

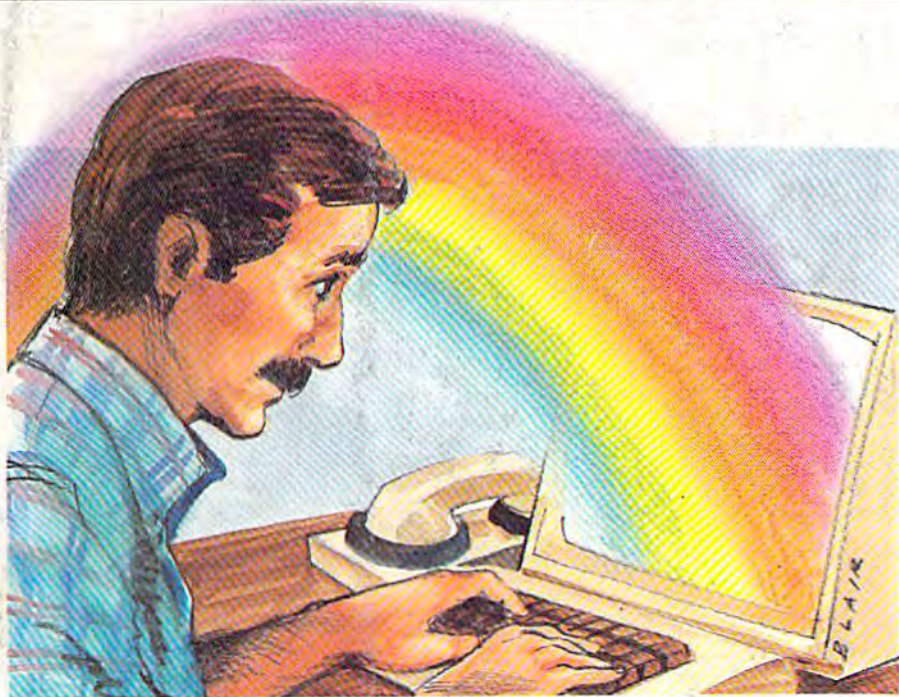
COMPUTER'S GAZETTE™

\$2.95

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Issue 17 Vol. 2, No. 11

02220 \$3.75 Canada

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



C/G Term

Talk to other VIC and 64 users with the Color/Graphics Terminal program, the first in a series of integrated telecommunications software. Designed especially for ease of use.

Horizons:64

How does the new Plus/4 stand up to the 64? A revealing look at Commodore's new computer.

Also In This Issue:

Function Key

Machine Language
For Beginners:
A VIC/64 Assembler

Programming Sound
And Graphics With
The Super Expander 64

Plus an expanded
reviews column

Bulletin Board Fever

A look at the growth of telecommunications networks geared to Commodore owners.

Disk Auto Load For The 64

A handy utility that automatically loads and runs your BASIC or machine language programs.



Bagdad

Stay on your magic carpet and fend off the evil genies. Put them back in their bottles, but don't let them escape. A challenging arcade-style game for the VIC and 64.





The Nice Family:
Bill, Janet,
Tom and Marybeth.

Once upon a time (it was 1984, in fact) and not so far away (right in your neighborhood), there lived a Nice Family: Bill and Janet Nice, and their children, Tom and Marybeth. The Nices owned a home computer, and they liked what they could do with it. But something was wrong. Every time they went to the store to buy a new game, no one was ever happy. ● “Oh no,” said Janet Nice. “This won’t do at all!

These games are not for us!”
“You’re right,” said Bill. “They’re just not nice.”

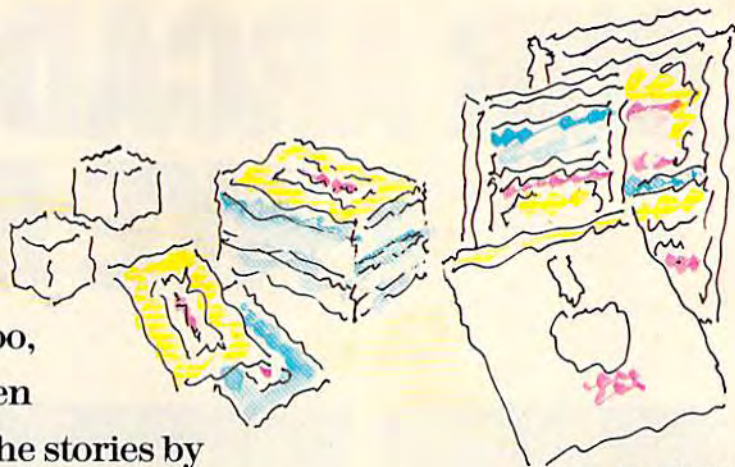
You see, all the games were about war and killing and hurting for no good reason. Things that the Nices didn’t want the Nice children doing or even thinking about doing. So Mr. and Mrs. Nice decided to buy educational programs. But that made Tom and Marybeth unhappy, because they thought educational programs were— you know— B-o-r-i-n-g. What were these Nice people to do? ● Then, one day, they found some new games called *Adventures in Narnia*, part of the new LifeWare™ line from Word Publishing. The first two games were *Narnia* and *DawnTreader*, and they were based on the classic fantasies by C.S. Lewis. ● The Nice kids were happy because these games were loaded with action, adventure, excitement



and challenge. Why, they even included things usually found in board games! So everyone in the family could get in on the fun! ● Mr. and Mrs. Nice were happy with *Adventures in Narnia* games, too, because they made their children *think*. And, of course, because the stories by C.S. Lewis present sound concepts and values (no other computer games do). "It's as if these games had our name on them!" said Janet Nice. ● Which brings us to the end of the story. It might be too much to say this family lived happily ever after. But they did live more happily with their computer—and with each other. ● And what could be nicer than that?

The End.

But not really. Your family's *Adventures in Narnia* are waiting for you at your local computer store or Waldenbooks store. Ask for *Narnia* and *DawnTreader*—the first two games in the *Adventures in Narnia* interface series—they're compatible with Apple II series® and Commodore 64™ home computers.




An *Adventures in Narnia* game includes diskette, a guide to Narnia, a free C. S. Lewis paperback book and playing pieces usually found in board games.



LIFEWARE™



from Word Publishing

One of the ABC Publishing  Companies

Available at all stores nationwide.

Waldenbooks



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OUR ARCADE GAMES WE BROUGHT



Bally Midway's Spy Hunter puts you in the driver's seat of the hottest machine on four wheels. You're after enemy spies. The situation is life and death. You'll need every weapon you've got - machine guns, and guided missiles, oil slicks and smoke screens. But the enemy is everywhere. On the road, in the water, even in the air. So you'll have to be more than fast to stay alive in Spy Hunter. You'll need brains and guts, too.

Do you have what it takes?



Bally Midway's Tapper would like to welcome you to the fastest game in the universe.

You're serving up drinks in some of the craziest places you've ever seen. And the service better be good, or else. You'll work your way through the wild Western Saloon to the Sports Bar. From there to the slam dancing Punk Bar and on into the Space Bar full of customers who are, literally, out of this world!

Are you fast enough to play Tapper? If you have to ask, you probably already know the answer.



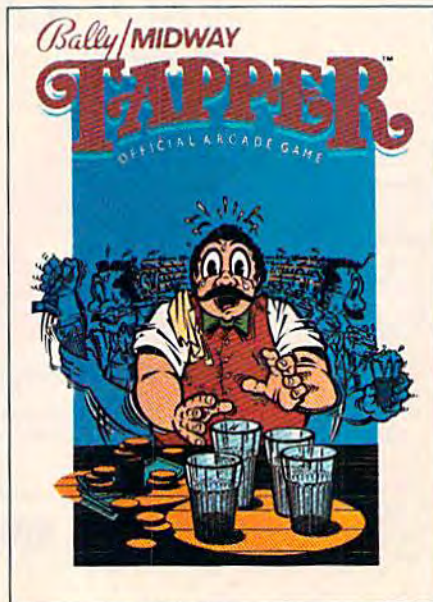
Bally Midway's Up 'N Down by Sega. In this game, a crash is no accident.

In fact, it's the whole object of the game. You'll race your baja bug over some of the worst roads south of any border. Leap dead ends, gaping canyons and oncoming traffic in a single bound. And if anyone gets in your way, crush 'em.

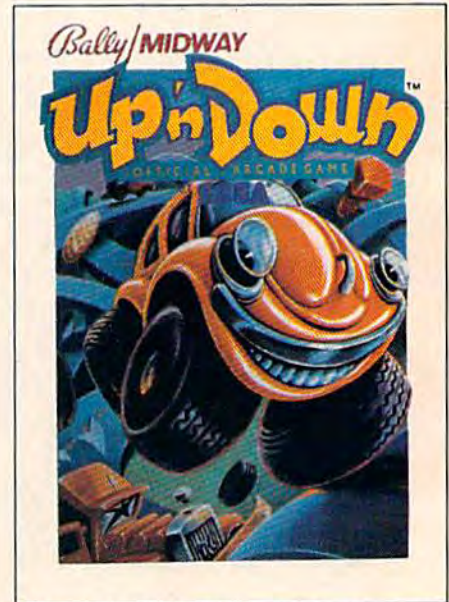
Crashing, bashing Up 'N Down. It's one smash hit that really is a smash.



The #1 Arcade Game of 1984.



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



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

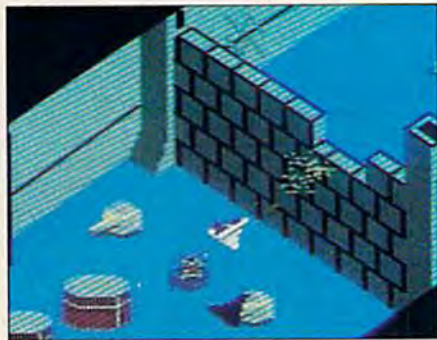
WERE SUCH BIG HITS, THEM HOME.



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

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.

Congo Bongo. It's fast and it's fun. But be careful. It's a jungle in there.



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.



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.

	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

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*Atari 400, 800, 600XL, 800XL and 1200XL.
(Congo Bongo cartridge: 400, 800 and 800XL.)
†Atari 800, 600XL, 800XL and 1200XL.

**Also available for IBM PCjr.

All new games are scheduled to be in your stores for Christmas. Check your local dealer.

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TWO SURE WAYS TO GET MORE OUT OF YOUR COMMODORE 64

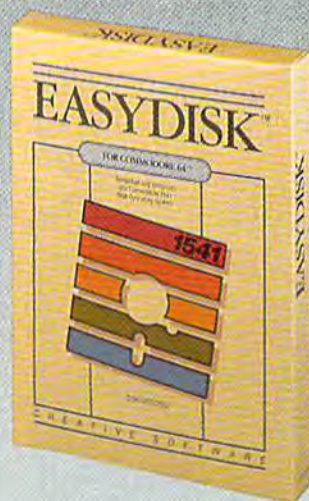
I AM THE C-64 provides you with a friendly and patient private tutor. This series is the perfect guide to learning all the power your Commodore 64 has to offer.

- Complete six-volume series.
- Each operation you can perform is explained in simple terms right on the screen; no more struggling with confusing manuals.
- Includes overall introduction to the Commodore 64 and its keyboard.
- Learn BASIC programming language as well as advanced programming techniques.
- Advanced series guides you through music and sound effects and sprite graphics.



EasyDisk eliminates disk based aggravation. It saves time and adds extra features, all at the touch of a key. A must for all Commodore 64 disk drive owners.

- Simplifies the Commodore 1541 Disk Operating System.
- Organizes all the commands in a simple, easy-to-follow menu.
- Allows you to select and execute commands with just a few simple keystrokes.
- Provides full disk backup (using just one drive).
- Doesn't interfere with the normal operation of your computer; it's simply there when you need it.



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*=General, V=VIC-20, 64=Commodore 64.

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THE EDITOR'S

notes

GAZETTE Editor Lance Elko contributes a guest editorial this month.

Robert Lock, Editor In Chief

At last June's Consumer Electronics Show, the prototype of a very powerful, new personal computer was demonstrated inside a closed, invitation-only suite. The computer was manufactured by a small Silicon Valley company, the Amiga Corporation, previously known only as a manufacturer of joysticks. Amiga was looking for capital to finish developing the rough prototype and move it into mass production.

Code-named *Lorraine*, the computer wowed the few who saw it. Although it houses the same microprocessor found in Apple's Macintosh—the 16/32-bit Motorola 68000 chip—it could leave the Mac in the dust. Consider that the Amiga was designed to come with 128K of RAM (expandable to 512K internally and several *megabytes* externally); a built-in 320K double-sided disk drive (IBM-compatible), expandable to several more floppy drives and a hard disk; built-in speech software and modem; four sound channels with synthesizer capabilities similar to the Commodore 64's; medium- and hi-res graphics (with an astonishing 4096 colors); eight sprites (with up to 16 colors each); standard parallel and serial interface ports; outputs for TV, composite video, and two types of RGB monitors; and a lot more. Plus, original plans called for it to be bundled with its own operating

system, word processor, and spreadsheet.

The retail price? With all the above features, Amiga claimed the *Lorraine* would sell for under \$1400.

Although the power of this new machine surprised many industry watchers, what surprised them more was the August announcement that Commodore had purchased the Amiga Corporation—and what could be the most powerful personal computer yet developed.

Not to be denied, Atari, under Jack Tramiel's new leadership, filed a \$100 million suit against Amiga, contending that Atari had already made a deal with Amiga to obtain the new custom chips which make the *Lorraine* possible. This lawsuit came several weeks after Commodore had filed litigation against a group of engineers who left Commodore to join Atari. Commodore claims the engineers took with them some of Commodore's computer design secrets. An interesting game of one-upmanship, perhaps?

As one Commodore source noted during this writing, no court injunctions have been granted in either case, and Commodore is continuing with its plans to market the *Lorraine*—possibly for under \$1000.

Whatever the results of the suits and countersuits, Commodore and Atari seem to be planning more powerful and less costly computers for the future. The outcome may depend on home computer sales this Christmas. Commodore leads in

the under-\$1000 market by a wide margin, but with Tramiel now heading Atari and the Japanese preparing to distribute MSX-based computers, we can expect renewed activity on the price/features front in 1985.

Telecommunications Software Series

Beginning with this issue, we're introducing a series of integrated telecommunications software, which includes a terminal program and a bulletin board. "C/G Term," which starts on page 38 in this issue, is designed for the VIC and 64 and is easy enough for a novice to use.

What makes this terminal program unique is that it eliminates nearly all the cryptic codes and tedious chores normally associated with the operation of terminal software. For example, you don't have to worry if you're sending or receiving a letter, program, or color graphics screen. The program figures it out and does the hard work.

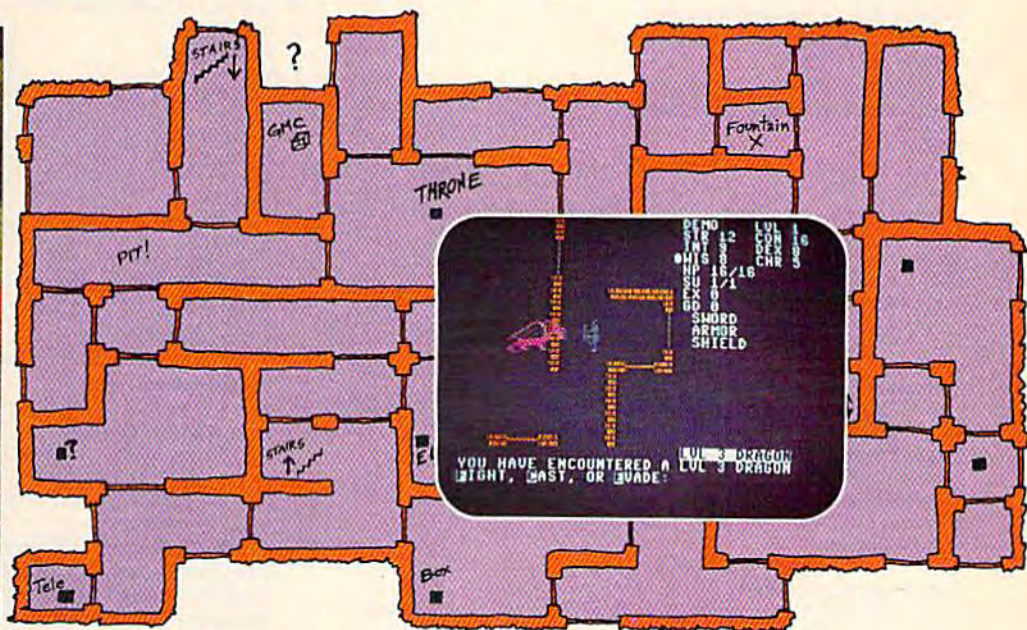
Next month, we'll publish the first half of the listing for the bulletin board system, designed for the Commodore 64 and for use with C/G Term. The remaining half will appear in the January issue.

Until next month, enjoy your GAZETTE.

Lance Elko
Editor

In the October issue, page 132, we incorrectly noted the phone number of the *Modem Times*. The correct number is (303) 578-5405.

Be Amazed!



Telengard: How low can you go?

We've created a subterranean monster. Fifty stories low.

That's the number of levels in the TELENGARD dungeon.

Each labyrinthine level holds hundreds of dark chambers and tomb-like corridors for the mighty adventurer to explore. It goes without saying that a shifting collection of hideous monsters with unpredictable behavior patterns can make life in the TELENGARD maze quite interesting—and frequently quite short!

Using wits, magic and true grit, your character delves deeper and deeper into the depths of TELENGARD in this realtime fantasy role-playing game. Available on cassette for Commodore® 64, Atari® Home Computers (40K), for a ghoulish \$23.00. 48K diskettes for Apple® II, Atari®, Commodore® 64 and TRS-80® available also, for \$28.00.

AND FOR THOSE WHO DON'T DIG UNDERGROUND GAMES . . .

There's **B-1 NUCLEAR BOMBER**, a nail-biting solitaire simulation of a manned B-1 on a mission over the Soviet Union. Your plane is equipped with six Phoenix Missiles, a one megaton warhead and orders to retaliate! Cassette for Commodore 64, Atari Home Computers (32K), TI99/4 & 4A (16K), VIC-20 (16K), Timex/Sinclair 1000 (16K), and TRS-80 Mods. 1/III (16K) are available for an explosive \$16.00. Diskette versions for Apple (48K), TRS-80 (32K), Atari (24K) and IBM (48K) just \$21.00.

NUKEWAR: Defend your country by massive espionage efforts, or by building jet fighter bombers, missiles, submarines and ABM's. Your cold and calculating computer will choose its own strategy! Cassette for Commodore 64, VIC-20 (16K), TRS-80 Mods. 1/III (16K) and Atari Home Computers just \$16.00.

FOOTBALL STRATEGY: Animated action on a scrolling field. A head-to-head challenge or solitaire as you select the best offensive or defensive plays in response to your opponent. Commodore 64, Atari Home Computers (32K) and TRS-80 Models 1/III/IV (16K) cassette for \$16.00. Atari (32K), IBM (64K) and TRS-80 Models 1/III/IV (32K) diskettes available at \$21.00.

T.G.I.F.: Thank Goodness It's Friday! Avalon Hill's new party game for one to four players recreating an often-not-so-typical week in the lives of the working class. Half the fun is just making it from Monday to Sunday. Commodore 64, Atari Home Computers (40K) cassette for a meager \$20.00. Atari diskette (48K) for \$25.00.

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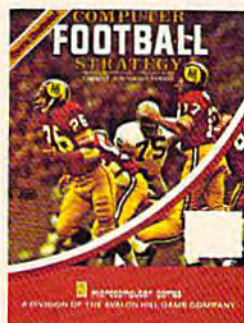
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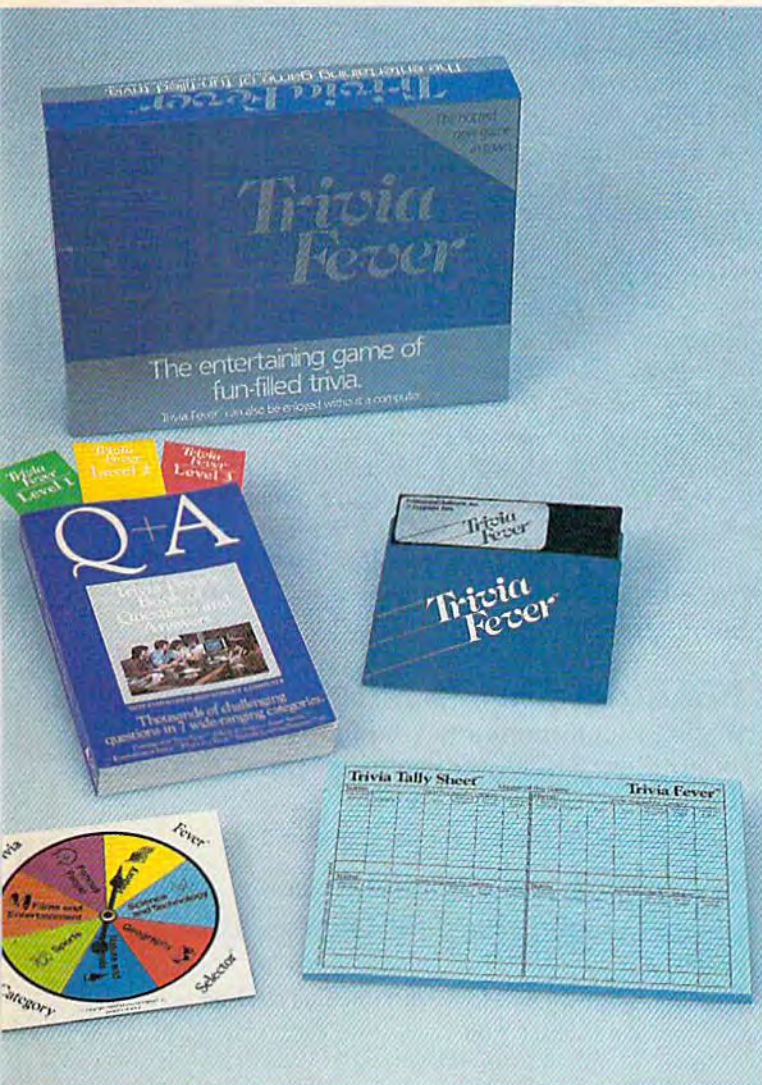
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Trivia Fever™

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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.

DATA statement with the lowest BASIC line number is read first. Enter and run this example, which will READ and PRINT names from a DATA statement:

```
10 READ A$:IF A$="END" THEN END
20 PRINT A$
30 GOTO 10
40 DATA TOM,GEORGE,DICK
50 DATA HARRY,FRED,PERCY
60 DATA END
```

Also, we've covered this subject in depth in past issues. See especially November 1983, page 150.

Better Pictures

In most of your programs, the graphics tend to be significantly better for the VIC-20 than they are for the 64. Can you explain why this is?

Eric Miller

Very simply, the reason is because of the difference in size of the characters. The VIC has 22 characters per screen line, while the 64 has 40. This means that the VIC's characters are larger and sharper. Hence, the better picture.

Mysterious DATA Statements

In some of your programs, you have lines such as: DATA John,Jerry. What exactly does that mean? What do DATA statements really do in a program?

Brian Dempsey

DATA statements are used to store information within a program. Data stored in this fashion is an integral part of the program, as opposed to being stored externally on a disk or tape.

DATA statements themselves are not executed. When a program is running and it comes upon a DATA statement, it skips to the next BASIC command. For this reason, it's best to place them at the end of the program.

The information in DATA statements is accessed with the READ statement. Data can be either numeric or string, although there are a few characters (commas and quotation marks, for example) which can cause problems. Multiple items of data within one DATA statement are separated by a comma. A DATA statement containing both numeric and string data might look like this:

```
10 DATA 1,2,3,Charles,Todd,Kathy
```

The READ statement retrieves data within a DATA statement from left to right, in sequential order. The

What's Zero Page?

I've often come across the term *zero page*. I'd like to know what this term means, and what it's used for.

Rob Gronemann

In the terminology of machine language, a page is 256 continuous bytes of memory. There are 256 pages of memory (64K) in a Commodore 64 or VIC-20; some are RAM and some ROM, although in an unexpanded VIC some pages are empty.

Since programmers begin counting at zero, zero page is the first page of memory, locations 0-255. This area of memory is especially important to machine language programmers because there are many ML instructions which work only on the contents of zero page locations. For example, the BASIC language itself, which is actually a collection of machine language routines, makes use of almost all of the locations in zero page.

PEEKing The Joystick

While programming my Commodore 64, I've found these PEEKs for use in programs that use the joystick. Use this formula:

```
PEEK(56321) AND A for joystick port 1
or
PEEK(56320) AND A for joystick port 2
```

where A is one of the numbers in the table listed below.

Value of A	Joystick Function Desired
1	up
2	down
4	left
5	up and left
6	down and left

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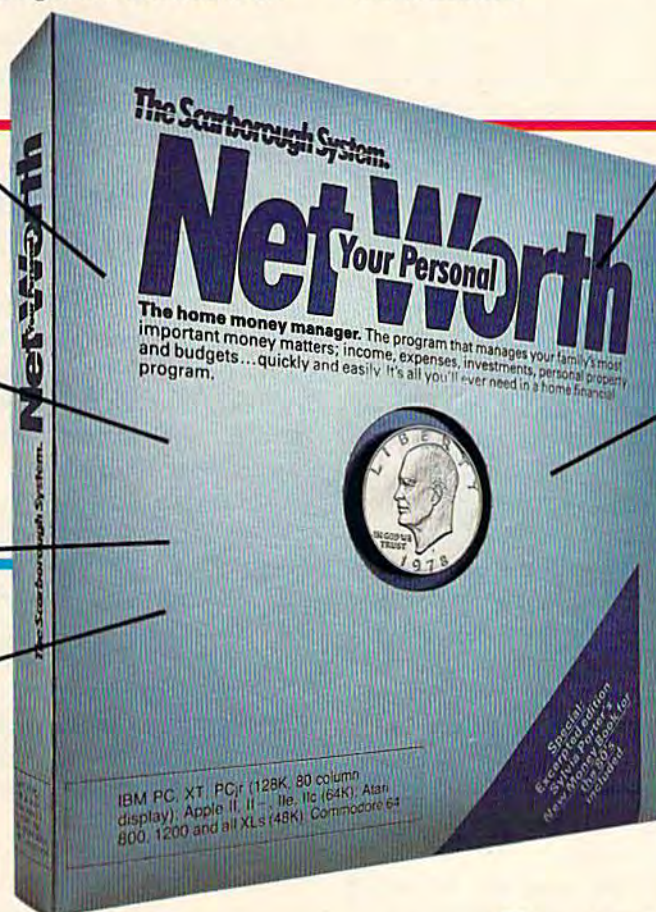
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The Program comes with two disks, one of which has accounts already set up for entry. However, only one disk drive is necessary.

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8	right
9	up and right
10	down and right
16	fire
17	up and fire
18	down and fire
20	left and fire
21	up, left, and fire (diagonally)
22	down, left, and fire (diagonally)
24	right and fire
25	up, right, and fire (diagonally)
26	down, right, and fire (diagonally)

For example, to test whether the fire button is being pressed on the joystick connected to port 2, you could use a line like the following:

```
IF PEEK(56320) AND 16 THEN PRINT "FIRE"
```

Mike Sudduth

Hot Drives

I often load a program or a game that I know will be played for hours. However, I don't like to leave the disk drive on because it might heat up. Is it safe to turn off the drive after it has finished loading the program?

