The Move Toward Integrated Software

COMPUTE!'s GAZETTE

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January 1985
Issue 19, Vol. 3, No. 1
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For Owners And Users Of **Commodore VIC-20** And **64** Personal Computers

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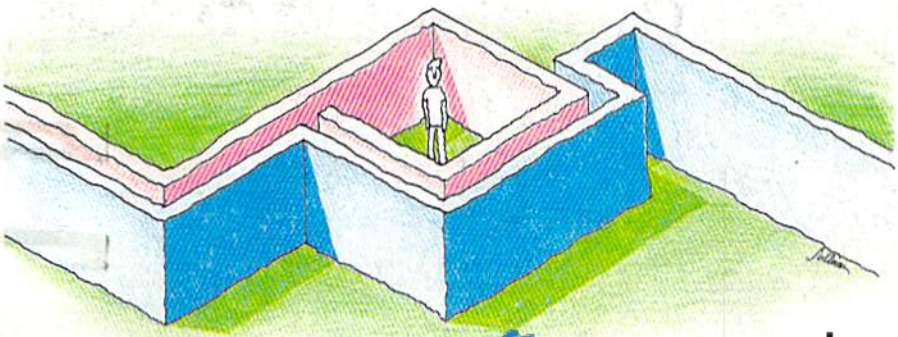

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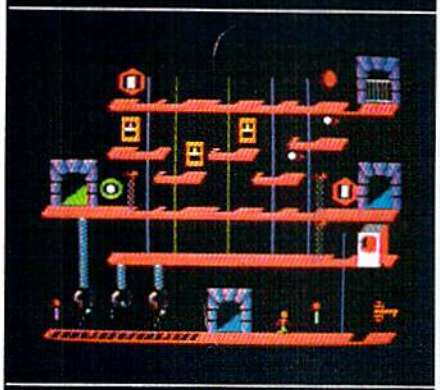
RAID ON BUNGELING BAY™

When you shopped for a computer, you wanted one with a lot of intelligence. This game may lead you to regret that choice, as your friendly little computer becomes the brains behind the most fantastic enemy you will ever face: The War Machine.

A monstrous artificial intelligence directs an endless army of self-replicating robot weapons and a complex of factories hidden on six heavily defended islands. Even as you strike at one island, robots beyond your field of vision continue to multiply...to repair the damage you've done...to attack and destroy.

Before all of Humankind is crushed beneath the Bungeling Empire's iron heel, one faint hope remains: you in your helicraft.

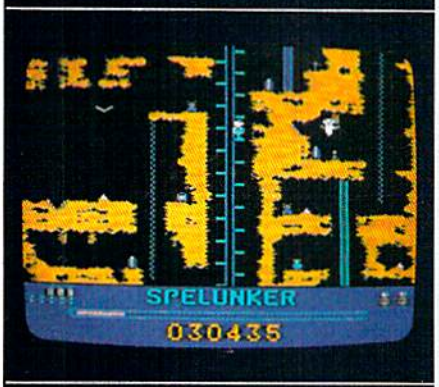


THE CASTLES OF DOCTOR CREEP™

Ever dream that you were locked in a haunted castle, wandering blindly through darkened corridors, never knowing what ghastly demons await you? Then you'll feel right at home in *The Castles of Doctor Creep.*

It's a maddening maze of 13 separate castles, more than 200 rooms in all. Sinister surprises await you behind every door: mummies and monsters, forcefields and death rays, trap doors and dead—*very* dead—ends. Remember where you've been and watch where you're going...there's got to be a way out *somewhere*!

Better hurry, or you'll wind up playing a rather unpleasant role in one of Doctor Creep's experiments.

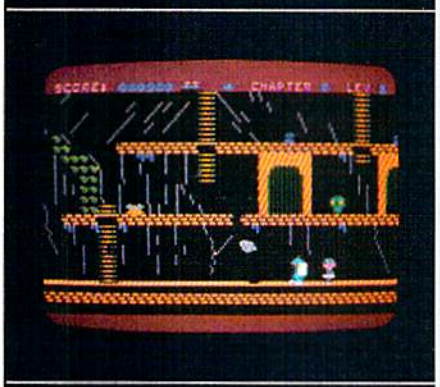


SPELUNKER™

Who knows what fabulous treasures—and unspeakable dangers—await you in the world's deepest cave? This is one game you can really get into... and into...and into.

Wander through miles of uncharted passageways, swinging on ropes and ladders, tumbling over subterranean falls and plunging to the very depths of the earth on an abandoned mine railroad. Deadly steam vents and boiling lava pits threaten you at every turn. Chattering bats and the Spirits of dead Spelunkers beg you to join them, permanently.

Let's face it: you're in deep, deep trouble.



WHISTLER'S BROTHER™

You're the star of a full-fledged arcade adventure—and the big question is whether it'll turn out to be a comedy or a tragedy. That's because your co-star and beloved brother, Archaeologist Fenton Q. Fogbank, is rather absent-minded and extremely accident-prone.

As you search for priceless treasures in steaming tropical jungles, ancient cliff villages, musty old tombs and glittering crystal caverns, you control both your character and your brother. The only way to keep him on track and out of trouble is to whistle and pray that he follows you to safety.

Poison arrows, runaway boulders, fearsome frogs and mysterious mummies are only a few of the hazards that'll make you wish you weren't your brother's keeper.

STEALTH™

You're all alone on a strange and forbidding planet. On the distant horizon, looming thousands of meters above the blasted landscape, lies your destination: The Dark Tower, home of the mysterious Council of Nine, cruel overlords of a conquered world.

You must maneuver your Stealth Starfighter through an unending assault by the Council's automated arsenal—jets and heat-seeking missiles, photon tanks and anti-aircraft batteries, vaporizing volcanoes and deadly energy fields. Outgunned and outmanned, you must press ever onward, with only your stealth to rely on.

You must reach the Tower. You must destroy it. There's no turning back.

All titles available on Commodore 64. Championship Lode Runner *also available on Apple II+, IIe, IIc.* Whistler's Brother, Spelunker *and* Stealth *also available for Atari Home Computers. Commodore 64 is a trademark of Commodore Electronics, Ltd. Apple is a trademark of Apple Computer, Inc. Atari is a trademark of Atari Corporation.*

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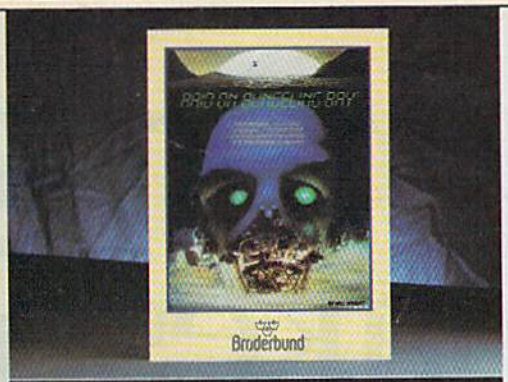

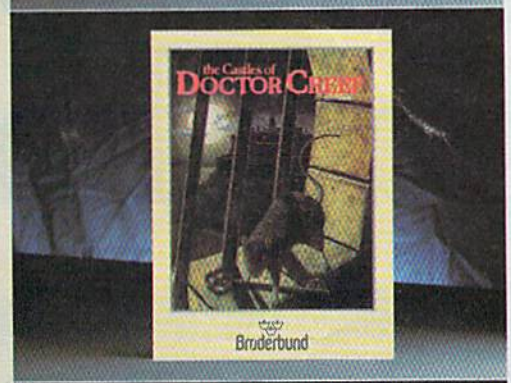

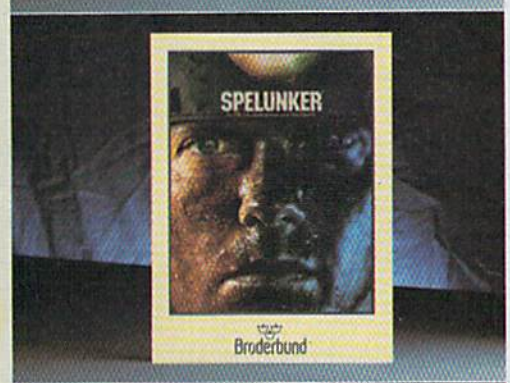

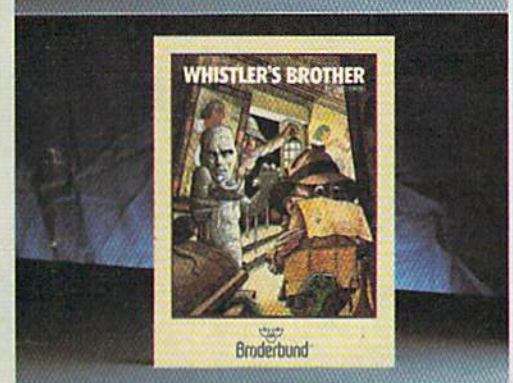

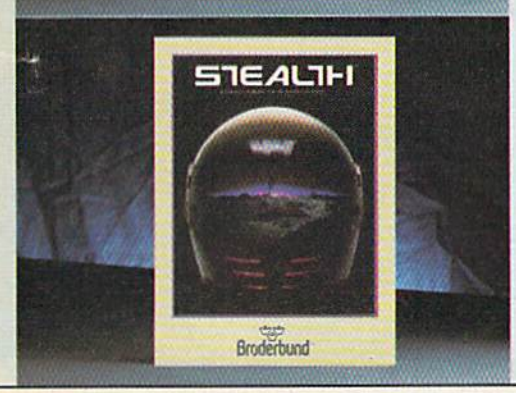

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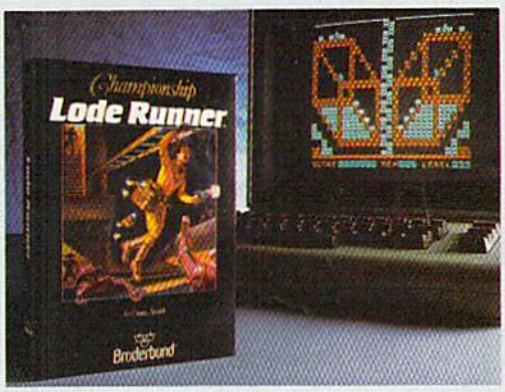

CHAMPIONSHIP LODE RUNNER™

It has come to our attention that some of you out there think you're pretty good at *Lode Runner*, 1983's best computer game. For those foolhardy few, we offer a challenge of a higher order: *Championship Lode Runner.*

With fifty fiendish Treasury Chambers: more intricate, more elaborate, more insidious than anything you've seen before. You'll need lots of skill, lots of smarts, and every ounce of your lode-running experience to have any hope at all of survival.

And if you haven't yet paid your dues on the original *Lode Runner,* don't even think of attempting this championship round.

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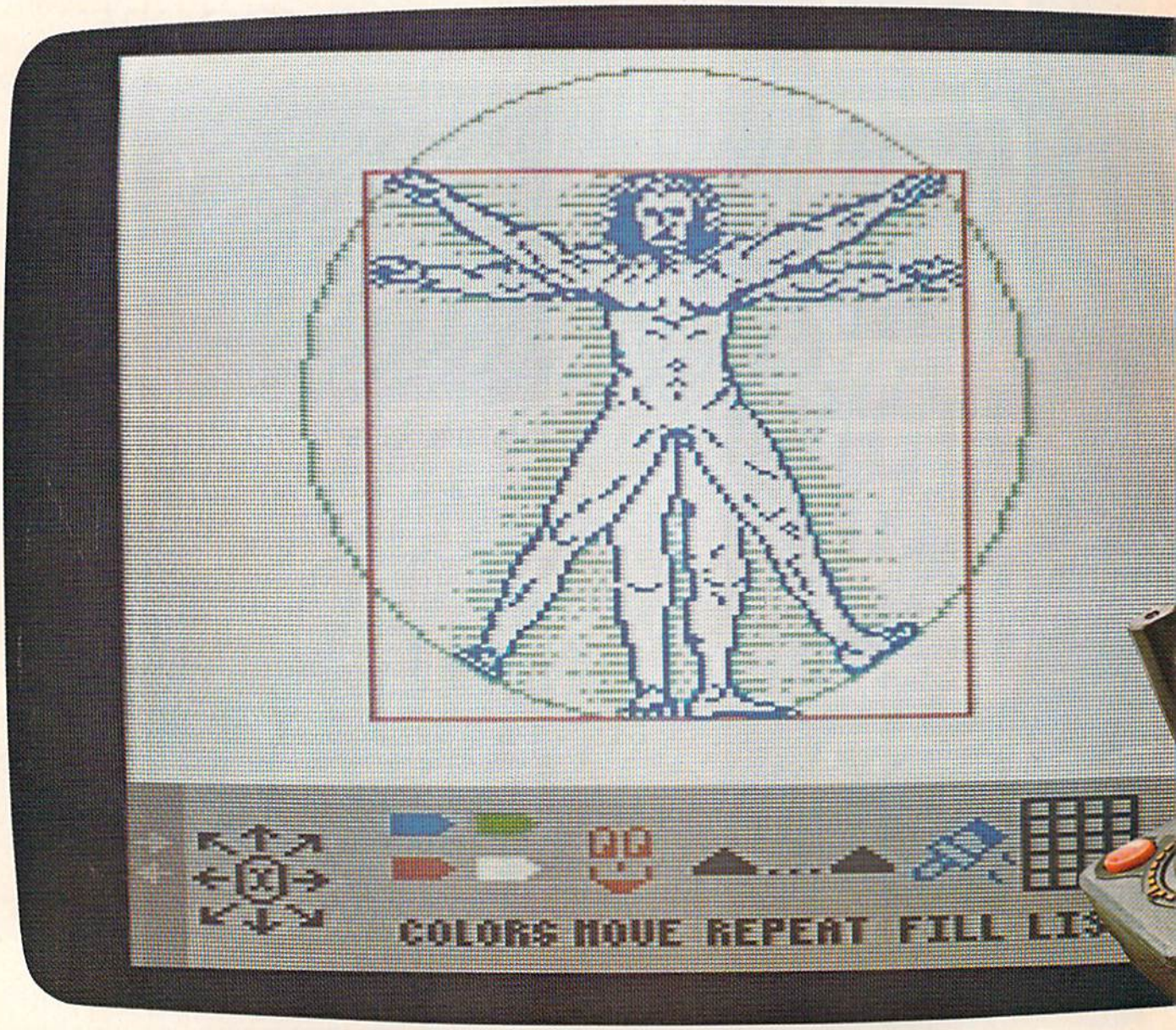

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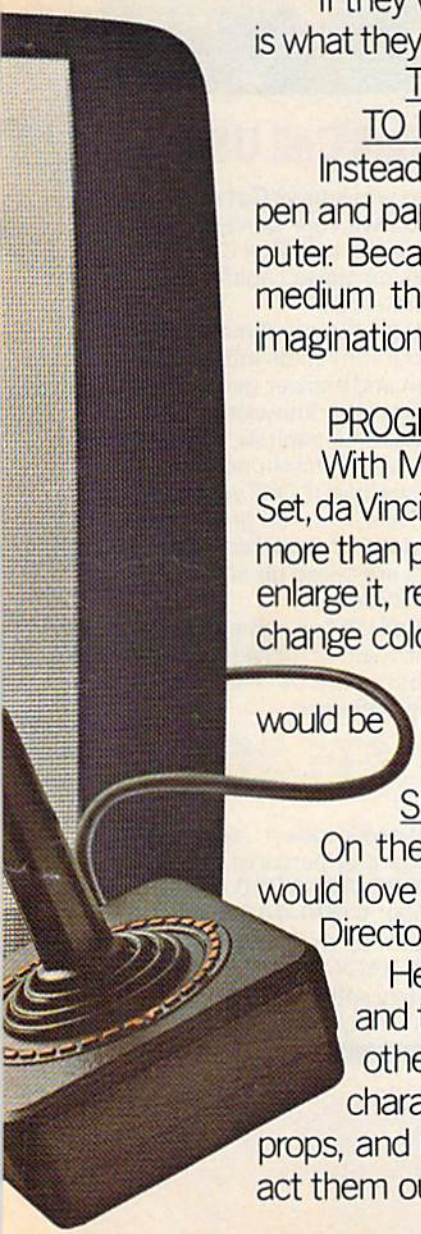

If they were starting out today, this is what they could start with. Pixelwerks.

THE OTHER WAY TO DRAW AND WRITE

Instead of a brush and canvas, a pen and paper, they'd create on a computer. Because Pixelwerks is the first medium that can keep up with their imaginations.

MR. PIXEL'S PROGRAMMING PAINT SET

With Mr. Pixel's Programming Paint Set, da Vinci (or any 8-year old) could do more than paint a picture. He could also enlarge it, repeat it, move it around, and change colors. Instantly.

And at the same time, he would be developing his programming skills. Painlessly.

SHOW DIRECTOR

On the other hand, Shakespeare would love to play around with Show Director.

He'd use it to create plots and think up one scene after another, and he'd get a big cast of characters, lots of backgrounds, props, and musical sound effects to act them out.

BANK STREET STORYBOOK

Dickens wouldn't be able to keep his hands off Bank Street StoryBook by George Brackett.

Not only could he write his own story, but he could also illustrate the scenes and characters he sees in his mind.

MR. PIXEL'S CARTOON KIT

Maybe Al Capp wouldn't be satisfied with cartoons that just sit on the page after he tried Mr. Pixel's Cartoon Kit. Because he could make his cartoons come to life by animating them. His characters could move around, and even react to each other.

Every kid has a touch of creative genius buried inside. The job of Pixelwerks is to bring it out, with more features, more options and more flexibility than other programs.

In short, we supply the tools. Kids supply the imagination.

PIXELWERKS

Pixelwerks is published by Mindscape, Inc., 3444 Dundee Road, Northbrook, IL 60062. For more information, call 1-800-221-9884. In Illinois 1-800-942-7315.

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Quick.

How many plates can the Juggler juggle?

Chinese Juggler

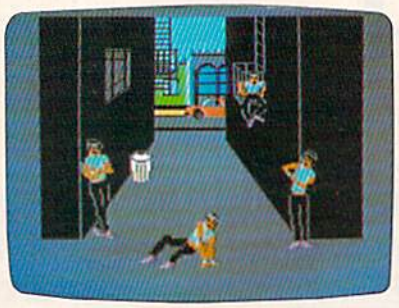
That depends on you. You are the Juggler and your act is the delicate art of plate spinning. Yours will be a tough act to follow if you succeed in matching colors and spinning plates on all 8 poles at the same time.

As your skill increases, so does the pace and the challenge of the game. You must act with speed and precision or the curtain will come down and your act will be all washed up!

Chinese Juggler is a refreshing departure from the usual shoot-em-ups and strategy games. It's fun, fast-paced and will delight players of any age. For Commodore 64. New from Creative Software.

$24.95

How do you moonwalk, snake and tut?



Break Street

You'll soon become a break dancing expert with our latest bestseller, Break Street. Now that combination of gymnastics, mime, funk, and just plain show-off, leaves the sidewalks and comes home to your Commodore 64.

Individual play guides you through the footwork of moonwalk, backspin, windmill, tut, and the rest of those sidewalk moves. Slow motion and lively musical accompaniment help you perform each move step by step. String together a whole series of moves and record them for future replay.

Catch the beat of the street with Break Street. For individual or team play. New from Creative Software.

$24.95

The answers are at your finger tips.

What's the capital of Alaska?

Roll Call USA

Do you know? Get ready to outwit your family and friends with Roll Call USA's fun facts on states,capitals and major industries.

Roll Call USA combines history and geography facts into a colorful question and answer game that challenges your knowledge of the 50 states, their capitals, major industries and statehood dates.

Feel confident? Drill yourself with a Flash Test. The game is speeded up, so think fast. Your answers are tallied up at the end for a final score.

Roll Call USA, a game of USA trivia for team or individual play. For Commodore 64. New from Creative Software.

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Call and order today! Use your Visa, MasterCard or personal check. Toll Free **1-800-331-7990** (outside California), **1-800-448-1001** (in California), or **1-408-745-1655.** MONEY BACK GUARANTEE. If not completely satisfied, return within 10 days for full refund.

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* =General, **V**=VIC-20, **64**=Commodore 64, +**4**=Plus/4, **16**=Commodore 16.

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THE EDITOR'S *notes*

Whither Commodore?

By now, or perhaps *not* by now, the Plus/4 and the 16 are making their long awaited debut across the retail frontiers of America. From what we can tell so far, this debut may well be an "emperor's new clothes" phenomena, with lots of debut, and not much else. Our old friend Jim Dijon, a Commodore marketeer and survivor, was recently quoted as suggesting that if the marketplace so wished, Commodore would be happy to make the 16 and Plus series compatible with the 64. One would hope the marketplace wouldn't have to wish too hard for such compatibility, what with at least a million or so 64s out there. On top of all this wishing, Commodore has somehow managed to devise an entirely unique plug for the Plus/4, thus insuring that existing peripherals won't be compatible.

Why do we feel that we've written this editorial seventeen times or so in the last five years?

Hope?!?

Rumor now has it that perhaps the 16 and Plus/4 are already being "de-emphasized," giving way in turn to the even newer 128 series. Ah. More memory? Yes. Software compatible? Yes. Peripheral compatible? Yes. Plus, some new peripherals, notably a dual disk drive . . . now those are pluses we can applaud. Lest we sound totally like sour grapes this issue, we'll remind our loyal readers that this is the company that has been responsible for much of the home computer industry, and we feel, correctly we think, that they have a continuing obligation to help drive and nurture it. Commodore's potential success with the Lorraine is something we're anxiously awaiting.

We've seen successive iterations through hardware and software "breakthroughs" in this industry, and we think the Lorraine has the potential for achieving several breakthroughs at once. The significant power this computer can cost-effectively bring to the marketplace will, in our opinion, define a new benchmark for price and performance in the entire industry. No one in the market was selling a color computer with reasonable memory for less than $1000 until Commodore broke the price and hardware constraint barriers. With the power of Lorraine: 128K RAM, built-in drive, 4096 colors, 68000 microprocessor, multicolored sprites, maximum hi-resolution of 640 × 200 pixels . . . the list goes on, including built-in speech synthesis and built-in modem. These are only highlights of the features of the Lorraine prototype demonstrated by Amiga before they sold their company to Commodore. This unit was preproduction priced at $1200–$1400.

Of course, Commodore may change some of these features before product introduction. Pricing will probably change as well. But we've seen enough to call the Lorraine a significant price/performance breakthrough, and we think it will spark a new plateau in the industry. We expect to learn more about the configuration of the "real" system at this month's Consumer Electronics Show in Las Vegas. We'll keep you posted.

Robert Lock

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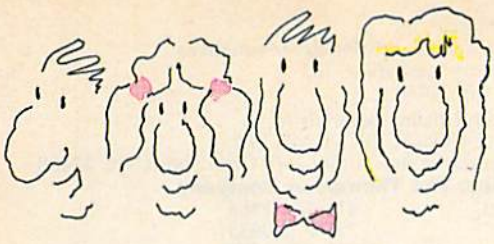
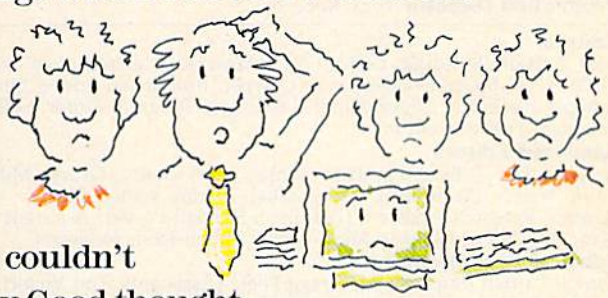
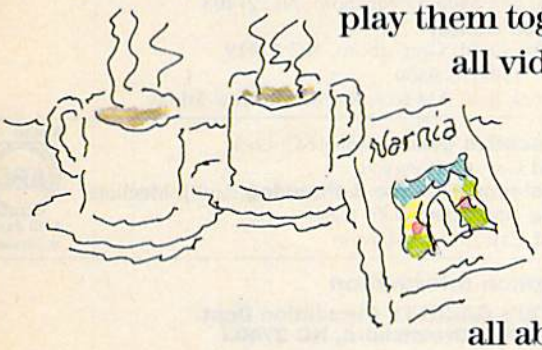


How the Nice Family Helped Their Good Neighbors

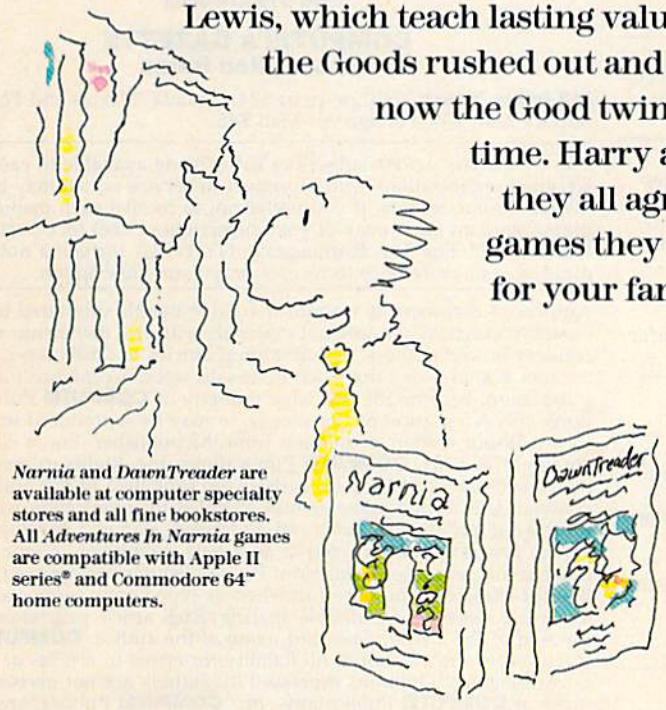
It was after Christmas. The Nice family was still enjoying all the wonderful presents they received from one another. But next door, at the home of their Good neighbors, things weren't all that wonderful.



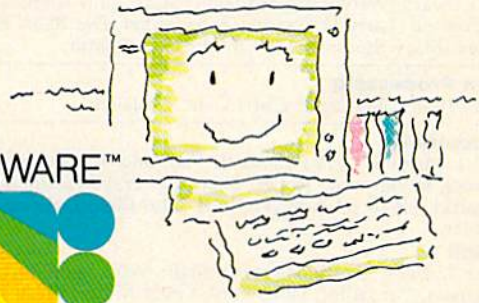
You see, Mr. and Mrs. Good (Harry and Betty) had given a new home computer to their twins (Kim and Kerry). It was a very good gift, but they didn't know what to do with it. Harry Good thought video games were bad because the twins couldn't play them together. Betty Good thought all video games were too violent. And the Good twins thought anything *but* games were boring!



Then, one day, Betty Good was talking to Janet Nice over morning coffee. "We have this wonderful computer, and nothing to do with it!" moaned Betty. Janet just smiled, and told Betty all about *Adventures In Narnia*, a new series of LifeWare™ computer games from Word Publishing. These games are the first ones the whole family can share. And they're based on the famous stories of Narnia by C.S. Lewis, which teach lasting values good for *everyone* to learn. Well, the Goods rushed out and bought *Narnia* and *DawnTreader*. And now the Good twins play with their new computer all the time. Harry and Betty Good play with them, too. And they all agree *Adventures In Narnia* are the best games they could have. Maybe they'd be good for your family, too!



Narnia and *DawnTreader* are available at computer specialty stores and all fine bookstores. All *Adventures In Narnia* games are compatible with Apple II series® and Commodore 64™ home computers.



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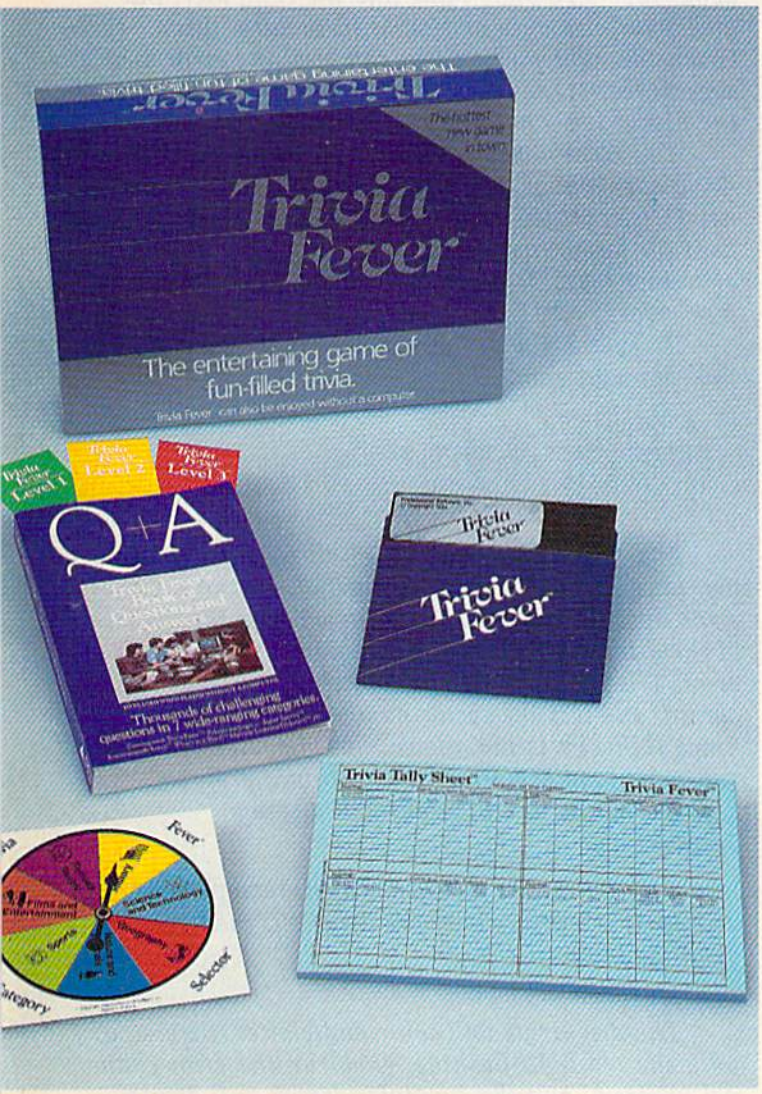

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GAZETTE FEEDBACK

EDITORS AND READERS

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

Note: In the November "Buyer's Guide To Modems," the Mitey Mo Modem was listed as being RS-232 compatible. It is actually Commodore 64 compatible and plugs directly into the user port. It does not require an extra interface.

Where's The Printer?

Several readers have written asking where they can get Okidata's new color printer, the Okimate 10 (see the Consumer Electronics Show report in the September GAZETTE *for details). According to an Okidata representative, there had been problems with the supporting software. As this issue went to press, we received an Okimate 10. It will be covered next month in Charles Brannon's "Horizons" column.*

Warning Light

Could you write a short set of directions that explain what to do when the red light on a disk drive begins blinking? Also, why does the manual say (on page 8) "Never remove the diskette when the green drive light is on."? The green light comes on when the drive is turned on and stays on.

Evelyn M. Arnold

The green light indicates the disk drive is turned on. You can safely insert and remove disks while the green light is on. In fact, you should wait until the drive is on before inserting a disk. Don't turn it on with a disk inside; it's possible the initial surge of power will scramble some data on the disk.

The latest editions of the 1541 manual have been corrected to say "never remove the diskette while the red light is on." This is the proper advice.

When you load or save a program to disk, the red light comes on to indicate disk activity. If you open a data file, the red light will stay on until the file is closed. In these cases, there's nothing to worry about. The red light means the drive is doing its job.

But use an incorrect disk command and the red light will begin flashing rapidly, signaling a disk error.

If you type in a BASIC command incorrectly or make some other programming error, your computer will respond with ?SYNTAX ERROR or another such message. If you encounter a disk error, however, there is often no warning on the screen to alert you that something has gone awry, but the red light on the drive will flash.

The 1541 disk drive is an intelligent device, containing its own microprocessor, ROM, and RAM. It also has error-handling routines in ROM similar to the routines in the VIC and 64. A tape drive doesn't have its own microprocessor, so messages about tape errors are built into the computer. But disk error messages are found in the disk drive. When the light flashes, you can read the error message. But first you must instruct the computer to ask the disk drive what the problem is.

You must always communicate with the disk drive over one of the 16 available channels. Channel 15 is reserved as the command channel. *It's used for formatting disks, scratching files, and various other tasks. It is also the channel for reading disk errors.*

To find out why the red light is flashing, enter this short program:

```
10 OPEN15,8,15
20 INPUT#15,E,E$,T,S
30 CLOSE15
40 PRINTE;E$;T;S
```

Line 10 OPENs channel 15, the command channel. Line 20 INPUTs the information concerning the error from the disk drive into the 64. E is the number of the error, E$ is a short description in text of the error, T is the track number on which the error occurred, and S is the sector number of that track. Since INPUT# is not allowed in immediate mode, you must read the error from within a program.

Normally, this program will display:

```
0 OK 0 0
```

To generate an error condition, remove your disk from the drive, turn the drive off, then back on again and enter:

```
LOAD"*",8
```

The disk drive will whir and clatter, then stop, with the red light flashing. Now run the error channel program, and the computer screen will display:

```
21 READ ERROR 18 0
```


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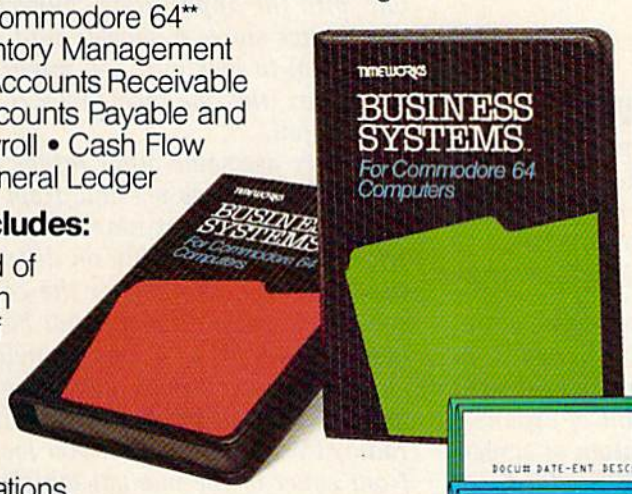

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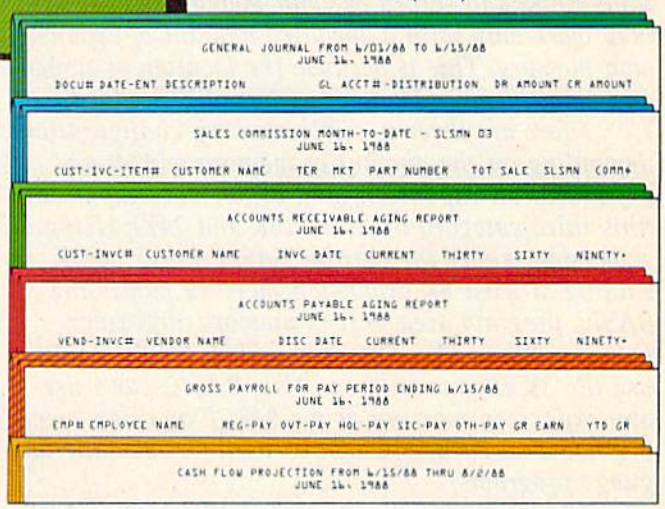

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The number 21 indicates the type of error encountered, READ ERROR is a brief description of the error, 18 is the track which the disk drive was attempting to read, and 0 is the sector which the disk drive was attempting to read. Since no disk was in the drive, there was nothing to read, causing a READ ERROR.

