

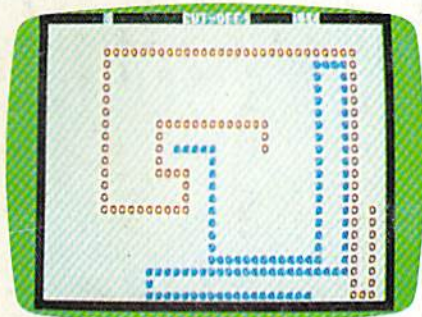
COMPUTER'S GAZETTE

October 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

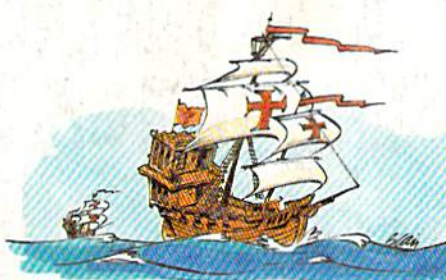
CUT-OFF! *Educational Games For The 64*

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.



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.

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**Computing For
Families**

**Machine Language
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MAKING MORE READABLE LISTINGS

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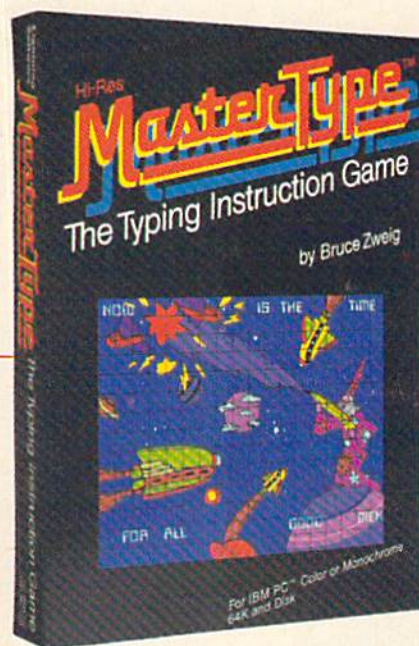
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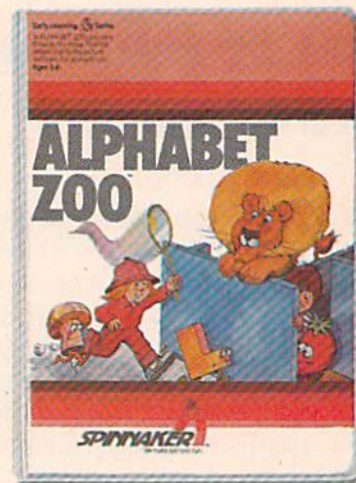
So if you're looking for a line of learning games that are as much fun to play as they are to buy, consider Spinnaker Games. They're compatible with **Apple, Atari, IBM PC, PCjr, Commodore 64, Coleco Adam** and parents who don't mind their kids having fun while they learn.



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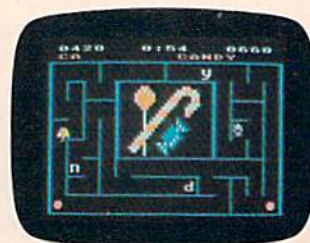
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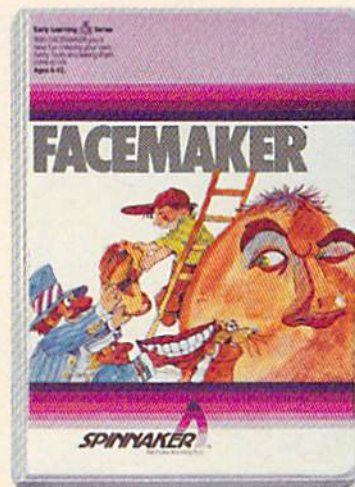
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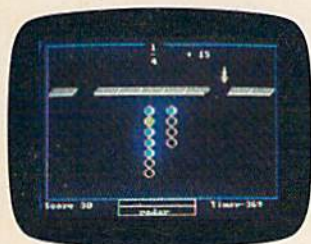
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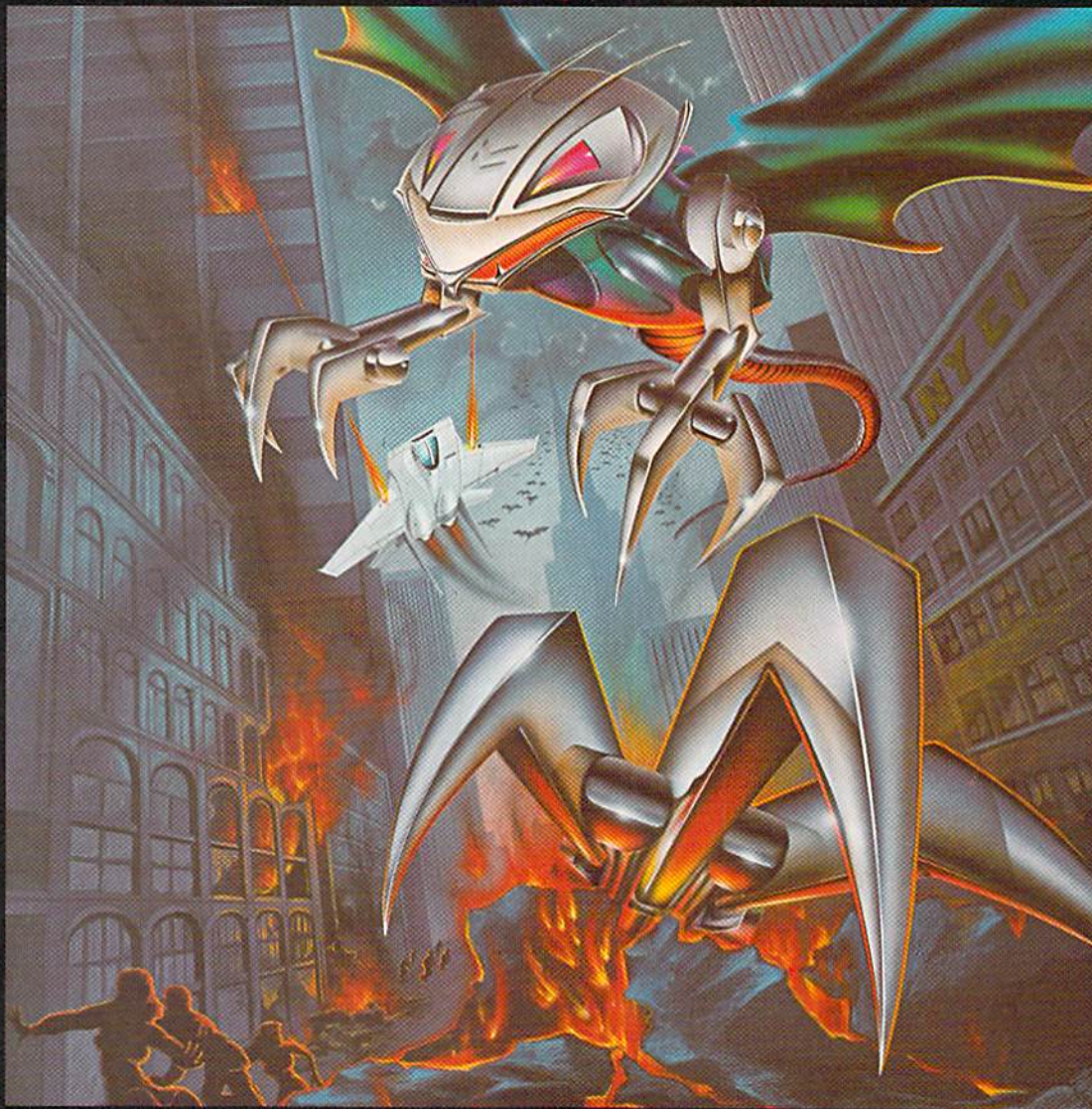


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SAVE NEW YORK.™ For the Commodore 64.

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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.

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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.



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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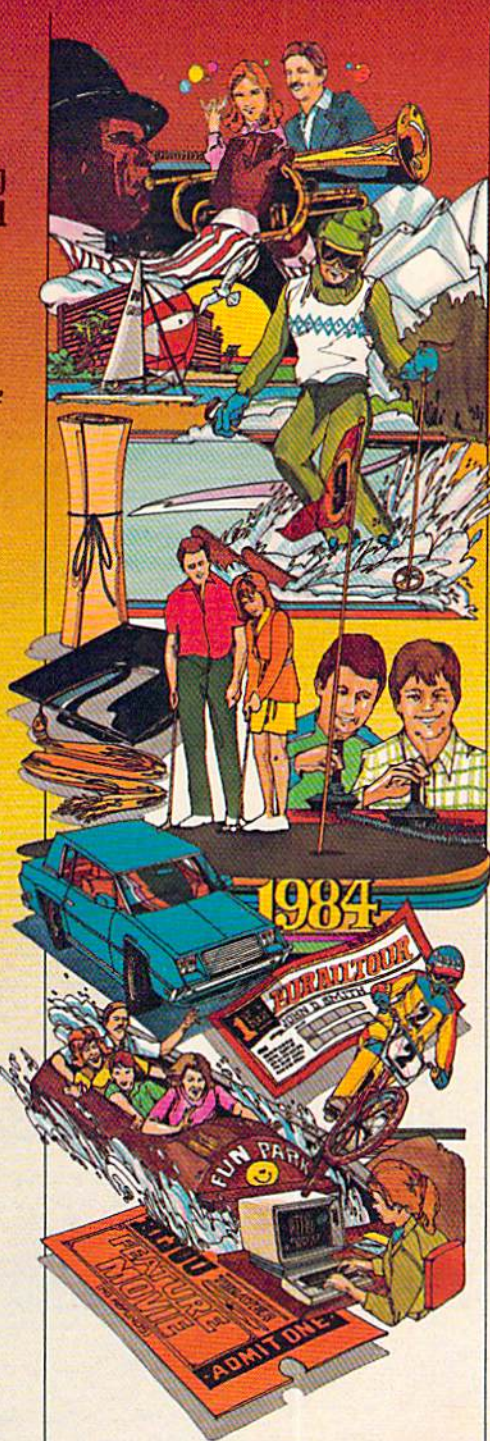
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GAZETTE FEEDBACK

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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 Datasette?