Ilse Herrmann

Once a game is loaded, it's fine in most cases to turn off the disk drive. Of course, if the program you're running needs to access the disk, then it will have to be left on. Some games like Infocom's text adventures continuously use the disk drive while the game is in play.

If you are going to turn the drive off, be sure to remove the disk first.

Cursor Controls

I've discovered a technique for simple cursor control. In many of the programs I study, the cursor is positioned prior to printing with cursor control characters: {DOWN}, {LEFT}, etc. There is a much easier way to position the cursor. An added plus to this technique is that you don't need to know the current cursor position to move to the new position.

There is a Kernal routine called *PLOT* that can be accessed easily from BASIC or machine language. The subroutine (starting at address 65520) requires that the desired row number be placed in the X register and the desired column number in the Y register, and that the accumulator carry flag be cleared (set to 0). At first glance, this looks complicated, but the X and Y register values can be easily loaded from BASIC before calling this Kernal routine.

To set the registers, POKE memory locations 781-783. These bytes are arranged as follows:

Location	Register
781	X
782	Y
783	status register

To use the PLOT function, first POKE the registers with the desired row and column values. For example, if you wanted to print the word TEST starting at the sixth row down and the eleventh column over, you would: POKE 781,5: POKE 782,10. (Remember, the computer calls the top horizontal line of characters row 0, and the leftmost vertical line of characters column 0).

Next, the carry flag of the status register must be cleared. Bit 0 of the status register is the carry flag. When this bit has a value of zero, the carry flag is clear. To set the carry flag:

```
POKE 783,PEEK(783) OR 1
```

and to clear the flag:

```
POKE 783,PEEK(783) AND 254
```

Using the above example, the program to print TEST would look like:

```
10 POKE 783,PEEK(783)AND254:POKE 781,5:POKE782,10:SYS65520:PRINT"TEST"
```

Jack K. Bonge

This can be a useful technique for simulating the PRINT@ (print at) statement common in other versions of BASIC, and will work on both the VIC and 64. Readers should remember to begin counting at zero. The upper-left corner is row zero, column zero, which is why you POKE a 5 to get row 6 and a 10 to get column 11.

Interfacing With The SX-64

I own a Commodore SX-64, and I have a Cardco interface and a Gemini printer. In the recent article, "Selecting a Printer Interface," you stated that interfaces which draw power from the cassette port will not work with the SX-64. This is correct, but with a soldering iron, a bit of solder and a joystick port connector (available at your local electronics store), you can remedy the problem quickly and easily.

First, remove the original connector designed to plug into the cassette port. Solder the end of the wire to pin 7 (see figure) of a joystick plug (*not* the joystick port of the SX-64), and cover the solder connection with electrical tape, or cover the back of the connector with a specially designed hood (also available at electronics stores). To power up the interface, simply insert the connector into the joystick port and turn on your computer.

Patrick Spence

This is a good solution. However, if you aren't experienced in electronics, consult a specialist. Be careful not to void your warranty. Also, some interface manufacturers claim there is insufficient current available from the joystick port to drive their interfaces. Contact the interface manufacturers

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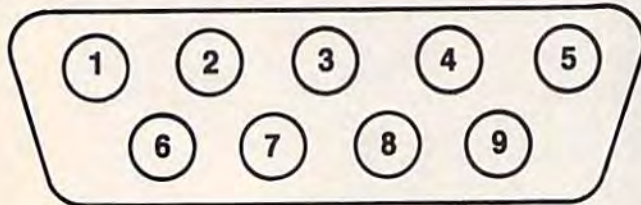


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for further information.

Also, see page 139 of the SX-64 User's Guide for information on the joystick port. Readers should be sure not to use the original joystick plug connector.

Joystick Plug (Rear View)



WordPro 3 Plus/64 Modification

We've received several letters regarding incompatibility between WordPro for the 64 and the Commodore 1526 printer. Professional Software, distributor of WordPro, has a fix and will send information on the modifications on request. Contact them at:

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Kathy Yakal, Editorial Assistant

A modem is a rather unremarkable-looking piece of equipment. Plastic housing, maybe a couple of lights or switches, occasionally a wire or cable attached to one end. Nothing magical.

But when you connect it to your computer and dial certain phone numbers, remarkable things do happen. *Telecommunications networks* offer help with technical problems, up-to-date news, movie reviews, public domain software, shopping catalogs, and, sometimes, new friends.

CompuServe and The Source are probably two of the best-known national networks. They are *multi-user systems* which can be used by more than one caller at a time. They charge a subscription fee and an hourly on-line charge. Most large cities (population of 50,000+) have a local number, so you can avoid long-distance charges.

Of course, you don't have to call an established telecommunications service to communicate with your modem. If you and a friend each have modems, you can call each other and

Get used to hearing busy signals: Telecommunications networks are tied up a lot these days. And bulletin board systems specifically designed for Commodore owners are popping up daily around the world. Here's a look at what's happening.

"type" to each other, or send software, instead of talking. Though that can be fun for a while, the novelty soon wears off (and the phone bills add up if it's long-distance).

Another telecommunications alternative that's fast gaining popularity is the bulletin board system (BBS). Some of the original boards went on-line in the late seventies, and were run by computer user group members. They were used primarily for posting messages.

Over the past year, BBSs aimed specifically at Commodore owners have popped up all over the country—even in many foreign countries.

It's not hard to see why

they call them electronic bulletin board systems. Think of what you most often see tacked up on regular bulletin boards. Notices of time and place for upcoming meetings. Items wanted, or items available for sale or swap. Funny cartoons or articles clipped out of newspapers and magazines. People needing assistance of some sort.

That's the kind of interaction you'll find on Commodore bulletin boards. Only your interaction won't be limited to the bulletin board hanging at the laundromat or on the office wall: You'll have access to people literally all over the world.

Let's walk through your first call to a BBS. Once you've received an answer and a terminal tone, and answered with your own, you'll probably see a message welcoming you. If nothing happens in the first ten seconds or so, try hitting the RETURN key a couple of times. Some systems require you to give them a couple of carriage returns to signal the software that someone is on-line.

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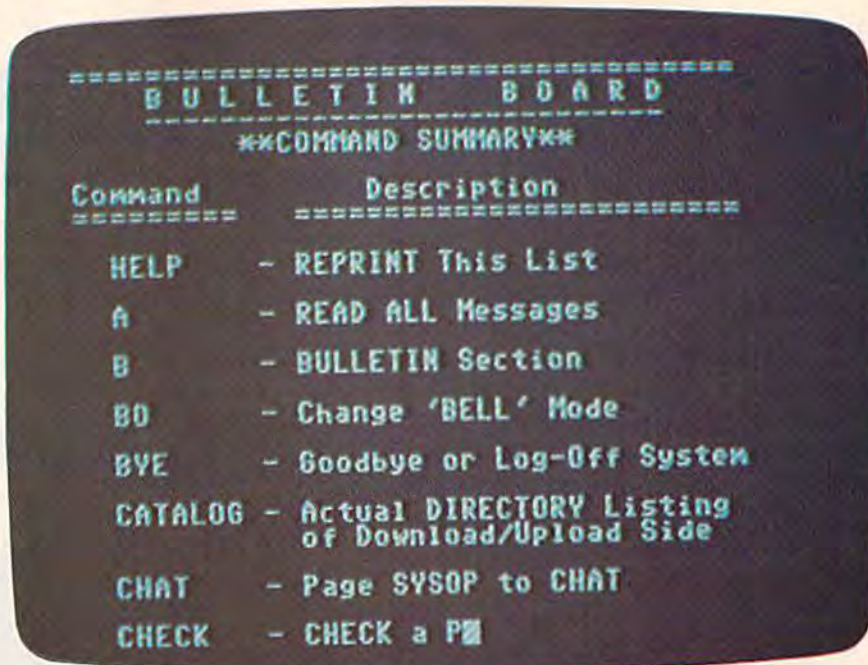
you'll be asked for your name and the city and state you're calling from. You may also be required to make up a password you'll have to remember and use each time you call. This insures that no one can post fake messages using your name. Make sure you write down your password.

Because of the tremendous number of calls that BBSs get, and the tendency of some users to try to crash boards, you may get no farther than this. Many Commodore bulletin boards have been forced to go private in the last year or two. If this is the case, you'll be given an address and/or telephone number to call to inquire about gaining access to the board. Some require modest membership fees, others just want more information about you.

In any case, have a piece of paper and pencil handy. Once the system's menus come rolling by, you may want to take notes, though most systems offer commands that let you stop the action for awhile. Watch for a message that says something like, "Hit S to pause. Once paused, hit S to restart, A to abort." Remember those commands. You'll want to use them once you've become familiar with a BBS and to skip over the opening bulletins.

Command level is where things start happening. You reach this level when all of the sign-on procedures and opening bulletins are completed and the BBS software wants to know what you'd like to see.

It's a good idea to *download* a system's main menu and print out a copy of it (though you must have software that allows downloading to do that). You'll probably become familiar enough with the features that you use most often to remember the commands, but you may also be missing out on some other features.



This is a partial listing of the commands available on Commodore Communications, a Commodore BBS located in St. Louis.

Once you've chosen a command and entered it (usually just one or two letters), the system will give you instructions on how to proceed. For example, if you want to enter a message to an individual or for everyone to read, it will prompt you all the way through the process, then give you options to edit or abort the message if you've made a mistake. (If you're brand new to the board, you may have restricted access—allowed to read messages but not leave any—until you sign up as a member.) Most bulletin board systems are user-friendly, as long as you stay alert for command menus and prompts.

Try to complete your business as soon as possible. Bulletin boards are not multi-user systems: While you're on-line, everyone else trying to call is getting busy signals.

One of the commands you must remember is the one to log off. Most often, it's G (goodbye), Q (quit), or just OFF. If you disconnect your modem without first logging off the system, it will take longer for the next person to gain access. You

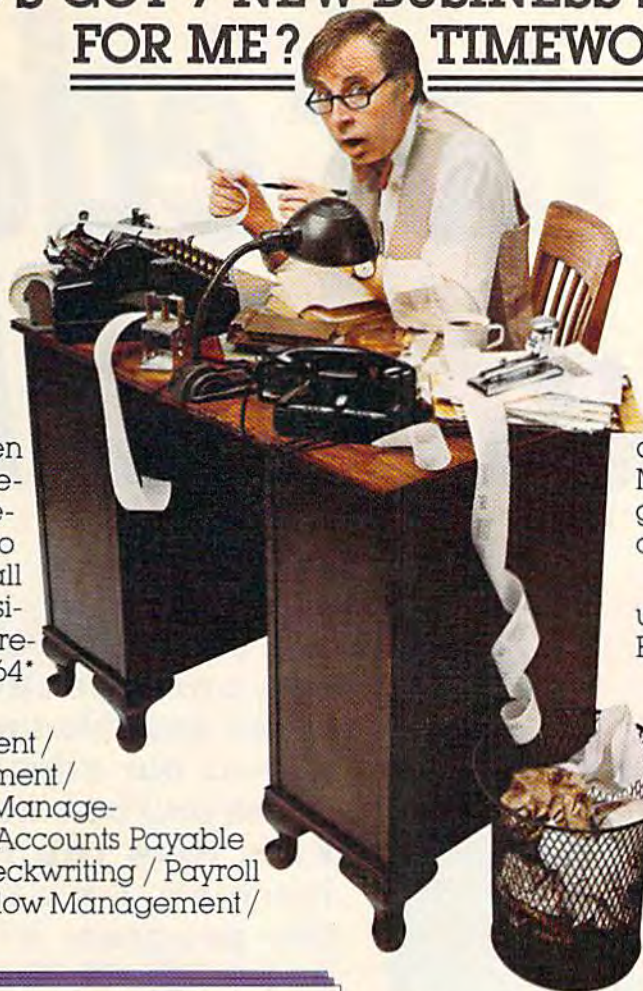
may even wreak some havoc with the BBS software. Some bulletin boards will automatically log you off if there is no activity for five (or ten or fifteen) minutes. If the board is very popular, the sysop may decide to limit calls to thirty minutes per person per day, to prevent callers from monopolizing board time.

The two most common uses of Commodore bulletin board systems, say many sysops, are *electronic mail* and program *downloading*.

Users leave messages about all kinds of things: selling or trading equipment, advice on what kind of software to buy, questions about technical problems, opinions about movies and books and TV personalities, and even debate about political issues. Some of the debates get so heated, in fact, that the sysop will occasionally intervene and put an end to the discussion.

Besides the public forum that electronic mail provides for all to see, a lot of messages are sent privately on BBSs. (You're always given this option when entering a message.)

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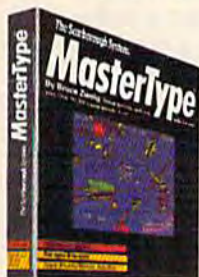
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The Indispensable Sysop

Kathy Yakal, Editorial Assistant

For one sysop, starting a bulletin board system was a leisure-time hobby, an entertaining way to learn about computers. For another, it was an important factor in recovering from a decade of serious illness. Tony Ott and Bob Shannon tell contrasting stories about their histories as sysops and authors of BBS software.

A good way to learn something, it's often said, is to teach it to someone else. In order to explain a concept, you must understand it much more fully than if you were just trying to understand it yourself.

Tony Ott had such a theory when he decided to start a Commodore bulletin board system over two years ago. "By establishing a BBS, I thought I would triple my learning time about computers," he says. "The board has done that."

Ott, who travels frequently in his job as a management consultant, runs the BBS from his St. Louis home in his spare time. He has written several telecommunications-oriented programs which are in the public domain, and recently completed a software program for BBSs that runs on the Commodore 64. He plans to market that, as well as set up a second board using it.

Ott went on-line in the pre-Commodore 64 days, when only PETs and VIC-20s were available. "Initially, one had to be somewhat wealthy to set up a Commodore system," he says. "CBMs were still selling at \$1795, 4040s and 8050s [disk drives] were \$1795, and the IEEE modem cost \$395.

"Then you had to build your own auto-answer circuit, which was another \$75-\$100. That's a tidy sum, but it was really worth it. It's an amazing learning tool for someone who's really serious about it."

During the last year or so, it's become possible to start a BBS using only a Commodore 64 or VIC-20, a 1541 disk drive, an auto-answer modem, and BBS software. "There are at least 50 BBS programs in the public domain, but they all have enormous problems," says Ott.

Which may be one reason why so many boards perish quickly. Several systems have gone on-line and disappeared, the victims of inadequate software, equipment failures, lack of funds to maintain two phone lines (one for the BBS, one for personal use), or pranksters bent on crashing boards. Ott uses Steve Punter's BBS software, modified for his own use.

Some bulletin board systems store hundreds of *public domain* programs, software that is not copyrighted and can be shared freely. Users are encouraged to upload public domain programs, or programs they have written themselves. Sysops will often put a limit on the number of programs you can download without having uploaded some already, just to keep the program disks full.

Other common features include:

**Bulletins.* News about the latest Commodore hardware and software products; information about user group meetings; miscellaneous industry news.

**Delete* a message or program you uploaded.

**Expert Mode.* Lets you skip over new user information, explanations, and menus.

**System Usage Log.* Gives you a list of who has been using the system.

**Summary of Available Messages.* Lets you scan over message headings and only read the ones you want.

**Other BBS numbers.* Lists telephone numbers of other bulletin board systems. This is the most up-to-date way of finding other BBSs to call.

**Chat Mode.* Allows you to "chat" on-line with the sysop (if he or she is available).

You might wonder what's on the other end of the line when you call a bulletin board system. Occasionally it's the back room of a computer store, but often, it's an individual's living room or bedroom. Usually, the sysop is a Commodore dealer or a user group member.

The hardware that runs the BBS may be no more complicated than your own set-up. All you need to start a BBS is a computer, disk drive, monitor, auto-answer modem, BBS software—and a lot of time and patience. Sysops spend anywhere



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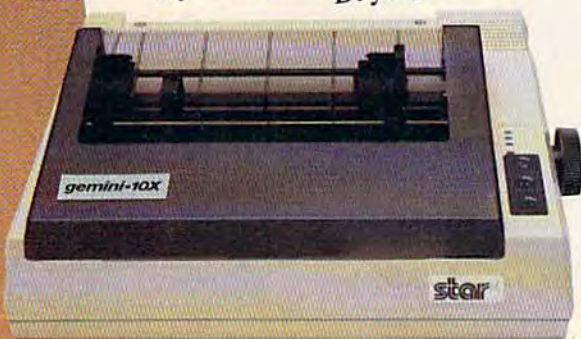
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The biggest problem with being a sysop, according to Ott, is lack of time. "It's an enormous responsibility," he says. "I get from ten to twenty-five messages a day, addressed to me, people wanting help." And the only way he can get logged onto the BBS to answer those questions is by auto-dialing the system from another computer in his home.

Beyond that, he has received thousands of letters over the last several months, as well as a steady stream of phone calls. "There was a period there when my phone bill was running about \$400 a month, just from returning calls to people who had questions," he says.

Why his BBS's activity picked up so dramatically last fall and hasn't stopped yet is a mystery to Tony Ott. "I kind of wish I could bring back the old days sometimes. It loses the personal touch when there are so many people," he says. Ott's board averages around 70 calls per day, with callers staying on for 10 to 20 minutes.

Though the personality of his BBS hasn't changed, the age of the callers has. "The old PET-CBM people—the ones that bought the old 8K PETs—still call, but they're in the minority today," he says. "Most of the activity is with youngsters."

Nor has Ott's role as sysop changed. "I'm still doing the same thing now as I was two years ago, providing a lot of information and answering a lot of questions.

"There's something mystical about this, and I don't know why. I think it's sort of a security blanket to a lot of people in small towns that call because they don't have a dealer in their town and there isn't even a K-mart for a hundred miles. They know that if I don't know the answer, that someone I come into contact with over a week's period of time will know it."

For the present, Ott considers his work with bulletin boards and software a hobby, though it certainly could be a full-time job. "It's really a release from my high-pressure job," he says.

"Beyond that, the consistency of staying on-line and growing is a big thing. So many boards come and go. I'm just enthralled and fascinated by it now."

Halfway across the country from Tony Ott, Bob Shannon lives and works in a house on the beach near Fort Bragg, California, about 150 miles north of San Francisco. He's the sysop of *Electric Magazine*, a BBS designed in a magazine format. Callers can get updates on local news, read and leave messages, and read columns on a number of topics.

from 2 to 20 hours a week on board maintenance, doing things like answering mail, deleting outdated messages, updating bulletins, and modifying software.

Why do they do it? Toronto resident Steve Punter, author of the *WordPro* word processing package and one of the longest-running Commodore sysops, says he's always had a fascination with communication.

"Computers are another way of communicating," he says. "And being at the center of a communications network like a bulletin board is fascinating.

"People think that running a board is simple. They soon find out that it's a lot of work."

Another sysop, 14-year-old Matt Peterson, of San Francisco, found that out when someone crashed his board and destroyed his software. He's trying to reconstruct the program, feature by feature. It's slow going.

But it's better than a \$100 phone bill every month, which is what prompted Peterson to start his own BBS. "I wanted to have people start calling me instead of having to call them," he says.

Many user groups start BBSs as a service to their members, instead of, or in addition to, a monthly newsletter. Some, like the Commodore Club of Augusta, Georgia, have equipment donated to them or get it at wholesale cost. Club president David Dumas says that having a bulletin board system simplified the task of distributing public domain software to club members.

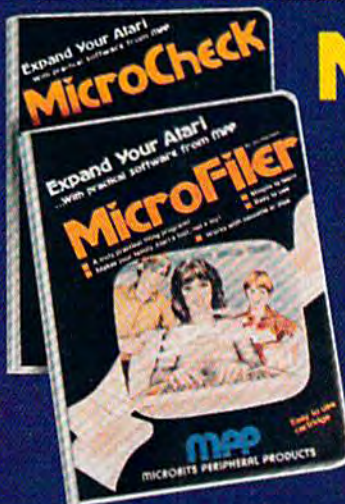
Tim Renshaw, a Commodore dealer in Indianapolis, was simply intrigued by the idea of bulletin boards. He had been calling an Apple board in the area, then found out that Steve Punter had written a BBS program for Commodore computers. Renshaw's BBS went

Tomorrow I've got to get ORGANIZED!



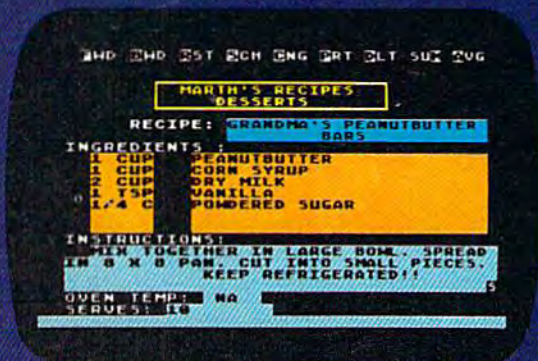
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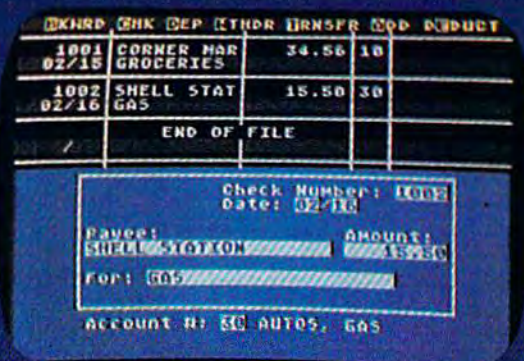


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Shannon has sold his BBS software to almost 400 people, and keeps in close contact with his sysops through phone calls and a monthly newsletter. He charges \$39.95 for the software, unless it's requested by someone who plans to use it for communications between the handicapped. His most recent donation went to a group in Israel, who plan to translate it into Hebrew and set up a BBS for the deaf.

"Because it's so much fun, I probably spend more time on upkeep of the board than most sysops do," says Shannon. "It's fun because of the contact with people, and because I'm making enough money to start my own little business."

Five years ago, Shannon wasn't even able to consider such things. Severely brain-damaged from an industrial accident in the late sixties, he was confined to his home for ten years.

Thanks to advances in psychiatric medication, Shannon started to recover a few years ago. He bought a Commodore 64 and began teaching himself to program. "I had read Toffler's *The Third Wave* about three years ago, and remembered how he talked about new entrepreneurs with home computers," he says. Shannon began to wonder if he could do something with computers that was fulfilling and profitable.

He contacted the State Department of Rehabilitation, which told him about a program called PASS (Plan to Achieve Self-Support). By enrolling in it, he could still receive his Social Security disability pay for three years while trying to start a business.

Shannon had logged on to a number of bulletin board systems, and was intrigued by the idea of writing his own. He wrote his own program in about two weeks and went on-line last November using a Commodore 64, a 1541 disk drive (which has run perfectly ever since), and an auto-answer modem.

His BBS software has sold so well, he thinks, "because it's a 14K BASIC program, very easy to tailor. I think its simplicity is kind of a selling point. The board can develop the personality of the sysop. You could look at my boards running all over the country and they don't look at all like mine."

With the money he's made from the sale of his program, Shannon is in the process of setting up his own software store in Fort Bragg. But he has no plans to abandon the *Electric Magazine*, or the daily contact he has with his sysops. "After so many years of disability, it's terribly enjoyable."

on-line August 11, 1982; and has been running ever since.

Sysops report a dramatic increase in activity on their bulletin board systems in the last year. Five calls a day have grown to 75. Message sections of the boards, which used to have months-old mail on them, now have to be cleaned out weekly. More women are calling. Public messages, which used to be all computer-related, have turned to all kinds of topics.

Such a jump has to be related, in part, to increased modem sales. Tim Renshaw thinks the movie *War Games* had a lot to do with that. "That movie opened up a whole new world for people who had computers and didn't know what modems are all about," he says.

But there's another reason, believes Renshaw. "In one light, it's kind of taken the place of CB radio. It's a chance for people to chat with each other and maintain a little bit of anonymity," he says.

Matt Peterson agrees. "You can say what you want without people knowing who you are."

Telephone numbers for BBSs mentioned here (all are operational 24 hours a day unless noted):

AVC Commodore Bulletin Board
(Tim Renshaw, sysop)
(317) 898-5027

Commodore Club of Augusta
(David Dumas, sysop)
(404) 863-7733

Commodore Communications
(Tony Ott, sysop)
(314) 867-6950

The Electric Magazine
(Bob Shannon, sysop)
(707) 964-7114

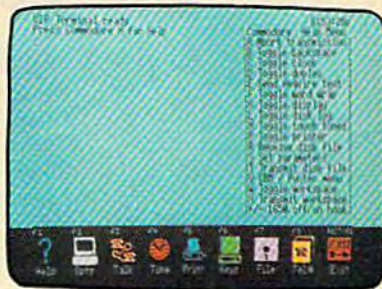
PSI-Word Pro
(Steve Punter, sysop)
(416) 624-5431
(M-F, 6 p.m.-8 a.m.;
24 hours on weekends)

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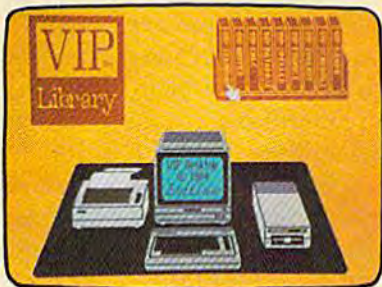
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A Buyer's Guide To Modems

Sharon Darling, Research Assistant

Talking to other computers, whether they're across town or across the world, is easy. All it takes is a computer, a telephone, a *modem*, and a *terminal software program*.

A modem (MODulator-DEModulator) simply translates the numeric digital data from your computer into analog signals (which sound like high-pitched whistles) that can be carried by your telephone. Another modem then reverses the conversion at the receiving end. Terminal software is the program that tells your computer *how* to talk with other computers.

Although modems are primarily signal converters and translators, there are numerous features which bear individual consideration. Modems range in capabilities from the quite simple to the complex. Before buying one, you must decide which features are important to you, and how much you're willing to spend for those extras.

Compatibility is the first thing to be concerned with when modem shopping. The modem you buy must be capable of working on your computer.

That's a little trickier than it sounds, where the Commodore 64 and VIC-20 are concerned. While many modems are equipped with an RS-232 interface, and your Commodore

Telecommunicating with other users, data bases, information networks, bulletin boards, and buying services opens up a fascinating world of possibilities. All you need is a modem, but there's a variety to choose from, with a wide range of prices and features. Here's a look at what's available for Commodore users.

computer has an RS-232 port on the back, it's not as simple as plugging it in.

The Commodore RS-232 port is not compatible with the industry standard RS-232, so unless a modem is designed to work specifically with the 64 or VIC, you'll need an adapter (available from Commodore) to make it work.

Your next consideration should be what kind of phone system you have. Telephone lines are incapable of transmitting the digital bips and beeps sent out by computers, so, again, compatibility is a factor. On some modems, the special features such as automatic dialing will work only with touch tone telephones, while others will work with either pulse (rotary) or touch tone models. Check before you buy to see what kind you need.

Connectors are available to convert your phone's signal to one that will work with the modem you want to buy, should you have your heart set on a particular brand.

Price becomes a consideration when deciding whether you want a *direct-connect* or *acoustic* modem.

With acoustic modems, which are generally less expensive than direct-connect models, you place the handset of your telephone into soft rubber cups on the modem. One of the cups contains a speaker, which generates audio tones, while the other cup acts as a microphone to receive tones from the other modem.

