THEN1560              :rem 145
1530 E=E(TV):F=F(TV):G=G(TV):H=H(TV)
                                        :rem 139
1540 CD=WK+389+TV*8:IFCD>WK+429THEN1560
                                        :rem 43
1550 GOSUB740:IFTV<5THENNEXTTV          :rem 226
1560 FORA=1TO5:E(A)=0:F(A)=0:G(A)=0:H(A)=
     0:NEXTA                            :rem 242
2000 PRINTD$F$:FORA=1TO5:POKE(1015+A),PT(
     A):NEXT                            :rem 145
2010 FORA=1TO5:POKE(1015+A),PT(A):NEXT
                                        :rem 249
2020 SYS908:FORA=1TO5:PT(A)=PEEK((1015+A)
     ):NEXT                              :rem 44
2110 YY=0:IFPT(5)-PT(4)=1THENIFPT(4)-PT(3
     )=1THENYY=1                        :rem 147
2115 IFYY=1THENIFPT(3)-PT(2)=1THENIFPT(2)
     -PT(1)=1THENSS=1                     :rem 9
2120 IFST(1)=ST(2)THENIFST(2)=ST(3)THENIF
     ST(3)=ST(4)THENIFST(4)=ST(5)THENFL=1
                                          :rem 9
2130 SYS960:XE=PEEK(1011):ZQ=PEEK(1012)
                                         :rem 13
2160 IFPT(1)=PT(2)THENIFPT(1)=PT(3)THENIF
     PT(1)=PT(4)THENFR=1                :rem 170
2170 IFPT(5)=PT(4)THENIFPT(5)=PT(3)THENIF
     PT(5)=PT(2)THENFR=1                :rem 183
2180 IFSS=1THENIFFL=1THENIFPT(5)=14THENSC
     =SC+249:Z$=G$(10):GOTO3030         :rem 99
2190 IFSS=1THENIFFL=1THENSC=SC+99:Z$=G$(4
     ):GOTO3030                         :rem 128
2200 IFFR=1THENSC=SC+19:Z$=G$(12):GOTO303
     0                                  :rem 211
2210 IFZQ=4THENIFFR<>1THENSC=SC+9:Z$=G$(1
     3):GOTO3030                        :rem 187
2220 IFFL=1THENSC=SC+7:Z$=G$(14):GOTO3030
                                        :rem 158
2230 IFSS=1THENSC=SC+4:Z$=G$(15):GOTO3030
                                        :rem 177
2240 IFZQ=3THENSC=SC+3:Z$=G$(16):GOTO3030
                                        :rem 185
2250 IFZQ=2THENSC=SC+2:Z$=G$(17):GOTO3030
                                        :rem 185
2260 IFZQ=1ANDXE>=11THENZ$=G$(18):GOTO303
     0                                   :rem 7
2270 SC=SC-1:Z$="{14 SPACES}LOUSY HAND!!
     {4 SPACES}":QP=1                   :rem 13
3030 GOSUB5050:PRINTCHR$(156):IFQP=1THENP
     RINTCHR$(144)                      :rem 68
3040 FORA=1TO5:PRINTB$;Z$:UA=20:FORB=135T
     O243STEP12                         :rem 158
3050 IFQP=1THENFORB=243TO135STEP-12:UA=32
                                        :rem 14
3060 POKECL+4,17:POKECL+1,B:POKECL,B:FORC
     =1TOUA:NEXT:NEXT                   :rem 159
3070 POKECL+4,16:PRINTD$:FORD=1TO100:NEXT
