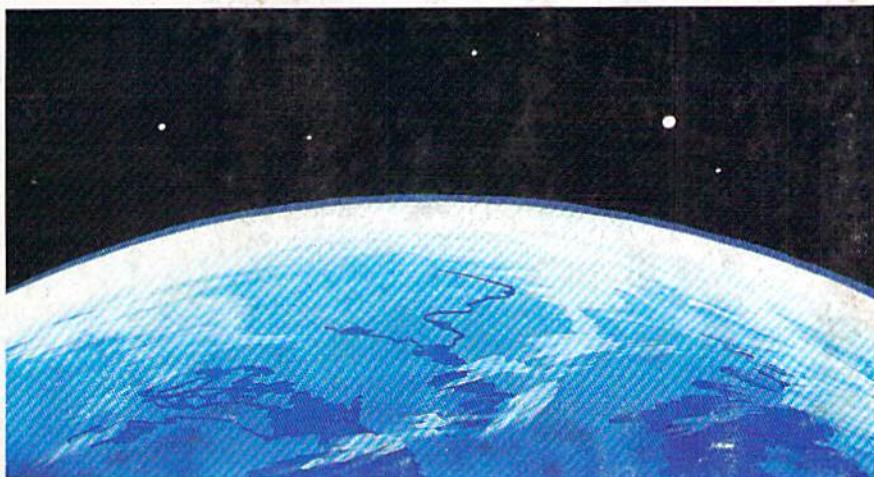


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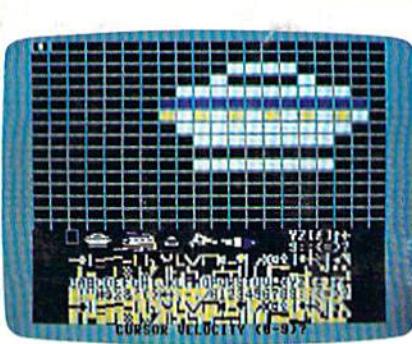
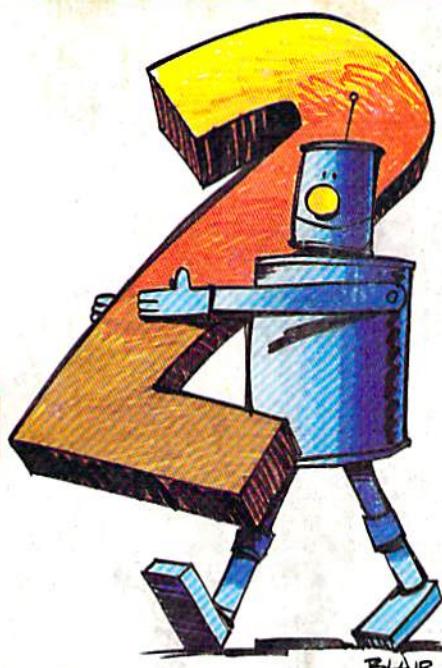
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Dear Susan,

I've discovered something very exciting that I want to share with you. I've always thought assembly language was too complicated for me to learn and I've been doing all my programming in Basic, or buying software that doesn't do quite what I want. You know, Basic is just too slow for a lot of tasks, and I can't find ready made software to do those specialized things I want to do.

Well, I just bought Panther's C64 Assembler and I found out that assembly language is easier than I thought, and it's also fun.

The C64 Assembler is very "friendly" and the documentation is clear and well written. One very nice feature of the manual is a section for the neophyte assembly language programmer that really helped me understand how to use the machine.

Now I'll be able to write those programs myself instead of waiting for some software manufacturer to guess what I'm looking for! My programs will do exactly what I want, and I'll have fun writing them.

The dealer even told me that Panther is looking for good programs in assembly language, and they're willing to publish and pay royalties for useful programs which meet their standards.

As you know, I don't have any experience yet, so I can't compare assemblers, but Jim's seen it and he's a professional assembly language programmer. He says it's the easiest-to-use and the fastest assembler he's seen for any microcomputer. In fact, he said he's going to buy a Commodore 64 just so he can use it.

Come on over to my place when you have time and I'll show off the assembler for you, or go to the dealer down the street to see it. The whole Commodore community is excited about the C64 Assembler.

I've got to sign off now. I'm anxious to get back to my assembler and finish the program I'm working on. This is fun!

Let's get together soon.

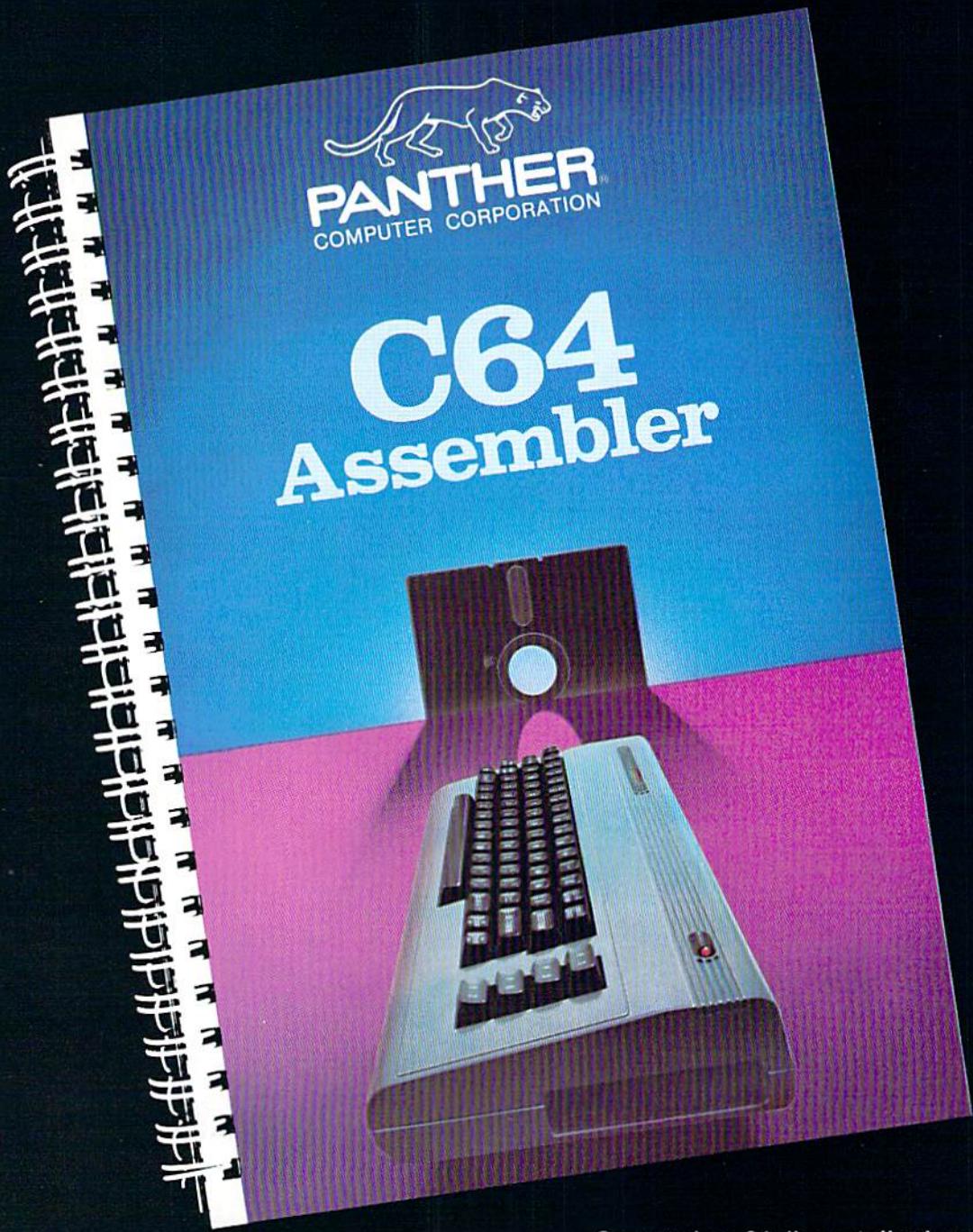
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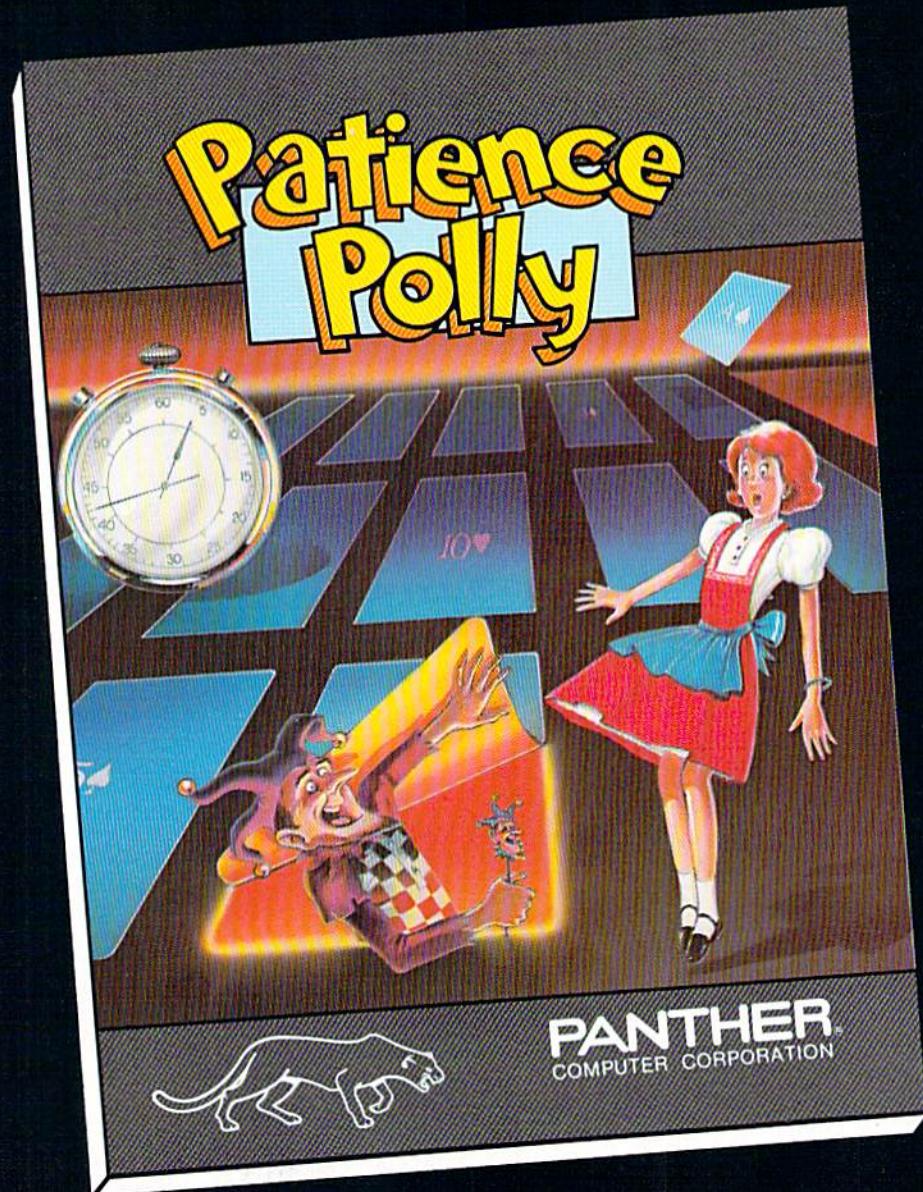
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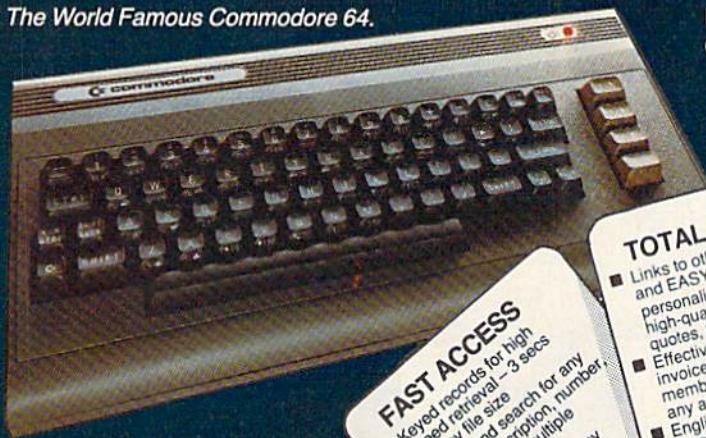
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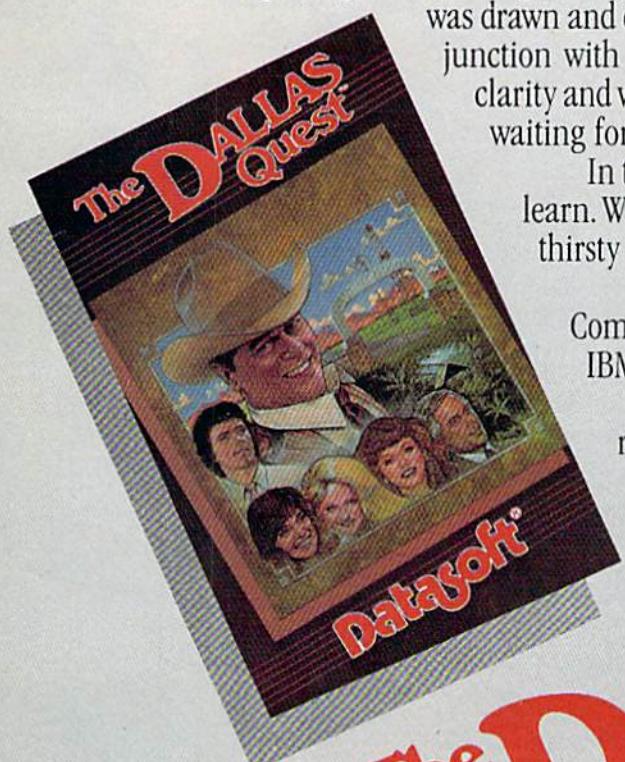
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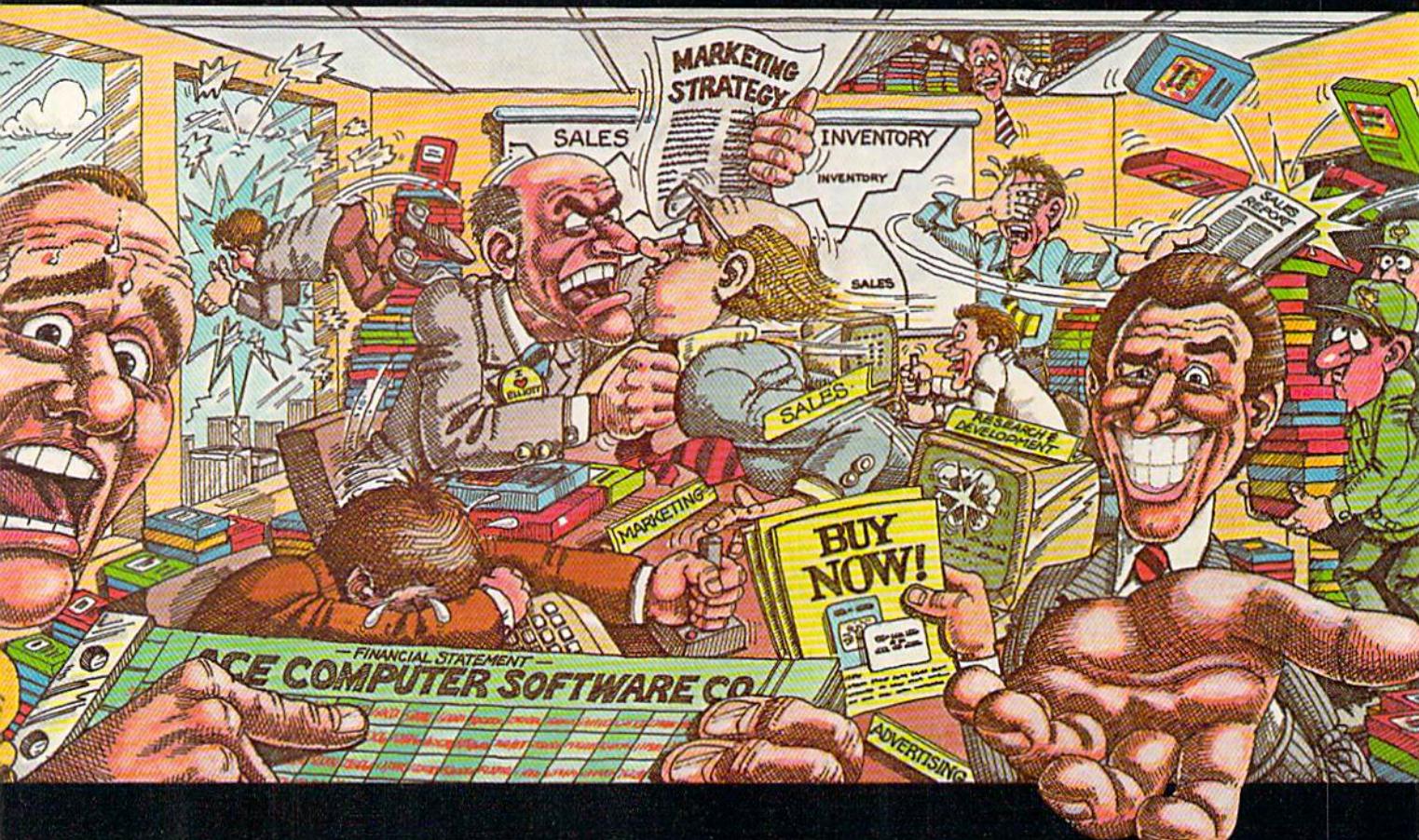
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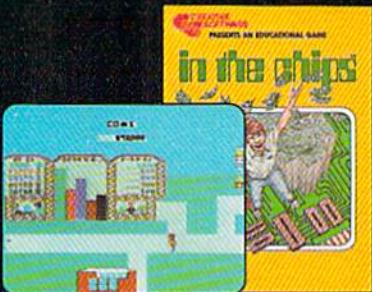
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THE EDITOR'S *notes*

I've asked Lance Elko, *Gazette Editor*, to contribute the *Editor's Notes* this month.

Robert Lock, *Editor In Chief*

In an upcoming issue, we'll be reporting on the Summer Consumer Electronics Show at which new Commodore products and a variety of third-party hardware and software for the VIC and 64 will be introduced. It will be interesting to see if Commodore has final versions of the 264 and the TED-16 (or C-16), a 16K version of the 264, ready to show.

Commodore plans to market various "flavors" of the 264. Some will have a built-in word processor, others will offer a spreadsheet or a built-in Logo. Commodore says that they can offer a machine with almost any application built in. This may be a little tricky to market, though. The TED-16 will be sold for under \$100, and can be upgraded to a 64K 264.

The 264 and TED-16 will be marketed as a new kind of computer. Until now, most home computers have had a hobbyist slant. The 264 may be targeted to people who merely want to use a computer, not program it. (This is the same audience Apple hopes to reach with its Macintosh). The large ROM capacity will support sophisticated applications on cartridge. This may be why Commodore is apparently unconcerned by the lack of sprites and the loss of the SID sound chip. We'll fill you in on the details in a future issue.

On another subject, those of you who take the time to fill out and mail the *Editor's Feedback* cards probably wonder

about their fate. Do they ever get read? Yes, every one of them. They're valuable to us because they establish a very useful two-way communication.