In most cases you don't need to know the track and sector where the error happened, so you can leave off the T and S. And you can get the error-reading routine down to a single line: 10 OPEN15,8,15: INPUT#15,E,E$: PRINTE;E$: CLOSE15.

A handy utility is included on the disk which is packaged with your disk drive, the DOS Wedge. Load and run the DOS Wedge loader program, then you can read the error channel by just pressing the @ or > key on the computer.

For information about the errors likely to be encountered while using your disk drive, consult your 1541 User's Manual.

VIC Expansion Memory

When programs in your magazine point out that at least 3K or 8K expansion is needed, does that mean that these programs will run on a 16K VIC without making any changes in the POKEs?

N. C. Barrows

BASIC programs with no POKEs which work with 3K or 8K will run fine with 16K. If a program contains POKEs to screen or color memory, however, it may work only with a specified amount of expansion memory. This is because the location of screen and color memory changes as memory is added.

There are three possible memory configurations depending on the amount of memory added: unexpanded, 3K expansion, and 8K or more expansion (this third category includes 16K and 24K). Using 3K expansion moves the start of BASIC lower by 3K. Adding at least 8K expansion memory moves the BASIC program area, screen memory, and color memory. When 8K or more is added, BASIC can't use the 3K expansion area. Also, BASIC can't use any expansion memory above 24K. Expansion memory not used by BASIC can be used for machine language programs.

The key phrase in this case is "at least." Any program which runs on a VIC with 8K will also run with 16K or 24K. That's why we usually say "at least 8K" for VIC programs.

The following table gives the starting addresses for BASIC, screen memory, and color memory for any amount of expansion.

Expansion	BASIC	Screen	Color
none	4097	7680	38400
3K	1025	7680	38400
8K+	4609	4096	37888

Turn It Off, We're Trying To Watch TV

When I turn on my Commodore 64 and the television nearby is tuned to channel four, diagonal lines appear on the screen. If anybody is watching TV, they complain they can't see the picture. I switched the computer to channel three and the same problem occurs. How can I solve this problem?

Michael Miller

In order to get a picture onto a television screen, a computer sends out a television signal. The RF modulator in your 64 acts like a miniature television station, with limited range.

The problem you're having is that the signal is a little too strong. The best solution is to shorten the cord which goes from the 64 to the TV. If you don't want to cut it yourself, you can probably find one with the appropriate connectors at a local electronics store. A shorter cord allows less of the TV signal to leak out. You might also wrap the switchbox (the one labeled TV/Computer) with aluminum foil.

Here are some other things to try: Move the computer as far as possible from the family television, or to another room. Try using different electrical outlets, preferably on different lines—one for the television, another for the computer. Or put something metal, like a metal bookshelf, between your 64 and TV to act as a shield.

Before a computer can be sold in the U.S., it has to be tested by the FCC for its effective radio/TV interference. If you look on the inside front cover of the manual which came in the box with your VIC or 64, you'll see the statement of FCC certification. It also lists a pamphlet about solving interference problems, which is available from the Government Printing Office.

Special Effects On The 64?

Is there any way I can turn my 64 into a special effects generator? I want to connect one or more VCRs as inputs to make split screens, borders, and windows, combining the video picture with a text overlay.

Mike Winderman

The signal sent out by a VIC or 64 is TV-compatible, which means it is also VCR-compatible. There are two ways to hook up your computer to a VCR. If the VCR has an input jack for cable TV, you should have received a small 75/300 ohm converter with the VCR (so you can attach an antenna in place of the cable). Disconnect the computer cable from the two antenna screws in back of the television and attach the two prongs from the switchbox to the 75/300 ohm converter. Then plug it into the VCR.

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Most VCRs also have two other inputs: one for audio in, one for video in. If you have a monitor cable (which plugs into the front of a 1701 or 1702 monitor), you can plug the two wires into the back of your VCR, audio to audio, video to video. This results in a better picture than the first method.

Why connect your computer to a VCR? There are several reasons. If you don't have a printer, you can list a program while the VCR is recording. You then use reverse, fast forward, and freeze to look at the program listing. Or use graphics and color screens (generated by the computer) as titles and credits in homemade videos. And if your telecommunications software cannot download, you can record conversations or electronic mail to look at later (although you still can't download programs).

Recording the computer's video output, while using a separate microphone for audio could be useful in a class on programming.

And finally, you might record a videogame, so you can later study your moves and the computer's responses. Recording the score would also be a way to prove to friends that you really got five million points in your favorite action game.

So it is possible to put the audio and video signals from a VIC or 64 onto videotape. Unfortunately, the special effects you mention, windows and text overlays, require a specialized video-editing machine. You can't create them with just your 64.

If you have both a VCR and a color monitor, there's another possibility you might not have considered. One of our editors has his Commodore 1702 monitor hooked up to a VCR. The 1701 and 1702 have a much higher resolution picture than a color television in the same price range, but they don't have tuners. The VCR does have a channel selector, and many have video and audio output *jacks (as well as inputs). By routing these signals to the monitor, he gets much sharper, clearer pictures than are possible on a conventional television. Thus, when he's not using the monitor to display computer programs, he can use it to watch his favorite television programs.*

Elusive Characters

I've run into a problem typing programs from your magazine. The answer is not listed in "How To Type In COMPUTE!'s GAZETTE Programs." How do you type {SHIFT-SPACE} or {2 SHIFT-SPACE}?

James Litrell

Commodore computers have two different space characters. You get the first by simply pressing the space bar. The second, a SHIFT-SPACE, is entered by holding down the SHIFT key while you type a space. Think of it as a "capital space." A regular space has an ASCII value of 32, a SHIFTed space is ASCII 160. And if you PEEK the screen, they have two different values, 32 or 96.

As explained in "How To Type In COMPUTE!'s GAZETTE *Programs" in the back of the* GAZETTE, *any time you see a number X preceding a special character in brackets, it means to type that character X number of times. So {2 SHIFT-SPACE} means you should type two SHIFTed spaces—hold down the SHIFT key and press the space bar twice.*

There are two reasons why a SHIFTed space might appear in a listing. If the program runs in upper-/lowercase mode (as opposed to uppercase/graphics) and a message contains all capital letters, it's easiest to type it with the SHIFT LOCK key down. You could type the message "PRESS ANY KEY" with the SHIFT LOCK key engaged, and the spaces between the words would actually be capital spaces.

Second, if a program uses redefined characters, there might be one new shape for a space and a different shape for a SHIFTed space.

In the first case (uppercase messages) it wouldn't matter much which space character you used. They look the same on the screen. In the second (custom characters), it makes a big difference which character is which.

One other character in our listings which gives some readers trouble is the left-arrow, just above the CTRL key, in the upper left-hand corner of the keyboard. The printer used for GAZETTE *listings does not have this character, so when it appears in a program, it's listed as a less-than sign with a hyphen through the middle. It looks a little like the tracks of a chicken walking through snow.*

Relocatable Machine Language

I'm a fanatic about writing machine language programs which are totally relocatable within RAM. As such, I tend to rely on relative addressing as much as possible, using multiple branches to make longer jumps. As of yet, I have not found a method of branching to subroutines which has worked satisfactorily. I'd like to know if it's possible to access the program counter so that its contents may be pushed onto the stack prior to a relative jump to a routine which ends with the RTS instruction.

Donald E. Cook

Certainly there are advantages to relocatable machine language, but what you're proposing is fairly advanced. The longer your ML program, the more difficult it becomes to make it relocatable.

The 6502/6510 gives a programmer no direct access to the program counter. Only instructions like JMP, JSR, RTS, and branches can indirectly change the program counter. Since you are branching to a subroutine, you must have a way to create a return address on the stack so that when the sub-

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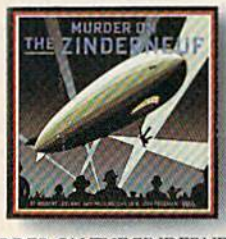

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routine hits the RTS, execution is returned just after the instruction that called the subroutine.

There is a trick you can use to deduce the current value of the program counter. When you jump to a subroutine with JSR, the address of the next instruction is pushed onto the stack high byte first, then low byte. The actual value is one less than the address of the next instruction. RTS pulls the two bytes off the stack, adds 1 to the value, then stores this in the program counter, effectively returning from the subroutine.

Since JSR stores this address on the stack, the address can be examined in a subroutine with PLA. This small subroutine performs the "where am I?" task. After the bytes are examined, they have to be put back onto the stack so that the "where am I?" subroutine can return to the main program.

```
WAI   PLA       ;get low byte of return address-1
      TAX       ;save it
      PLA       ;get high byte of return address-1
      TAY       ;save it
      PHA       ;put high byte back on stack
      TXA       ;get low byte back into the accumulator
      PHA       ;put it back so address is restored
      SEC
      SBC #2    ;get address of the JSR opcode
      TAX       ;low byte is in X
      TYA       ;get high byte
      SBC #0    ;adjust for carry
      TAY       ;high byte back in Y
      RTS       ;return with address in X and Y
```

When you want to know the value of the program counter, JSR WAI. The WAI subroutine itself cannot be relocatable, of course, since your program must know the address of WAI in order to JSR to it. Once you have this current address, you can then create a return address for the instruction following a branch to a subroutine. Remember that the return address is the actual address minus one. Push it onto the stack high byte first, then low byte. You can then branch to a subroutine, and RTS will return execution as you desire. This can be extremely cumbersome, though.

The "Where am I?" technique can also be used to calculate the address of a data table. You must know the offset between the address of the JSR WAI and the location of the data table. You add in the value returned by WAI, and you have the absolute address of the data table. Again, though, the work needed to set up relocatable code is hardly worth the effort. A relocating loader that moves and adjusts an absolute program can often be far more useful. Some assemblers can generate object code that can be loaded anywhere by a relocating loader. Even though most advanced programmers know about this theoretical way to achieve true relocatability, few programmers consider it worthwhile. You'll just have to wait until home computers use a microprocessor like the 68000, which supports full relocatable code (and then some).

Locating A Program On Tape

I have a tape problem. Some of your programs come in two parts. I type in Program 1 and save it, then type in Program 2 and save it. Then I discover an error in Program 2. How should I fix it? If I load it, debug it, and save it back to tape, it will be one program away from where it should be. The tape will have Program 1, Program 2 (with errors), and Program 2 (corrected). Should I look at the tape counter? Or is there a better way?

John C. Onken

When you're trying to position a tape to a specific location, you can use the tape counter. But it is not entirely accurate, and you may encounter problems if you accidentally record over the end of a previous program.

Another solution is to load Program 1, save it at the beginning of a brand new tape, followed by the correct version of Program 2. The disadvantage, of course, is that it's time-consuming to load and save two programs, especially if you have to do it more than once.

The best answer is to use the VERIFY command. The purpose of VERIFY is to make sure that a program has been saved correctly. But it also positions the tape just past the verified program.

So, after you've corrected Program 2, rewind the tape and enter VERIFY. The computer will try to verify the first program on the tape (Program 1). Program 2 (in memory) won't match up and you'll see ?VERIFY ERROR on the screen. Ignore the error message. The tape will have advanced past Program 1 to the place you want to put Program 2. You can now save it.

VERIFY can also be used to find out which programs are on a specific tape, without disturbing the program in memory. Make up a name, one that you're certain has not been used, like QWERT1111 and try to verify it. Type VERIFY"QWERT1111" and the computer will respond SEARCHING FOR QWERT1111, followed by FOUND PROGRAMNAME (or whatever the first program is called). It will keep searching for the nonexistent program name, while listing each of the programs it has found on the tape.

A Solution For The Unscratchable Comma File

In your October 1984 issue, you published a letter from a reader who had an unwanted disk file named ",". I've experienced the problem several times and suspect it is very common. It's usually the result of accidentally typing RETURN when prompted by a program to input a name for a file to be saved.

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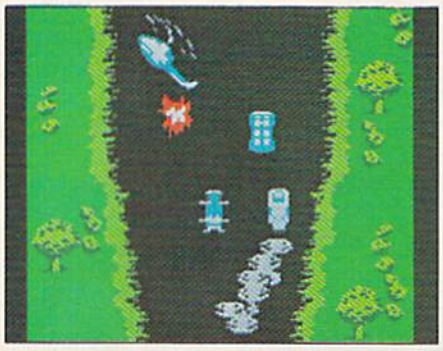

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Bally Midway's Up 'N Down by Sega. In this game, a crash is no accident.

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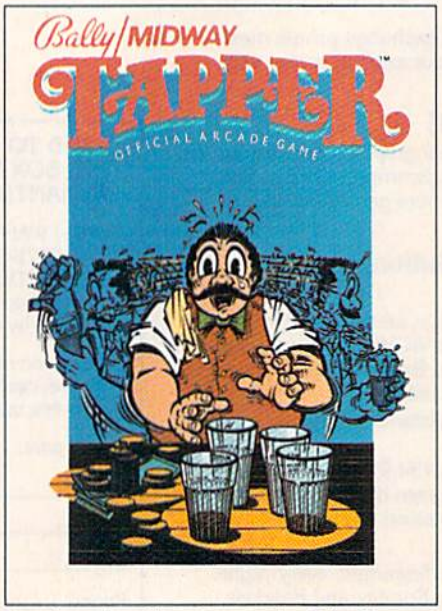
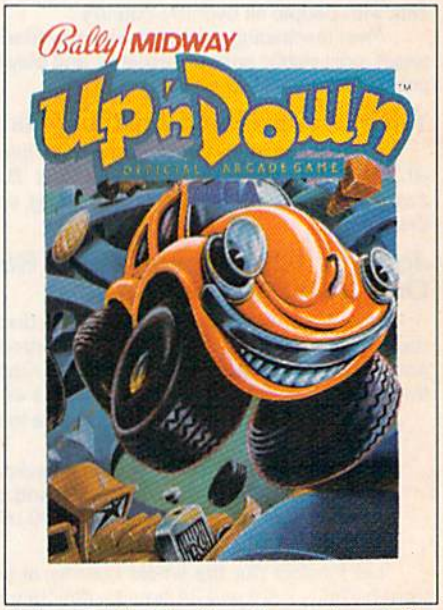


Nominated as Most Innovative Coin-Op Game of 1984 by *Electronic Games* magazine.



#1 Arcade Hit, *Play Meter* Conversions Poll, 8/1/84.

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WERE SUCH BIG HITS, THEM HOME.

Sega's Congo Bongo rocked the home game world when it shot up to Number 3 on the Billboard chart this spring.

And now it's available for even more home systems. So check the chart and get ready for jungle action. You'll pursue the mighty ape Congo up Monkey Mountain and across the Mighty River. Do battle with dangerous jungle creatures. Ride hippos, dodge charging rhinos and try to avoid becoming a snack for a man-eating fish.

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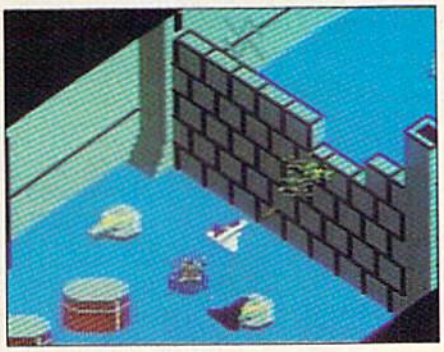
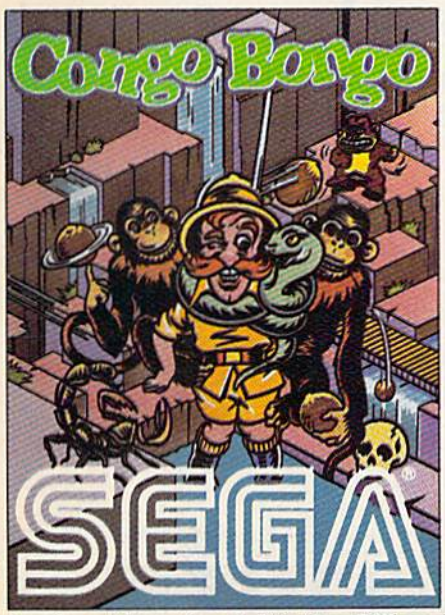


Sega's Zaxxon. If you haven't played Zaxxon, you must have been living on another planet for the past few years.

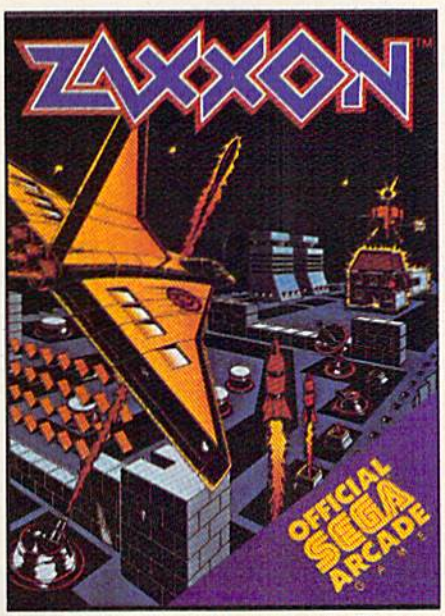
And now the ultimate space combat game is available for even more home systems. You'll pilot a space fighter through force fields and enemy fire on your way to do battle with the mighty Zaxxon robot. Countless others have gone before you in this Hall of Fame game. But this time your life is in your own hands.

Zaxxon killed them in the arcades. But compared to what it will do to you at home, that was child's play.

	SPY HUNTER	TAPPER	UP 'N DOWN	CONGO BONGO	ZAXXON
Atari 2600 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓
Atari 5200 cartridge				✓	✓ NEW
Atari Computers* cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Atari Computers† diskette	✓ NEW	✓ NEW	✓ NEW		✓
ColecoVision & ADAM cartridge	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Commodore 64 cartridge	✓ NEW	✓ NEW	✓ NEW	✓	✓ NEW
Commodore 64 diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
Apple II, IIe, IIc diskette	✓ NEW	✓ NEW	✓ NEW	✓ NEW	✓
IBM PC diskette	✓ NEW	✓ ** NEW	✓ NEW	✓ ** NEW	✓ ** NEW



Arcade and Home Smash. Hit #3 on *Billboard* magazine's Top Video Games survey.



One of only ten games ever to make *Electronic Games'* Hall of Fame.

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SCRATCH command and entering ? as the name. This also scratches all files with a single character name, and care should be taken to rename or duplicate them before scratching the "," file.

Fred Q. Hickam

You're right. Many readers wrote to tell us of this solution. The question mark is described in the 1541 User's Manual *as a "wild card," which can stand for any other character. So, if you type LOAD "P?N",8 the computer will load the first program with a name which fits that pattern: PEN, PIN, PAN, P9N, etc.*

For readers who are new to disk commands, here's a quick explanation of how you scratch and rename:

*OPEN15,8,15,"S0:*filename*":CLOSE15 scratches a file from disk. And with the question-mark wild card, OPEN15,8,15,"S0:?":CLOSE15 will scratch all files with one-letter names. If you have a file called "Q" you don't want scratched, you can rename it with OPEN15,8,15,"R0:*newname*=Q" :CLOSE15 before scratching the one-letter files.*

Chained Programs

What statement is used in a program to call another program? What this command should do is load another program and run it automatically.

Sandra Rodriguez

Is there a way to add the BASIC line SYS XXXXX to machine language programs that start at 49152 or elsewhere (so I could type RUN without having to remember the SYS number)?

S. J. Carpenter

To load a BASIC program from within another BASIC program, simply put the LOAD command in a line inside the first program. When you load from direct mode, the program goes into memory but does not automatically run. But if you load from inside a program, it loads and runs.

Since BASIC programs always load into the beginning of memory, the second program will overwrite the first. Variables may be erased, depending on how long the programs are. If the first is larger, all numeric variables will be available for use in the second program. String variables are passed to the second program only if they are dynamic. To be sure they make it, add a null string to the end of each string variable. Instead of A$="HELLO", use A$="HELLO" + "" to force the computer to store the string in high memory.

If the second program is larger, all variables will be lost when it is called by the first.

You can load a machine language program from a BASIC program, but a small problem must be overcome. Remember that loading from within a program automatically runs the second program. But something unexpected happens if you try

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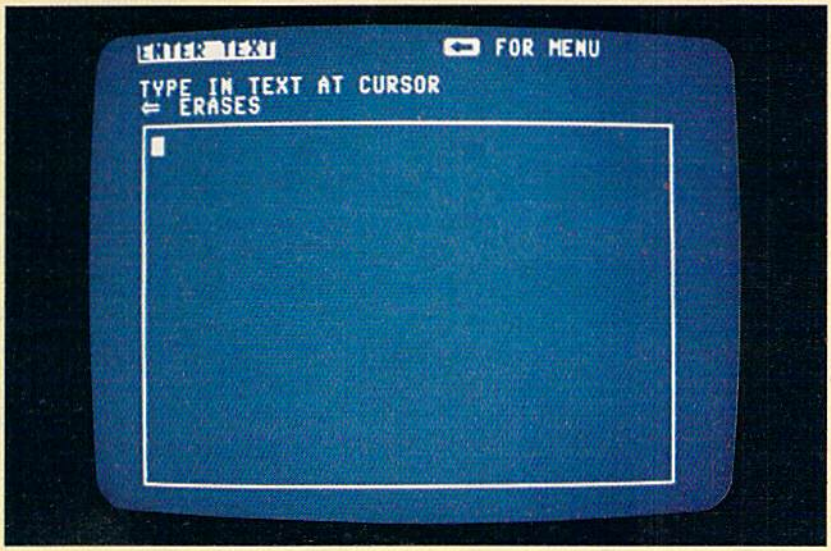

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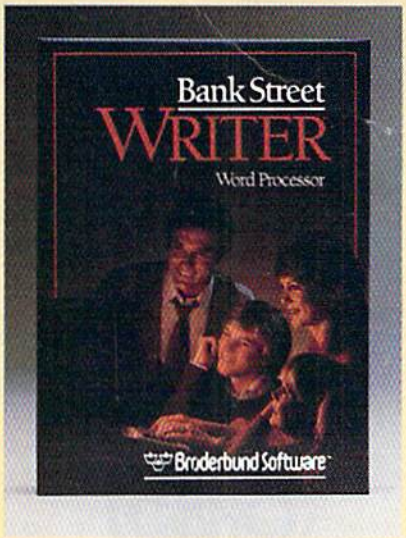

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something like this:

```
10 LOAD "MLGAME",8,1
20 SYS 49152
```

Tape users should change the 8 in line 10 to a 1. The program MLGAME loads into its proper place in memory, but then the computer tries to run the program in BASIC memory. So it loads the program again (and again and again and again). It never reaches line 20.

Variables are kept intact, so you can make a small change:

```
10 IF L=0 THEN L=1: LOAD "MLGAME",8,1
20 SYS 49152
```

The first time through, the variable L equals 0, so the game is loaded. After the LOAD, the program is run again, but this time L is 1, so it skips to line 20, which activates the ML program.

You can't really add the SYS line to an ML program at 49152 (to save as one complete program) because BASIC ROM gets in the way. But you can create a short ML loader program which loads and activates the program. And you don't have to remember the SYS number, it's built into the loader.

To load a program from within an ML program, simply call the three Kernal routines SETLFS, SETNAM, and LOAD. Details about these and other Kernal routines are in the Programmer's Reference Guide.

An Equivalent POKE?

On the VIC-20 there is a POKE 650,128. I'd like to know the equivalent of this POKE on the Commodore 64.

Ted Kalamvrezas

If you use that POKE with a VIC-20, all keys will repeat when held down. The 64 equivalent is POKE 650,128. The same POKE does the same thing.

With a few exceptions, memory locations 0–1023 have the same functions on both the VIC and 64. For example, locations 43–44 point to the beginning of BASIC program storage. The values found there will be different between the two computers, because BASIC programs start at different locations on the VIC and 64. But the two bytes serve the same function (a pointer to the beginning of the BASIC program storage area).

In any case, you can't do any harm to your computer by experimenting. If you know about a POKE for the VIC, try the same thing on a 64. The worst that could happen is the computer would lock up and you'd have to turn it off and back on.

User memory, screen and color memory, BASIC ROM, interface chips, and other locations occupy memory from 1024 to 65417. There are not a lot of similarities here. You can usually find an equivalent POKE or SYS, but the locations might be quite different.

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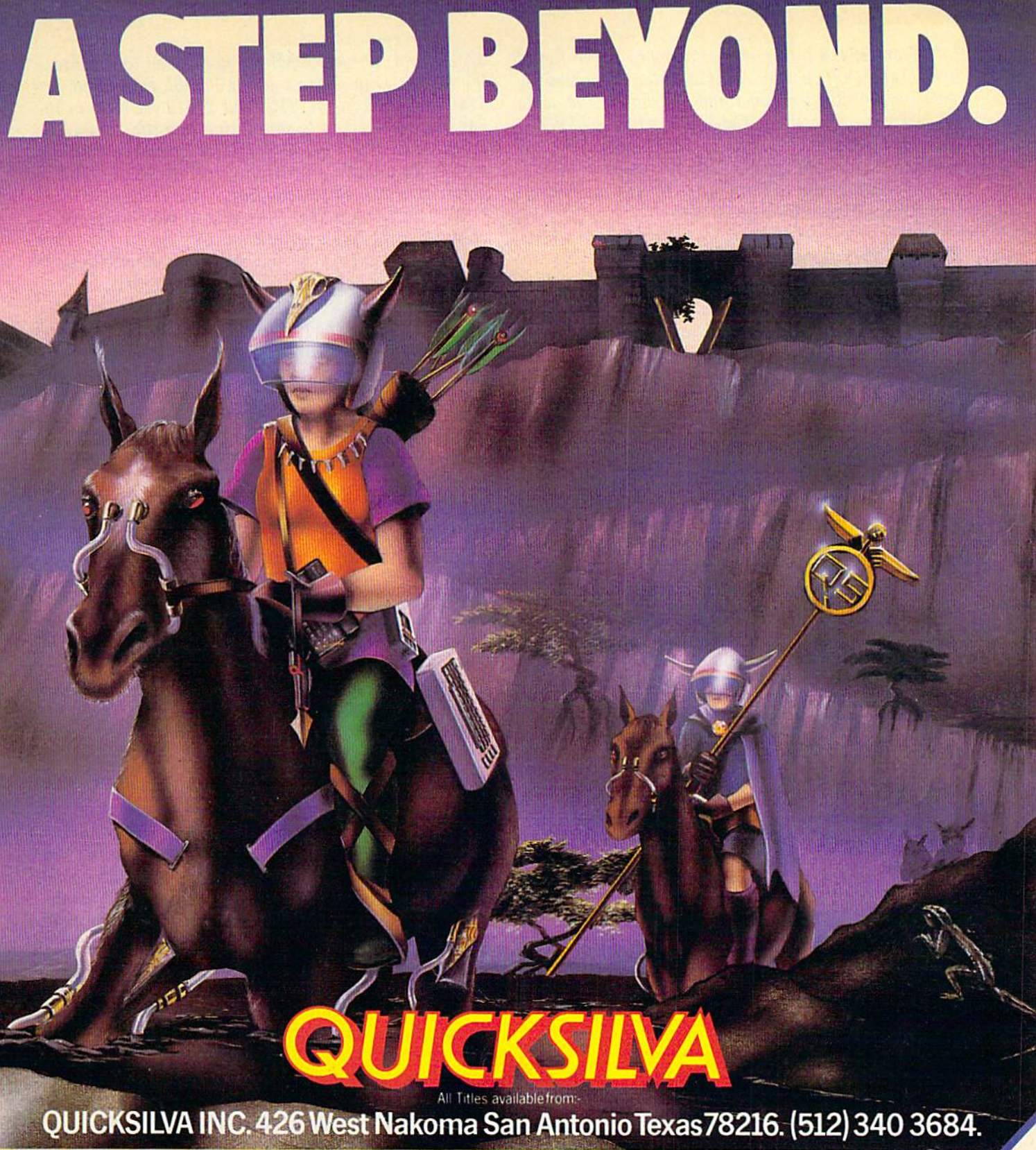

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From 65418 to the end of memory is the Kernal Jump Table, which may contain different values on a VIC or 64. But the functions are exactly the same. The location with the hexadecimal address $FFD2, decimal 65490, is one example. It's the location for printing a character in machine language. Other Kernal routines are explained in the VIC and 64 Programmer's Reference Guides.

Entering Long Programs

I'm just beginning to type in a program. Because it is rather long, I decided to type in a little each day then save that day's work.

But when I try and go back and load the different sections together, I encounter a problem. Each successive section I load erases (loads over) the previously loaded section. Is there any way to load all the sections together without erasing the section you just loaded?

Brad McCollum

The problem you're having stems from the fact that you're treating each day's work as a separate module, or program, and saving them that way. When you reload the sections, the computer thinks they are separate programs, and loads one on top of the other.

This is supposed to happen. When you use the BASIC LOAD command, many subroutines (in BASIC and Kernal ROM) are performed to execute the LOAD. One of these is the PARSL routine at 57809 ($E1D1) in the VIC, and 57812 ($E1D4) in the 64. In a nutshell, this subroutine sets the X and Y registers with the values found in memory locations 43 and 44 which point to the start of BASIC. This is where it will load the program. This is similar to a NEW command, and it's the reason your program modules are being overwritten.

When you type in long programs in modules, do not save each one as a separate program.

After entering the first session's work, save it to tape or disk. When you wish to continue, load the latest version back into the computer, and continue to enter the program starting at the point where you left off. After the session is over, save the program (now the combined first and second sessions) to tape or disk. If you're not done yet, continue repeating the same cycle until you've finished.

Reading DATA Strings

I'm having a slight problem with DATA statements. When I run the following program, it prints "A$" instead of "HELLO"

```
10 A$="HELLO"
20 READ B$
30 PRINT B$
40 DATA A$
```

My question: Is there a way for the computer to see A$ as "HELLO" in a DATA statement after having previously defined it as such (A$="HELLO")?

Buddy Flerl

No, there's no method to do what you ask. It might help to imagine a variable as a box. On the outside you paste a label, the variable name. Inside the box is a string or numeric value. In line 20, you're reading information from a DATA statement. The name of the variable is B$ (the outside label), the contents of B$ is "A$" (a string containing two characters). As far as your computer is concerned, the string "A$" has no real connection with A$ the variable name. You can't pull a label off a variable and use it as a value, and vice versa.

Probably the best solution to your problem is to use arrays. A numeric variable can be an index to an array. In this way, one variable points to another. Try the following program:

```
10 A$(1)="HELLO"
20 READ B
30 PRINT A$(B)
40 DATA 1
```

In line 20, the value 1 is read into B from a DATA statement. That value can then be an index to the array and in line 30, "HELLO" is printed because A$(1) holds that string. If you changed the value of B, line 30 would print something else from the array.

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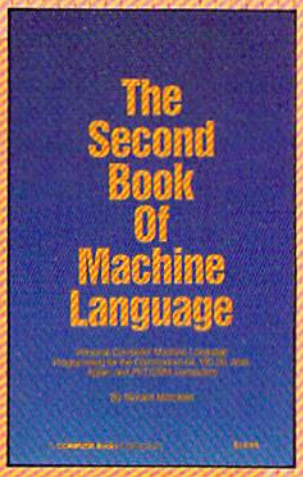

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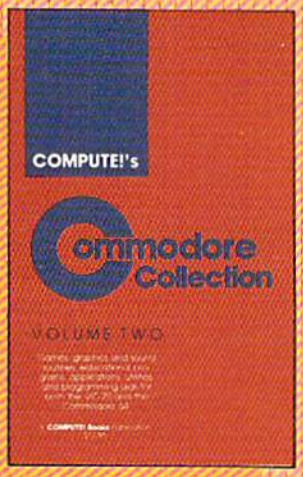

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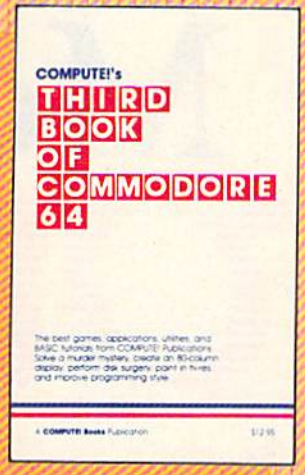

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The Move TOWARD Integrated Software

Word processing, record keeping, budgeting—you can accomplish each of these everyday tasks with your Commodore 64. Software producers are now offering new personal productivity programs which bring those separate functions together for even faster and more efficient use.

Selby Bateman, Features Editor

Imagine yourself at a desk. There are four drawers, each containing one of the following items: a typewriter, a calculator, a file box with folders, and a drawing kit of pens and markers. You take out the typewriter and begin to compose a letter. Suddenly you realize that you need a couple of records from your file box to include in the correspondence.

So, you put your typewriter in its drawer, pull out the box, find the files, take them out, return the box to its drawer, and retrieve your typewriter. A few moments later, you want several budget totals which are still stored in the calculator's memory. The cumbersome procedure begins all over again as you place the calculator on your desk, sliding the typewriter out of the way in order to use the other item. The same situation applies if you want to draw a graph of those figures.

Of course, no one actually follows such a strange and unwieldy process. Why not use all four of those items together, integrating the information and the procedures in a productive manner? When it comes to computers, that's exactly what the more powerful business machines do—accomplish multiple tasks with integrated software programs.

But for the most part, that hasn't been the case with home computers. Say you use a data base for keeping track of your stamp collection. If you then want to write a letter offering some of the stamps for sale, you'll probably have to type them in again, because your data base files aren't compatible with your word processor files. While many word processors, data bases, and spreadsheets perform their respective repertoires quite well, their acts have most often been workhorse solos rather than lilting duets or rich concertos.

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While a symphony of integrated movements on the Commodore 64 has yet to be composed in the personal productivity area, that is clearly the goal toward which an increasing number of companies are headed.

One such company is Arktronics Corporation, with a new package called *Jane*.

"The idea behind *Jane* is to give professional features in the home market by making it very easy to use," says Howard E. Marks, the 22-year-old co-founder of Arktronics. *Jane* is an integrated productivity software package scheduled to be released for the Commodore 64 by the time you read this. The price is expected to be about $80. First available on the Apple IIc, the program has a Macintosh-like *icon*-based environment, using pictures and symbols to guide the user, as well as onscreen *windows* for displaying information. "*Jane* has three applications—the word processor, the spreadsheet, and the data base—on a disk. The system is on a (32K plug-in) cartridge...which boots up automatically when you turn on the computer," says Marks.

The program includes the applications disk, a data disk containing tutorial files and utilities, and the cartridge. The system is designed to work with a *mouse*—a desktop pointing device most associated with Apple's Macintosh computer—as well as the keyboard, joystick, or touch pad. Arktronics is working with several companies now as they develop mice for the Commodore 64. *Jane* also contains utilities which will configure the system for your particular printer.

The package is designed to be particularly easy to use by people new to computers, says Marks. (Hence, the name, which comes from the familiar Dick and Jane kindergarten reading characters.) "With the word processor, what you see is what you get. So you see boldface, underlining, superscripts, subscripts, and all the accents for any language on the screen. We use the full-color bitmap, the same technology as the Macintosh. You can see 80 columns on the screen, 64, or 40 columns."