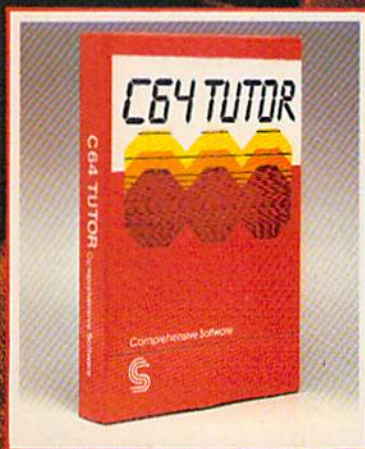
Robert Zarriello

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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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 Datasette 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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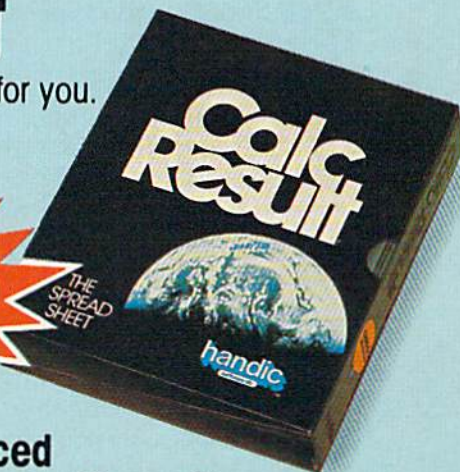


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COMPUTING for families

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.

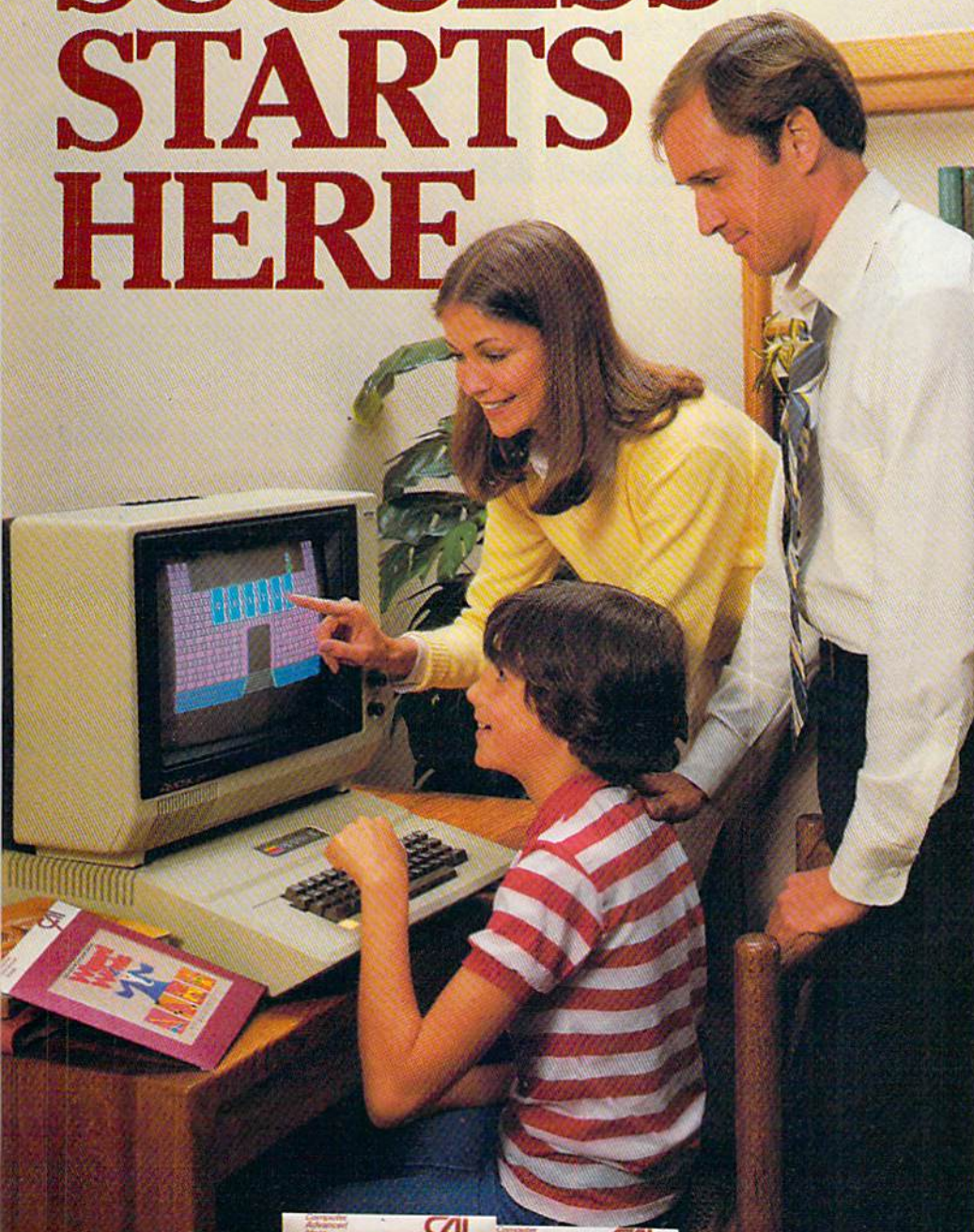
I began my bridge-building project by calling Catie's teacher, Mrs. Albertson, and volunteering to loan the school an extra computer we had sitting around the house.

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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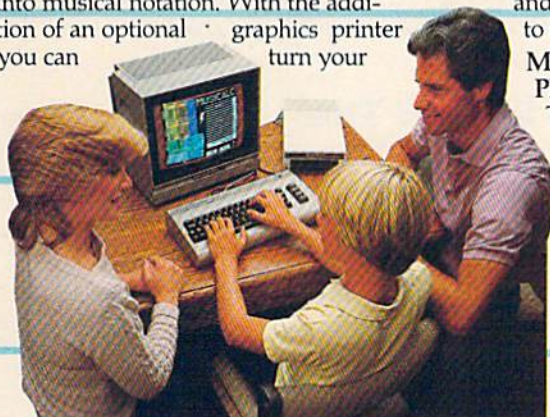
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I told Mrs. Albertson that we didn't have a TV set or monitor for the computer. She would have to scavenge one somewhere. Also, I told her that the class would need a table for the computer and a six-foot-square space in the room next to an electrical 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. Paitzell 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.



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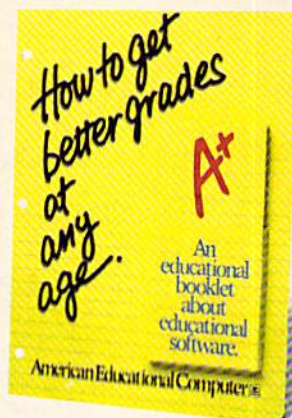
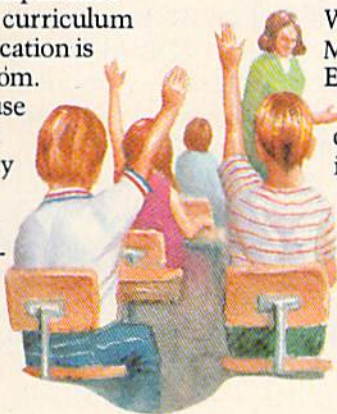
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I selected Catie and Eric's best educational programs to show off at school. I drove to the computer store and picked up a computer like the two that would be donated to the school. Then I drove to the school.

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.

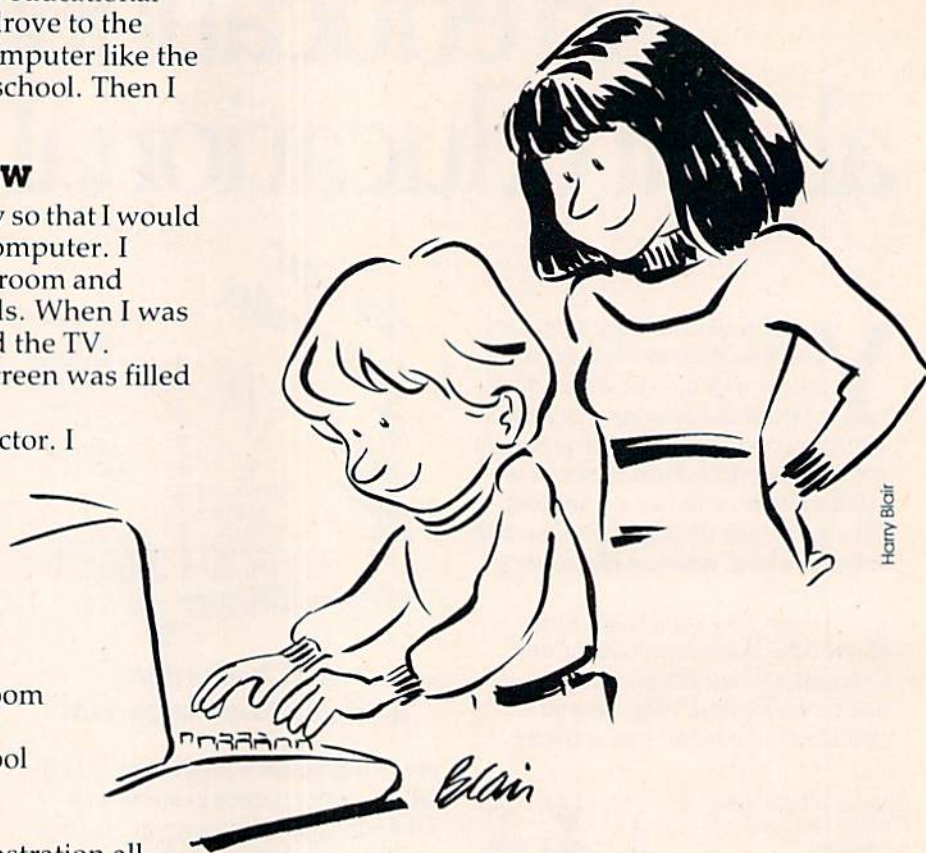
Culture Shock

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 DesignWare), and *Bank Street Writer* (from Scholastic and Bröderbund).

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



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* 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 multi-colored 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.

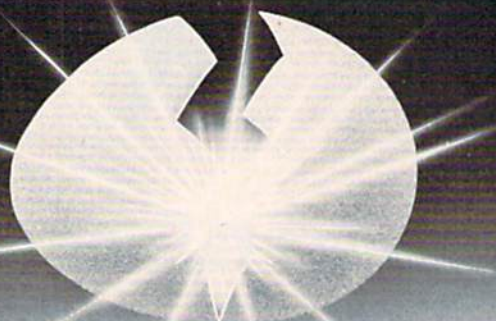
I can use their help. They can work with the teachers and help train them on the computers. They can bring their computers to school for show and tell. They can share their software with the school.