In surveying the responses we've received over the past few months, it's apparent that most readers are extremely happy with the *GAZETTE*. The most common responses to "What do you like best about COMPUTE!'s *GAZETTE*?" are: "I like the whole magazine," and "it's easy to understand."

But what do readers like least about the *GAZETTE*? We get a variety of answers to this question, a majority of them very specific in nature—and some contradictory. For example, "not enough for the VIC-20" and "not enough for the 64." Or, "too much educational material" and "not enough educational programs." With comments like these running nearly 50/50, it appears that our mix is meeting the needs of most of our readers.

The most common negative response until recently was "bugs." With the advent of the *GAZETTE DISK* and the resulting drop in typing load, we've heard much less about this particular programmer's curse. And those who continue to type in the programs have probably noticed a lower (in fact, almost nonexistent) incidence of bugs.

A number of readers have asked why we don't "grade" our reviews or "degrade" some products. Essentially, any product we review is, in our opinion, of merit. We feel that it's only worth your time and space in the *GAZETTE* to review products that are well designed. The market is flooded with products, and we'd rather tell you about

the good ones.

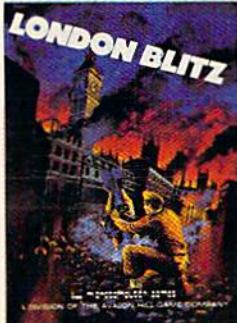
While the grading of products may be helpful to some readers, it is often unfair to the product. If you've ever read reviews of records you really like, only to see a thumbs-down or a poor grade, you probably wondered if the critic heard the same thing you did. The goal of quantifying a product with a letter or number grade is to be objective, yet it's often subjective and arbitrary. If we took a poll of our staff, we'd have a number of different answers. Describing the product, how it works, and sometimes how it compares to other similar products is the most honest information we can give to our readers.

On the lighter side, some of our readers have told us that what they like least is "spinach," "people who smoke when I eat," and "lack of TI coverage." I guess they have no real complaints.

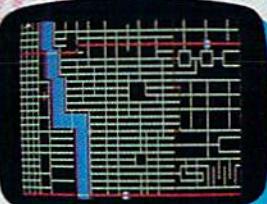
One reader asked if we plan to continue publishing quality programs ("Are there any left?"). In upcoming issues, we have slated a first-class machine language sprite editor, an 80-column simulator for the 64, some significant telecommunications software for the VIC and 64, and some other surprises.

We appreciate your comments and ideas. They're vital to the magazine, so keep them coming and, until next month, enjoy your *GAZETTE*.

Lance Elko
Editor



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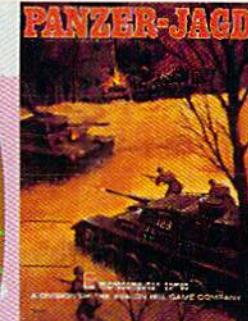
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GAZETTE FEEDBACK

EDITORS AND READERS

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

Incomplete Disk Saves

When I save a program on my 1541, it sometimes saves incorrectly. Then, when I try to scratch it, it doesn't scratch correctly. Why am I having this problem?

Cyrus D. Bhathena

Although incomplete saves can stem from a number of problems, the problem you're having might be caused by improper closing of the saved file.

After the program is saved, the computer places a marker indicating the end of the file. This is done automatically by the operating system. However, every once in a while, a program is not properly closed. These are sometimes referred to as poison files, and if not properly attended to, can cause problems on that diskette.

To tell if the file was improperly closed, first load the directory (LOAD "\$",8), then LIST it. A file that is still open will be indicated by an asterisk next to the program name, as shown here.

```
0 "COMPUTER'S GAZETTE" CG 2A
27 "PROGRAM 1"      PRG
27 "PROGRAM 2"      PRG
0 "PROGRAM 3"      *PRG
610 BLOCKS FREE.
```

READY.

If you do have an open file on your diskette, don't scratch it. That is, do not try to purge it using the OPEN 15,8,15:PRINT#15,"\$0:filename" command.

The proper way to eliminate the file is with the VALIDATE command. After a diskette has been used for some time, the directory can become disorganized. This can be caused by repeated saves and scratches, which might leave many small, unused gaps on the diskette. The VALIDATE command is used to reorganize the diskette. Purging improperly closed files is part of the process.

To validate a diskette, type and enter the following command:

OPEN 15,8,15:PRINT#15,"V":CLOSE15

The disk drive should whir, spin a bit, then quit. If the diskette is full, the process may take a few minutes or so.

One important word of caution, though. The VALIDATE command will also purge random files and relative files. So, if you have any random or relative files on the diskette, don't use the VALIDATE command.

Also, there is a way to check if programs were saved properly. This is done with the VERIFY command. After saving a program in the usual way (SAVE "filename",8), type and enter: VERIFY "filename",8. The filename in both cases should be identical.

The VERIFY command compares the program in memory with the program on disk. It does this by comparing the two byte by byte, and if anything is amiss, an error will be indicated. If you get an OK after the verify, the save has been performed correctly.

Moving Sprites

I am a beginning programmer in the process of writing a game. I need to know how to move a sprite in all directions. I have referred to the Programmer's Reference Guide, but the instructions are vague.

Scott Cundiff

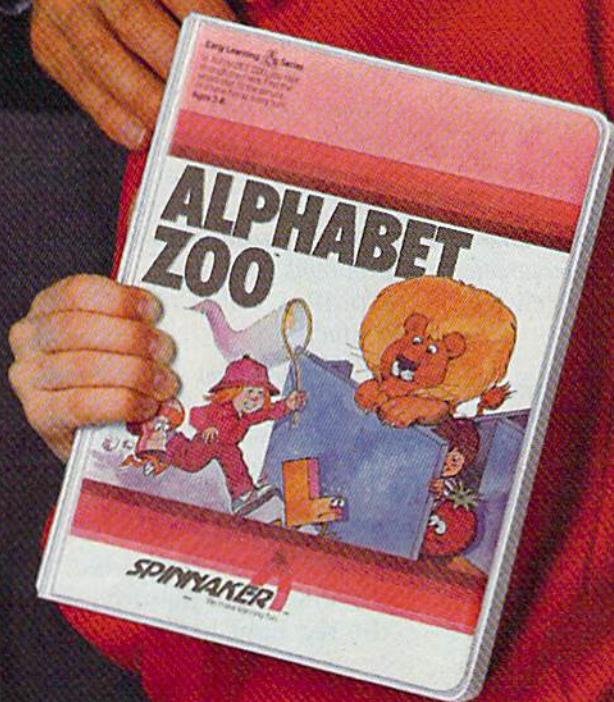
Moving the sprites on the 64 is done by POKEing values into memory locations 53248 through 53263. These 16 bytes control the positions of the eight sprites.

Each pair of memory locations corresponds to one sprite, the first byte being the X (horizontal) position, and the second the Y (vertical) position. For example, memory locations 53248 and 53249 are the bytes for sprite 0. 53248 is for the X position, and 53249 for the Y.

As an illustration, run the following program. It allows you to input positions for sprite 0 and demonstrates how the positions are changed.

```
10 XX=53248:POKE53280,0:POKE53281,0
20 POKEXX+21,1:POKE2040,192:POKEXX+39,1
30 PRINT"[CLR]ENTER SPRITE X, Y POSITIONS"
40 INPUTPX,PY:IF PX>255ORPX<0ORPY>255ORPY
<0THEN30
60 POKEXX,PX:POKEXX+1,PY
70 GOTO30
```

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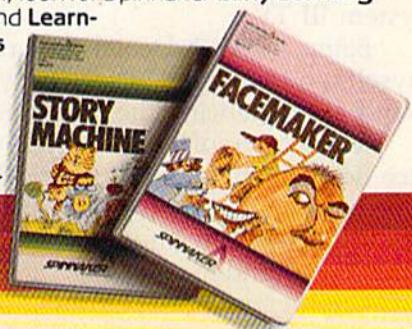
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With the program running, enter 255,100 for the X,Y coordinates. Notice that setting the X position with 255 (the maximum value that can be POKE'd into a single byte) only moves the sprite about three quarters of the way across the screen.

To move the sprite the rest of the way, one more byte has to be POKE'd, location 53264. The eight bits correspond to the eight sprites, bit 0 being for sprite 0, and so forth. When the bit is on (1), the sprite will be positioned on the right quarter of the screen. When it is 0, the left three quarters of the screen will be used. To see how this works, POKE 53264,1 then rerun the program.

Secret Messages

In your program called "64 Electronic Notepad" (January), there was an option to enter two secret codes, but the codes were not printed to the screen. How was this done?

Vito L. Devenere

This was done by simply changing the character color (the color of characters printed to the screen) to the same color as the screen background. Here's an example of how it's done:

```
10 POKE 53280,0:POKE 53281,0:PRINT "[WHT]"
20 PRINT "[CLR][DOWN]ENTER YOUR NAME,":PRINT "[THEN PRESS [RVS]RETURN[OFF]]"
30 INPUT "?{BLK}"; NS
40 PRINT "[WHT][DOWN]YOUR NAME IS:";NS
```

VIC users should leave out the first two POKEs in line 10 and replace them with POKE 36879,8.

In this example, just before you are asked to enter your name, the character color is changed to black, the same as the background. You then enter your name, and the color is then changed back to white and printed.

Jumping Screens On The VIC

I've heard of many people having trouble with "jumping screens" when using a VIC on a Zenith System III TV.

Being a Zenith Dealer, I've run across this myself, and have an answer for your readers who may be experiencing the same problem.

Readers should ask their Zenith dealer or service department about a thing called a "vertical sync mode jumper." It's located on the Zenith 9-152 series module, and allows integrated vertical sync or "countdown sync."

Unplugging the 2H jumper and dressing it out of the way usually allows integrated vertical sync.

Mike Schurman

Thanks for the tip. We have, and continue to receive, many letters about the Zenith System III's in-

compatibility with some Commodore computers.

WordPro 3 And 1526 Incompatibility

I'm the owner of a Commodore 64 and a 1526 printer, and I'm having trouble using WordPro 3. It doesn't seem to work with the 1526. I've tried all of the printer arrangements, but to no avail. Do you know of a fix for this problem?

Rodney Ward

The earlier versions of WordPro 3 Plus/64 are incompatible with the 1526 printer. A spokesman for the company stated that the problem revolves around the different internal timing of the 1526 printer. The spokesman also stated that as soon as they became aware of the incompatibility, the program was updated. The updated versions (now being offered) should work with the 1526.

As for those of you who have the old version, don't despair. On request, Professional Software will send you an update program. This should solve any problems you may be encountering while using WordPro 3 with the 1526. For further information, contact:

Professional Software Inc.
51 Fremont St.
Needham, MA 02194
(617) 444-5224

Spinning Disks

I have a 1541 disk drive. Is it OK to remove the diskette while the drive is still spinning but after the red light has turned off?

Dwight A. Albright

A Commodore representative says it's best to let the drive stop spinning first. Although the read/write head is disengaged when the door is opened, the spinning drive may still present a problem.

Opening the door and removing the diskette while the drive is turning could do damage. Pulling the diskette across the spinning hub—the part that spins the diskette—could do damage.

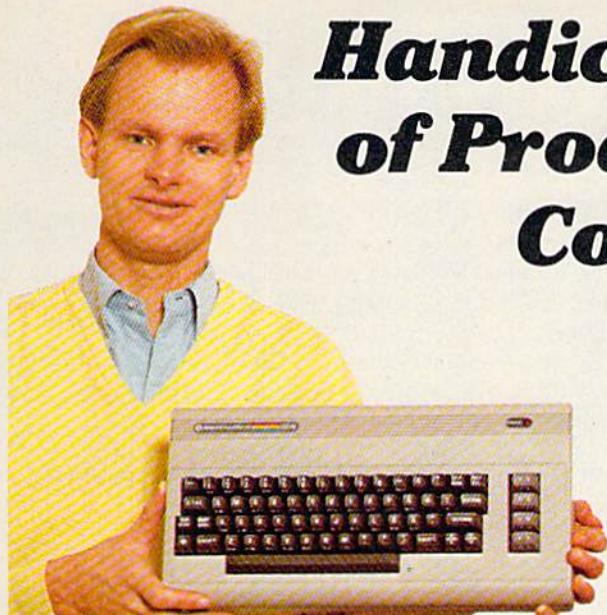
All in all, it's safer to wait those few extra seconds and let the drive stop before opening the door.

Cloning Joysticks

Is it possible to use an Atari-type trackball on the VIC? Both computers seem to have the same type of plug.

Joe Wiebe

Yes, it is. Both the Atari computers and the VIC and 64 have the same type of nine-pin joystick plugs. Atari trackballs and joysticks work fine on the VIC or the 64—and vice versa. Atari paddles can also be used on the VIC or 64, but they won't be as responsive as Commodore paddles.

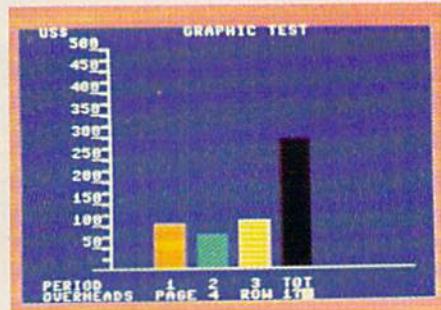


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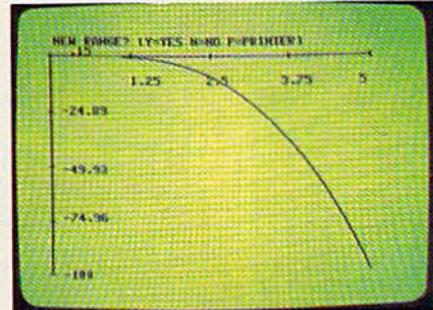
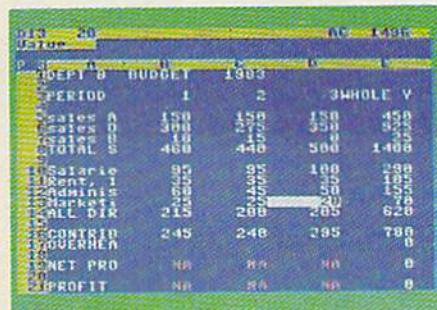
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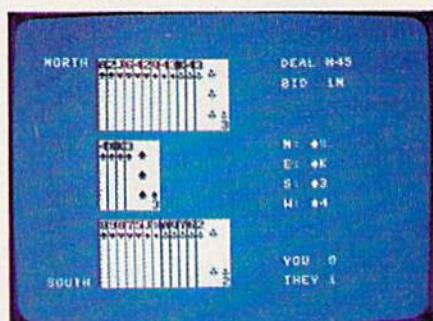
Turn statistical information into graphic format

GRAF 64 converts mathematical functions into graphical analysis on the Commodore 64. An ideal program for studying math. Define a function, set the limits of an axis, plot a graph and display the extreme points, intersection values, etc.



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User Group Update

Changes

The new address of the Mid-Missouri Commodore Club is now 780 East Park Lane, Columbia, MO, 65201, (314) 474-2868. Contact person is Jim Whitacre.

The VIC Software Development Club of Sewell, NJ, is no longer in existence.

The new address for the 64 Club in Baton Rouge, LA, is 5200 Corporate Blvd., Baton Rouge, LA, 70808, (504) 925-5870. Contact person is Tommy Parsons.

North Valley Commodore User's Group

Jim Banks
P.O. Box 1925
Chico, CA 95927
(916) 343-4611

Rocky Mountain Commodore Club

Ray Brooks
P.O. Box 377
Aspen, CO 81612
(303) 923-5037

Fairfield County Commodore User Group

Kenneth H. Hottes, President
P.O. Box 212
Danbury, CT 06810

Commodore Users Group of Stratford

Dan Kern-Ekins
P.O. Box 1213
Stratford, CT 06497
(203) 377-8373

Newark Commodore Users Group (NCUG)

Bob Black
210 Durso Drive
Newark, DE 19711
(302) 737-4686

The Brandywine Users Group (BUG)

Joe Fitzpatrick
P.O. Box 10943
Wilmington, DE 19850

The Commodore Advantage

Deanna Owens
P.O. Box 18490
Pensacola, FL 32523
(904) 456-6554

The Commodore Bardstown User Group (C*BUG)

Patrick Kirtley
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Bardstown, KY 40004
(502) 348-6380

MUMPS Users' Group

4321 Hartwick Rd., Suite 308
College Park, MD 20740
(301) 779-6555

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1306 Hamilton St.
Salisbury, MD 21801

Commodore VIC-20 User Group

Patrick Rooney
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Malden, MA 02148

Columbus Commodore 64 Club

Jim Gregory
407 East Gaywood
Columbus, MS 39702
(601) 328-8589

The Alliance Commodore Computer Club

M. Sallee
1629 Boise
Alliance, NE 69301

Hudson County Commodore Users Group

Dave Westphalen
308 Palisade Avenue
Union City, NJ 07087

Jersey Shore Commodore Users Group

(Covering Ocean and Monmouth counties)
(201) 542-2113

The Southern New Mexico Commodore User's Group

Scott Gardenhire
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Las Cruces, NM 88005
(505) 523-5336

Commodore 64 User Group

Sam Soltan
67-42 Harrow Street
Forest Hills, NY 11375

Upstate Commodore User Group

Chris P. Johnson, Pres.
P.O. Box 5242
Arnot Mall
Horseheads, NY 14844

Merrick Commodore Club

2158 Vine Drive
Merrick, NY 11566
TTY: (516) 868-4835
(Ask operator about TTY non-voice calls)

Oswego 64 Users

Dr. John R. Boronkay
208 Park Hall
Dept. of Industrial Arts & Technology
State University College
Oswego, NY 13126
(315) 341-3010

Commodore SIG Computer Club of Rockland

Peter Bellin
P.O. Box 233
Tallman, NY 10982
(914) 357-8941

Mohawk Valley Commodore User's Group

William A. Nowak, Pres.
P.O. Box 343
Tribes Hill, NY 12177
(518) 829-7576

Wilmington Commodore Users Group (WCUG)

Terry M. Brown
409 R.L. Honeycutt Drive
Wilmington, NC 28403
(919) 799-5041

Commodore 64 Users Group (CUG)

Jeff Eklund
702 Park Avenue, NW
New Philadelphia, OH 44663
(216) 364-6158

Mid-Ohio Commodore User's Club

French Ball
Box 21
Nova, OH 44859

The Southeast Houston (TX) VIC User Group is no longer in existence.

The address for the C-64 User Software Exchange Resources (U.S.E.R.S.) is P.O. Box 4022, Rochester, NH, 03867. No calls, please.

The new contact person for Eight Squared in Mt. Holly Springs, PA, is Mindy Skelton. The new telephone number is (717) 486-3274.

Worldwide Commodore Users Group

David L. Walter
P.O. Box 337
Blue Bell, PA 19422

The Executive Touch (E.T.)