> "... we'll get more personal. The idea is to go toward intelligent systems that are easy to use."

And, importantly, the system allows you to move from one application to another. You can shift information from one window to another, thus integrating the three programs. For example, suppose you have a letter you want to write in one window and a budget in the other. By moving an electronic symbol of a hand over the typewriter and calculator icons, you can take the numbers out of the budget window and insert them anywhere you want them in the letter. By using the mouse, or one of the other input devices, you can carry out the process without touching the keyboard.

"One of the big problems that computers have today is that they're not easy to use," says Marks. "People who are afraid of computers—who have computerphobia—are not going to buy them because they are difficult."

That sentiment is echoed by David Johnson of California-based International Tri Micro. He designed and programmed the ROM-based integrated applications software which comes built into the new Commodore Plus/4 computer.

"The original concept was to provide as powerful and as friendly a work space as possible for the average user, a general-purpose work space which a large segment of the population would be able to use," he says.

Originally called *3-Plus-1* when planned for the Plus/4—to reflect the word processor, file manager, and spreadsheet, plus bar charting capability—the same programs are available on disk for the Commodore 64 in separate packages. *Your Home Office* is a word processor and spreadsheet, *The Write File* is a word processor and data base, and *Plus Graph* adds the ability to produce pie charts and variable bar and line charts from either spreadsheet or data base information.

"To make a truly software-driven machine, the idea was that these three categories represent the majority of what the first-time computer user wants to do with the machine, or will have some need to do," says Johnson. "What will happen, as we get more room [computer memory] available, is we'll get *more* personal. The idea is to go toward intelligent systems that are easy to use. That's still quite a distance on."

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The more integrated a series of programs becomes, the greater the memory requirements. Packages which gobble up thousands of bytes of memory for their systems are fine for high-end business computers. But home computers with 64K must make tradeoffs. Arktronics' *Jane* attempts to solve the problem by adding a 32K cartridge to allow more capabilities. Most commercial packages for the Commodore 64 try to work within the available memory by drawing limits where necessary and by offering some integration in the most frequently used applications.

For example, while *Jane* has enough space in memory to allow you to type the equivalent of ten to twelve pages of text per file, Johnson's system in both the Plus/4 and for the 64 permits only 99 lines of text for each file. To get around that limitation, the user can link individual text files together for a printout.

There are too many personal productivity programs available for the 64 to list them all in one article. Most of the better known systems have at least some integration of features. The *Insta* series from Microsci Corporation's Cimarron Division, consists of nine

The following companies are among those with personal productivity software for the Commodore 64, with some degree of internal integration of features:

Arktronics Corporation
520 E. Liberty Street
Ann Arbor, MI 48104
(313) 769-7253
Jane, *approximately $80.00*

Arrays, Inc./Continental Software
11223 South Hindry Avenue
Los Angeles, CA 90045
(213) 410-3977
Get Rich Series, *suggested $49.95 each*

Batteries Included
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Canada M5V 1Z1
(416) 596-1405
Home Organizer Series, *$29.95 each*

Cardco, Inc.
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Wichita, KS 67214
(316) 267-6525
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Commodore Computer Systems Division
1200 Wilson Drive
West Chester, PA 19380
(215) 431-9100
Magic Desk I, *approximately $30.00–$35.00*

Creative Software
230 East Caribbean Drive
Sunnyvale, CA 94089
(408) 745-1655
Creative Writer, Creative Filer, Creative Calc, *$49.95 each*

Electronic Arts
2755 Campus Drive
San Mateo, CA 94403
(415) 571-7171
Financial Cookbook, *$50.00*

Handic Software, Inc.
520 Fellowship Road
Mt. Laurel, NJ 08054
(609) 866-1001
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International Tri Micro
1010 N. Batavia, Suite G
Orange, CA 92667
(714) 771-4038
The Write File *($49.95)*, Your Home Office *($49.95)*, Plus Graph *($39.95)*

Microsci Corporation
Cimarron Division
2158 South Hathaway Street
Santa Ana, CA 92705
(714) 662-2801
Insta-Writer *($49.95)*, Insta-Mail *($19.95)*, Insta-Calc *($39.95)*, Insta-File *($49.95)*

Prentice-Hall Home Software
P.O. Box 819
Englewood Cliffs, NJ 07632
(201) 592-2611
IMSI Home Library, *$39.95 each*

Sierra, Inc.
P.O. Box 485
Coarsegold, CA 93614
(209) 683-6858
Homeword *($69.95)*, Homeword Finance *(price not available)*, Homeword Tax *(price not available)*

Timeworks, Inc.
405 Lake Cook Road
Deerfield, IL 60015
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Word Writer *($49.95)*, Data Manager *($24.95)*, Data Manager 2 *($49.95)*, Electronic Checkbook, Money Manager *($24.95 each)*

TOTL Software, Inc.
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Walnut Creek, CA 94596
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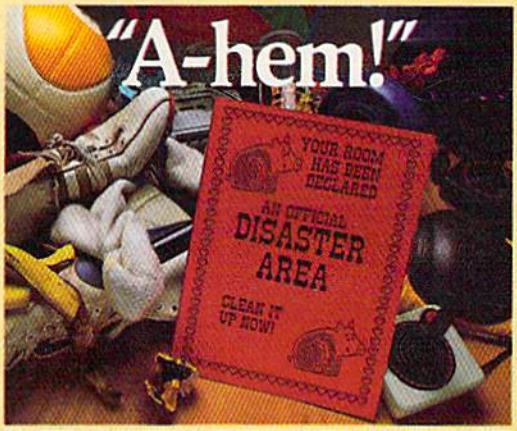

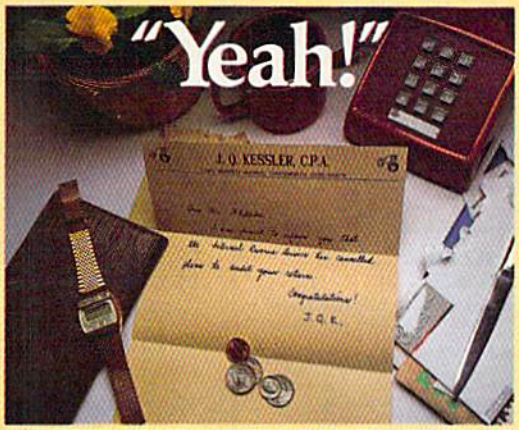

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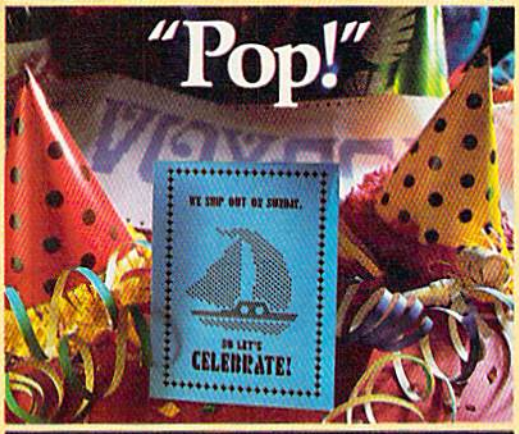

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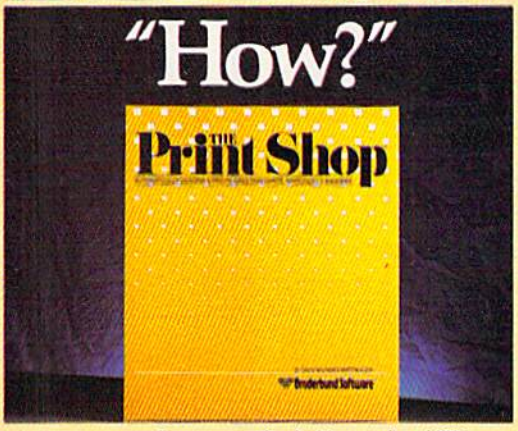

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packages for the Commodore 64 based around its *Insta-Writer* word processor on cartridge. With the word processor, you can also use the *Insta-Mail* mailing list program and the *Insta-File* data base management program. The spreadsheet and investment programs in this series can be used with the graphing package as well.

Creative Software offers three interactive packages, *Creative Writer, Creative Filer,* and *Creative Calc,* which also let you use files in an integrated manner.

Sierra's Homeword series, built around the *Homeword* word processor, includes an integrated filing system as well as a spelling checker. Other integrated packages which are scheduled for release—as this is written—include *Homeword Finance,* a home finance package; *Homeword Tax,* a tax preparation program; *Homeword Typer;* and even a *Homeword Gardener.*

Commodore's *Magic Desk I: Type and File* is a good example of how ease-of-use can be combined with limited multiple functions to provide basic applications. Using icons, or symbols, to direct the user, the program lets you type and file letters, memos, notes, and the like—a simple word processor and file manager in one.

Personal finances are well suited for integration since a common chart of accounts can be used with a variety of different programs, whether it's balancing a budget, planning future investments, buying property, or figuring interest rates.

That idea is the premise behind the new Get Rich financial series from Arrays, Inc./ Continental Software, available for the Commodore 64.

"The first module coming out, called *Get Rich: Strategies,* addresses what people do once they have discretionary dollars, those dollars people have left over once they've paid for all their necessities," says Hank Scheinberg, executive vice president.

"Integrated is too strong a word, right now. This is more like a series of books," he adds. "Once you go through *Strategies,* and you have some ideas of amortization schedules, compounding interest, inflation rates, real buying power, and the like, then the second module is *Get Rich: Real Estate Planning.*" Subsequent modules include insurance planning and retirement and estate planning, he notes. Each of the subject-specific volumes is designed to work in tandem with the original *Strategies* program, which gives the user an overall financial picture.

"These modules are set up in a question-and-answer situation. You're constantly asked questions, and the user just fills in the blanks and then picks the choice which is most beneficial," he says. "It asks questions which the uninitiated perhaps would not know enough to ask."

Whether the format is question-and-answer prompts, icon-based menus, information windows, or easy-to-remember commands, software designers are emphasizing a mix between ease of use and flexibility, that is, how easy it is to use a system versus how powerfully and flexibly it operates. That's good news for Commodore 64 owners who want productivity packages that will let them really get down to business.

In addition, software companies realize there is still a large untapped consumer market for computers. What will make people buy a computer? Perhaps the answer lies in the initial responses Hank Scheinberg has received: "The comments we're getting back are that this is a real reason to have a home computer."

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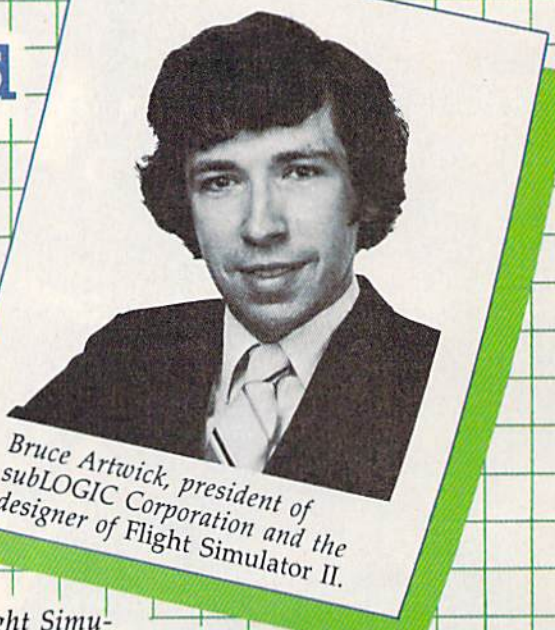
Bruce Artwick, The Designer Behind *Flight Simulator II*

Kathy Yakal, Feature Writer

There must be a lot of would-be pilots out there. *Flight Simulator II*, a microcomputer-based flight simulator, has sold a quarter of a million copies and stayed on the best-seller charts since it was introduced. Here's a look at the program and the designer.



Bruce Artwick, president of subLOGIC Corporation and the designer of Flight Simulator II.

You've seen those air disaster movies where the pilot and co-pilot are suddenly stricken with a mysterious ailment, or injured in a struggle with a hijacker. A stewardess or even a passenger must take over and fly the plane to safety.

There might have been a little less sweating in all of those movies if the substitute pilots had used *Flight Simulator II* from subLOGIC. It turns your Commodore 64 into a flight simulation lab, and puts you at the controls of a small aircraft.

The tremendous success of *Flight Simulator II* may be a bit surprising to those of us who are a bit phobic about flying. Even with our feet on the ground and hands on the keyboard, the illusion of flying can bring back memories of white-knuckled flights.

Bruce Artwick, the designer and programmer of *Flight Simulator II*, says it appeals to people for different reasons. "Some buy it just for the fun of flying around. A lot buy it because they like the graphics," he says. "There's an arcade game built into it, so some people buy it for that. And some people actually want to use it to practice flying. All of these elements—the game, flying, and nice scenery combine to attract a few from here and there."

Flying is an avocation for Bruce Artwick (he's had a pilot's license for several years), but his real interest is computer graphics. Raised in the Chicago area, Artwick went to school at the University of Illinois at Champaign-Urbana. While finishing his master's thesis there, he worked on 3-D graphics software for real flight simulators at the school's aviation research laboratory.

He took a job at Hughes Aircraft in California in the late seventies, about the time the microcomputer industry started to pick up speed. Interested in the possibilities of graphics on the new machines, Artwick started programming small 3-D graphics packages for them. He formed subLOGIC in 1977, and moved back to Illinois at the urging of his partner, Stu Moment.

His first demo program for the new Apples was a small flight simulator. "I was surprised at how successful it was. It made me realize there was a lot of consumer interest in flight simulation," says Artwick. *Flight Simulator I* for the Apple hit the bestseller charts and stayed there.

In late 1981, Artwick was

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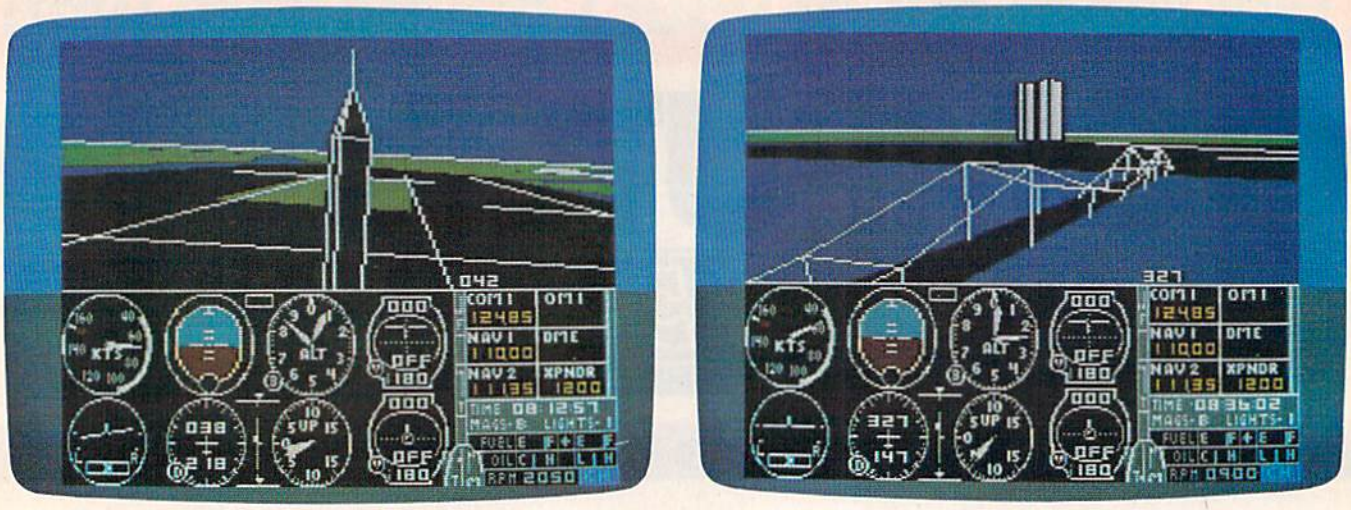

Two views of New York City from the cockpit: the Empire State Building and Manhattan Bridge.

approached by IBM and Microsoft. Both wanted him to translate his program for a new machine that would be coming out the next year, a microcomputer with a powerful new processor that would allow him to do more than he was able to on the Apple.

He finally went with Microsoft, which published *Flight Simulator II*, an upgrade of the original Apple version, for the new IBM PC. It was so popular that people at Commodore and Apple went after him to translate it for their new computers.

"Back then, I didn't think it was possible to bring that kind of graphics performance down to the smaller machines," he says. "But we gave it a try and did the best we could."

Crunching the program down for Commodore, Apple, and Atari "...was a major project," says Artwick. "We knew that we were very tight on memory. One of the most important things to have would be good software tools to do it, a good assembler and debugger. We couldn't do development on the machine we were designing it for. Like on the Apple, we couldn't have the Apple do assemblies and load it into itself and run it because it takes up all of memory, almost every last byte." They spent a half year setting up that development system on an IBM PC with hard disk drives. Once they got the basic simulation going, they started packing in as many features as possible. "We used to have meetings and say, 'We have 30 systems we have to add and only 1300 bytes left,' " says Artwick. "We packed it tighter and tighter until we had just about everything we wanted."

And those features that had to be left out are basically cosmetic, "like the windshield cracking on the IBM version," says Artwick. "It took up a lot of memory, but we had it."

The sequel was just as popular as the original. *Flight Simulator I* was finally knocked off the bestseller charts by *Flight Simulator II*.

The control panel of *Flight Simulator II* resembles the instruments of a Piper PA-28-181 Archer II, a single-engine, nonretractable gear aircraft. It was chosen because it offers good performance, yet is uncomplicated and easy to fly.

You control the aircraft by pressing designated keyboard letters. The right bracket (]) increases your throttle. F makes it bank, and G controls the banking. Press B for a view out the back of the plane, and T for a front view. You'll need to spend a couple of hours learning all the various commands, maybe more if you know nothing about flying. (The program comes with a user's manual and a booklet explaining the concepts of flight physics and aircraft control.)

The first time you take off, you leave Meigs Field in Chicago. From there, you can fly to a number of airports in downstate Illinois, or set the controls to take you to one of the other three designated "scenery" areas: Seattle, New York, or Los Angeles. Flight is in realtime, so if you take off from Chicago before you go to work or school and leave the program running, you can come home for lunch in time to land on the West Coast.

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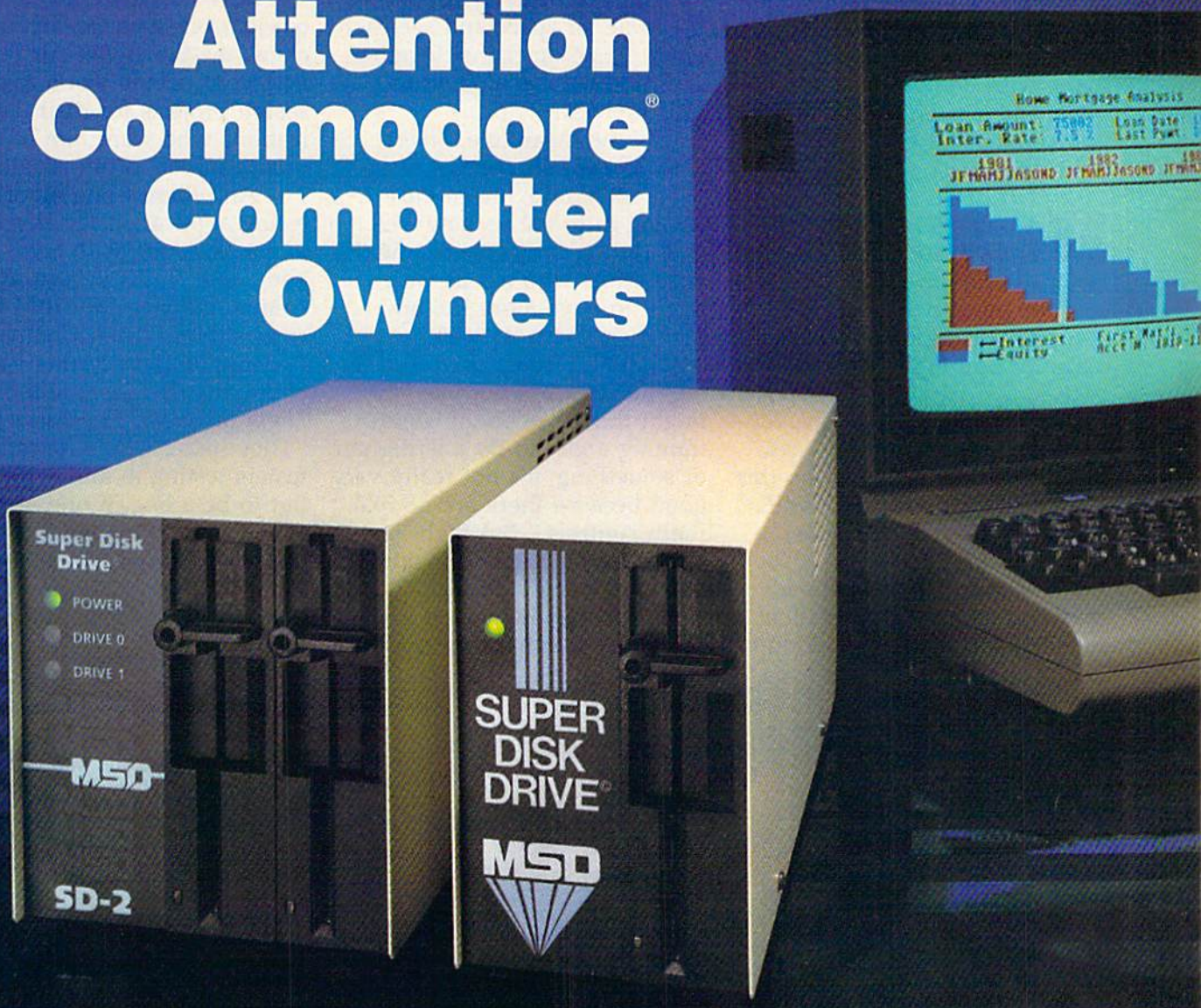

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pilot blunders, and *reality mode*, which adds more sophisticated factors.

If you tire of the challenge of keeping a plane in the air, you can play WWI Ace, the game option which equips the plane with bombs, machine guns, and a radar screen, and pits you against other WWI fighting planes.

More memory, for the engineers at subLOGIC, means faster simulations and more complex scenery (they're already preparing new scenery disks for San Francisco, Washington, D.C., and the Denver/Rocky Mountain area). "We're trying to stay updated on new machines, because we think this is an area of interest that will stay around for a long time," says Artwick.

The Apple IIc has already spawned an enhanced edition called *Flight Simulator IIM*, to be released sometime in 1985. It's a multi-player game. By linking two or more Apple IIc's (either in the same room or via modem), you can fly around in the same air space and see each other, "...go on flights together and hide behind mountains," says Artwick.

In the meantime, *Flight Simulator II* still appeals to a wide age group, "from kids writing in to tell us how well they did on the game to middle-aged pilots who tell us we ought to have more ILS approaches," says Artwick.

And it's being used in training, he says, but not like you might think. "When it comes to training a guy to fly a jet fighter or something, it's not really very good because there are no real flight controls." But flight instructors and national institutions are using it to show students how the gauges and other navigational instruments look and how they work. "In that respect, it's pretty useful, a lot more useful than a textbook."

Artwick has received requests from such far-off customers as the Singapore Air Force, and from people working on research projects for their organizations who want him to make modifications to the program.

And there's one more interesting application for *Flight Simulator II*: Along with *Lotus 1-2-3* and *dBase II*, it's known as a compatibility test for IBM PC compatibles. When Compaq Corporation was testing its machine, the designers found that *Flight Simulator II* wouldn't run. "They had a whole roomful of testers testing it, and it turned out to be a bug in one of Intel's chips," says Artwick. "In their hardware design, it was more sensitive than IBM. Compaq actually had to change their ROMs."

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And since it also has the IBM-PC*, Apple MacIntosh* and IIC*, Serial, and Centronics interfaces**, you can use the Blue Chip M120/10 with just about any computer you may eventually own.

The Blue Chip Personal Printer costs a lot less than anything similar... without compromise in quality. Highly powerful and relentlessly practical.

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A Window To The World:

Modems In The Home

Sharon Darling,
Research Assistant

With the advent of telecommunications services and on-line data bases, computers can give you a "window to the world" from your home, offering hundreds of productivity and entertainment services.

If you own a Commodore 64 and a modem, perhaps you've considered subscribing to an on-line telecommunications service. Is it worth the investment? Let's imagine the following scenario:

It's seven o'clock on a Thursday night. The library closed at five, and Sammy Jordan has a school report due tomorrow on a subject he hasn't yet researched. Dad has been dabbling in the stock market, studying which stocks he'd like to buy. Now he's ready to plunge ahead, but can't place an order with a stockbroker until 9 a.m. Friday. And he's leaving on a business trip at 8 a.m. Mom meant to stop at the bank on her way home from the office, but left work too late to get there before the bank closed.

To top it all off, Sally's birthday is coming up, and her birthday present wish list contains an item not available in their hometown. The closest store that carries it is 50 miles away.

Such a situation could cause a lot of stress and worry.

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If practice makes perfect, buy the SAT and typing programs that make practicing easier.

Harcourt Brace Jovanovich COMPUTER SAT	FEATURES	Computer preparation for the SAT THE PERFECT SCORE
Two double-sided	Number of disks	Six double-sided
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Yes!	Sample test	Yes!
No	Practice SAT and TSWE on disk	Yes!
Yes!	Manual with test taking strategies	Yes!
No	Continuous on-screen clock	Yes!
No	Print-out capability	Yes!

Studying with a computer program makes more sense than using a manual. But Harcourt's Computer SAT ($79.95) gives you a fat manual and just 2 double-sided disks.

For $89.95, Barron's Computer Study Program gives you an even fatter manual, plus 3 double-sided disks.

Why not buy a computer program that's a computer program?

Ours has 6 double-sided disks and a skinny manual. And costs just $69.95.

MASTER TYPE	FEATURES	KEYBOARD CADET
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No	Sentence and paragraph typing	Yes!
Yes!	Multiple levels	Yes!
No	Based on Successful typing procedure	Yes!
No	Timed paragraph typing test	Yes!
No	Drill on weakest characters	Yes!
No	Progress recorded	Yes!

Unlike Keyboard Cadet, Master Type doesn't show you the correct finger positions on the screen. So you might become a fast hunt-and-peck typist instead of a fast typist.

As long as you're learning how to type, why not learn how to type the right way? Keyboard Cadet, $39.95.

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But not for our fictional family. They recently subscribed to an on-line telecommunications service for use with their Commodore 64. Now, they're going to put their investment to good use.

Sammy logs on first and gets the information he needs for his report from an on-line encyclopedia, then looks through a special interest group (SIG) data base to get a few more facts. He downloads the data, prints it out, and starts writing his report. Next, Dad accesses the financial services section and places his stock order. He can now leave for his business trip without worrying. He knows the stockbroker will receive instructions as soon as the office opens and will immediately place his order. Dad will later receive confirmation of the purchase.

While he's on-line, Dad also checks the weather forecast for the city he's going to on his business trip. Since the report is calling for rain, he packs a raincoat and umbrella.

It's Mom's turn next. She visits the bank, which is a member of the telecommunications service, and transfers money from savings to checking. She also looks through merchandise available in the service's on-line shopping mall and orders a birthday present for Sally.

While this is only a fictional scenario, the services described are used every day by thousands of computer owners who log on right from their homes. Today, there are a growing number of companies offering well over a thousand different on-line services and data bases which can make many routine household tasks more convenient—even fun.

On-line services have come a long way in a relatively short period of time. Take, for example, CompuServe, the largest of all such home-based telecommunications systems, with 145,000 subscribers. Started as a time-sharing service for businesses, home computerists were first allowed access to the system in 1979.

At the time, it was a data base for hobbyists says Paul Battaglia, a CompuServe spokesperson. A CB radio owners' interest group was one of the most popular services. There were under one thousand subscribers, and only about 25 different data bases which could be accessed. By 1980, the number of subscribers had increased to about 5,000. Today, there are more than 800 different data bases, special interest groups, and services, covering almost every topic, from aviation to world news.

The Source, another popular system, has roughly 60,000 subscribers right now, and offers hundreds of data bases in six major categories—business and finance, travel, games, consumer services, news and sports, and communications. Dow Jones has well over 120,000 subscribers. While most of its offerings are geared toward business users, there are several services which appeal to the home computerist, such as movie reviews, sports and weather reports.

If you've been looking for additional uses for your computer, joining an on-line service could be one of the most rewarding. Let's take a look at some of the options available.

Buying stocks, bonds, and other securities on-line is a relatively new concept for the services. It is currently available to subscribers of The Source and CompuServe, for example, through different brokerage firms.

You open an account with either Max Ule & Company, if you are a CompuServe subscriber, or Spear Securities, Inc., if you have joined The Source. The brokerage houses are members of these two major services. With CompuServe, you must also have access to its Executive Information Service. Security, accessibility, and guaranteed service are very important in any of these computerized systems. For example, subscribers must clear a number of security levels before placing their buy and sell orders. This makes the chances of illegal entry "minute," according to Richard A. Baker, CompuServe's director of corporate communications.

Besides buying stocks, other financial information is available on The Source and CompuServe, as well as Dow Jones News/Retrieval, one of the most respected business-oriented telecommunications networks.

Computerized banking, while still in its infancy, is a fast-growing service. CompuServe, Chemical Bank's Pronto Home Information and Banking System, and a few others let you do your banking from the comfort of your living room. Right now, CompuServe has agreements with three banks (Shawmut in Boston, United American Bank, Memphis, and Huntington National Bank, Columbus, Ohio). Baker says more banks will probably be added to the network later.

Chemical Bank's Pronto system, which can be used by Commodore 64 owners, topped 10,000 subscribers last summer. It offers users the ability to pay bills, transfer funds, get balances, see electronic statements, track budgets, and balance checkbooks.

In addition, the bank has licensing agreements with eight other banks coast-to-coast. Another on-line system, Keyfax Interactive Information Service, based in Chicago, offers home banking, educational packages, data bases, and financial options. A home shopping service is planned as well.

While The Source does not

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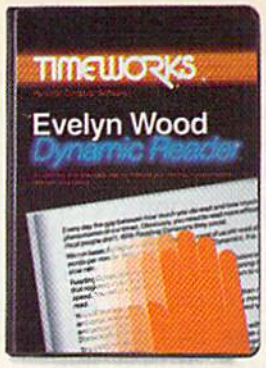

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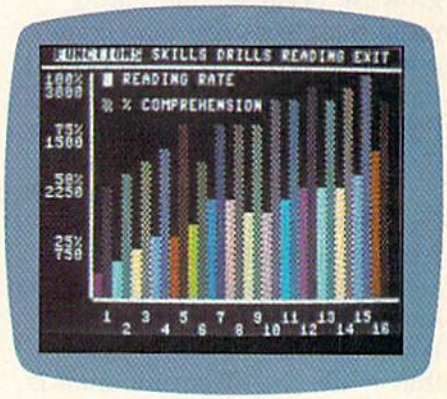

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have home banking yet, it probably will be added in the future, says JoAnne Montgomery, a Source spokesperson.

There are many types of at-home shopping services available. Perhaps the best known is Comp-U-Card's Comp-U-Store, which is available on CompuServe, The Source, and Dow Jones.

Subscribers to these services pay an additional fee to belong to Comp-U-Store, which offers more than 60,000 items from national manufacturers and stores. Comp-U-Store also offers discounts of up to 40 percent on its merchandise.

Right now, Comp-U-Store has 16,000 on-line subscribers and 800,000 telephone subscribers who do not have access to a computer, says Lynn Booth, director of corporate communications for Comp-U-Card International. She says the popularity of the service is growing because "more and more people have home computers, and they find they don't have the time to spend browsing or comparison shopping, so they use a service like ours."

CompuServe introduced the Electronic Shopping Mall last April, which offers goods from about 90 national merchandisers like Sears, Bloomingdale's, and Waldenbooks. Battaglia says that while the electronic mall is popular, "I don't think it's ever going to replace going out to the store and buying goods—there's a certain social function involved (in shopping), and I think this (the mall) is a convenience factor."

Use of such services should grow though, he adds, as people get accustomed to shopping by computer. "Right now, it's a unique thing," Battaglia says, "and I think there are more products that are sold more readily over this kind of medium than other kinds of products.

"A designer dress, for example, would be difficult to sell to the public right now because they're not acclimated to making purchases with just that information at hand."

Shopping by computer should really take off, Battaglia says, when home computers are able to receive sophisticated enough graphics that can show what a product will look like, versus a word description of the merchandise.

Whether it's financial information you need, or material for a school paper, or even the answer to a trivia question, you can probably get the facts you need from one of the on-line services. Sports news, encyclopedias, weather reports, news items from national and international wire services, movie reviews, and newspapers are all examples of information you can access with your computer.

And there are special interest groups of every type available as well, ranging from people who own specific kinds of computers, to pilots, to home canners.

If you're planning a trip, you can check the Official Airline Guide (OAG) to find the best ticket prices. Even making airline reservations from your home has become a simple procedure with your computer.

Another popular feature which ties directly into your home is electronic mail. According to Montgomery, The Source's electronic mail service "gets the most use from consumers and business." CompuServe's Battaglia also attests to the popularity of the service. Electronic mail is "hot" right now, for both consumers and business users, he says.

Unusual subject areas can be accessed. CompuServe, for instance, offers an advice columnist, Aunt Nettie, as well as information on PGA golfers, insurance, humor, and human sexuality.

On The Source, categories include collectibles, classified advertisements, teens, and schedules of the U.S. House of Representatives. Those services are but a sample of what's available. To list every subject category offered by the various services might take an entire magazine.

Of course, it costs money to join any of the on-line services. A basic subscription will cost you roughly the same price as a piece of commercial software. The Source reduced its subscription fee this fall to $49.95. Getting on-line with CompuServe costs about $40, although many modem manufacturers offer a free subscription to CompuServe as part of the package.

Dow Jones has three different levels of membership, with prices ranging from $50 to $75. In addition, there are charges from each service for the amount of time spent on-line. Some of the services, such as sending an electronic mail letter, also require an extra fee.

In addition to the sign-up fee, most services charge an hourly rate for time spent on the service. It generally costs more during business hours, but in the evening, the rates may be as little as six dollars an hour. And if you have to call long-distance, the time is charged against your phone bill (many services have local numbers you can call, so you can avoid paying long-distance bills). The telecommunication options available by home computer are expanding every day, and there are no signs of slowing down. Modems remain one of the most popular peripherals for Commodore 64 owners, a fact not lost on the major on-line systems. Will this expansion continue? CompuServe is already planning to increase its mainframe computer capacity by 90 percent over the next two years. And everyone else seems to be following suit.