     :NEXT                              :rem 162
3080 FORX=1TO13:FORY=1TO4:J%(X,Y)=0:NEXT:
     NEXT:K=0                           :rem 102
3090 FORA=1TO5:PT(A)=0:ST(A)=0:NEXT:SS=0:
     FL=0:ZQ=0:FR=0:K=0:XE=0:QP=0   :rem 5
3100 FORA=1TO1500:NEXT:GOTO350      :rem 71
4030 POKE53281,1:PRINT"{CLR}"LEFT$(N$,11)
     SPC(16)"{BLK}{RVS}HAND";HD    :rem 250
4040 D=231:FORA=1TO3:FORB=0TO15:POKE53280
     ,B:POKECL+1,D:POKECL+21,D     :rem 241
4050 FORC=1TO40:NEXT:NEXT:NEXT:POKE53280,
     12:RETURN                          :rem 231
5000 FORA=1TO3:FORB=0 TO 15 :POKE53280,B:
     FORC=1TO50:NEXT:NEXT:NEXT:POKE53280,
     14                                 :rem 36
5010 RETURN                             :rem 166
5050 PRINTLEFT$(N$,3)SPC(13)CHR$(28)CHR$(
     18)"WINNINGS:"CHR$(146)"$";SC;"
     {2 SPACES}"                        :rem 106
5060 RETURN                             :rem 171
5100 Z=1:FOR T=1024 TO 1063:POKET+54272,T
     -1023:POKET,160:NEXT T             :rem 32
5110 FOR T=1024 TO 2024-40 STEP 40:Z=Z+1:
     POKET+54272,Z:POKET,160            :rem 27
5120 POKET+54311,Z:POKET+39,160:NEXTT
                                        :rem 222
5130 FORT=1984 TO 2023:POKET+54272,T-1984
     :POKET,160:NEXT T                  :rem 61
5140 RETURN                             :rem 170
6040 DATA162,4,142,246,3,174,246,3,160,0,
     140,247,3,185,249,3,217,248,3,176
                                        :rem 107
6045 DATA 16,72,185,248                 :rem 121
6050 DATA3,153,249,3,104,153,248,3,169,1,
     141,247,3,200,202,208,228,173
                                        :rem 156
6055 DATA 247,3,240,5,206,246           :rem 149
6060 DATA3,208,210,96                    :rem 57
6070 DATA162,0,142,245,3,172,245,3,185,24
     8,3,217,249,3,208,4,232,141,243
                                          :rem 4
6075 DATA 3,200,192,4,208               :rem 203
6080 DATA242,238,245,3,173,245,3,201,4,20
     8,226,142,244,3,96                 :rem 138
6090 DATA836,29,839,31,849,149,852,151,86
     4,30,867,30,870,31,873,31,883,150,88
     6                                  :rem 131
6100 DATA 150,889,151,892,151           :rem 161
```

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

MLX For VIC And 64

(Article on page 145.)

BEFORE TYPING...

Before typing in programs, please refer to "How To Type COMPUTE!'s Gazette Programs," "A Beginner's Guide To Typing In Programs," and "The Automatic Proofreader" that appear before the Program Listings.

Program 1: MLX—64 Version