Patricia Watkins
Commodore C-64 and VIC-20 Users Group
208 Hwy 15
Myrtle Beach, SC 29577
(803) 448-8428

The Charleston Computer Society

Jack A. Furr, Jr.
P.O. Box 5264
N. Charleston, SC 29406
(803) 747-0310
BBS 747-6981

Society of Computer Owners and P.E.T. Enthusiasts (SCOPE)

Gary Stevens, Pres.
P.O. Box 3095
Richardson, TX 75083
(214) 475-4057

The Woodlands Commodore Users Group

Andrew Gardner
3 Splitrock Road
The Woodlands, TX 77380
(713) 292-8987

Comm Bay 64

Jeff Schroeder
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Green Bay, WI 54303
(414) 434-1619

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Walter Kindt

22 Traders Lane

Cairns, Queensland

4870, Australia

Guelph Computer Club

A. Holman

38 Cheltonwood

Guelph, Ontario

Canada N1E 4E3

VIC 64, Apple Users Group

Warren Robertson

42 Kenninghall Blvd.

Mississauga, Ontario

Canada L5N 1J4

Overseas Commodore User's Group

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APO, NY 09102

Christchurch Commodore User's Group

John Kramer

P.O. Box 15-024

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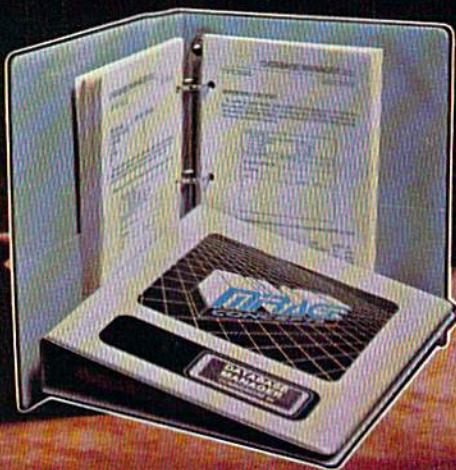
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In Touch With Your Computer: Graphics Tablets And

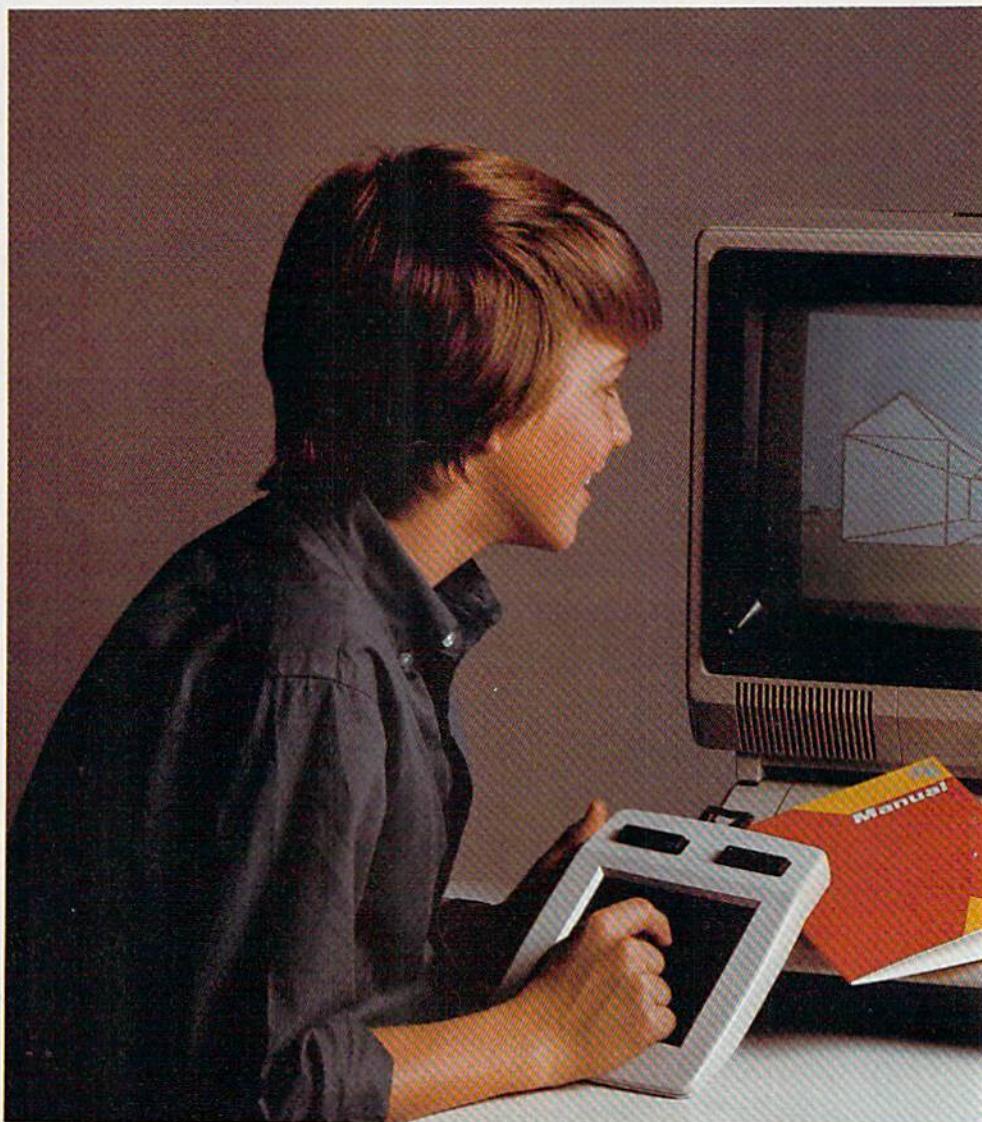
Kathy Yakal, Editorial Assistant

How many times have you wanted to jab a finger at your computer screen to indicate your choice from a menu? Or, after hours of trying to finish the title screen of a game have you been tempted to take a magic marker and draw in the curling tail of the sea monster whose detail eludes you? New input devices—graphics tablets and light pens—make that kind of interaction with your computer possible.

Think of the first time you ever saw an illustration on a computer screen, then looked at the program listing that created it. You may have been overwhelmed by the pages and pages of DATA statements and foreign-looking code that it required.

On the other hand, you may have been underwhelmed, thinking that so many lines of commands could surely produce something a little more impressive than a crude-looking spaceship being chased by what looks like Chicken McNuggets.

However seasoned the programmer, creating detailed illustrations in a program still takes long hours, a good amount of programming knowledge, and plain hard work. The reason is



Light Pens



that, until recently, the only way to communicate with computers was by typing in the correct combination of numbers, letters, and symbols on the keyboard.

New input devices—graphics tablets and light pens—have changed that.

Technically, these devices are not new. Some have been used for years in higher-level applications by people like industrial designers. And though they haven't exactly flooded the home computer market, consumers and soft-

ware publishers are beginning to take notice of their potential applications.

Graphics tablets and light pens, like the keyboard itself, are simply input devices, ways for you to communicate with your computer. Instead of typing in a command or moving the joystick back and forth, you touch your finger or a stylus to the surface of the graphics tablet, or point the light pen at the desired spot on the screen.

What that desired spot is depends on the kind of software you're using. Graphics tablets and light pens, in tandem with the appropriate software programs, can basically do two things: draw pictures and select options in menu-driven software.

Any discussion about graphics tablets and light pens without an almost simultaneous discussion about software is useless. These input devices make no sense without software. So let's walk through our first few minutes with a graphics tablet. We'll use the *PowerPad*, by Chalkboard, as our example.

The *PowerPad* is probably the largest graphics tablet around. The pad itself measures 12 x 12 inches; its housing brings the total dimensions to 20 x 17 inches. One end of the cord is inserted via a modular



The Koalapad can be used for a number of business and home applications.

phone-type jack into the pad; the other end plugs into port 1 on the Commodore 64.

Once everything is connected and the computer turned on, it's time to load some software. Chalkboard currently offers 14 different packages.

you want on either the keyboard or staff on the overlay. *PowerPad*'s unique multisensor technology (the pad can sense and respond to more than one touch at a time) lets you create harmony.

MicroMaestro does not

then—maybe even entice someone who is not prone to doodling.

One of the initial software packages produced for Koala Technologies' *Koalapad* is *KoalaPainter*, a comprehensive painting, drawing, and graphics program. After drawing a picture, you can choose from several colors and textures to fill in different areas of the illustration.

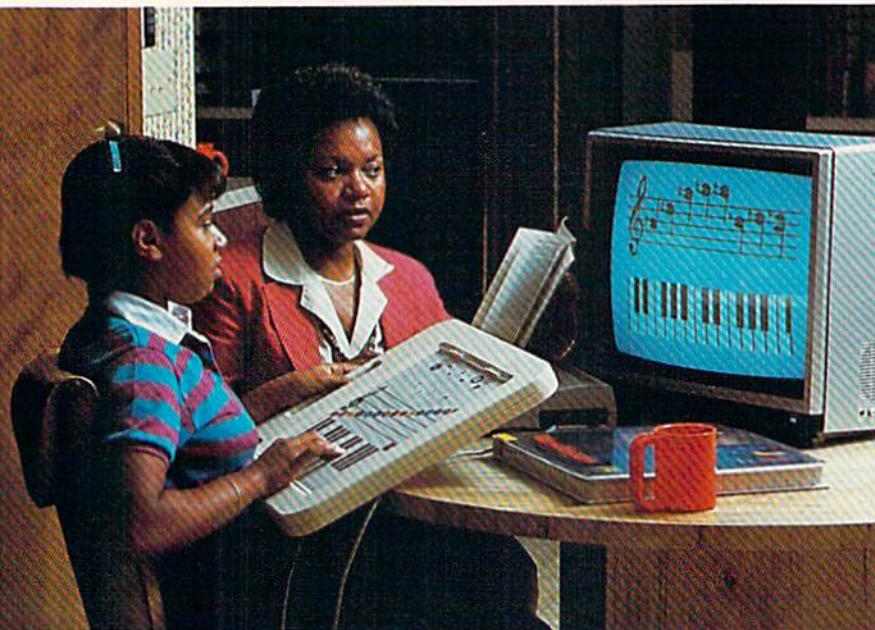
Kids' stuff? Not entirely.

Granted, bypassing the keyboard opens up computing to a much younger set. But graphics tablets can be used to move text in a word processing program, design a spreadsheet or bar graph, create patterns for wallpaper and fabrics, even map out floor plans for buildings. The *Koalapad* can be programmed to operate as a set of up to 36 special function keys with custom overlays, which makes it possible to run business and financial programs without using a traditional keyboard.

Though drawing pictures on a graphics tablet may come quite naturally, some people criticize them because of the spatial problem: You have to keep looking back and forth from the tablet to the screen.

Light pens allow you to interact directly with the screen. Like graphics tablets, they're used to draw and point, but the drawing and pointing are done directly on the surface of the screen. "The good thing with a light pen is that you can see what you're doing," says Matthew Hock, a software designer for Futurehouse, manufacturers of the *Edumate Light Pen*.

A light pen looks much like an ordinary pen with a cord attached that plugs into a user port on the computer. Some have "switches," buttons that must be pressed to activate the light pen. Others require that you hold down a key on the keyboard.



Using a PowerPad and MicroMaestro software, this child can compose and play music.

Called *Leonardo's Library*, this series offers learning in a number of subject areas, like music, mathematics, visual arts, science, language arts, and social studies applications.

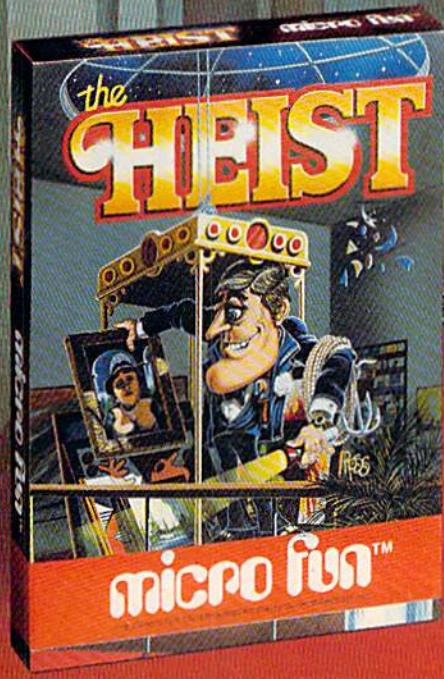
Each program comes with a Mylar keyboard overlay which, depending on the software, turns the *PowerPad* into an artist's canvas, a piano keyboard, a LOGO-language package, even a programming kit to create new software using the *PowerPad*.

Let's load a music program, *MicroMaestro*. The overlay contains a partial keyboard, a musical staff, and several command notations. The computer screen looks similar; it, too, shows a keyboard and staff. To compose music, simply touch the notes

force you into a strict 4/4 time. It remembers pauses and syncopation, playing the music just as you composed it.

But what's probably most exciting about touch tablets is their graphics applications. You may have seen examples of art programmed on a computer, but those high-tech masterpieces require a tremendous amount of programming skill and artistic ability. Not many of us have those qualities, especially in that combination.

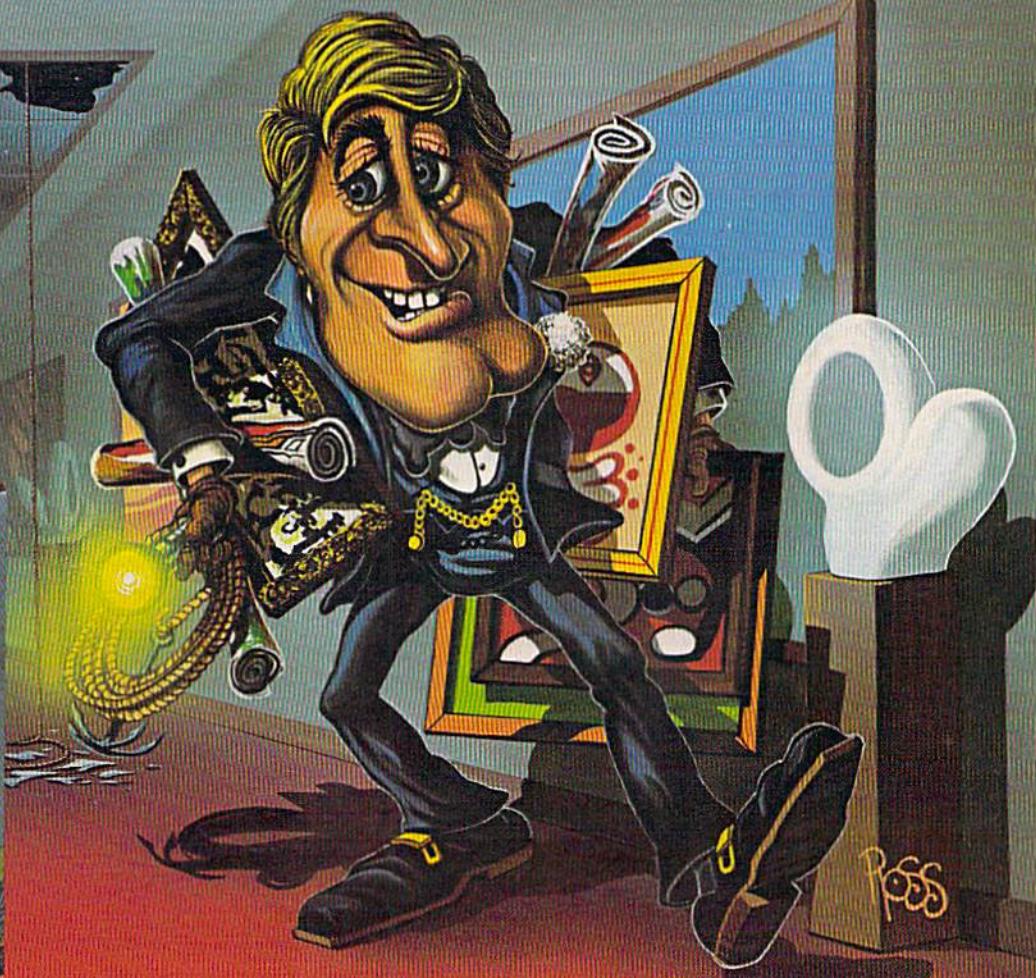
Graphics tablets bring computer-generated art to the masses. They can't necessarily make someone a better artist, but they provide a different medium for anyone who likes to do a little drawing now and



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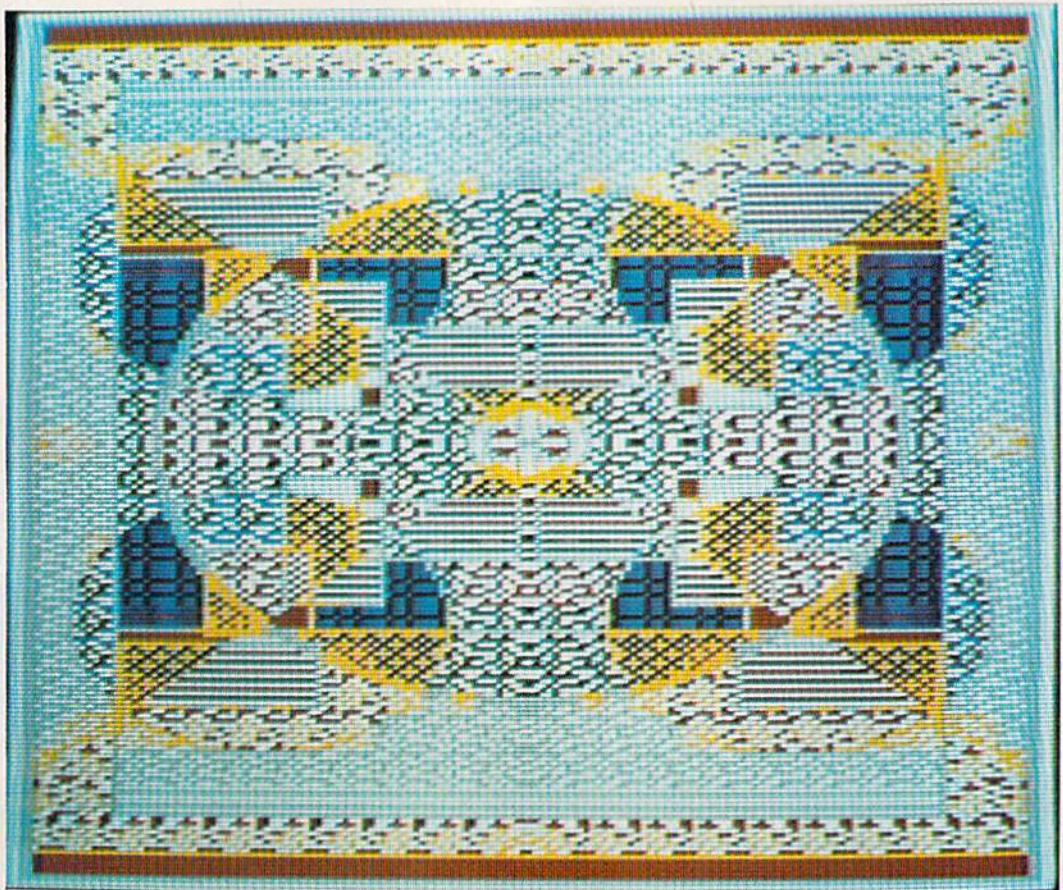
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This illustration was drawn using the Edumate Light Pen and Futurehouse's graphics package, Peripheral Vision.

Like graphics tablets, light pens have many home and business applications. They're especially appropriate for choosing options in menu-driven software. But some of the graphics software that's been designed for them may lure even the most unartistic person to draw a picture of her black cat and see what she would look like with a paisley coat.

Futurehouse, Inc., has developed such a package. Called *Peripheral Vision*, it is an advanced graphics package that can be used with the *Edumate Light Pen*.

Peripheral Vision works much like graphics software for touch tablets. Banners illustrating user options run across the top and bottom of the screen. To select an option, you touch the light pen to it, then move to the drawing portion of the screen to start your illustration.

If you just want to do a freehand drawing, you first select one of six brush stroke widths, pick up one of the 15 different colors, and draw. If you want to fill in your picture, you can pick up one of the 35 predefined textures (or create your own) and touch the light pen to the area you want filled in. It's not necessary to move the pen back and forth, like you would if you were painting with a crayon or paintbrush: The area

fills in automatically.