While you'll save money with this kind of modem, you'll probably sacrifice some quality, as the connection generally is not as good as with a direct-connect modem. And room noises can interfere if the phone handset is not sealed tightly in the cups.

With direct-connect models, the modem plugs directly into the telephone through a modular phone jack. Some direct-connect modems, such as the VICmodem, are cartridges that plug into a port on the computer.

Still other models are stand-alone units that can be placed directly underneath the phone and plugged in.

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This system includes:

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A Buyer's Guide To Modems

Modem	Manufacturer/ Distributor	Compatibility	Interface Required?	Communication Standard	Coupling Method	Baud Rate	Duplexing	Auto- Answer	Auto- Originate	Self- Test	Carrier Detection Indicator	Power Supply	Cables/ Connectors Included?	Terminal Software Included?	Warranty	Price
Westridge 64-20	Anchor Auto- mation, Inc.	Commodore 64, VIC-20	no	Bell 103	direct- connect	300	full/half	yes	yes	no	light	host computer	yes	yes	2 years	\$99
1650 Automodem	Commodore Business Machines	Commodore 64	no	Bell 103	direct- connect	0-300	full/half	yes	yes	no	LED	host computer	plugs into computer	no	90 days	\$79
VICmodem	Commodore Business Machines	VIC-20 and Commodore 64	no	Bell 103	direct- connect	0-300	full	no	no	no	LED	host computer	plugs into computer	yes	90 days	\$49
Smartmodem 300	Hayes Microcomputer Products, Inc.	RS-232	yes	Bell 103	direct- connect	0-300	full/half	yes	yes	yes	LED	AC	yes	no	2 years	\$289
HealModem 1	Human Engineered Software	Commodore 64, VIC-20	no	Bell 103	direct- connect	0-300	full/half	no	no	no	light	host computer	yes	yes	90 days	\$74.95
HealModem 2	Human Engineered Software	Commodore 64	no	Bell 103	direct- connect	110-300	full/half	yes	yes	no	on screen	host computer	some	yes	90 days	\$109.95
Clear Signal 300- Baud Modem	Inmac	RS-232	yes	Bell 103	direct- connect	300	full	no	no	yes	LED	AC	some	no	1 year	\$99
Intec 300	Intec Corporation	RS-232	no	Bell 103	direct- connect	0-300	full/half	yes	yes	no	LED and on screen	AC	yes	yes	1 year	\$189
MFJ-1237	MFJ Enterprises, Inc.	VIC-20, Commodore 64	no	Bell 103	direct- connect	300	full	yes	yes	no	LED	host computer	yes	yes (pro- gram listing in manual)	1 year	\$49.95
MFJ-1233	MFJ Enterprises, Inc.	RS-232	no	Bell 103	acoustic or direct- connect	300	full	no	no	yes	LED	AC	no	no	1 year	\$129.95
Microconnection R1A	The Micro- peripheral Corp.	RS-232	no	Bell 103	direct- connect	300	full/half	yes	yes	no	LED	AC	yes	yes	90 days	\$199
Microconnection Auto-Print	The Micro- peripheral Corp.	RS-232	no	Bell 103	direct- connect	300	full/half	yes	yes	no	LED	host computer	yes	yes	90 days	\$179.95
ATV	The Micro- peripheral Corp.	Commodore 64	no	Bell 103	direct- connect	300	full/half	yes	yes	no	LED	AC	yes	yes	90 days	\$179.95
Cat	Novation, Inc.	RS-232	yes	Bell 103	acoustic	0-300	full/half	no	no	yes	LED	AC	yes	no	1 year	\$189
D-Cat	Novation, Inc.	RS-232	yes	Bell 103	direct- connect	0-300	full/half	no	no	yes	LED	AC	yes	no	1 year	\$199
J-Cat	Novation, Inc.	RS-232	yes	Bell 103	direct- connect	0-300	full	yes	yes	yes	LED	AC	yes	no	1 year	\$149
103 Smart-Cat	Novation, Inc.	RS-232	yes	Bell 103	direct- connect	0-300 & 110	full	yes	yes	yes	LED	AC	yes	no	1 year	\$249
Operator 103	TNW Corporation	RS-232	yes	Bell 103	direct- connect	0-300	full/half	yes	yes	yes	beep	AC	some	no	2 years	\$169
UDS-103JLP	Universal Data Systems	RS-232	yes	Bell 103	direct- connect	0-300	full	yes	no	no	light	telephone line	some	no	1 year	\$165
UDS-1030/ALP	Universal Data Systems	RS-232	yes	Bell 103	direct- connect	0-300	full	no	no	no	light	telephone line	yes	no	1 year	\$125
Milety Mo	USI Inc.	RS-232	no	Bell 103	direct- connect	300	full/half	yes	yes	yes	on screen	host computer	yes	yes	3 years	\$99.95



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It's here! The new OKIMATE 10 Personal Color Printer. The first color printer that lets you show off and tell all. The printer that lets you print all the information you can create with your Atari® or Commodore® computer. But with the remarkable ability to create original drawings and graphics as well, in over 26 beautiful colors.

A class act! The OKIMATE 10 gives you crisp, clean term papers, school reports and homework. Word processing capability means everything you do can be printed letter quality in minutes, instead of typed in hours. OKIMATE 10 color gives you the opportunity to print graphs, charts and pictures from popular graphics and drawing programs. OKIMATE 10's brilliant color means you'll shine, every time.



OKIMATE 10 feels right at home. Anywhere.

A special PLUG 'N PRINT™ package lets you plug your new OKIMATE 10 into your Atari or Commodore computer. And print. It's that easy. In minutes you'll be printing everything from soufflé recipes to needlepoint patterns. Party invitations to kitchen inventory. Love letters to gardening directions. At 240 remarkable words per minute. And not just in black and white, but in over 26 brilliant colors!

Financial statements will keep you tickled pink for very little green.

If you use your personal computer to keep track of mortgage payments, tuition payments, balance your checkbook or jump ahead of the Dow Jones', there's good news for you. You'll find that the new OKIMATE 10 gets down to business quickly. And easily.

A "Learn-to-Print" diskette and tape shows you how to set up your new personal color printer and start printing. A complete OKIMATE 10 Handbook will show you how you can take your imagination to places it's never been before.

FOR

PERSONAL COLOR PRINTER UNDER \$250.

And while your imagination is soaring, you'll be glad to know that your new printer can keep right up with it! The new OKIMATE 10 is built with the same tradition of quality and manufacturing excellence that has made Okidata the most respected name in computer printers. Okidata craftsmen specially designed and engineered the new OKIMATE 10 to be incredibly small and lightweight. And they made it quiet as a whisper. But their imagination didn't

stop there. To help you and your personal computer keep within your personal budget, they made the OKIMATE 10 available at retailers everywhere for less than \$250. Something that should make every personal budget tickled pink.

patible with a variety of software packages that will run on your Atari and Commodore with a simple disk drive. Just load and you're off and running. Plotting charts. Designing special graphs. Creating original illustrations and pictures. Drawing special graphics. And printing them all beautifully for everyone. On most kinds of paper. In over 26 beautiful colors!



Color your world.

If you've been playing games on your personal computer, now you can get serious and still have fun. The new OKIMATE 10 is completely com-

QUESTIONS & ANSWERS

Q: Why do I need a printer?

A: You might as well ask, "Why do I need crayons?" When it comes to communicating, "putting it on paper" is still the best way to get your message across. You can have lots of computer equipment, but without the OKIMATE 10, it doesn't mean very much. Unless you get your letter, report, term paper or party invitation off the screen and down on paper, nobody's going to see it.

Q: What makes the OKIMATE 10 better than any other printer?

A: Because the OKIMATE 10 is unlike any other printer. First, it prints in COLOR. Up to 26 beautiful colors. Second, it prints up to 240 words a minute, so quietly you can talk in a whisper right next to it and still hear every word! And third, it prints letter quality, every time.

Q: What about graphics and pictures?

A: The OKIMATE 10 does it all. Graphs, charts, symbols, pictures, illustrations, and special drawings! With a compatible drawing package, anything you create on your screen can be printed in full color; a disk drive is required for color screen printing.

Q: What kind of paper can I use?

A: Just about any kind of smooth paper you want. From continuous feed computer paper to single sheets. From mailing labels to plastic acetate for overhead transparencies, the OKIMATE 10 prints crisp, clean, colorful images you'll be proud to send to friends, teachers, business associates, or frame and hang right in your own living room!



Q: Is the OKIMATE 10 easy to use?

A: As easy as "PLUG 'N PRINT!" No other printer is easier to use than the OKIMATE 10. Connecting the printer to your Commodore or Atari computer is, literally, a snap. The exclusive PLUG 'N PRINT package snaps into the printer. One cable connects it directly to your computer or disk/tape drive. Turn it on and you're in business. Once your OKIMATE 10 is up and running, the "Learn-to-Print" software program (included) teaches you printer basics—the "Color Screen Print" disk (also included) automatically prints everything on the screen in a single stroke. As a matter of fact, most of your printing can be done with just one command.

Q: What's the printer like in operation?

A: In one word: easy! Incredibly easy! The ribbon comes in a "Clean Hands" cartridge. So it's as easy to change as the tape in your audio cassette player.



Q: What about reliability?

A: Okidata has built the reputation of its complete line of printers on quality, dependability and rugged construction. The OKIMATE 10 is no exception. Don't let its light weight and compact size fool you. This printer is not a toy. It's a workhorse.

OKIDATA
an OKI AMERICA company

Available at retailers everywhere.

www.commodore.ca

Modem Manufacturers And Distributors

Listed below are the manufacturers and distributors of the modems included in this buyer's guide.

Anchor Automation, Inc.
6913 Valjean Avenue
Van Nuys, CA 91406

Commodore Business Machines
1200 Wilson Drive
West Chester, PA 19380

Hayes Microcomputer Products, Inc.
5923 Peachtree Industrial Boulevard
Norcross, GA 30092

Human Engineered Software
150 N. Hill Drive
Brisbane, CA 94005

Inmac
2465 Augustine Drive
Santa Clara, CA 95051

Intec Corporation
P.O. Box 5164
West Bloomfield, MI 48033

MFJ Enterprises, Inc.
921 Louisville Road
Starkville, MS 39759

The Microperipheral Corporation
2565 152nd Avenue N.E.
Redmond, WA 98052

Novation, Inc.
20409 Prairie Street
Chatsworth, CA 91311

TNW Corporation
3444 Hancock Street
San Diego, CA 92110

Universal Data Systems
5000 Bradford Drive
Huntsville, AL 35805

USI
71 Park Lane
Brisbane, CA 94005

Any modem you buy will be capable of full, half, or both types of *duplexing*. With a half duplex modem, only one computer can "talk" at a time, while full duplexing allows both the sender and receiver to transmit at the same time, much like a normal conversation. Full duplexing is pretty standard on most bulletin boards; when you type something, it goes over the phone lines and the receiving computer echoes it back to your TV screen or monitor.

When you access a bulletin board system, it will usually tell you what type of duplexing is needed, as well as the *baud rate*, or speed at which you can transmit information.

Most of the modems in this buyer's guide have baud rates from 0-300, which roughly translates to 0-30 characters per second. Some of the more expensive models have a baud rate of 1200 or more.

The *communication standard* of your modem also tells you the baud rate. Those listed as Bell 103 allow information to be sent at 300 baud; some can go as fast as 600 baud. Bell 202 and 212A standards allow for faster transmission rates.

Extras to consider for your modem are whether you want one that can automatically dial and answer the telephone, and whether the modem is capable of a *self-test* to make sure everything is hooked up and working properly.

One essential item, as we noted, is *terminal software*. Some modems come with their own software; if yours doesn't, you'll have to purchase a terminal program, or type one in from a manual or magazine. (For a Commodore-specific terminal program, see "C/G Term" elsewhere in this issue.)

The accompanying chart gives specifications for many brands of modems for the 64 and VIC, each priced under \$300. ●

GAZETTE

Telecommunications

Software

Part 1: C/G Term

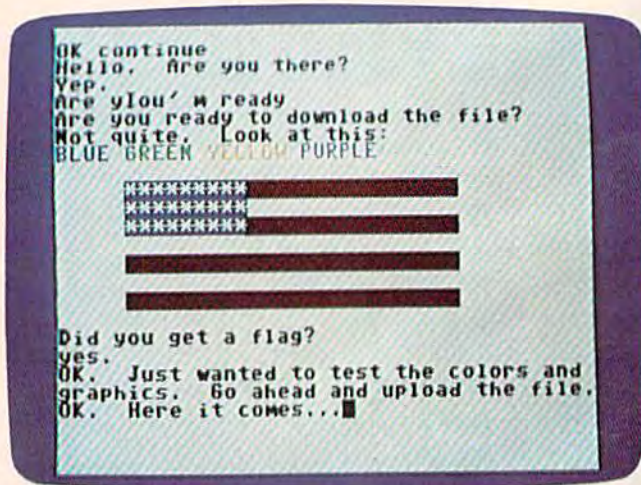
Robert Sims

The first in a series of integrated telecommunications software, "C/G Term" (Color/Graphics Terminal program), is tailor-made for VIC (with 16K expansion) and 64 users. It's easy to use and includes a number of transparent features which take care of the time-consuming and tedious chores normally involved in telecommunicating. Written entirely in machine language for speed and efficiency, no knowledge of ML is required for its use.

C/G Term offers upload and download capabilities and makes full use of Commodore's color and keyboard graphics. Next month, we'll continue with the C/G Bulletin Board System. Although C/G Term is designed for use with the bulletin board, it can be used as a stand-alone terminal program for instant two-way telecommunication. A disk drive and modem are required.

"C/G Term" is a lot like having a two-way typewriter and a chalkboard plugged into your telephone.

This terminal program makes your computer work in much the same way as when you are



Telecommunicating in color with C/G Term.

typing in a BASIC program or using a word processor: Whatever you type on the keyboard is displayed on the screen. But C/G Term also transmits your words and graphics characters, in color, over the phone line, and displays incoming characters as well.

Two people with telephones, modems, and copies of C/G Term can communicate in several



LAST NIGHT WE EXCHANGED LETTERS WITH MOM, THEN HAD A PARTY FOR ELEVEN PEOPLE IN NINE DIFFERENT STATES AND ONLY HAD TO WASH ONE GLASS...

That's CompuServe, The Personal Communications Network For Every Computer Owner

And it doesn't matter what kind of computer you own. You'll use CompuServe's Electronic Mail system (we call it Email™) to compose, edit and send letters to friends or business associates. The system delivers any number of messages to other users anywhere in North America.

CompuServe's multi-channel CB simulator brings distant friends together and gets new friendships started. You can even use a scrambler if you have a secret you don't want to share. Special interest groups meet regularly to trade information on hardware, software and hobbies from photography to cooking and you can sell, swap and post personal notices on the bulletin board.

There's all this and much more on the CompuServe Information Service. All you need is a computer, a modem,

and CompuServe. CompuServe connects with almost any type or brand of personal computer or terminal and many communicating word processors. To buy a Starter Kit, see your nearest computer dealer. To receive our informative brochure or to order direct, call or write:

CompuServe

Consumer Information Service
5000 Arlington Centre Blvd., Columbus, OH 43220
800-848-8199
In Ohio call 614-457-0802.

An H&R Block Company

www.commodore.ca

ways. They can talk, type messages back and forth, or swap programs and text files automatically, with only a few keystrokes.

C/G Term can also be used off-line, to create graphics screens and messages for later use. And it's designed to communicate with the Color/Graphics Bulletin Board System, to be published next month.

For Commodore Only

Most bulletin board systems (BBSs) and information utilities (like CompuServe or Delphi) are designed to work with a wide variety of computers and modems. For this reason, most use standard seven-bit ASCII. Terminal programs generally do not allow you to send Commodore graphics characters, which do not have a standard ASCII equivalent.

To send graphics and color requires a new Commodore-specific protocol. For this reason, you cannot use this terminal program to call CompuServe or most bulletin boards. The computer you call must be running C/G Term or next month's Color/Graphics Bulletin Board.

The incompatibility with CompuServe is offset by C/G Term's color and graphics capabilities, as well as the reliable and easy-to-use upload/download features which allow you to trade files with friends.

Typing Over The Phone

The program automatically handles most of the technical aspects of personal telecommunications, allowing you to concentrate on your message, rather than on the transmission medium.

To use the program for two-way communication, connect your modem to the computer's user port *while the power is off*.

One party must set the O/A switch on the modem to O (originate) while the other party must use A (answer). If you're using the Commodore Automodem, set the H/F switch to F (full duplex), and set the D/T switch to T (telephone).

Load C/G Term and run it. An initialization prompt will appear on the screen:

Press any key
to start, or
CTRL-C to
bypass handshake

This means the computer is on hold. If you're calling a friend, you can go ahead and press CTRL-C to bypass the handshaking routine (which is more important for the C/G Bulletin Board). When the other party answers, unplug the cord from the telephone handset and plug it into the VICmodem (or move the Automodem D/T switch to D for data). The two programs

Function Key Assignments

Key	Terminal Mode	Message Mode
f1		load a message file
f2		send message to bulletin board
f3	change border color	change border color
f4	change background color	change background color
f5		save screen into a message file
f6	clear the screen	clear the screen
f7	not used	
f8	go to message mode	go to terminal mode

will then complete the connection, and you'll see the "OK continue" prompt.

The program starts in *terminal mode*, which simply means the computer is ready to communicate with another VIC or 64. Once the connection is made, you can switch back and forth from modem to voice communication without disturbing the program. To talk, unplug the cord from the VICmodem and plug it into the handset (or move the Automodem D/T switch from D to T). When you're through talking, just move the Automodem switch back to D (on the VICmodem, plug the handset cord back into the modem), and resume typing.

The program makes use of the standard keyboard, with a few exceptions. The CLR key is disabled, the function keys (f1-f8) perform specific tasks, and the CTRL key has a special significance. Also, as you type in responses to prompts, you may notice that some keys don't seem to work. For example, if you are asked for a filename, the program will only accept letters, numerals, and the period. All other characters are ignored. Or, if the program asks for a number, alphabetical characters are ignored.

As a general rule, if you press a key and nothing appears on the screen, the key has been ignored.

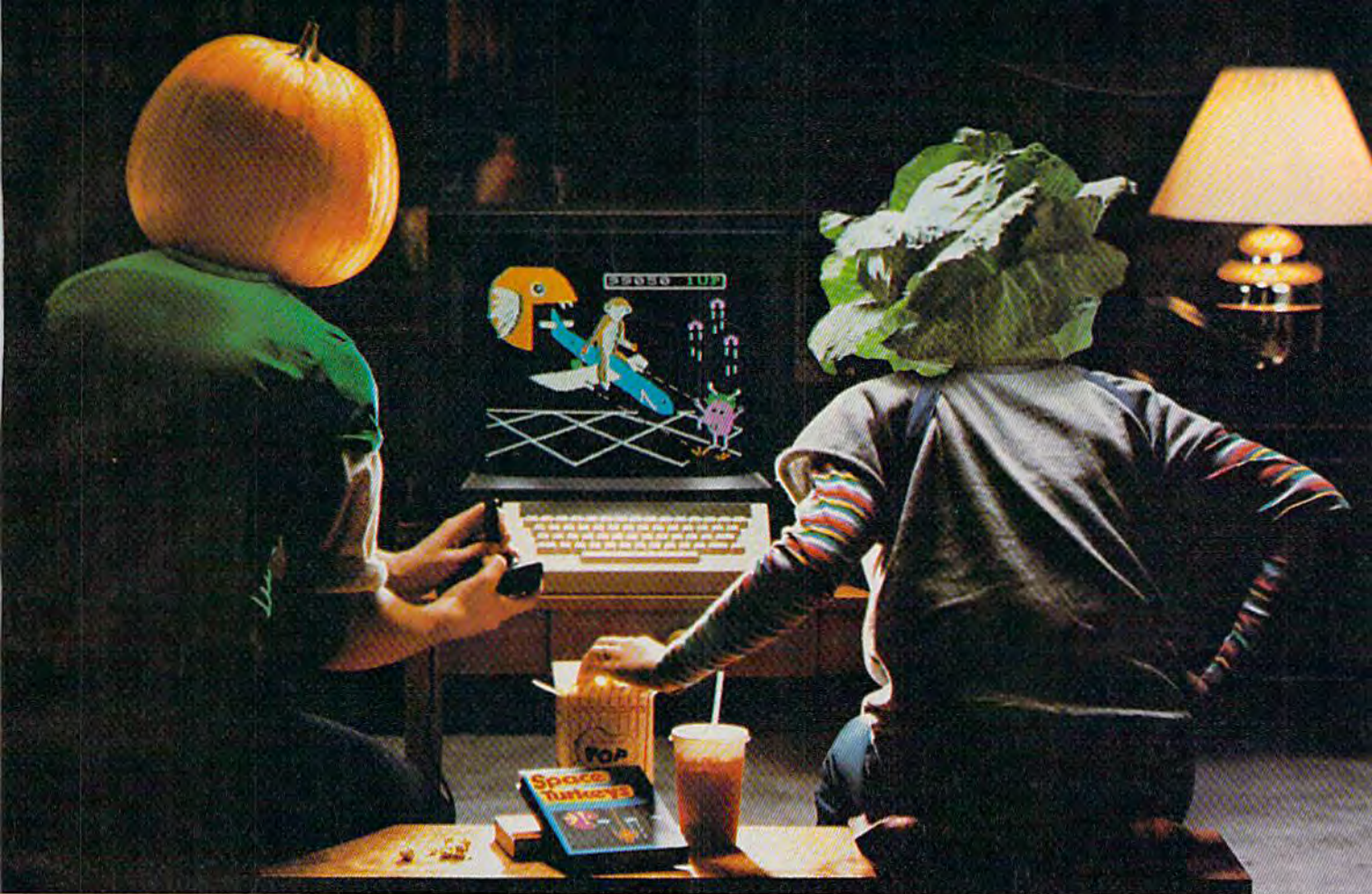
Color And Graphics Keys

In terminal mode, you have full control over screen and character colors, and the full set of keyboard graphics characters is available.

Border and background colors are usually changed with POKES. But C/G Term lets you change the border color by pressing the f3 function key; to change the background color, use f4. The f3 and f4 keys change only *your* screen's colors; they are not transmitted over the phone line to the other party.

However, character color *is* transmitted, so be careful not to change your character color to the same color as the other party's background and cause your message to be invisible.

As you might expect, character color is



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Introducing a whole crop of Learning Adventure games from Spinnaker.

When it comes to cultivating adventurous young minds, the computer's potential is endless.

Unfortunately, the search for software that makes the most of that potential has been endless, too.

That is, until Spinnaker created the Learning Adventure Series. A unique collection of games that reward curiosity with

hours of adventure and learning. So the time kids spend with our games will help them develop valuable skills. Instead of just tired thumbs.

But what really makes our Learning Adventure games unique—educational value aside—is how much fun they are. Which isn't too surprising when you consider you can do things like bargain with aliens, search a haunted house, or build your own railroad empire.

In fact, our games are so much fun, kids will really enjoy developing some very important skills. Deductive reasoning, note taking, and problem solving, for instance.

So, if you're in the market for software that will truly cultivate young minds, pick the Spinnaker Learning Adventure Series.

It's the best way to be sure your search will be fruitful.

Spinnaker Learning Adventure games are available for Apple,® Atari,® IBM® and Commodore 64™ home computers.



It's New! TRAINS.™

You're in charge of an old-time railroad—and whether it turns into a bonanza or a bust depends on how well you run it. But either way you'll find that working on this railroad is a challenge—and a lot of fun! **Ages 10-Adult.**



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Design a challenging adventure game that you or a friend can tackle—or let the computer design one for you. It's complex, exciting—utterly addictive! **Ages 12-Adult.**



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It isn't easy to find—even in your B-liner. But you'll have help from your Uncle Smoke Bailey as you search the universe to find the Most Amazing Thing. **Ages 10-Adult.**

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We make learning fun.

Disks for: Apple, Atari, IBM, and Commodore 64.
Cartridges for: Atari and Commodore 64—
(ADVENTURE CREATOR only).

IT'S YOUR TIME AND BOTTOM LINE!

COMMODORE OWNERS now have an alternative to the frustrating LOAD ... wait ... UNLOAD ... wait ... RELOAD ... wait procedure. The NEW MSD DUAL DISK DRIVE ... SUPER DISK II will eliminate those hours wasted during task performance and time lags that inflate expensive labor costs and deflate your bottom line.

One SUPER DISK II will copy, format, and verify in less than two minutes ... a procedure that normally takes 30 to 40 minutes using 2 single drives. Yes, SUPER DISK II is TWENTY TIMES FASTER!

MSD provides quality craftsmanship that is backed by an exceptional six month warranty. The SUPER DISK II workhorse drive never overheats, so why be aggravated by the loss of time and money?

Invest today in SUPER DISK II, the SMART disk drive which contains its own microprocessor and memory enabling the computer to command the drive and then continue. SUPER DISK II does the work quickly so that you can get on with your program.

As for the money you will save in unproductive labor costs ... perhaps you will invest it in a daisychain of SUPER DISKS. These workhorse drives will allow you to connect up to four drives for maximum speed and reliable, continued performance.



SUPER DISK II DESIGN ASSETS

- Sturdy sheet metal casing and heat sink
- Vertical load for ergonomic space efficiency
- Key latch secures disk position
- Smart disk contains microprocessor and memory in each drive
- Status lights to display which drive is in use
- Three steel bands for repeated accuracy of alignment
- Flexible use of serial or parallel communication
- Access flexibility configured as drive 0 or drive 1

MSD

SYSTEMS, INC.

Dealer and distributor inquiries invited.

www.fcc.com/fcc/usa/02

SUPER DISK II Features and Specifications

COMPATIBILITY .. Commodore 64,[™] VIC-20,[™]
PET[™] CBM

BUFFER MEMORY
CAPACITY 6K

COMPLETE Less than 2 minutes. (Compare
DUPLICATION to 30-40 minutes with two
TIME: Format, Copy 1541s).
& Verify a Full Disk.

TIME TO 17 seconds. (Compare to 1
FORMAT min/20 sec. with 1541).

SERIAL BUS YES, 2 connectors.

PARALLEL BUS .. YES, for enhanced speed, IEEE for
Commodore compatibility.

DAISYCHAIN Up to 4 drives

OPERATIONAL SUPPORT • Power-on diagnostics to ensure
proper disk drive operation.
• LED status lights display where
error is occurring.
• Easy to understand instruction
manual.

OVERHEAT TIME . NONE. Tested for weeks of con-
tinual operation.

WARRANTY • 6 MONTHS. (Compare to 3
months for 1541).
• 48 hour factory repair service.
• Local service centers.

WHEN YOU ARE READY TO GET DOWN TO SERIOUS COMPUTING

RELIABLE SINGLE DRIVE READILY AVAILABLE

MSD Systems also offers COMMODORE OWNERS the reliable and efficient SUPER DISK I, a single disk drive which is compatible with the COMMODORE 64, VIC-20, and PET computers. Like the dual drive, MSD's SUPER DISK I never overheats ... its internal state-of-the-art design provides exceptional durability and longer life even in continuous run cycles, with more speed and power for internal operations.

A greater 4K double capacity buffer memory allows users to open more files at any one time. The drive accomplishes many internal operations in less time than other single disk drives require. The SUPER DISK I can format disks in 17 seconds, and execute utility commands in a minimum amount of time.

The SUPER DISK I has both serial and parallel buses. Up to three times the serial communication's speed can be achieved by adding the MSD IEEE 488 interface (CIE) and IEEE/PET cable.