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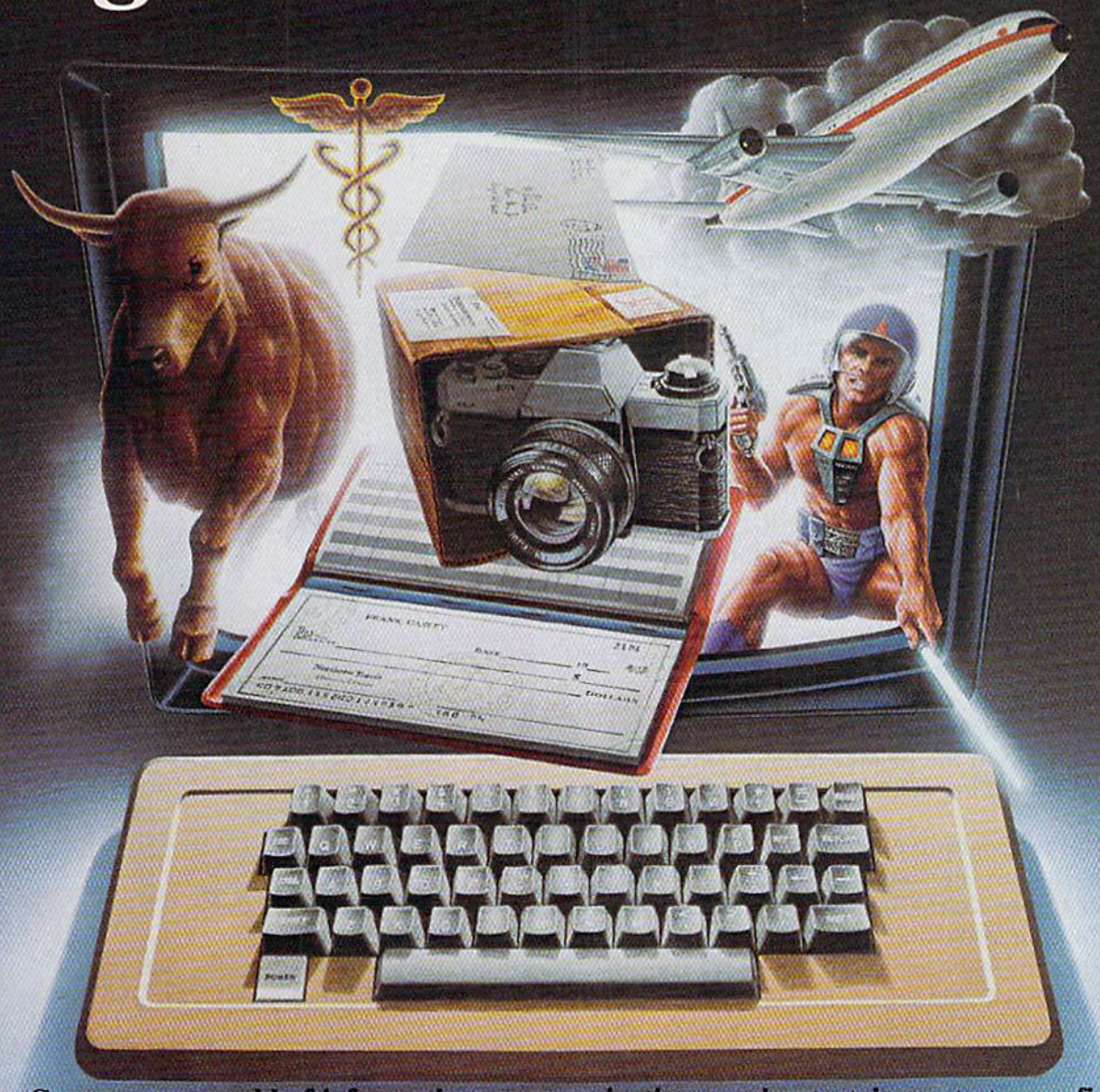

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A Visit With Sweetums The Ogre

Fred D'Ignazio, Associate Editor

I had the thrill of my life last week.

I'm the "children and computers" commentator and product reviewer for The NewTech Times TV show (each week this fall and next spring on PBS), and I got to visit Jim Henson's Muppet Mansion in New York City to review the *Muppet Learning Keys*, a new computer keyboard for children from Henson Associates, Sunburst Communications, and Koala Technologies.

When I stood outside on the street, the Muppet Mansion looked to me like any other posh dwelling on Manhattan's upper East Side. But when I walked through the front door, I left the city behind and entered the world of Jim Henson's imagination.

The mansion's foyer is dominated by a three-story-high muppet balloon—rather, balloons on top of balloons on top of balloons stretching up to the distant ceiling. Tiny muppets cling to the balloons and float around them on all sides.

The muppet puppeteer's room is around the corner, behind the stairs, and there I saw a drawer full of Kermit heads and Gonzo perched lazily atop a bookshelf.

I left the balloons, the puppeteers, and the Kermit heads behind and climbed the stairs. Sweetums the Ogre was waiting for me on the second floor. Sweetums is a tall (very tall) ogre whose film career dates back to a monster "extra" part he played in Kermit the Frog's movie debut, *The Frog Prince*, in 1971.

Sweetums is not the sort of creature I'd like to bump into on a dark night. He's big, hairy, and all mouth. And he doesn't walk, he gallops. When he saw me, he galloped across the floor and gave me a friendly, bone-stretching ogre hug. I felt like I'd been swallowed by a furry rug.

Sweetums volunteered to be my child tester

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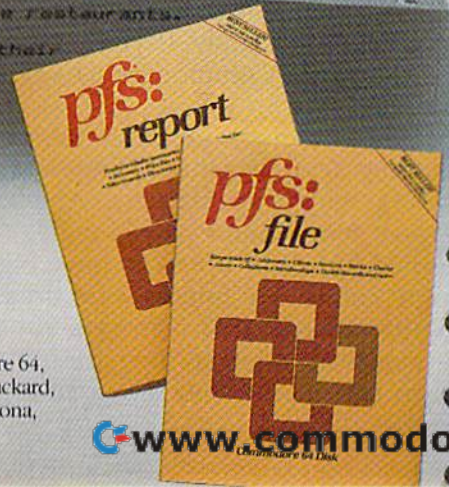

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and help me review the *Muppet Learning Keys*. I've worked with lots of children, but I've never worked with an ogre before, so there were a few things we had to get straight. First, I had to tell Sweetums not to eat the floppy disk that comes with the keyboard (he got the disk stuck on his snaggle tooth). Second, we had a very undignified tug-o'-war when we first got the keyboard. Sweetums wanted to play with the keyboard first, and when I told him I needed the keyboard, he turned his back to me and pouted. Third, Sweetums does not speak English. He only speaks "ogre." So I had to learn what things like "Grrrr . . . Mmmmm . . . Hrrumph . . . Um-Be-Dum-Be-Dum-Be-Dum-Be-Dum" meant. I paid attention (it's hard not to pay attention to Sweetums), so I eventually caught on.

My favorite part of the review was when Sweetums picked up the Commodore 64 keyboard and tried to press the keys. His big, furry monster fingers squashed six or seven keys at a time. So now I know. If you have an ogre in your family, a Commodore 64 keyboard is not adequate.

But you might look into the new *Muppet Learning Keys*. Sweetums' fingers worked fine on the big, widely spaced keys. And so did my adult fingers, too. When I played with the keyboard I learned how nice it was to have big keys in bright colors. My fingers were tired of cramped computer keyboards. The keys are arranged in alphabetical order, so they are not suited for touch typists. But they are great for the one-fingered typists of the world, kids or adults.

There were two things about the keyboard I liked in particular. First, it was like a non-computer person's version of the Macintosh "desktop" environment. The Macintosh, as you probably know, has a display screen that shows little icons, or pictures, that are supposed to resemble items found on a person's desk at his or her office, including a wastebasket, file folders, an alarm clock, and so on. This "desktop" metaphor is all right for someone in an office, but it's not very exciting for little kids and for people who don't get that turned on by desks. And, besides, it's not really a desk, it's a picture screen. And the pictures are black and white and so tiny you have to squint to see them.

The "Anywhere" Desk

The *Muppet Learning Keys* also pretend to be a desktop. They plug into the Commodore 64 keyboard in joystick port 1. The keyboard is 14 by 15 inches, and about an inch high. You can prop the keyboard in your lap, or better yet, you can dive to the floor, and set up your "desk" there.

On top of your desk is a ruler, marked in inches, with big numbers, from 0 to 9. The numbers are really the number keys on the keyboard—rounded bumps on a flat, membrane keyboard.

Beneath the ruler is a paintbox with lots of watercolors, including yellow, orange, blue, red, and violet. Each color has a label beneath it. To select a color, you just stick your finger in the appropriate paint dish.

A little green chalkboard sits beneath the paintbox. Written in white chalk are the letters of the alphabet, in capital letters, and in alphabetical order. Underneath the chalkboard is one of those marbly assignment books with a Space key (it looks like outer space, with a comet and stars), and round arithmetic keys: plus, minus, multiplication, and division.

On the right side of your desk is a button that looks like you could pick it up and pin it on your shirt. It says "Zap" and you use it to escape from an activity and go back to a menu.

Beneath the Zap key is an eraser, so you can back up and erase mistakes. Next to the eraser is a compass. It's like a real compass that tells you North, South, East, and West, with arrow keys pointing up, down, to the right and left. It's an official Frog Scout Compass. You know that for sure because there's a famous green frog's face in the center of the compass.

In the lower righthand corner of the desk is a comic book. It's opened to the middle (you can see the staples). There are four cartoons showing.

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There is a picture of Super Gonzo being launched by a cannon toward a brick wall shouting, "Oops!" When you press this picture, you can undo a mistake you've made.

There's a picture of Miss Piggy tied up on the railroad track crying, "Help!" If you use computers regularly, it's not hard to figure out what this key is for.

A cartoon of Fozzie Bear with a police cap and STOP sign and a picture of Kermit on a motorcycle underneath a green traffic light that says GO disguise keys that enable you to start and stop activities and animate pictures on the screen.

To make your desk work, you need software. And now we've come to the *Muppet Learning Keys'* chief drawback. For $80, the keys come with a "Muppet Discovery Disk" created by Sunburst Communications. But that's it for now. According to Koala, many more disks are on the way, as well as overlays that fit on top of the keyboard so you can use it for different activities with different aged children. But no more software now is a real limitation, since the *Muppet Learning Keys* are a real keyboard, and it would be great if children and adults could use it as an alternative to the standard keyboard. But to do that, they need software.

The software that comes with the keys is limited, but it's also good. And this brings me to the second reason why I like the keyboard: It has succeeded in turning the computer into an electronic playground. I've claimed in many of my columns in the GAZETTE that my children (ages 8 and 5) spend most of their time on our Commodore 64 just banging on the keyboard and not using any software whatsoever. They know the computer far better than I do, just by experimenting with the different keys and looking at the display screen to see what pops up. This is "discovery learning" at its best, and it's also what you get with the *Muppet Learning Keys.*

To find out more about the *Muppet Learning Keys,* contact:

Koala Technologies
3100 Patrick Henry Drive
Santa Clara, CA 95052-8100
(408) 986-8866

When you call Koala, tell them Sweetums and Fred sent you. And tell them to get busy making new software!

The Computer Book Shelf

When I'm not in faraway places playing with ogres, I'm back in my house in Roanoke, Virginia, writing—and reading. Here are some of the books I've looked at recently that I recommend to families.

Scholastic Books has a new series of four computer activity books which are popular with me and my eight-year-old daughter. Each book costs only $4.95 and contains dozens of programs that kids will like to enter into their Commodore 64.

The books are all written by Paul Somerson and Stephen Manes and are titled *Computer Space Adventures, Computer Craziness, Computer Olympics,* and, my favorite, *Computer Monsters.*

The books don't start with a boring table of contents. Instead they begin with messages like "Greetings, Earthling!" or "Welcome, Human!" Then they tell kids the basics they'll need to know to enter a program on the computer. And they start showing kids programs, sample output, and weave it all into scenarios starring silly creatures, secret space missions, nutty numbers, and magic codes—a delightful smorgasbord for your 8- to 12-year-old.

When you get tired of monsters and rocket ships, you can come back to earth and try *1, 2, 3, My Computer & Me!* by Jim Muller (Reston, 1984, 96 pages, paper, $12.95). Muller is the Honorary Turtle and co-founder of the Young Peoples' Logo Association (P.O. Box 855067, Richardson, TX 75085—or call the Midnight Turtle bulletin board on your computer by dialing 214-783-7548).

1, 2, 3, My Computer & Me! is a workbook that children (ages 5 and up) can do with their parents. The book is an introduction to Logo thinking, programming, and playing. There are lots of exercises and experiments to do, and lots of blank space in the book for children to draw their own pictures, take notes, color, and just doodle. If you and your children are just beginning to use computers, I recommend this book as a very gentle introduction.

If your children are even younger and your wallet is flatter, you might want to look at *COMPUTERS!* (Golden Book, 1984, 32 pages, paper). This book, at only $1.95, has to be the least expensive computer book on the market, and one of the best buys.

As with Muller's book, the emphasis in this book is on parents and children working at home together. The book is suitable for children ages five and up, and has two pages of stickers, games, experiments, and lots of other activities that parents and children can do with or without a computer. So get your pencils, glue, scissors, and crayons, Mom and Dad, and begin computing!

After you've been down in the trenches with your kids for heavy-duty glue-and-sticker computing, you may want a change of pace—food for thought instead of something gooey to stick to your fingers. In this case, you might look at *Buy A School For Your Home* by Judy Lower with Ed Neil and Tim Finger (Reston, 1984, 265

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pages, paper, appendices, bibliography, $14.95) or *Bank Street's Family Computer Book* by Barbara Brenner with Mari Endreweit (Ballantine, 1984, 251 pages, appendices, bibliography, indexes, paper, $8.95).

Both books are intended for families who are just beginning. They answer your basic questions—for example, "Why should we buy a home computer?" And they give you plenty of information about how to buy a computer, how to shop for software, and most important, how to use the computer and software once you've got them home.

Buy A School has separate chapters on using computers with different aged children, and carries with it a strong emphasis on families using computers together and using computers as a learning tool. It also contains a 110-page section reviewing some of the better family programs.

Family Computer Book is rich with case histories about real families who have begun computing, based on the extensive experiences of the researchers at Bank Street College's Center for Children and Technology. It guides parents through the ins and outs of computer jargon and offers specific tips on how to select the right computer equipment and software for the family.

Both books are especially helpful, however, because they don't just keep to the specifics—the logistics—of family computing. They also have the insight and sensitivity to explore the bigger issues parents face when they invest in a computer for their family.

For those families who are past glue-and-crayons computing, and have already mastered the fundamentals, I recommend Eugene Galanter's *Kids & Computers: Advanced Programming Handbook* (Putnam/Perigee Books, 1984, 224 pages, appendices, index, paper, $8.95). This is the third in the series of Kids & Computers books by Galanter and is intended for the older child, age 12 and up, who is already programming. I liked the book because it reminded me of a junior version of my computer science courses back at the University of North Carolina. This book is a home-study course in computer science for a student to take to supplement a course he or she is taking in school, or to read alone to pick up some new programming tricks and techniques like structured programming, using files and data structures, and creating basic sorting and searching algorithms. The book is thorough, but I offer one warning: It reads like a textbook. It's for the child who is already motivated, and not for the hesitant beginner.

Catalog Time!

Each month I get a bushel basket full of new computer catalogs brimming with new software suitable for the family. I recommend that you take a look at several of these catalogs because they give you the chance to comparison shop for different kinds of software right in your own home.

Here are the best catalogs I've received:

Special Learning Ed Software (SLED)
(specializing in spelling programs)
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Opportunities for Learning, Inc.
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South Brentwood, NY 11717
(516) 231-1220

The Children's Software Catalog
Evanston Educators, Inc.
1718 Sherman Avenue
Evanston, IL 60201
(312) 475-2556

Sunburst Educational Computer Courseware
(preschool to adult)
Sunburst Communications
Room BC39
Washington Avenue
Pleasantville, NY 10570
(800) 431-1934

Microcomputer Educational Programs MCE, Inc.
157 South Kalamazoo Mall
Kalamazoo, MI 49007
(800) 421-4157
(in Michigan, 616-345-8681, collect)

Scholastic Microcomputer Instructional Materials
(grades K–12)
Scholastic, Inc.
P.O. Box 7503
2931 E. McCarty Street
Jefferson City, MO 65102
(800) 325-6149
(in Missouri, 800-392-2179)

1984 Instructional Materials Catalog
DLM Teaching Resources
P.O. Box 4000
One DLM Park
Allen, TX 75002
(800) 527-4747
(in Texas, 800-442-4711)

Time Saver II
(preschool to adult educational software)
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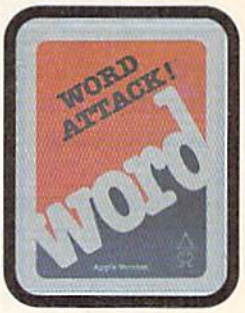

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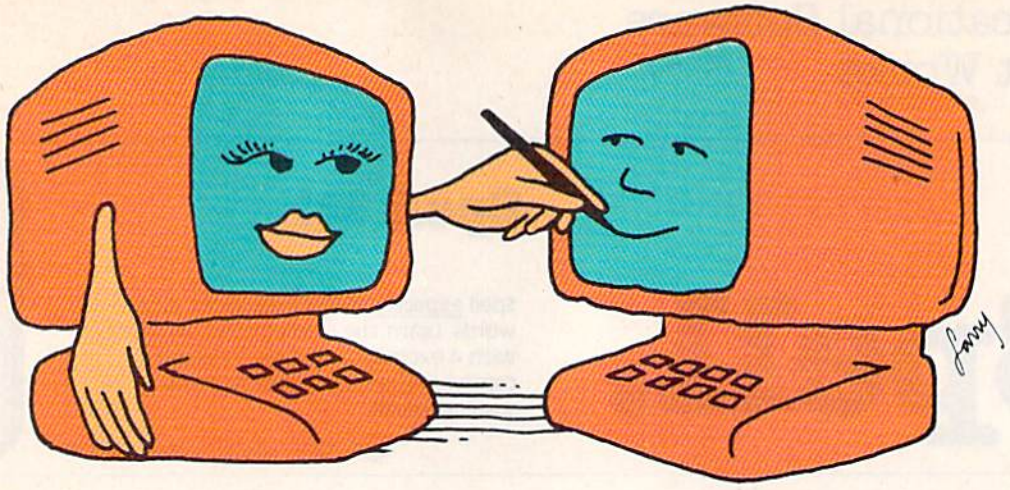

VIC Magic Draw

Kevin Gough

Turn your computer into a high-resolution sketchpad with this program. The pictures you create can be saved to tape or disk. Requires at least 8K of expansion memory.

Here's a program that lets you create high-resolution pictures on a 176 × 160 dot grid. "VIC Magic Draw" requires 8K or more expansion memory. After the program is typed in and saved to disk or tape, you must change the start of BASIC and the screen, before loading the program.

There are two ways to do this: manually or with a boot program. Manually, type POKE 648,30:SYS 58648 and press RETURN. Now type POKE 642,32:SYS58232 and press RETURN. Your VIC will display the usual "CBM BASIC V2" at the top of the screen, except the number of bytes free is 3584 less than when you turned your VIC on. That's because the start of BASIC and variables have been moved (to 8192).

The other method for moving memory is a boot program that automatically loads Magic Draw. Program 1, "Magic Draw Boot," does this for you. It consists of five lines of BASIC. If you're using a disk drive, enter and save it as is. If you're storing Magic Draw on tape, change the device number at the end of line 30 from 8 to 1. Make sure you store this boot on your tape before the Magic Draw program. If you're storing Magic Draw on disk, then change the device number at the end of line 30 from 1 to 8.

Three simple machine language programs are automatically POKEd into certain areas after running Magic Draw. They have the functions of saving and loading hi-res pictures that you create, from disk or tape, and clearing the screen of any extraneous matter. These routines are DATA statements in the BASIC program, so take care typing them in. A checksum is performed to make sure the data was typed in correctly, so if there is any wrong data you will be notified.

Here's a list and explanation of Magic Draw control keys.

SHIFT/CLR: This clears the high-resolution screen of any plotted dots. After the first run of Magic Draw, you'll want to clear the screen of any random garbage. After clearing it, you'll see the flashing pixel at the center of the screen.

SHIFT/CRSR (up): This moves the pixel cursor up one dot.

CRSR (down): Moves the pixel cursor down one dot.

SHIFT/CRSR (left): Moves the pixel cursor left one dot.

CRSR (right): Moves the pixel cursor right one dot.

HOME: Moves the pixel cursor to the center of the screen.

X: Plots one dot in the current position of the pixel cursor.

Z: Erases one dot (if present) under the pixel cursor.

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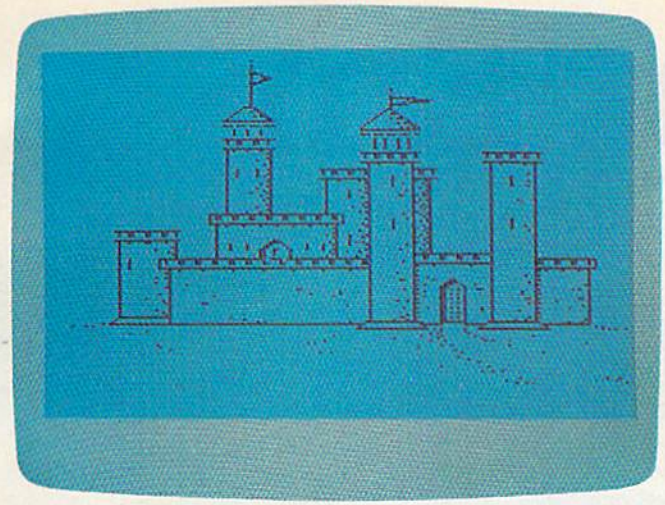

This hi-res castle was created with "VIC Magic Draw."

D: Draws continuously wherever you move the pixel cursor. Press *D* again to turn this function off.

E: Erases continuously wherever you move the pixel cursor. Press *E* again to turn this function off.

@: The "at" key creates a box-shaped figure to the right and below the pixel cursor. The size of the box is controlled by the plus (+) and minus (−) keys.

+: Increases the size of the box figure by one dot each time the key is pressed. The limit is 90 dots.

−: Decreases the size of the box figure by one dot each time the key is pressed. The limit here is a box two dots square.

G: Graphs a pattern of dots on the screen 8 × 8 dots square. This is useful for drawing precise, dimensioned pictures. Press SHIFT and *G* to erase the graph.

Q: Quit the high-resolution draw mode. The screen will clear and return the normal VIC cursor. You can run the program again and still retain your previously drawn picture.

S: Save a picture to disk or tape. Each picture takes up to 3524 bytes. Pressing *S* clears the high-resolution screen and asks for the name of your picture. You next enter 1 for disk or 2 for tape save. After it is saved, you return to the high-resolution screen and your picture. Tape users should make sure that buttons on the Datassette are pressed down. You will be prompted with TAPE OFF? before being prompted to PRESS RECORD AND PLAY ON TAPE. Just press RETURN at the *tape off* prompt and then the record and play buttons on the Datassette.

L: Load a picture. You'll be prompted to type in a name and then a 1 for disk or 2 for tape. If using disk and the picture is not found, an error message is generated. After the picture is loaded, draw mode is entered and your creation is displayed on the screen. The pixel cursor flashes in the middle of the screen.

Adding More Functions

You'll find you have a good amount of memory free after Magic Draw is up and running. Press *Q* and type ? FRE(0). The amount of bytes free is determined by the size of your memory expansion. The extra memory allows you to add new functions. A screen dump to the printer (1515 or 1525) has been added. I've used the program on page 112 of *COMPUTE!'s First Book of VIC*. Now, suppose your screen and the bottom half was blank. You wouldn't want to wait double the time it takes to print out the entire screen. So we must add a line between line numbers 6 and 7. This BASIC line will also serve to end the print routine when the printer is done with the screen:

```
GETA$:IFA$="F4"ORL>154THENPRINT#4,CHR$
(15):CLOSE4:RETURN
```

If you press f4 while the printer is dumping the screen, the PRINT routine will end and you'll be returned to the draw mode. Printing the entire screen takes about 35 minutes.

See program listings on page 156.

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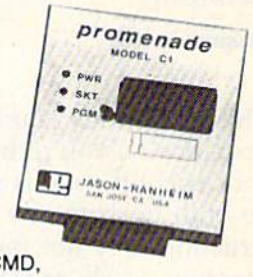

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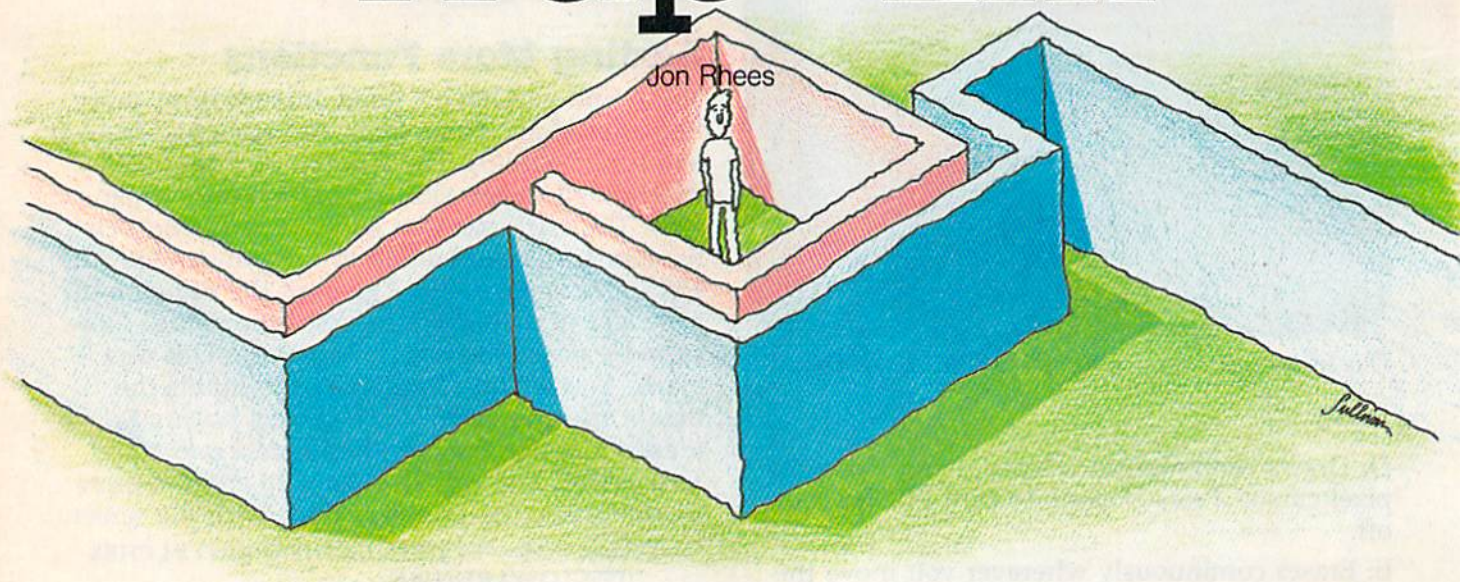
Trap 'Em

Jon Rhees



Build fences around your opponent without letting yourself get hemmed in. This simple game includes a variety of options to keep it ever-challenging. Originally written for the 64, we've added a VIC version.

This game puts you in the construction business. Specifically, you're building fences, and the construction code is straightforward: Fences may be built horizontally or vertically; your construction may not touch the outer walls, your previous work, or your opponent's work; nor can it touch any obstacles that may be strewn in your path.

You score points by outlasting your rival. If his fence crashes first, you win the round and a number of points based on the amount of time consumed by the round. The first player to reach 100 points wins the game.

The choices available in setting up the game are: one or two players; joystick or keyboard input; adding obstacles to the playfield; and increasing or decreasing the speed of the game.

Approximately 30 percent of the program—the game action itself—is written in machine language. The sound, timing, and scoring routines are written in BASIC. Accompanying the article is a line-by-line description of how the 64 version works. The VIC version is similar, so the program description also applies with a few exceptions.

Commodore 64 Program Description

Lines	Description
100–120	Call the option routines and initialize variables.
130	Checks for winner and jumps to win routine.
140–150	Draw screen border.
160	Checks for barrier option, jumps to subroutine.
190	Positions players and directions. (Locations 251–254 hold low and high bytes of each player's position. Locations 837–838 hold player's directions.
200	Initializes time and calls machine language routine, which returns to BASIC when collision occurs. Score is then determined based on amount of elapsed time.
210–230	Check value in location 834 for number of player in collision, then jump to appropriate routine to update winner's score.
245–250	Flash colliding fence.
270–480	Allow player to choose options.
490–510	Randomly place barriers on screen.
520–550	Initialize sound and variables.
560–660	Print scores and totals, then jump to beginning.
670–1350	Load machine language portion of Commodore 64 version.

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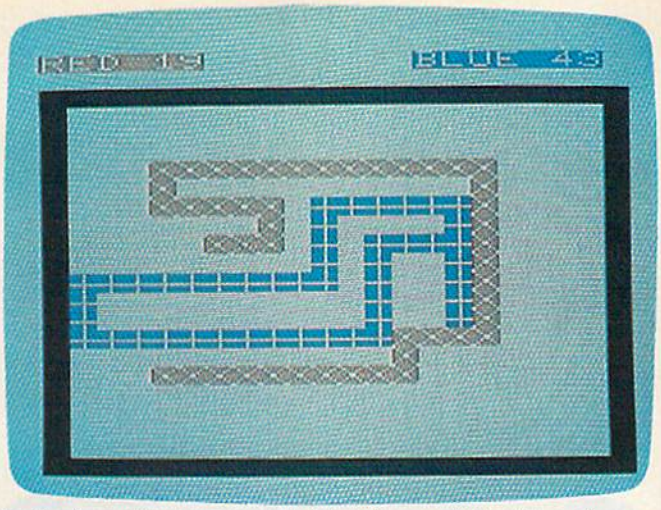


In the two-player game, Red has trapped the Blue player (VIC version).

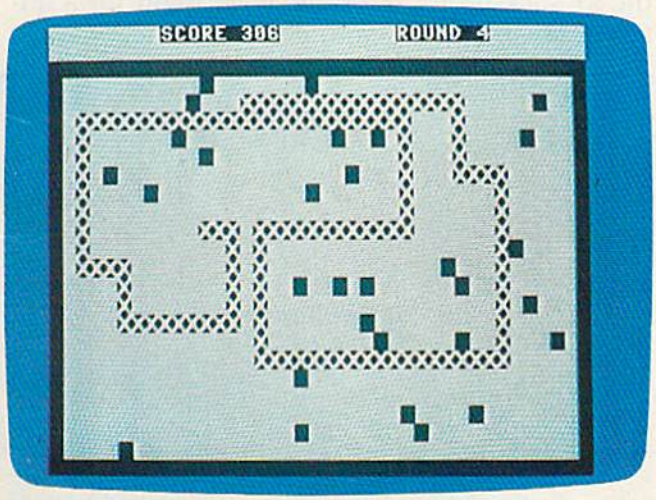
The game is best when played by two people. The one-player option was added so players could practice if no opponent could be found. You race the clock, trying to survive as long as possible. If you use the practice option, the most challenging level is nine, with obstacles. You have ten rounds to rack up as many points as you can.

Note To VIC Users

Programs 2 and 3 comprise the VIC version of "Trap 'Em." First, type in Program 2, the game loader, and save it to tape or disk. If you're using tape, change the 8 to a 1 in line 130.

Next, type in Program 3, the main game, and save it with the filename "VT". If you're using tape, be sure to save Program 3 *immediately* after Program 2. This will automatically load Program 3. In the VIC version, the ML routine is POKEd in lines 100–880 of the loader program.

See program listings on page 157.



Practicing in the one-player game, with barriers (64 version).

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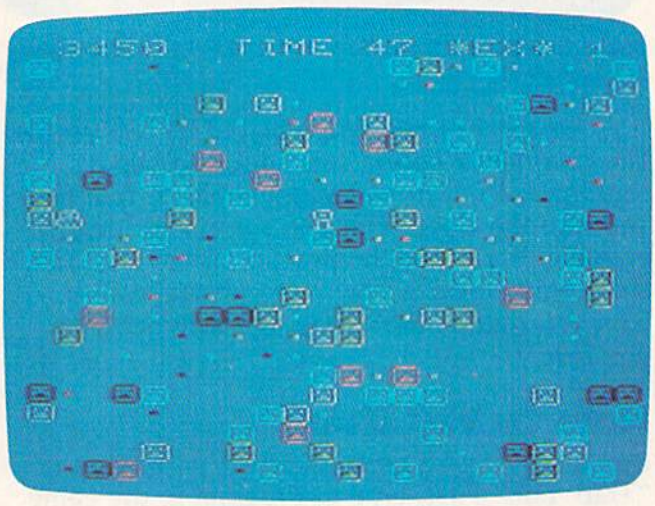
George Hu

In dire need of energy crystals, your spaceship has landed on an alien planet. But the crystals are guarded by soldiers and a vicious droid. Act fast because time is running out. For the VIC and 64; joystick required.



Press the fire button to instantly create more crystals—and soldiers (VIC version).

You are a space explorer from the planet Earth. During your voyage, your ship encountered a meteorite belt and most of your ship's energy was drained in protecting the ship. You encounter a strange planet which contains crystals that can restore your ship's power. Unfortunately, the planet is guarded by dormant soldiers and vicious droids. You send a probe, nicknamed Chomper, to collect the crystals.

Using your joystick maneuver Chomper across the planet's surface and gobble up as many energy crystals as fast as you can. For every crystal you collect, you receive 150 points. If you hit a soldier, you lose 450 points. If you allow a droid to catch Chomper, he is destroyed—and that spells doom for you and your mission.

Racing The Clock

You have 45 seconds in which to collect as many crystals as you can. If you earn 3000 points, you will be given bonus time. The first bonus is 45 seconds. Each bonus you earn decreases the next bonus time by 5 seconds. If you earn 6 bonuses, you get a new Chomper in a different section of the planet, with 45 more seconds of play. If you would like more crystals, press the fire button. But beware: More crystals mean more soldiers.

The game begins with a diagram of joystick positions. Push the joystick right for easy play; push it left for harder play. Pushing the stick up increases the number of droids: up to seven for the 64 version or two for the VIC version. After your selection, the playing field and the droid(s) are randomly placed on the screen. The score, time remaining, and bonuses are displayed at the top.

After the game is over, you may be asked to enter your name for a high score. Type in your name and press RETURN. Another diagram will appear with the session's high score on top. Push the joystick up for the same level, right for a different level, and down to end the game.

Variable	Contents
L	Score needed for bonus
S	Present score
G	Total bonus time received
V	Bonuses reached
R	Amount of next bonus
W	Droid being controlled (1 or 2)
X1	Chomper's X coordinate
Y1	Chomper's Y coordinate
C	Chomper's screen location
X(N)	Droid's X coordinate
Y(N)	Droid's Y coordinate
D(N)	Droid's screen location
C1	1 or 2 droids
F	Ratio of Chomper moves to droid moves
BS	High Score
N$	Name of high scorer
M	Multi-use counter

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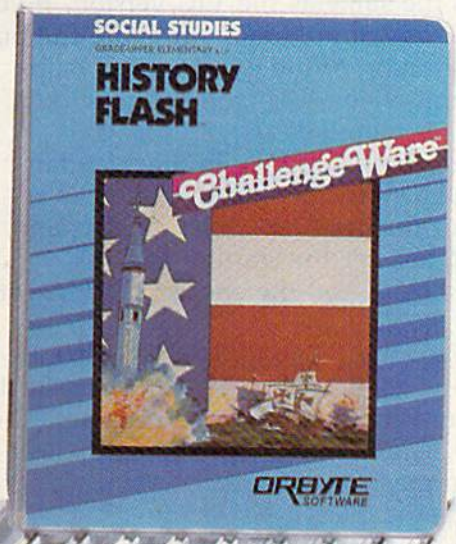
Who Invented the Submarine?