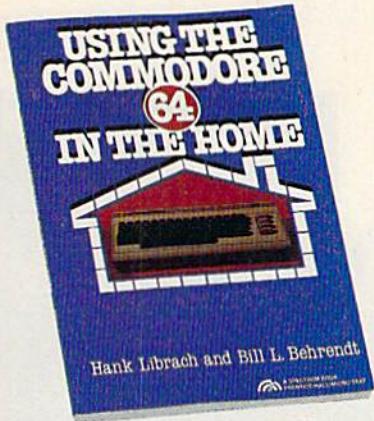
For more advanced designs, *Peripheral Vision* offers several options. The zoom feature allows you to focus on a very small space and design very intricate detail. If you need very exact circles, triangles, rectangles, or even straight lines, *Peripheral Vision* lets you set the defining points, then draws them for you in perfect geometric shape. There's even a mirror mode, in which everything you draw will be mirrored in a horizontal and vertical direction for a kaleidoscope effect.

When you've completed your design, you can save it to disk or make a printout.

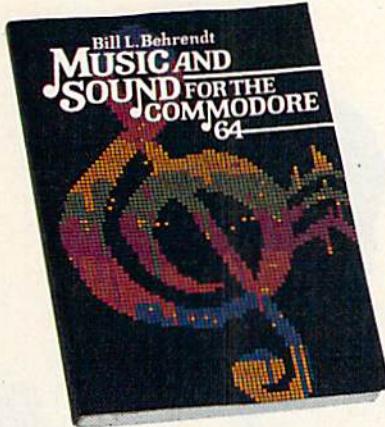
If you're interested in experimenting with a graphics tablet or light pen, you're pretty much restricted to software packages published by the manufacturer of whichever one you purchased. Here again, compatibility is the real bugaboo. The makers of graphics tablets and light pens are expanding their own lines of software, but there have not been any major steps in the direction of standardization for these new input devices.

If the market responds favorably, software packages may someday have stickers that say, "For the Commodore 64. Graphics Tablet or Light Pen Required."

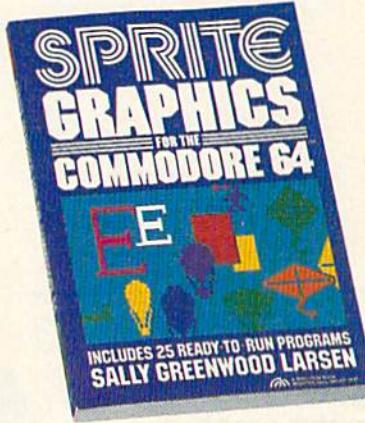
Prentice-Hall speaks a Commodore language other publishers have forgotten. **English.***



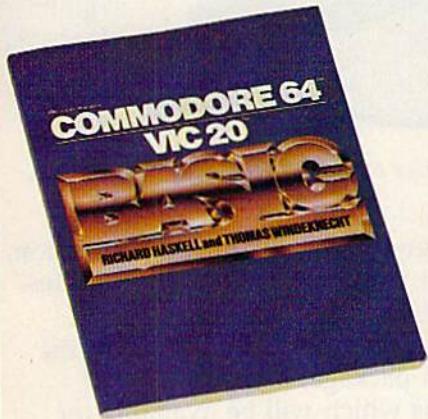
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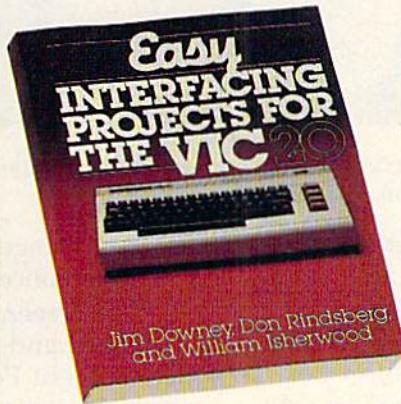
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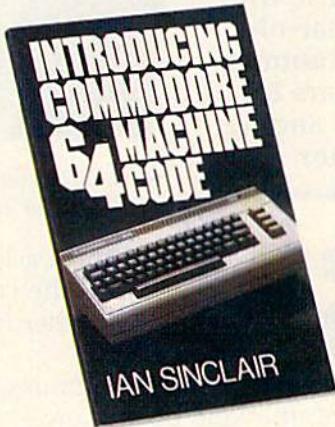
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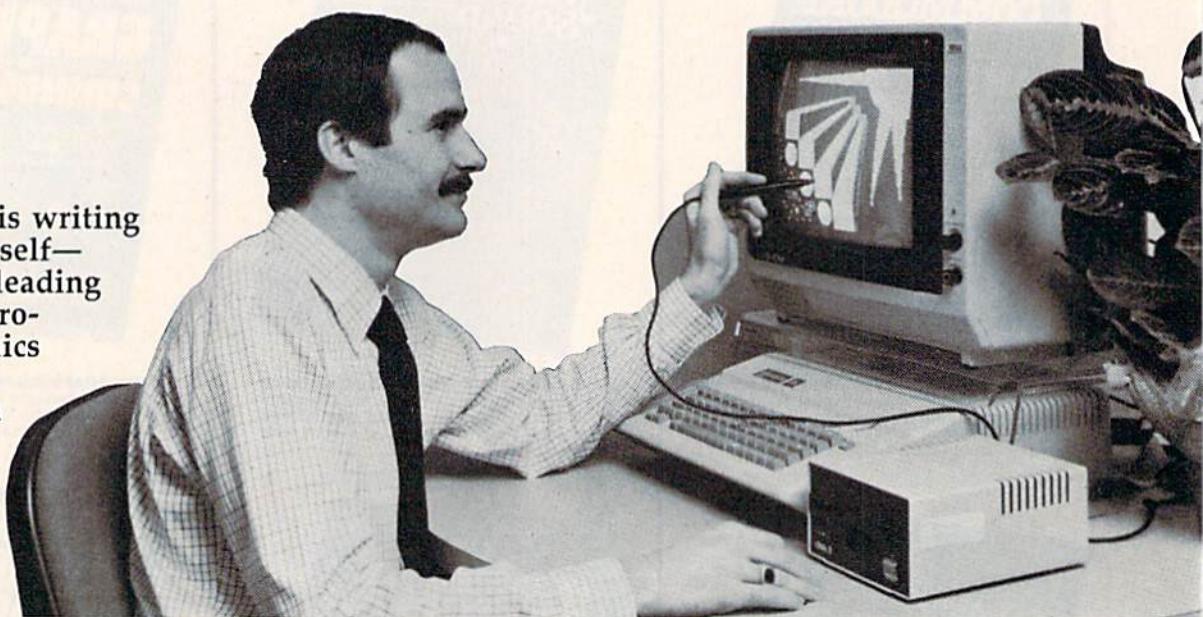
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Steven Gibson

The Designer Behind The Gibson Light Pen

Selby Bateman, Features Editor

Steven Gibson is writing a name for himself—in lights—as a leading designer of micro-computer graphics software. With his new Gibson Light Pen System, the 28-year-old programmer appears to have another winner.



Steven Gibson demonstrates some of the graphics capabilities of his Gibson Light Pen system, available for the Commodore 64 this summer.

Steven Gibson leans back in a deck chair, gazing absently at the ceiling, and a smile breaks out from under his neatly trimmed moustache.

"I was sitting one morning in a JoJo's Restaurant, thinking about how I could handle symbols. And suddenly this idea of overlapping cards hit me. On a napkin, I drew four overlapping squares. I said, 'Ahhh, that's it!'"

Gibson stretches forward suddenly; his gaze more focused as he recalls this particular step in the development of his new light pen system. "I ran back to the office. And because of the

Pentrack Language I had written as a foundation, I had the concept working in about ten minutes."

The screen card-selection format Gibson developed and refined is but one feature in the Gibson Light Pen package, a versatile set of graphics programs which will be available for owners of Commodore 64 computers by mid-July.

First demonstrated last January at the Winter Consumer Electronics Show (CES) in Las Vegas, the Gibson Light Pen attracted immediate attention. Gibson perched on a raised platform as computer dealers and members of the press

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crowded around to watch him put the system through its paces on an Apple computer.

Wielding the small, black pen, Gibson quickly drew several floor plans on the screen with one piece of the system's software. Later, he made sketches, duplicating several designs and magnifying others for detailed refinement. At each step, easy-to-understand icons—pictorial symbols—offered a wide range of directions and options.

For \$99.95, Commodore 64 owners will be able to get the light pen; the Pentrack Language System, a graphics programming language; and three software packages:

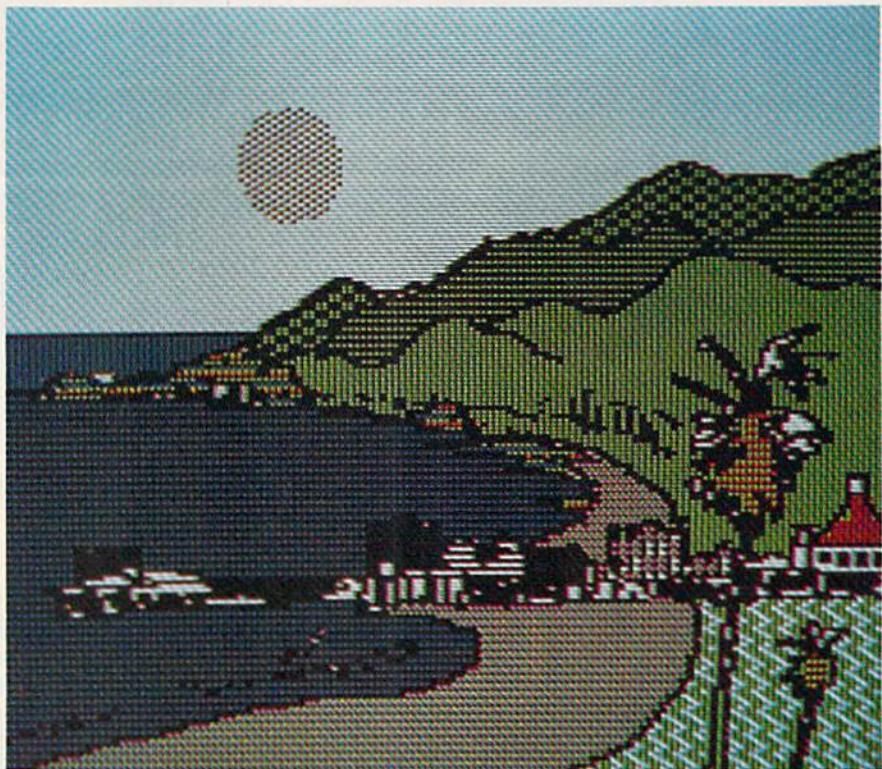
- *Pen Painter*, a color graphics program featuring free-hand drawing, elastic geometric shapes, and color-fill patterns. The software features Macintosh-style icons.

- *Pen Animator*, an introduction to animated computer graphics, which allows you to create up to 20 frames of animation that can run on your computer screen fast enough to produce the sensation of motion.

- *Pen Musician*, an introduction to music composition, which lets you set, edit, and play back notes on a musical staff by using the light pen.

Koala Technologies, which markets the package, also plans to release another Gibson Light Pen program for the 64 later this year, called *Pen Designer*. This is a black-and-white line-art program for technical or business-oriented graphics, which will let you develop floor plans, engineering diagrams, flow charts, and landscape architecture. The software supplies templates, with such images as furniture, bushes and trees, and engineering symbols, which may be moved, saved, and magnified for detailed work.

Gibson has been working with light pens for some time. He developed the first Apple-compatible light pen in 1980, and has since created a light pen for Atari. The new Gibson Light Pen System is already available for the Apple II family and IBM's PC and PCjr.



The Gibson Light Pen System allows you to grid draw, stipple, cross hatch, and create patterns with geometric figures on a color palette, among other features. It will be available for the Commodore 64 by mid-July.

Gibson is surprised at how far graphics software has come in just the last five years, despite the fact that much microcomputer hardware has stayed relatively the same.

"Which to me means that the determining factor has been how high do you want to reach? What are your expectations? What are users satisfied with? We could have done five years ago what we're doing today, but we just didn't know how. We were just not sophisticated."

"To some degree, it's been a matter of learning the machines better. And on the newer machines—the Commodore 64, the Atari—there is more powerful hardware, which gives the programmer more to work with," he says. "But in general, it seems that it's more of a philosophical difference that has occurred and which really sets the pace for what kind of applications software gets written."

The development and growing popularity of icon-based software menus in place of the traditional text-based formats delights Gibson.

"Using icons is an intuitive way of working. You don't have to remember what L stands for, or what R stands for. There's a little picture of it there, a little line or rectangle or circle or whatever."

"Those are breakthroughs. Like pop-down menus, where you see, for example, the word color. You touch the word and, bang, below it

SOFTWARE ARTISTS?

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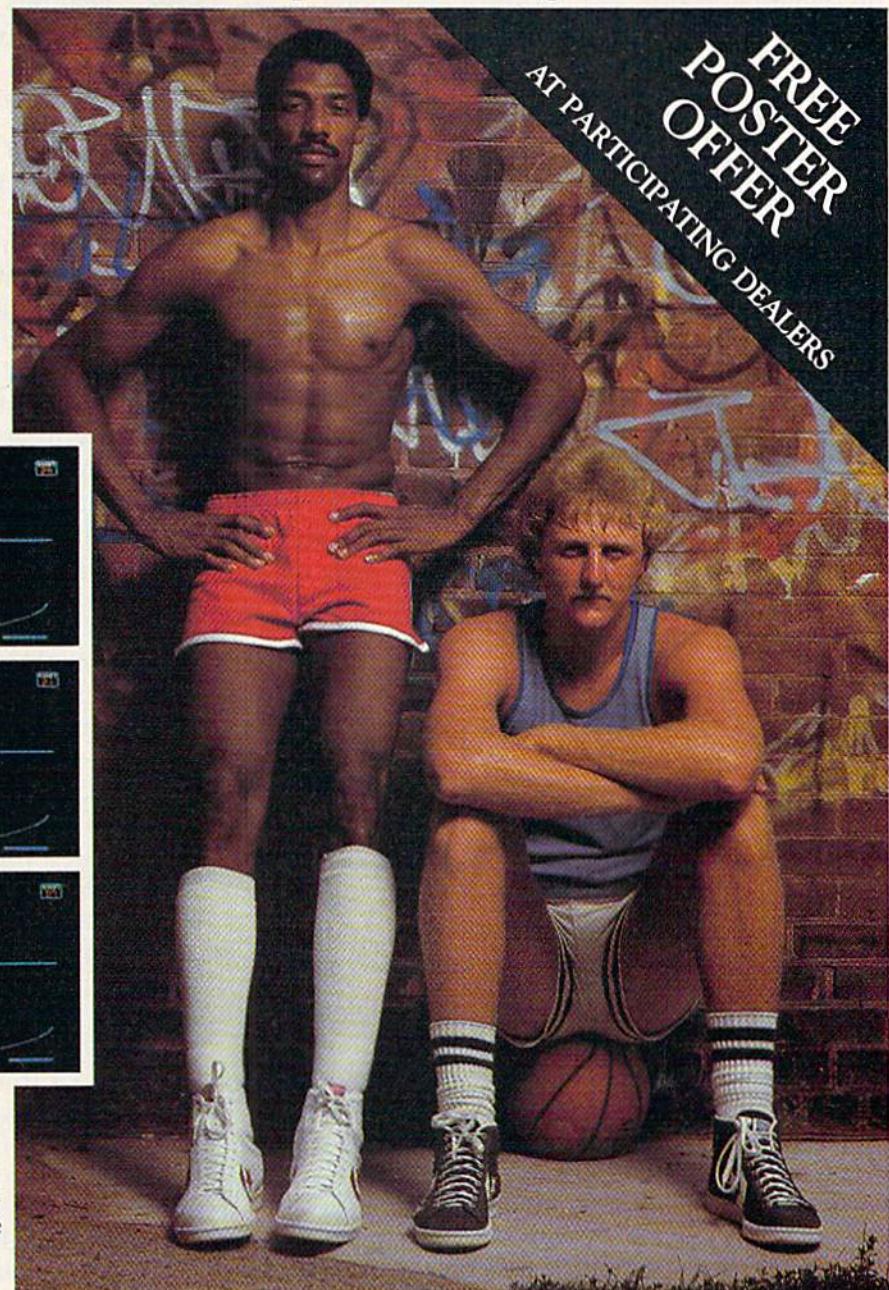
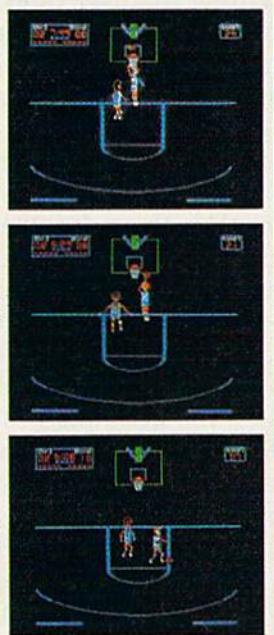
It wasn't easy. When they talked, we listened. When they criticized, we made big changes. When they gave suggestions, we took them.

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appears a list of colors. You then select a color and you're done. As opposed to having to remember, let's see, blue-green is BG," he says.

Gibson attended the University of California at Berkeley and now makes his home in Irvine, California. Before signing an exclusive agreement with Koala Technologies for the light pen system, he owned and directed Gibson Laboratories through which he produced and sold light pens. Gibson closed the laboratories when the headaches of business management began overshadowing his software development.

"We manufactured and sold four thousand light pens for the Apple computer over the course of a year or two. Koala made five thousand the first month!" Gibson says with a shake of his head. "I was so busy deciding how many rolls of toilet paper to buy, and answering the phone and opening the mail. Even with just 15 people, you start having political squabbles. You know, these people won't talk to those people—and I'm not a baby-sitter."

"So I went out and found the best company, which happens to be Koala, to take over my pens," he says.

Freed from administrative duties, Gibson is able to spend the necessary time developing software he really wants to see people use. "The market is so much bigger today than it used to be, by virtue of the fact that there is a large installed base. So a programmer such as myself doesn't mind spending six months doing a knockout piece of software.

"I'm in a competitive marketplace, so I've got to beat the other guy's package," he says. "And things like ease of use, friendliness, how quickly you can learn it, and would my mother be able to use it are real determining factors."

Gibson is well aware of the limitations even today's more powerful microcomputers put on programmers who compete in the commercial software market. All of Gibson's work is written in machine language. "The machines today are just not powerful enough to really do much within a high-level language. As soon as you start using BASIC or Pascal, as much as it's a wonderful environment to program in, you don't get the performance."

"And some other guy is going to come along, like a Bill Budge, and write that same thing in machine code and blow out of the water anything written in a high-level language. You need to program in machine code to get the performance."

He doesn't hesitate to call himself a software artist, and dismisses those who criticize computer art.

"I have no problem with the designation of software artist. I firmly believe that it's possible to give a piece of myself to my customer, to almost have my personality in the product," he says. "Features and creativity can be conveyed. And I think when you start giving the buyer of your product a piece of yourself, that's what creates the real designation of artist."

What's the best way for computer users to find the graphics software they will want to use at home or in the office? Get a demonstration before you buy if at all possible, Gibson advises. Look at its capabilities and decide if they really show you what you need to use.

One of the most important functions to have in graphics software—in fact, for any software—Gibson calls the "Undo" feature.

"Anything the user does, he can go, 'Oh shoot. That's not what I wanted.' He pushes the Undo button and it steps backward. Koala has that on its software; it's called an Oops button on the menus," says Gibson.

"In my case [with the Gibson Light Pen], the ability to refill a pattern is an Undo. You can have an explicit Oops feature or it can be built intrinsically into the software so that it's easy to recover from any mistake you make. In other words, it just exists as a part of what makes the system easy to use, fun, and relaxing."