```
100 PRINT"{CLR}{CYN}";CHR$(142);CHR$(8);:
    POKE53281,1:POKE53280,1          :rem 73
101 POKE 788,52:REM DISABLE RUN/STOP
                                     :rem 119
110 PRINT"{RVS}{40 SPACES}";         :rem 176
120 PRINT"{RVS}{15 SPACES}{RIGHT}{OFF}
    £*£{RVS}{RIGHT} {RIGHT}{2 SPACES}
    £*£{OFF}£*£{RVS}£{RVS}
    {13 SPACES}";                    :rem 250
130 PRINT"{RVS}{15 SPACES}{RIGHT} £G£
    {RIGHT} {2 RIGHT} {OFF}£{RVS}££*£
    {OFF}£*£{RVS}{13 SPACES}";       :rem 35
140 PRINT"{RVS}{40 SPACES}"          :rem 120
200 PRINT"{2 DOWN}{PUR}{BLK}{3 SPACES}A F
    AILSAFE MACHINE LANGUAGE EDITOR
    {5 DOWN}"                        :rem 130
210 PRINT"£5£{2 UP}STARTING ADDRESS?
    {8 SPACES}{9 LEFT}";             :rem 143
215 INPUTS:F=1-F:C$=CHR$(31+119*F):rem 125

220 IFS<256OR(S>40960ANDS<49152)ORS>53247
    THENGOSUB3000:GOTO210            :rem 235
225 PRINT:PRINT:PRINT                :rem 180
230 PRINT"£5£{2 UP}ENDING ADDRESS?
    {8 SPACES}{9 LEFT}";:INPUTE:F=1-F:C$=
    CHR$(31+119*F)                   :rem 20
240 IFE<256OR(E>40960ANDE<49152)ORE>53247
    THENGOSUB3000:GOTO230            :rem 183
250 IFE<STHENPRINTC$;"{RVS}ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
                                     :rem 176
260 PRINT:PRINT:PRINT                :rem 179
300 PRINT"{CLR}";CHR$(14):AD=S:POKEV+21,0
                                     :rem 225
310 PRINTRIGHT$("0000"+MID$(STR$(AD),2),5
    );":";:FORJ=1TO6                 :rem 234
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                     :rem 228
390 IFN=-211THEN 710                  :rem 62
400 IFN=-204THEN 790                  :rem 64
410 IFN=-206THENPRINT:INPUT"{DOWN}ENTER N
    EW ADDRESS";ZZ                   :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETHENPRINT"
    {RVS}OUT OF RANGE":GOSUB1000:GOTO410
                                     :rem 225
417 IFN=-206THENAD=ZZ:PRINT:GOTO310
                                     :rem 238
420 IF N<>-196 THEN 480              :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
    ";:INPUTT                        :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
    T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
    0                                :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$("000
    0"+MID$(STR$(I),2),5);":";       :rem 30
```


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```
451 FORK=0TO5:N=PEEK(I+K):PRINTRIGHT$("00
    "+MID$(STR$(N),2),3);",";      :rem 66
460 GETA$:IFA$>""THENPRINT:PRINT:GOTO310
                                   :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI:PRINT:PRIN
    T:GOTO310                      :rem 50
480 IFN<0 THEN PRINT:GOTO310       :rem 168
490 A(J)=N:NEXTJ                   :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT    :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(20)
                                   :rem 234
515 IFN=CKSUMTHEN530               :rem 255
520 PRINT:PRINT"LINE ENTERED WRONG : RE-E
    NTER":PRINT:GOSUB1000:GOTO310:rem 176
530 GOSUB2000                      :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:POKE54
    272,0:POKE54273,0              :rem 227
550 AD=AD+6:IF AD<E THEN 310       :rem 212
560 GOTO 710                       :rem 108
570 N=0:Z=0                        :rem 88
580 PRINT"{+}";                    :rem 79
581 GETA$:IFA$=""THEN581           :rem 95
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                  :rem 229
590 IFA>128THENN=-A:RETURN         :rem 137
600 IFA<>20 THEN 630               :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {LEFT} {LEFT}";:GOTO690        :rem 172