Who was the only president to serve more than 3 terms?
The purchase of what state was known as Seward's Folly?



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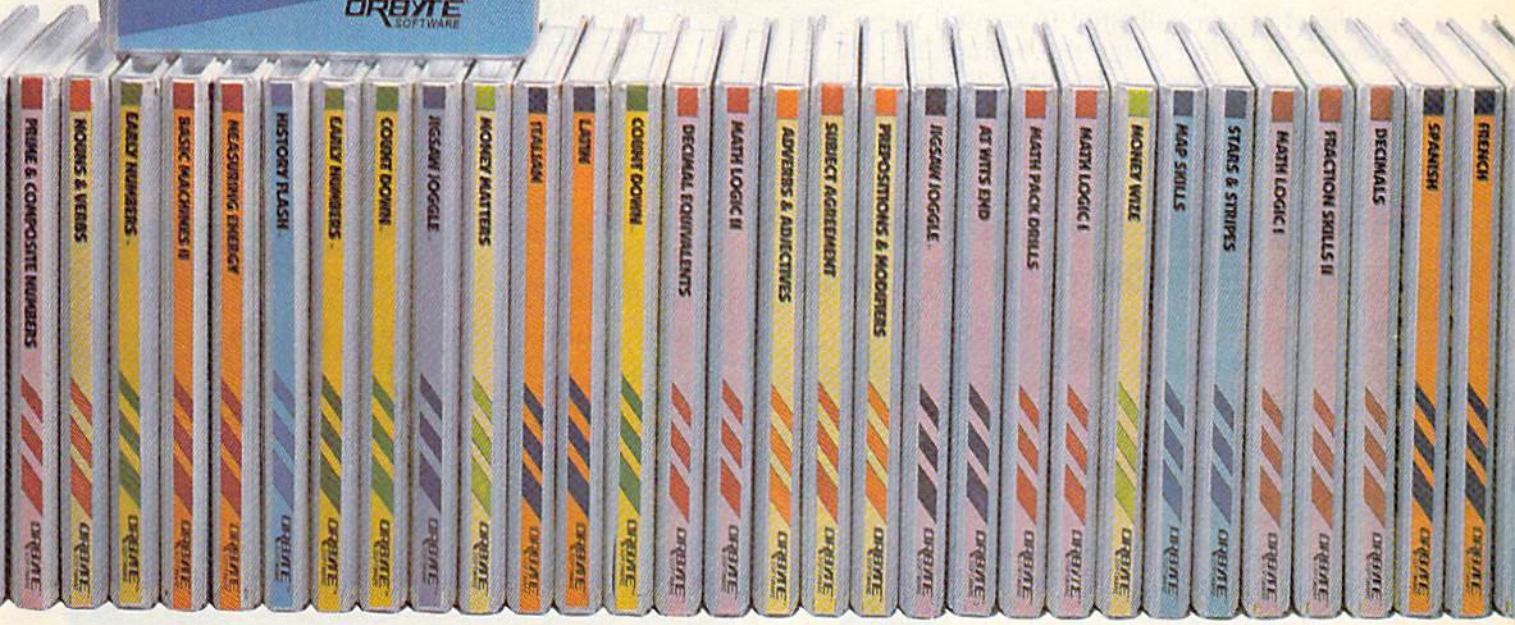

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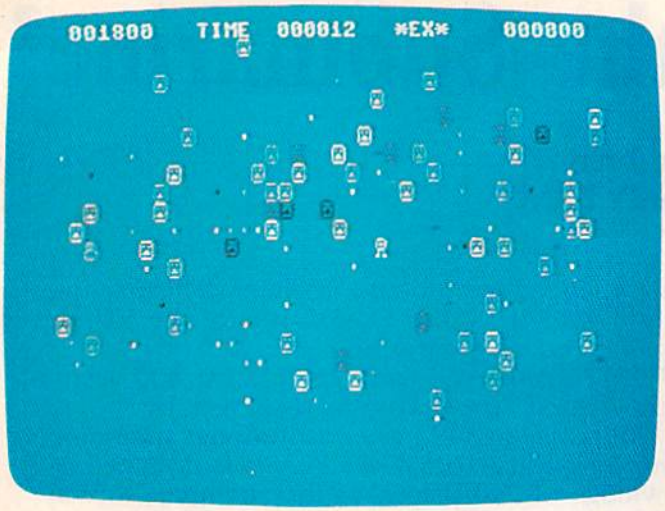

Your chomper has limited time to mine energy crystals and avoid the droids (64 version).

Customizing The Skill Level

If you find the game is too hard, or too easy, the skill level can be adjusted in several ways. The easiest way is to change the bonus time. By changing the value of R in line 390, the bonus time can be changed. By changing the 6 in the last statement in line 210, you can change the number of bonuses required to get a bonus screen. By changing the value of F in lines 460–480, you can adjust the ratio of Chomper's moves to the droid's moves.

64 Version Notes

Other than allowing up to seven droids, the 64 version plays the same as the VIC version. If you have a black-and-white screen, press the fire button at the beginning of the game until a B appears. This adjusts colors so you can play on a non-color TV or monitor.

The 64 version is entirely in machine language, and MLX (elsewhere in this issue) is required to enter the program. After loading and running MLX, answer the starting address prompt with 49152, and the ending address with 50891.

To run the game, type SYS49152. Also, be sure to load the game with LOAD"*filename*",8,1.

If you'd rather not type in the program (VIC version only), send a blank tape, $3, and a self-addressed stamped envelope to:

George Hu
16212 122 Ave. SE
Renton, WA 98055

See program listings on page 165.

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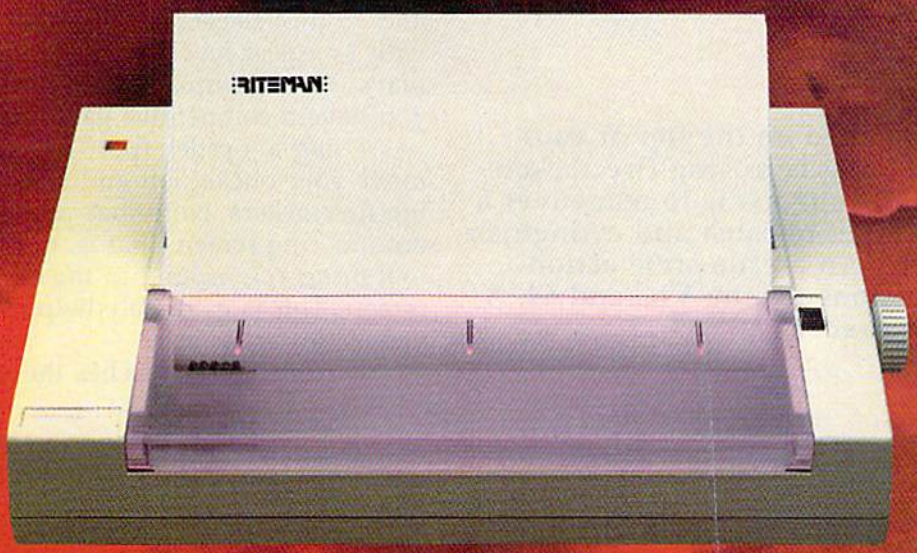

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Kablam!

Stephen Ressler

A prankster perched on the top of your apartment building is tossing firecrackers on to the street. Your job is to maneuver a water-filled bucket to catch and extinguish the firecrackers. An arcade-style action game with versions for the VIC and 64. A joystick is required.

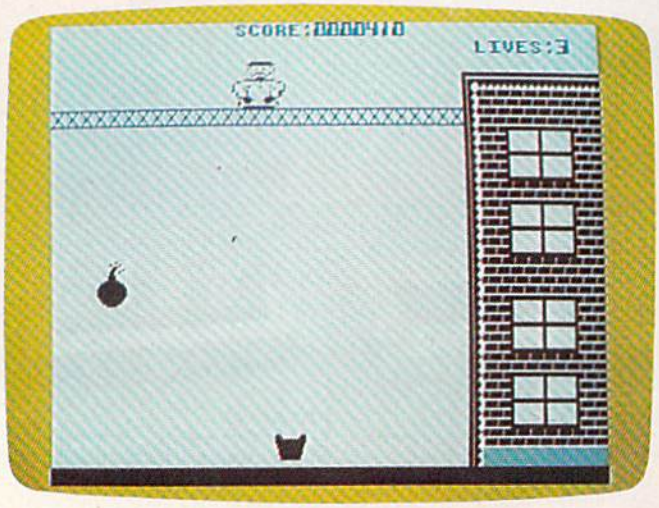
Your once-quiet neighborhood is suddenly being showered with firecrackers. And the culprit won't let up. You arive on the scene in a mad dash to extinguish the firecrackers in a bucket of water.

Take It To The Limit

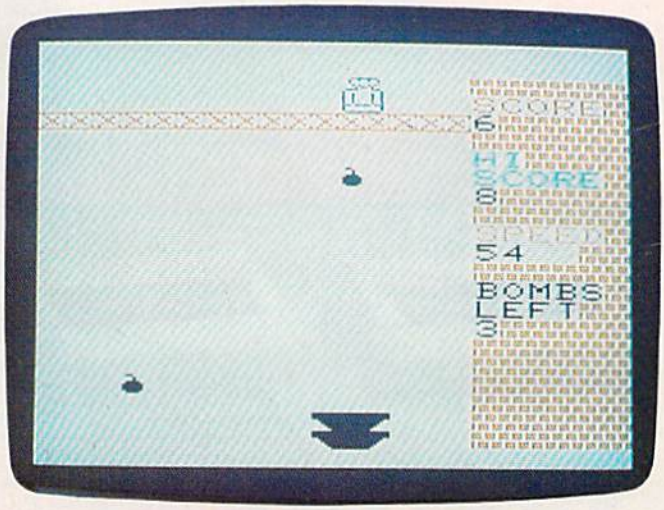
When the title screen appears, you'll be asked to choose one of 15 skill levels, 1 being the slowest and 15 the fastest. You'll probably want to start with an easier level at first to see how the game plays. Then go up a couple of skill levels until you have a competitive game.

Using a joystick (port 2 in the 64 version), move your bucket left and right to catch the falling firecrackers. Note that your bucket can "wrap around" the screen, that is, moving to a far edge will bring you around to the opposite side of the screen. This is extremely helpful at the more advanced levels.

If a firecracker reaches the ground, an



A quick move to the left might catch the firecracker dropped by the prankster (64 version).



The player faces a decision in the VIC version of "Kablam!"

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explosion is heard, and one of your four plays is lost. The game ends only when you're out of plays. You can then choose another level and play again.

If things get too frantic or you need a break in the middle of the game, pause the action by pressing the space bar. Press the CTRL key to resume the game.

If you'd rather not type in the game (64 version only), send a self-addressed stamped envelope, a blank tape or disk, and $3 to:

Stephen Ressler
18 Erindale Drive
Marlton, NJ 08053

See program listings on page 168.

Special VIC Notes

The VIC version of "Kablam!" is similar in play to the 64 version, but there are a few differences. You have a total of three plays rather than four, and instead of 15 difficulty levels, there are five. However, the speed of each firecracker increases with each one you catch and decreases with each one you miss—a kind of self-adjusting handicap.

The VIC version also displays the high score, current score, firecracker speed, and firecrackers (plays) left. The SHIFT LOCK key serves as a pause button.

Written entirely in machine language, the VIC version must be entered using a special Kablam! version of "Tiny MLX," found elsewhere in this issue. Once entered and saved, simply load and run in an unexpanded VIC.

If you have 8K or more expansion for your VIC and a copy of the full-featured VIC MLX (published last month and in earlier issues), you don't have to type in Tiny MLX. Insert the expansion memory, turn on your VIC, and enter this line: POKE 642,32:SYS 58232. This POKE and SYS moves the start of BASIC into the memory expander, where it won't interfere with the machine language program. You can then load the regular VIC MLX, and type in Kablam!.

The starting and ending addresses are built into the special version of Tiny MLX. If you're using an 8K or greater expander with regular MLX, use 6291 as the starting address, 7682 as the ending address.

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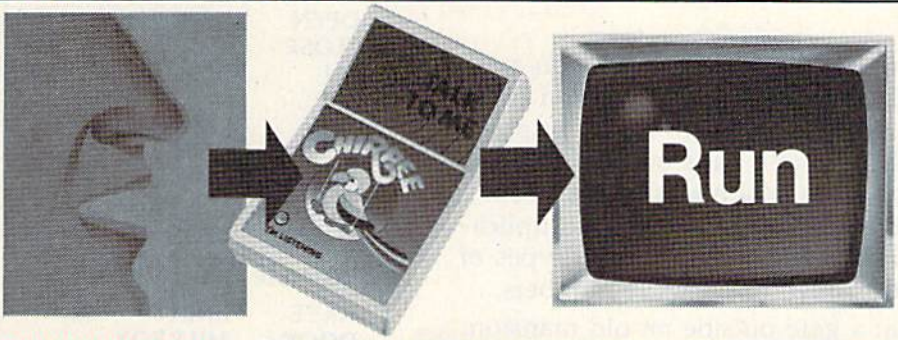

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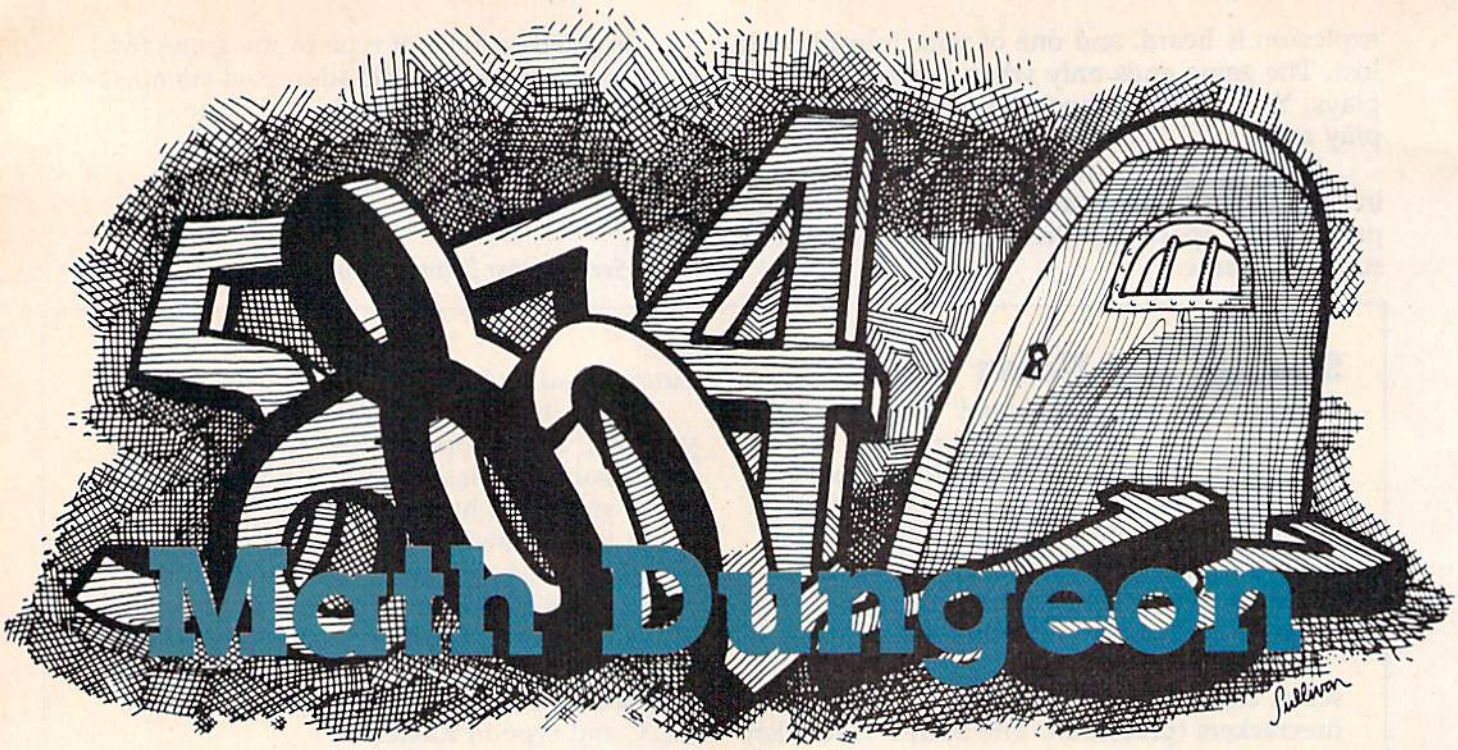

Can you escape the dungeon by finding the key which opens the door? First, you must get by the math monsters who block your way, asking questions about addition, subtraction, multiplication, and division. An entertaining, educational adventure game for the VIC (8K or more expansion) or 64.

At the beginning of "Math Dungeon," you are asked for a difficulty level. Levels one and two deal only with addition and subtraction of positive numbers. Level three adds multiplication and division (still only positive numbers). Four brings in negative numbers, covering multiplication and division. And five asks all four types of questions about positive or negative numbers.

You begin at a gate outside an old mansion. First, find a way through the gate and get to the front door, which is closed. If you can get the door open, you can enter the mansion and you'll be whisked to the underground dungeon. Your adventure begins.

As you wander through the dungeon, you may find different colored keys and doors. The keys are color coded according to the door they open. One of the doors leads out of the dungeon (to end the game).

In your search for the exit, you may also find a map. It can be very helpful. Once you get it, type MAP to see where you are. The map uses R to represent rooms, H for hallways, M for monsters, and * for your location.

The Command Vocabulary

This game recognizes a limited number of words. The verbs are:

GET	Pick up an object
INV	Inventory
LOOK	Look around
OPEN	Open a door
CLOSE	Close a door
ON	Turn on a light
OFF	Turn off a light
MAP	Look at the map
N	Go North
S	Go South
E	Go East
W	Go West

The possible nouns include:

GATE	LIGHT
DOOR	MILKBOX
NOTE	GOLD
KEY	MAP

And if you find yourself in a jam, typing ALGEBRA may get you out. Certain commands need only a single word or letter, like LOOK or N. Others combine a noun with a verb, like GET GOLD. The verb usually goes first.

Information about the dungeon is kept in an array FL(10,10), which is filled with rooms, hallways, and monsters in lines 1620–1850. Lines 1620–1640 randomly place monsters, according to the level chosen at the beginning. Lines 1650–1680 randomly place hallways and rooms

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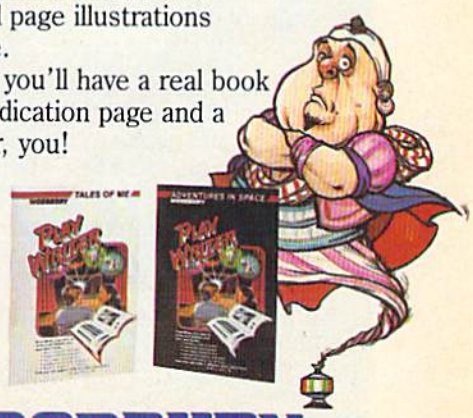

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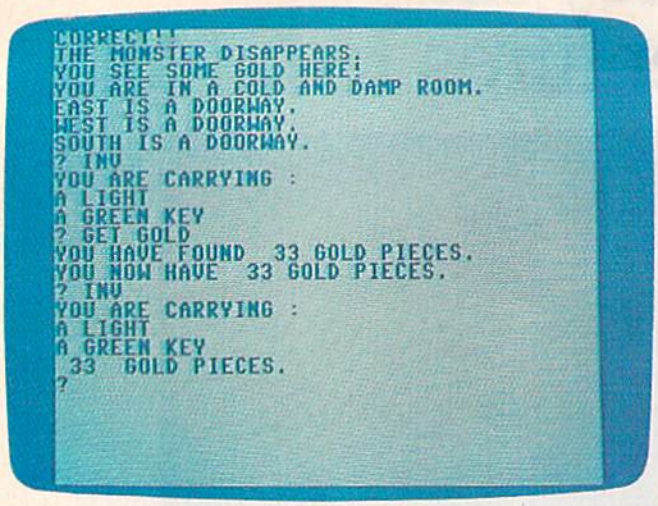
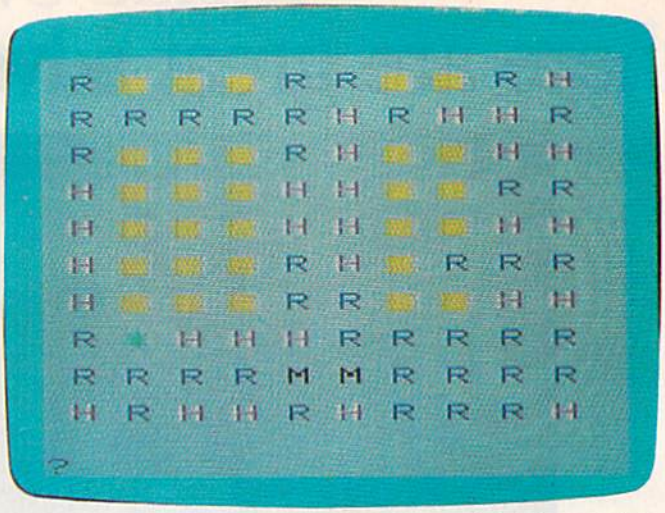


Vanquish the Math Monster by answering a question correctly (64 version).



A map of Math Dungeon is behind one of the doors (VIC version).

throughout the dungeon. Lines 1690–1710 make sure a path is available to each monster. Lines 1720–1770 randomly place colored keys and doors around the array.

The game runs on both the VIC and 64. Playing it on the VIC requires at least 8K of expansion (16K or 24K will work). The SYS at line 120 determines which computer is being used (according to whether there are 22 or 40 columns on the screen) and sets the variable CC. This information is used to format anything which is printed to the screen.

If you would like a copy of Math Dungeon (tape only), send a self-addressed stamped envelope, a blank tape, and $3 to:

Richard Lowe
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See program listing on page 162.

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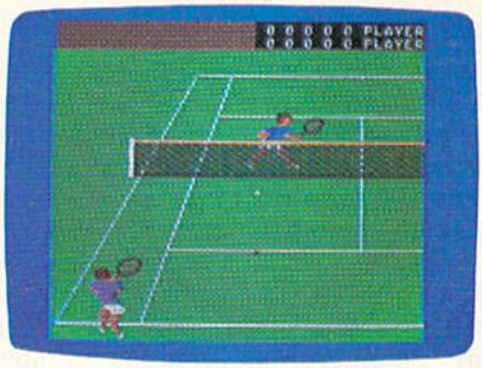

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Magazine Indexer

Daniel Miller

"Where's that article on making backups?" If you're tired of spending time looking through back issues of magazines for an elusive article, let your computer do the searching with "Magazine Indexer." For the VIC or 64, tape or disk.

If you're like a lot of people, you subscribe to several magazines. Every month there are articles you intend to read, or games and utilities you plan to type in. But there's just not enough time. When you eventually get around to them, a new issue has arrived. You fall behind and those interesting articles become lost in the shuffle.

Instant Reference

This program, "Magazine Indexer," runs on the VIC or 64 and provides an instant reference to articles you wish to keep a record of. On the 64, you can store up to 500 records (adjust the DIM in line 100 for more); that is, you can store and review references for up to 500 articles. On the unexpanded VIC, the program can store only 15 articles, although the addition of memory expansion (any size allowed) makes the program far more useful. With an 8K expander, approximately 250 articles can be stored, and with 16K, approximately 500 articles can be stored.

Searching for an article can be done in a variety of ways: magazine title, issue date, article title, or category (article type). The program also provides for deleting references so you can keep the file up to date.

Menu Operation

All of your selections are done via the menu, which first appears when you run the program. Each choice is numbered 1–9. Simply press the number of your selection—you don't need to press RETURN.

1. LOAD ALL ARTICLES
2. LIST ALL ARTICLES
3. ENTER NEW ARTICLES
4. DELETE PREVIOUS ENTRIES
5. LIST ARTICLES BY MAGAZINE
6. LIST ARTICLES BY DATE
7. LIST ARTICLES BY TITLE
8. LIST ARTICLES BY CATEGORY
9. SAVE DATA AND END

When you first use the program, select option 3. To enter data, type in the information when prompted. The field length is highlighted, so you know how many characters are allowed (10 for magazine title; 15 for article title; up to 5 for issue date—for example, 12/84 or 1/85; and 1 character for category). When entering the issue date, be sure to enter the "/" character to separate month and year—don't use commas. For the category, use letters which are easy to associate with the articles, such as U for utilities, G for graphics, E for entertainment and games, and so on.

After you've entered all the information, use option 9 to save your data to Cassette (C) or Disk (D). The program automatically handles the creation and maintenance of the data file (a sequential file with the name "ARTICLES"). If you wish to change this filename, make the appropriate changes in lines 720 and 730. Tape users should insert a blank tape, rewound to the beginning, to store the data. Screen instructions are clear and should eliminate any confusion.

The next time you use the program, select option 1 to load your previous work. Then you can use option 2 to list all articles. There are ten per screen on the 64, and five per screen on the VIC. If you have a larger number of articles, the first batch (five or ten, depending on your computer) is displayed and you are prompted to press RETURN to see the next batch. This technique is used to prevent scrolling of data up the screen.

To delete previous entries (option 4), enter the record number (corresponding to the list displayed with option 1). All entries are automatically numbered sequentially when entered with option 3. Also, the program closes up the numerical sequence of articles after a deletion. For example, if you delete article 7, article 8 assumes the seventh position, and the articles which follow (9 and up) move down correspondingly.

Menu items 5–8 let you search for information by entering the magazine title, date, article title, or category. It works like a small data base.

See program listing on page 159.

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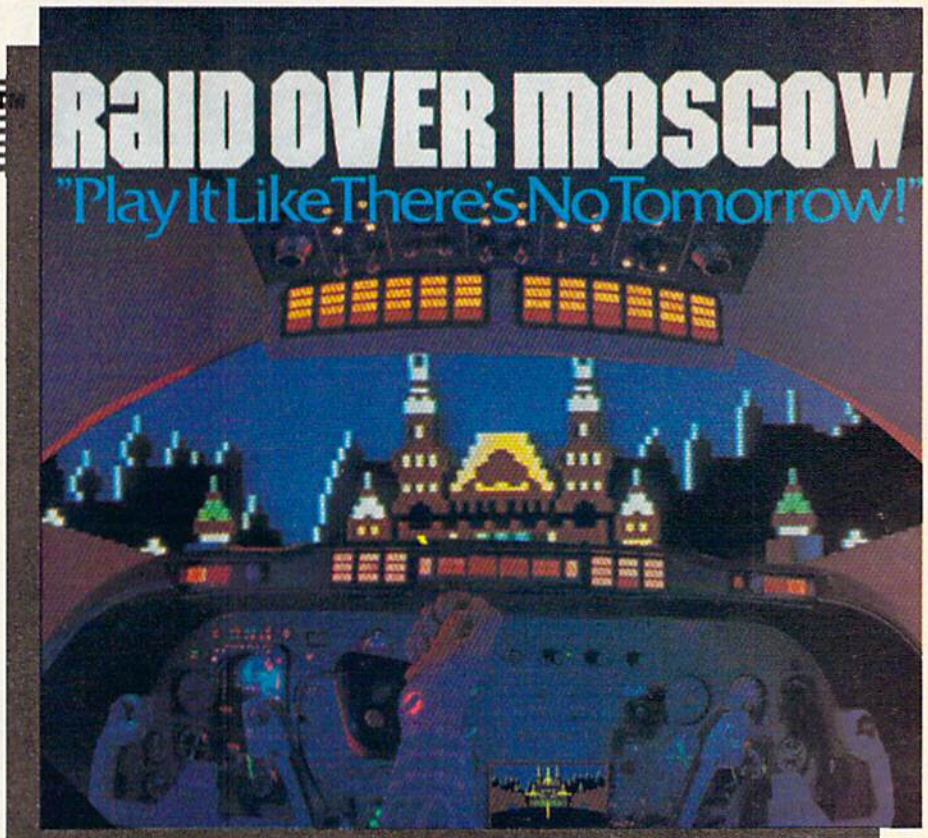

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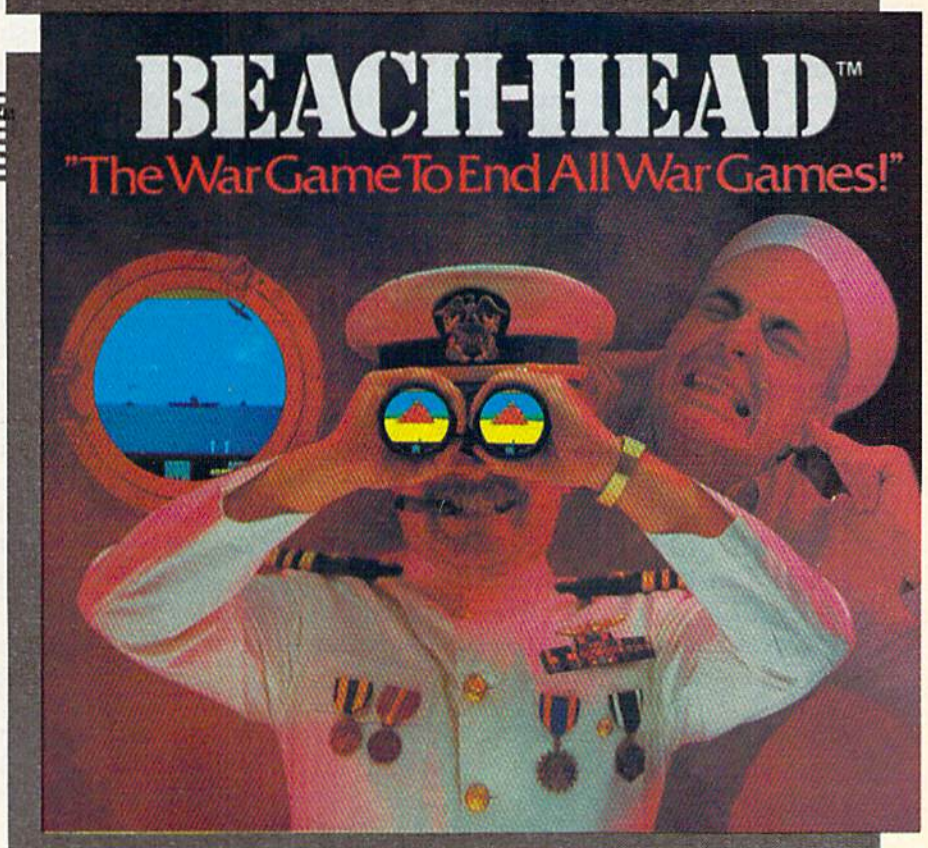

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SIMPLE ANSWERS TO COMMON QUESTIONS

Tom R. Halfhill, Staff Editor

Q A

Each month, COMPUTE!'s GAZETTE *tackles some questions commonly asked by new Commodore users and by people shopping for their first home computer. If you have a question you'd like to see answered here, send it to this column, c/o* COMPUTE!'s GAZETTE, *P.O. Box 5406, Greensboro, NC 27403.*

Q. Is it possible to build a RAM disk for the Commodore 64 and, if so, where can I find information on how to do it? Also, wouldn't a RAM disk be a better investment than a disk drive? RAM chips are so inexpensive nowadays (downright cheap, in fact) that you can purchase a 16K dynamic RAM on sale at Radio Shack for a measly $1.99 each. At that rate, you could purchase 2000K of super-fast, repair-free memory for the same $250 that you would have to pay for a Commodore 1541 disk drive. All a person would need to do is borrow a disk drive occasionally to store disk-based programs. A RAM disk with 2000K of memory—which almost equals 12 floppy disks on the 1541—should be plenty for the average user's needs. But if not, I assume that such a RAM disk would have unlimited expansion capabilities. Am I right about all this? Am I on-line or have I made a syntax error?

A. There's nothing wrong with your reasoning, but we're afraid you've made an out of data error.

The chief drawback to using a RAM disk to store programs is that RAM (Random Access Memory) is *volatile*. That is, all the information it holds is erased as soon as the power is shut off. RAM chips must be constantly refreshed with electricity to maintain their active state. Even a split-second power interruption—as often happens during thunderstorms—can wipe out all the data the chips store. RAM is intended for temporary storage only. It's the computer's workspace for running programs. Disks and tapes are meant for more permanent data storage.

Remember that a *RAM disk* isn't really a disk at all, but simply a block of memory which is set up to imitate a disk drive. The block of RAM can be extra memory that you add externally, or part of the computer's existing internal memory. A special program reserves the block of RAM, protecting it from other uses, and treats it like a floppy disk drive.

For example, the RAM disk could be set up as device #9 (a single floppy drive is normally device #8). When you type SAVE *"filename"*,9 the file is saved from workspace RAM to the RAM disk. Since the RAM disk isn't really a mechanical disk drive, of course, the save is practically instantaneous. Loading a file is just as fast. All you're really doing is transferring the file from one part of memory to another.

Therefore, if the power is turned off (deliberately or accidentally), the file is wiped out. The usual practice when using a RAM disk is to copy the file from the RAM disk to a real floppy disk before ending the session and switching off the computer. Why use a RAM disk at all? Because some disk-intensive programs—such as data base managers which frequently access the disk drive—can run much faster with a RAM disk. But the final copy must always be saved onto an actual disk or all the work will be lost.

It would be possible to use a RAM disk for more permanent storage if it were left switched on 24 hours a day, preferably with battery back-

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up in case the unexpected happens. But building such a device yourself would be a formidable task.

For one thing, the 16K RAM chips you've seen on sale at electronics stores such as Radio Shack don't store 16 *kilobytes*. A 16K RAM chip actually stores 16 *kilobits*. Since there are eight bits in a byte, it takes eight 16K RAM chips to store 16 kilobytes, commonly referred to as "16K." This alone would inflate your cost estimate by a factor of eight. Instead of $250 for 2000K, you'd be paying $2000.

There are other considerations as well. You can't just wire up a few rows of RAM chips on a circuit board and plug them into a computer. You'd need additional chips to control the RAM chips, plus miscellaneous support circuitry (including a system for power-refreshing, required by dynamic RAM chips many times per second). Everything would have to be designed to interface flawlessly with the computer's hardware. Finally, you'd have to write a sophisticated machine language program to link with the computer's operating system so the RAM disk would be recognized as a storage device. Obviously, it's a job best left to engineers and advanced programmers.

There have been some products advertised for the 64 and VIC which add additional memory through bank switching. These memory expanders add 64K to a 64, but only one bank of 8K is available at any time. They're not exactly RAM disks, but they give you additional space for storing data. And you still need to save programs on tape or disk.

If what you're looking for is a faster, cheaper, and more reliable alternative to floppy disk drives, you probably won't have to wait for long. In the next few years, we can expect to see better systems for mass storage. Hard disks, formerly affordable only by businesses and well-heeled hobbyists, are becoming cheaper every day. We've seen some ten-megabyte (10,000K) hard disks for the IBM PC advertised for as low as $795.