Gibson credits software designer Bill Budge, who created the acclaimed *Pinball Construction Set* for Electronic Arts, with being one of the most creative forces in microcomputer software development.

"Electronic Arts has taken a very high visibility approach toward popularizing its artists. And they've generated a great deal of PR," Gibson says. "I think Budge has repeatedly demonstrated innovation in his work. *Pinball Construction Set* was a beautiful piece of work."

That is the sort of creativity, inspiration, and program depth Gibson says he's tried to bring to the Gibson Light Pen System.

Gibson has moved his programming efforts into the area of computer animation, and is even thinking of developing hardware that will enhance the computer's capability to handle animation.

He laughs good-naturedly at his present hectic pace. "I can guarantee you that you haven't seen the last of me." ☺

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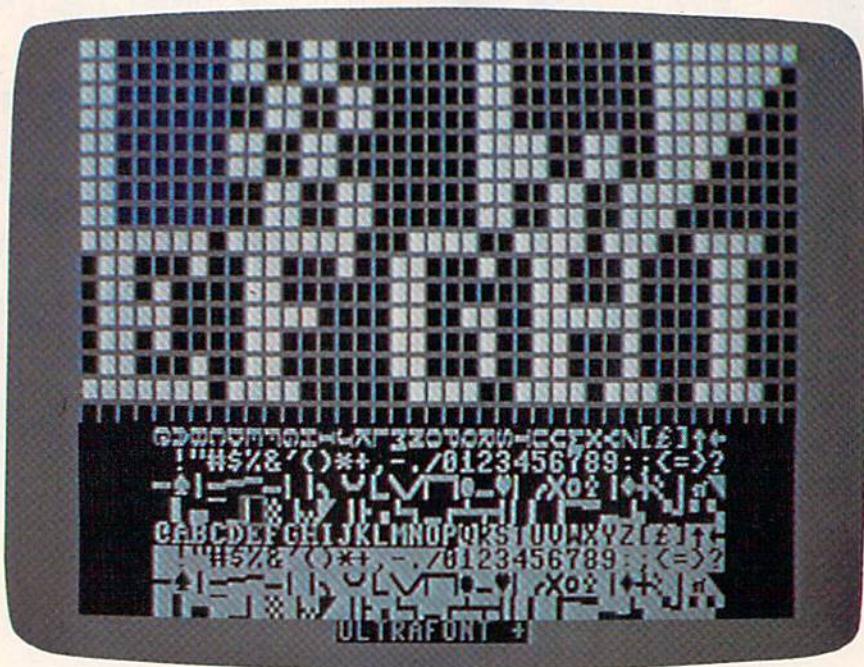
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Ultrafont +

Charles Brannon, Program Editor

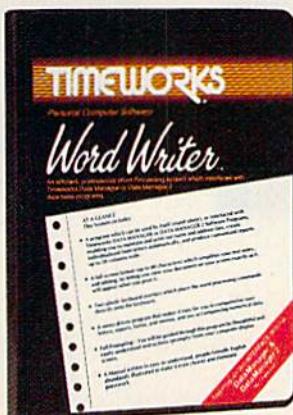


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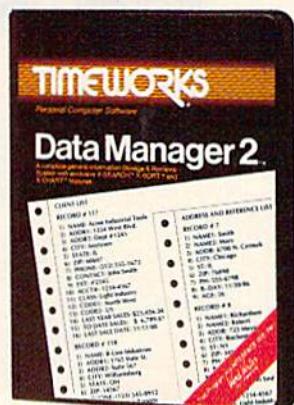
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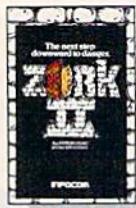
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Typing It In

Ultrafont + is written entirely in machine language, giving you speed and efficiency that BASIC can't match. While this gives you a product of commercial quality, it does carry the liability of lots of typing. The program is actually rather short, using less than 4K of memory at hexadecimal location \$C000 (49152), which is reserved for programs like this one. Therefore, you don't lose one byte of BASIC programming space.

However, 4,000 characters require three times as much typing, since each byte must be represented by a three-digit number (000-255). With that much typing, mistakes are inevitable. To make things manageable, we've prepared Ultrafont + to be typed in using MLX, the Machine Language Editor. Full instructions are provided in the MLX article in the back of the magazine. So, despite the typing, rest assured that a few afternoons at the keyboard will yield a substantial reward.

Once you've entered, saved, and run MLX, answer the two questions, starting address and ending address, with 49152 and 52367, respectively. After you've saved the program with MLX, you can load it with LOAD "filename",1,1 for tape or LOAD "filename",8,1 for disk. After it's loaded, enter NEW, then SYS 49152. This command runs the machine language program at \$C000 ($12 \times 4096 = 49152$).

The Display

After you SYS to Ultrafont +, you should see the work area. At the bottom of the screen are eight lines of characters. These are the 256 characters you can customize, arranged in eight rows of 32 characters. A flashing square is resting on the @ symbol, the home position of the character set. Above the eight rows is the main grid, a blown-up view of ten characters. The last row of the

screen is reserved for messages. The first time you SYS 49152, you'll be asked whether you want to edit the uppercase/graphics character set, or the lowercase set.

About The Grid

The grid is like a large-size window on the character set. You see the first five characters and the five beneath them. A large blue cursor shows you which character you are currently editing, and a smaller flashing square is the cursor you use to set and clear pixels in order to draw a character.

Moving Around

You can use the cursor keys (up, down, left, right) to move the large blue cursor to any character you want to edit. If you move to a character not on the large grid (out of the window), the window will automatically scroll to make the character appear. You can also look at the bottom of the screen to move the larger cursor, as the flashing square on the character set moves with the main grid.

The HOME key moves the small cursor to the upper-left corner of the screen. If you press it twice, it will take you back to the top of the character set—to @.

A joystick (plugged into port 2) moves the small cursor within the grid. If you move the cursor out of the current character, the blue cursor will jump to the next character in whatever direction you want to move. The display at the bottom will adjust, and the grid will scroll as necessary. This means that you can ignore the traditional boundaries between characters, and draw shapes as big as the entire character set (256 x 64 pixels—a pixel is a picture element, or dot). You can still edit one character at a time, or make a shape within a 2 x 2 box of characters.

The fire button is used to set and clear points. When you press fire, if the cursor is resting on a solid square, it will be turned off. If the square is off, it will be turned on. If you hold down fire while you move the joystick, you can stay in the same drawing mode. If you set a point, you will continue to draw as you move. If you clear a point, you can move around and erase points all over the screen.

If the drawing cursor is too fast or too slow to use, just press V to set the cursor velocity (speed). Answer the prompt with a speed from 0 (slow) to 9 (too fast for practical use).

Manipulations

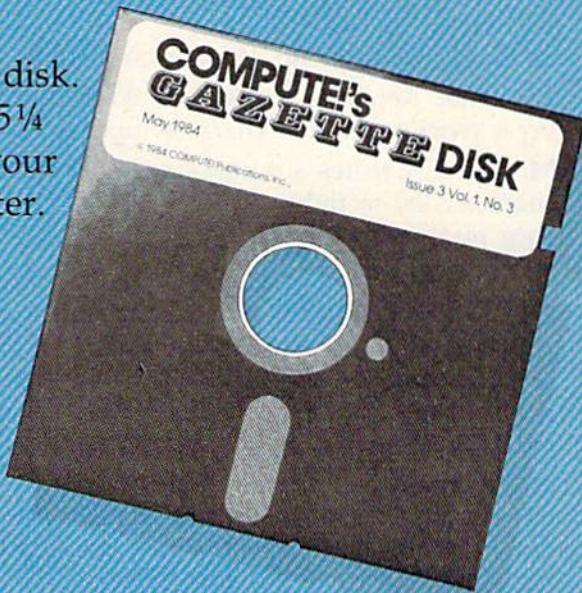
There are several functions that affect the current character (where the blue box is). You can rotate, shift, mirror, reverse, erase, replace, and copy characters. The best way to learn is to play with

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f3: Scroll character down. All pixels move down. The last row of pixels wraps around to the top.

f4: Scroll character up. Wraparound is like f3.

R: Rotate. Rotates the character 90 degrees. Press twice to flip the character upside-down.

M: Mirror. Creates a mirror image of the character left to right.

CLR (SHIFT-CLR/HOME): Erases the current character.

CTRL-R or CTRL-9: Reverses the character. All set dots are clear, and all empty dots are set. The bottom half of the character set is the reversed image of the top half.

CTRL-back arrow: This causes the lower half of the character set to be the inverse of the upper half. This way, you only have to re-draw the normal characters, then use CTRL-back arrow to create the inverse set.

F: Fix. Use this if you want to restore the normal pattern for the character. If you've re-defined A, and press F while the blue cursor is on the character, the Commodore pattern for A will be copied back from ROM.

T: Type. This lets you try out your character set. The screen clears, with a copy of the character set provided for reference. You can type and move the cursor around, just as in BASIC. This is handy for envisioning sample screens, and fitting together multiple-character shapes. Press the RUN/STOP key to exit from Type and return to Ultrafont +.

Saving And Loading Character Sets

To save your creation to tape or disk, press S. Then press either T for tape or D for disk. When requested, enter the filename, up to 16 characters. Don't use the 0: prefix if you're using a disk drive (it's added for you). The screen will clear, display the appropriate messages, and then return to the editing screen if there are no errors. If there are errors, such as the disk being full, Ultrafont + will read the disk error message and display it at the bottom of the screen.

Press a key after you've read the message and try to correct the cause of the error before you save again. The computer cannot detect an error during a tape SAVE.

To load a character set previously saved, press L and answer the TAPE OR DISK message. Enter the filename. If you're using tape, be sure the tape is rewound and ready. After the load, you will be returned to the editing screen, and a glance is all it takes to see that the set is loaded. If an error is detected on tape load, you will see the message ERROR ON SAVE/LOAD. Once again, if you are using disk, the error message will be displayed. Press a key to return to editing so you can try again.

Copying And Moving Characters

You can copy one character to another with function keys 7 and 8. When you press f7, the current character will flash briefly, and it will be copied into a little buffer. Ultrafont + will remember that character pattern. You can then position the cursor where you want to copy the character and press f8. The memorized character will then replace the character the cursor is resting on. You can also use the buffer as a fail-safe device. Before you begin to edit a character you've already worked on, press f7 to store it safely away. That way, if you accidentally wipe it out or otherwise garble the character, you can press f8 to bring back your earlier character.

Creating DATA Statements

A very useful command, CTRL-D, allows you to create DATA statements for whatever characters you've defined. Ultrafont + doesn't make DATA statements for all the characters, just the ones you've changed. After you press CTRL-D, Ultrafont + adds the DATA statements to the end of whatever program you have in BASIC memory. If there is no program, the DATA statements exist alone.

You can LOAD Ultrafont +, enter NEW to reset some BASIC pointers, LOAD a program you are working on, then SYS 49152 to Ultrafont + to add DATA to the end of the program. The DATA

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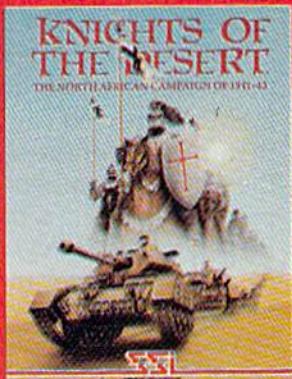
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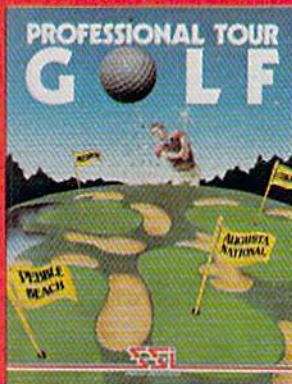
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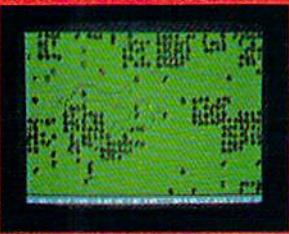
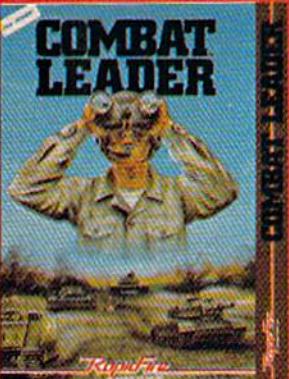
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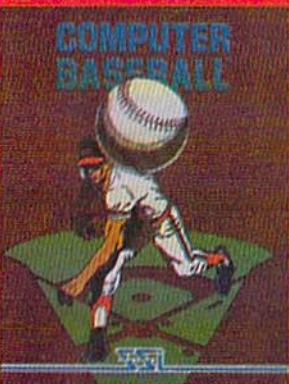
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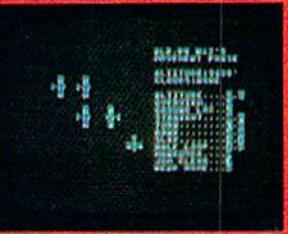
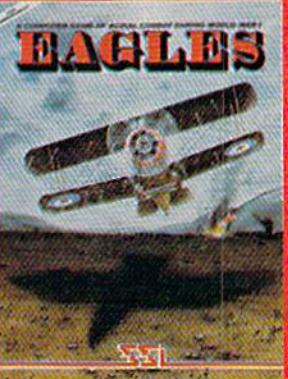
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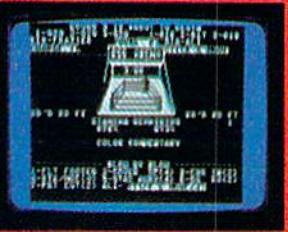
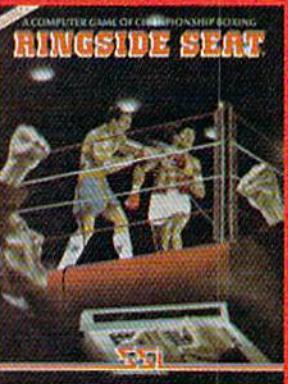
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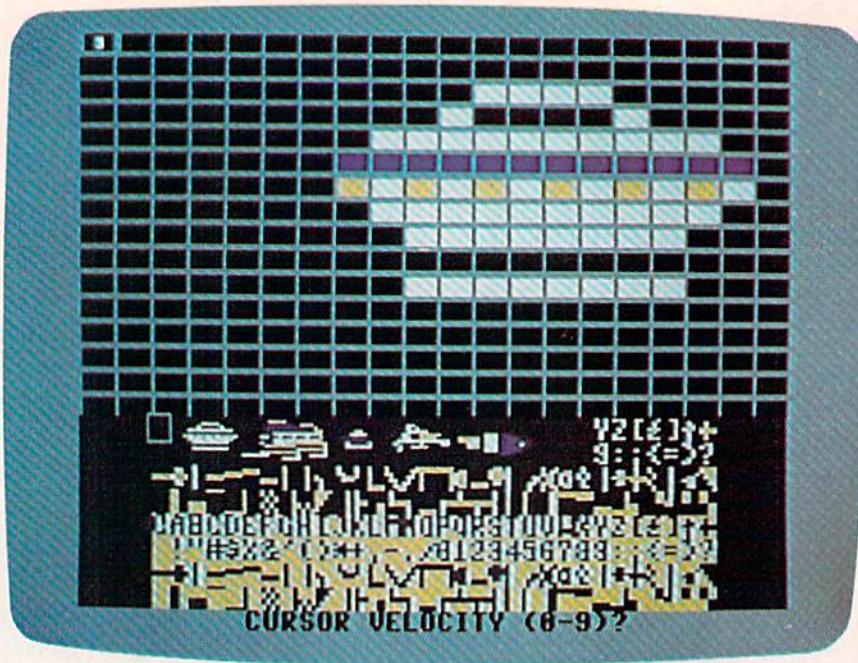
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Creating multicolor characters for use in a game.

statements always start at line 60000, so you may want to renumber them. If you press CTRL-D twice, another set of DATA statements will be appended, also numbered from line numbers 60000 and up. Since the keys repeat if held down, just tap CTRL-D. If you hold it down, you may find a hundred DATA statements have been created! See the notes at the end of this article for more details on using the DATA statements in your own programs.

Exiting Ultrafont +

After you create the DATA, you'll still be in Ultrafont +. If you want to exit to see the DATA statements or go on to other things, press CTRL-X. The screen will reset to the normal colors and you'll see READY. If you've made DATA, a LIST will dramatically reveal it. I recommend you enter the command CLR to make sure BASIC is initialized properly after creating DATA statements. One thing to watch out for: Don't use RUN/STOP-RESTORE to exit Ultrafont +. The program moves screen memory from the default area at 1024, and the RUN/STOP-RESTORE combination does not reset the operating system pointers to screen memory. If you do press it, you will not be able to see what you are typing. To fix it, type blind POKE 648,4 or SYS 49152 to reenter Ultrafont + so you can exit properly.

Re-entering Ultrafont +

To restart Ultrafont + within the program, press SHIFT-RUN/STOP. After you've exited to BASIC, you can rerun Ultrafont + with SYS 49152. You'll see the character set you were working on previously, along with the message USE ROM SET? (Y/N). Usually, Ultrafont + will copy the ROM character patterns into RAM where you can change them. If you press N, however, the set you were working on previously is left untouched. Press any other key, like RETURN, to reset the characters to the ROM standard. You can copy either the uppercase/graphics set from ROM, or the lowercase set.

A Whole New World Of Multicolor

We're not finished yet. There is a yet another mode of operation within Ultrafont +, the multi-

color mode. In multicolor mode, any character can contain up to four colors (one has to be used for the background) simultaneously. Multicolor changes the way the computer interprets character patterns. Instead of a 1 bit representing a solid pixel and 0 representing a blank, the eight bits are organized as four pairs of bits. Each pair can represent four possibilities: 00, 01, 10, and 11. Each of these is also a number in decimal from 0-3. Each two-bit pattern represents one of the four colors. Programming and using multicolor characters is described in "Advanced Use of Character Graphics," found in *COMPUTE!'s First Book of 64 Sound and Graphics*.

Ultrafont + makes multicolor easy. You don't have to keep track of bit pairs any more than you have to convert binary to decimal. Just press f5 and—presto! The whole screen changes. The normal characters are rather unrecognizable, and the drawing cursor is twice as wide (since eight bits have been reduced to four pixel-pairs, making each dot twice as wide). You only have four dots horizontally per character, but you can easily combine many characters to form larger shapes.

Multicolor redefines the way the joystick and fire button work. The fire button always lays down a colored rectangle in the color you are currently working with. The color it lays down is shown in the center of the drawing cursor. Press



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the number keys 1,2,3, or 4 to choose different colors to draw with. The number of the key is one more than the bit pattern, so color 1 is bit pattern 00, and color 4 is bit pattern 11. When you first SYS to Ultrafont +, the four colors show up distinctly on a color TV or monitor.

You can easily change the colors. Just hold down SHIFT and press the appropriate number key to change that number's color. You will see the message PRESS COLOR KEY. Now press one of the color keys from CTRL-1 to CTRL-8 or Commodore-1 to Commodore-8. Hold down CTRL or the Commodore logo key as you do this. Instantly, that color, and everything previously drawn in that color, is changed.

Three of the colors (including 1, the background color) can be any of the 16 colors. But because of the way multicolor works, color 4 (represented by bit pattern 11, or 3 in decimal) can only be one of the 8 CTRL-colors. Assigning it one of the Commodore logo colors just picks the color shown on the face of the color key. Incidentally, it is the color of bit pattern 3 (color 4) that changes according to the character color as set in color memory. The other colors are programmed in multicolor registers 1 and 2 (POKE 53282 and 53283), so all characters share these two colors. When you want to vary a certain color without affecting the rest of the characters, you'll want to draw it in color 4.