620 GOTO570                        :rem 109
630 IFA<48ORA>57THEN580            :rem 105
640 PRINTA$;:N=N*10+A-48           :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                   :rem 229
660 Z=Z+1:IFZ<3THEN580             :rem 71
670 IFZ=0THENGOSUB1000:GOTO570     :rem 114
680 PRINT",";:RETURN               :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                   :rem 149
691 FORI=1TO3:T=PEEK(S%-I)         :rem 67
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                   :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                   :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                   :rem 236
720 INPUT"{DOWN} FILENAME";F$      :rem 228
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
     {RVS}D{OFF}ISK: (T/D)"        :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                   :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                   :rem 158
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256               :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                   :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                             :rem 69
765 POKE254,S/256:POKE253,S-PEEK(254)*256
    :POKE780,253                   :rem 12
766 POKE782,E/256:POKE781,E-PEEK(782)*256
    :SYS65496                      :rem 124
770 IF(PEEK(783)AND1)OR(ST AND191)THEN780
                                   :rem 111
775 PRINT"{DOWN}DONE.":END         :rem 106
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720       :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720           :rem 103
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}"
                                   :rem 212
800 INPUT"{2 DOWN} FILENAME";F$    :rem 244
810 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
     {RVS}D{OFF}ISK: (T/D)"        :rem 227
820 GETA$:IFA$<>"T"ANDA$<>"D"THEN820
                                   :rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                   :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256               :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                   :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                             :rem 70
850 POKE780,0:SYS65493             :rem 11
860 IF(PEEK(783)AND1)OR(ST AND191)THEN870
                                   :rem 111
865 PRINT"{DOWN}DONE.":GOTO310     :rem 96
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
                                   :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO800           :rem 102
1000 REM BUZZER                    :rem 135
1001 POKE54296,15:POKE54277,45:POKE54278,
     165                           :rem 207
1002 POKE54276,33:POKE 54273,6:POKE54272,
     5                             :rem 42
1003 FORT=1TO200:NEXT:POKE54276,32:POKE54
     273,0:POKE54272,0:RETURN      :rem 202
2000 REM BELL SOUND                :rem 78
2001 POKE54296,15:POKE54277,0:POKE54278,2
     47                            :rem 152
2002 POKE 54276,17:POKE54273,40:POKE54272
     ,0                            :rem 86
2003 FORT=1TO100:NEXT:POKE54276,16:RETURN
                                   :rem 57
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
     GOTO1000                      :rem 89
```

Program 2: MLX—VIC Version

```
100 PRINT"{CLR}{PUR}";CHR$(142);CHR$(8);
                                   :rem 181
101 POKE 788,194:REM DISABLE RUN/STOP
                                   :rem 174
110 PRINT"{RVS}{14 SPACES}"        :rem 117