Ten megabytes is the equivalent of 64 floppy disks on a Commodore 1541 drive, and hard disks are so fast that you might mistake them for RAM disks. Although $795 might seem like a lot of money compared to the price of a 1541, it's not really much more than what ordinary floppy disk drives cost a few years ago. Soon we may see them for $500 or less, and marketed for home computers as well as high-end personal and business computers. And laser disks, now used mainly for audio and video recordings, are a promising possibility.

You can also expect floppy disk drives to continue improving in terms of reliability, storage capacity, and cost effectiveness.

The use of battery-powered (or bubble memory) RAM disks for mass storage purposes will probably be limited to portable computers. Predictions in this industry are risky, of course, but it seems likely that magnetic and optical media will remain cheaper in terms of kilobytes per dollar than electronic circuitry.

Q. I have a question about the *SpeedScript* word processor published in COMPUTE!'s GAZETTE. When you are programming in BASIC on a Commodore 64, the screen says there are 38911 bytes of memory available. When you're using *SpeedScript*, however, you have 45824 bytes available for text. How can you have more room for text than usable memory?

A. You *can't* have more room for text than usable memory, of course. The answer is that the Commodore 64 has more than 38911 bytes of usable memory. The catch is that not all of it is available in BASIC.

Remember that the Commodore 64, as the name implies, has 64K of RAM. It also has 20K of ROM (Read Only Memory). The ROM is permanent memory which holds the operating system (8K), the BASIC interpreter (8K), and the character generator (4K). All together, that's a total of 84K of RAM and ROM.

The problem is that the microprocessor chip which is the central brain of the Commodore 64 cannot address, or "see," more than 64K of memory at a time. To get around this limitation, the Commodore 64 designers layered the ROM atop some of the RAM. This masks out 20K of RAM. After additional RAM is subtracted for things like screen memory and other overhead, only 38911 bytes remain available for BASIC programming.

If you're writing a BASIC program, the operating system has to use BASIC ROM to understand and interpret the program. It's possible to switch out the ROM to get to the RAM underneath, effectively disconnecting the computer's BASIC brain, but without a brain it wouldn't recognize anything you typed. That's why the bank switching technique is used primarily by machine language programmers.

Because *SpeedScript* is written entirely in machine language, not in BASIC, it can take advantage of some of this "invisible" RAM hidden beneath the ROM. It switches off BASIC completely, freeing 8K of extra RAM for text (plus the 4K starting at location 49152), leaving a total of about 45K. Many other programs use this technique, too.

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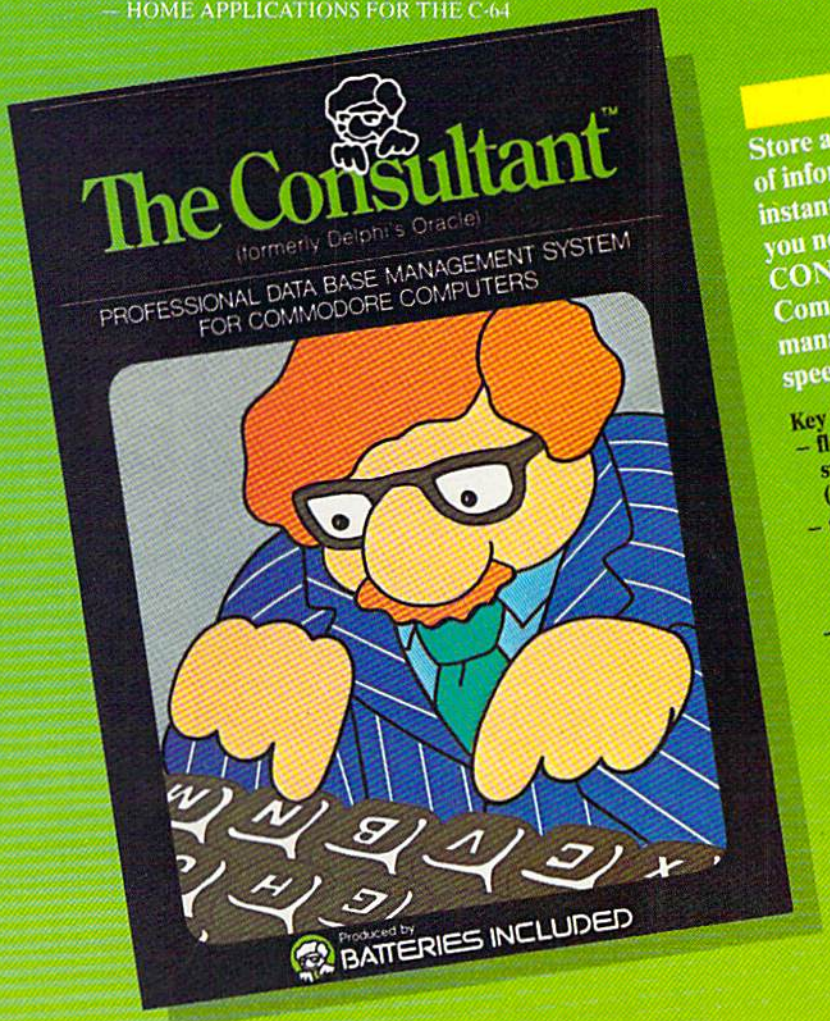

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Using Variables In 1985

To begin with, variables work the same in 1985 as they did in 1984. But since it's January, let's start off with a New Year's resolution. My resolution is that I'm going to show you how to use variables in BASIC programs—and your resolution is to learn how variables work. Is that a deal? Let's get started. We've got the whole year ahead of us.

Uses Of Variables	Short Examples To Try
Calculation	`10 A=100:B=20:PRINTA"TIMES"B"="A*B`
Formulas	`10 RATE=.12:LOAN=80000:PRINTRATE*LOAN`
Random Numbers	`10 X=INT(10*RND(1)+1):PRINTX:GOTO10`
FOR-NEXT/Repeat Action	`10 FORB=1TO9:PRINT"REPEAT ACTION 9 TIMES":NEXTB`
FOR-NEXT/Time Delay	`10 PRINT"WAIT":FORT=1TO1500:` `NEXT:PRINT"CONTINUE"`
INPUT Statements	`10 PRINT"YOUR NAME";:INPUTN$:PRINT"HI,"N$`
Abbreviate Long Info.	`10 A$="FREQUENTLY USED LONG MESSAGE":PRINTA$`
Editing Commands	`10 C$="{CLR}":PRINTC$`
Colors	`10 BK$="{BLACK}":PRINTBK$"THIS PRINTS BLACK NOW"`
String Functions	`10 X$="YESNO":PRINTLEFT$(X$,3):` `PRINTRIGHT$(X$,2)`
Check The Keyboard	`10 GETK$:IFK$=""THEN10` `20 PRINT"PROGRAM CONTINUES WHEN YOU PRESS A KEY"`

The XYZ's Of Variables

Variables put more "magic" in BASIC programs than any other technique. Some discussions of variables talk about memory locations or algebra, but I like to use a simpler approach. Type the following line and then press RETURN:

```
A=5:PRINTA
```

There are two commands in this line. The first command (A=5) tells the computer that from now on, the letter A is the same as the number 5. The second command (PRINTA) tells the computer to print the variable A on the screen, and since A equals 5, the computer responds by printing the number 5.

Notice that when we PRINT a variable, it's always OUTSIDE quotation marks. It might help to think of a variable as a "stand-in" or "substitute." We can use variables to stand for numbers, formulas, letters, words, sentences, graphic symbols, color commands, POKE numbers, editing commands, and more.

Here's a short program showing another way to use variables (enter these lines as shown and be sure to press RETURN at the end of each line):

```
10 B$="BASIC MAGIC IS FUN!"
20 PRINTB$
```

Type RUN and press RETURN. The computer prints the sentence: BASIC MAGIC IS FUN! Why? Well line 10 tells the computer that the variable B$ stands for everything inside the quotation marks—in this case, a whole sentence. So when we tell the computer to PRINT B$ in line 20, the computer prints the sentence.

As we've seen in our opening examples, there are two types of variables: *numeric variables* and *string variables.*

Numeric variables are used to stand for *number values* used in calculations and formulas. A numeric variable name can be any letter of the alphabet, two letters, or a letter and a number. Here are some examples of numeric variables:

```
A, AB, A1, B2, XY
```

String variables can be used to stand for anything which is normally put inside quotation marks in a BASIC program—letters, words, sentences, graphics symbols, color commands, screen editing commands, and more. The only difference in appearance between string variables and numeric variables is that string variables have a dollar sign ($) at the end. Here are some examples:

```
A$, AB$, A1$, B2$, XY$
```


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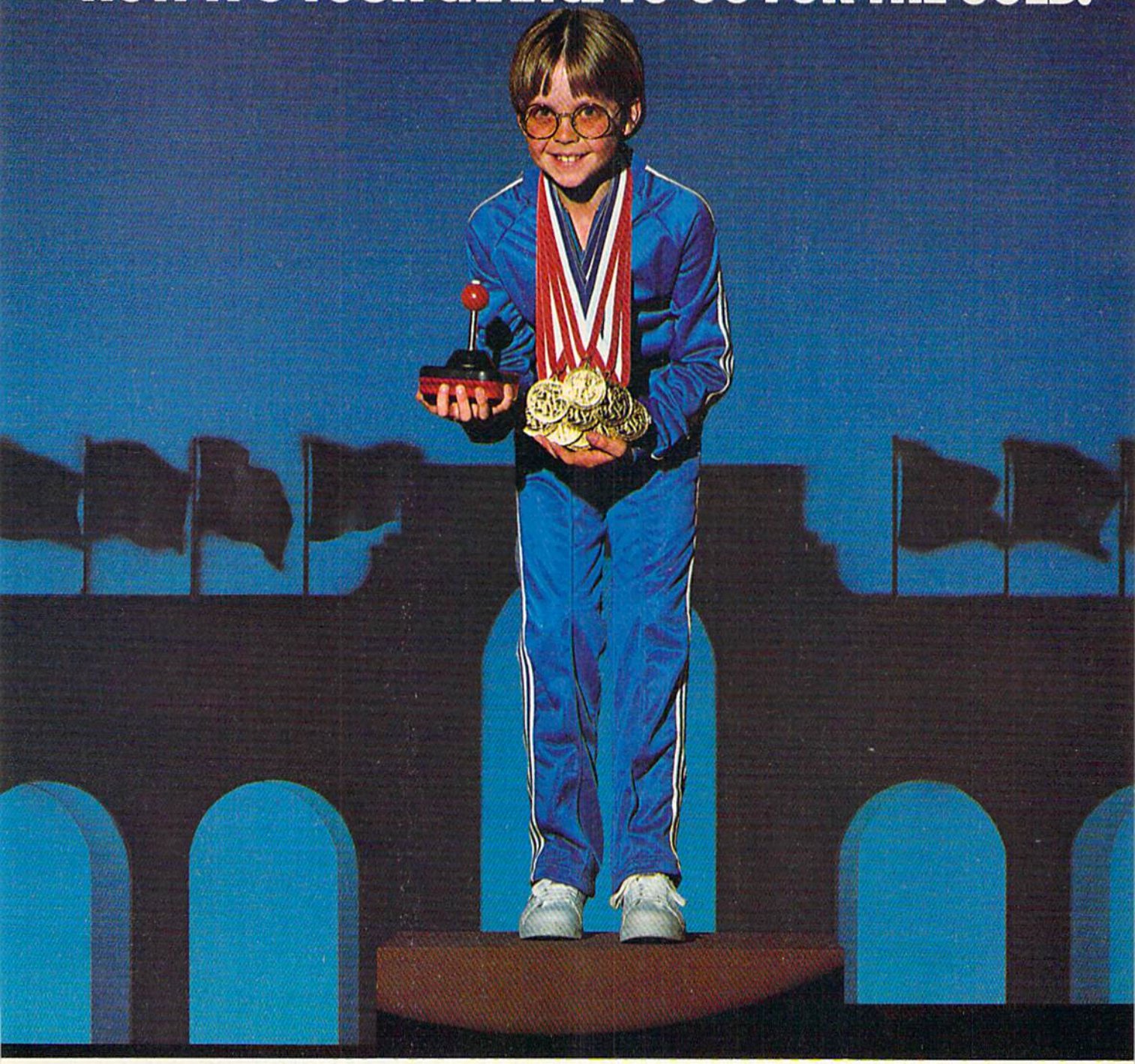

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REM: *Some BASIC statements, like ST, cannot be used as variables. Some of the letter combinations which are "reserved" by the computer for use as BASIC statements are: IF, OR, ST, GO, TO, TI, and TI$. If you try to use these as variables, the computer will give you a SYNTAX ERROR message. Do not use variables which contain keywords...for example, you can use MO as a variable but MOR won't work because it contains the keyword OR.*

It's possible to use complete words like RATE and RATE$ as variables, although I recommend that you use one- or two-character variables rather than complete words like RATE$. The problem is, the computer will accept a long variable name like RATE, but it only "sees" the FIRST TWO LETTERS. So if you name a variable RATE or RATE$ the computer only reads RA or RA$, which means you can get into trouble if you try to define two variables like RATE and RANGER. The computer will think they're both the same (RA).

Using Numeric Variables

You can use numeric variables just like numbers. This is important because this feature lets you *change* the variable by adding to it or subtracting, multiplying or dividing it. To show you how this works, type NEW and press RETURN, then enter this short program and run it:

```
10 X=1
20 PRINTX
30 X=X+4
40 PRINTX
```

The computer prints two numbers: first the number 1, and then the number 5. And it uses the same variable (X) to do it. The trick is that we *changed* the value of X. Here's how it works:

Line 10 defines X as the number 1.

Line 20 prints the value of X, which is 1.

Line 30 *adds* 4 to the old value of X, so that the *new value* of X becomes 5. In other words, X=X+4 is the same as saying X=1+4 and 1+4 equals 5 so X=5 and 5 becomes the new value of X. It's important to remember that the new value is always to the left of the equals sign. Anything to the right is the old value. So, for example, X=X+X means the new value is the old value plus the old value. In other words, it's doubled.

Line 40 prints the last value of X, which was 5, and from now on unless you change the value of X again, X stands for the number 5.

Got that? Let's consider a few more examples. The key is line 30. If we said in line 30 that X=X+20, then the new value of X would be 21. We could also change the old value of X by multiplying it by some number. For example, if we put X=X*12 in line 30, the new value of X would be 1*12 which is 12. And if we wanted, we could change the value by subtracting, dividing, or even multiplying X by a percentage or bank interest rate—that's how "business" programs work. They use variables to help calculate various formulas, like interest rates.

Type NEW and press RETURN, then enter and run this program:

```
10 PRINT"ENTER DOLLAR AMOUNT":INPUTC
20 PRINT"ENTER AN ANNUAL INTEREST RATE (U
   SE .12 FOR 12 PERCENT)":INPUTR
30 PRINT"$"C"TIMES"R"EQUALS"C*R
```

Type NEW and press RETURN, then enter this program:

```
10 X=1
20 PRINTX
30 X=X+1
40 FORT=1TO200:NEXT:GOTO20
```

To stop the program, hold down the RUN/STOP key and press RESTORE at the same time, then type LIST and press RETURN to see the program. Do you see how this program uses the variable X to "count"? Here's how it works:

Line 10 defines X as the number 1. Now when the computer sees X it interprets it as the number 1. But we can also *change* the value of X—and we're going to do that in a moment.

Line 20 prints the value of X, which is 1, so the computer displays the number 1 on the screen.

Line 30 adds 1 to the value of X, which makes it 2. In other words X=X+1 is the same as X=1+1 or X=2. So the *new value of X is* 2.

Line 40 starts off with a FOR–NEXT time delay loop which tells the computer to pause and "count" to 200 before going on (computers count fast). GOTO20 tells the computer to jump back up to line 20 and print X. The computer prints the most current value of X, which is now 2.

The program keeps going to line 30, where it adds 1 to the value of X. Except this time X equals 2, so X=X+1 is the same as X=2+1 or X=3, and the new value of X is 3. The program loops through line 40 to line 20 again and prints the new value of X which is now 3.

We'll show you some more sophisticated uses for numeric variables further on, but first let's take a look at how string variables work.

Here's a short program which uses numeric variables to "count" through the screen colors—notice the numeric variables SC and T:

Commodore 64 Version:

```
10 FORSC=0TO15:POKE53281,SC:FORT=1TO1000:
   NEXTT:NEXTSC
```


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VIC-20 Version:

```
10 FORSC=1TO255:POKE36879,SC:FORT=1TO1000
   :NEXTT:NEXTSC
```

Plus/4 and Commodore 16 Version:

```
10 FORSC=1TO255:COLOR0,SC,7:FORT=1TO1000:
   NEXTT:NEXTSC
```

This line defines SC as a range of numbers from 0 to 15 (or 1 to 255). Then we use a POKE (or COLOR) command to change the color of the screen—the colors will be displayed in order from 0 to 15 (or 1 to 255). Then comes a time delay to slow things down, and finally the NEXT command which wraps up the FOR–NEXT loop.

Using String Variables

Did you ever look at a long program in a computer magazine and get confused by all those letters and dollar signs? In BASIC, anything followed by a dollar sign is a *string variable* and it's really not so confusing if you know how to read it. The only exception is if the dollar sign is inside quotation marks, in which case you're either printing the character ($) or using it as part of a string. The three-line interest rate program above is an example of this.

The key to interpreting string variables in a new program you haven't seen before is to look for any "definitions" in the program, such as D$="{10 DOWN}" or C$="{CLR}". In this example, D$ is used to stand for 10 cursor commands ({10 DOWN} means press the CRSR DOWN key 10 times) and C$ is used to *clear the screen* ({CLR} means hold down the SHIFT key and press the CLR/HOME key). Type NEW to erase your previous program, then enter and run this example:

```
10 C$="{CLR}":D$="{10 DOWN}"
20 PRINTC$D$"NOW WE CAN USE...":FORT=1TO5
   00:NEXT
30 PRINTC$D$"OUR VARIABLES EASILY...":FOR
   T=1TO500:NEXT
40 PRINTC$D$"TO POSITION OUR MESSAGE.":FO
   RT=1TO500:NEXT
```

Using variables to stand for editing commands is a common use of string variables. This is not only convenient but it also saves some memory if you're trying to "crunch" your program to keep it small and manageable. You can use string variables to stand for colors, cursor movements, insert and delete functions, clearing the screen, HOMEing the cursor, and more.

You can also use string variables to stand for a graphics symbol, or even a "string" of symbols. Type NEW and press RETURN, then enter this example:

```
10 C$="{CLR}":L$="CCCCCCCCCCCCCCCCCCCCC"
20 PRINTC$L$
```

In line 10, C$ is defined as the *clear screen* command and L$ is defined as a string of graphic "line" symbols. Now, whenever you PRINTC$, you'll clear the screen, and whenever you PRINTL$, you'll draw a line across the screen. In our example, we put both variables together.

One of the most common and important uses of string variables is the INPUT statement. If you type INPUT followed by *any* variable, the computer displays a question mark on the screen and waits until you type something; when you press the RETURN key, whatever you typed gets assigned to the INPUT variable. We've already used some short examples in this column so here's a longer version:

```
10 PRINTCHR$(147)"ENTER A LOAN AMOUNT AND
    PRESS RETURN (USE 80000 FOR";
20 PRINT" $80,000...DO NOT TYPE $ OR COMM
   AS)":INPUTL
30 PRINT:PRINT"ENTER AN INTEREST RATE AND
    PRESS RETURN (USE .12 FOR";
40 PRINT" 12 PERCENT)":INPUTR
50 PRINTCHR$(147)"THE ANNUAL INTEREST ON"
   L" AT"(R*100)" PERCENT IS $"(R*L)
60 PRINT"{HOME}"TAB(242)"PRESS ANY KEY TO
    CONTINUE."
70 GETK$:IFK$=""THEN70
80 GOTO10
```

Line 10 uses the PRINT statement to clear the screen, then displays a *prompt message* (inside quotation marks) with instructions to the user. It's not absolutely necessary to include a prompt, but it helps a lot. If you used only INPUT statements, the user might not know to type in a number, seeing only a question mark and a blinking cursor. The semicolon ties this PRINT message to the next PRINT message in line 20 so the two PRINT statements are displayed as one continuous line. Semicolons in BASIC are sort of like super glue.

Line 20 continues the message begun in line 10. We could use the superglue semicolon (;) again, to put the INPUT question mark at the end of the PRINT message. But we left it out, because VIC-20s have a quirk which doesn't allow input prompts longer than 22 characters (one line). We didn't use the semicolon, so the INPUT question mark appears on the next line down. The INPUT command tells the computer to wait for an entry and assigns the variable L to the number you typed in—we're using L to stand for "Loan."

Line 30 starts with a PRINT command all by itself—this puts a blank horizontal line on the screen to put some "space" between our messages. Next, we have another prompt message inside quotation marks. Prompt messages tell the person using your program exactly what they should do next. Again, our message "spills over" to the next line, so we use a semicolon at the end

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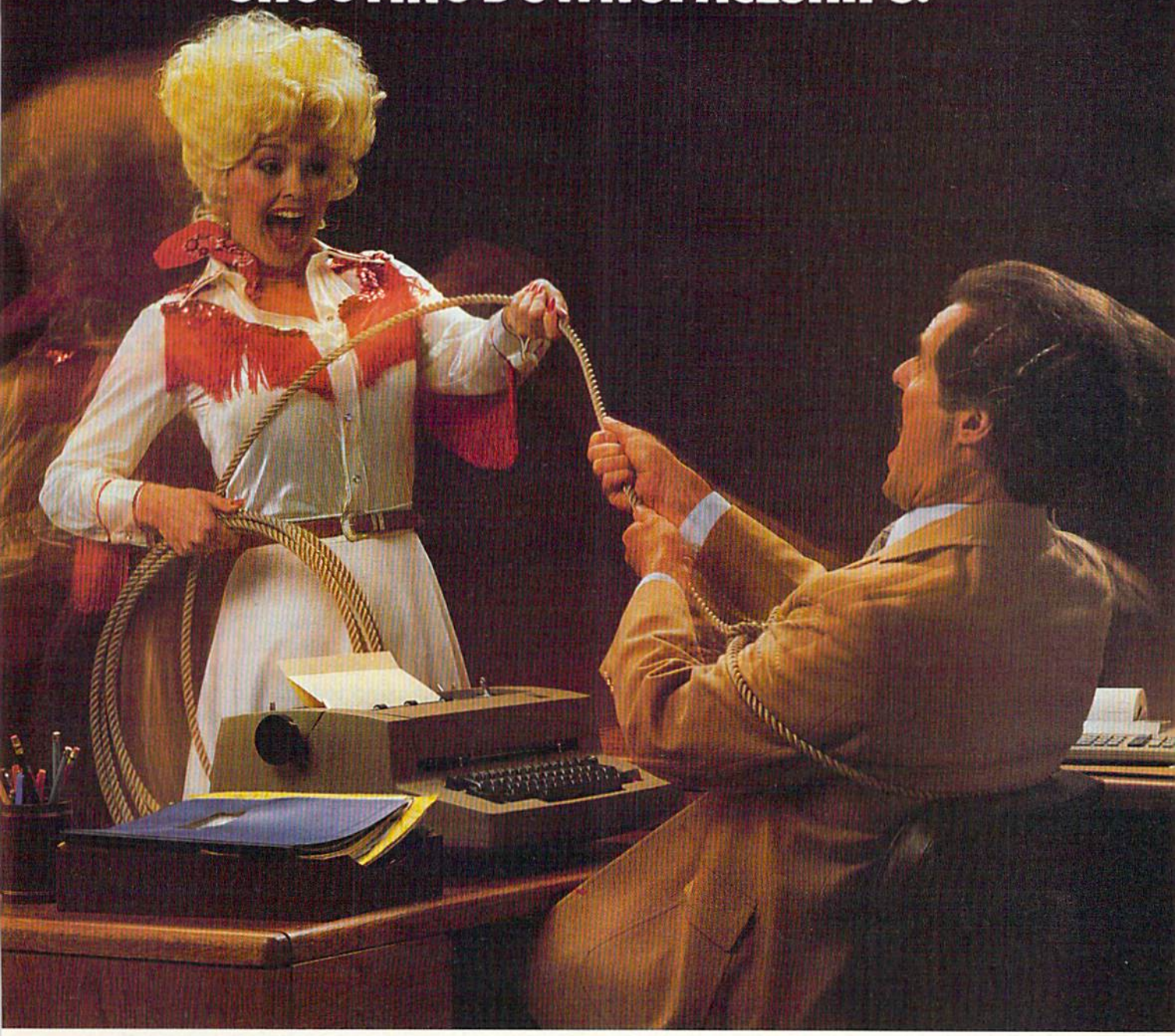

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of the first part to tie things together.

Line 40 finishes the message, waits for the interest rate to be INPUT, and assigns the variable R to it.

Line 50 clears the screen and prints a message which contains the words of the message inside quotation marks, the INPUT variables which display the numbers you typed in as L (loan amount) and R (interest rate). The calculation (R*100) converts the decimal interest rate into a whole number—for example, if R is .12 this calculation makes it 12 so we can say "12 percent" in our message. The formula (R*L) at the end of the message multiplies the two variables to automatically give the result. If L is 80000 and R is .12 the result is 9600.

Line 60 goes to the "home" position and TABs across 242 spaces, then prints a prompt message.

Line 70 checks the keyboard to see if any key was pressed. This line keeps going back to itself if no key is pressed. As soon as a key is pressed, the computer drops down to the next line which tells it to GOTO the beginning of the program and do it over again.

Let's take a quick look at another use of a string variable: the GET$ function.

Using GETK$ To Check For Any Key

The GET command uses a string variable to identify a key from your computer's keyboard, so you can tell in a BASIC program which key a user is pressing. I like to use the variable K$ to stand for "key." Try this short program:

```
10 PRINTCHR$(147):PRINT"PRESS ANY KEY TO
   {SPACE}START"
20 GETK$:IFK$=""THENGOTO20
30 PRINT"I'M A SMART COMPUTER.{2 SPACES}I
    KNOW WHAT KEY YOU TYPE.{2 SPACES}TYPE
    A KEY."
40 GETK$:IFK$=""THEN40
50 PRINT"THE KEY YOU TYPED IS "K$
60 FORT=1TO1000:NEXT:GOTO10
```

Since we're going to devote a future column to GETting and PEEKing the keyboard, we'll make this a short explanation. The "key" lines in this program are line 20 and line 40. In both of these lines, we tell the computer to GET a key from the keyboard. We're using the variable K$, although you could use any string variable here. The IF-THEN statement in these lines tells the computer that if K$ equals *nothing* (two quotation marks "" side by side mean "nothing" in this use), then keep going back to the same line to check the keyboard. As soon as a key—any key—is pressed, this line stops going back to itself and the program continues. K$ now stands for the key you pressed in line 40, so in line 50 we can actually PRINTK$ and the computer will display the character on the key you pressed. Any key including SHIFTed characters will be detected.

LEFT$, MID$, And RIGHT$

These three commands are seldom discussed in BASIC tutorials but can be very useful. Here's how they work. If you put a long group of characters, words, color commands, or other information inside quotation marks, these "string functions" let you pull out virtually any character or group of characters from the group. We'll use the following program as an example:

```
10 W$="YESNOMAYBE"
20 PRINTLEFT$(W$,3)
30 PRINTRIGHT$(W$,5)
40 PRINTMID$(W$,4,2)
```

Line 10 defines the string variable W$ as a group of letters in quotation marks which form the words YES, NO, and MAYBE.

Line 20 uses the LEFT$ command to print the first three characters which form the word "YES." Notice the format inside the parentheses. First comes the variable, then a comma, then *how many characters counting from the left side* you want to use—in this case we took the first three letters. You tell the computer to start at the left of string variable W$, and pick out three letters.

Line 30 works just like line 20, except this time we print the five characters counting from the *right* side, forming the word "MAYBE."

Line 40 works similarly to lines 20 and 30. The MID$ command requires an extra number in parentheses. The number 4 in parentheses tells the computer to *count four characters* from the left side of the string. The number 2 *selects* two characters—in this case, the fourth and fifth characters, which are the letters N and O. If you want to experiment, try using MID$ instead of RIGHT$ to get the word MAYBE in line 30. (Hint: Change the two numbers in parentheses to 6 and 5.)

There are many, many other ways to use variables—for example, we haven't even covered random numbers yet, or how the computer calculates numbers. We'll explore these "magical" topics and much more in the coming months—and keep our New Year's resolution to learn more about variables and how they work.

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HORIZONS

Charles Brannon
Program Editor

This is the first installment of the new Commodore column for both the VIC and the 64. Because of the cancellation of "VICreations," we've decided to cover both machines in what was formerly "Horizons: 64". As the new Commodore 16 and Plus/4 computers arrive on the market, we'll cover them here, too. The nature and style of this column will not change unless you, the reader, want to make recommendations. The column will try not to slight any machine for the benefit of another, but the 64 must get the attention it deserves.

A hardware item reviewed here (such as a printer or interface) can be applicable to both machines. Software reviewed here for the 64 is sometimes available in a VIC-20 version.

End Of An Era

The VIC-20 is in its sunset days. It has been and still is a good value for the money, but even better price/performance buys are becoming available (such as the Commodore 16). Commodore is no longer manufacturing the VIC-20, but there are thousands of under-$100 VICs still available in stores and warehouses. New hardware and software for the VIC is becoming hard to find. In fact, almost every major software publisher has discontinued its VIC product line.

Nevertheless, many people have made quite an investment in the VIC—it originally sold for $299. A theoretical VIC-20 system could have an 80-column display cartridge, 32K of memory, several disk drives, a high-quality printer, not to mention joysticks, light pens, a color monitor, and perhaps $1000 in software. Even though the VIC-20 is no longer a current product, there's still an active and enthusiastic VIC audience out there.

VIC owners should remember that for less than $200 they can add a Commodore 64 to their system, cheaper than some fully expanded VIC motherboards. The 64 can use most VIC-20 peripherals, such as the 1541 (but not the earlier 1540) disk drive, any color monitor, Commodore-compatible printers and printer interfaces, a Datassette, and game peripherals. Even some VIC software will work on the 64. There's no good reason (except financially) that you can't own and use *two* computers. That way you don't lose the investment you've made in VIC-20 software, plus you gain access to a new (and more powerful) software library. The new Commodore 16 and Plus/4 can also use many VIC and 64 peripherals. If at least all peripherals could be guaranteed compatible with future models, it would not be considered financially reckless to upgrade just your computer console. Your peripherals will always end up costing more than the computer.

VIC And 64 Reunion

If you do own both a VIC and a 64, you've probably realized that both machines cannot share a disk drive or printer. Each machine must have complete control of the serial bus. With two controllers (computers) vying for priority, all the peripherals get quite confused. Usually the whole system crashes.

You can use both a VIC and 64 simultaneously as long as you unplug the serial cable from the computer not currently needing access to peripherals. If you have a Commodore color monitor, the VIC can be attached to the front connections, and the 64 to the rear ones. A flip of a switch is all that is necessary to change your display from the VIC to the 64, or vice versa. But not only is it inconvenient to change cables, it can also sometimes reset the computer (wiping out anything in memory), and even damage your computer or peripherals. You should never plug in or remove any cables or cartridges with the power on (some people won't even plug in a joy-

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stick with the power on, though I've never found this to be a problem).

The Reunion is a small black box that solves this problem. Simply plug the cables from the box into both a VIC and a 64. Your standard serial cable plugs into the rear of the box, which is then connected to the first peripheral in the chain. Both computers cannot access the serial bus simultaneously, but with a push-button toggle switch you can easily alternate between the VIC and 64. We've used the box here when translating programs. The original program can run on one machine for comparison while you are working on the translation.

When I developed the VIC version of *SpeedScript*, I simply switched cables. I translated the source code and assembled it on the 64, then saved the object code to disk. When I wanted to test the VIC version, I would switch cables, load the program into the VIC, and test it. My source code was safe on the 64, so if the VIC crashed, I didn't need to go through the laborious process of reloading the assembler, my utilities, and the source code. It also reduced the number of times I had to save my source code. The Reunion would have been quite handy, and I wouldn't have had to fear losing any programming when I switched cables.

Incidentally, it would at first appear that you could simply plug a cable between the VIC and 64 to permit them to directly communicate with each other over the serial bus. But what device number would you use? As it turns out, that's a dumb question, since a controller does not have a device number. Both machines are trying to control each other, and neither will give in. That's the problem with an intelligent bus. The RS-232 (modem) port, however, is not considered an intelligent bus. We've used a null modem cable (a cable which directly connects two RS-232 ports, obviating the need for modems and telephones) to let the VIC and 64 talk directly to each other at high speed. Another possibility is using the parallel user port (which is the same physical port as the RS-232 port, but can be reprogrammed to act as a simple parallel port).

Speed Up Your System

Two new products from Skyles Electrical Works can significantly amplify the power of your 64. *Blitz!* is a BASIC compiler that translates almost any Commodore 64 BASIC program into P-code, a compiler language much faster than BASIC. *1541 Flash!* is a hardware modification that transparently drives your 1541 at three times normal speed (or 300%, which *sounds* even faster). *Blitz!*, therefore, effectively speeds up your computer, and *1541 Flash!* speeds up the disk drive. Both of these products are excellent.

The *Blitz!* BASIC compiler is a dream come true for BASIC programmers. BASIC is easy to learn and use, but is much slower than machine language. You can write almost any program in BASIC, but games tend to be sluggish, business programs take lengthy siestas during sorts and searches, and utilities take forever to read a disk file. Machine language, of course, can be a thousand times faster than BASIC, but since each ML command does so little, great attention to detail is necessary. It can be a painstaking task to set up something in machine language which could be accomplished in a few lines of BASIC. On the other hand, machine language is great for repetitive tasks like filling the 1000 locations of color memory.

Compiling a program with *Blitz!* is easy. Just save your BASIC program to a disk with at least 300 blocks free. Load and run *Blitz!*, give it the filename, and after a few minutes you can load and run the compiled program. *Blitz!* works best with two drives or a dual drive, permitting you to compile more than one program at a time, but will run quite nicely with a single drive.

There are few limitations on your BASIC program. Any program that runs in Commodore 64 BASIC will compile, unlike some compilers that require you to limit yourself to a subset of BASIC. You rarely have to make any changes to your program to make it compile. *Blitz!* is not available in a VIC version, and cannot compile a VIC-20 program to run on the VIC.

Blitz! can also compile programs written in extended BASIC languages like *Simon's BASIC*, *Super Expander*, and *VicTree*. Everything but the extended commands is compiled. The added commands are passed on to the resident language during run time.

We compiled several BASIC games including "Hardhat Climber" (published in the January 1984 issue of the GAZETTE). Hardhat Climber is a good example of a playable all-BASIC arcade game. The speed is a tad slow for real arcade nuts, but fast enough to be exciting. Your man moves at about the same rate that the cursor blinks. Well, after the game was compiled, the little man fairly zoomed across the screen, running as if he were a repeating cursor (he ran so fast he kept falling off the edge of the girders). The barrels did not leisurely roll, but raced like a truck going down a grade with no brakes. In fact, the game was unplayable at this speed. The difference was as remarkable as an LP album played at 78 rpm. Just a nudge of the joystick sent the climber halfway across the screen. Ironically, this BASIC game would have to be slowed down to be playable when compiled.