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?" @

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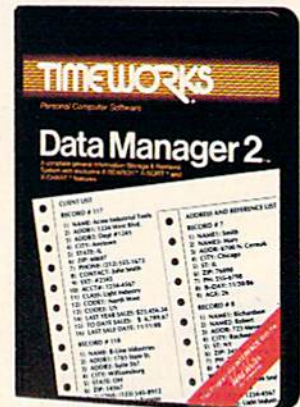
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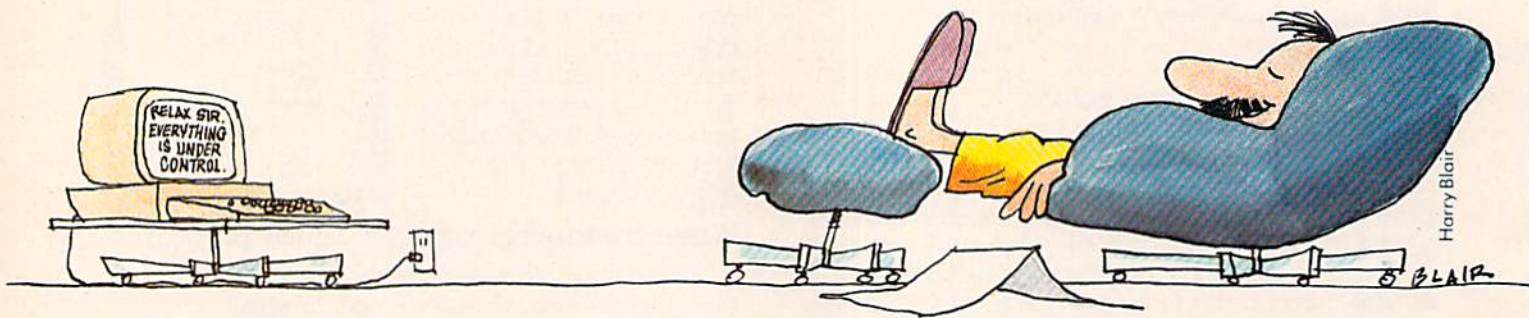
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The Electronic Castle: Managing Your Home With Your Computer

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

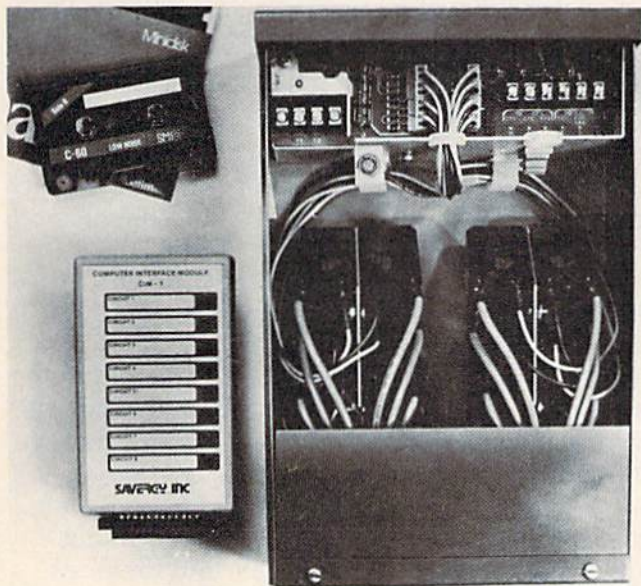
that analyzes trends in the personal computing industry, says her company is in the midst of a major psychographic and demographic analysis of buying patterns among home and business computer users.

"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.

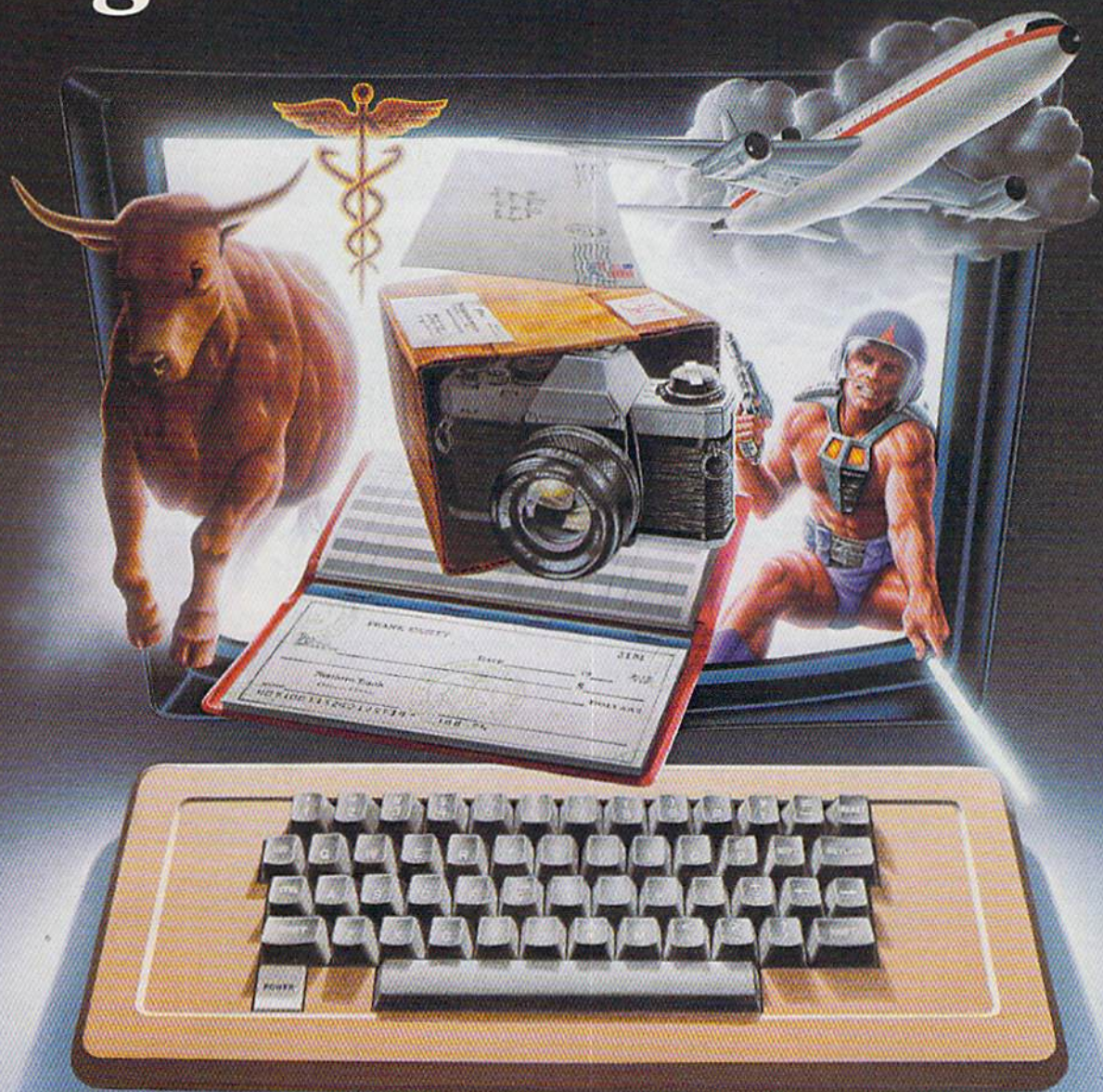
One of the more interesting experiments is the Keyfax Interactive Information Service, scheduled to go on-line this spring in Chicago.

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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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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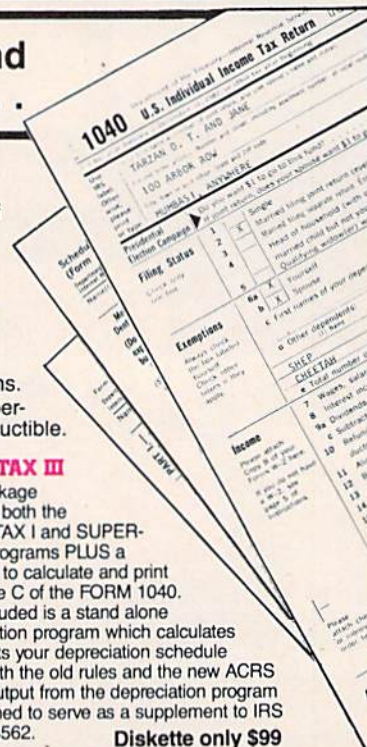
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3



4



5

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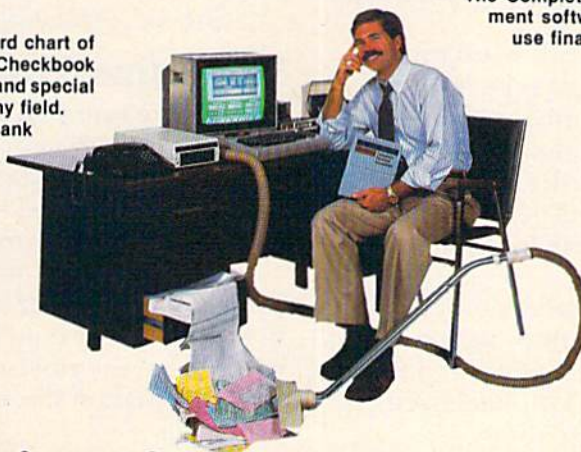
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The Data Base As A Home Information Center