120 PRINT"{RVS} {RIGHT}?{OFF}{*}£{RVS}
    {RIGHT} {RIGHT}{2 SPACES}{*}{OFF}
    {*}£{RVS}£{RVS} "              :rem 191
130 PRINT"{RVS} {RIGHT} {G}{RIGHT}
    {2 RIGHT} {OFF}£{RVS}£{*}{OFF}
    {*}{RVS} "                     :rem 232
140 PRINT"{RVS}{14 SPACES}"        :rem 120
200 PRINT"{2 DOWN}{PUR}{BLK}A FAILSAFE MA
    CHINE":PRINT"LANGUAGE EDITOR{5 DOWN}"
                                   :rem 141
210 PRINT"{BLK}{3 UP}STARTING ADDRESS":IN
    PUTS:F=1-F:C$=CHR$(31+119*F)   :rem 97
220 IFS<256ORS>32767THENGOSUB3000:GOTO210
                                   :rem 2
225 PRINT:PRINT:PRINT:PRINT        :rem 123
230 PRINT"{BLK}{3 UP}ENDING ADDRESS":INPU
    TE:F=1-F:C$=CHR$(31+119*F)     :rem 158
240 IFE<256ORE>32767THENGOSUB3000:GOTO230
                                   :rem 234
250 IFE<STHENPRINTC$;"{RVS}ENDING < START
    {2 SPACES}":GOSUB1000:GOTO 230
                                   :rem 176
260 PRINT:PRINT:PRINT              :rem 179
300 PRINT"{CLR}";CHR$(14):AD=S     :rem 56
```

```
310 PRINTRIGHT$("0000"+MID$(STR$(AD),2),5
    );":";:FORJ=1TO6                    :rem 234
320 GOSUB570:IFN=-1THENJ=J+N:GOTO320
                                        :rem 228
390 IFN=-211THEN 710                    :rem 62
400 IFN=-204THEN 790                    :rem 64
410 IFN=-206THENPRINT:INPUT"{DOWN}ENTER N
    EW ADDRESS";ZZ                      :rem 44
415 IFN=-206THENIFZZ<SORZZ>ETHENPRINT"
    {RVS}OUT OF RANGE":GOSUB1000:GOTO410
                                        :rem 225
417 IFN=-206THENAD=ZZ:PRINT:GOTO310
                                        :rem 238
420 IF N<>-196 THEN 480                 :rem 133
430 PRINT:INPUT"DISPLAY:FROM";F:PRINT,"TO
    ";:INPUTT                           :rem 234
440 IFF<SORF>EORT<SORT>ETHENPRINT"AT LEAS
    T";S;"{LEFT}, NOT MORE THAN";E:GOTO43
    0                                   :rem 159
450 FORI=FTOTSTEP6:PRINT:PRINTRIGHT$("000
    0"+MID$(STR$(I),2),5);":";          :rem 30
455 FORK=0TO5:N=PEEK(I+K):IFK=3THENPRINTS
    PC(10);                             :rem 34
457 PRINTRIGHT$("00"+MID$(STR$(N),2),3);"
    ,";                                 :rem 157
460 GETA$:IFA$>""THENPRINT:PRINT:GOTO310
                                        :rem 25
470 NEXTK:PRINTCHR$(20);:NEXTI:PRINT:PRIN
    T:GOTO310                           :rem 50
480 IFN<0 THEN PRINT:GOTO310            :rem 168
490 A(J)=N:NEXTJ                        :rem 199
500 CKSUM=AD-INT(AD/256)*256:FORI=1TO6:CK
    SUM=(CKSUM+A(I))AND255:NEXT         :rem 200
510 PRINTCHR$(18);:GOSUB570:PRINTCHR$(20)
                                        :rem 234
515 IFN=CKSUMTHEN530                    :rem 255
520 PRINT:PRINT"LINE ENTERED WRONG":PRINT
    "RE-ENTER":PRINT:GOSUB1000:GOTO310
                                        :rem 129
530 GOSUB2000                           :rem 218
540 FORI=1TO6:POKEAD+I-1,A(I):NEXT:rem 80
550 AD=AD+6:IF AD<E THEN 310            :rem 212
560 GOTO 710                            :rem 108
570 N=0:Z=0                             :rem 88
580 PRINT"[+]";                         :rem 79
581 GETA$:IFA$=""THEN581                :rem 95
585 PRINTCHR$(20);:A=ASC(A$):IFA=13ORA=44
    ORA=32THEN670                       :rem 229
590 IFA>128THENN=-A:RETURN              :rem 137
600 IFA<>20 THEN 630                    :rem 10
610 GOSUB690:IFI=1ANDT=44THENN=-1:PRINT"
    {LEFT} {LEFT}";:GOTO690             :rem 172
620 GOTO570                             :rem 109
630 IFA<48ORA>57THEN580                 :rem 105
640 PRINTA$;:N=N*10+A-48                :rem 106
650 IFN>255 THEN A=20:GOSUB1000:GOTO600
                                        :rem 229