Some of the commands in the multicolor mode aren't as useful as others. You have to press f1 and f2 twice to shift a character, since they only shift one bit, which causes all the colors to change. You can use CTRL-R, Reverse, to reverse all the colors (color 1 becomes color 4, color 2 becomes color 3, and color 3 becomes color 2). R: Rotate changes all the colors and is rather useless unless you press it twice to just turn the character upside down. M: Mirror will switch colors 2 and

3, since bit pattern 01 (color 2) becomes 10 (color 3). You can still copy characters using f7 and f8 (see above).

Returning To Normal

You can switch back instantly to the normal character mode by pressing f6. If you were drawing in multicolor, you can see the bit patterns that make up each color. Multicolor characters look just as strange in normal mode as normal characters look in multicolor.

If you changed colors in the multicolor mode, some of the colors in the normal mode may have changed. You can change these colors as in multicolor mode. Press SHIFT-1 to change the color of the empty pixels, and SHIFT-3 to change the color of the eight rows of characters. Use SHIFT-2 to change the color of the on pixels.

Quick Reference: Ultrafont + Commands

Cursor keys:	Move to next character
HOME	
(CLR/HOME):	Moves the cursor to upper left corner
V:	Press twice to go back to start
f1:	Cursor velocity; answer from 0 (slow) to 9 (fast)
f2(SHIFT-f1):	Scroll right with wraparound
f3:	Scroll left
f4(SHIFT-f3):	Scroll down
R:	Scroll up
M:	Rotate 90 degrees; press twice to invert
SHIFT CLR/HOME:	Mirror image
CTRL-R, CTRL-9:	Erase current character
CTRL-, CTRL-F:	Reverse pixels
F:	Copy first four rows of characters, inverted, to bottom four
L:	Fix character from ROM pattern
S:	Load. Tape or Disk, Filename
T:	Save. Tape or Disk, Filename
	Typing mode; RUN/STOP to exit
f7:	Memorize character (keep)
f8(SHIFT-f7):	Recall character (put)
f5:	Switch to multicolor character mode
f6(SHIFT-f5):	Return to normal character mode
CTRL-D:	Make DATA statements
SHIFT-RUN/STOP:	Restart Ultrafont +
CTRL-X:	Exit Ultrafont + to BASIC

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characters. It shows how your program can read the SAVED files directly, without having to POKE from DATA statements. You should still have a good grasp of the essentials of programming characters (see Scott Card's "Make Your Own Characters," also in *COMPUTE!'s First Book of 64 Sound and Graphics*). Ultrafont + is intended as an artistic aid in your creations, letting the computer take over the tedious tasks it is best suited for.

Notes: How To Use The DATA Statements

The DATA statements are created from lines 60000 and up, as many as necessary. Each line of data has nine numbers. The first number is the internal code of the character (the code you use when POKEing to the screen). It represents an offset into the table of character patterns. The eight bytes that follow are the decimal numbers for the eight bytes it takes to define any character. A sample program to read them and display them could be:

```
10 POKE 56,48:CLR
50 READ A:IF A=-1 THEN 70
60 FOR I=0 TO 7:READ B:POKE 12288+A*8+I,B
:NEXT:GOTO 50
```

```
70 PRINT CHR$(147); "10 DOWN":REM TEN CU
RSOR DOWNS
80 FOR I=0 TO 7:FOR J=0 TO 31:POKE 1028+J+I*40,I
*32+J:POKE 55300+J+I*40,1:NEXT:NEXT
90 POKE 53272,(PEEK(53272)AND240)OR12:END
```

You'll also need to add the following line to the end of your DATA statements:

```
63999 DATA -1
```

If you want to have your cake and eat it, too (that is, also have the normal ROM patterns), copy them from ROM down to RAM by adding:

```
20 POKE 56334, PEEK(56334)AND254:POKE 1,PE
EK(1)AND 251
30 FOR I=0 TO 2047:POKE 12288+I,PEEK(5324
8+I):NEXT
40 POKE 1,PEEK(1)OR4:POKE 56334,PEEK(5633
4)OR1
```

See program listing on page 138.

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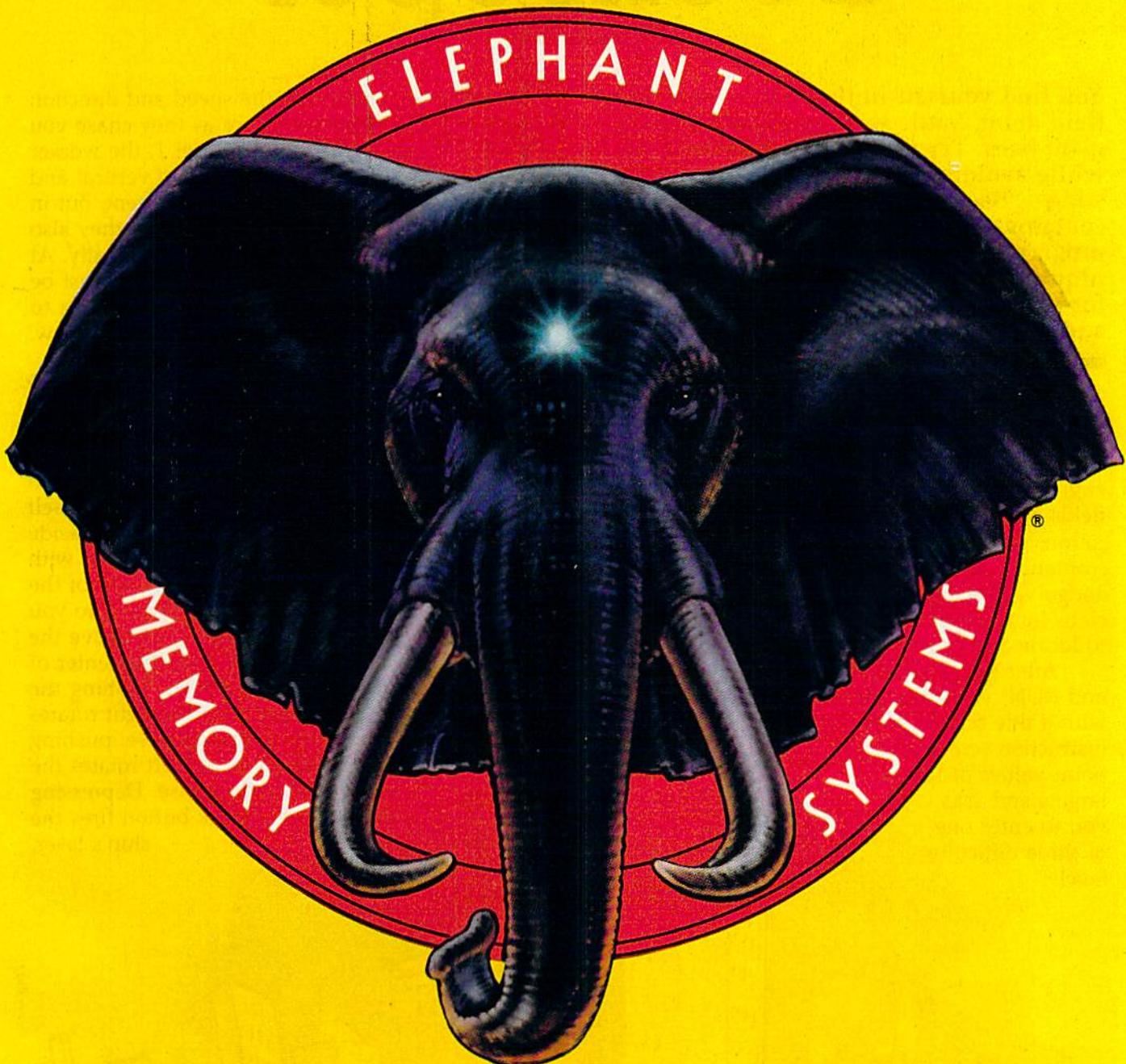


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Beekeeper

Daniel Gray

You find yourself in the middle of a clover field doing battle with some rather nasty giant bees. Try maneuvering to the hive while avoiding the deadly stings. "Beekeeper" also contains some innovative programming techniques. Versions for the VIC-20 and the 64.

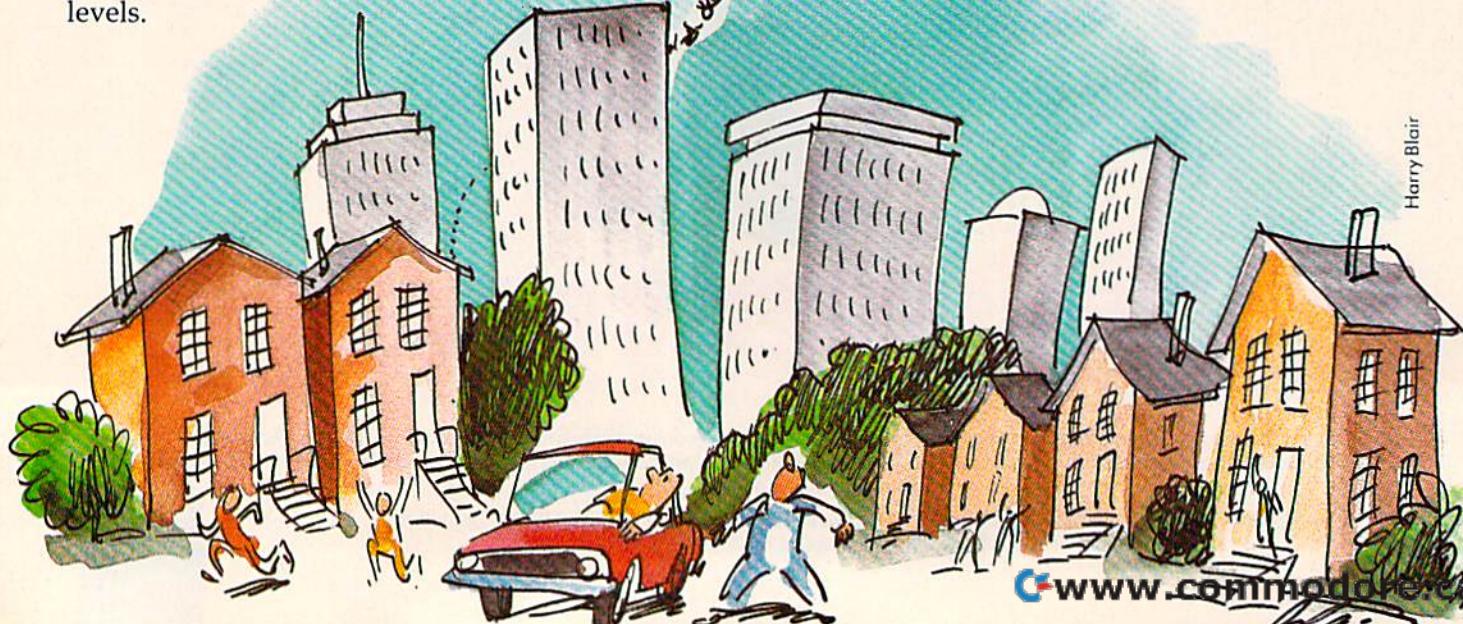
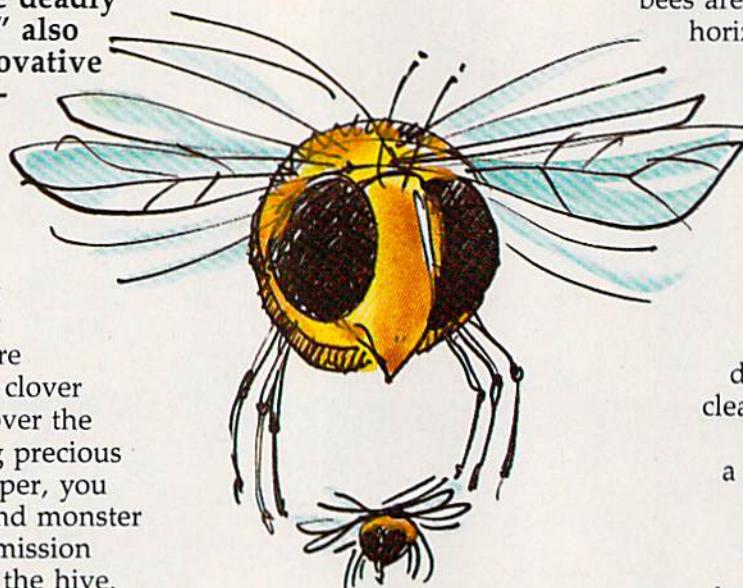
Giant bees are taking over the world. Their enormous beehives are engulfing cities; their clover fields are spreading over the countryside, invading precious croplands. As Beekeeper, you dodge worker bees and monster crabs in a desperate mission to locate and destroy the hive.

After the program is entered and RUN, you are presented with a title screen. Next, an instruction screen tells you the point values of the game targets and asks you to enter one of three difficulty levels.

Each level determines the speed and direction of the worker bees and crabs as they chase you around the clover field. In level 1, the worker bees are confined to vertical and horizontal movement, but in levels 2 and 3 they also move diagonally. At level 3, you must be very quick in order to avoid sting and claw.

The Bees Hunt You Down

Once you've selected a difficulty level, the screen clears and you find yourself in a clover field beside a giant beehive filled with drones. The first of the eight ships given to you appears just above the beehive, near the center of the screen. Pushing the joystick to the right rotates your ship clockwise; pushing the joystick to the left rotates the ship counterclockwise. Depressing the joystick button fires the ship's laser.



Harry Blair

1984



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VIC 20™

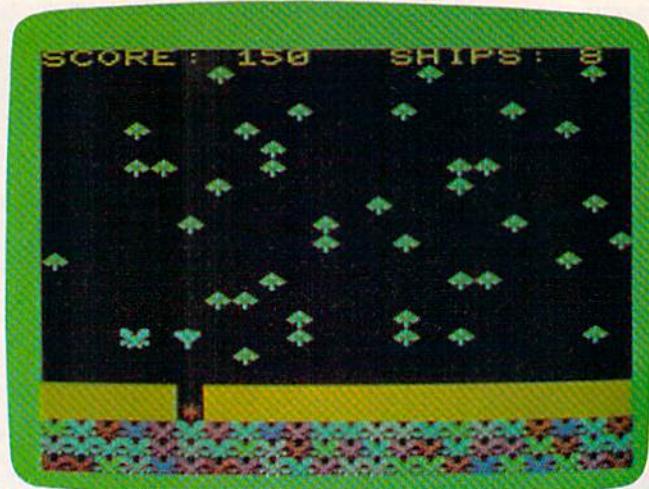
SKYHAWK

Author: Chartec
A quiet European village is attacked, pilot the jet fighter Skyhawk against the attackers.

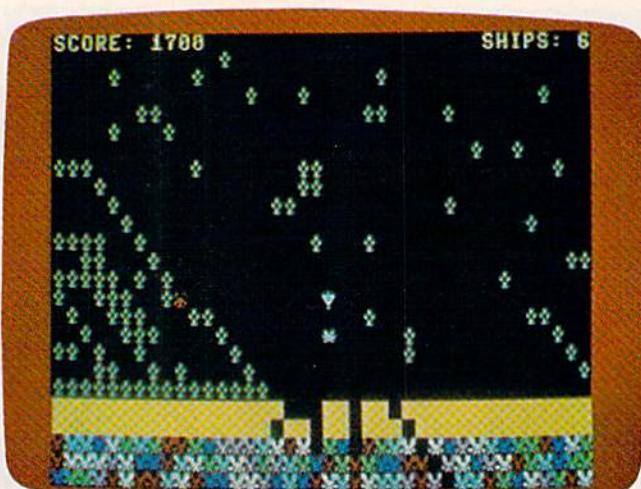
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While the Beekeeper uses the laser on the hive, a huge worker bee gets ready to attack (VIC version).



A monster crab, leaving trails of clover, homes in on the Beekeeper (64 version).

Use The Laser To Score

If you don't control the ship, it will run into the clover or the hive. If you are stung or pinched, your ship is destroyed. Defend yourself with your laser; each worker bee or crab you disable is worth 200 points.

Each block of the hive is worth 50 points and each drone is worth 100 points. You can also fire at clover to get it out of your way (no score). The best way to aim at the hive is by looping around the clover field until you are moving directly toward the target. Continue straight ahead while firing at the hive.

Once all 66 drones in the hive have been exterminated, the screen clears and another field is created, along with more ships. The game is over when all your ships have been destroyed.

Super Expander Version

If you have a Super Expander, you should substitute the lines below for the corresponding lines in Program 1:

```
50 S=RJOY(0) :rem 186
60 REM NOT NEEDED :rem 224
70 IFS<>128THEN130 :rem 227
130 IFS<>4THENIFS<>8THENIFS<>132THENIFS<>
136THEN200 :rem 238
140 CC=1:IFS=4ORS=132THENCC=-1 :rem 45
```

These lines replace POKEs and PEEKs with the Super Expander's RJOY(0) function. Since the function is in machine language, the joystick response is slightly improved.

Also, the Super Expander version requires less memory than the original because several variables are eliminated.

A VIC-20 Keyboard Version

To use the keyboard instead of the joystick, substitute these lines for the corresponding lines in

Program 1:

```
50 S=PEEK(203) :rem 0
60 REM NOT NEEDED :rem 224
70 IFS<>42THEN130 :rem 236
130 IFS<>52THENIFS<>13THEN200 :rem 7
140 CC=1:IFS=52THENCC=-1 :rem 153
600 POKE36879,31:PRINT"[CLR]{RED}{DOWN}
{RIGHT}USE KEYBOARD TO PLAY":PRINT"
{BLU}{DOWN}{RIGHT}BEE"TAB(11)":SPC(5)
"100" :rem 193
```

The keyboard version plays exactly like the joystick version, except that the O, P, and F keys replace the joystick controls. The P key rotates the ship clockwise, the O key rotates it counter-clockwise, and the F key is the fire button.

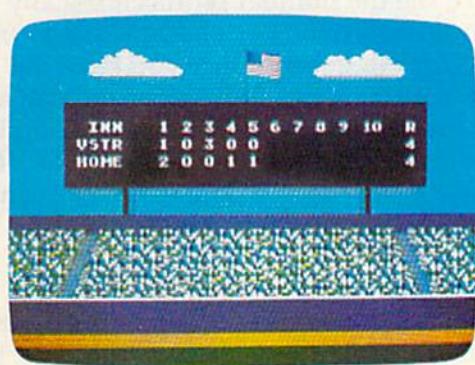
These keys are detected by PEEKing memory location 203 (for the VIC or 64). Each time a key is pressed, a unique number representing that key is stored in location 203 (and in location 197). For example, when F is pressed on the VIC, a 42 is stored in that address. When O is pressed, location 203 will contain a 52, and a 13 is placed in this location when you press the P key. (For the 64, pressing F, O, and P will cause 21, 38, and 41, respectively, to be stored in location 203.)

To change the 64 version (Program 2) from joystick to keyboard control, substitute these lines:

```
50 S=PEEK(203) :rem 0
60 REM NOT NEEDED :rem 224
70 IFS<>21THEN130 :rem 233
130 IFS<>38THENIFS<>41THEN200 :rem 12
140 CC=1:IFS=38THENCC=-1 :rem 157
600 PRINT"[CLR]"SPC(10)"{RED}{DOWN}USE KE
YBOARD TO PLAY" :rem 26
```

Since this process requires fewer variables than the joystick routine, not as much RAM is used. However, the ship is slightly harder to control with the keyboard.