The unique vertical load architecture of MSD's SUPER DISKS reduces desktop space normally required. The durable sheet metal casing minimizes heat retention and contributes to the reliability and long life of the SUPER DISKS. MSD confidently offers an exceptional 6 month warranty to support SUPER DISK users.

MSD SUPER DISK DRIVE TECHNICAL SPECIFICATIONS

STORAGE*

Total Capacity 174848 bytes per diskette
Sequential 168656 bytes per diskette
Relative 167132 bytes per diskette
65535 records per file
Directory Entries ... 144 per diskette
Blocks 683 total per diskette
664 available per diskette
Tracks 35 per diskette
Sectors 17 to 21 per track
Bytes 256 per sector
Diskettes Standard 5¼", single sided
single density

*NOTE: The SD-2 contains two disk drive mechanisms and can therefore handle two times the above capacities (one for each diskette).

SOFTWARE

16K Bytes Operating System
4K RAM buffer area (6K for the SD-2)
Microprocessor based disk controller (6511Q)
Commodore Compatible Serial Bus Interface
Commodore Compatible IEEE Parallel Bus
Interface

PHYSICAL DIMENSIONS

	SD-1	SD-2
Height	6.2" (157 mm)	6.2" (157 mm)
Width	4.2" (107 mm)	5.9" (150 mm)
Depth	13.3" (338 mm)	13.3" (338 mm)

INTERFACE

Dual Commodore compatible Serial Bus
Commodore compatible IEEE Parallel Bus
Jumpers for selecting device number 8, 9, 10
or 11.

ELECTRICAL REQUIREMENTS

Voltage 110 or optional 220 VAC
Frequency 50 or 60 Hertz
Power 50 Watts

changed by pressing the CTRL key in combination with the number keys. If you have a 64, you can also hold down the Commodore key and press one of the number keys. (For a discussion of changing character color, see the User's Guide that came with your computer.) Character color may cause problems for a VIC owner communicating with a 64. The VIC will not properly receive the eight extra colors generated by the 64's Commodore key. So, if you have a 64 and are talking to a VIC, use only the CTRL key to change your character color.

To clear the screen, press f6 (SHIFT-f5).

The graphics characters on the front of the keys are generated by pressing the appropriate key while holding down the Commodore key (for the character on the left of the key) or the SHIFT key (for the character on the right).

When the program starts, the keyboard is in lowercase mode. This means that when you press SHIFT, you get uppercase letters instead of graphics characters. But the graphics characters associated with the Commodore key will work in lowercase mode.

You can toggle between lowercase and uppercase/graphics modes by pressing the SHIFT and Commodore keys at the same time, just as in normal operation. In the uppercase mode, you get uppercase letters, the graphics associated with the Commodore key, and the SHIFTEd graphics as well.

File Transfers

C/G Term provides for automatic disk-to-disk transfer of either sequential files or program files. The files may contain any type of data, whether a BASIC or machine language program, graphics characters, a *SpeedScript* document, or data created by some other word processor.

You can use C/G Term as your own private electronic mail carrier. For example, you can write a letter with *SpeedScript* and save it to disk. Then you can call a friend, connect your computers using C/G Term, and upload the letter. Later, your friend can use his or her copy of *SpeedScript* to read the letter. The long-distance charge may be more than a 20-cent stamp, but your letter arrives immediately.

If you want to send a file to the other party, then you are the *uploader* and the other party is the *downloader*. The uploader sends an existing file to the downloader's disk drive, where it is stored as a new file.

Easy Uploading

To transmit a file, the uploader types CTRL-U (press U while holding down the CTRL key). C/G Term then takes over. Each party will see

the messages searching for the filename and loading. The downloader's filename will appear as \$0:@!%, which is a dummy filename for reading a directory off the disk. This can be ignored, as the program handles the exchange automatically. The uploader is prompted for the name of the existing file to be transmitted, while the downloader is prompted for a new filename so the incoming file can be stored onto disk.

Once the respective filenames have been typed in, the two programs perform several *handshakes* (communications exchanges) in which information is exchanged on whether there is room on the receiving disk for the incoming file, whether the file type is sequential or a program, and when to start transmitting. All of this is performed automatically by the program.

The file is then taken from the disk of the sending computer, transmitted, and stored on the disk of the receiving computer.

An *image* of this process is displayed on the screen. You'll see a series of lines consisting of a colon followed by 76 numbers or letters, comprising a hexadecimal image of the file's contents.

Uploading becomes a simple process. The uploader presses CTRL-U and the name of the program. The downloader just invents a filename. C/G Term does the rest (of course, your disk drive has to be on, with a disk inserted).

Checking For Accuracy

There will be a brief pause after each line is sent, while the receiving computer calculates a *checksum* to insure that the line was transmitted correctly. If not, the line is sent again. When the transfer is complete, the message "OK continue" is displayed, and the program returns to terminal mode.

Even though file transfer is automatic, it is not failsafe. For example, if the uploader fails to type in the filename exactly as it appears in the disk directory, an error message is printed and the operation is cancelled. An error message and cancellation also occur if the downloader types in the name of an existing file.

To avoid these errors, it's good practice to make a copy of the disk directory before you go on-line, so you'll know exactly what's on the disk. Or, make up a name you know is not on the disk (like QWERTY).

If a mistake is made, though, no harm is done. The program returns to terminal mode, and you can try again.

Other problems are not so simply solved. No error-trapping routine can overcome noisy phone lines or hardware failures. Even though such

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The Revolutionary Printer Interface for the Commodore 64™

A New Era in Commodore Printing Power.

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Exclusive Grappler CD features provide a variety of graphic screen dumps, text screen dumps and formatting. No other Commodore interface can offer this.

If you own a Commodore 64...

If you're serious about quality, trouble free printing... You need the Grappler CD.

Contact your nearest Commodore dealer or call Orange Micro for a dealer near you.

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A Uniquely Intelligent Interface:

- Prints Screen Graphics Without Software
- Graphics Screen Dump Routines Include Rotated, Inversed, Enhanced and Double Sized Graphics.
- Full Code Translation From Commodore's PET ASCII to Standard ASCII, the Language of Most Printers.
- Complete Emulation of the Commodore 1525 Printer for printing of Commodore's Special Characters.
- Dip Switch Printer Selection for Epson, Star, Okidata, ProWriter and other popular printers.
- Conversion Mode for Easy Reading of Special Commodore Codes.
- Text Screen Dump and Formatting Commands
- 22 Unique Text and Graphics Commands

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problems are rare, you can make the best of a bad situation if you know what to expect.

Garbage On The Line

Sometimes you'll get strange characters on your screen (garbage) even when you are typing carefully. These garbage characters usually occur for one of two reasons: Either there is some disturbance in the phone signal, or one of the modems is malfunctioning.

If the transmission is normally correct, but an occasional garbage character comes in, the phone line probably is the culprit. If a transmission suddenly turns to total garbage for both parties, you can probably blame the phone connection again.

But if you experience such problems constantly, or if you're getting garbage while the other party is receiving without difficulty, take your modem back to the dealer or service center and have it checked.

If garbage is mixed into an image line during a file transfer, the line will be retransmitted up to five times before the program aborts the transfer, closes the disk files, and returns to terminal mode. The first two characters will be an up arrow followed by a capital R when a section is being retransmitted.

Crash Insurance

If garbage interferes with a handshake, the two programs may go into an infinite loop, waiting for a signal that's never coming. This is highly unlikely, but if it happens you'll notice that the image display has stopped, without an error message.

Also, the red light on the drive will remain on, indicating that a disk file is still open.

The solution is for both parties to go off-line by holding down RUN/STOP and pressing RESTORE. Then type:

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

to close the file. Next, initialize the disk:

```
OPEN 15,8,15,"10":CLOSE 15
```

Then run C/G Term again (the 64 version requires a SYS), press RETURN, enter a CTRL-C, and your connection should be restored. If it isn't, then both parties must reload their programs and run them again to restart the handshaking.

Disk Problems

Another potential problem (though very rare) involves the disk drive and disk. C/G Term cannot evaluate the data; the program takes whatever data the drive sends. If the drive is out of alignment, if the read/write head is dirty, or if the

disk surface is worn or damaged, then it's possible that bad data can be transferred.

If you find garbage in a transferred file, check the original file. If the original was clean, chances are good there's been a drive malfunction, or you have a defective disk. If you get a garbled file, try another disk.

The life of a disk is difficult to estimate, since it depends on how often the disk is used. Also, it's hard to see signs of wear on the surface, and most disks are so reliable as to give the impression that they last forever. But disks do wear out, and even a tiny flaw can render a disk useless. To be safe, if the disk surface looks worn, replace it. If you can't remember how long ago you started using the disk, replace it.

Avoid using a disk that's full, or nearly full (less than 100 blocks free). When you begin an on-line session, you can't be sure how many files you may download or how long they may be. If there's plenty of room on the disk, you won't need to worry about having a transfer canceled with a "FILE WON'T FIT" message.

Creating Graphics Files

Besides transmitting programs and text files, C/G Term has a message mode that lets you create graphics screens or brief messages, and save them to disk for uploading later.

You can enter the message mode in two ways. First, you can load and run the program without hooking up your modem. When the initialization message is displayed, press CTRL-C, which puts you into terminal mode without going through the on-line handshaking sequence. To get to message mode from here, press f8. The screen will clear and "message mode" will be displayed.

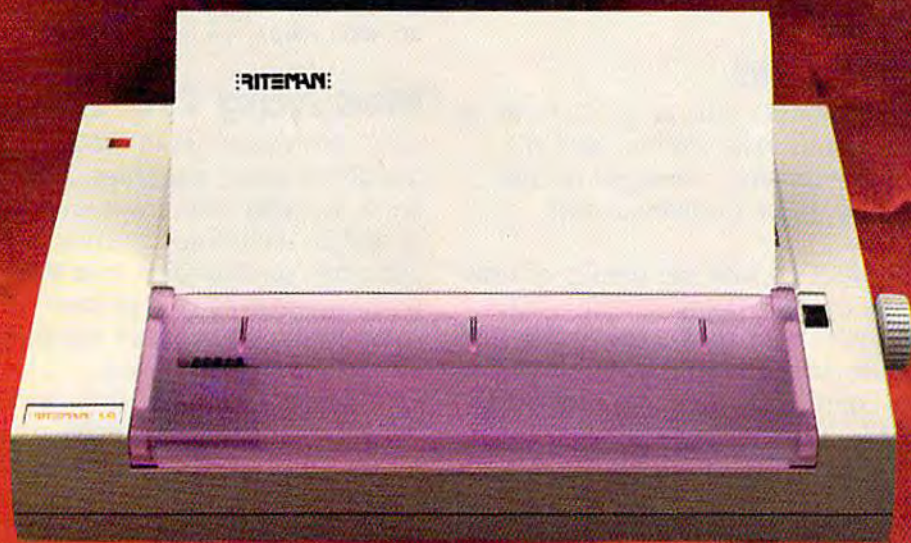
You can also get to message mode while on-line by pressing f8. Keep in mind, though, that the other party will be ignored while you're in message mode.

To create a screen, simply type in the graphics or message contents. You can move freely around the screen, but are not allowed to type anything on the last screen line. There are two reasons for this limitation: First, it prevents your message from scrolling up the screen. And the bottom screen line is used to display prompts and error messages which otherwise would destroy your design.

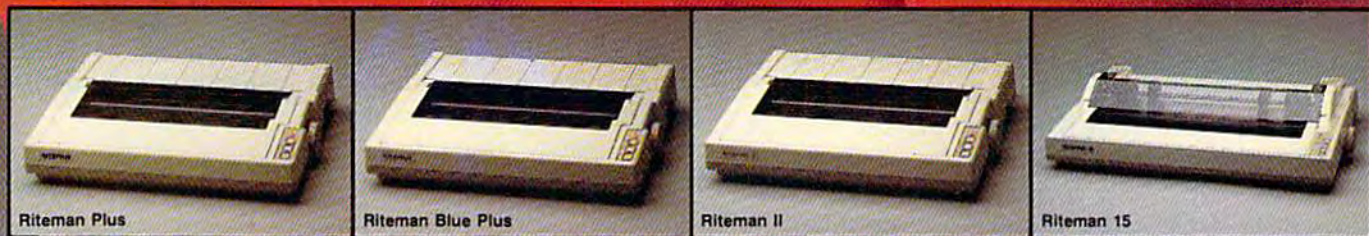
When you're satisfied with your screen, press f5. You'll be prompted for a filename. If you have a VIC, this filename must contain fewer than 10 characters, since the screen will scroll and destroy your design if you type beyond the end of the line. Enter the filename, press RETURN, and your graphics screen will be

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saved to disk.

As with downloading, you must not use the name of an existing file.

In message mode, you also can load a screen file, edit it, and save it back to disk. But again, be sure to save it under a new filename to avoid an error message.

To erase a screen and start over, press f6. To return to terminal mode from message mode, press f8.

Another use for CTRL-C at the initialization prompt is to help you learn to use C/G Term without going on-line.

CTRL-C puts you in terminal mode even though your modem is not connected. You can learn to change colors, type graphics characters, and experiment freely with cursor movement. If you first try out C/G Term on your own, you will avoid delays and errors when you do go on-line with another person.

You can practice with any feature except uploading. If you press CTRL-U without being connected to another computer, the program will lock up because it's trying to shake hands and nobody's shaking back. If this happens, hold down RUN/STOP and press RESTORE. Then load the program and run it again.

The Bulletin Board

Message mode does double duty in C/G Term. It allows you to create and save screens, and it's the routine you'll use to send messages to the bulletin board system to be published next month.

In that issue, we'll go into the details of how C/G Term and the bulletin board interact. For now, you should know that all the color and graphics features discussed here also will work with the bulletin board. Together, the programs allow you to read public messages, leave messages for others, to send and receive private electronic mail, and to upload or download files.

Typing In With MLX

To type in C/G Term for either the VIC (16K expansion required) or 64, first type in MLX, elsewhere in this issue, and save it to disk. Before beginning, read the instructions for using MLX.

Next, turn your computer off and then on and enter this line:

```
POKE 642,45: SYS 58260 (Commodore 64)
POKE 642,45: SYS 58232 (VIC-20 with at least 16K
expansion)
```

This POKE and SYS relocate the beginning of BASIC so MLX will run above the section of memory used by C/G Term. Now you can load

MLX back into your VIC or 64.

Enter RUN and you'll be prompted for a starting and ending address. The starting address is 4609, the ending address is 11262. Commodore 64 users should type in the listing exactly as shown in the back of the magazine. VIC users should also type in the same listing, but replace the last three lines of the program with these:

```
11245 :234,234,022,132,015,017,123
11251 :227,016,021,022,023,020,060
11257 :022,021,234,234,234,234,204
```

After the program is saved to disk, VIC users can load the program by typing LOAD"CGTERM",8. Then simply type RUN as you would for a BASIC program. (Of course, this assumes that you used the filename CGTERM when you saved the machine language you typed in using MLX.) Load the 64 version by typing "CGTERM",8,1. To run, type SYS 4621. Alternatively, 64 owners who don't want to have to remember the SYS address can use the following short boot program. When run, this program will load in and start the machine language:

```
10 IF A=0 THEN A=1:LOAD "CGTERM",8,1
20 SYS 4621
```

Modifying C/G Term

C/G Term uses about 8K of memory, including the object code, variables, and temporary storage areas. Several useful options can be added to the program, including routines to read the disk directory, to save data into a capture buffer, and to dump screens to a printer. There is plenty of room in the 64 or in an expanded VIC for refinements and modifications.

However, because it is written entirely in machine language, changes are difficult to make unless you have the source listing. And the listing is too long to print here. It would take up more space than the MLX listing.

If you wish to modify the program or study any of the routines, or you'd just rather not type it in, you can get a copy of the source listing in PAL/LADS format (and the machine language program itself—the object code) on disk by sending a SASE (a padded disk mailer is preferable), a blank disk, and \$3, to:

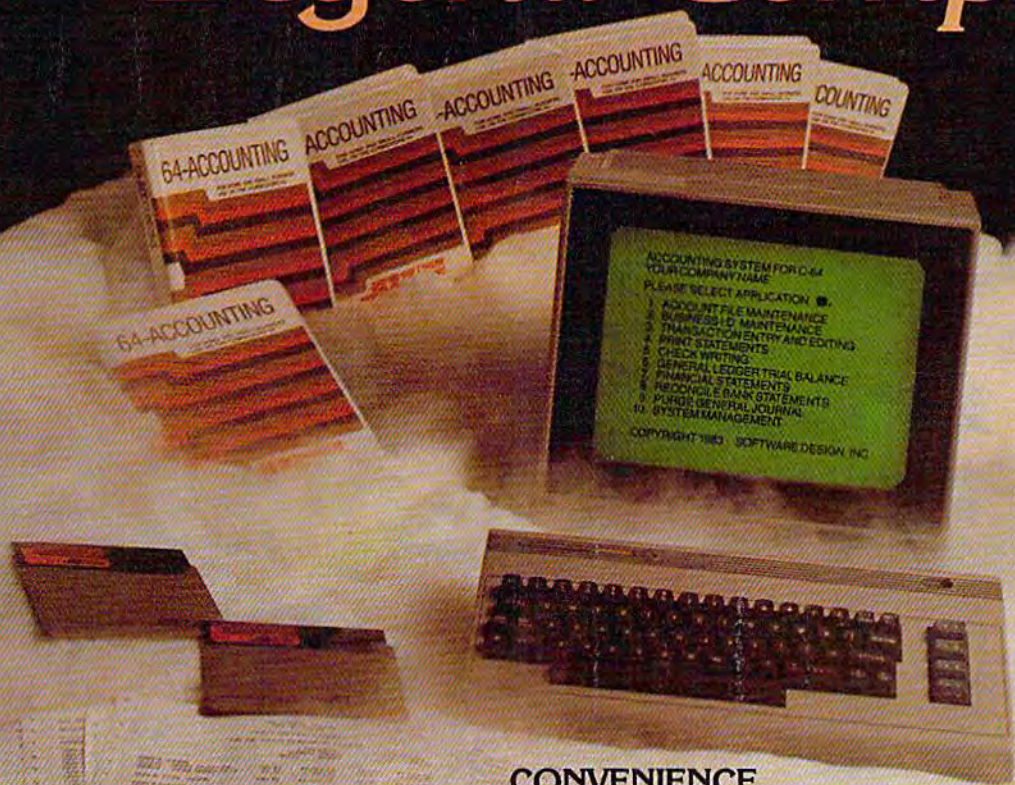
Robert Sims
100 Lee Street
Jamestown, NC 27282

My CompuServe ID# is 75005,1553. On Delphi, it's BOZART.

See program listing on page 199. ■

64 Software

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Free Fall Associates: The Designers Behind *Archon* and *Archon II: Adept*

Selby Bateman, Features Editor



Free Fall Associates: Jon Freeman and Anne Westfall.

Emerging from the avalanche of a thousand computer games came *Archon*, 1983's popular and unique mixture of strategy and action, good and evil, light and dark. Now, *Archon's* creators bring you the sequel—and the fight between Order and Chaos is on again.

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Magic is subtle. Magic is sly.

Our ancient and enduring fascination with things magical stems chiefly from that strange interplay between illusion and reality. And at the heart of that fascination is the human imagination.

"We have some pretty wild imaginations," admits Jon Freeman, laughing and smiling at his wife and collaborator, Anne Westfall.

"But in our wildest dreams we did not anticipate a sequel when we created *Archon*. It was just not the kind of game that suggested to us a sequel. We didn't want to just do the same game with a little teeny bit of difference and then resell it."

Freeman and Westfall (hence, Free Fall Associates) and *Archon* co-creator Paul Reiche III faced a dilemma in 1983. The game was so successful that seemingly everyone was asking them for a sequel. And that included Trip Hawkins, a big fan of *Archon* and the president of Electronic Arts, the company that published the game.

Hawkins kept asking them about a follow-up game. And Freeman, Westfall, and Reiche kept saying to themselves, "Sequel? Good grief!"

"First, we had to convince ourselves that it seemed like a reasonable thing to do," says Freeman.

They began to study the components of their own creation, trying to isolate the magical elements that made *Archon* a very different game from any that had appeared before.

The fundamentals were engaging in their own right: A chess-like strategy game which dissolves at times into a fierce arcade-action battlefield.

Enough wizards, dragons, goblins, golems, and djinnis to fill a medieval alchemist's nightmare. The struggle to conquer and hold five "power points." And

the shifting subtleties of teleporting, summoning "elementals," learning luminosity cycles, and the like.

In fact, to look at the complexity of *Archon* is to realize that the creators of the game are certainly not newcomers to game design or programming.

Paul Reiche III (pronounced RICH-EE), for example, has been involved with the creation of fantasy role-playing games since high school. He worked for TSR, which publishes *Dungeons & Dragons*, following production of his D&D module, *Temple of Poseidon*. Reiche also worked with Freeman on the creation of programs for Automated Simulations (later renamed Epyx), which Freeman cofounded.

Westfall, who took up computer programming at the age of 30, soon found that her talents in that area were considerable. After a couple of years producing complex technical software, she joined Freeman at Automated Simulations and began her efforts in game programs. It was her programming expertise that turned the game designs by Freeman and Reiche for *Archon* and *Adept* into substance.

No name is more associated with excellence in computer game design than that of Jon Freeman. Among the numerous games he developed at Automated Simulations was the award-winning *Temple of Apshai* (for which he designed the *Dunjonquest System*) and *Star Warrior*. He is also the author of *The PLAYBOY Winner's Guide to Board Games*, *The Complete Book of Wargames*, a variety of stories and articles, and more than a dozen game manuals. With *Adept*, Freeman has now published 17 games.

It was in late 1981 that Freeman and Westfall formed Free Fall Associates, located a couple of miles from the Stanford University campus in Palo

Alto, California, and began working with Reiche on what was to become *Archon*. The trio also designed an earlier Electronic Arts release, *Murder on the Zinderneuf*, a murder mystery game which is one of Freeman's personal favorites.

"With *Adept*, what we wanted to do—this is an oversimplification, but—while preserving the mechanics and the general feel of *Archon*, mostly the mixture of strategy and tactics, we wanted to do as many things differently as we could," says Freeman. "To do things that we couldn't do in *Archon* for one reason or another. And to put things in that people had suggested."

Why doesn't *Archon* have varying difficulty levels, some players have asked?

Well it does, Freeman replies with a smile, but then admits that the function is subtle and has never been mentioned before. "There's a built-in, self-adjusting difficulty factor in *Archon* so that if the computer keeps beating up on you, it will get easier and easier.

"But most people don't know that because it goes in little tiny increments. By the time it really starts kicking in, players think, 'Oh, I'm just getting better.' Well, they are, partly; but partly it's because the computer is not being as good," he adds, laughing. "But nobody knows that's there. It's not something we advertise, but we were aware of the problem.

"Just like chess: How do two unequal players play chess? Well, not very well. And there's not really a great deal you can do about it. If you start taking pieces away, you change the game so radically that you're not playing chess anymore. *Archon* is the same way. So we said, we want to do a game in which we can do that without screwing it up," he says.

Other ardent *Archon* fans suggested that the game should



An Adept of Order summons a Gorgon (in box at upper right) for placement on Fire, Air, Water, or Earth in the Electronic Arts' game, Archon II: Adept.

allow you to be able to build your own armies, to play some of your opponent's types of pieces, to use magic spells more often, and to limit the edge given to players who happen to be agile with a joystick—without slowing down the game. Those ideas and much more have been incorporated into *Adept*.

In the game, you use your four Adepts—something akin to powerful wizards—to conjure and then maneuver monsters, cast spells against the enemy, and ultimately win by occupying the six flashing—and moving—power points.

While the basics are in many ways similar to the original game, *Adept* is a different game and has a number of interesting features: Energy must be monitored and expended carefully; the health of individual Adepts is crucial to your chances, and the various gorgons, wraiths, firebirds, sirens, juggernauts, giants, and other monsters are more or less effec-

tive depending on which of the four elemental bands on the game board they occupy: fire, air, water, or earth.

There is even an Apocalypse spell which at certain times can be used to begin the battle that ends the game.

"At the start, there are only four pieces on a side, the Adepts," says Freeman. "Everything else you add.

"You can concoct your own army to suit yourself. For instance, if you have trouble mastering certain pieces or you need practice on them, you don't have to use them. Don't summon them. Or, if you like some particular piece, that's all you can have. Or you can have a little of everything," Freeman adds.

"This is a game of, in part, resource management. You can cast as many spells as you want as often as you want. You can summon pieces from now to kingdom come—as long as you can pay for them. You pay in magical energy, and you get magical energy by occupying

power points, which cycle from element to element each turn."

In designing *Adept*, the three creators came up with a particular piece which is especially nice for beginners not used to conducting battles with a joystick: the Siren.

"All you have to do with the Siren is push the joystick button—you don't aim, you don't move—just push the button," says Freeman. "And as long as you push the button, she sings. And as long as she sings, the other person's lifeline goes down.

"But you can't move while you're pressing the button, so you can't dodge. Whenever [an opponent] fires something and you think it's going to hit, you have to let go of the button and run. As soon as the missile's passed, you go back to holding down the button. For beginners, this piece is overwhelming.

After a while, when you get used to everything else, then it's not nearly as good," he says.

On the other hand, the Chimera may be the most difficult piece in *Adept* to learn, Freeman adds. "The Chimera has three different attacks. It breathes fire, snorts a cloud of poison gas, and has a poison stinger in its tail. And all three of those attacks do different amounts of damage and require different ranges.

"That's a hard piece to learn. Beginners have trouble with it. But in *Adept*," says Freeman, "they don't have to use it until they've practiced."

Adept, now available for the Commodore 64 as well as Atari computers at a suggested retail price of \$40, is not by any means the last program from Free Fall Associates. Now that they've recovered from the creation of *Adept*, there is already a list of possible projects a mile long, Freeman admits.

But there are only twenty-four hours in a day. Not even an Adept can change that. ☉

Bagdad



Bryan Files

Beware of the evil genies determined to knock you from your magic carpet. With a little strategy and skill, you can trap them in bottles—but work quickly before they re-emerge. A lively arcade-style game for the VIC, we've added a version for the 64. A joystick is required.

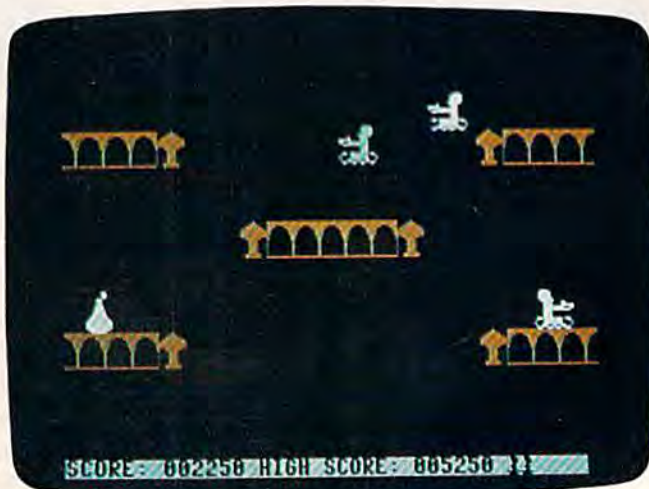
Flying through Bagdad on your magic carpet, you're suddenly accosted by some rug-riding evil genies bent on knocking you off—literally and figuratively. Your only defense is to knock them off first, and this takes some tricky maneuvering. First, you must trap each genie in a bottle. Then collect the bottles before the genies have a chance to escape. If you fail to collect a bottle in time, the lid opens and your battle resumes.