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Blitz! does not convert your program directly into machine language. Instead, it translates BASIC statements into a high-speed language called *P-code*. P-code is executed by a P-code *engine* written in machine language. This interpreter, 6K in length, is tagged onto the compiled program. Therefore, you can run a compiled program on any 64 without the compiler. The extra memory used by the interpreter is not a real encumbrance, since the compiled program is typically reduced to 60% of the size of the original BASIC program.

How fast is *Blitz!*? The program listed at the end of the column is a simple bubble sort that alphabetizes 100 three-character strings. (If you've wondered about how to alphabetize a list, look at lines 140–160. There are much faster ways to sort, but this is one of the simplest.)

I think a sort makes a good *benchmark* (a program used to evaluate a system) since it is a practical application. The sort shown below uses a variety of BASIC statements and features, including comparisons (IF/THEN), calculations, variable assignments, and strings. It's also very easy to tell if the program runs correctly. The program automatically reports how long it took to sort the list. We ran the program through *Blitz!* with no problems. It took 1 minute and 32 seconds to compile.

Running in BASIC, the sort takes 119 seconds. When *Blitz!*'ed, the string sort runs in 27 seconds. A simple calculation shows that the program runs 4.4 times faster. I then changed the string array to an integer array, thinking that working with two-byte integers must be faster than three-character strings. To my surprise, the BASIC integer sort was actually slower than the BASIC string sort, running in 133 seconds. However, the compiled integer sort ran 4.75 times faster than its BASIC counterpart, with a speed of 28 seconds. Just like BASIC, the compiler is slower sorting integers than strings, but can speed up the use of integers more radically than the use of strings.

In addition to faster program execution, *Blitz!* gives you several features not supported by Commodore BASIC. First, you can chain to another program without losing any variables, and the second program doesn't have to be smaller than the first (a limitation of BASIC's normal chaining process). *Blitz!* also treats integer variables (those with a % sign following the variable name) specially. Normally, BASIC converts an integer to floating point, does the calculation, then converts the result back into an integer, which slows down integer calculations. But *Blitz!* performs all integer calculations with special integer math routines, which run much faster than floating point calculations. It's also legal to use integer variables as the index of a FOR–NEXT loop. Unlike some compilers, though, *Blitz!* fully supports floating-point operations.

You should note that before compiling, the BASIC program should be tested and debugged. *Blitz!* makes programs which run faster, and if there are bugs in the original, there will be even faster bugs in the compiled program.

Blitz! is a fine program, but the manual leaves something to be desired. Only 23 pages, the documentation barely covers all the features of *Blitz!*, and may be confusing to novice programmers. A compiler, being a language system, deserves more than 23 pages. On the other hand, compiling a program is so easy you almost don't need a manual, but a longer manual could afford to be tutorial in style for the sake of beginners, with details for the more advanced programmer.

A testament to *Blitz!*'s power can be found in several commercial programs. LIST them, and all you see is the word BLITZ!. Obviously, these programs were written in BASIC, compiled with *Blitz!*, and became fast enough to be commercially successful. In fact, Skyles Electrical Works does not charge a royalty or license fee for use of your compiled programs (even though 6K of the compiled program is the *Blitz!* runtime package). If you do distribute a program compiled by *Blitz!*, Skyles merely requests that you give *Blitz!* credit in your program or documentation, along with the address of Skyles Electrical Works.

Warp Drive Revisited

In the November column, I mentioned a software product called *Kwik-Load* that speeds up 1541 program LOADs by 300%. As software, *Kwik-Load* is vulnerable, often wiped out or crashed by other programs. The idea is a good one, but only a hardware modification could be truly fast, yet transparent to most software. (*Transparent* means that a program or system does not interfere with any other program. Moreover, a truly transparent system is invisible to all other programs, as the name implies. Some printer interfaces transparently emulate a Commodore printer, simulating all the commands and modes of a Commodore printer on a non-Commodore printer.) Of course, *Kwik-Load* only costs $19.95, cheaper than almost any hardware product.

1541 Flash! is a set of parts and instructions to modify both your computer and disk drive to boost the effective speed of disk transfer by three times. Unfortunately, a hardware modification is more difficult than merely loading and running a program, or inserting a cartridge. *1541 Flash!* consists of a piggyback module that wedges into the

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Kernal ROM, a replacement DOS ROM for the 1541, and an interface cartridge (called the CableCard) and cable that attaches the modem port to a chip within the disk drive.

Performing the upgrade is not trivial, but at least no electronics expertise or soldering is needed. Anyone with a steady hand and attention for detail can install *1541 Flash!*. The manual says it should take about 30 minutes. It took me about 15 minutes, since I've done similar things before. Utmost care is needed, though, since you really can damage both your computer and drive if you are reckless.

You need to open the case of both your computer and drive to get at their innards—not a task for the squeamish or those who wish to preserve their 90-day warranty, since the upgrade is more or less permanent. (Though we've been told that Commodore does not check for hardware modifications on warranty returns. They merely check to see if the computer works, and if not, they send you a new one.)

You first have to find the Kernal ROM in your 64, marked with one of three part numbers. The manual includes pictures and diagrams to help you identify the correct chips to replace. The Kernal ROM is removed, then inserted into a socket on a tiny board. You then plug the board into the empty ROM socket. The board contains a modified version of the Kernal. With both ROMs on board, you can choose either the normal or enhanced Kernal by flicking a switch on the interface card.

The biggest problem here is that many 64s do not have socketed ROM chips; they're soldered directly to the board (it saves Commodore a little on manufacturing costs, but makes it difficult to replace faulty chips). We asked Skyles about this, and they estimate from 10 to 20 percent of all 64s do not have socketed ROM chips. Whether or not your machine has socketed chips does not seem to correlate to when it was manufactured, or what serial number it has. I had to open three 64s before I found one with socketed ROM chips. You can mail your computer to Skyles along with $28.50 and they'll install the necessary socket. It could take a couple of weeks for turnaround, though. Skyles encourages their dealers to install a socket for you, or to send your 64 to Commodore for the modification. Many dealers will install *1541 Flash!* for you for about $10 extra.

Wires leading from the Kernal module lead out through the modem port, which then plug into the CableCard, a small cartridge plugged into the modem port. The cartridge includes another modem port so that you don't lose the use of a modem or RS-232 interface.

Inside the disk drive, you remove the disk operating system ROM and replace it with a new one. As long as you don't bend any of the tiny pins on the ROMs, it's not too hard to pry them out with a thin-blade screwdriver. On my 1541, I had to use a $1 chip extractor rather than a screwdriver, since you can't lever the screwdriver against the board without mashing some capacitors.

The trickiest part is that you must locate one 6522 chip (there are two of them), then remove it. It's much harder to remove a long chip like the 6522 without damaging any pins. I bent several pins, but was able to ease them all back into place without breaking any. After the chip is out, you purposely bend one pin at a 90-degree angle, then re-insert the chip. Once you've bent the pin, you can't reverse the procedure without snapping off the delicate pin. A white microclip attaches to the bent pin, and a black one to an adjacent pin. You also screw down a grounding lug. This cable is then threaded out the back of the drive and attached to the modem port cartridge.

Once you've sweated over these crucial maneuvers, you're rewarded for your effort with a significant upgrade in speed. It really works. All disk read access is three times faster. The speedup works with almost every program I tried. After some tests, I found that writing to a disk is only about twice as fast. After checking with Skyles, they confirmed that writing to a disk is only 1.8 times as fast. Almost all commercial software will load from twice to three times normal speed. I said *almost* all, but of three Epyx games I tried, none of them would load with the *1541 Flash!* installed—probably related to the copy-protection employed by Epyx. With a POKE and a command to the drive, you can turn off the speedup, but even with this, I couldn't get the Epyx games to load. So beware, this modification is almost impossible to reverse.

The enhanced ROM also adds a few features to your 64. The routines that support the extra features take the place of the cassette output routines, since you probably won't use your cassette as much when you have a disk drive. With the *1541 Flash!* ROM enabled, you can load a cassette program, but not save one to cassette. You can load a tape program and save it to disk, though, and you can always switch back in the normal 64 ROM if you need full access to the tape drive.

The DOS wedge is built into ROM, and you can activate it at any time with SYS 65526. LOAD, SAVE, and VERIFY default to the disk drive, rather than the cassette. (You don't need to add the ,8.) Several new editing keys have been added. CTRL–back arrow flicks the cursor to the bottom of the screen. Holding down the

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Commodore key and the back arrow tabs the cursor to position 15 (a 16-character tab). Commodore key-up arrow lets you toggle in and out of quote mode without typing any quotes. CTRL still is used to slow down scrolling, but you can now freeze a scrolling screen with the SHIFT key, or keep it frozen with SHIFT LOCK. Letting up on these keys resumes the listing. You can wipe out the line the cursor is on with Commodore–INST/DEL, and erase the screen from the line the cursor is on to the end of the screen with Commodore–CLR/HOME.

The manual includes documentation on several new high-speed disk commands for use by machine language programmers. You can set the drive up to continually spool sectors. You don't have to request a track and sector—your program merely needs to read continuously. By taking advantage of these new direct-access disk commands, you could get even more speed out of the 1541.

Having used *1541 Flash!* for several days, already I can't bear to go back to a slow 1541. It's amazing how quickly you can get spoiled by a luxury like this. More than a few editors here have cast covetous eyes on the upgraded 64/1541. And the price is reasonable for such a dramatic enhancement. After reading the installation description above, you can decide if you're up to opening your equipment, yanking out chips, and enjoying a 300% speedup.

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String Sort Program

```
100 A=RND(-1):REM FORCE ALL RUNS TO USE S
    AME RANDOM SEQUENCE
110 DIM A$(100):PRINTCHR$(147)"GENERATING
     STRING DATA"
120 FORI=0TO99:A$(I)=CHR$(65+26*RND(1))+C
    HR$(65+26*RND(1))+CHR$(65+26*RND(1))

130 NEXT:PRINT"NOW SORTING":T=TI
140 EX=0
150 FORI=0TO98:IFA$(I)>A$(I+1)THENT$=A$(I
    ):A$(I)=A$(I+1):A$(I+1)=T$:EX=1

160 NEXT:IFEXTHEN140
170 PRINT"SORT FINISHED IN";(TI-T)/60;"SE
    CONDS.":PRINT
180 FORI=0TO99:PRINTA$(I);" ";:NEXT
```


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Double Duty Variables

William A. Yarberry, Jr.

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No matter how much memory your computer has, there are times when it's inadequate for your purposes. There's a sort of universal law: Programs grow to fill all free memory (plus a little more).

Here's an old programming trick which can be adapted very easily to the VIC or 64. The idea is to crunch two or more variables into one, making the variable do double duty.

Variables And Memory

When a value is assigned to a variable (X=5, for example), it takes memory. And no matter what the value is, it takes the same amount of memory. Try this experiment:

```
CLR: PRINT FRE(0): X=1: PRINT FRE(0)
```

Since the Commodore 64 gives negative numbers when there's more than 32K available, you can change FRE(0) to FRE(0)+65536 to get a positive answer.

Type the above line and press RETURN. Type CLR (don't press the CLR/HOME key), to clear out variables from memory. The amount of free memory is printed. A value is given to variable X, and the free memory is printed again. Note that the variable has occupied seven bytes. Two are used for the variable name, five for the value.

On a new line, type the same line again, changing X=1 to something like X=999999. Press RETURN again and what happens? The same amount of memory is used. No matter how big or small the value, the same memory is used (five bytes). And no matter how long the name of the variable (try XABCDE=999999), two bytes are used for the name.

Variable arrays act almost the same. A number in a floating point array, like the variable X above, uses five bytes for each value. But there's only one name and it uses seven bytes (only once). So, for example, dimensioning an array Q with DIM Q(20) takes five bytes for each of the 21 elements (0 through 20), a total of 105, plus seven for the name. Thus, it requires 112 bytes.

Doubling Up

Now let's imagine a simple data base program. You swim every morning and want to keep track of how many laps you've covered. The program you write has two arrays, D(I) for the date and L(I) for number of laps that day. It doesn't matter in this example whether the data is stored on tape or disk, or read from DATA statements.

After 50 swimming sessions, the two arrays will use up 262 bytes each, for a total of 524. It might be years until memory is a problem. Even on an unexpanded VIC, it would take a year of swimming before free memory dwindled to nothing.

But you decide to expand your program. Perhaps you want to print out a bar graph, or you add the time (to get a daily swimming speed and overall average). Or you have five friends who want their laps and times added. As the program grows, you find yourself running out of memory.

One solution is to double up on variables. The date you input is always between 101 (January 1) and 1231 (December 31). And the number of laps always ranges from 0 to 999. So, when you input the date and time, combine the two numbers into a single variable. Multiply the date

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by 1000 and add the laps.

Since variables use up the same amount of space, no matter what the value, squeezing the two numbers into one cuts in half the memory used for the two variables.

Using this system, the number 330021 would mean 21 laps on 3/30. 1201101 would mean 101 laps on the first of December.

The two formulas needed in the program are simple. To combine the two numbers into a single variable DL, DL=D*1000+L, or date times 1000 plus laps. To uncrunch the numbers, D=INT(DL/1000) and L=DL-1000*D. Date is the integer value of DL divided by 1000. Laps is DL minus 1000 times the date.

Depending on the range of values, you could combine three, four, or more variables into one. But you should be aware of one limitation—once a number goes beyond nine digits, it is rounded off. Try to avoid using numbers larger than 99,999,999. Also, fractions are not always as reliable as integers, because they get rounded to the nearest base-two fraction.

Multiple Binary Values

A variation on this technique can be used when the values are all yes/no decisions. In the example above, the dates ranged from 101 to 1231, the number of laps from 0–999. Altogether, seven decimal digits were used in the final doubled up variable.

Instead of multiplying by ten, one hundred, one thousand, and so on, you can multiply by twos (1, 2, 4, 8, 16, etc.). What you are doing, in effect, is turning individual bits on and off. (Note that this technique would not work on the swimming program, because date and laps are not yes/no situations.)

For example, you want a program to keep track of a few hundred members who belong to the local user group. In addition to the usual information about name/address/phone, you have the following categories:

1	Adult Member/Student
2	VIC Owner
4	64 Owner
8	Interest in BASIC
16	Interest in ML
32	Interest in Games
64	Interest in Education
128	Interest in Business
256	Willing to Help Organize
512	Willing to Teach Seminar

When a new person signs up for the user group, he or she provides the above information (all yes or no questions). The appropriate numbers are added up; for example an adult with a 64, interested in BASIC, games, and educational software would be given the number 109.

The different categories can be sorted out with a logical AND. In the program, each member has been assigned a number, let's say variable J. IF (J AND 16) = 16 then the person is interested in machine language. If it equals zero, then the member is not interested. Loop through the membership list, reading J and ANDing it with 16, and you'll find out who has that particular interest.

You can also combine categories. Maybe you want to set up a seminar on programming ML games on the 64, but don't know who would be interested. The categories are 4, 16, and 32, so you could have the computer search through the list of members. A single line would find all people who checked the three boxes when they joined, IF (J AND 52)=52 THEN C=C+1. The variable C, in this case, is used as a counter, to keep track of how many members are interested in ML games for the 64. If you checked the 512 bit, you might then find someone who is willing to teach the seminar.

In the example above, instead of ten different variables using up (at least) five bytes each, you reduce everything to a single variable per member, with bits acting as flags which are up or down. Thus, you use a tenth as much memory, and this gives you more room for adding new members or categories.

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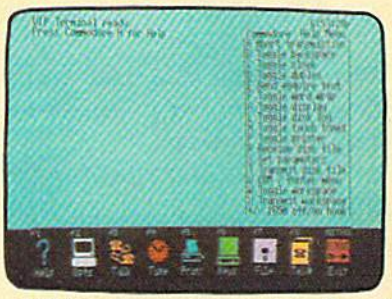

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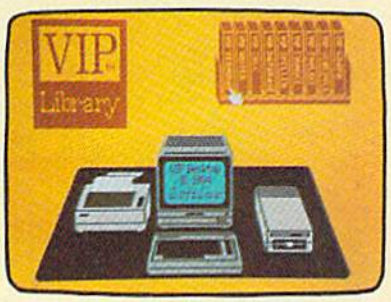

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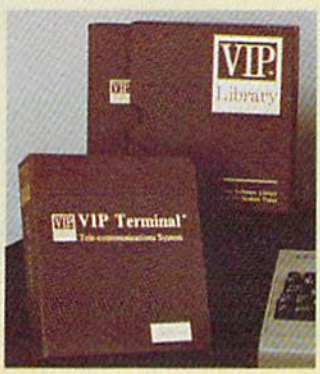

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User Group Update

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Send additions, corrections, and deletions for this list to:

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Attn: Commodore User Groups

Changes

The new contact address for the Sacramento Commodore Computer Club is P.O. Box 227, Sacramento, CA 95810.

The Commodore Brooksville User Group (C-BUG) has a new contact person, Eleanor Hott, who can be reached care of C-BUG, P.O. Box 1261, Brooksville, FL 33512. The phone number is (904) 799-5292.

The Memphis Commodore Users Club also has a new address: P.O. Box 38095, Bartlett, TN 38134-0095.

The North Country (NY) Computer Club has changed its name to North Country Commodore Club. The new contact person is Eleanor Cunningham, who can be reached at 1607 Ford Street, Ogdensburg, NY 13669. The phone number is (315) 393-2708.

Another group with a new name is the Nova Scotia Commodore Computer Users Association, formerly the Nova Scotia Commodore Computer User Group. The new address is P.O. Box 3426, Halifax South, Halifax, Nova Scotia B3J 3J1.

New Listings

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Tri-County Commodore Users Group
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Commodore Users Group of Pensacola
Debbie Johnston
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Pensacola, FL 32516
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GEORGIA

Clayton County C-64 Users Group
Joyce Jay
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Riverdale, GA 30274
(404) 478-7906

ILLINOIS

Northwest Suburban Commodore User Group
Orrin J. Adler
214 South Greenwood
Palatine, IL 60067

MICHIGAN

Delton Area User Group (D.A.U.G.)
Al Pilukas
11386 Letches Lane
Delton, MI 49046

Lansing Area Commodore Club
Jae Walker
P.O. Box 1065
East Lansing, MI 48823-1065
(517) 351-7061

Video Innovation Club (V.I.C.)
Michael Levay
424 Woodlawn
Roscommon, MI 48653

MISSOURI

Northeast Missouri Commodore Users Group (NEMOCUG)
Terry Kinney
555 Western Drive
Macon, MO 63552
(816) 385-2955
or contact:
Stephen Foltz
P.O. Box 563
Macon, MO 63552
(816) 385-5530

NORTH CAROLINA

Commodore Users Group of Fayetteville (CUGOF)
Steve Peterson
P.O. Box 41601
Fayetteville, NC 28309
(919) 864-6972

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Westcom 64 Commodore Users Group of Western Cincinnati
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Spartanburg Commodore Users Group (SPARCUG)
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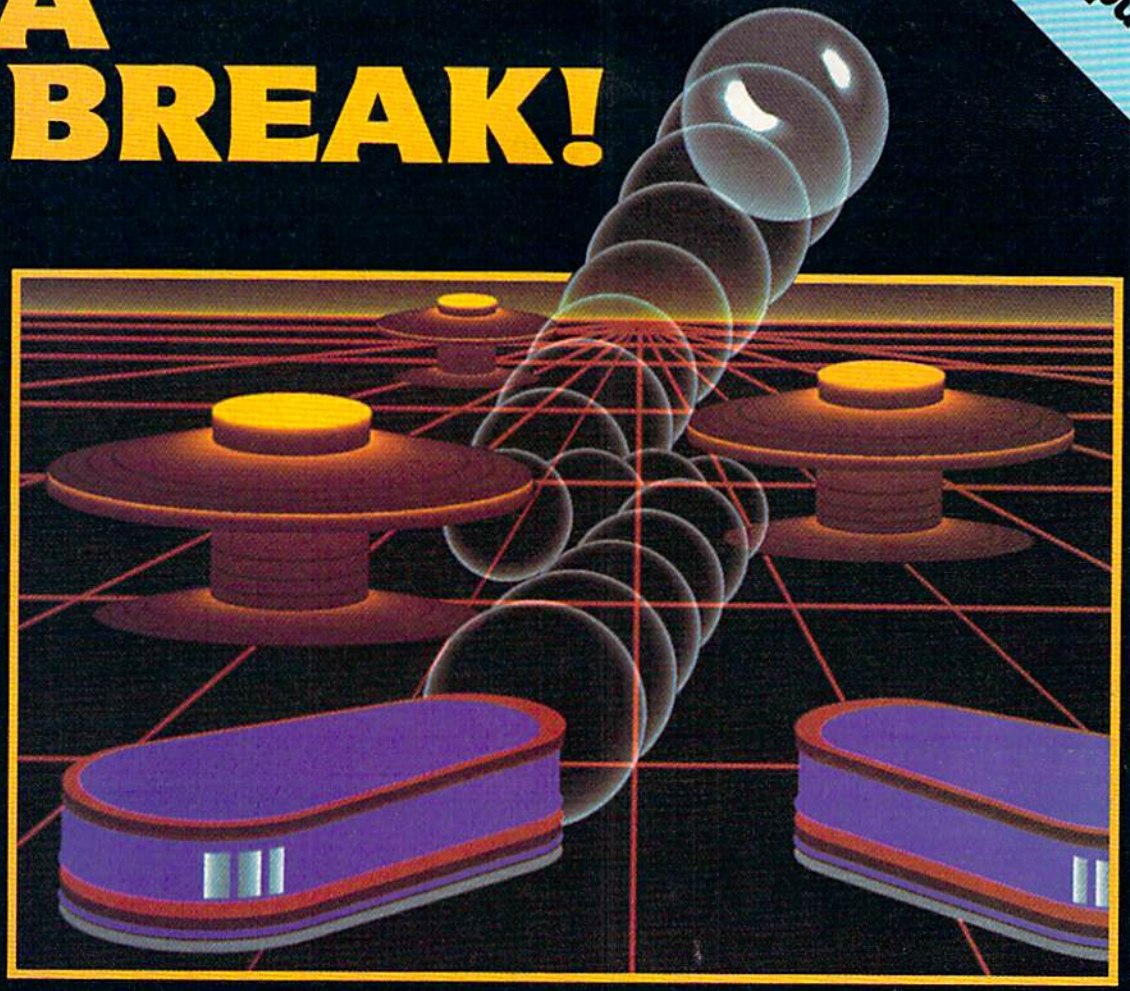

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A user group is being formed in Randallstown, Maryland. Those interested should contact Steven Ziglar, C-64 & VIC-20 Users Group of Randallstown, 8827 Sigrid Road, Randallstown, MD 21133. The phone number is (301) 655-8402.

The Pomona Valley Commodore Users' Group has changed its name to Cal Poly Commodore Users' Group. The contact person is David Dietzel, and the address is 14617 1/2 Ramona Boulevard, Baldwin Park, CA 91706. The phone number is (818) 960-9906.

COM-VICS, a Commodore and VIC-20 user group in Maine, has a new mailing address. Inquiries should be sent to COM-VICS, Commodore/VIC Users Group, P.O. Box 1541, Auburn, ME 04210.

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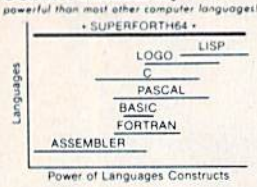

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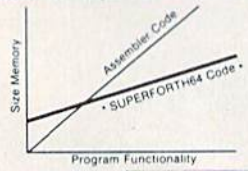

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Gregg Keizer, Assistant Editor, Books

Your expedition has landed on uncharted territory as the search for gold and glory continues in Seven Cities of Gold.

Games are fantasies. Even the simplest children's game, like hide-and-seek or tag, has elements of fantasy. Hide and I'm invisible; your touch is poison. Most computer games are fantasies in one way or another, too. You become a fighter pilot in *Zaxxon*, or a frantic tunneler in *DigDug*. Some games make fantasies seem more realistic (sounds almost like a contradiction) than others. Often these realistic games, whether they're electronic or played on a board, are called simulations.

But what does all this have to do with *Seven Cities of Gold*?

Two things really. First, *Seven Cities* is a simulation. Second, it's a fantasy.

I'm not saying that the game is unreal, or even untrue to history. Quite the opposite. It's one of the most interesting games I've played, one that kept me staring at the screen and holding the joystick long after I would have walked away from most games. But it *is* a fantasy, at least for me. It probably will be for you, too.

Orellana And The Amazon

A long time ago, I read an account of Francisco de Orellana. He's rarely mentioned in the histories of the Spanish conquest of South America. A relative of the Pizarro family (Francisco Pizarro was already governor of Peru, having defeated the Incan Empire in 1533), he accompanied an expedition across the Andes in 1541. The 200 Spaniards and their 4000 slaves were searching for cinnamon trees and gold. After crossing the mountains, the Conquistadors dropped into the edges of a vast jungle. They found their cinnamon trees, which were too far from civilization to be worth anything. The expedition then turned to the east, to the 2-1/2 million square miles of the Amazon Basin. Eventually they reached the Napo River, one of the tributaries of the Amazon.

Natives told the Spanish of a great city of gold downstream. It was a good way to get the invaders out of the area. So Orellana and 50 men began their fantastic voyage. For 17 months, on crude rafts or simple ships they built themselves, the Spaniards saw mile after mile of river. What they were doing was crossing the continent by navigating the entire Amazon River! Of course, there were close calls with natives (including, according to Orellana, a tribe led by women—the famous "Amazons"), times when they almost starved, and weeks of depression and disease.

But they reached the Atlantic on August 26, 1542. They even made it back to Spanish settlements by sailing along the coast. Orellana was greeted as a hero by the King when he returned to Spain.

I've always imagined being a part of this strange and wonderful odyssey. Until now, however, there was no way to play out that fantasy—I really didn't want to go down the Amazon, I just wanted to *imagine* doing it.

1492

Seven Cities of Gold let me do just that. Designed and created for Electronic Arts by Ozark Softscape, the team which brought us *M.U.L.E.*, this computer game/simulation makes you one of the first Spanish explorers of the New World.

Starting in 1492 with a small fleet of ships, complete with armed men, food, and trading goods, you sail west across the Atlantic. You hope there's something on the other side, something you can set foot on and claim before your food runs out and your men begin starving. You find it. Now the decisions begin to pile up.

How many men to take on an expedition into the interior? Can they carry enough food to see them back again? What to

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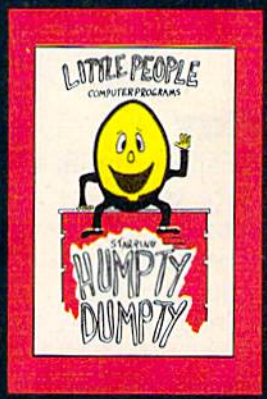

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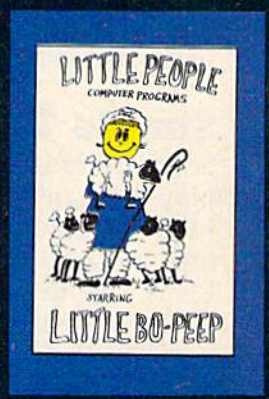

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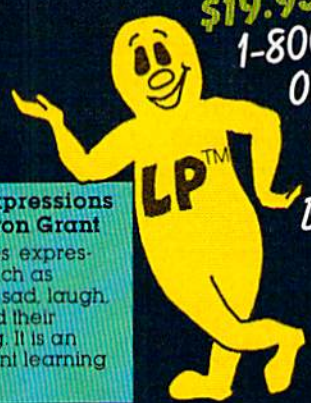

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do when a native village is finally found? Enter and trade, or enter and kill?

Simple To Play

Seven Cities is quite simple in its play mechanics. Once you've followed the directions and created a map disk (you need a blank disk to play the game, as well as a joystick), loaded the game and watched the title display, the only thing you have to do is move the joystick and press the fire button. Menus appear when needed. Before you leave Spain, for instance, you can walk into the outfitter to buy supplies. A menu is displayed which lets you purchase additional ships, men, food, and goods, *if* you have the gold. There are other menus available while your expedition is exploring. They're all accessed by pressing the joystick fire button. Expedition movement, whether on land or sea, and combat are controlled with the joystick.

Once you make landfall, you need to create another expedition. You can select its composition, choosing the number of men and the amount of trading goods and food. Jungles, swamps, mountains, plains, and rivers are there for the exploring.

And there are hundreds of villages, towns, and cities scattered across the two continents (*Seven Cities* includes both North and South America). If you earlier chose the novice level of play, the settlements can be seen. When you move up to the higher levels, however, the natives can only be found if you stop and search. Settlements will blink if they're nearby, giving you an idea of where to head.

Peace Or War?

As soon as you move into a village, town, or city, you have an ethical decision to make. Trade for the gold and food you need, or simply take it. It's a fascinating decision. To be historically accurate, *Seven Cities* has to allow the player to repeat history. The Conquistadors, for all their bravery and exploits, were little more than thugs in their relations to the natives. They rarely traded, instead opting for the quick and simple approach—intimidate the natives until they handed over whatever wealth they had.

If you want to follow this path, you can. You can rush into any settlement and within minutes defeat even the fiercest tribe. It may cost you the lives of some of your men, but that's usually all.

Or you can move cautiously into a village, offer gifts to its leader, and then trade goods for gold and food. *Cautiously* is the key word here; if you move too fast, you'll bump into some of

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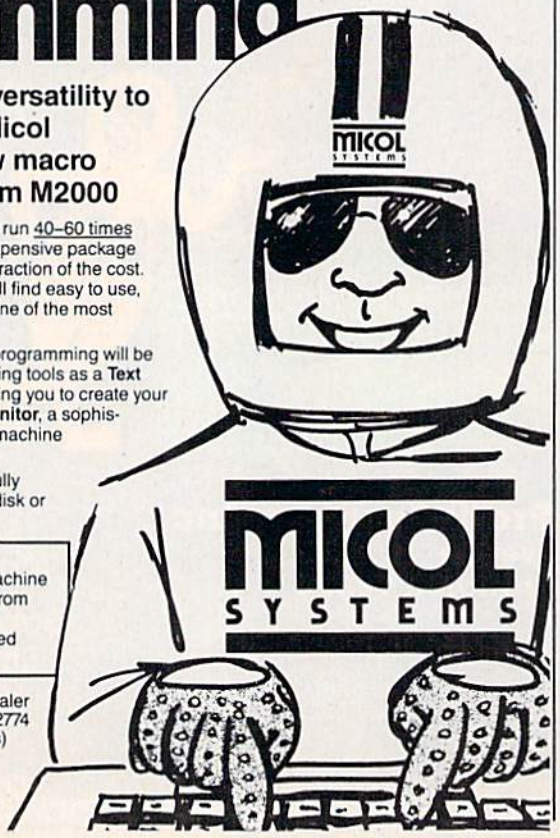

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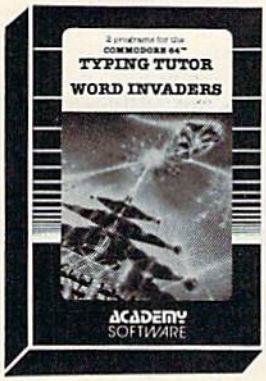

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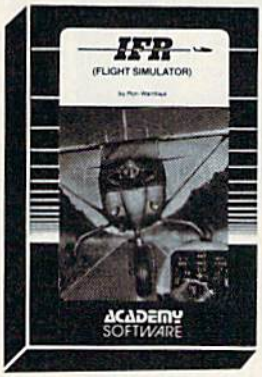

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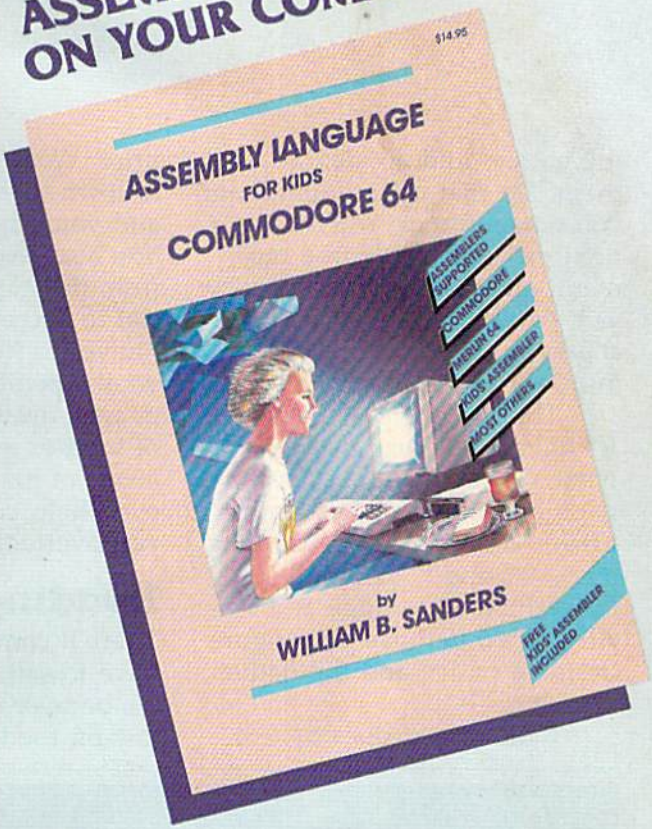

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the natives and accidentally kill them. Do that often enough and you enrage them. You'll have a fight on your hands in a moment, and the result is the same as it would have been had you charged into the place with murder in your heart.

The designers of *Seven Cities* have made warfare somewhat abstract. It's just not *fun* to wipe out entire villages and towns, certainly not as thrilling as destroying fleets of alien spaceships that dodge and twist. All you do is move your figure beside a native and the native vanishes.

Making war does have a price. Word spreads from village to town to city of your cruelty, and you'll be ambushed often. You also won't get any help from the natives, something crucial to success. Without willing natives to help carry things, your expedition can't travel far, or walk away with large amounts of food or gold. In the higher levels of play, your bearers can even help you find settlements you overlooked.

Heading Home

There'll come a time when you have to sail for home. Usually it's because your expedition is low on food or out of trading goods. If you've been fighting natives, it may be because there are few soldiers left. Navigating home is done the same way as sailing to the New World. Use the view map feature to find your latitude. Home is at 30° North. Once home, you can report to the king, perhaps receive a promotion and additional moneys; go to the pub to save the game map to disk; or go to your own home to view your progress. The outfitter waits for you, too. Using the gold you obtained on the voyage, you can buy more ships, equip more men, and load more food and goods. You're ready to sail on another voyage.

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How exciting can it be to explore a world you already know? Obviously, you can't erase your own knowledge of geography. *You* know things the explorers could not. You know approximately where the Mississippi River empties into the Gulf; you know that the Incan Empire is somewhere in Peru. But this doesn't really detract from *Seven Cities'* play. Geography is important, but dealing with the natives is vital. That's the heart of the game.

However, there is another world in *Seven Cities*. Actually, hundreds if not thousands. By using the random continent creation feature, you can explore totally new New Worlds. It's not North and South America anymore.