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Mark Cotone
Hi-Res Magazine
May/June 1984



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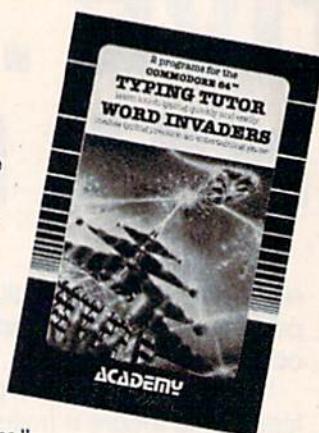
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Programmers: Write to our New Program Manager concerning any exceptional VIC 20™ or Commodore 64™ game or other program you have developed.

If you want to change the keys which control your ship's movement and laser fire, you will need to know the number which represents your new key in location 203. To find the number, type in this one-line program:

10 PRINT PEEK(203): GOTO 10

This simple program is an infinite loop that displays the contents of location 203 onto the screen. When you RUN the program, you will see the number 64 scroll continuously up the screen; location 203 contains a 64 when no key is being pressed. To see the number representing any key, just hold down the key and note the number that scrolls up the screen. Once you have the number of your new key, you can make that key your new fire button by substituting the number in place of the 42 in line 70 of Program 1 for VIC. (For the 64, replace the 21 in line 70 of Program 2.)

A Chart Of Keyboard Codes

You can use this one-line program to make a chart of the numbers representing each key on your keyboard. Hold down each in turn and note the number on the screen. Pressing the following keys does not affect location 203: RESTORE, SHIFT, SHIFT LOCK, CTRL, the Commodore key, and RUN/STOP. Use RUN/STOP to break out of the infinite loop.

Other versions of Beekeeper can be created by manipulating the initial values of the variables. Here is a list of the most useful variables in lines 700-710:

Variable Description

P1	Starting position of ship on screen
SH	Starting direction of ships
SQ	Starting number of ships provided in each level
AQ	Starting number of drone bees in hive for each level
SA	Highest point on the screen that the ship can reach
SE	Lowest point on the screen that the ship can reach

Also, the IF-THEN statement in line 110 can be changed to give your ship's laser a greater range. For example, you can have the laser reach across the VIC screen by changing this statement to:

IF I<21 THEN 90

For the 64 version, substitute the number 39 for 21 in the above statement.

The DATA in lines 840-880 (lines 840-885 for the 64) controls the shape of Beekeeper's user-defined characters. By changing the DATA in these lines, you can create your own characters.

If you prefer not to type in this program, send \$3, a cassette, a note giving the Beekeeper variation you want (VIC version only), and an SASE to:

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See program listings on page 136.

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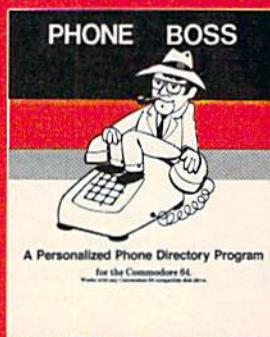
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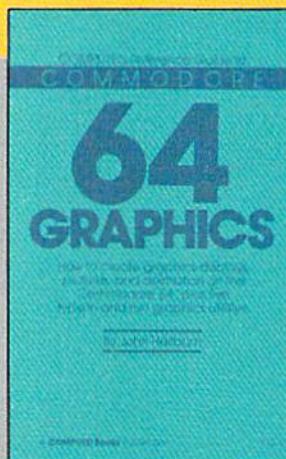


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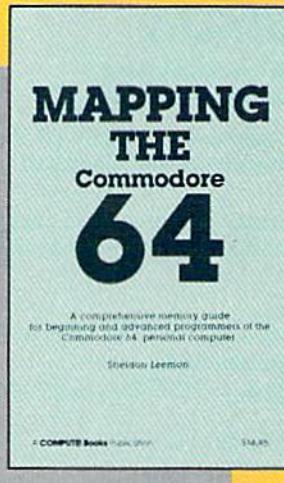
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A comprehensive memory guide for beginning and advanced programmers of the Commodore 64 personal computer.

Stephen Leemon

COMPUTE Books / 1984 / 158 pp.

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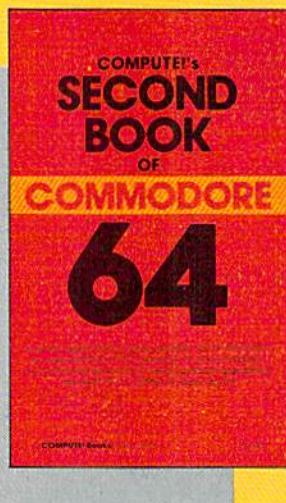
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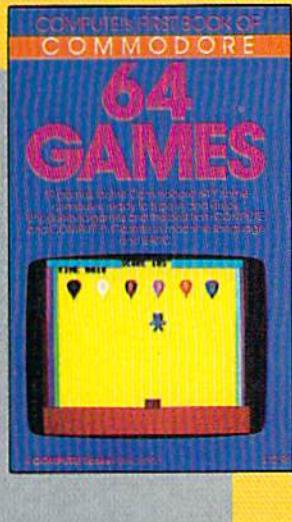
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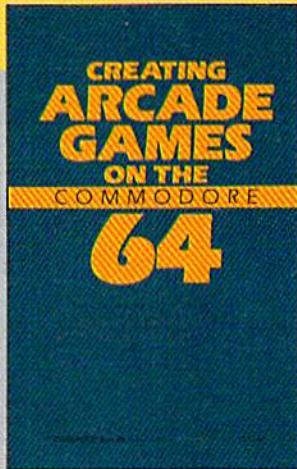
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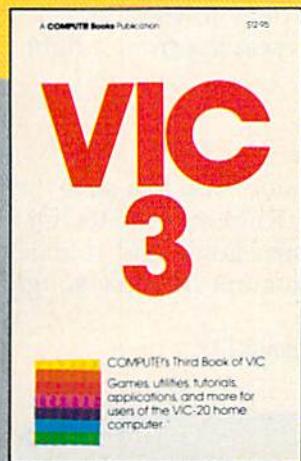
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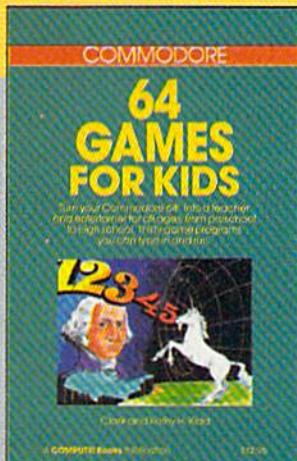
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Bonking Barrels

Bruce S. Gordon

Score points by climbing the girders, but beware the falling barrels. For the VIC and 64.

The goal of this game is to weave your way through a maze of girders and make it safely to the top. But someone (you can't see who) is rolling large barrels in your direction.

"Bonking Barrels" will appeal to those who want to take a break from fast-action games which require quick reactions. There are plenty of safe spots where you can stop and watch the action while you decide on your next move. Some people prefer to play with calculating conservatism, moving slowly from level to level, while others rush upward with wild abandon. The choice is yours.

Keyboard Control

Start at the bottom of the screen with the first of four players. Use the A key to move left, D to move right. When you are underneath a break in the girders, the f3 key allows you to jump up to the next level. You can create an opening at any

time with the f1 key, although doing so will decrease your score. If you reach the top, you start at the bottom of a new screen.

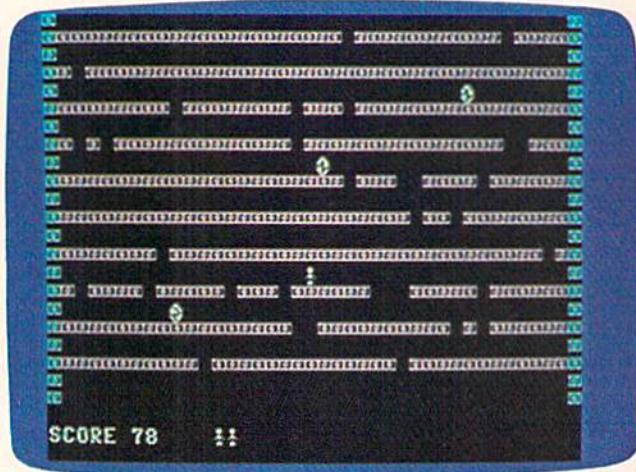
You get two points for each level you climb. Each time f1 is used to blast an opening, you lose five points. Getting bonked costs you eight points. The new score is displayed when you reach the top or when a barrel reaches the bottom of the screen, whichever comes first.

After the first two screens, the number of barrels is randomly selected, which affects the speed of play. In addition, each time a new screen appears, the passageways between levels are placed randomly. Sometimes you will find a level with no openings, and will have to use the blaster. It is also useful for escaping from a tight squeeze.

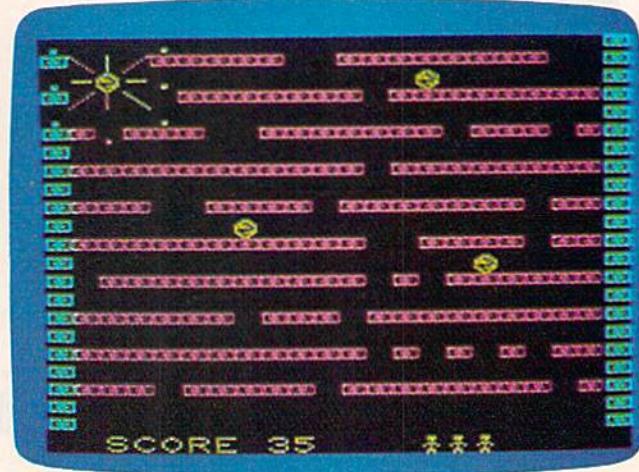
VIC Instructions

When entering the VIC version, you can save memory by leaving out the REM statements. Or delete lines 92-100 (the instructions) and change line 91 to RETURN. The program fits very snugly into an unexpanded VIC.

See program listings on page 142.



The player rests for a moment in a safe area (64 version).



A barrel has bonked the hero in the VIC version.

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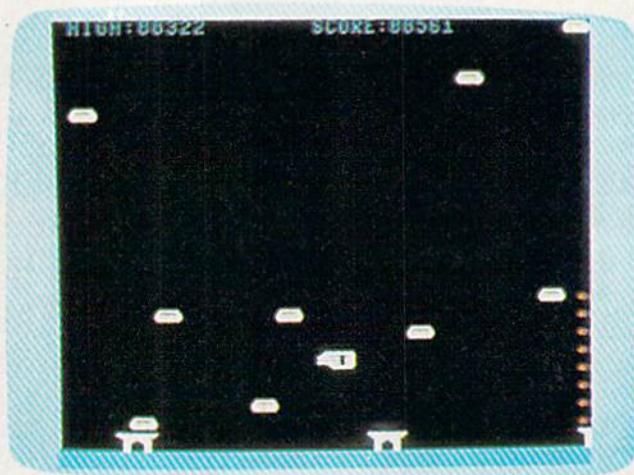
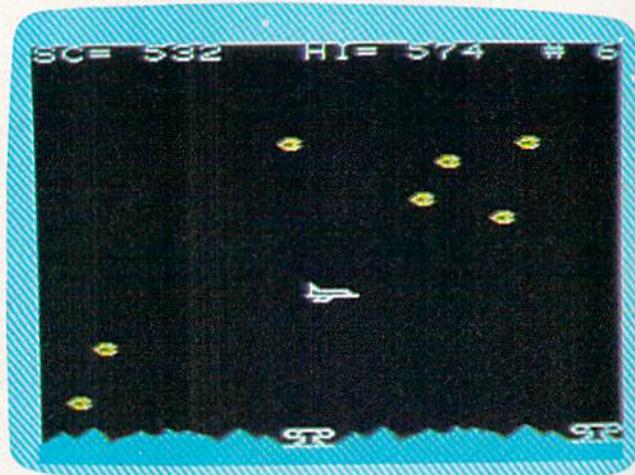
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SPACE PATROL

Salvador Alcántara



In this VIC version, the player must decide to quickly descend and destroy the two ships about to land or move up and attack the new wave of invaders.

You are engaged in a battle in space above your planet, trying to prevent the aliens from landing. If you're to succeed, a good strategy is required. Versions are included for the VIC and 64. Joystick required.

Your mission is to defend your planet from an intergalactic invasion. You are in charge of a space patrol craft which can move up and down the center of the screen. Moving the joystick to the left or right changes the direction the ship is facing. If you hold the joystick in the same position, the surface starts moving in the opposite direction, giving the appearance of motion.

Invader ships appear at the top of the screen and move down at variable speeds; this makes their capture more exciting. The fire button shoots torpedoes in the direction your ship is pointing. Use the torpedoes to destroy invader ships and

The player's ammunition (on the right edge) is running low as the invaders begin to land (64 version).

increase your score. Remember that your ship moves vertically, but you can shoot only horizontally.

Don't Let Them Land

You want to prevent the invaders from landing on your territory. When five alien ships reach the surface, you have failed and the game is over. But you get an extra chance with each 500 points scored in the VIC version. In the 64 version, you get an extra chance with the first 500 points, and an extra chance with each 300 points scored thereafter. The number of remaining chances is indicated in the upper-right corner of the screen and the score is indicated in the upper-left corner. The 64 version also contains a pause feature (f1).

Your score depends on the skill level selected. You earn more points for hitting ships at harder levels. The skill level varies according to the speed and number of invader ships; you get

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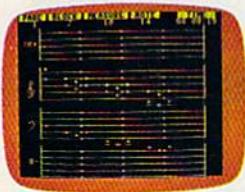


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higher speeds and fewer ships as the level is increased.

The game is not as easy as it seems. In the beginning, you are provided with only 20 torpedoes. Each time you fire you lose one. A column of bombs along the right side of the screen tells you the number of torpedoes remaining. When you shoot all your torpedoes, your ship looks different on the screen (it seems to be empty) and you cannot fire at the invaders.

Find A Supply Base

To obtain a new provision of torpedoes, you must land in one of the supply bases that appear at the bottom of the screen. To reach the supply base, you have to be exactly over the base and move the joystick down. You can't get a new provision of torpedoes until you have finished your current supply.

The new provision is less than the original, depending on the level selected. Each time you visit the bases you receive fewer torpedoes. Five is the minimum you can get.

One of the special features in this game is the moving characters. During program execution the definition of the invader ship in memory is altered. This makes all the ships in the screen change simultaneously, giving them a uniform motion.

Another exciting aspect of the game is the way that the planet surface moves, offering a changing background for the game.

Loading Instructions

"Space Patrol" for the VIC is divided into two parts. Program 1 loads the data for the custom characters into a block of protected memory. This prevents the data from being destroyed when the main program is loaded. After Program 1 is run, it automatically loads and runs the second program. Program 2 is the game itself. For disk you must save Program 2 with the filename "SP". If you are saving to tape you must change ,8 to ,1 in Line 45 of Program 1.

Tape users should type in and save Program 1, then type in Program 2 and save it immediately following Program 1 on the same tape. Again, use "SP" as the filename.

The 64 version of Space Patrol (Program 3) plays the same (except for bonus points, as mentioned earlier) as the VIC version.

I hope you find that these techniques will help you in the design of new and more exciting games. If you reach a bonus score, wait for a great surprise.

See program listings on page 145. 

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Comments

- "This game is one of the best I've seen for the C64 so far." Popular Computing Weekly.
- "With some nice graphics, original sound effects and a very high addictive factor, this one is a must for any C64 owner." Personal Computer Games.
- "A fast action and compelling game which I highly recommend." Personal Computer News.

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A gripping three-part tale of heroism and romance. Can you help **Hideous Bill** pit his wits against the **Gi-Giants** to rescue his true love **Greta**? In the first level of the **Gi-Giants** nest, your task is to save **Greta** (your true love) from becoming ant food. To complete this phase you must crush all the eggs. **Gi-Giant**'s shells are covered in a **poisonous slime**.

In the 2nd Screen – On this level there are **no weapons** to help you. In the 3rd Screen – The object of your true love is now in sight! **Greta** can be seen imprisoned in the **Gi-Giant's tomb**.

Comments

- "This game has been very well designed. All in all a well presented package." Home Computing Weekly.
- "It's very addictive and like Falcon Patrol the use of sound is superb." Which Micro.

Manufacturer's suggested list price

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SPACE AMBUSH

You will be attacked by strangely shaped **mutants** who will try to destroy your ship by either **ramming** or **bombing** it. To defend yourself you have a **fast-firing laser cannon**. At first your **attackers** which appear totally at random, are slow moving and easy to hit. But when hit they split in two, and speed up. Successive mutant waves appear **time after time** and in increasing numbers.

After **24 waves** the re-docking procedure is followed and you then emerge with **twin lasers**! Now the action really speeds up and you will become one of the fastest beings ever to come into contact with a **Commodore 64**.

Comment

- "This is a truly addictive game of the old school, with excellent sound, color, game play – compulsive and heart-racing." Leisure Electronics Trader.



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REVIEWS

Gridrunner II For The VIC-20

Todd Heimark, Assistant Editor

Read the instructions and you almost feel obligated to play:

"It is 100 years after the infamous Grid Wars. You, one of the few survivors of the Gridrunner Squadrons, are sitting watching TV when suddenly an announcement breaks in:

"All pilots with gridrunner experience report to base immediately. This is an emergency!"

"Arriving at base, you are shown into a briefing room, already thronged with pilots. The briefing begins:

"We have brought you here because once again Earth is in danger. The droids have returned—with superior weapons and tactics! We intend to form a new squadron—codename MATRIX—of the best pilots to combat this menace!"

You have been recalled to duty. It would be unpatriotic to refuse. Humankind is depending on you.

The basic idea of Hesware's *Gridrunner II* (originally marketed as *Attack of the Mutant Camels*) is that aliens attack and you fight back. But this game is more than a typical shoot-'em-up arcade-style game.

Traveling The Grid

If you are not familiar with the original *Gridrunner*, you need to understand that Earth depends on huge grids which orbit the planet and provide electricity. Aliens have landed on the grids. It is your duty to eliminate them using your gridrunner, a space-



Droids, bombs, zappers, and the snitch are some of the perils in Gridrunner II.

ship specially designed for travel on the grid.

Using a joystick, move your ship up and down, back and forth. Press the fire button to shoot your cannon. Your bullets travel straight up; you cannot shoot left, right, or down. Hitting an alien ship does not necessarily destroy it: It becomes a pod which eventually develops into a bomb that drops straight down. After you shoot an alien you have a chance to destroy the pod; it takes a few extra shots.

But once it starts dropping, your only option is to get out of the way because your cannon is ineffective against bombs. If you shoot a lot of droids in one section of the screen, expect a tumult of bombs within a few seconds. You soon learn to clear away some safe areas.