The Calm Before The Storm

Ridding the city of enemy genies gives you a brief rest before the next wave of more numerous and determined genies. Only white genies are encountered during the first four waves, but the fifth wave brings a new, more aggressive menace—the blue genies. (The 64 version plays a bit differently—see 64 Notes below.)

If you manage to reach the ninth wave, white, blue, and the dreaded purple genies emerge for a fast and furious battle.

Twelve is the maximum number of genies that will appear, but the difficulty increases with each higher level. You begin with four green genies (one on the screen, three in reserve), and a new one is added for each 4000 points scored. For each bottle collected, 250 points are awarded.



The player must swoop down to retrieve the bottle before the genie within escapes (64 version).

Current score and high score are continuously displayed in the VIC version.

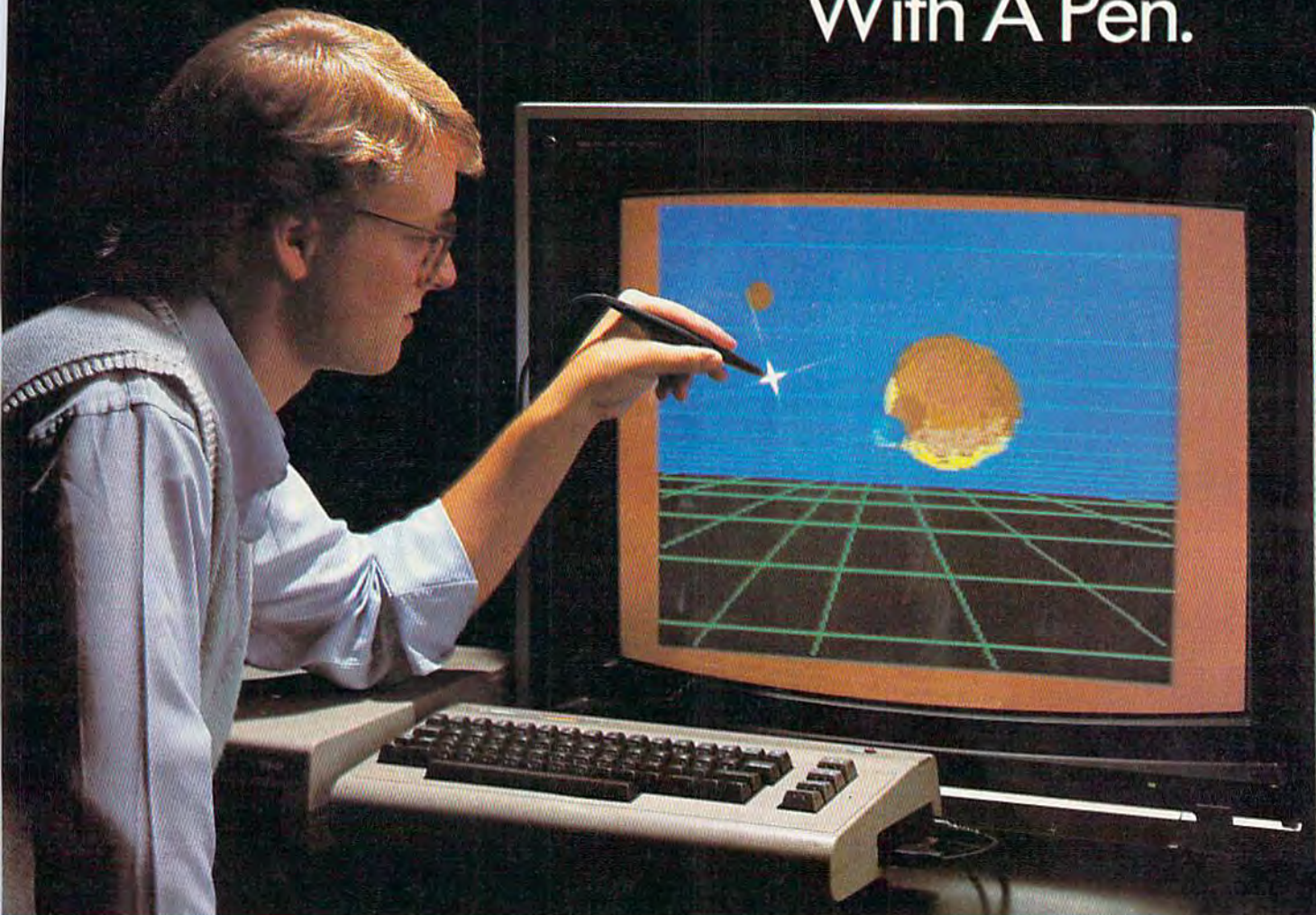
Flying The Magic Carpet

To start a new game, push the joystick forward. Move the joystick (port 2 in the 64) left or right to move your genie correspondingly. Press the fire button to fly up, and release it to allow gravity to pull you down. Hovering requires alternately pressing and releasing the fire button. If you reach the top of the screen, your genie will bounce, however, he will wrap around the screen at the left and right edges.

Strategic positioning is extremely important. When two genies hit at the same level, they bounce off each other. You have to use your carpet to hit the other genies. If you're at a higher level when you collide, the edge of your carpet knocks the genie off his rug. The falling genie

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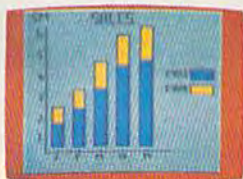
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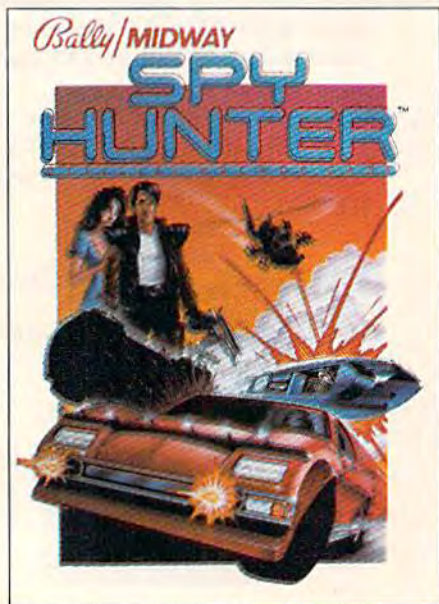
Are you fast enough to play *Tapper*? If you have to ask, you probably already know the answer.



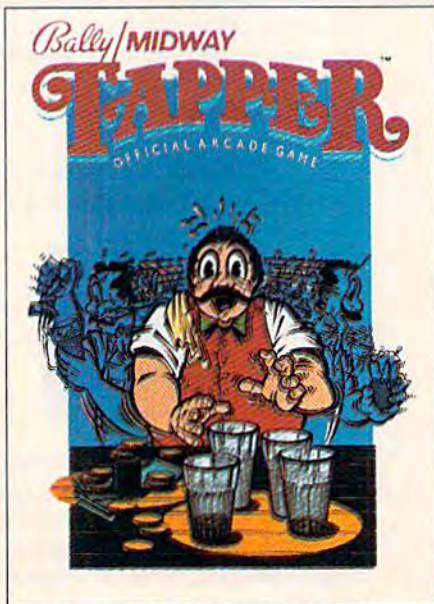
Bally Midway's *Up 'N Down* by Sega. In this game, a crash is no accident.

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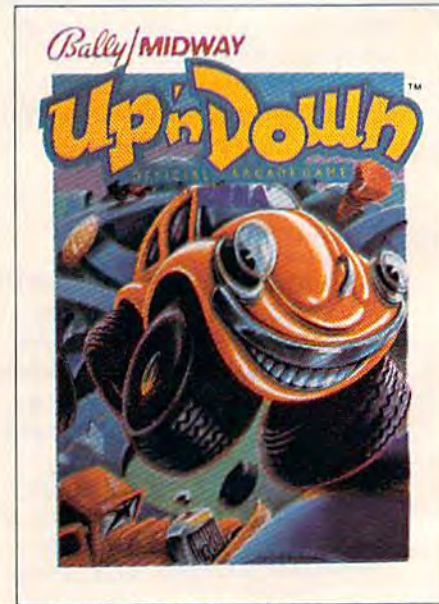
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The #1 Arcade Game of 1984.



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

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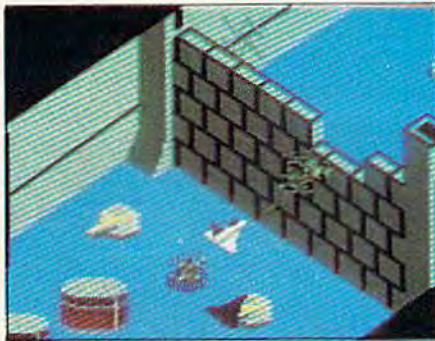
Sega's Congo Bongo rocked the home game world when it shot up to Number 3 on the Billboard chart this summer.

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Congo Bongo. It's fast and it's fun. But be careful. It's a jungle in there.



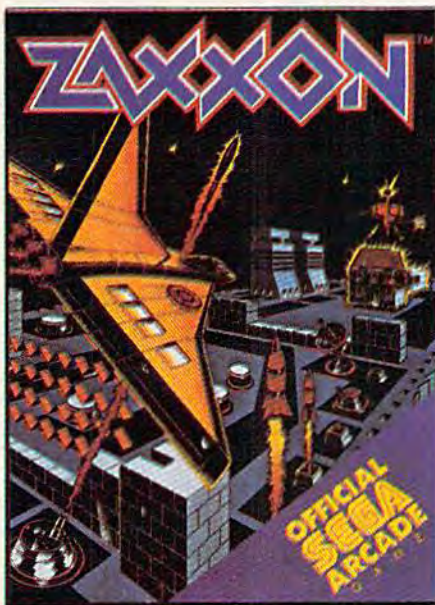
Arcade and Home Smash. Hit #3 on Billboard magazine's Top Video Games survey.



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

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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	✗	✓	✗	✗

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*Atari 400, 800, 600XL, 800XL and 1200XL.

(Congo Bongo cartridge: 400, 800 and 800XL.)

†Atari 800, 600XL, 800XL and 1200XL.

**Also available for IBM PCjr.

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The evil genies hover while the good genie is reincarnated (VIC version).

then crawls back into his bottle, which falls to the ground (or to one of the intermediate levels).

Once in the bottle, the evil genie begins to work his way out again. The only way to get rid of him is to fly down and pick up the bottle.

If you hit a genie when you're at a lower level, you're the loser. You don't have a bottle, you simply lose one of your genies. You'll reincarnate at the bottom of the screen, providing you have at least one life remaining. During the three or four seconds the genie is flashing, he cannot be defeated by enemies. However, if no genies are nearby, you can terminate the flashing and begin play by moving the joystick.

Important VIC Instructions

Since "Bagdad" uses the entire memory of the unexpanded VIC (including the stack and screen memory), it must be entered in three parts. Program 1 is written in BASIC and is entered in the normal manner. Program 2 represents replacement lines for tape users (see below), and Programs 3 and 4 are written in machine language and require the use of MLX (elsewhere in this issue). *At least 8K memory expansion is required to run MLX.*

Follow these instructions carefully to enter and save the program:

1. Type in and save Program 1. If you're using tape, replace lines 32-59 of Program 1 with those shown in Program 2. After saving, *do not rewind the tape*, but remove it from the Datassette. You might want to save a copy onto two different tapes or disks.
2. Turn your VIC off and back on to reset the machine. Install your 8K (or greater)

memory expander.

3. Type the following statement in immediate mode (no line number) then press RETURN:

```
POKE 648,26:SYS 58648:POKE 44,28:POKE
7168,0:NEW
```

This moves screen memory to 6656, and puts the beginning of BASIC just above the screen, to leave room for the ML program.

4. Load and run the VIC MLX program. Answer the MLX prompts as follows:

```
starting address: 4096
ending address: 6144
```

5. Enter and save the second part of Bagdad (Program 3). Disk users must save the program with the filename "B" (make sure you don't already have a file with this name). If you're using tape, save the data on the same tape you used for Program 1, immediately following that program.

Again, do not rewind the tape, but remove it from the Datassette.

6. Turn your VIC off and on to reset the machine. Leave the 8K expander in place.

7. Type the following statement with no line number, then press RETURN:

```
POKE 44,33:POKE 8448,0:NEW
```

Screen memory is now back at 4096, and BASIC begins at a location in the memory expander, to free up memory for the second ML program.

8. Load and run MLX again and answer the prompts as follows:

```
starting address: 6144
ending address: 8192
```

9. Enter and save the third part of Bagdad (Program 4). If you're using disk, you must save this data with the filename "C". For tape, use the same cassette you used for the first and second parts, and save the data immediately following the previous part (Program 3).

You now have all the programs necessary to play Bagdad. Turn off the computer and remove your memory expander. Bagdad is now configured to run only on the unexpanded VIC. To begin, simply load and run the first program. After viewing the game instructions, the remaining machine language will be loaded automatically.

If you'd rather not type in the programs, I'll make a copy (VIC version only) on receipt of a blank tape, self-addressed stamped mailer, and \$3. Write to:

Bryan Files
404 Eastbrook Lane
O'Fallon, MO 63366

64 Notes

The 64 version of Bagdad is somewhat different from the VIC version, although the game concept is the same. You begin with three lives (compared to four in the VIC version). The maximum number of enemy genies in one wave is seven, and a new life is added every 5000 points. The *tenth* level introduces the first blue genie, and the *fourteenth* level debuts the sinister purple genie. High score is displayed only at the end of each game.

As in the VIC version, MLX is required for typing in Bagdad (Program 5). Follow these instructions carefully:

1. After turning your 64 on, type POKE 44,32:POKE 32*256,0. Press RETURN.
2. Type NEW, press RETURN, then load and run MLX.
3. Respond to the prompts with:

starting address: 2049
ending address: 6020

4. Type in Program 5, save it, turn off the computer to reset the pointers, then load and run.

See program listing on page 178. ☐



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Jump!

Fernando Ciccarelli and Marcel Ferreira

Fire your laser and defend your planet from the invading Ryiads in this keyboard-controlled game for the VIC and 64.

"Jump!" pits you against an invader who's trying to blast both you and your planet. He's wily and you must use your laser in defense.

When you hit the invader, a Ryiad, you get 50 points and 25 energy units. When a Ryiad shot hits the surface of your planet, the point of impact is illustrated by reversing the damaged character. When he hits it a second time, a crater is formed. If he hits the same spot a third time, it disappears and you lose 25 points.

You can move over the undamaged and slightly damaged areas of the surface, but you lose a turn if you try to move over craters or pits. Move left by holding down the Z key. To move right, hold down the C key.

Avoiding The Pits

You can bypass craters and pits by jumping over them. Pressing SHIFT Z allows you to jump over an empty spot to your left. To jump to the right,

press SHIFT C. Fire your laser by pressing X, SPACE, or RETURN.

As you play, you'll notice that your energy units are constantly ticking away. Standing still costs one energy unit per second, moving costs five, and jumping costs ten. You get a total of three turns.

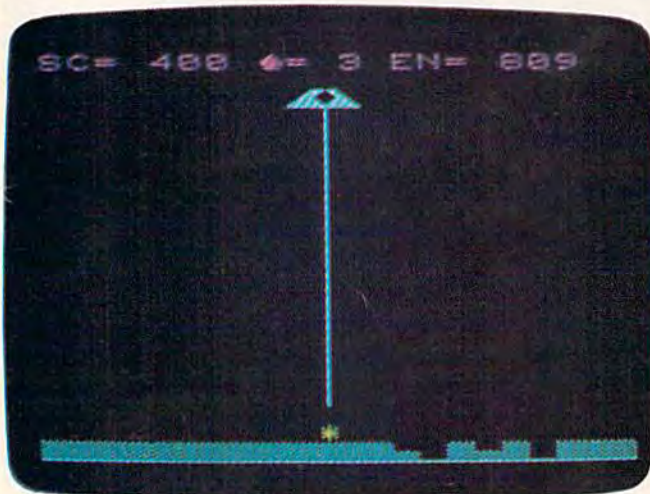
Five Difficulty Levels

There are five difficulty levels: Beginner, Rookie, Pro, Expert, and Random. Try Beginner just to see how the game plays. When you're comfortable with that level, go on to Rookie. Pro is the major level; it gives you a fair game. At the Expert level, the Ryiad is smart and fast. In the Random level, the difficulty factor is chosen randomly for each invader.

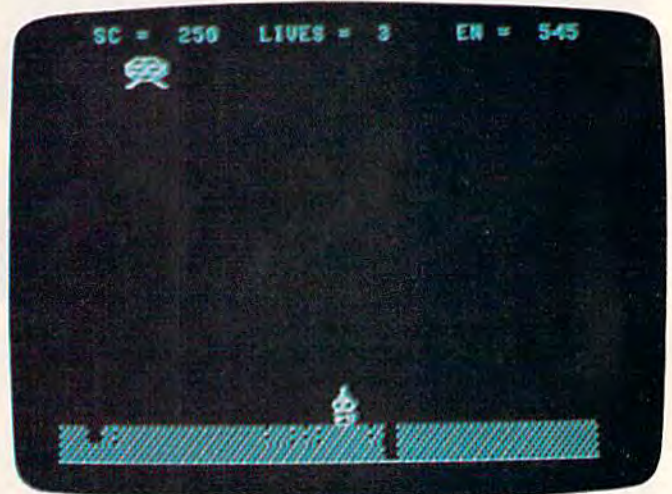
If you would like a copy of the program (VIC version only), send a SASE with a blank tape and \$3 to:

*Fernando Ciccarelli
14 Poplar Place
New Rochelle, NY 10805*

See program listings on page 173. ☺

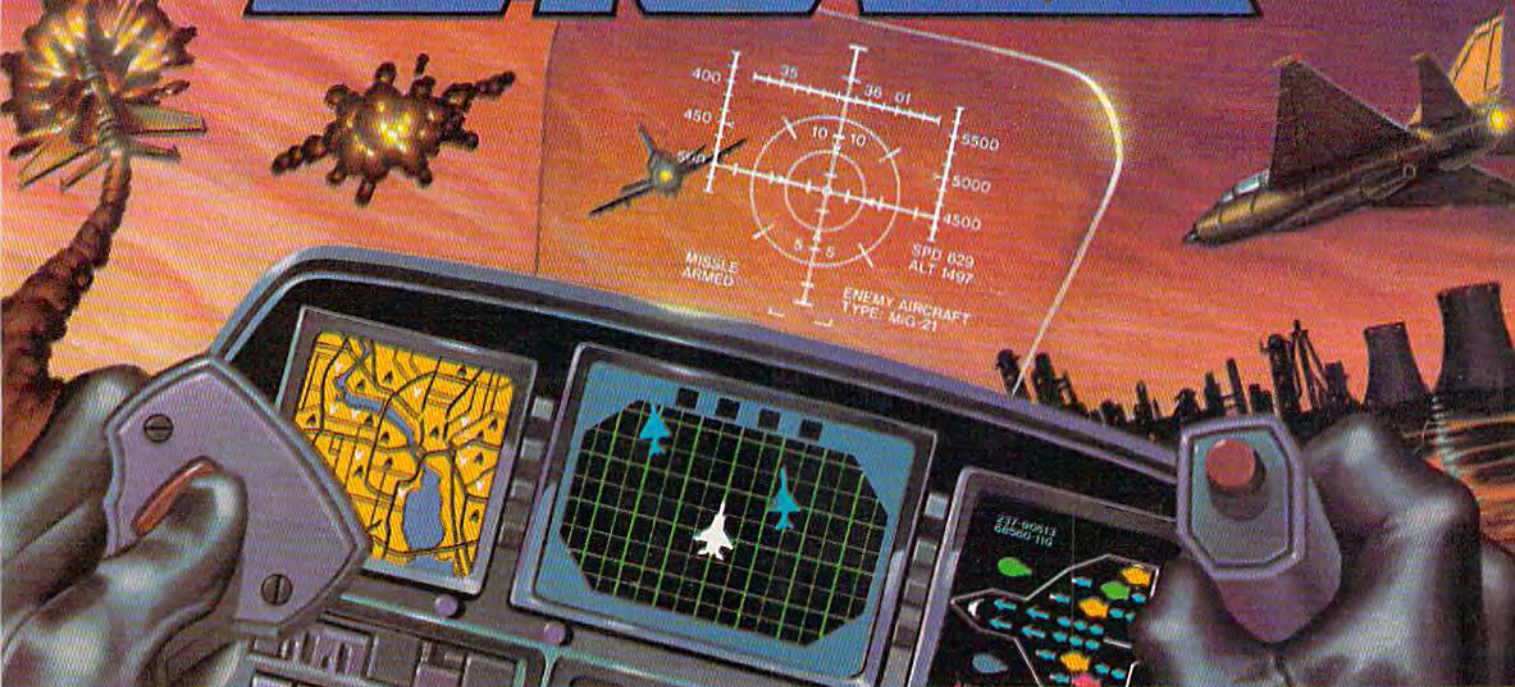


A life is lost during this direct hit in the VIC version.



To cross either of the holes made by the invader, you must remember to jump (64 version).

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Supertank

Boris Litinsky

In this unusual action game for the 64, your goal is to prevent hostile tanks from crossing into your territory. By aiming carefully and avoiding direct hits, you may make it to the rank of Marshal.

Your orders are to stop the enemy tanks. But in the back of your mind, you know there's more to it than just following orders. You know that if you don't stop them, they'll stop you. Your goal is simply to survive.

Your commander has been kind enough to give you a choice of three different tanks. The Tiger has strong armor, which is great for helping you survive, but it moves sluggishly. The T-34 has moderate armor and speed, but lacks fire-power. If you choose the Sherman, you'll have a quick tank with a good cannon, but almost no defense (armor). If you're a new recruit, you might want to choose the T-34 because of its defensive capabilities. Advanced players who

are sure of their abilities may prefer the Sherman, although a single hit by the enemy can be devastating.

Controlling The Tank

After you are outfitted, your tank moves onto the battlefield. Enemy tanks move across the screen from left to right. Using the joystick to control the crosshairs of your cannon, get the tank in your sights, and press the button to fire a salvo. Remember that it takes time for the missiles to travel; you'll have to adjust your shots accordingly, shooting slightly in front of your target.

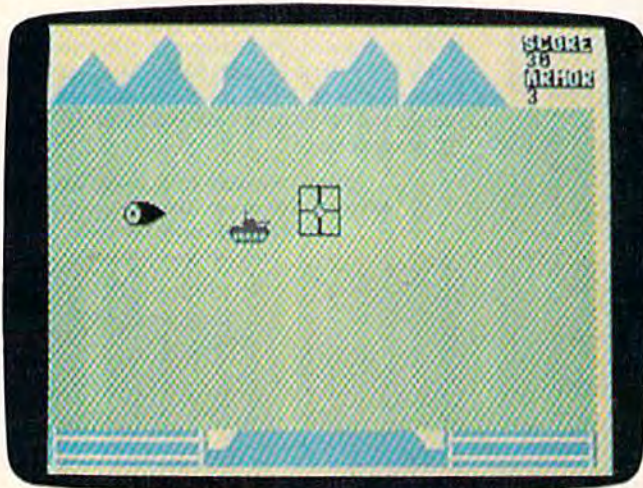
After pressing the fire button, you'll see the missile fly (from the left edge of the screen). If it misses, nothing will happen. But if it hits its target, the enemy tank will explode and the screen will change color, to simulate new terrain and new weather. You score ten points for each successful shot.

If you miss, you become the target. The enemy tank will turn toward you and fire. The enemy rarely misses—and you'll lose one armor point when you get hit. In the upper right corner is a status indicator which displays how many points you've scored and how much armor you have left. When your defenses reach zero, your tank is destroyed. The windshield cracks, and the tank is reduced to scrap.

Extra Chances

Losing a tank is not a total catastrophe, however. You manage to escape by the skin of your teeth, and make your way back to headquarters. Based on performance, you are awarded a rank from Private (less than 50 points scored) to Marshal (over 1000). But if no points are scored, you're branded a Traitor. Whatever your rank, you are given another chance to go forth and do battle. Choose another tank and the game begins again; you may yet earn the exalted rank of Marshal.

See program listing on page 170. ☺



A missile flies toward the opposing tank.

Science
Fiction

Fahrenheit 451 • Ray Bradbury

010-10110-1-101

Science
Fiction

Arthur C. Clarke RENDEZVOUS WITH RAMA

010-10110-1-101

FANTASY

DRAGONWORLD

BYRON PREISS, MICHAEL REAVES
AND JOSEPH ZUCKER

010-10110-1-101

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Adventure

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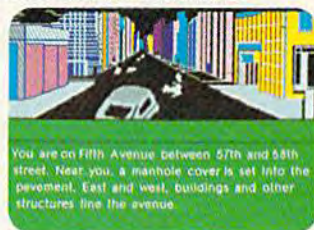
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Descent To Kaylon

Steve Stiglich

Gliding asteroids and a layer of clouds separate you from your supply base on Planet Kaylon. Is safe passage possible? For the VIC and 64.

Cruising over Planet Kaylon in your spaceship, you spot a supply base below. But as soon as you send off a shuttle ship to the base, a cluster of asteroids sails across its path. Darting quickly through the asteroids and clouds, your shuttle narrowly escapes collision before touching down on Kaylon.

This fast paced, arcade-style game uses the full potential of the unexpanded VIC, and is entertaining on the 64 as well. There are as many levels of play as you can master, and the program automatically records the high score after each game.

"Descent To Kaylon" begins with your spaceship moving across the top of the screen. To release a shuttle, press the space bar. Your shuttle will begin moving downward through the

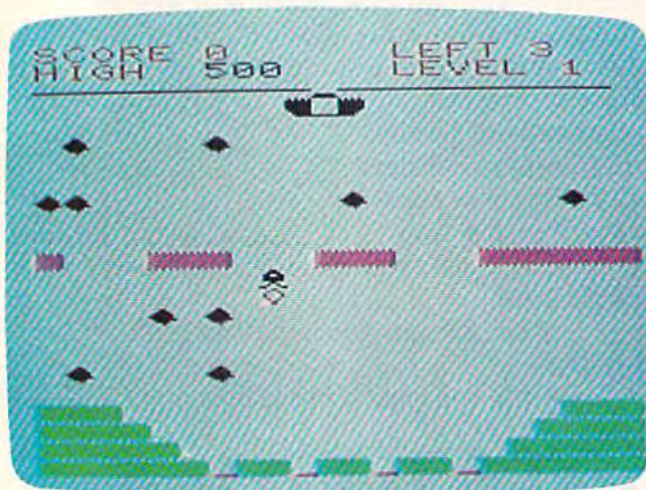
layers of asteroids and clouds. Pressing A moves it to the left, and D to the right. You can also hold your shuttle at one latitude by pressing the space bar.

There are four landing pads on Kaylon. For each shuttle that you safely land, you earn 100 points. Landing four shuttles on the base advances you to the next level, and adds to your score a bonus of 100 points times your level. With each increasing level, more asteroids are added to the screen.