660 Z=Z+1:IFZ<3THEN580                  :rem 71
670 IFZ=0THENGOSUB1000:GOTO570          :rem 114
680 PRINT",";:RETURN                    :rem 240
690 S%=PEEK(209)+256*PEEK(210)+PEEK(211)
                                        :rem 149
692 FORI=1TO3:T=PEEK(S%-I)              :rem 68
695 IFT<>44ANDT<>58THENPOKES%-I,32:NEXT
                                        :rem 205
700 PRINTLEFT$("{3 LEFT}",I-1);:RETURN
                                        :rem 7
710 PRINT"{CLR}{RVS}*** SAVE ***{3 DOWN}"
                                        :rem 236
720 INPUT"{DOWN} FILENAME";F$           :rem 228
730 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
     {RVS}D{OFF}ISK: (T/D)"             :rem 228
740 GETA$:IFA$<>"T"ANDA$<>"D"THEN740
                                        :rem 36
750 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                        :rem 158
760 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                    :rem 3
762 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                        :rem 109
763 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                  :rem 69
765 POKE254,S/256:POKE253,S-PEEK(254)*256
    :POKE780,253                        :rem 12
766 POKE782,E/256:POKE781,E-PEEK(782)*256
    :SYS65496                           :rem 124
770 IF(PEEK(783)AND1)OR(ST AND191)THEN780
                                        :rem 111
775 PRINT"{DOWN}DONE.":END              :rem 106
780 PRINT"{DOWN}ERROR ON SAVE.{2 SPACES}T
    RY AGAIN.":IFDV=1THEN720            :rem 171
781 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO720                :rem 103
782 GOTO720                             :rem 115
790 PRINT"{CLR}{RVS}*** LOAD ***{2 DOWN}"
                                        :rem 212
800 INPUT"{2 DOWN} FILENAME";F$         :rem 244
810 PRINT:PRINT"{2 DOWN}{RVS}T{OFF}APE OR
     {RVS}D{OFF}ISK: (T/D)"             :rem 227
820 GETA$:IFA$<>"T"ANDA$<>"D"THEN820
                                        :rem 34
830 DV=1-7*(A$="D"):IFDV=8THENF$="0:"+F$
                                        :rem 157
840 T$=F$:ZK=PEEK(53)+256*PEEK(54)-LEN(T$
    ):POKE782,ZK/256                    :rem 2
841 POKE781,ZK-PEEK(782)*256:POKE780,LEN(
    T$):SYS65469                        :rem 107
845 POKE780,1:POKE781,DV:POKE782,1:SYS654
    66                                  :rem 70
850 POKE780,0:SYS65493                  :rem 11
860 IF(PEEK(783)AND1)OR(ST AND191)THEN870
                                        :rem 111
865 PRINT"{DOWN}DONE.":GOTO310          :rem 96
870 PRINT"{DOWN}ERROR ON LOAD.{2 SPACES}T
    RY AGAIN.{DOWN}":IFDV=1THEN800
                                        :rem 172
880 OPEN15,8,15:INPUT#15,E1$,E2$:PRINTE1$
    ;E2$:CLOSE15:GOTO800                :rem 102
1000 REM BUZZER                         :rem 135
1001 POKE36878,15:POKE36874,190         :rem 206
1002 FORW=1TO300:NEXTW                  :rem 117
1003 POKE36878,0:POKE36874,0:RETURN
                                        :rem 74
2000 REM BELL SOUND                     :rem 78
2001 FORW=15TO0STEP-1:POKE36878,W:POKE368
    76,240:NEXTW                        :rem 22
2002 POKE36876,0:RETURN                 :rem 119
3000 PRINTC$;"{RVS}NOT ZERO PAGE OR ROM":
    GOTO1000                            :rem 89
```

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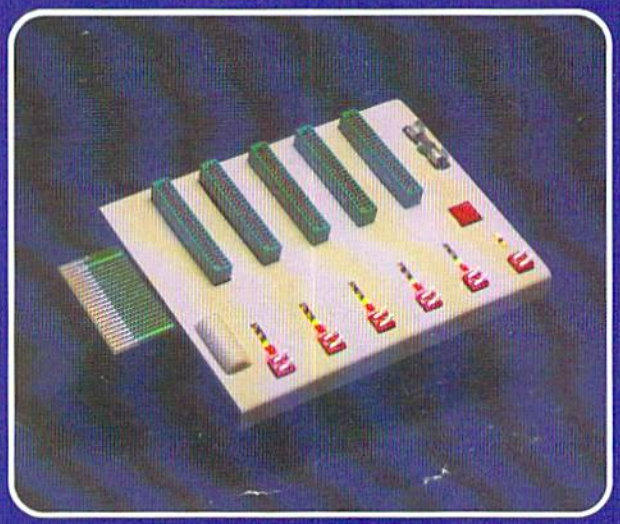

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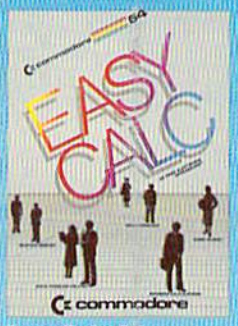

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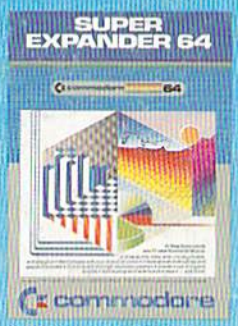

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