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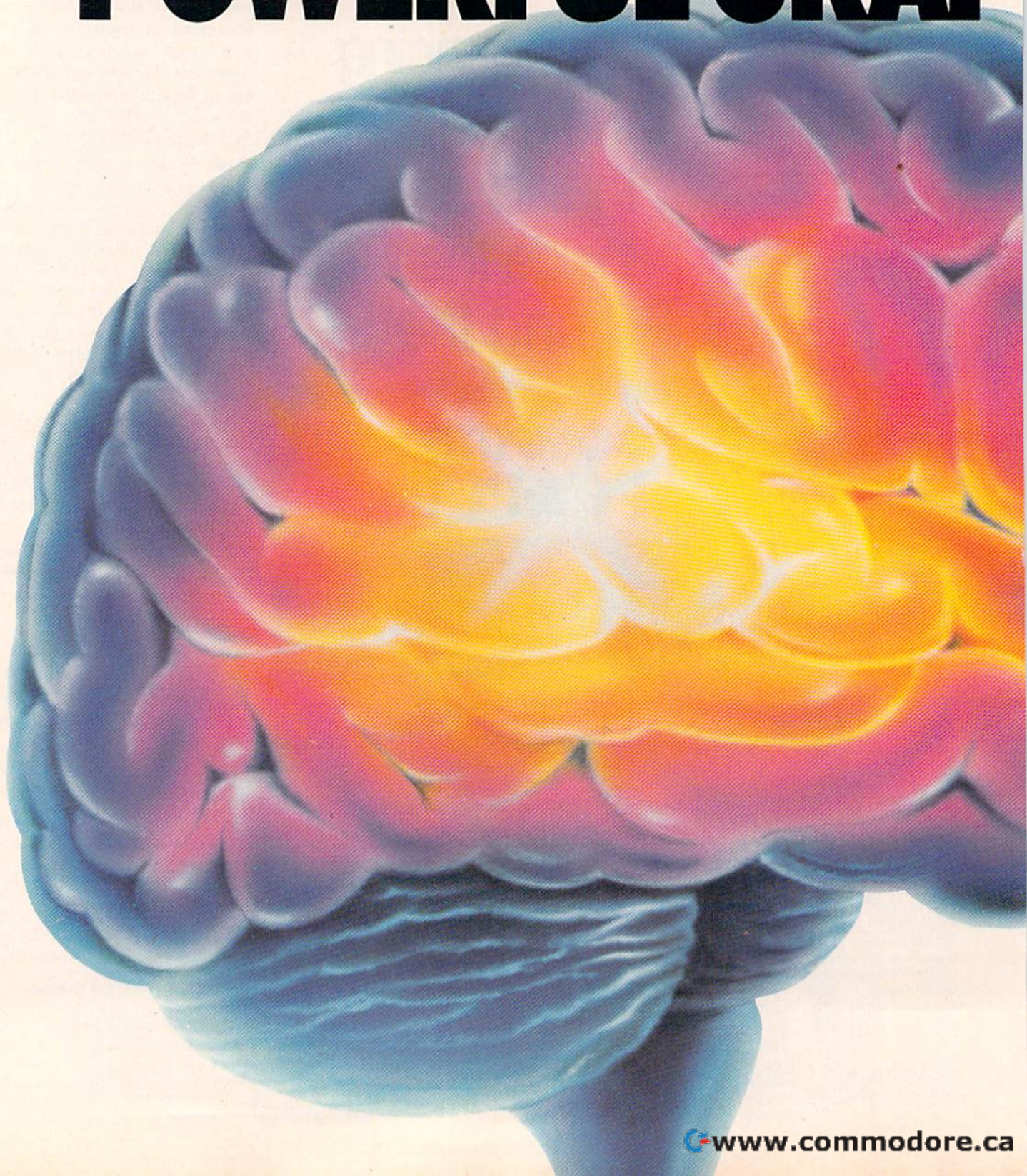
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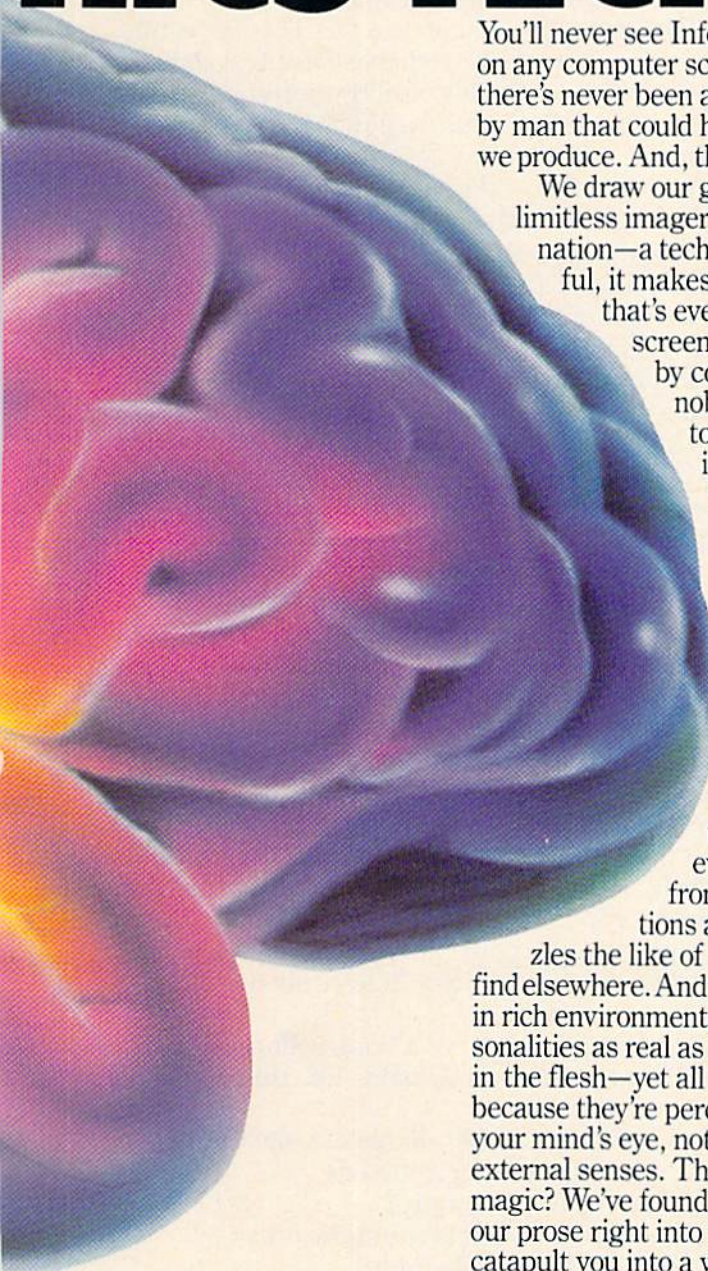
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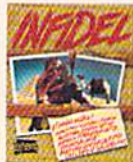
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systems used by larger computers, consists of the same basic components. A bank's computer may have millions of words and figures to keep straight, while your VIC-20 has only to organize a 75-name Christmas list, but they can both use data base programs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

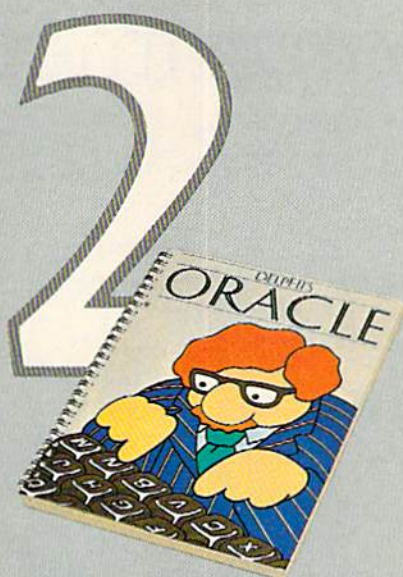
A data base will not organize your life for you. That still takes some time and effort on your part. But if you have a personal computer, and are looking for ways to make it a practical part of your home life, you might find a data base a very useful tool. ☺

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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.



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

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

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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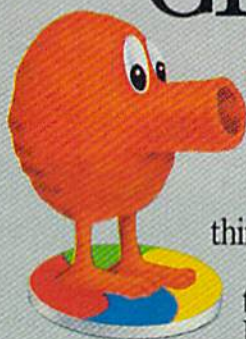
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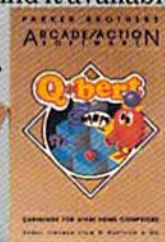


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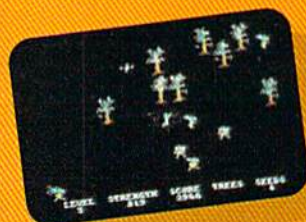
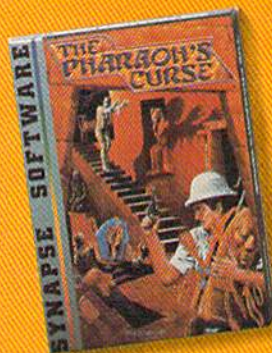
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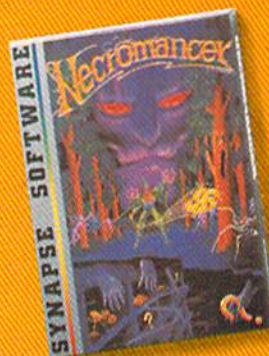
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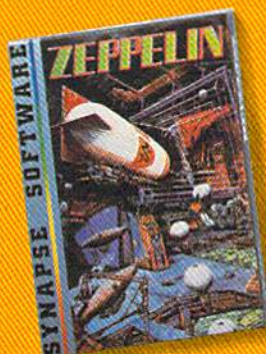
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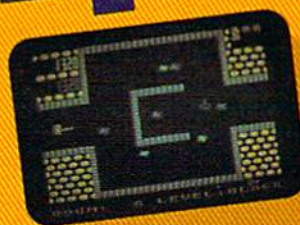
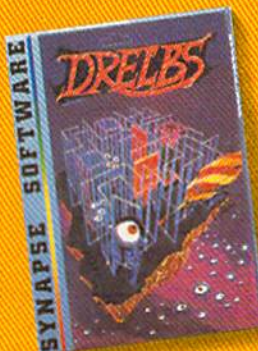
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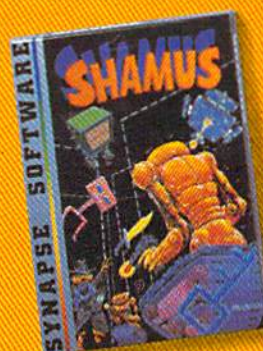
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back in the late sixties on the big vacuum tube computers."

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 micro-computer 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 re-sorted. And it can be very irritating if your record entry is interrupted by those functions.

DELPHI'S ORACLE C64 DBMS V3.14
Copyright Delphi Systems Group 1982

Select from menu below:

- ☒ 1 = Set data-file name.
 - ☒ 2 = Create a new data file.
 - New record format
 - Modify existing format
 - ☒ 3 = Modify an existing file.
 - Add new record
 - Delete records
 - Change records
 - ☒ 4 = Searching & Reporting.
 - Find records
 - Print reports
 - ☒ 5 = Disk Utilities.
 - ☒ 6 = Exit from this program.
- Enter Selection - 1

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 re-creating 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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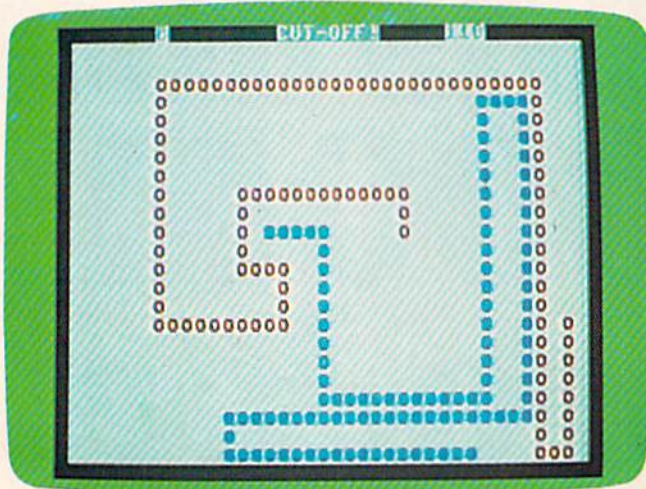
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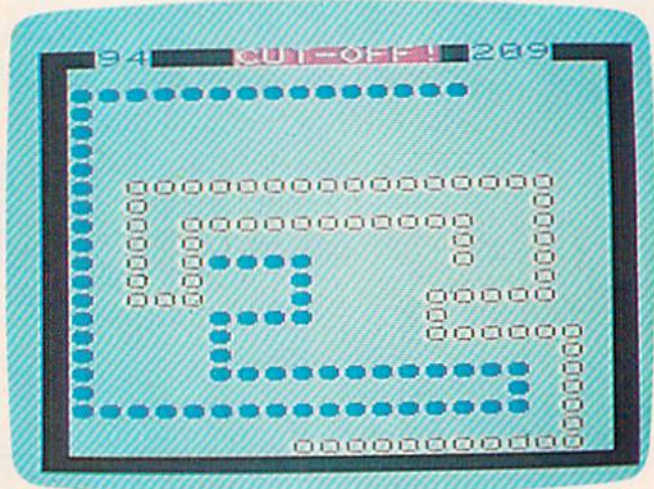


CUT-OFF!