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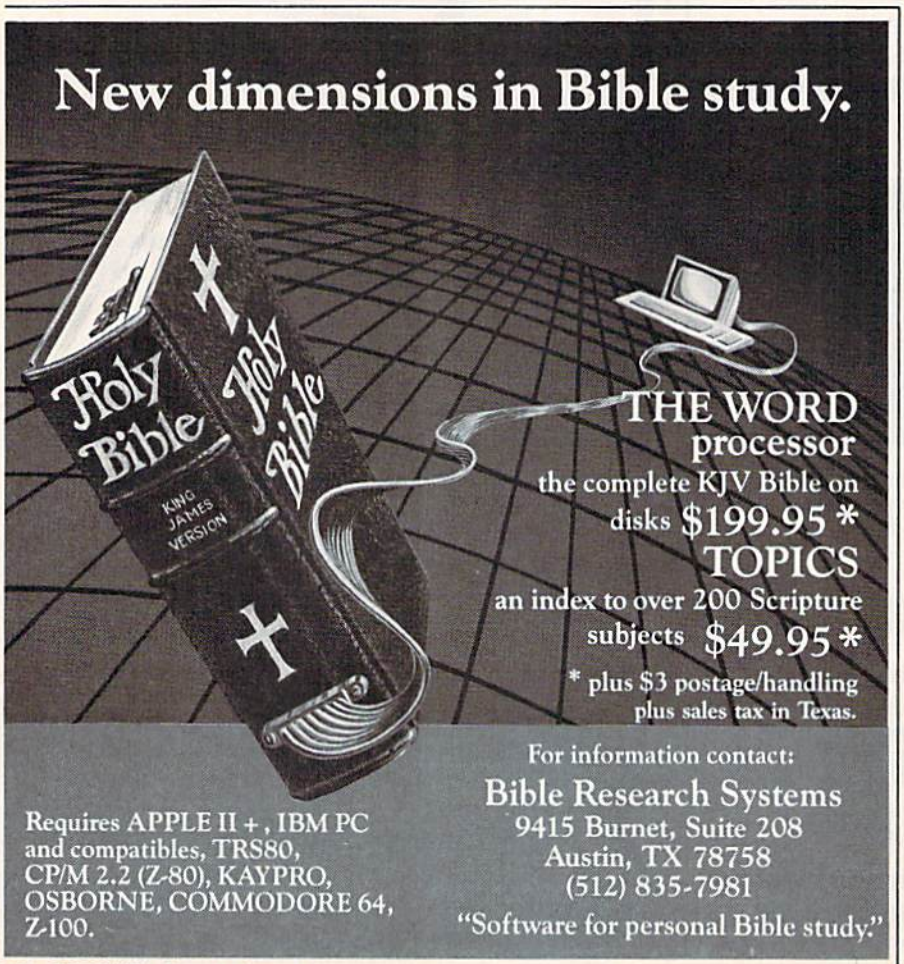

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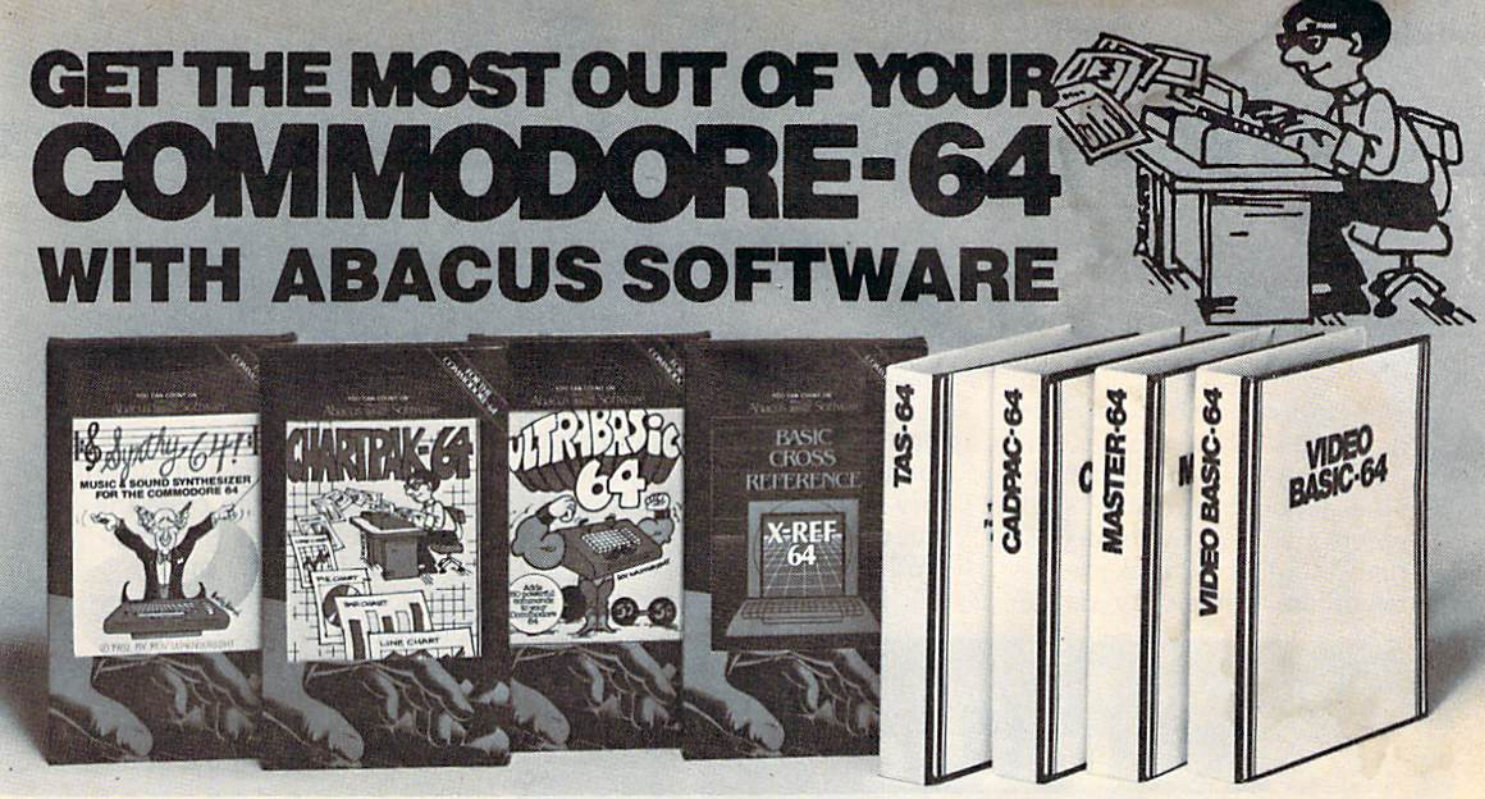

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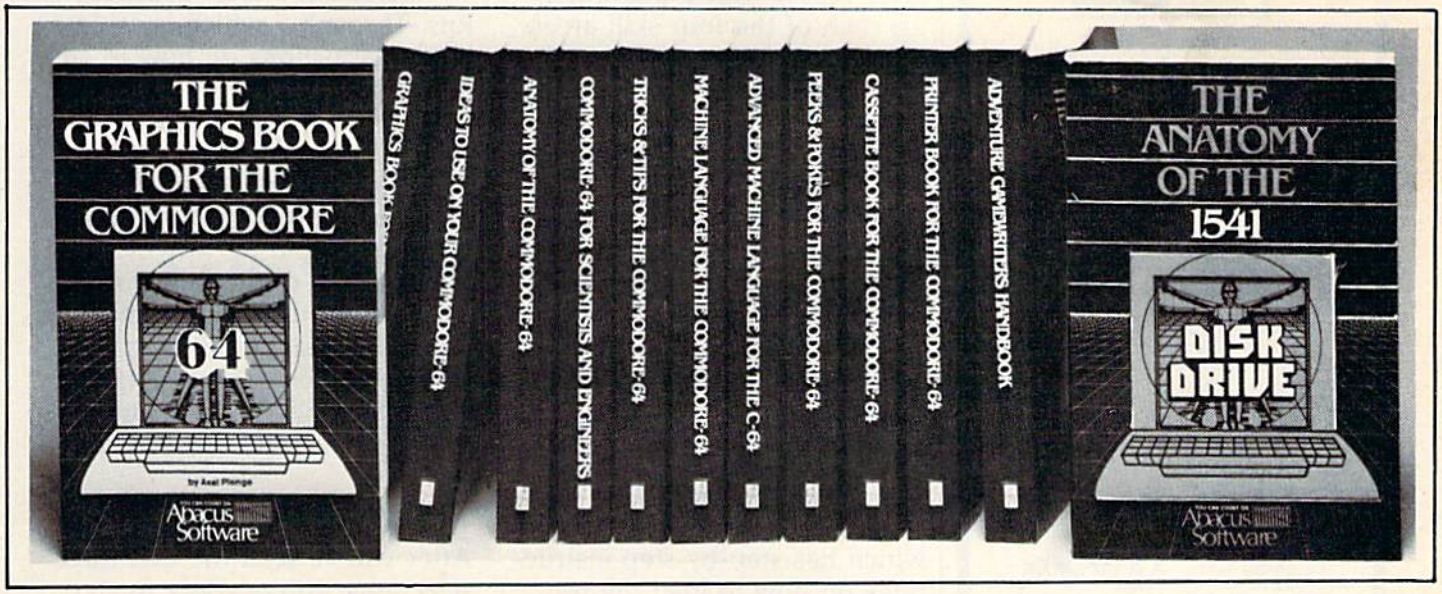

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skills, Language Skills, and Personal and Social Skills. The results can then be compared to other children in the same age group.

For each child tested, you get a report with explanations for each of the four skill areas. You may also see a bar graph of the skill levels for Up-to-Age items, Challenge items, and Above-Age items. A printout is also available from within the program. *Childpace* comes with one diskette which contains a series of programs, plus room for results for up to 16 children.

Step Through The Menu

The program is designed for ease of use. Included in the package is a reference card which has step-by-step instructions on how to load the program. If you're using the program for the first time, you should select 1, "How to Use *Childpace*" from the main menu. This program illustrates the computer and shows how to use the function keys. On every screen, the operation of the function keys (f7 to move forward, f5 to move backward, and f3 to return to the main menu) are shown, and any other significant keys are highlighted. The use of color for emphasis is effective, and text is clear on either a color or green-screen monitor.

Selection 2 on the main menu is "Background," which presents the philosophy of *Childpace*. If you're one of those people who doesn't read the printed material that comes in the package, you can get the information from this program. Although a 27-page manual comes with the software, all the same information is included in the programs.

Selection 3 is a "Practice Run-Through," which is essentially instructions on how to administer the tests. Example questions for you to score are shown. "Rose," an attractive character who can jump, hop, and walk, is introduced to help you understand by way of illustration some of the motor skills. If you don't understand how to do a particular skill that is described in words, press E (for Example), and Rose will appear on the screen and demonstrate.

Testing A Child

After you've seen the first three selections, you're ready to start testing a child. Selection 4 is Parent Questions and must be completed for each child you test. Enter the child's name and sex, plus the date of testing and the child's birth date. The computer calculates the number of months for the age. Depending on the child's age, you will be asked some questions about the child, most of which are in the Personal and Social Skills area. Again, the program is easy to use. Press Y for yes and N for no, or the space bar to erase. You may use f5 to back up, or f3 to go back to the main menu. The computer accepts only certain key presses and ignores all others. The colors indicate where you need to answer.

After answering the Parent Questions, you can select 5 to

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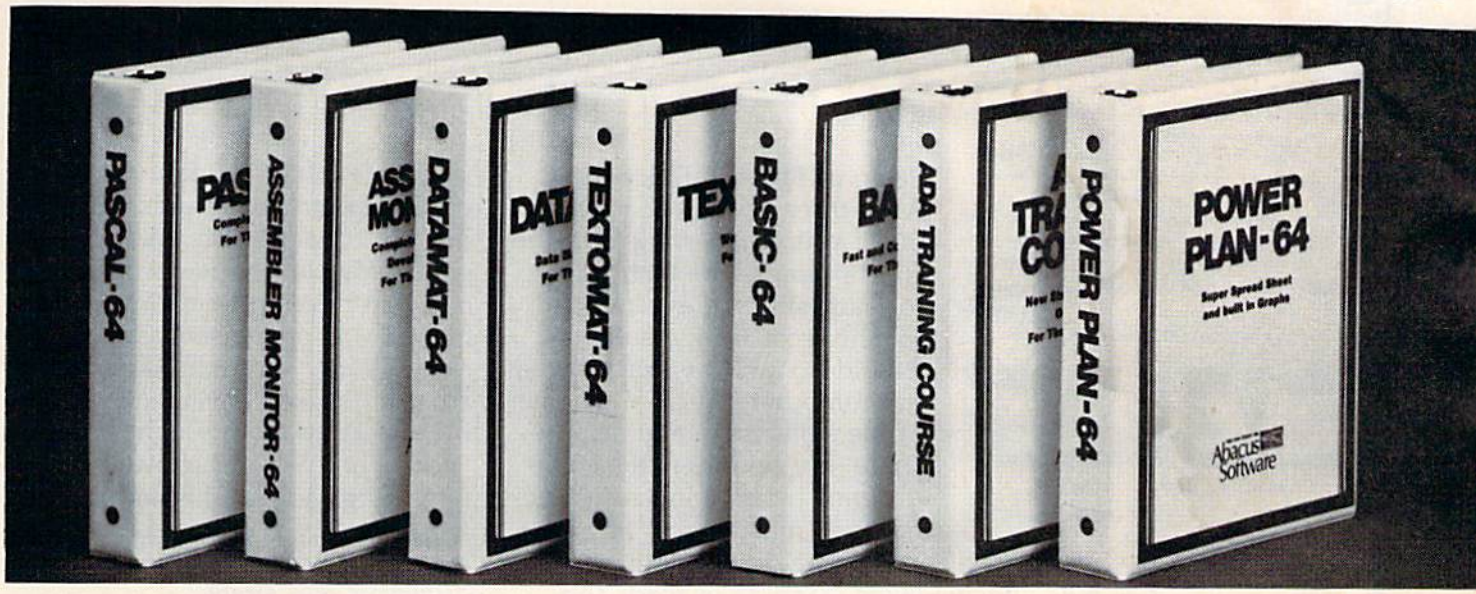

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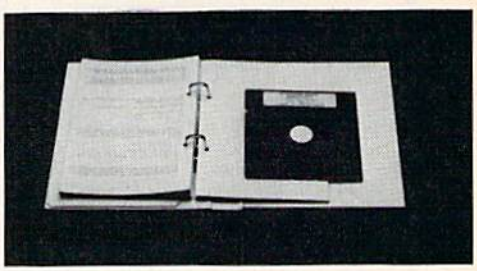

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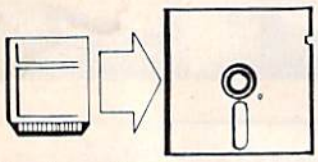

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Begin or Resume Exercises. After three screens of instructions, you start testing with the child present. The instructions for each skill are explicit, and for the most valid results you should do and say exactly what the computer directs. On some of the skills, you may demonstrate, but on others the score depends on how much instruction you must give.

Some of the motor skills include standing in place and jumping, a distance jump (jumping over a sheet of paper), hopping, catching a ball, and walking backward heel to toe. Remember, if you aren't sure what the activity is, you can press E to see Rose perform the activity.

A *Childpace* Record Booklet is included to aid in testing the detailed movement. One of the activities, for example, is to copy a circle (although you are not allowed to say the word "circle" to the child). Another is to draw a cross. (My son said, "OK, I'll draw a plus.") One skill is to draw a person, and the score is determined by how much detail the child provides. The manual shows examples of passing and failing results or how to score the drawing of a person.

For younger children, Language Skills test items may have questions about pronouncing words or understanding parts of the body. Older children need to recognize colors (colored blocks are included in this package), repeat sequences of words, recognize opposites, define words, and tell object composition: For example, what is a spoon made of? What is a shoe made of? What is a door made of? In defining the words, you have to consider that this program only chose a few words, and that doesn't necessarily make a comprehensive test. For example, my son didn't know what the word "pavement" meant. At first he thought I said "payment." When I showed him the pavement, he said it was concrete or asphalt or was more specific with sidewalk, driveway, and street.

The Personal and Social Skills are mostly answered in the Parent Question section. These skills include dressing, feeding, washing hands, and social interaction with others.

Evaluating The Results

The next section is viewing the results. First, an explanation of the results is discussed, then you get a report for each of the four areas. Each screen tells how the child performed in up-to-age items, challenge items, and above-age items. Pressing CTRL-P gives you a printout (actually a screen dump) of the report. If you press f7 to continue, you see an attractive graph of the results with arrows showing the child's skill level compared with "norms." After the last graph, an evaluation of the child is given with a general summary.

If the report indicates the child is behind schedule, the manual says "don't push the panic button," and lists several reasons for possible negative results, along with some suggestions. The manual also gives a

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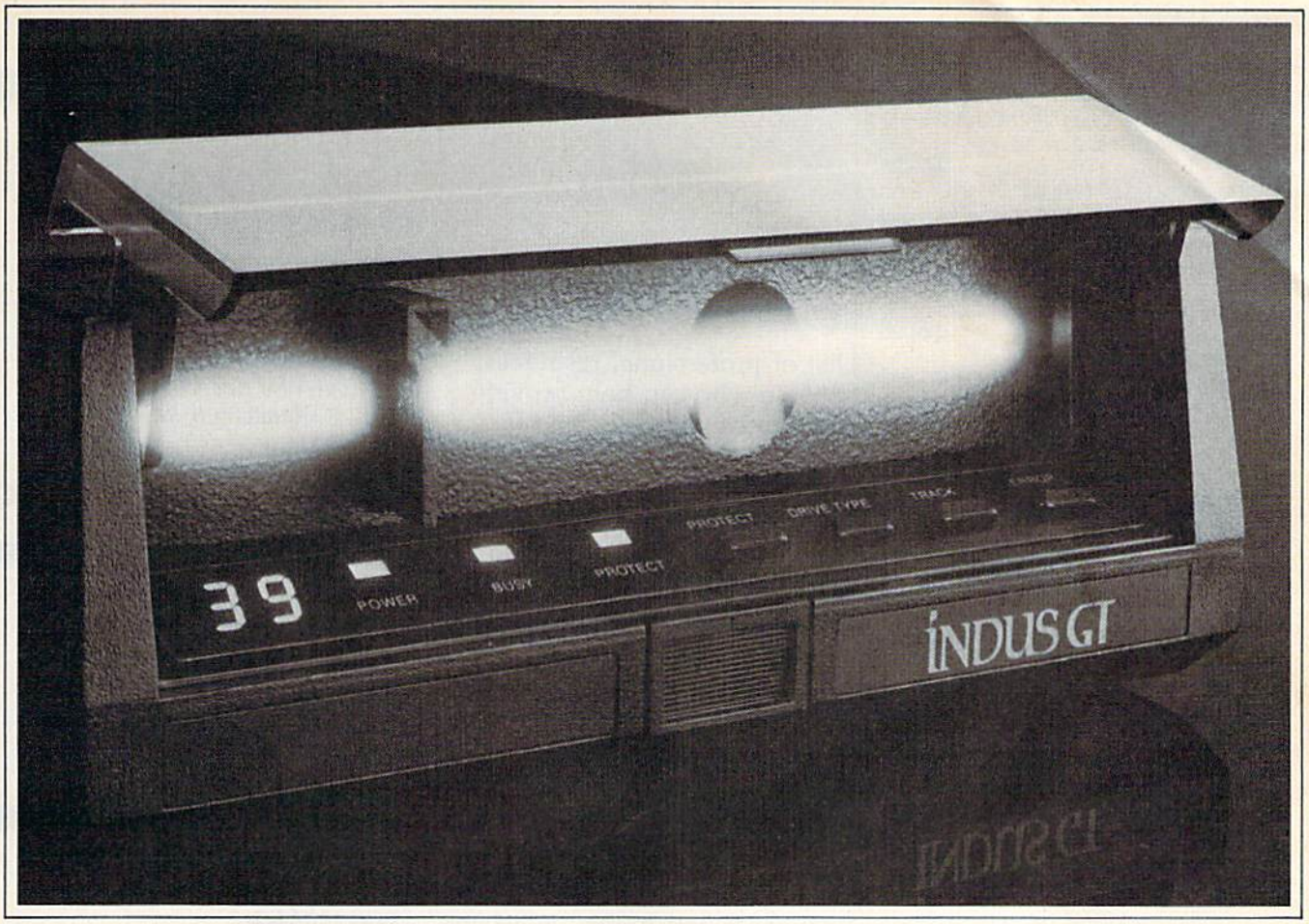

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list of professional resources, people who can help provide assistance with the child if needed.

When I had my first child, I got several books that had lists of what the child should do at certain ages. As interested and concerned parents, we checked those lists periodically to see how our daughter was doing. With our fifth child, we were much more relaxed and assumed he would walk eventually, talk when he got around to it, and play with other children when he got to school. We haven't paid much attention to standards and norms. However, it was a lot of fun to try out this program to see how our four-year-old compared with the average.

My assessment? It would be fun to start with a young baby, then keep track of the progress every few months. An electronic baby book! The best thing about this program is its ease of use, designed so that any parent (even one who has never used a computer) can use it. The instructions are clear and understandable. Blocks, a tube, and a pom-pom come with the package.

The manual is easy to understand and has helpful examples. The program itself is "user-proofed" so you can't crash it with bad key presses. The screens show exactly what keys may be pressed for answers, scoring, or to go to different screens. *Childpace* lends itself to use either at home or in nursery schools to help with assessing child development.

Childpace
Computerose, Inc.
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Also Worth Noting

Rockney Disk Utilities

Rockney Disk Utilities (RDU) is an all machine language, menu-driven collection of disk utilities. With a colorful text display, RDU makes it easy to access almost every disk feature, eliminating the need for OPEN 15,8,15. Features supported are: enhanced directory, display sector, display BAM (Block Allocation Map), trace file (shows all sectors used by a file), initialize, display error channel, copy disk, edit sector, rename, copy file, concatenate (merge) files, validate, and scratch. Programmers will especially appreciate the ability to display and edit sectors. Pressing a function key can give you a help screen, hex to decimal and decimal to hex conversion, and a screen dump. Two extra programs permit you to perform single drive file copying and full disk backup. Unlike some disk utility packages, *Rockney Disk Utilities* has no provision for backing up copy-protected disks.

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The manual tersely covers all the disk commands and includes technical information on how each command works. This approach may be confusing to beginners, but it's more than substantial for intermediate programmers. Indeed, the value of this package is educational. The manual includes techniques for unscratching a file, modifying a machine language program without loading it into memory, and packing disk files, explaining not only how it's done, but why it works.

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The Voice Messenger

This new product from Currah Technology adds speech synthesis to a Commodore 64. It doesn't require an external speaker—the voice goes through the television or monitor speaker. Installation is easy: Simply plug it into the cartridge port, then take the cable leading out of the cartridge and plug it into the audio/video socket. Since the same socket is used by the monitor cable, a Y-connector is available from Currah for use with a monitor.

The Voice Messenger adds five new commands to BASIC, which can be used within a program or in direct mode. The manual also includes the necessary technical information for machine language programmers. INIT (initialize) turns on the voice. BYE turns it off. KON turns on the key-speech feature, which says each key when it is pressed. For example, if you enter the BASIC line 10 PRINTA, you hear *one-oh-space-pea-ar-eye-en-tee-ay-return*. All graphics characters are pronounced *graphic*. Key-speech could be a great help for people entering data, children learning the alphabet, or teaching touch typing to the blind. KOFF turns off this feature.

The fifth command, SAY, speaks letters, words, or sentences. It must be followed by a string or string variable. Unlike some voice modules, the vocabulary is not limited to a certain number of words. The different sounds of English are built-in. *The Voice Messenger* uses a system of rules for deciding how a word should be pronounced (for example, *plough* is pronounced differently than *cough*, even though they're spelled similarly).

Using allophones gives you even more control over the sounds. The hard *g* sounds in *big* and *got* are actually (slightly) different. So you could type SAY "HELLO" or, using allophones to make it sound more like English, SAY "[HE(LL)(OO)]". The full list of allophones is included in the manual.

The sounds to be spoken are stored in a buffer which holds up to 255 allophones (about 25 to 30 seconds of speech). Because it is interrupt-driven, BASIC programs do not slow down or stop while words are being spoken. There are two voices, a low one that sounds a bit like Darth Vader and a higher one. Two intonations are available for each voice, normal and emphasized.

Currah also markets speech synthesizers (in England) for the VIC-20 and the Sinclair Spectrum. *The Voice Messenger*, now available in America for the 64, is an easy-to-use, entertaining speech processor. And the price is right.

Currah Technology
50 Milk Street/15th Floor
Boston, MA 02109
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Tapper

One of the most addictive games we've seen lately, this Bally Midway arcade translation for the 64 from Sega has a lot going for it. *Tapper* is not only fun to play, but also immensely challenging, graphically entertaining, and full of action.

It might first appear to be just another super-fast arcade game, but the longer you play, the more you realize it's a very well-designed strategy game. As the "tapper" (bartender), you are serving a rude and motley crew of publicans whose thirst is nearly impossible to quench. There are four bars, and you must move quickly from one to the other to service the nearest customer. As the mob approaches, waving their fists, you must decide in what order they should be served. If one reaches the bar without being served, be prepared to be picked up by the collar and thrown down the bar. Inglorious treatment for all your efforts.

If that isn't enough, you must also retrieve the empty

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mugs as they return sliding back down the bar toward you. Unfortunately, many of the patrons want immediate refills. A key to staying alive for any length of time in the game is to pick up the occasional tip (if you have time). This triggers a chorus line of dancing girls which distracts some of the patrons and lets you catch your breath.

Dexterity with a joystick is a must for this game. Controlling the tapper isn't so difficult, but moving fast enough and to the right place at the right time is taxing to the point of exhaustion.

The title screen offers several options: one or two players, and Beginner, Arcade, or Expert levels. The Beginner level is a real handful. The first scenario is a Western bar (1890s). Make it past this one to go to a county fair, where the action picks up. If you make it through this scenario, you're treated to an abominable punk-rock bar. And, finally, an outer space bar with creatures a la *Star Wars*. Between scenarios, you can rest or play a guessing game with the Soda Bandit (sponsored by *Mountain Dew*).

You stay in the game simply by not losing one of your lives (five at the Beginner level, three at the others). A life is erased if you're thrown down the bar, fail to catch a returning mug, or slide a refill down the bar to a customer who's just left. You can gain extra lives by achieving a high number of points (depending on the level you choose).

Tapper is not for the timid, but we rate it near the top in entertainment value.

Sega Enterprises, Inc.
Sega Consumer Products
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El Segundo, CA 90245
disk or cartridge
(price unavailable)

Mancopter

Pedaling a copter across the skies? Be serious. Too childlike. Though that may be your reaction to reading the directions to this game, or even seeing it on the screen, it's only a first impression. *Mancopter* is a game for the 64 that's challenging enough for adults and picturesque enough for children.

As a pilot in the great mancopter race, you need to evade dozens of computer-controlled mancopters, dodge fish-stealing pelicans, and avoid falling dodo birds and leaping squids on your way to the finish line. It's never easy, for as soon as you stop hitting the joystick button, you begin to lose altitude. There are other obstacles, too, like tangled mangrove trees that force you to skim the water, or waving mermaids who want your last fish.

The scrolling screen moves smoothly as you fly from right to left. You can reverse direction, but its impossible to fly far that way. Not that you want to; there's a time limit. You need to reach that next buoy to get another 40 seconds on the clock.

If you bop other copters from above, they drop into the water. Unfortunately, they can do the same to you. Then you have to give one of your valuable fish to the whale. Otherwise, he won't come and provide his back as a launching pad. You begin the race with four fish. But it seems everything is trying to take them from you. Pelicans, squid, dodo birds, and even mermaids want them. There *are* ways to get more—some of the pelicans and mermaids have a fish in their beaks or hands, and if you're agile, you can take them.

Scoring is based on capturing fish, bopping and passing other mancopters, and finishing the race. Bonus points for passing mancopters are awarded when you land at a raft checkpoint.

The game gets more frenetic as you must fly under more and more of the mangrove trees. Avoiding the fish-stealers becomes increasingly difficult. Storm clouds appear and lightning bolts search you out. But the pace is worth it. The game is challenging and graphically entertaining.

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MACHINE LANGUAGE FOR BEGINNERS

Richard Mansfield, Senior Editor

ML Mailbag

If you have a question about machine language (ML), please send it to the address at the end of the column. This month let's answer some commonly asked questions:

Using The Kernal

How do you clear the screen in ML? I've tried filling it with 32's, the space character, but I know there's a better way. Also, how do you check what's being typed into the computer from the keyboard? I've tried looking at location 197, but it doesn't work out.

To effectively program in ML, you need several tools: an assembler, a disassembler, a map of your computer's memory (especially the BASIC and Kernal ROM routines), and a table of the Commodore version of the ASCII code (often called a Character Set Table). You'll find the first three in my book, *Machine Language for Beginners* (available from COMPUTE! Books or in most bookstores), and we've reprinted the Commodore ASCII table this month.

Your questions suggest that you are unfamiliar with the Kernal section of the BASIC ROM. Many of the fundamental things you ordinarily do in BASIC are easily accessed from ML programs as well. In BASIC you would just PRINT a clear screen character. You can clear the screen in ML by:

```
LDA #147
JSR 65490
```

The 147 is Commodore ASCII for clear-the-screen (see the table below) and you just load 147 into the Accumulator and then JSR to the computer's built-in PRINT routine. At the very top of ROM memory are several important addresses (referred to collectively as the *Kernal*) which can be used in your ML programming. The Kernal addresses are the same on a VIC and 64.

To simulate a BASIC INPUT command, JSR 65487. To simulate GET, JSR 65508. Probably the most useful of all the Kernal routines is 65490. The Commodore ASCII character value currently in the Accumulator will be printed to the screen. What's especially useful about this routine is that it remembers where the cursor would be. In other words, the next time you print what's in the Accumulator, the new character will be placed immediately following the previous character. You can also use all the special codes for clear screen, delete, backspace, etc. Other useful Kernal routines open and close files, save and load programs, read the time, check the STOP key, and read or set the position of the cursor on the screen.

STANDARD ASCII

1	start of heading
2	start of text
3	end of text
4	end of transmission
5	enquiry
6	acknowledge
7	bell
8	backspace
9	horizontal tabulation
10	line feed
11	vertical tabulation
12	form feed
13	carriage return
14	shift out
15	shift in
16	data link escape
17	device control 1 (X-on)
18	device control 2
19	device control 3 (X-off)
20	device control 4
21	negative acknowledge
22	synchronous idle
23	end of transmission block
24	cancel
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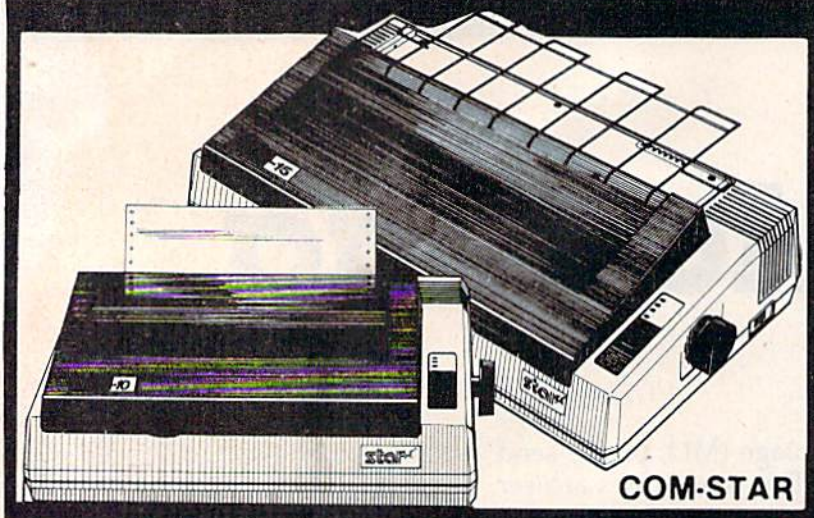

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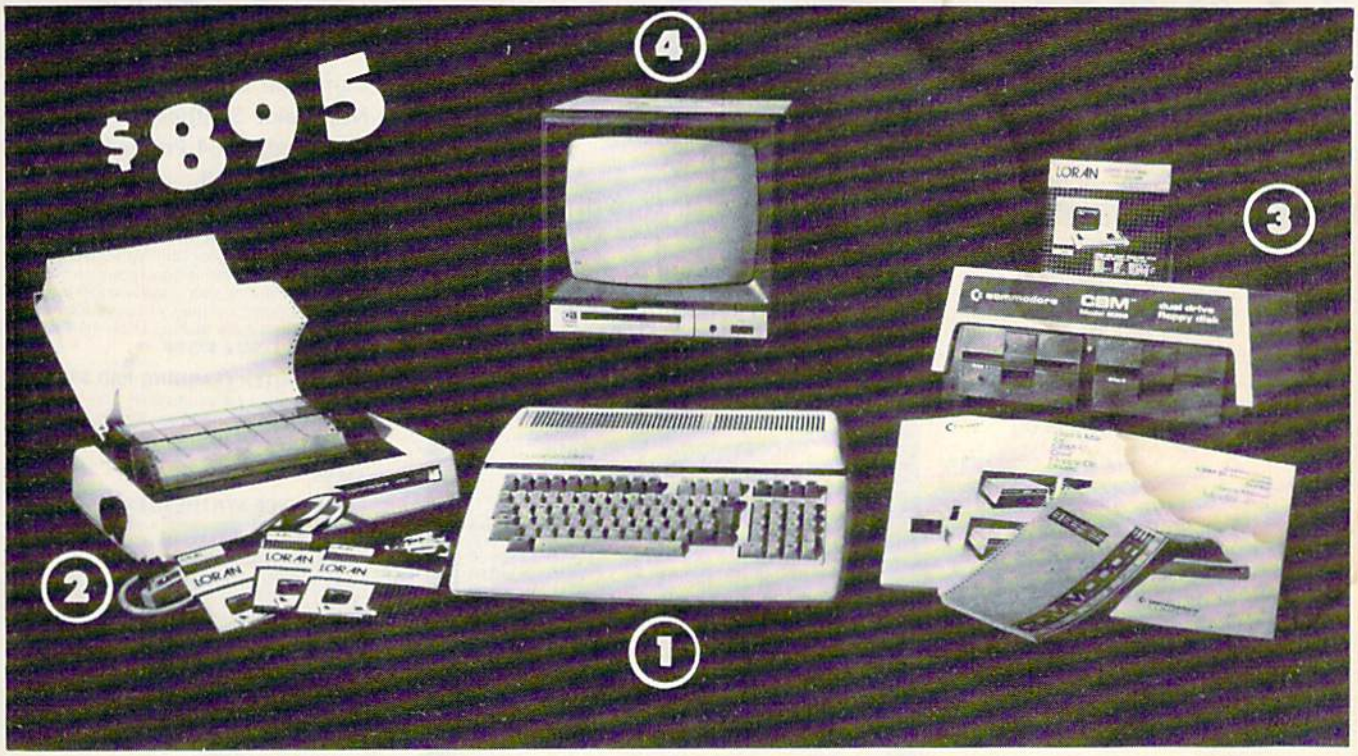

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