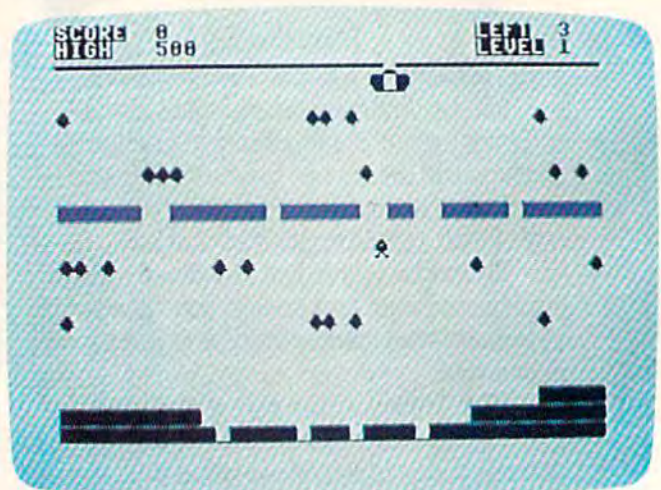
If your shuttle collides with a cloud or asteroid, you can start again at the top of the screen. After three of your shuttles have collided, though, the game ends. With the demise of your last shuttle, the instructions are reprinted, the high score is updated, and you're given a chance to replay.

Variable Names

- V = Volume for sound generators (VIC version only)
- S1 = Sound generator for VIC
- SD = Sound generator for 64



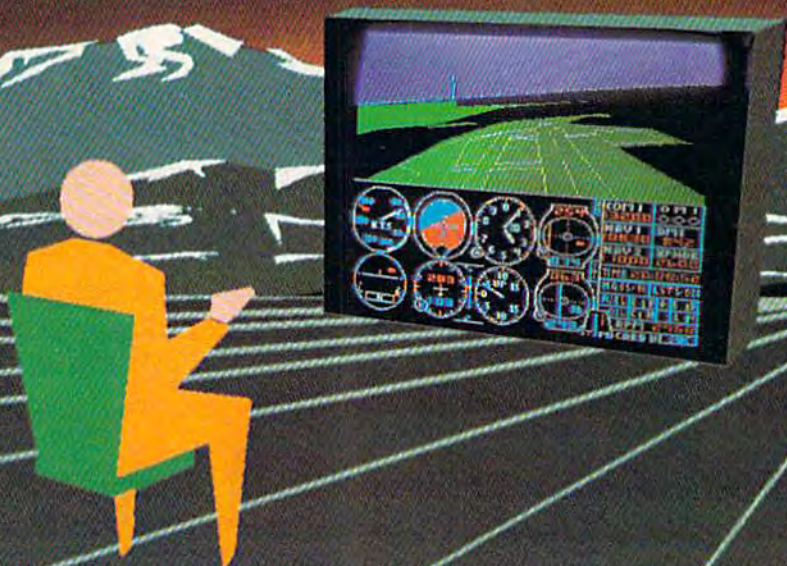
Having traversed the layer of clouds, this shuttle must now dodge some asteroids (VIC Version).



In the higher levels, more asteroids move across the screen (64 version).

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- LF = Number of ships left
- PO = Position of shuttle
- C = Location of color RAM under screen position
- M\$(1) and M\$(2) = Two characters used to make the strings of asteroids
- A\$, B\$, C\$ = Three strings of asteroids printed on the screen
- HI = High Score
- LV = Level of play

Program Description (VIC Version)

- 0-1 Reserves character set; changes screen color; enters special character mode.
- 6-30 Resets most variables.
- 49-59 Creates strings of asteroids, with increasing difficulty at each level of game.
- 98-106 Sets up play screen.
- 190-192 Moves spaceship across the top of screen; checks keyboard for input.
- 219 Moves the strings of asteroids in the appropriate direction.
- 227-233 Checks keyboard for input.
- 350 Collision check.
- 500 Determines what you have collided with.
- 510-511 After collision with obstacles, decreases remaining shuttles by one. If no shuttles remain, GOTO 1200.
- 600-603 Increments score when you land on base.
- 700-712 Calculates bonus according to level of play.
- 1200 Sets high score.
- 1201-1215 Prints Game Over message and instructions.

See program listing on page 176. ■

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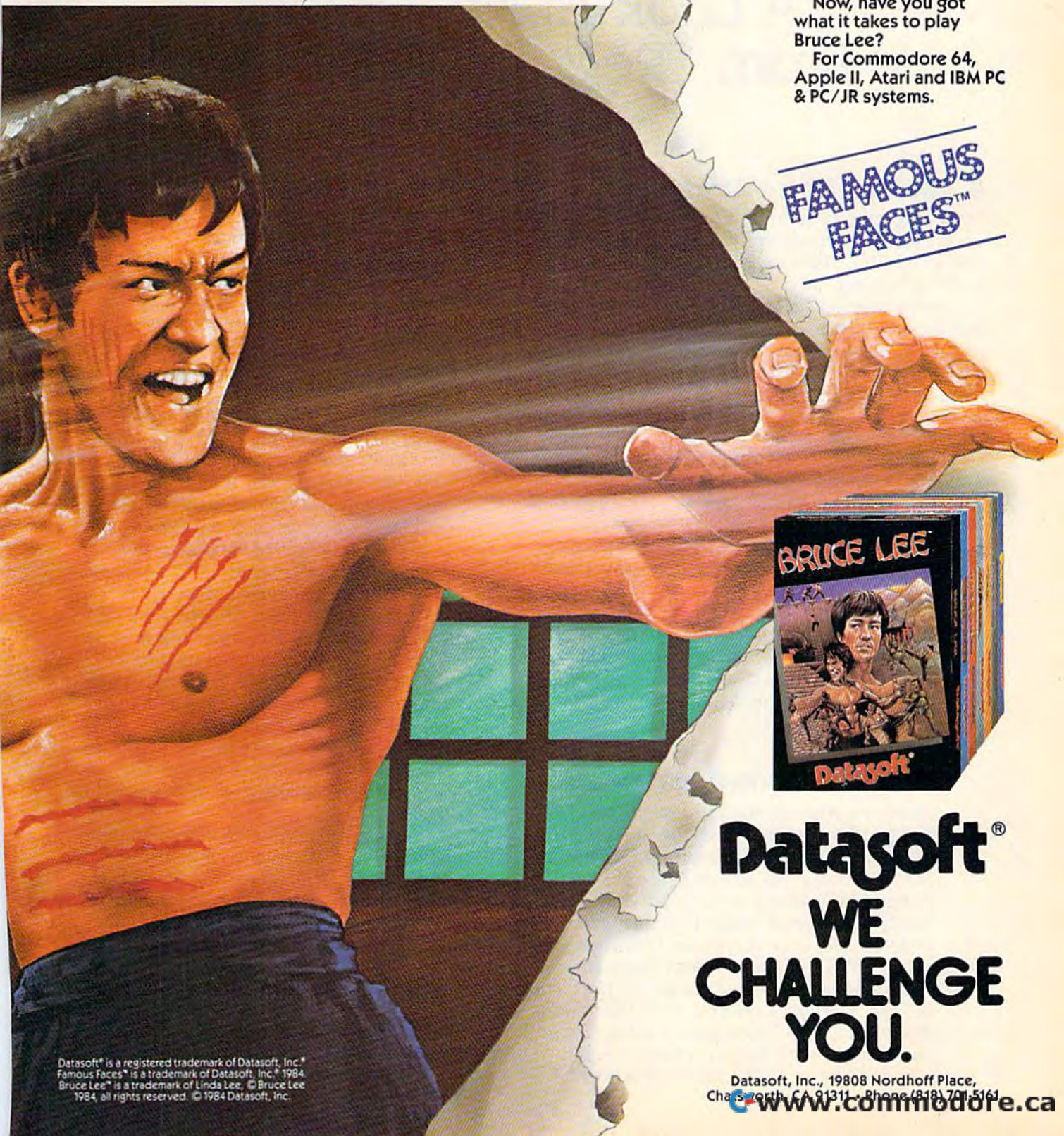
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A Peek In The Mirror

I'm a magazine columnist. That means that every month I get the opportunity to climb up a mountain, grab a bullhorn, and harangue thousands of GAZETTE readers.

Some months I take a look at new products that have caught my fancy. Other months I tell you about all the foolishness that goes on around my house, with our kids and computers. And some months I get philosophical, and spin off ideas and opinions I hope will stimulate and provoke you.

Until a couple weeks ago, when I got up and made my speech to you each month I never thought about how I must look to you. Then I got a letter from Dallas Denny of Nashville, Tennessee. Dallas enclosed the June 1984 issue of the *Nashville Commodore Users Group (NCUG) Magazine*. On page 5 was a piece by Dallas entitled, "On the Road with Reggie D'Ignazio." The title of the piece comes from my column in COMPUTE! magazine entitled, "On the Road with Fred D'Ignazio." And the piece parodies my columns in various COMPUTE! publications. I'd like to share it with you here:

On the Road with Reggie D'Ignazio

There is a place in my house where you or I can go zooming into the sky like a jet fighter pilot with a fine mustache, or feed peanuts to the elephants at the zoo, or figure out our budget for Christmas presents for Aunt Patsy and Uncle Roger, or play tic-tac-toe with someone who lives in a cloud. It is a magical, exciting place. It does not have fancy curtains or decorations, or even a rug on the floor, but in it my neighbor's children have killed nasty green aliens from space, and in it they have made friends with men in red-and-white-striped balloons. It is a place where there is a

television screen, but where television never comes. It is a place which is filled with wonderful sights and sounds.

The place that I am talking about has a lot of outlets to plug things into. You can plug things into slots in the floor or the wall, or dangle them from the lightbulbs on the ceilings. It has a desk with lots of interesting things: there are pencils without erasers and pens without caps, staples, rulers, ink, paper clips, rubber bands, razor blades, harmonicas, matchbooks from faraway places, batteries, note pads, stamps, out-of-date prescriptions, envelopes, guitar picks, pocketknives, screws, rolls of tape, and expired identification cards.

On the desk in my place sits a computer. It is not a particularly big computer, or a particularly tiny computer; it is just a computer. But my computer is a ticket on Lufthansa Airlines. It is a letter from my grandmother. It is a vacation trip to Disneyland. My computer is a lifetime subscription to National Geographic Magazine. It is a paper cup telephone that connects me with my friends. It is a notebook on which I can scribble my thoughts. It is dinner for two at Andre's. It is a reunion with an old friend, it is a coloring book, it is a safari to Africa.

There are places with computers like mine all over America, all over the world. Magic places. And ... who knows? Maybe there are similar places on Betelgeuse, Sirius, or Proxima Centauri. If there are, do you think we could arrange a software exchange? When I read Reggie's "column," I laughed and winced—at the same time. Do I really sound like Reggie to you readers out there?

I would welcome hearing more from Reggie and from any other "Fred D'Ignazio" clones and lookalikes that you can invent. In the future, I

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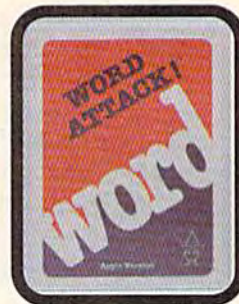


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plan to publish the best "columns" I receive. Then I'll ask you if you can tell the difference between the real Fred D'Ignazio and his artful imposters. I have the embarrassing suspicion that separating Freddie and Reggie D'Ignazio will not be that easy.

A Potpourri Of Books

Every month I receive dozens of books about computers, robots, and high technology. I read through the ones that look like they would interest me. I'd like to share the best of these with you.

I've grouped the books by topic. First, *introductory books*. There are thousands of these on the market. One of the most current and most readable is George Beekman's *The Commodore 64 Home Companion* (Datamost, 1984, \$19.95, 359 pages, index, appendices).

Unlike many so-called "beginner's" manuals, Beekman's book is truly accessible, attractive, and *inviting*—for the entire family. It's a great alternative to a user's manual. It should appeal to both the young and old non-technical members of the family.

Also, the book is comprehensive. It begins by introducing you to the applications home computers can perform. Then it takes you, step by step, into buying software and hardware, setting up a system on your own, programming, and dealing with peripherals like modems and printers. The book ends up with a solid index, a list of user groups, and a handy pull-out summary card with BASIC commands, how to LOAD and RUN a program, how to SAVE a program, how to view the disk directory, how to format a disk, how to control the screen, and how to use a modem.

The second introductory book I'd like to recommend is *Computer FUNDamentals*, by Barbara Kurshan and Nancy Healy (Reston, 1984, \$16.95, 208 pages oversized).

Computer FUNDamentals is a big activity book, equally suitable for families and schools. Each chapter begins with a brief look at such topics as computer history, programming, and computer applications. Most of each chapter, however, consists of activities, and *many of the activities don't require a computer*. For example, you can assemble your own computer out of an egg carton and write programs for it. Or you can create a junk robot out of shoe boxes, bits of tin foil, and markers. There are dozens of activities. All are attractive and easy to do, and they all teach some aspect of using computers. At the end of the book is a "keys and answers" section that gives the solutions to computer problems in the book.

Computer FUNDamentals makes an excellent

introduction to the broader, more practical aspects of "computer literacy" for children ages 8 to 13.

As a companion to *FUNDamentals*, I would recommend *The Beginner's Computer Dictionary* by Elizabeth S. Wall and Alexander C. Wall (Avon/Camelot, 1984, \$2.25, 80 pages, paperback). This is a straightforward reference book and complete guide to computer terms for children grades 4 and up.

For younger children, I'd recommend *The Computer Alphabet Book* by Elizabeth S. Wall (Avon/Camelot, 1984, \$2.25, unpagged).

This is a sprightly little book designed to be used by beginning readers in 1st, 2nd, and 3rd grade, and to be read by parents to younger children. When you browse through the book, you see that on the left side you have a big letter of the alphabet, followed by a computer term and a brief explanation. On the right side (on the facing page) is a cartoon of a silly, Snoopy-like dog learning about computers.

This book has a laudable, secondary purpose. As parents read it to their children, they may also be acquiring a painless dose of computer literacy themselves, including information about the computer's memory, programming languages, computer parts, computer applications, and fundamentals about how people actually use computers. If you find other computer manuals too scary and technical, then this is the book for you.

A companion package to Wall's *Alphabet Book*, or a possible alternative, is a book/software package, *Qwerty's Alphabet Adventure* by Shadow Lawn Press (Hayden, 1984, \$19.95, 4-color unpagged book, Commodore 64 diskette).

Qwerty is a cute little caterpillar who takes your child on a journey through the letters of the alphabet. The pictures on the computer screen are extremely simple, but the Qwerty character and the illustrations in the Qwerty book compare favorably with other alphabet books for children.

I like Elizabeth Wall's *Alphabet Book* and *Qwerty's Adventure* because picturebooks, stories, and cartoon characters are a familiar and comfortable way for young children and their parents to begin learning about computers. In addition, the Qwerty package combines storytelling and books with a hands-on introduction to the computer keyboard.

Puzzles And Adventures

Computers can act like workhorses and number crunchers, but they can also stimulate our imagination, and help strengthen our thinking skills. I welcome any books and programs that open up this dimension of computers to new users—especially children.

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The Commodore Puzzle Book: BASIC Brainteasers by Gordon Lee and Nevin B. Scrimshaw (Birkhauser, 1983, \$7.95, 125 pages, paperback) and *At the Heart of the Mountain: A BASIC Adventure for the Commodore 64* (Birkhauser, 1984, \$9.95, 170 pages) are two good books that emphasize using the computer to strengthen your thinking skills and your imagination.

The *Puzzle Book* is filled with 50 brainteasers and their answers (at the back of the book). The book gives various programming solutions to the puzzles and emphasizes that there are many different ways to write a program that solves a problem.

In *Heart of the Mountain*, you spend an adventurous summer with Erin in the White Mountains of New Hampshire and learn about the Commodore 64 along the way.

Heart and the *Puzzle Book* are for children ages 10 and up. If your children are younger, you might look into the *Micro Adventure Series* from Scholastic. The first book in the series, *Space Attack* by Eileen Buckholtz and Ruth Glick (Scholastic, 1984, \$1.95, 123 pages) lets your children use their computer to decode alien messages and become a member of ACT (the Action Computer Team). On the way they enter, use, and modify eight computer programs written in BASIC.

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In another book, *BASIC FUN with Adventure Games* by Susan Drake Lipscomb and Margaret Ann Zuanich (Avon/ Camelot, 1984, \$2.95, 96 pages), children get to go on a spy mission using their computer. Then they get to devise an adventure game of their own. The book teaches them how to construct a plot, define the solution, and determine all the obstacles and hazards that the gameplayer must face. Then it shows them how to translate their ideas into a BASIC program.

For older members of the family—teens and adults—you might want to look at *The Book of Adventure Games* by Kim Schuette (The Arrays, Inc., 1984, \$19.95, 341 pages oversized). This book is a bargain if you and your family spend your computer time wandering through mazes, dungeons, and caves in adventure games. It's a reference book full of evaluations, maps, illustrations, and clues for over 75 of the most popular games. The book takes the frustration—not the challenge—out of computer adventure games.

Armchair Computer Literacy

As we all know, computer literacy is more than learning about bits and bytes. To become truly literate about computers we need to be able to step back and look at them from a distance and try to assess the impact they are having on our world.

Three books that attempt to do this take very different vantage points and, hence, complement each other nicely.

Patricia Marks Greenfield, in *Mind and Media* (Harvard University Press, 1984, \$4.95, 210 pages, index, paperback) tries to assess the effects of television, video games, and computers on children. Anxious parents and teachers, concerned with their children's social and intellectual development, will find lots of fresh ideas in this book.

Glenn M. Kleiman, in *Brave New Schools* (Reston, 1984, \$14.95, 207 pages, index, paperback) takes a close look at the computer in the classroom and at the many ways it can be used as a valuable learning tool. If you are wondering what your kids are doing with computers in school—or what they *ought* to be doing—you should read Kleiman's book.

Last, Sherry Turkle, in *The Second Self: Computers and the Human Spirit* (Simon & Schuster, 1984, \$17.95, 362 pages, index, hardcover), looks at the way computers affect the way we think—especially the way we think about ourselves. Turkle spent four years investigating the influence computers have on the psychology and development of preschoolers, elementary-age children, and teenagers. According to Turkle, the question is not what will the computer be like in the future, but what will *we* be like?

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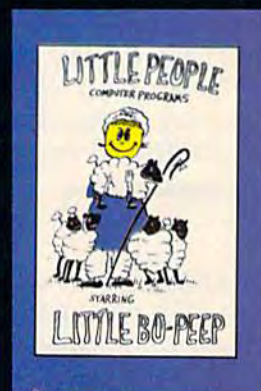
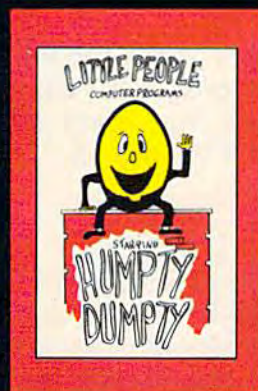


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Budgeteer

Robert M. Pineau

This handy money manager will help you keep your checkbook and your budget balanced. For disk or tape users. Versions are included for the VIC and 64.

Did you ever wonder about the most manageable way to break down your paycheck to an assortment of categories? How much can I save this month? How much should I pay on my charge accounts? "Budgeteer" provides an easy way to help you manage your money. It will keep a record of your checkbook balance and allocate the balance among ten accounts:

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3. INSURance
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6. VACAtion
7. MEDICal
8. BOOK (subscriptions or entertainment)
9. CHGE (store charge account)
10. MISCellaneous

The total balance is kept in a separate account, CHBK.

Start With The Date

Budgeteer first asks you for the current date. Your input may be in just about any format you wish: July 4 1984; Jul. 4 1984; 7-4-84; or 7/4/84. The date format, however, must not contain commas unless the entire date is enclosed in quotes. In the INPUT statement, commas are reserved to separate variables.

After a brief pause, the program asks you to insert your data tape or disk. If you keep your data files on a separate tape or disk from programs, then there's no danger of data files overwriting your programs or vice versa. When the program continues, it will then read the account balances written during the previous session.

The very first time you run the program you'll need to establish zero balances for all the

accounts, since a data file does not yet exist. When the program asks you to insert the data tape or disk, press RUN/STOP-RESTORE and add the following temporary extra program line:

```
24 GOTO 40 (VIC version)
260 GOTO 360 (64 version)
```

This causes the program to skip the read routine. This feature is also useful when the balances recorded in CHBKFILE are outdated and need to be erased. Remember to delete this line when the account is established.

Plenty Of Prompts

The program provides visual and audio prompts along the way. When you want a transaction, the choice is between making a deposit, writing a check, or transferring funds between accounts. A deposit is credited to the MISCellaneous account as well as added to the CHBK balance. When you write a check, enter the amount followed by the number of the account from which the money will come. For temporary convenience, individual account balances may be negative. Negative balances are corrected by transferring money from an account which has ample funds, usually the miscellaneous account, where deposits are credited.

The input to be made for each transaction and the required order with quantities separated by commas are:

- amount when making a deposit
- amount from account # when writing a check
- amount from account #, to account # when transferring funds.

There are built-in safeguards against some possible errors. Checks written for the wrong amount must be corrected by writing an extra check if the first was too small, or by redepositing the check amount before writing a smaller check if the first was too large. If errors cannot be readily corrected by depositing extra money, writing extra checks, or transferring between accounts, you should stop the program, type the extra GOTO line (as mentioned before), and start again with zero balances.

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Tracking The Cash Flow

The amount of the last transaction is displayed at the top of the table of balances. An asterisk identifies the two accounts involved in the last transaction. After your final transaction, a response of N to the TRANSACTION? query will cause your updated CHBKFILE balance file to be recorded for the next session. If you are using tape, there will be a pause for you to rewind the cassette if you have not already done so. After writing the new file, you get a final display of balances and the number of transactions executed replacing the amount of the last transaction.

VIC Instructions

The VIC version has no POKES to screen or color memory, so it will run with any or no expansion.

After running the instructions (Program 1), you have the option of repeating them if you wish. When you are finished with the instructions, the main program (Program 2) is loaded and starts running automatically. The program can be used with either tape or disk.

For the load-and-run feature to work properly, Program 2 must be saved with the filename B2. Tape users should save Program 2 immediately following Program 1 on the same tape. To modify Program 1 to work with disk, change the ,1 in line 118 to ,8. Program 2 will work with either tape or disk, depending on the value of X in line 2. If X=0, Program 2 will read and write the data file CHBKFILE on cassette; X=1 directs the program to read and write on disk.

64 Specifics

The 64 version (Program 3) operates in the same manner as the VIC version. You can select between tape and disk filing by changing the value of X in line 100 (0 for tape, 1 for disk). See program listing on page 189. ☐

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BASIC Magic

Michael S. Tomczyk

The Four Most Important BASIC Commands

Did you ever think to yourself, "There must be some shortcuts in BASIC programming that'll let me get started sooner?" After all, young children don't have to learn the whole dictionary before they start talking. Most kids communicate quite well with just a few words. BASIC is no different. You can write some very sophisticated programs with just a few commands.

In BASIC, there are four special commands that form the basis for the entire language: PRINT, GOTO, FOR-NEXT, and INPUT. I call them the "four sizzlers" because they're the four most important BASIC commands in computing. Note that all our examples work on your Commodore 64 or VIC-20, as well as the Commodore 16 and Plus/4.

A Review Of The PRINT Command

Last month, we introduced the PRINT command, so we'll start with a very brief review of PRINT and launch right into the next three commands.

The PRINT statement has more uses than any other command. Here's a quick review of the most common uses. To try the examples, just type the PRINT command exactly as shown and press RETURN after each line to execute the command:

Note: Refer to the article "How To Type In COMPUTE!'s GAZETTE Programs" if you do not understand how to type the characters in braces ({ }).

The GOTO Command

Whenever you type RUN, your computer starts at the lowest numbered line and continues line by line to the highest. The GOTO command tells the computer to GO TO another line in the BASIC program, to break out of the usual pattern. The most common example looks something like this:

```
10 PRINT "BASIC MAGIC "  
20 GOTO 10
```

This two-line program displays the same message over and over again, in a vertical column. To see how it works, type both lines as shown, then type RUN and press RETURN. To stop the program, press RUN/STOP.

If we add a semicolon (;) at the end of line 10, the messages will display horizontally instead of vertically. To make this change, type the word LIST and press RETURN, then move the cursor to the end of line 10 and type a semicolon, like this:

```
10 PRINT "BASIC MAGIC";
```

You could retype the line if you like, but with Commodore's on-screen editing you can just list

Uses Of The PRINT Command

Display messages
Display graphics
Display reverse characters
Calculate numbers
Change character colors
Clear (erase) the screen
Move the cursor "home"
Set position on the screen
(Use with cursor keys or
the TAB or SPC commands)
PRINT blank rows
Calculate and PRINT variables

Examples

```
PRINT "E.T. COME HOME "  
PRINT "QQQQQQQQQQ "  
PRINT "{RVS}HI{OFF} BYE "  
PRINT (5+15)*(7-2)  
PRINT "{GRN}THIS IS GREEN "  
PRINT "{CLR} NEW MESSAGE "  
PRINT "{HOME}THIS IS THE HOME POSITION "  
PRINT TAB(155)"HELLO "  
PRINT SPC(40)"HELLO "  
PRINT "{2 RIGHT} HI{2 SPACES} "  
PRINT "ROW1":PRINT:PRINT "ROW3 "  
X=170:PRINTX  
X=170:PRINTX+5
```


(A subtle merchandising ploy)

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the line, make the change, and press RETURN. Line 20 stays the same. Now, cursor down to a blank area of the screen (past line 20) and type RUN and press RETURN. Oops—the message is moving a little too fast. How do we slow it down? We'll use our next command, the FOR-NEXT loop.

The FOR-NEXT loop is a two-part command which lets you do two things: create time delays and repeat actions. A time delay slows down any activity in a program—for example, when you want to print a message and leave it on the screen for a few seconds. Repeating actions is the second major function of the FOR-NEXT loop, but first let's see how the time delay works.

A FOR-NEXT delay loop tells the computer to stop where it is and count to some number (one that you choose) before going on to the next part of your program. You can insert this line almost anywhere when you want to slow things down. Here's what it looks like:

```
FOR T=1 TO 500:NEXT
```

The key number here is 500, because that's how far the computer counts before going on. If you make this number smaller, the delay is shorter and the program moves faster. If you make it higher, the delay is longer and the program moves more slowly. The variable T can be any other letter of the alphabet (we'll use T here to stand for Time). The word NEXT tells the computer to go on to the next number.

Let's slow down the GOTO example we just typed in the previous program. We'll do this by adding a FOR-NEXT loop just after the PRINT message. This will make the computer display the message, then count to 500 before going on. Enter the line shown below. (First, type LIST and press RETURN to see our original program.) To see what it does, type RUN and press RETURN:

```
15 FOR T=1 TO 500:NEXT
```

Presto! The program runs slower. To see how different numbers change the speed, LIST your program and change the 500 in line 15 to a larger or smaller number.

Two Flashing Messages

Here's another example. Type NEW and press RETURN, then enter this program:

```
10 PRINT"{CLR} WELCOME TO"  
20 PRINT"{CLR} BASIC MAGIC"  
30 GOTO 10
```

After entering, cursor down past line 30 and type RUN.

Too fast, right? To slow down this program, we need *two* delay loops—one after each message. First, press RUN/STOP, then type LIST. Now enter these two lines:

```
15 FOR T=1 TO 700:NEXT  
25 FOR T=1 TO 700:NEXT
```

Here's a timesaving tip: Since the lines are identical (except for the line number), you can type all of line 15, press RETURN, and then cursor up and change the 15 to a 25, and press RETURN.

Now LIST your program again. Notice that the computer has automatically inserted line 15 between lines 10 and 20, and line 25 between lines 20 and 30. Your new program should look like this:

```
10 PRINT"{CLR} WELCOME TO"  
15 FOR T=1 TO 700:NEXT  
20 PRINT"{CLR} BASIC MAGIC"  
25 FOR T=1 TO 700:NEXT  
30 GOTO 10
```

Type RUN and press RETURN to see a new and slower program. You can use this little program to flash a message or title at the top of the screen. But what if you wanted to flash the message just a certain number of times—eight times, for instance?