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

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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.

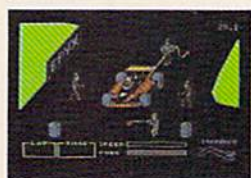
After a crash, the surviving player is awarded points equal to the number of segments in the crashed player's trail. This means that the longer the players last before crashing, the more points are at stake. Thus, it's possible to catch up even if you're way behind.

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. ☐

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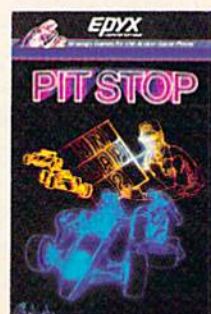
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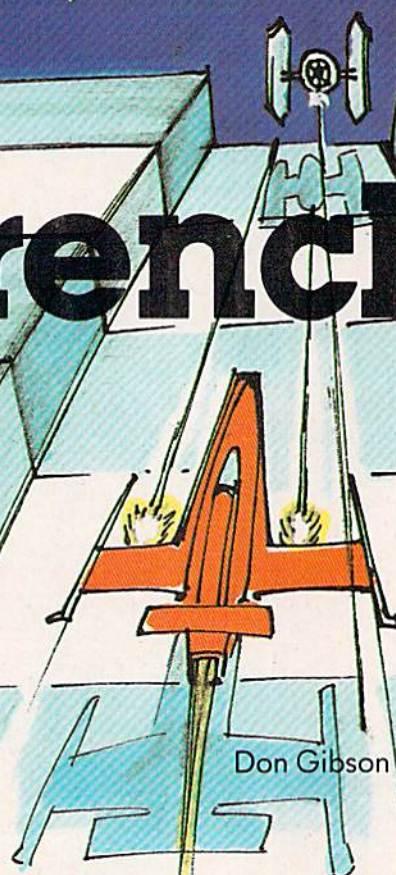
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Trenchfire



"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 accom-

plished 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:

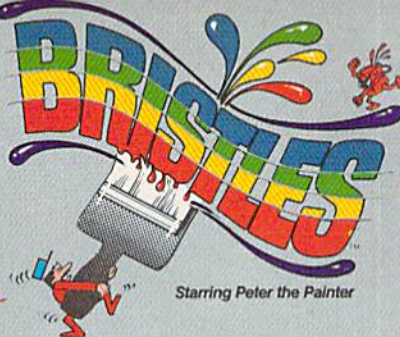
`210 S = 4352:E = 6079`

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.



designed by *Fernando Herrera*

Starring Peter the Painter

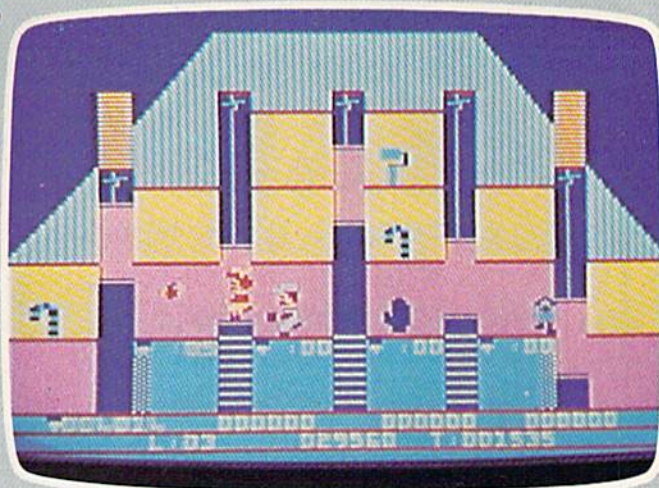
C-64 conversion by Adam Bellin

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designed by *James Nungaro*

C-64 conversion by Paul Kanevsky

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□ 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

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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:

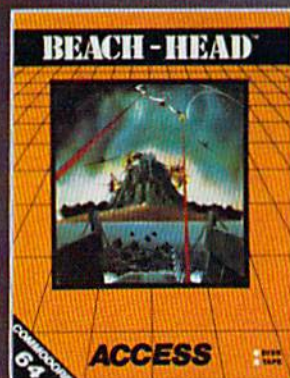
f1 beginner	f5 advanced
f3 intermediate	f7 expert

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

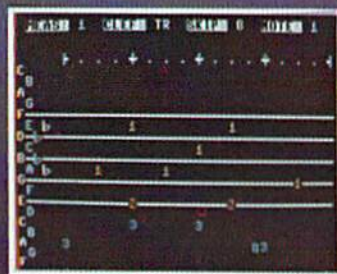
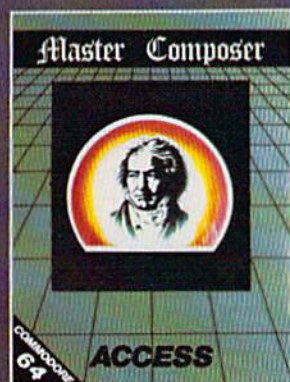
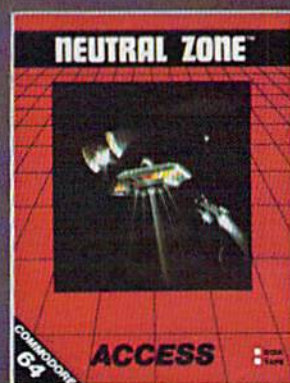
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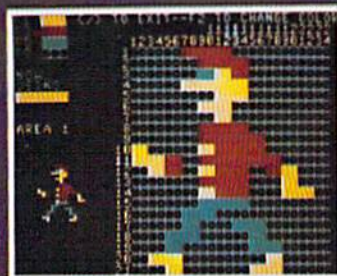
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POKER

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.



Harry Blair

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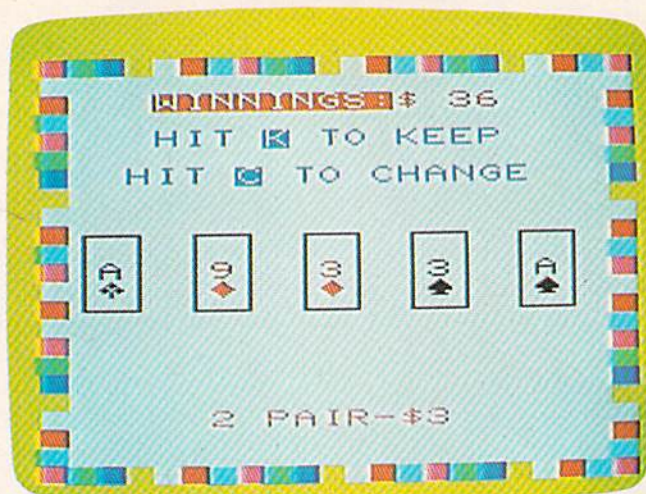
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Like real poker, you can keep your hand or draw up to three new cards (VIC version).



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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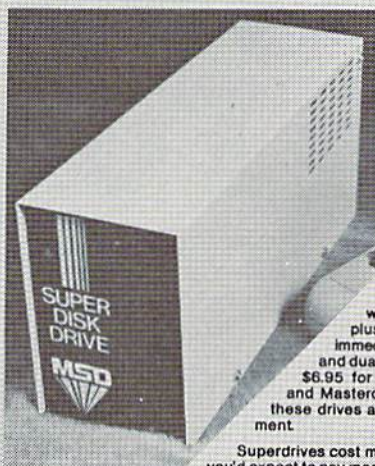
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Tree Tutor For Tots

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

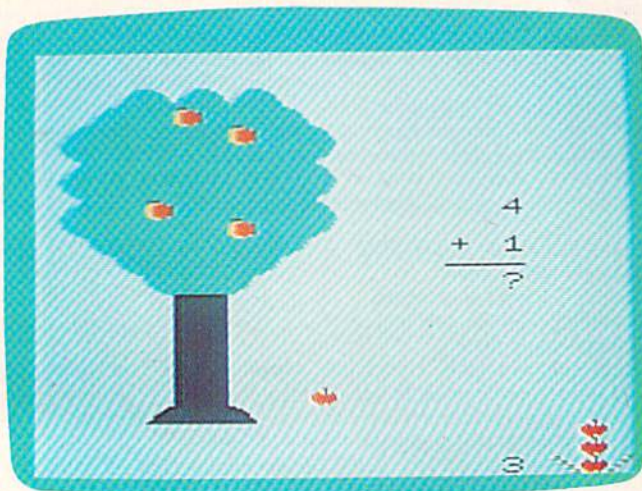
basket and flies off the screen. After ten right answers—and ten apples stacked in the basket—the game ends.

Choosing Levels Of Play

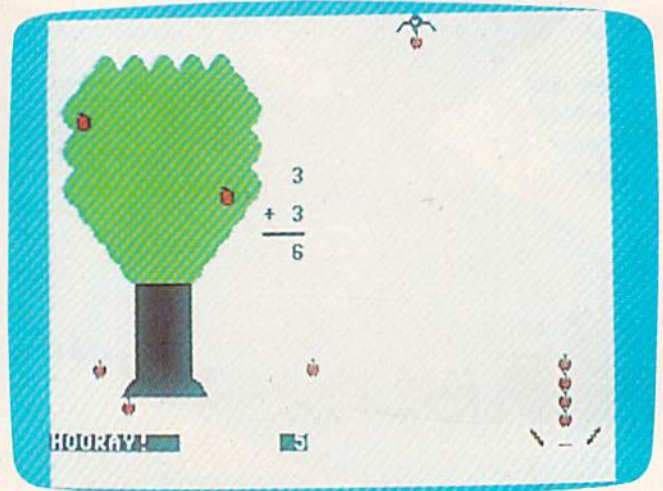
LOAD the program and RUN it. After a short wait, the title appears and you are asked to "Choose highest sum (2-9)." Hitting a 7, for instance, generates problems with answers no higher than seven. A beginner should choose 2, proceeding to the harder problems as the easier ones are mastered.

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)

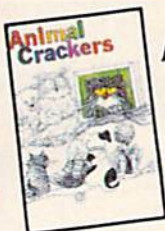


In the 64 version, the child has answered correctly. The bird is carrying an apple to the basket.