Using FOR-NEXT To Repeat Actions

The most important use of the FOR-NEXT loop is to repeat actions in your program. To repeat an action, simply put the FOR part of the loop at the *beginning* of the action, and put the word NEXT at the *end* of the action, like this:

```
FOR X=1 TO 8:(THE ACTION YOU WANT TO REPEAT):NEXT
```

The computer will repeat everything between the FOR part of the command and the word NEXT. The numbers 1-8 mean the action will be repeated 8 times. (The computer is counting again, just like in our time loops.) Of course, you can use any number in place of the 8, depending on how often you want to repeat the action. The variable X, like the variable T in our previous example, can be any letter of the alphabet. If you use more than one repeat-action loop in a program, you should use different variable letters for each loop.

To make our blinking message flash eight times, we put the first part of the loop in front of the actions we want to repeat, and the word NEXT at the end. Note that we don't need the GOTO command here because we don't have to "go back" to repeat the action. The FOR-NEXT loop *surrounds* the action and makes it repeat. To see how this works, let's edit our previous program by adding line 5 and retyping line 30. The new program looks like this:

```
5 FOR X=1 TO 8  
10 PRINT"{CLR} WELCOME TO"  
15 FOR T=1 TO 700:NEXT
```


[OH NO, NOT AGAIN.]

SON of ARCHON.

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The Archon Basilisk.

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Jon Freeman, Paul Reiche III and Anne Westfall created *Archon*, the 1983 "Game of the Year" according to *Softline* and *Creative Computing*. Recent evidence, however, indicates they were not satisfied with this.

Now for the third question. Why a sequel? Well, there are sequels and there are sequels. The good ones happen because people just haven't had enough of a good thing. Obviously we're here to tell you that *Archon II: ADEPT* falls into the right category.



The ADEPT Chimera.

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The ADEPT Thunderbird.

and Water. The role of magic is greater. The strategies are deeper. Things move faster. And the hidden algorithms that control the computer's play are considerably smarter.

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And if, by some strange chance, there is a parallel universe in which computer simulations come to life, we are confident that a large part of its population has Jon Freeman, Paul Reiche III and Anne Westfall to thank for their brief and miserable existence.



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```

20 PRINT"[CLR] BASIC MAGIC"
25 FOR T=1 TO 700:NEXT
30 NEXT

```

Type RUN, press RETURN, and the message will blink eight times. Notice that we have both PRINT statements *and* time delay loops between the FOR and the NEXT in our repeat-action loop. Yes, you can put loops inside of loops. Anything you put between the FOR and NEXT will be repeated: a sound effect, a graphics symbol, or a programming action. Loops can be tricky, though. Just remember that your loop has to completely surround the action(s) you want to repeat.

You can also use the FOR-NEXT command to repeat a graphics symbol to make a border, a design, or to draw a line, like this:

```
FOR X=1 TO 22:PRINT"␣";:NEXT
```

In this line, the action between the FOR and the NEXT is repeated 22 times—in other words, the horizontal line graphics symbol is printed 22 times. Let's see how we could use this in a BASIC program. Type NEW and press RETURN, then enter this short program, which demonstrates how to make a title with a line under it:

```

10 PRINT"[CLR]BASIC MAGIC:4 COMMANDS"
20 FOR X=1 TO 22:PRINT"␣";:NEXT

```

If you have a 40-column computer (such as the Commodore 64) and you want the line to go all the way across the screen, change the 22 to a 40. And if you're wondering why we put the semicolon in line 20, that's so the graphics line characters all print next to each other across the screen. If you remove the semicolon, you'll get 22 short lines running down the screen.

A Flashing Title

Now that we know how to slow down our BASIC programs, and how to repeat actions using the FOR-NEXT loop, let's try something a little fancier. First, we'll see how to make a long message appear on the screen and keep repeating using the GOTO command. Then we'll see how to make the message repeat five times and stop. Type NEW and press RETURN to erase the last program and type in this program exactly as shown:

```

10 PRINT"[CLR]"
20 PRINTTAB(92)"BASIC MAGIC"
30 FOR T=1 TO 700:NEXT
40 PRINTTAB(92)"TEACHES YOU"
50 FOR T=1 TO 700:NEXT
60 PRINTTAB(92)"EASY COMPUTING"
70 FOR T=1 TO 700:NEXT
80 PRINT"[CLR]":FOR T=1 TO 700:NEXT
90 GOTO 20

```

Type RUN and press RETURN. Now let's take a look at how this program works, line by line.

Line 10 prints the CLEAR character, which clears the screen.

Line 20 introduces the TAB command, which is used to position information on the screen. PRINT TAB(92) "BASIC MAGIC" tells the computer to "tab" over 92 spaces from the top lefthand corner of the screen, then print the message. Notice that the tab portion of the line is outside the quotation marks but is still a part of the PRINT statement.

Line 30 is a time delay loop that leaves the first message (BASIC MAGIC) on the screen while the computer counts to 700 before continuing.

Line 40 moves one line below the BASIC MAGIC line, then tabs over 92 spaces from the left edge of the screen, and prints the next message (TEACHES YOU).

Line 50 is another time delay loop, identical to line 30, that makes the computer wait a few seconds before moving on to print the next message.

Line 60 is another TAB and PRINT combination which positions and displays the final portion of our message (EASY COMPUTING).

Line 70 is another time delay loop, again, identical to line 30.

Line 80 is interesting. It clears the screen, then uses a time delay loop to leave the screen blank for a count of 700. Notice that you have to use a colon (:) to separate commands when you use more than one on the same program line like we did here.

Line 90 is our old friend the GOTO command. This tells the computer to go back to line 20 and print the messages all over again. Notice we don't have to GOTO line 10 and clear the screen because we already took care of that in line 80: We can go directly to line 20.

There's only one thing wrong with this program. The GOTO command traps you in an endless loop. It keeps going and going and going. What if you want to go on to something else in your program?

If we use the FOR-NEXT command to repeat the title five times, the computer will automatically go on to the next part of the program after the title is displayed the fifth time. To change our title program, we just have to include a new line 5, retype line 90, and add line 95. Here's how the modified program should look:

```

5 FOR X=1 TO 5
10 PRINT"[CLR]"
20 PRINTTAB(92)"BASIC MAGIC"
30 FOR T=1 TO 700:NEXT
40 PRINTTAB(92)"TEACHES YOU"
50 FOR T=1 TO 700:NEXT
60 PRINTTAB(92)"EASY COMPUTING"
70 FOR T=1 TO 700:NEXT
80 PRINT"[CLR]":FOR T=1 TO 700:NEXT

```


["Hi, we're from Europe. Where's the gold?"]

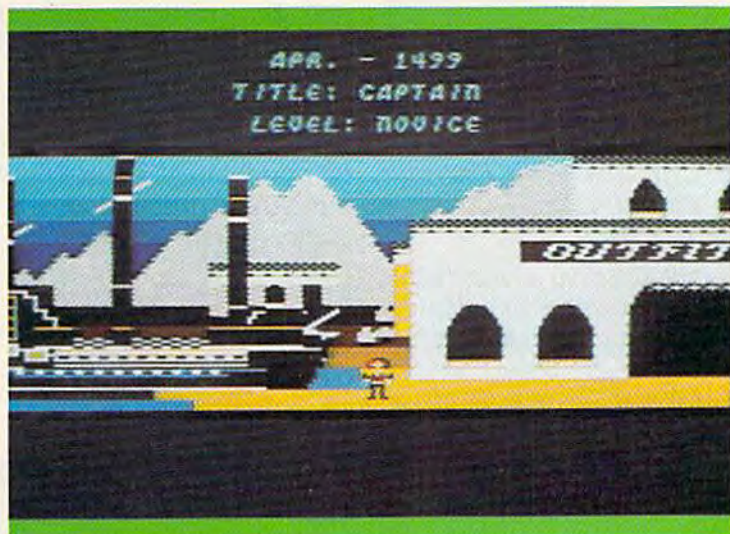
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Home again you view your maps, pat yourself on the back, and consider your place in history.

the way seasons change and your men behave, and the way your reputation precedes you gives you a sort of feeling that's unexpected in computer games. It's deeper. Maybe a little disquieting. It plays as much in your head as it does inside your computer.

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90 NEXT

95 PRINT "{CLR} THE REST OF YOUR PROGRAM GOES HERE"

Try experimenting with your own messages, or print some graphics designs instead of words. You might also want to experiment with the TAB command to position your messages in different places on the screen.

REM: The TAB command is used with the PRINT statement to position information on the screen or on your printer. You can tab from 1 to 255 spaces, but if you want to tab farther than that, you'll need to combine two TAB commands next to each other like this:

```
PRINTTAB(255)TAB(20)"HELLO"
```

The SPACE command, abbreviated SPC, works the same way except instead of tabbing over to a column position, the computer inserts the number of spaces shown in parentheses:

```
PRINTSPC(20)"20 SPACES"
```

Many programmers use the TAB and SPC commands as a shortcut to position characters on the screen. It's a lot easier and faster than trying to print a number of cursor-right and cursor-down commands, which is the other method of positioning.

A Peek At Variables

Variables are shortcut alphabetic codes which are used in BASIC programs to stand for numbers, words, or graphics characters. There are two types: numeric variables and string variables.

Numeric variables are used to represent numbers. The number can be a fraction (.5), a large number (99,589,870), or even a negative number (-15). The name of the variable can be a single letter, such as A, B, C, D; two letters, such as AB, QR, ZZ; or a letter and a number, such as H5, H6, J1. Note that the first character of a variable is always a letter from A-Z and the second has to be a letter or a number. You can use longer variable names if you like, but your computer looks only at the first two characters. So if you use one variable called HIGH and another called HIT, your computer will think they are the same (HI).

String variables represent words, letters, sentences, and graphics characters. Their names are similar to numeric variables (the first character is a letter, the second is a letter or number), but they are always followed by a dollar sign (\$). Here are a few examples: A\$, B\$, C\$, PQ\$, HH\$, F1\$, F2\$, G9\$. String variables are easy to remember because the dollar sign looks like the letter S for "string."

There is also a special kind of numeric variable called an integer variable (A%, for example) which is limited to whole numbers. But we won't

deal with that quite yet.

In BASIC programming, variables are substituted for words, phrases, and numbers because they are a faster, easier way to work with information. They're especially good in calculations and in the INPUT statements we'll see in a moment.

When you type RUN, all the variables are emptied out. Numeric variables are set to equal zero and string variables are set to a null (nothing) string. FOR-NEXT loops can put values into variables (as we've seen above). Or you can assign a value using the LET command. If you tell the computer LET A=5, you're saying from now on you want the variable A to hold the value 5. But LET is optional as you see here:

```
A=192:PRINT A
```

(PRINTA is the same as PRINT192)

```
A=2:B=3:PRINT A+B
```

(PRINTA+B is the same as PRINT2+3)
(R=R+1 is the same as R=1+1)

```
R=1:PRINT R:R=R+1:PRINT R
```

```
C$="MESSAGE":PRINT C$
```

(PRINTC\$ is the same as PRINT"MESSAGE")

The INPUT Command

The INPUT command can make your computer seem like it's intelligent. This command lets the computer ask questions and then respond to the answers you type in from the keyboard.

Here's an idea for a program to show how the INPUT command works:

1. Clear the screen
2. Print a prompt message (a question or instruction)
3. Type the INPUT command with a numeric or string variable
4. Process the information that was INPUT

Let's take a look at a short program that uses this format. Type NEW and press RETURN, then enter this program:

```
10 PRINT "{CLR}"
20 PRINT "PLEASE TYPE YOUR NAME AND PRESS {SPACE}RETURN"
30 INPUT N$
40 PRINT "{CLR} HELLO, "N$" ...HOW ARE YOU?"
50 FOR T=1 TO 1500:NEXT
60 FOR X=1 TO 100:PRINTN$" IS A NICE NAME I":NEXT
```

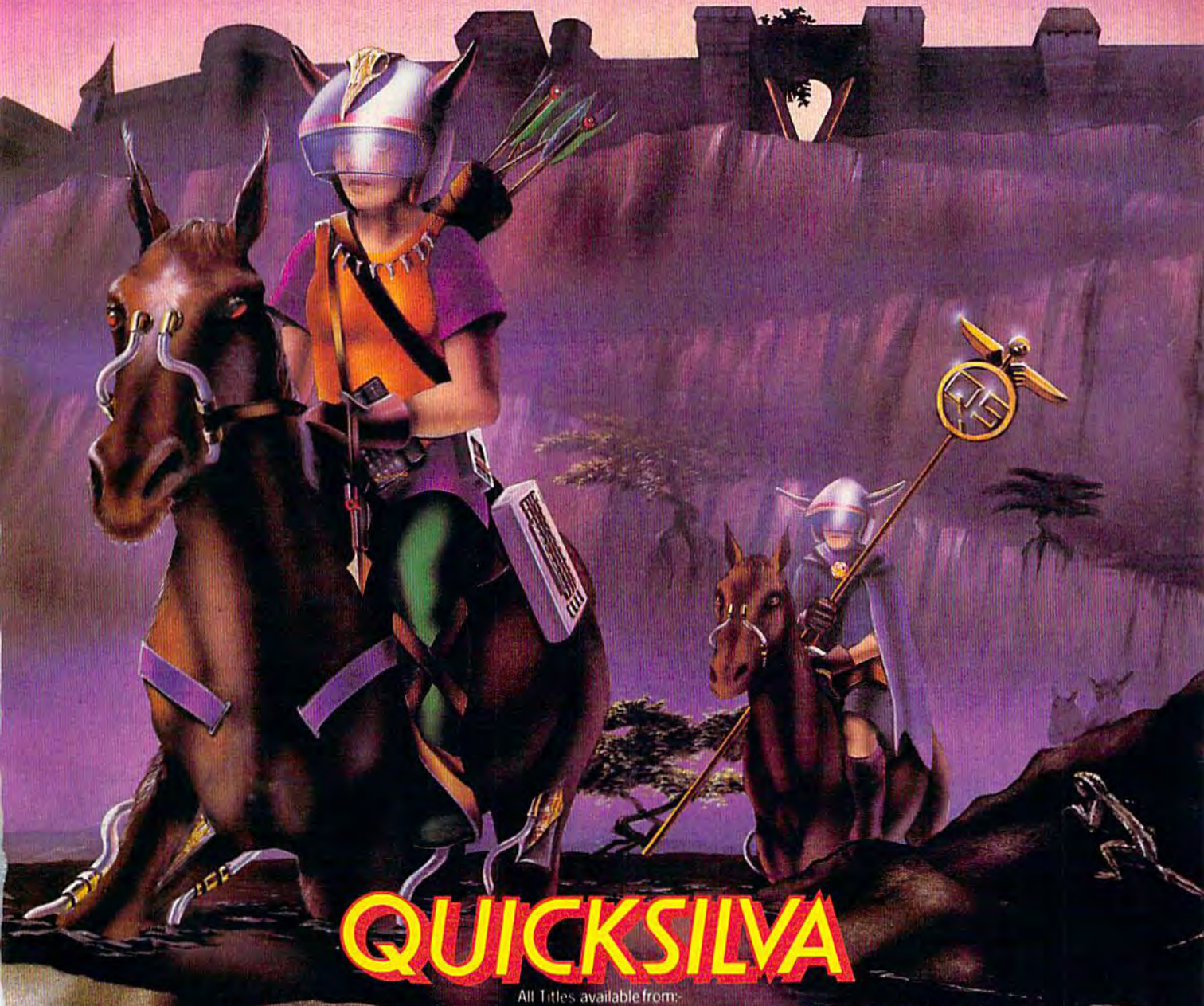
Type RUN and press RETURN. Follow the instructions on the screen and you'll see that you've just taught your computer to recognize your name. Here's a line-by-line explanation of how the program works:

Line 10 clears the screen.

Line 20 prints a message, asking the user to type his or her name.

Line 30 contains the INPUT command, which makes the computer automatically display a question mark (also called a prompt) and wait

A STEP BEYOND.



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until you type your name. When you type your name and press RETURN, the computer assigns your name to the variable N\$. From now on, any time the variable N\$ appears in this program, it's the same as using your name.

Line 40 clears the screen and prints a message containing your name. The word "HELLO" is printed *inside* quotation marks, then the variable N\$ (which is already defined as your name) is *outside* quotation marks, and the rest of the message "...HOW ARE YOU?" is *inside* quotation marks. This is a little clumsy, but it's necessary because words are always printed inside quotation marks and variables are always used outside quotation marks.

Line 50 is a time delay loop which leaves the HOW ARE YOU message on the screen for a count of 1500.

Line 60 is a repeat-action loop, which prints another message, using your name, 100 times. Again, the N\$ variable (your name) is outside quotation marks and the message itself is inside quotes.

The Magic Adding Machine

Let's try another example. This time we'll use numbers. We'll call this the "magic adding machine" because it lets you enter two numbers, then automatically gives you the answer. Because this example uses numbers instead of words, the INPUT variables will be *numeric variables* (no dollar sign) instead of string variables.

```
10 PRINT "{CLR}MAGIC ADDING MACHINE"  
20 FOR X=1 TO 20:PRINT"D";:NEXT  
25 FOR T=1 TO 1500:NEXT  
30 PRINT "{CLR}ENTER TWO NUMBERS AND PRESS  
RETURN AFTER EACH NUMBER"  
40 INPUT A  
50 INPUT B  
60 PRINT A"PLUS"B"EQUALS"A+B
```

Type RUN and press RETURN, then type in two numbers as requested and watch the magic adding machine work. By changing line 60 slightly, this can also be a magic multiplication, subtraction or division machine. Here's how it works:

Line 10 clears the screen and prints the opening title.

Line 20 is a repeat-action loop that draws a 20-column line across the screen under the title. Again, the semicolon makes the lines print across the screen (instead of vertically).

Line 25 is a time-delay loop that leaves the title on the screen a few seconds.

Line 30 clears the screen again and prints the prompt message, which tells you what to do—in this case, enter two numbers and press RETURN after each entry. (Prompt messages are very important. Don't assume that users will know they're supposed to press RETURN after

typing.)

Line 40 is the INPUT for the first number, which we'll call A. A is a numeric variable and from now on A stands for the first number typed in by the user.

Line 50 is the INPUT for the second number, which we'll call B. B now stands for that number.

Line 60 uses the two numbers (A and B) in a PRINT statement. First, the variable A is printed, followed by the word "PLUS". Then the variable B is printed, followed by the word "EQUALS". Next, a calculation is printed (A+B) and the computer displays the answer. All of this information is included in the same PRINT statement, but the variables A and B and the calculation A+B are printed *outside* quotation marks.

Remember: Numbers, numeric variables and calculations are always printed outside the quotation marks, so if you want to mix words and numbers or calculations as we did in this example, you'll have to pop in and out of quotation marks.

If you want to try a different type of calculation, such as a Magic Multiply Machine, you'd change the title in line 10, and change line 60 to:

```
60 PRINT A"TIMES"B"EQUALS"A*B
```

The asterisk (*) is used to multiply in BASIC because the normal multiplication sign (X) is too easily confused with the letter X and the X-shaped graphics symbol.

The Magic Nonsense Story

Our last example is a silly little nonsense story. You make your own story by filling in the words and numbers. You can probably think of some longer examples to try, but here's a short program to get you started:

```
10 PRINT "{CLR}TYPE A NUMBER 1 TO 12 AND P  
RESS RETURN":INPUT N  
20 PRINT "{CLR}ENTER A NOUN AND PRESS RETU  
RN":INPUT N$  
30 PRINT "{CLR}ENTER A VERB AND PRESS RETU  
RN":INPUT V$  
40 PRINT "{CLR}ENTER AN ADJECTIVE AND PRES  
S RETURN":INPUT A$  
50 PRINT "{CLR}IT WAS"N"O'CLOCK AND THE "A  
$" "N$" WAS "V$"ING ALL OVER THE PLACE  
!"
```

Type RUN and press RETURN, then answer the questions and read the one-line "story."

The only tricky part in typing in the program is inserting spaces in the right places so the sentence looks right when it's printed. Note the spaces in line 50. They're important because they make the sentence read correctly.

Until next month, practice with these commands and techniques. You'll find there's a lot you can do with these four important BASIC commands. ☛

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Changes

The Honeywell Commodore Users Club has a new president and address. The club can be reached care of Art Witbeck, Honeywell Inc., Marine Systems Division, 5303 Shilshole Ave. NW, Seattle, WA 98107.

The Corpus Christi Commodores have a new phone number, (512) 852-4426. Bob McKelvy is the contact person.

University VIC-Commodore User Support System also has a new contact person, D. Wade, who can be reached at (216) 673-9261.

Correspondence for Computer Operators (C.O.M.P.) should be sent to Brian Pringle, president, at 7514 Puttgutt Road, Richmond, MI 48062. The phone number is (313) 329-2625.

The Silver State Commodore Users Group has a new address: P.O. Box 81075, Las Vegas, NV 89180.

The phone number for the WICOMICO C64 Club is (301) 749-3573.

Southern Maine 64 Users Group has a new address: Edward Moore, 9 Lynda Road, Portland, ME 04103.

Ark-La-Tex Commodore 64 Club has a new president and address. Correspondence should be sent in care of Bill Walker, 5515 Fairfax, Shreveport, LA 71108. The phone number is (318) 636-3611.

The National Science Clubs of America/Commodore User Division is no longer in existence.

The new address and contact person for 64-B.U.G. (Boise User's Group), is Cheryl Ohnsman, 403 Thatcher St., Boise, ID 83702.

The Calgary Commodore Users Group has a new president and mailing address: Lloyd E. Norman, 810 Canfield Way SW, Calgary, Alberta, T2W 1K1, Canada.

The Commodore VIC-20 user group of Malden, MA, is now the Commodore Users Group of the Boston Area (CUGOBA). The Commodore 64 has been added as an area of interest. The club can be contacted through Patrick Rooney, 63 Whitman St., Malden, MA 02148.

The new address for the Bay Commodore Users' Group is P.O. Box 3187, Panama City, FL 32401.

The Fire 10 VIC User Group of Portland, OR, has reorganized and is no longer in existence. A new club in Portland is Rose City C-64 Club, Gary Getch, 5830 SW Kelly, Portland, OR 97201.

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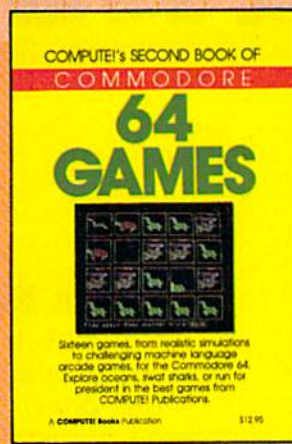


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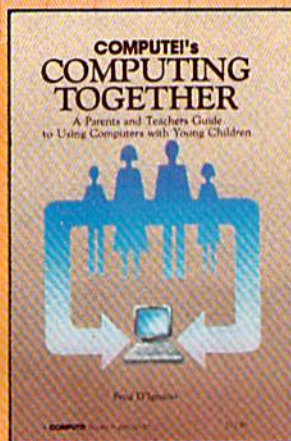


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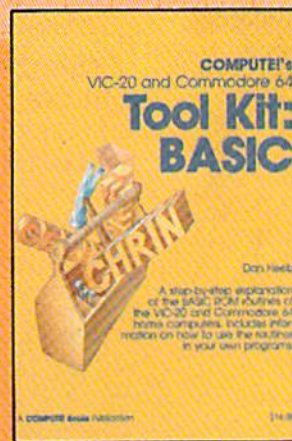


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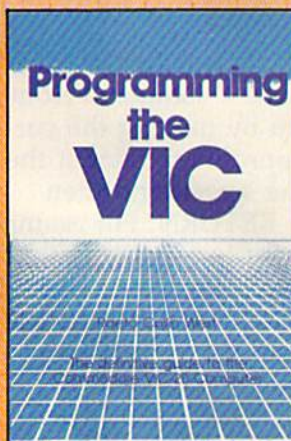


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REVIEWS

EasyDisk

Harvey B. Herman,
Associate Editor

The Commodore 1541 disk drive is a "smart" peripheral. It has its own microprocessor and the Disk Operating System (DOS) is permanently installed in the 1541's memory. Some computers require that a memory reducing program be loaded into the computer before normal disk operations are possible. Not so the 64/1541 combination. Internally, the 1541 contains a sophisticated and unique operating system which requires no additional programming effort from the 64. You can load or save BASIC programs, and interact with the disk drive as soon as the system is turned on.

As you might expect, there is a catch. The disk commands can be clumsy and non-intuitive. They are easy to forget if you haven't used them in a while. Years ago, when the PET disk first came out (with the same disk commands), I purchased an off-brand disk drive, rather than learning the following:

```
open 15,8,15
print#15,"rO:newname=old
name"
close 15
```

I am reminded of the times when I see beginners gnashing their teeth. It's not easy to explain the RENAME command (or any of the others) to someone who has recently taken their first computer out of the box.

All Is Not Lost

Several better ways are now available to interact with the disk drive. The Wedge, included on the demonstration disk that comes with a new 1541, is a good example. Using the Wedge considerably shortens the above rename sequence to:

```
>rO:newname=oldname
```

This program surely has been a boon to beginners. However, you still must remember the awkward syntax and be aware of the published tricks which allow the wedge to be saved on another disk.

SOS For DOS

EasyDisk, supplied on a protected disk (no backups allowed), is an inexpensive aid for befuddled disk beginners. I was in that category at one point, and I would have welcomed this program then. To quote the 11-page manual, "If you've ever had trouble remembering or using the Commodore 64's disk drive commands, then you'll be glad you have *EasyDisk*." I concur.

Here's what you see when you load and run *EasyDisk* with your 1541 disk drive:

EASYDISK BY D. POHORYLES (C) 1984				
LOAD	VIEW	REPLACE	PRINT	SAVE
VERIFY	BACKUP	RENAME	DELETE	COMBINE
RESTART	VALIDAT	NEWDISK		
Diskname				Blocks free
Directory Entries				
F1: HELP	F3: NEXT	F5: PREV	F7: CANCEL	
F2: BASIC	F4: SETUP	F6: OPTIONS		

My favorite method for renaming is contained in BASIC 4.0, which was developed for the PET/CBM a number of years ago. It was designed to help the user with disk commands. The RENAME command is intuitive in this version of BASIC:

```
rename "oldname" to "newname"
```

A few companies are now offering BASIC 4.0 for the Commodore 64, but I wouldn't recommend this approach to everyone—the additional hardware is fairly expensive, and the interaction is still not really very friendly.

You choose a command from the menu by moving the cursor to the appropriate item at the top of the screen and then pressing RETURN. For example, if you want to rename a file on disk, put the cursor on the RENAME command. Press RETURN and move the cursor to the filename you want to change. Press RETURN and you will then be prompted for the new name. What could be simpler?

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Commands And Options

There are a total of 24 commands, including options. Space does not permit a complete discussion of each one, but two will serve as examples—loading a BASIC program and printing a disk file.

Let's say you've already loaded *EasyDisk* and want to load a BASIC program. First, you would insert the disk with the desired program, type D and press RETURN. *EasyDisk* is now running and you are looking at its menu of commands. Now, press f4 to display an alphabetized directory from the inserted

disk. (It is essential that you use the SETUP function, f4, whenever disks are changed.) Move the cursor to the LOAD command and press RETURN. Move the cursor to the program name which you wish to load and press RETURN. Exit to BASIC with f2. Your program is now ready to go. Re-entry to the *EasyDisk* menu can be done at any time by pressing D. Additional options are RELOCATE and APPEND, which allow you to load at another address and combine two BASIC programs, respectively.

If you have a Commodore 1525 (or compatible) printer, you can print program listings directly from a disk file. This procedure will not erase a BASIC program currently in memory. Enter the *EasyDisk* menu (again, with D). Press f4 if the listed program is on a new disk. Put the cursor on the PRINT command and press RETURN. Find the desired program in the directory and press RETURN. A listing will be sent to the printer. Options include FROM, UNTIL, and FROM-UNTIL, which print just a selected line range rather than the entire file. You may stop the printing at any time by pressing RUN/STOP.

EasyDisk is a fine program for beginners who have difficulty with disk commands. It simplifies the operation of the Commodore 1541 disk drive by presenting all the commands in an easy-to-follow menu. And it includes options not provided with the 1541 disk operating system.

On the negative side, a few minor points should be noted: The disk is copy-protected and only a 90-day warranty is

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Once installed, the 1541 FLASH! is transparent. Computer operations all remain unaffected as it speeds up every disk-related function. The FLASH! is a permanent installation with both a software (ROM) and a hardware component. Through keyboard commands or a hardware switch, you can even return to the old, slow loading method—if you really want to.

And there is nothing new to learn for the FLASH! No special tricks or

techniques. Once it's in, just watch it go.

But if you're really serious about programming, the 1541 FLASH! is a gold mine. The manual will show you how to write software allowing data transfer to and from the 1541 disk drive at speeds up to *10 times* the normal.

For programs that usually load with a “”, “8,1” command, just hit Shift/Run-Stop. A spreadsheet program like BUSICALC 3 then loads in about 25 seconds.

The 1541 FLASH! even adds 21 extra commands for the Commodore 64 user. Some of these include editing, programming and loading commands, as well as “DOS Wedge” commands. You can ignore all these commands, though, and just enjoy the rapid disk operations.

It wowed the crowd at the Computer Olympics. Once you see its sheer speed, you'll know why. Call its coach, Skyles Electric Works, to place your order or to get more info.

1541 FLASH!, an add-on assembly, for the Commodore 64/1541 costs only \$89.95.



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offered. Personally, I don't care to see so many leading zeros in listings. Also, there appears to be a minor bug in the VIEW command. Listings to the screen of lines greater than 80 characters can temporarily disturb the bottom list of function key options. However, this happens only rarely.

Overall, *EasyDisk* is a fine product, especially for those just getting started, and for those who find that the lack of "friendliness" is interfering with their enjoyment of the Commodore 64 and 1541 disk drive.

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MusiCalc

Arthur B. Hunkins

In SID (Sound Interface Device), the Commodore 64 has the most powerful built-in sound generating capability on the market today. With the advent of *MusiCalc*, SID now has a sophisticated, flexible, and open-ended software system that realizes the lion's share of its sound-generating capability. Together, SID and *MusiCalc* make an excellent performance package which will appeal not only to serious hobbyists, but also to some professionals. *MusiCalc* is far and away the best music performance software that I've seen for the 64.

All of which is not to say that *MusiCalc* is either accessible or easy to use. Quite the contrary; sophistication comes at the expense of approachability. Be prepared to spend *days* exploring the potential of this package. Above all, be sure to work through the three tutorials first. Otherwise, you may find yourself thoroughly lost and frustrated. It took me the first day to get any sound at all, even though I knew music was supposed to be playing. Once I got the volume turned up, it took me another day to get the music to stop—quite a different matter from turning down the level.

The problem is not with the documentation, which—though somewhat scattered—is very good and thorough. It's very important to follow the manual because nothing is obvious, and there are no HELP screens (except for *MusiCalc3*, which we'll look at later).

An Open-Ended System

MusiCalc is a disk-based system, and the *MusiCalc1* disk is the heart of the system (there's a lot of software on it). A color monitor is recommended, but not required, since many functions—such as mode and voice selection—involve color coding.

But the system is powerful because it's open-ended. It interfaces with a number of external supporting programs (furnished), as well as numerous data files, some included on the system disk, others available as extra-cost "templates"

(African/Latin Rhythm and Rock/New Wave are current titles.) And, of course, you make and store your own "songs" (compositions) along with up to 32 instruments to play them.

In addition to the master and template disks, there is another disk in the series, one capable of stand-alone operation: *MusiCalc3—Keyboard Maker*. This program turns the 64's keyboard into a one-voice musical instrument. The various files on the disk simply program the four rows of keys as four octaves (or more) of various scales. Its limitations are the single voice, the single staccato tone quality (one "instrument"), and distressingly slow keyboard response (you always have to think in advance of the sound). If you play too fast, some notes are skipped altogether. *MusiCalc3's* primary utility comes in furnishing scales to *MusiCalc1* in Keyboard mode.

It's difficult in a review of modest proportions to convey an adequate impression of the variety of *MusiCalc's* features. Clearly it was designed for future expansion: *MusiCalc4* will offer software and a keyboard; and *MusiCalc2: Scorewriter*, has been announced. The latter will allow music entered into *MusiCalc1* to be viewed or printed in actual notation, and—perhaps more importantly—will overcome the rather severe length limitations of *MusiCalc1* (16 × 15 total event/beats, each voice's pitch or rest counting as a separate event). *MusiCalc2* will extend compositional length by "chaining" several scores together.

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bask

A Programmable Synthesizer

MusiCalc1 is a combination of *electronic synthesizer*—a SID chip parameter programmer—and *digital sequencer*, a timer/gate/pitch programmer. It is a three-voiced instrument that can be programmed to create a wide variety of electronic sounds, and that will play a sequence of these sounds with rhythmically independent voices according to pitch information stored in the sequencer (the "score"). The three synthesizer voices thus perform the three lines of a programmed composition ("song") contained in a sequencer file.

One of the more noteworthy features of *MusiCalc*—either a strength or weakness depending on intended use—is its "looping"; voices never actually stop, they just link, backward or forward, from one point to another. All links are absolute; no conditions are allowed. Thus, a set of notes cannot be played just twice, for example.

Nor can several voices play the same passage, exiting at different points to different destinations. For any "jumping off point" there is only one destination. Each voice has its own set of links, but the options basically boil down to infinite repetition or composing out each recurrence.

This linking method should appeal to arrangers who work with simple patterns, particularly those who want SID to be an accompaniment or backup for improvised solos. Other applications include commer-

cials, background sound, and rhythmic music for dancing. It might also work well for composers of slow-moving, ostinato-based process music (manually varying parameters during performance, as described below). For more conventional composer/arrangers, the unconditional linking will seem more like a severe creative straightjacket.

It is possible, however, to program a composition to stop (or at least to seem to stop). The solution is to end each voice (they all loop independently) with a rest, and loop the rest back to itself. The only annoyance here is the clicking sound every time the sequence clock advances. (This click is soft, and is only noticeable when there is no sound.)



Visual Music

Each performance file contains 32 sets of instrument definitions and 32 scores; any score can be played by any of the 32 instrument combinations. The main *MusiCalc* display consists of a synthesizer panel with pots and switches on the left, and a 16 ×

15 sequencer grid (for notes and rests) on the right. (See the accompanying photograph.) When a score/instrument file is called up, you can see the synthesizer settings and observe the voices and notes stepping through their position stages while the piece is playing.

During performance, there are a number of real-time options that can be exercised manually: You can change instrument definitions, tempo, volume; you can stop, start, or reset any and all voices (combinations allow the voices to get out of sync, which lead to fascinating interactions); you can also silence one voice, substituting (optionally recording) the keyboard as the third voice while the other two accompany.

Notes may be recorded a voice at a time, either by the keyboard in real time, or step by step (note by note); or—more like traditional notation—using a note name/octave, matrix system (a "score screen"). Furthermore, any of the three methods may be used later to edit a score.

As mentioned earlier, score capacity is presently limited. The maximum number of event/beats that can be stored per composition is 16 × 15 (240), where each event is a single pitch. Each event, or sequence step, is set to the lowest common rhythmic denominator. In other words, if you want to have a sixteenth note anywhere in your piece, the rhythmic beats (steps) must all be sixteenth notes, and all rhythms must be multiples of sixteenth notes (no triplets). Fast notes

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mean short pieces.

The tempo, along with all aspects of sound—instrument definitions, volume levels—are preset, and cannot be programmed to change during performance. (As mentioned, parameters may be changed manually, though this method is both limited and cumbersome.) Only pitches can change, and these solely at the beginning of sequence steps. Rests, ties, and slurs are easily specified, but the latter two cannot be entered in Keyboard mode—a real limitation.

Keyboard note entry is facilitated by the variety of scales resident on the master disk

(there are many more on *MusiCalc3*). (Different tuning, transposition, even “tune up to your group” options are also included.) As in *MusiCalc3*'s stand-alone mode, however, keystroke action is markedly slow, and notes must be considerably anticipated to register at the next sequence point.

When the keyboard is used to record a voice, slurs and ties must later be edited in using the notationally-oriented matrix method. Additionally, keyboard rests are ungainly in that they must be entered by hitting the space bar. (Notes don't stop when keys are released; they sound until the next key is pressed, and keep restriking at sequence steps.)

Indeed, there seems to be a general limitation whenever GATE OFF is involved. The only way to program a rest is to specify a pitch in the zero octave. Here, as with SPACE bar usage in Keyboard mode, the frequency apparently goes to zero, but there is no GATE OFF. This causes an immediate cessation of sound, without any Release. It is most unfortunate that whenever an instrument with a positive Sustain level is followed by a rest, the Release is truncated. (This qualifies as a “bug” which should be corrected.)

Ring modulation, sync, and test bit switching are all nicely implemented (Glissandos—slides—are not.) So also is a method for using the envelope and waveform values of Oscillator 3 for modulation purposes (filter, frequency, amplitude, etc.). (Audio output from Oscillator 3 can be switched on or off at will.) Each modulation type

may control only one parameter. Implementation of modulation via the envelope shape is simple and straightforward; that using the waveform of Oscillator 3 is not.

There are several problems here. First, there is no flexible way to specify sub-audio “pitches” (frequencies) with which to modulate. (Even so, narrow, fairly fast vibrato is possible.) Second, the sampling of modulation waveform values is done at a high sub-audio rate of speed which is constant and non-variable; at large modulation amplitudes (modulation amounts are programmable) the steps are very noticeable. It would be very useful if the sampling rate itself were variable—from faster (to eliminate or minimize stepping) to very slow, for simulation of sub-audio sample/hold effects commonly available on analog synthesizers.

A Variety Of Good Features

Finally, here's a sampling of other notable features. Among the numerous supporting programs are those that show how to interface *MusiCalc* with user programs in BASIC, both while music is playing (*MusiCalc* is interrupt-driven) and while it is not. Complete disk management is possible from within *MusiCalc*. Instrument and score files can be merged and interchanged in various ways. There are random play, random linking routines. (A bonus, hidden in a supplementary score/instrument file, and unmentioned in the manual, is a selection of Christmas carols.) The

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with one creature separate from the other ten—that's the one you get to design. With the joystick, move among the other ten shapes to choose the lower body and legs, then after choosing, press the fire button. Your shape takes on the body and legs you chose. Next, follow this same process to choose a head.

Selections then appear on the left side of the screen. COLOR determines the color of your creature. When you get the color you want, move to the next part of the designing process. The next word says OFF, but as you press the fire button, the choice cycles through OFF, SLOW, NORMAL, and FAST. This determines the speed of

your creature. The creature you are designing moves as you change the word so you can select the exact speed you want.

The next choice to make is from BOUNCE, RANDOM, GUIDED, CHASE, HIDE, or STAND, so you can dictate how your creature will move in the room. The last selection is POP, TALK, ASK, TRADE, GIVE, ACCEPT, or ZAP, which determines whether your creature will be a helpful one or an enemy when it meets you in the game. If you select TALK, you can then type in the message the creature will say. If you select ASK, you must type in the question, and then the acceptable answer.

Pressing the space bar ends the creation. RETURN shows the creature in a test room so you can try out the movement of your creature.

The "Funnest" Computer Game

The *Adventure Creator* package suggests it's for ages 8 to adult, but the advertisements recommend ages 12 to adult. My family felt the latter rating is more reasonable because of the complexity of the game (and because you have to be able to read and understand the instructions). However, once an older person designed a game, my eight-year-old enjoyed playing it. Younger children can also

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have fun playing the game and getting through the rooms looking for treasure, but they may not fully understand all the intricacies of the rooms and the tools.

My 13-year-old son said it was time-consuming but fun to build adventures. He enjoyed making his own creatures and changing the names of treasures. Although he favors arcade games, where he can put his initials in for top scores, he said *Adventure Creator* is the "funnest" computer game he has played.

Adventure Creator
Spinnaker Software
One Kendall Square
Cambridge, MA 02139
\$39.95 (cartridge)

***DROL* And *Spare Change* For The Commodore 64**

George Miller, Assistant Technical Editor

Brøderbund has recently released *DROL* and *Spare Change*, two new arcade-style games for the 64. Fast-paced and richly animated, these multilevel games will amuse arcade game players of any age group.

The Fantasy World Of *DROL*

A demonic witch doctor has lured a girl and a boy, their mother, and their pet lizard and

crocodile into a strange and mesmerizing fantasy world. To rescue them, you must take on this world and its inhabitants, protected only by your trance-resistant, anti-gravity suit and an unlimited supply of reality pellets. From the onset your mission is fraught with peril. Scorpions, flying turkeys, and a magnet-tossing witch doctor—not to mention a honking vacuum cleaner—are among your numerous assailants.

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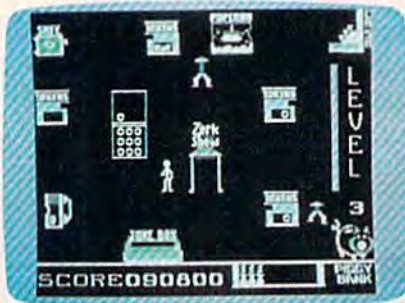


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A scorpion is about to end this round of Drol.



The Zerks head for the popcorn machine in Spare Change.

DROL takes place in a four-tier maze, with trap doors allowing passage between tiers. Using your joystick, you roam up, down, and between the tiers, searching for the captive family and firing reality pellets at hallucinatory monsters. To help avoid ambush, you can refer to the radar scope at the top of the screen, which diagrams the movements of your bewitching adversaries.

There are seven levels of play. Within each level, you have three missions to accomplish. First, you must find the girl and her pet lizard (who wears a rocket pack). In the second mission, you must rescue the boy and the crocodile (also wearing a rocket pack). Then, if you've survived the onslaught of monsters and spells throughout these two missions, you'll find the mother tied up and anxiously awaiting rescue in the next level.

You begin with five lives. If you use up all of your lives before completing the three missions, you can start again at the first level. But if you successfully complete the three missions, you'll be rewarded with an extra life and a charming cartoon before advancing to the next level.

Because of the amount of graphics data in the program, there's a 30-45 second wait between missions and levels. This may dampen your momentum slightly; or it may provide a refreshing pause in a very fast-paced game.

Those who like intense action and unusual animation will find challenge and amusement in *DROL*.

Spare Change: The Frenzied Arcade

Another new release from Brøderbund is *Spare Change*, a nonviolent game that's especially fun for younger children. In this game, you are the harried owner of a video arcade, whose most popular characters—the Zerks—are threaten-

ing to retire. But, in order to leave, they must first pilfer five game tokens from your machines and place them in their piggy bank. So, as you scurry about collecting tokens from your machines and depositing them in your token bin, you must be on guard lest the Zerks snatch up any of your tokens.

The game begins with two tokens in each machine. Using either the joystick or the keyboard, you dash from machine to machine, collecting tokens and warding off Zerks. As the machines empty, you can refill them with money from the cash register; when the cash register runs low, you can fetch a money bag from the safe.

Since you alone are up against two Zerks—Ozzie and Zeke—it's not hard for them to outmaneuver you in their quest for tokens. But don't get discouraged: The Zerks are easily distracted. Play their favorite song on the jukebox, and they'll go over to it. Or put a token in the pay phone; when it rings, they'll race to answer it. Or they can easily be lured to the popcorn machine.

To adjust the level of difficulty in *Spare Change*, press f1. This calls up the "Zerk Control Panel," with which you can modify the Zerks' behavior to suit the player's skill. On the least demanding settings, my four year old can keep himself entertained for hours, something I've rarely seen on most other games. But other levels proved challenging enough for my ten year old and even myself.

Oddly, *Spare Change* is not a game which you can clearly

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win. If the Zerks get five tokens in their piggy bank, you lose; but if you get nine money bags in the bank, you simply move into a new round of play.

Excellent sound effects and delightful animation make *Spare Change* fascinating for younger children, while its strategy and variety can provide entertainment for others in the family as well.

DROL and Spare Change
Brøderbund Software
17 Paul Drive
San Rafael, CA 94903
\$34.95 each, on disk

Also Worth Noting

Raid On Bungeling Bay

This addicting, yet frustrating, game pits your maneuverable

attack helicopter against strong defenses. Your targets are six factories scattered across an archipelago. You must bomb the factories into rubble. But defending those factories are anti-aircraft guns, jet fighters, and even a battleship under construction. Convoys of small supply ships keep the factories producing, and jet bombers try to sink your base, an aircraft carrier. The pace is fast and frantic. There are so many things going on simultaneously that you almost need prescience to win.

Graphically, the game is excellent. Horizontal and vertical scrolling allow you to smoothly crisscross the island chain. The detail of the landscape below is extraordinary, complete with small buildings, roads, radar stations, ports, and drydocks. The missiles, fighters, bombers, tanks, ships, and even light gunfire flashes make this game a pleasure to watch.

But winning is difficult. Once you've destroyed one factory, jet fighters pursue your helicopter. After three factories are eliminated, heat-seeking missiles launch from the anti-aircraft positions and trail you for miles. And if the battleship sets sail, bound for your carrier, it's almost impossible to sink. Crashing your spinning helicopter onto its deck seems to be the best bet. *Raid on Bungeling Bay* is an arcade game in the classic sense—it's so hard to win that you end up playing it again and again, if only to say that you can beat the computer. If you win, you are treated to a front-page newspaper story describing

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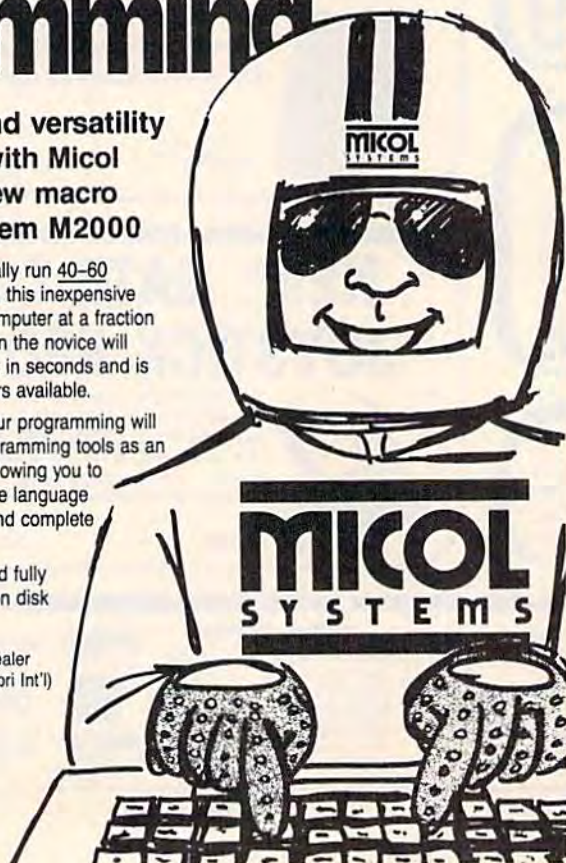
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REVIEWS

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PuzzlePanic

Puzzle buffs will love this brain teaser from Epyx. It's a well-designed package from Ken Uston which offers eleven games, each with one to six levels. You can select any game and level or try to solve the MetaSequence, a master puzzle which requires that each game on every level be solved *in the right order*. The clues for each game are embedded within the game and the sequence itself is yet another puzzle. A joystick is required.

The games have a childlike appeal, although younger children may miss the nuances (but can enjoy the play). The animation is superb, as is the color. Sound and music, also well done, accompany each game. One of the more delightful—and puzzling—games we've seen.

Epyx
1043 Kiel Court
Sunnyvale, CA 94089
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Gumball

In this entertaining strategy-action game from Brøderbund, you're a worker in a gumball factory. As various gumballs are produced and dropped down a chute, you open and close valves (with the fire button) in an intricate network of pipes

and chutes. You must guide each color-coded gumball into its color-corresponding bin. Bins are guided with a joystick.

If that isn't enough, you must also meet your day's quota before the 5:00 whistle or start over. There are five levels, each progressively more difficult with higher quotas and more gumballs and bins to manage.

There are also a lot of comical features such as the plant manager stalking out and dumping the gumballs out of your bin if you erroneously guide a gumball into the wrong one. At the end of each completed level, you are promoted (foreman, supervisor, etc.) and rewarded with an interim cartoon screen which depicts your character walking home to a bigger and better house.

Gumball is a lot of fun, and also has value as a teacher of logic and hand-eye coordination. For all ages.

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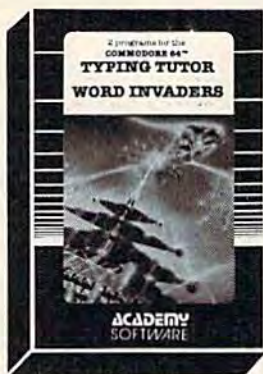
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The program is designed for use with one or two disk drives, and can generate various print-outs and reports. It can maintain up to 300 general ledger accounts, write checks, prepare statements, generate trial balances, and much more. It also keeps files of transactions, a general journal, a bank journal, and business identification accounts. Overall, *64-Accounting* is a complete and easy to use package.

Software Design, Inc.
1945 Mitchell Avenue
P.O. Box 570
Waterloo, IA 50704
\$69.95

Montezuma's Revenge

Your mission in the new Parker Brothers' game, *Montezuma's Revenge*, is to guide Panama Joe through a maze of chambers in search of Montezuma's treasure. The diminutive hero encounters bouncing and rolling skulls, snakes, spiders, disappearing floors, laser gates, and fire pits.

Montezuma's Revenge has the best elements of such climbing games as *Jumpman* (rapid movement, good joystick control, jumping ability, a variety of obstacles) and of graphic adventure games (a complex maze of

rooms, nine difficulty levels, special tools, and rewards to help you advance). The game can be frustrating in its difficulty, but there's extended play value in the challenges.

Parker Brothers
50 Dunham Road
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Satan's Hollow

Commodore has created a first-rate conversion of the popular Bally/Midway arcade game, *Satan's Hollow*, for the 64. Such translations from powerful

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arcade machines to home computers are never easy and often disappointing. But *Satan's Hollow* is quite good.

As you listen to the synthesized strains of Wagner's *Ride of the Valkyrie*, you attempt to build a bridge over a river of fire in order to reach the bonus round and fight Satan himself. Attacking you are waves of demons and other creatures—including a "Devil's Head," which shoots broad streams of fire. The background becomes progressively darker as the game continues and the demons are more difficult to see when night falls. The action is limited to two screens, and consists of rapid firing and quick dodging while you carry parts of the bridge from one side of the screen to the other.

If you enjoy fast-action "alien-invader" arcade games, you'll appreciate *Satan's Hollow*. One word of warning: On some monitors we found the color combinations made it difficult to see the main character on a portion of the bonus round's screen; not enough of a problem to ruin the game, but a limiting factor.

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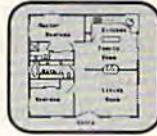
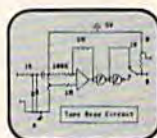
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MACHINE LANGUAGE FOR BEGINNERS

Richard Mansfield, Senior Editor

Getting Started

If you've never programmed in machine language (ML) because you thought it was too complicated, here's your chance. There are some new concepts and techniques to study. They seem strange at first, but they're essentially just new words and punctuation to instruct the computer to accomplish the same things you've been doing all along in BASIC. Loops are still loops. Branching is still branching.

Programming, ultimately, is programming—whatever the language. Give machine language a try; it's easier than you think and runs astonishingly fast.

Your Main Tool

This month we'll provide your main tool, an *assembler* program, and we'll use it to write a simple VIC and 64 program which lets you view some interesting places in your computer's memory. (You'll need at least 8K memory expansion on a VIC.) Ironically, this assembler (the tool you use to create ML) is written in BASIC. However, for beginners, it is a good learning tool. You can write short routines and test them on the spot.

If you type in the assembler (Program 1) on a Commodore 64, be sure to use standard Commodore abbreviations in line 244 so it will fit; this isn't a problem on the VIC with its longer program lines. Use ? for PRINT, P SHIFT-O for POKE (but don't abbreviate the word POKE where it appears within quotes), and G SHIFT-O for GOTO. This is the only line you need to worry about.

Machine language programs are written in very small steps. You enter a single command at a time, usually followed by a number. This number represents the address affected by the command.

For example, the purpose of the first few lines in the ML programs below is to fill color memory. On the 64, we want to POKE the number 7 into the entire color memory; on the VIC we want to POKE a 5. So we first "load" a 7 or 5 into the Accumulator (a temporary storage area in the 6502/6510 chip) by using the command LDA #7 or LDA #5. This sets things up so that we can keep POKEing over and over without

having to reload the original number. It's like a POKE submachine gun.

VIC Memory Display Routine

```
830 LDA #5
832 LDY #0
834 STA 37888Y
837 STA 38144Y
840 DEY
841 BNE 834
843 LDX #0
845 LDA 0X
847 STA 4096X
850 LDA 512X
853 STA 4352X
856 DEX
857 JMP 845
```

64 Memory Display Routine

```
830 LDA #7
832 LDY #0
834 STA 55296Y
837 STA 55552Y
840 STA 55808Y
843 STA 56064Y
846 DEY
847 BNE 834
849 LDX #0
851 LDA 0X
853 STA 1024X
856 LDA 512X
859 STA 1280X
862 LDA 53248X
865 STA 1536X
868 LDA 56320X
871 STA 1792X
874 DEX
875 JMP 851
```

Addressing Modes

The # symbol is an *addressing mode*. The 6502 chip inside our computers understands a variety of addressing modes. When you precede a number with the # symbol you are telling the chip to load the actual number 5 rather than whatever happens to be in *address 5*. LDA 5 would, by contrast, look at your RAM memory and put whatever it found in this byte into the Accumulator.

Let's use the VIC disassembly, as our example as we learn a few ML techniques. (A *disassembly* is an ML program listing. You can see a disassembly by using a disassembler program.) After putting the 5 into the Accumulator, we



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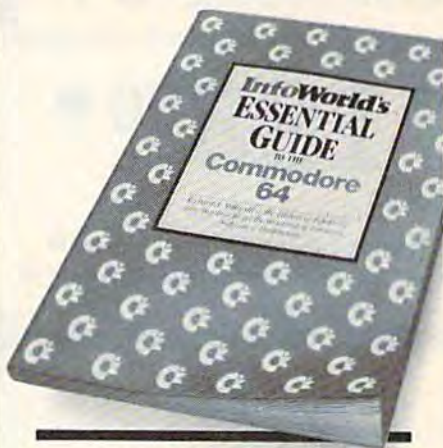
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