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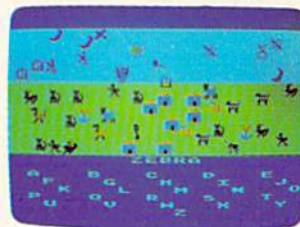
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saying something like, "There are two apples in the tree and one more on the ground. See this problem? It says 2 plus 1. How much is two and one? Let's count the apples and find out." Point out that the number of apples in the tree is the same as the 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:

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See program listings on page 148. @

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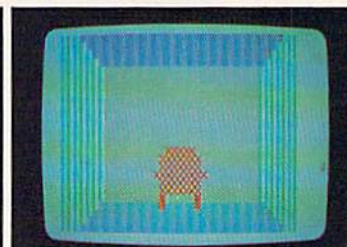


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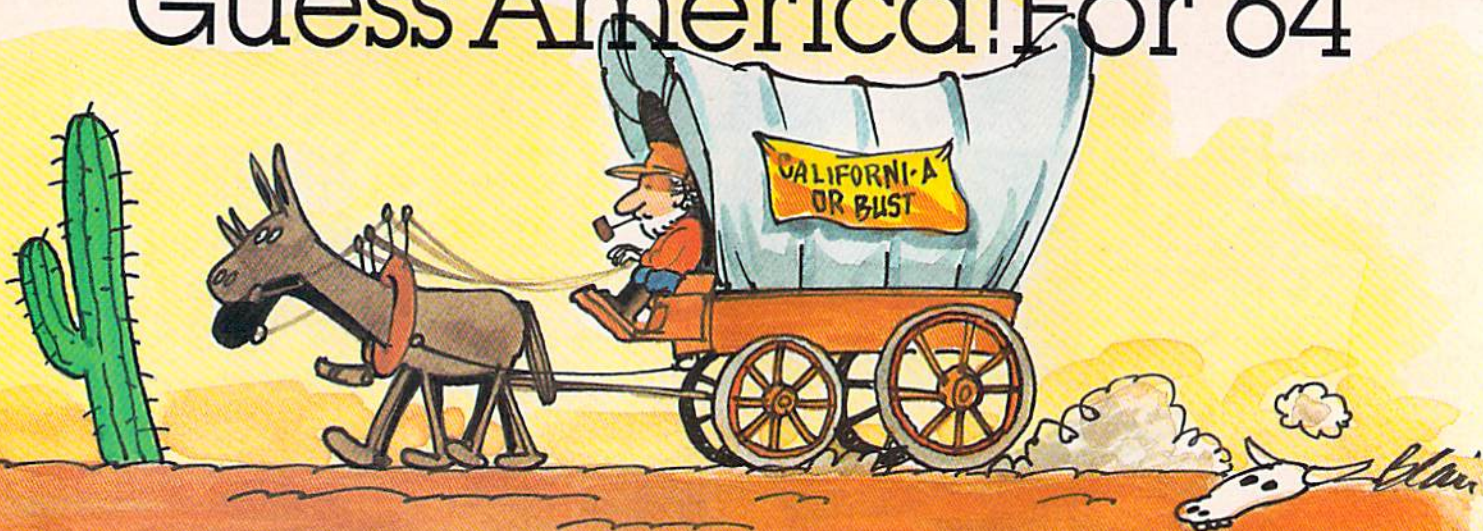
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Guess America! For 64



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



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

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.

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
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See program listing on page 155. @

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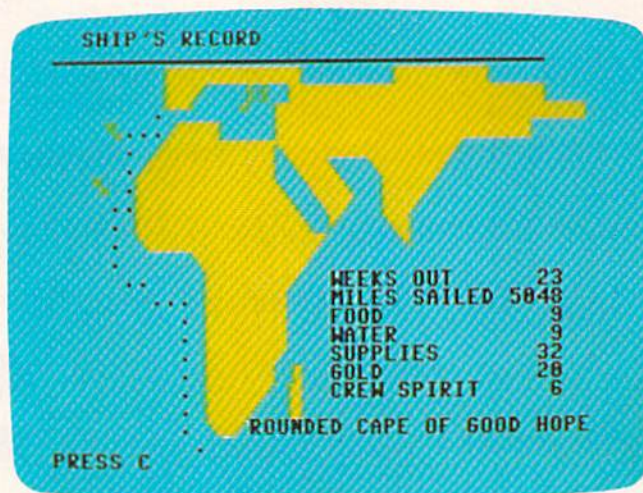
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Sea Route To India: A Historical Simulation For The 64

M. J. Winter

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.



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

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 Portuguese explorers in the fifteenth century.

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

made by Portuguese explorers in the fifteenth century.

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

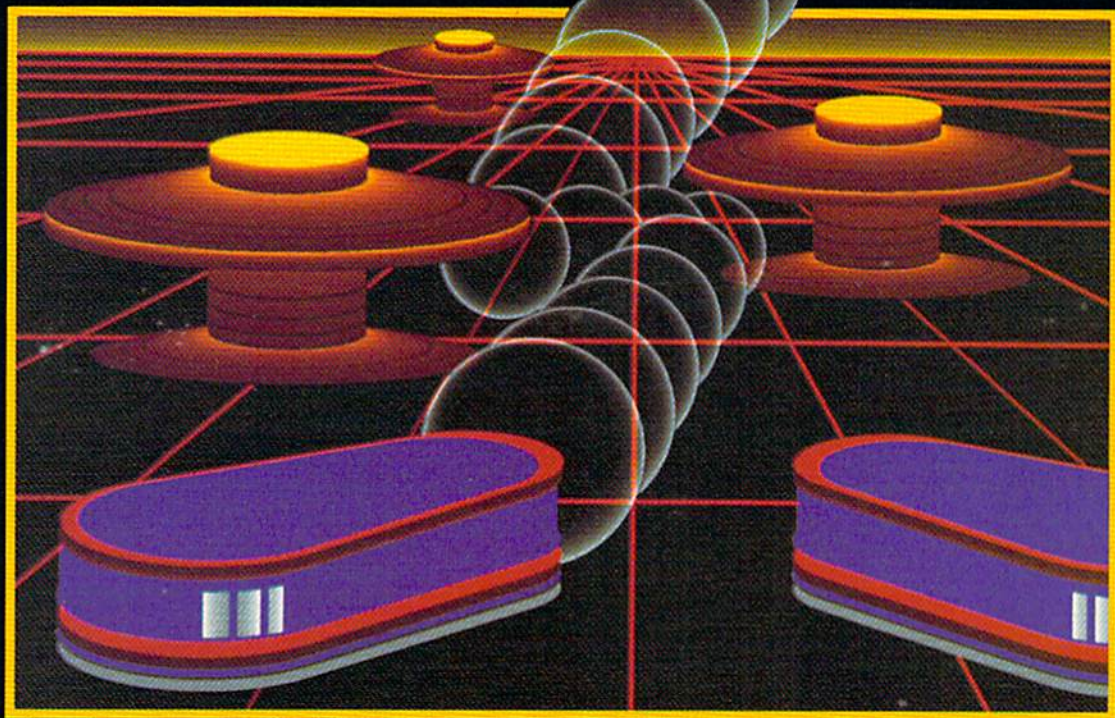
Your goal is to sail from Lisbon around Africa to India. During the voyage, you encounter the same dangers faced by the real explorers: hunger, thirst, pirates, natives, weather, mutiny, and attack by Arab traders.

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.

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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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REVIEWS

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 automati-

cally 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 birth-dates, 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.

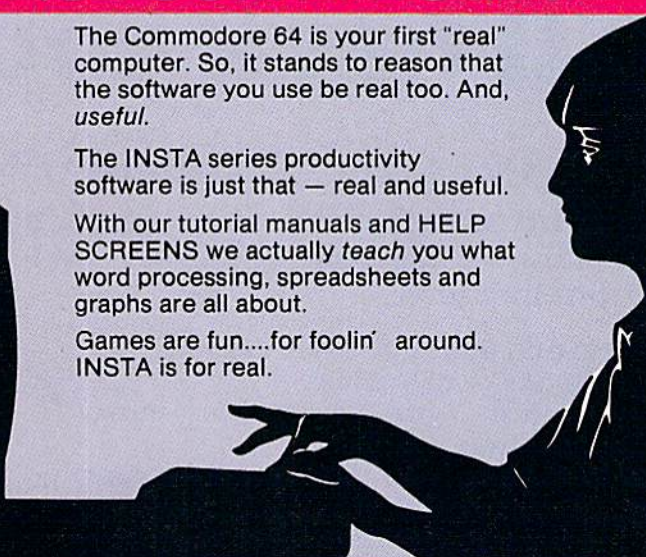
No Foolin' Around

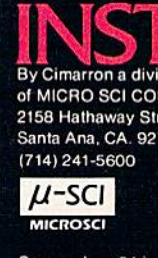




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REVIEWS

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

Quicksilver, 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

We'll back you up!



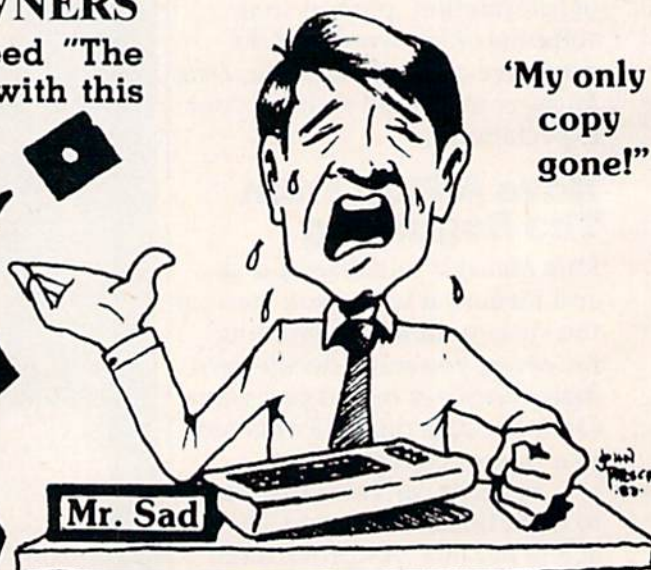
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well change your mind.

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

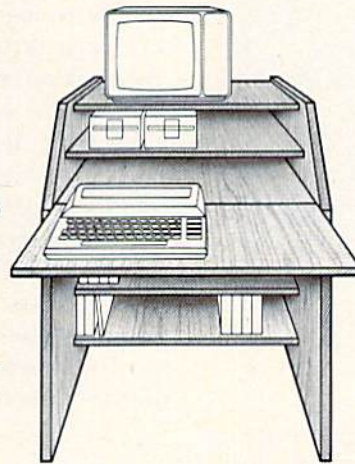
The object of the game is to cross a pond by hopping on the backs of four very fickle turtles, gather fruit, and return. Sounds easy, but it's not. The harmless looking turtles float on the water's surface and bob. But, one or more of them will submerge unpredictably. If you're in the middle of a jump 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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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 (*War Games*) 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.

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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 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 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.

Just plant your VICTREE cartridge in the cartridge port of your COMMODORE 64 or VIC-20 machine. You'll reap a harvest of programming benefits. And that's a lot of crop! Now only \$89.95, or \$109.95 complete with the Centronics/parallel standard printer cable. (Cable alone costs \$29.95.) Available immediately from your local dealer. Or order directly to Skyles Electric Works.

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String Variables Spoken Here

You can set up string variables for pronunciation, for example, `AS="WELCOME HOME"`: `SPEAK AS`. 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 `POKE`s 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 `PRINT`ing 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 `AS=B$(1,6):SPEAK AS`.

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.

COMvoice
Genesis Computer Corporation
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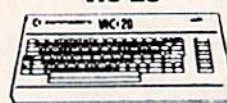
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Seafox For The VIC-20

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.

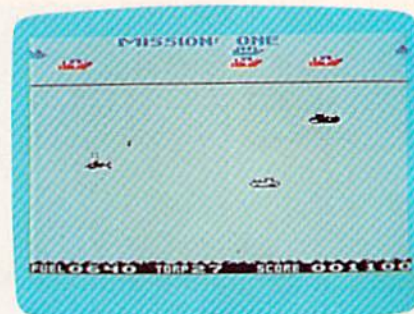
To fire at a freighter, give the joystick button a quick tap and a torpedo is launched toward the surface. If you hold down the joystick button, you launch a torpedo from your forward tubes. This weapon is used against your underwater foes, and also can be used to detonate depth charges and magnetic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

REVIEWS

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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HOTWARE

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

Kathy Yakal, Editorial Assistant

This Month	Last Month	This Month	Last Month
Commodore 64 Entertainment		VIC-20 Entertainment	
1 Temple Of Apshai (Epyx)	2	1 Shamus (HesWare)	2
2 Jumpman (Epyx)	1	2 Choplifter (Creative)	4
3 Frogger (Sierra On-Line)	3	3 Gridrunner (HesWare)	1
4 Choplifter (Bröderbund)	5	4 Temple of Apshai (Epyx)	3
5 Beach-Head (Access)	—	5 Crush, Crumble and Chomp (Epyx)	5
6 Neutral Zone (Access)	7	6 Protector (HesWare)	—
7 Fort Apocalypse (Synapse)	4	7 Attack of the Mutant Camels (HesWare)	7
8 Gridrunner (HesWare)	6		
9 Enchanter (Infocom)	—		
10 Telengard (Avalon Hill)	9		
Commodore 64 Home/Business/Utility		VIC-20 Home/Business/Utility	
1 WordPro 3 Plus/64 With SpellRight (Professional)*	1	1 Quick Brown Fox (Quick Brown Fox)	1
2 Quick Brown Fox (Quick Brown Fox)	2	2 HES Writer (HesWare)	—
3 Paper Clip (Batteries Included)	6	3 Household Finance (Creative Software)	3
4 Management Systems 64 (Entech)	8	4 TOTL Time Manager (TOTL)	5
5 Electronic Checkbook (Timeworks)	—	5 TOTL Text (TOTL)	6
6 Money Manager (Timeworks)	7	6 HES Mon (HesWare)	4
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		VIC-20 Educational	
1 Dungeons of the Algebra Dragons (Timeworks)	5	1 Touch Typing Tutor (Taylormade)	1
2 Facemaker (Spinnaker)	1	2 Primary Math Tutor (Comm*Data)	5
3 Spellbound (Timeworks)	—	3 Square Pairs (Scholastic)	—
4 Delta Drawing (Spinnaker)	—	4 Word Search (T & F)	3
5 Studio 64 (Entech)	3		
6 Primary Math Tutor (Comm*Data)	6		
7 Pipes (Creative Software)	7		
8 Up For Grabs (Spinnaker)	5		

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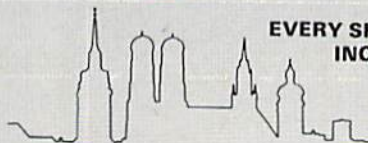
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Commodore 64 owners are buying more home applications software than games, and VIC-20 owners are moving in that direction, too. This month we'll look at some home applications products which are doing well, some which are not, and a few you can expect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

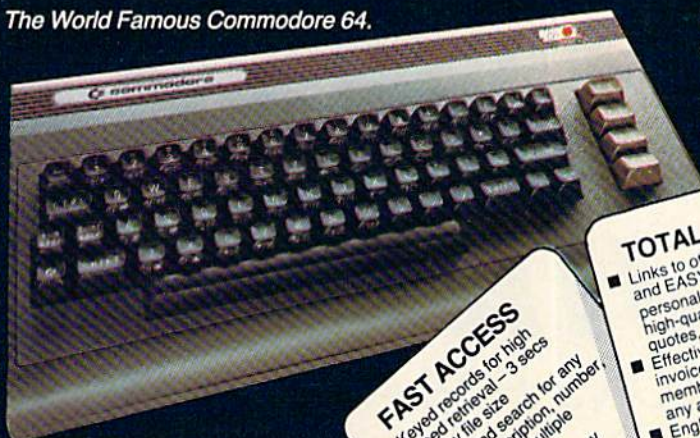
Orbyte's data base filing system, *Comfile*, allows you to access files you have created using another program (a word processor for example), even if that software was not published by Orbyte.

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"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."

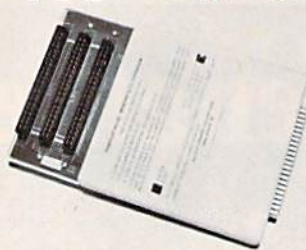
Know Your Needs Before You Buy

"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 Bröderbund Software. The Commodore 64 version of *Shamus* is published by Synapse Software. @

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THE BEGINNER'S CORNER

C. REGENA

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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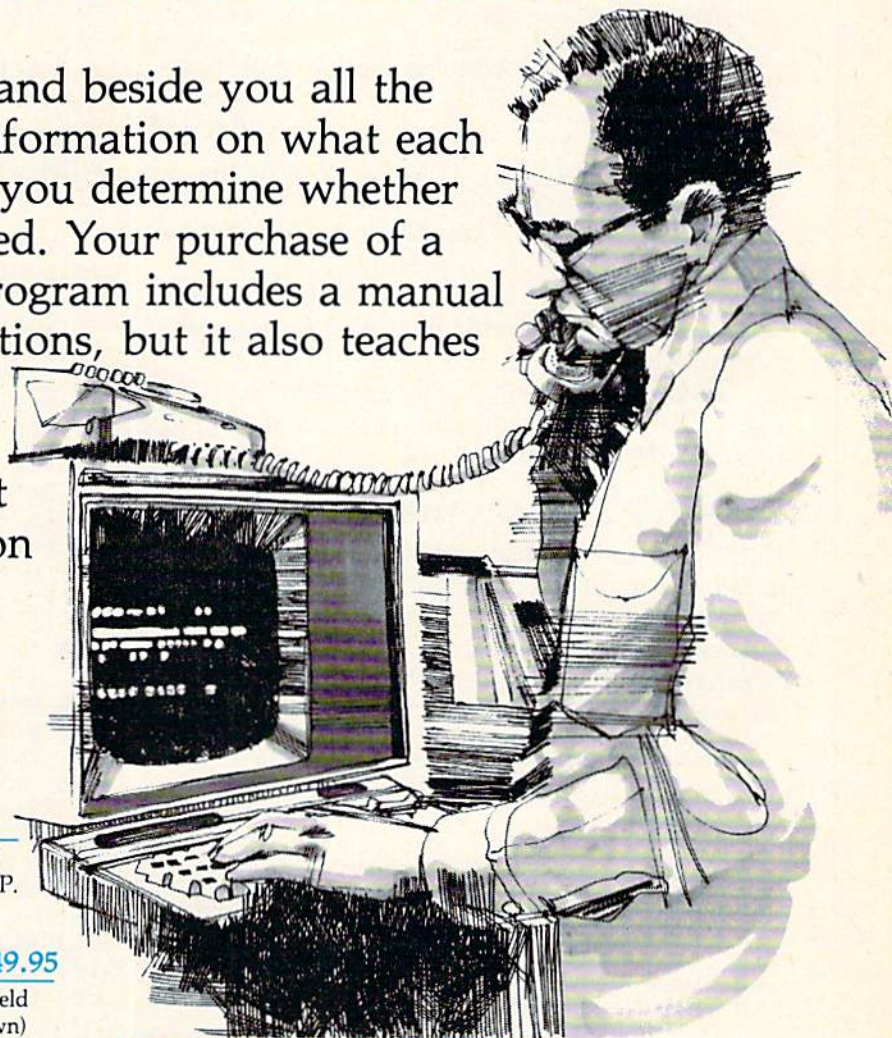
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Freezing The Program

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$
210 INPUT "FIRST NAME";F$
220 INPUT "STREET ADDRESS";A$
230 INPUT "CITY";C$
240 INPUT "STATE";S$
250 INPUT "ZIP CODE";Z
```

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

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

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
20 POKE 53281,1
30 PRINT "{CLR}{BLK} PARALLEL RESISTANCE {DOWN}"
40 PRINT "{2 SPACES}{2 Y}O{6 Y}O{6 Y}O{2 Y}"
50 PRINT "{4 SPACES}{G}{6 SPACES}{G}{6 SPACES}{G}"
60 FOR I=1TO3
70 PRINT "{4 SPACES}M{6 SHIFT-SPACE}M{6 SHIFT-SPACE}M"
80 PRINT "{4 SPACES}N{6 SHIFT-SPACE}N{6 SHIFT-SPACE}N"
90 PRINT "{3 SPACES}N{6 SHIFT-SPACE}N{6 SHIFT-SPACE}N"
100 PRINT "{3 SPACES}M{6 SHIFT-SPACE}M{6 SHIFT-SPACE}M"
110 NEXT I
120 PRINT "{4 SPACES}{G}{6 SHIFT-SPACE}{G}{6 SHIFT-SPACE}{G}"
130 PRINT "{2 SPACES}{2 P}{L}{6 P}{L}{6 P}{L}{2 P}"
140 PRINT "{DOWN}HOW MANY RESISTORS? ";
150 GETA$:IF(A$<"2")+(A$>"9")THEN150
160 PRINTA$:N=VAL(A$):T=0
170 FOR I=1TON
180 PRINT"R"+RIGHT$(STR$(I),1)+"=";
190 INPUT R
200 IF R>0 THEN 220
210 PRINT"{2 SPACES}R MUST BE GREATER THAN ZERO.{DOWN}":GOTO180
220 T=T+1/R
230 NEXT I
240 PRINT "TOTAL RESISTANCE ="
250 PRINT 1/T
260 PRINT "{2 DOWN}{GRN}PRESS:"
270 PRINT " 1 ANOTHER PROBLEM"
280 PRINT " 2 END PROGRAM"
```


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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.

This program uses DEF FNF(X) to define a function that will choose a random integer from 1 to X. This saves typing the function and saves memory when a random integer is needed later in the program. The GET function is used after menu screens are printed and at various places in the program to wait before continuing the program. INPUT is used in the sample problems to receive a numeric answer. GET is used to receive the answer for multiple-choice questions. Random numbers are used in the problems and also in determining which of three problems will be printed. Lines 78-86 in the VIC version and 900-1050 in the 64 version determine the multiple-choice answers.

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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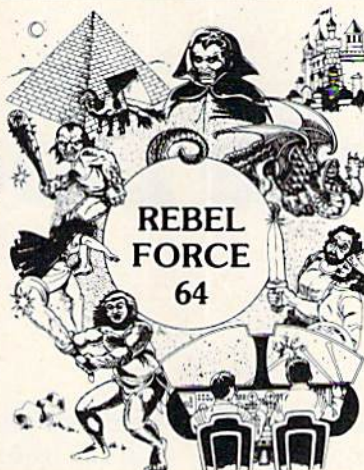
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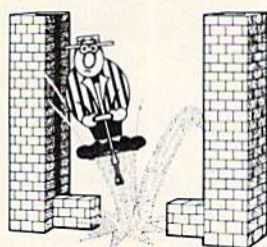
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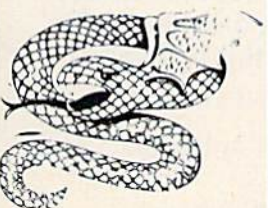
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MACHINE LANGUAGE FOR BEGINNERS

RICHARD MANSFIELD, SENIOR EDITOR

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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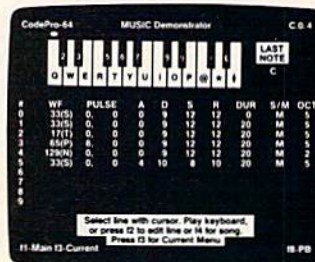
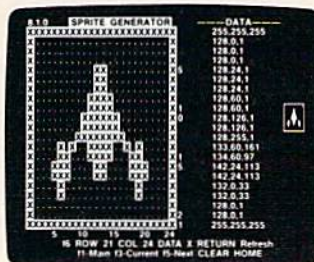
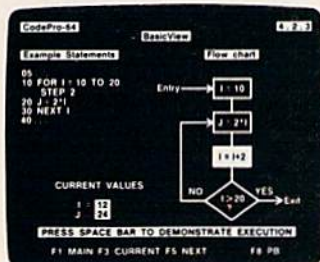
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Program 1: Paddle Routine

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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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.

SIMPLE SOLUTION

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

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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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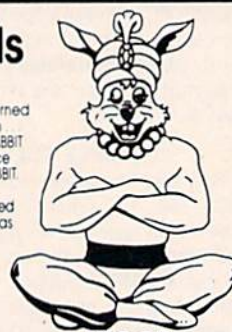
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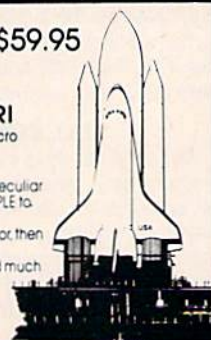
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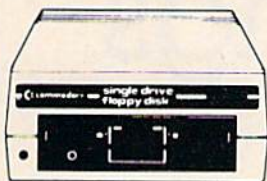
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Making More Readable Listings

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

SHIFTed 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 TOP and in BOTTOM. 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 BÖTTJOM = 90
30 PRINT BÖTTJOM - 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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I put auto-dial to work right away. I auto-dialed Compuserve, but couldn't get through, so I had VIP Terminal redial 'til it got through - it dialed five minutes straight! Then I auto-logged on with one of my 28 programmed keys, and downloaded some graphics screens, and stock quotes for dad. I printed it and saved it to disk as it came on the screen. Wow! And now I can send you my programs automatically. I got yours and they worked right off.

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.

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- Lone

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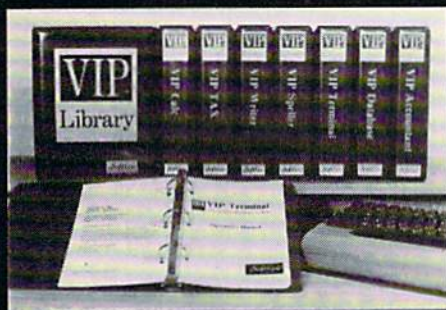
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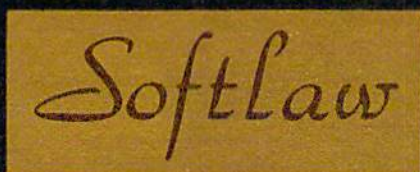
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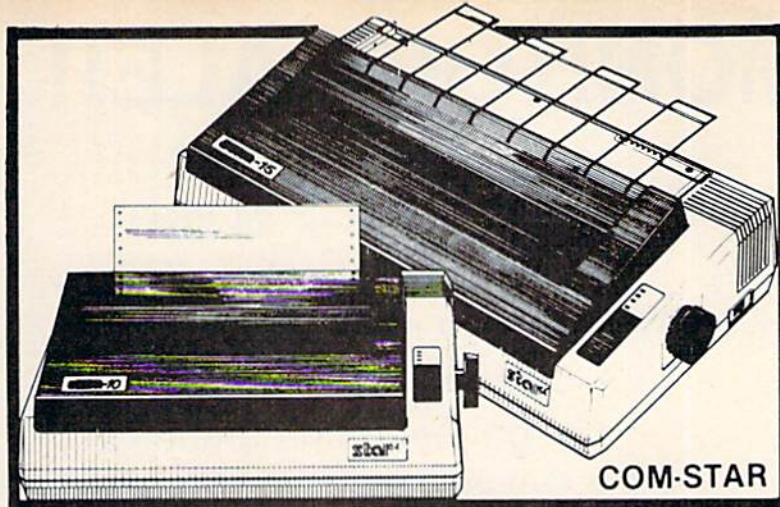
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line. Try it with LETTER, FN\$, EFFORT, SEND, or your own favorite forbidden variable name.

A word of caution, though. ST, TI, and TIS 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 sub-routines—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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Getting Started With A Disk Drive

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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8. Read a directory from disk.
9. Exit the program.



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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.

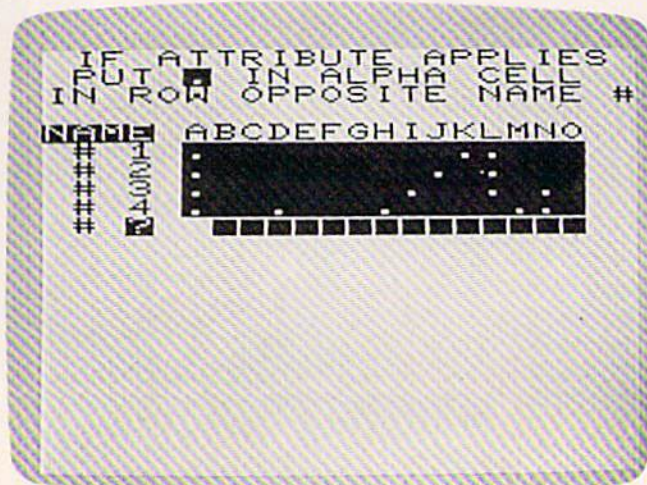
Another handicap is the small amount of memory. You get only 3583 bytes on the unexpanded VIC. This is still a couple of thousand more bytes than the fabled Univac and ENIAC—the big mainframes of 30 and 40 years ago that filled up whole buildings and brought on the age of computing. But unless you're 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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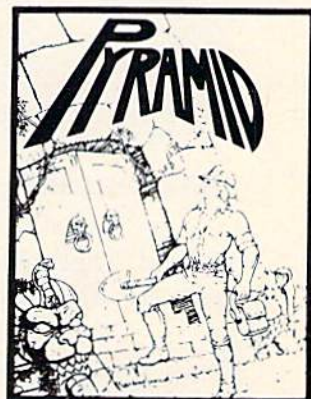
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You could feed the data in from tape a few bytes at a time, I suppose, process it, and then pull in some more data. But that would take a lot of time and tape. You'd also be using up most of your memory for tape handling and "overhead." So what can you do?

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Creating a data table with "Binamite."

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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.)

- 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:

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

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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 **VAL**ue 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 **VAL**ue 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 **VAL**ue 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: 212 211 210
B$: 1 0 1
```

```
1*22=4 (1 multiplied by the second power of 2)
0*21=0 (0 multiplied by the first power of 2)
1*20=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}LLLLLLLLLLLLLLLLL
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 **VAL**ue 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$))*2XP: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**.

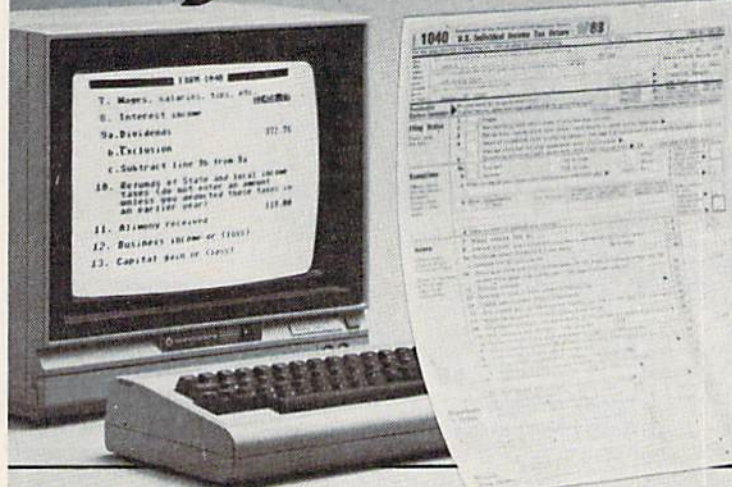
When the **FOR/NEXT** loop is completed, we **GOSUB** 300 in line 160 to deposit the row value into an array, then line 170 sends us back to line 120 to process another row:

```
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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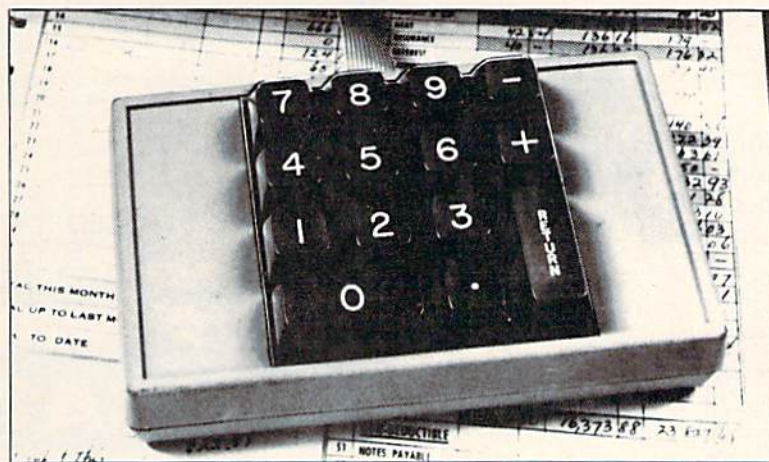


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```
240 FOR I=0 TO TT:PRINT#"I+1"{3 SPACES}"
D(I):NEXT
```

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 attribute columns for a range of prices, for instance. The A attribute col-

umn 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 DATA 169,0,133,212,174,0,16,32,205,221  
    ,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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