The enemy ships enter at the top of the grid, one leading the others, traveling in a long chain (as in *Centipede*). They traverse the screen in a boustrophedon manner. If you shoot a

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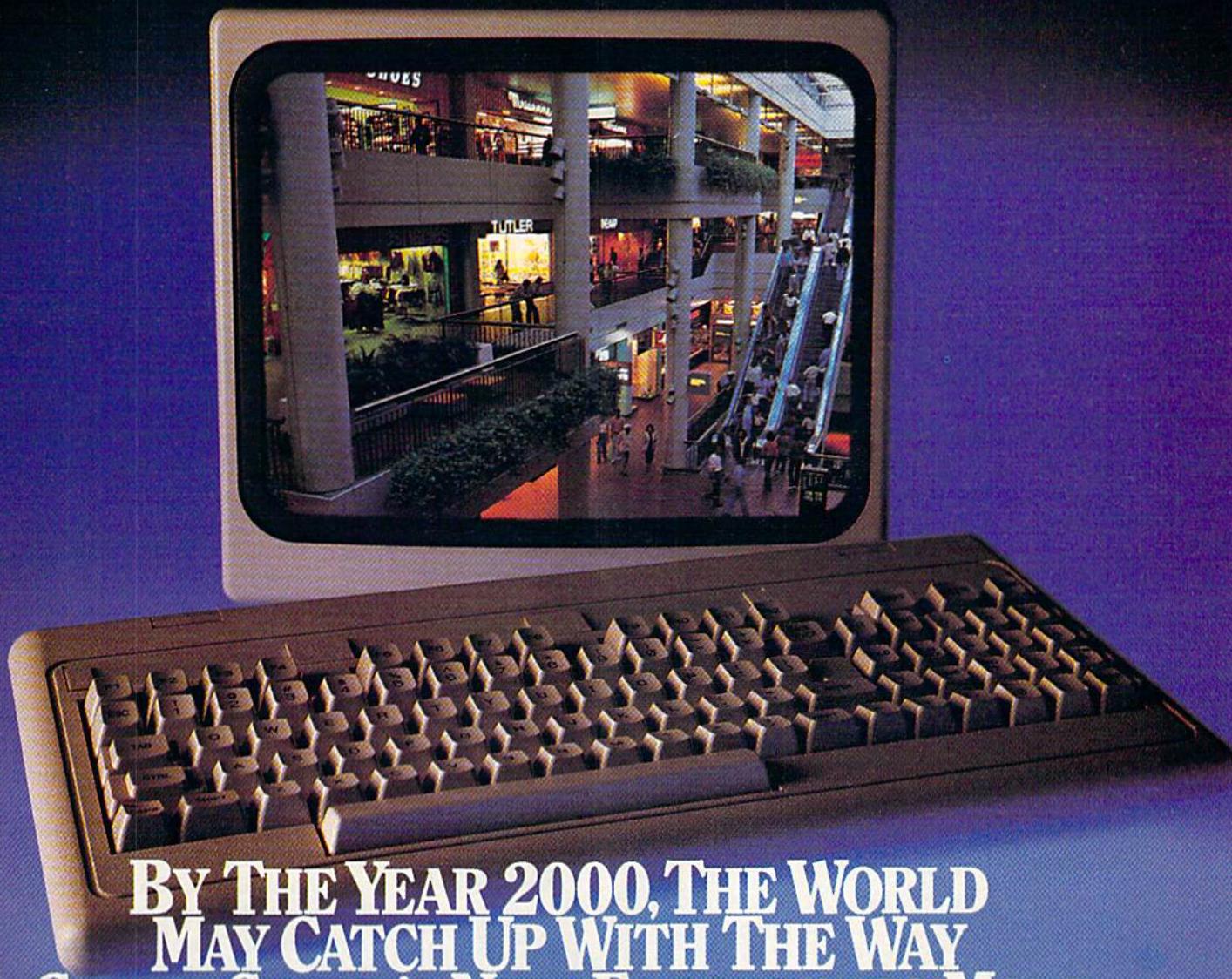
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ship in the middle of the chain, the squad splits into two smaller chains which move in different directions. When a droid ship hits one of the pods, it drops down a notch and reverses course. When it reaches the bottom, it stops moving back and forth and switches to diagonal mode.

The Dangerous Zappers

Battling droids and pods is a snap. To ambush a squad of droids, just let a few go by and, while moving in the same direction, start shooting. The bombs are easily evaded.

But there are complications. The alien invaders have more

weapons in their arsenal.

The X-Zapper moves down the left side of the screen. The Y-Zapper travels from left to right along the bottom. Neither is actually on the grid; you can't attack them. The X-Zapper regularly sends out a short burst. At the same time, the Y-Zapper shoots a laser. Where the two meet, a baby pod is planted. The pod, of course, grows into a bomb.

The pods and the bombs are not the problem, though. The real dangers are the short burst from X and the laser of Y. They zap so fast you have no time to get out of the way.

Fortunately, the zappers follow a regular pattern; once you figure it out, you remember which grid locations pose a danger and when. Unfortunately, the zapper pattern makes it more difficult to ambush the droids. You can't just jump on them from behind, you have to worry about where the next zapper blast is coming from. And, worse yet, you cannot concentrate on the droid waves. Your eyes stray from the aliens to the X-Zapper on the left and the Y-Zapper at the bottom.

And there's more.

The Snitch

You have to watch for the turn-coat humanoid. He has joined the alien side and helps them by running along the top of the grid. When the Snitch is directly above you, he stops. He waves his arms. If you stay where you are, the Y-Zapper sends an extra laser blast directly at you. Instead of staying where you feel

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comfortable, you have to move back and forth out of range of the traitor.

The actions of the Snitch are frustrating, like a little brother who eavesdrops and then reports everything to your parents. The Snitch, after all, is one of us. And we are laboring nobly, trying to save the Earth from total destruction. It hurts when you lose a gridrunner due to treachery.

Fighting against aliens is a standard game concept; you have to shoot them before they shoot you. And the Snitch could have been just another alien, a spotter or tracker or whatever.

But knowing the Snitch is a human, a spy, makes it worse when you are zapped. You are angry at the betrayal and want to get him back to the side of truth and justice.

Psychological Warfare

Looking like recent arrivals from a pack of Camel cigarettes, the mutant dromedaries (perhaps from Andromeda?) meander down the screen individually (unlike the droids, who travel in organized squads).

The Mutant Camels are rumored to be psychological weap-



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ons, designed to confuse and disorient. And they do confuse. First, they're camels who live in outer space. Second, they clutter up the screen and speed up the pace of the game. And, finally, they don't seem to do anything. They don't attack you, they don't drop bombs, they just move down the screen. You can even run into them with your ship; they just bounce off.

You can't ignore them, however. In certain rounds they make the score run backwards. You lose more and more points the longer they stay on the screen.

(According to the game's designer, Jeff Minter, the camels are a tribute to San Francisco radio station KMEL, which broadcasts at 106 FM. And, not so coincidentally, shooting a camel is worth 106 points.)

In later rounds, another psychological weapon is introduced. Deflexors appear on the screen. They're like mirrors. Shoot one and your shot ricochets, often right back at you. The more complicated the game gets, the more careful you have to be.

Twenty Screens, Nine Ships, And Mystery Points

Gridrunner II has 20 different screens, although I've only seen 14 of them. As you would expect, clearing a screen advances you to the next one.

You start with five gridrunner ships. Each time you clear a screen, you are awarded another ship, up to a maximum of nine. With strategic play, a game can last 20 or 30 minutes.

Once in a while, after you clear the screen, you are awarded a mystery bonus. There are certain patterns which tend to lead to a bonus, not moving your ship on the first screen, for example.

The game begins at a simple level, a single squad of droids descending slowly. Level two has two squads. The Snitch appears in level three. In later levels, the Mutant Camels and Deflexors come into play. At the highest levels the droids start out moving diagonally, which is difficult to handle at first.

Gridrunner II uses the VIC's features to maximum advantage. The graphics are superb, the sound effects are very good, and it is challenging. As a basic shoot-'em-up game, it is one of the best.

Gridrunner II

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Flexidraw For The Commodore 64

Daniel Feldman

Visual impact is what you get with the new *Flexidraw* system, a light pen driven, machine language hardware/software package for the Commodore 64. This professional quality, high-resolution (320 by 200 pixel) offering enables you to easily create either freehand or technical drawings on your screen.

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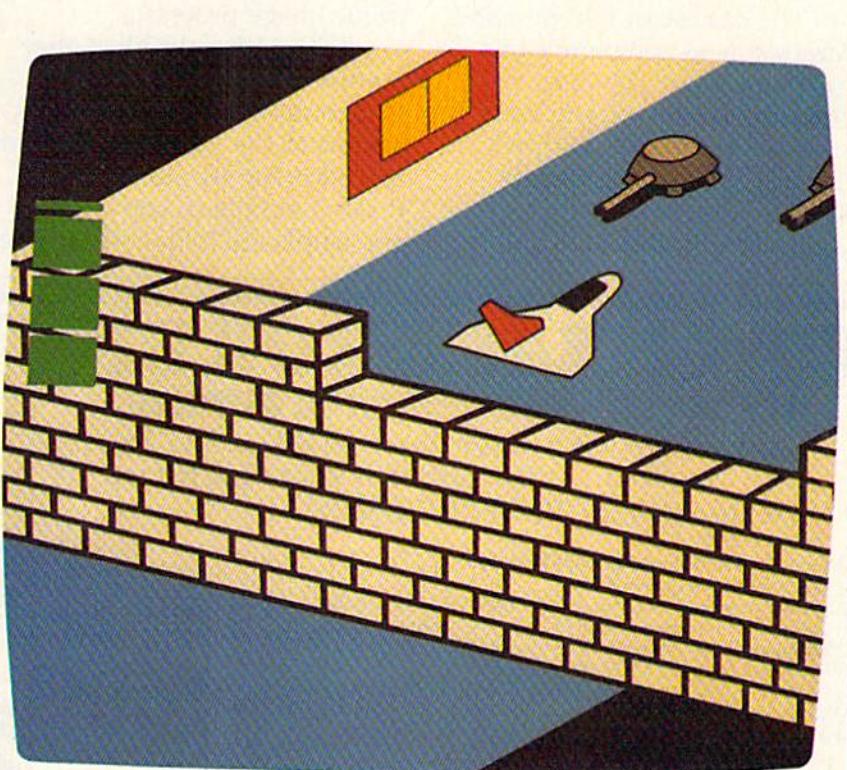
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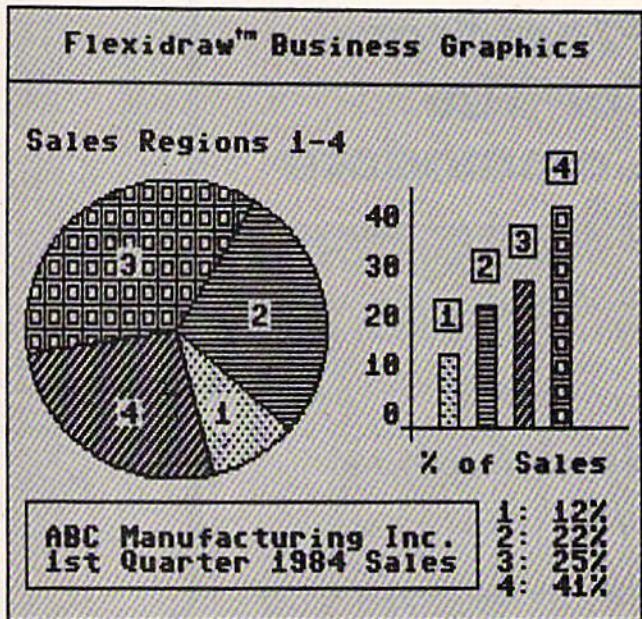
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REVIEWS

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The easiest way to describe Flexidraw is to compare it to a word processor. The most appealing feature of any word processor is the ease with which it permits you to manipulate text. Extend these same powers to images and you have an elec-

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I immediately liked the feature which permits me to electronically create templates similar to the plastic ones found in an art supply store. These make it simple to copy, move, and duplicate frequently needed

shapes or symbols. The software includes musical, architectural, mathematical, and electronic symbol template files. You can also design your own, and build a library of custom shapes.

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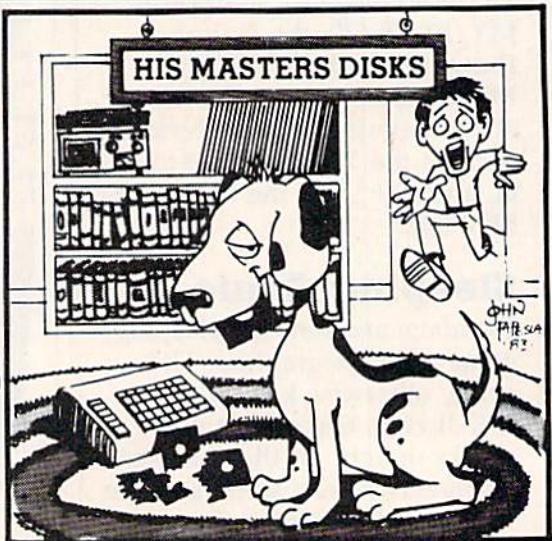
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Electronic Finger

Light pens have been available for some time, but effective software to drive them has been seriously lacking. Inkwell Systems, the developers of *Flexidraw*, have produced both an outstanding light pen and integrated software.

After examining the specifications and internal construction of the light pen, I am convinced that it will probably outlast my 64. It carries a two-year warranty, but more significantly, it has a rated MTBF (mean time between failure) in excess of 91 years of continuous use. In fact, it's the same light pen that Inkwell System's parent company, Design Technology, Inc., supplies with a \$500,000 CAD/CAM system.

The light pen and the 64 communicate via the VIC-II chip, which reads the horizontal and vertical positions of the pen when its tip touches the screen. Contact between pen and screen activates a tiny optical switch inside the pen. The pen's location is then read by a program. Since all of the software is written in machine language, it keeps the 64 well ahead of the fastest operation of the light pen.

ZOOM And Rubber-Banding

Flexidraw comes with a lot of advanced features. It offers two work screens, either freehand or point-to-point drawing modes, instant image inversion, and a rapid fill routine. Lines, circles, and rectangles require only two points to define their shape. The full assortment of 64 text and

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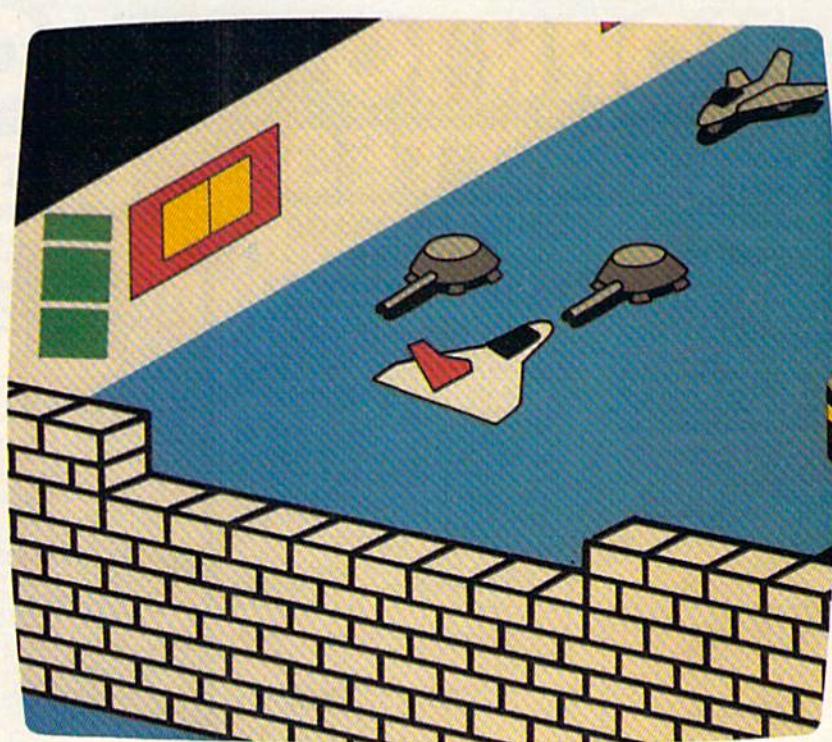
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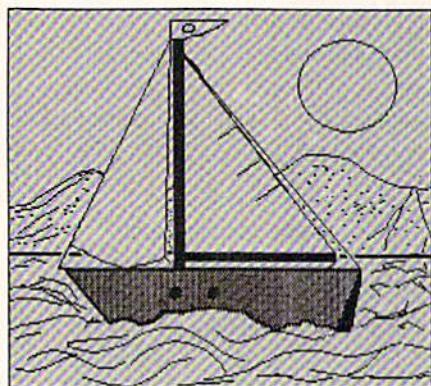
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REVIEWS



graphics characters are available to label your masterpiece.

If you like special effects, Flexidraw has several to make drawing more effective and fun. Zoom provides a 64 times

enlargement which translates a pixel into a character-sized block. At this scale, it is easy to turn individual pixels on and off with the pen. Four-directional scrolling allows you to manipulate other parts of your image while in zoom mode.

A fun technique called "rubber-banding" facilitates drawing lines exactly where you need them. You do this by first fixing a starting point. A line is then drawn, erased, and re-drawn from starting point to the tip of the pen. This gives you an animated display of the line on the screen. When you are satisfied with the position of the

line, you either press a key or touch the LINE menu item to complete it.

The program allows you to draw using one of two grid sizes, or none at all. In grid mode you can also make use of the powerful GET and PUT commands. These are used to copy or move pieces of your drawing. GET copies all or part of your image into an invisible buffer. PUT copies the GET buffer onto one of your work screens.

The extent of the area to be copied is determined by positioning your light pen. For completeness, three different

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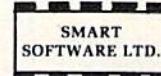
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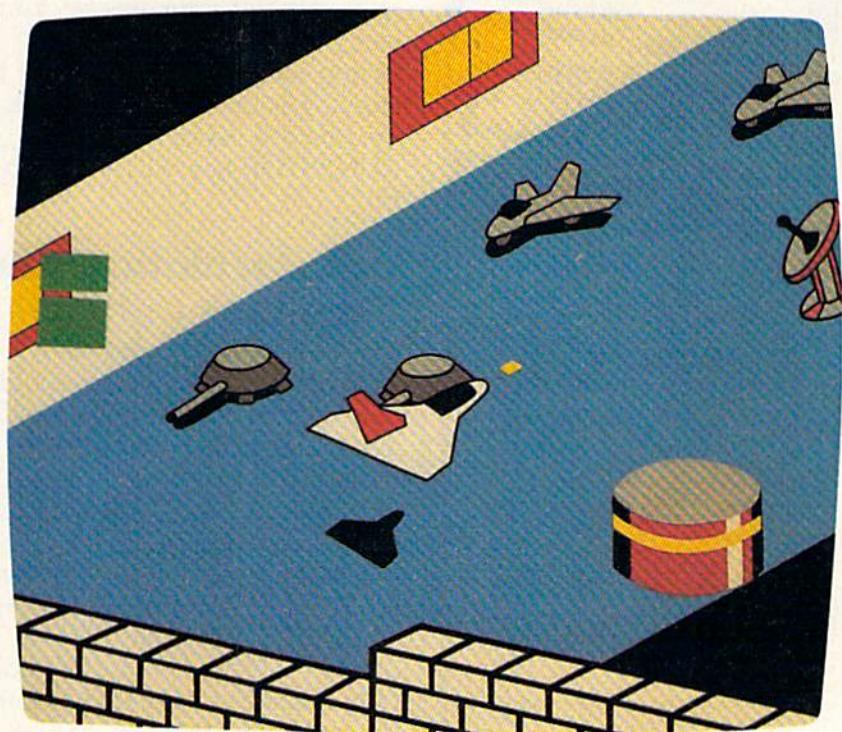
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PUT modes are menu-selectable. These are ABS, OR, or XOR. Together, they give you maximum control over the construction of your images.

Another feature allows you to shade in any of several different patterns with various halftones, cross-hatching, and brickwork patterns. They too are displayed on the on-screen menu. Any of them can be overlaid on the dark portions of your image.

Other useful features include the previously mentioned templates, an averaging function, the spray mode, and crosshairs. Averaging allows you to draw smoother curves, while spray mode allows you to make dotted freehand lines instead of continuous ones. Crosshairs provide a full screen horizontal and vertical row of dots centered on your cursor position. This electronic T-square is useful for making



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REVIEWS

many types of drawings requiring accuracy.

I found *Flexidraw* to be forgiving, too. It allows you to escape halfway through a process if necessary. Erasing is done by first inverting the image and then drawing on the inverted image. In this manner, you can erase any unwanted lines.

Other techniques allow you to erase specified sections of your image. Zoom mode provides precision pixel erasing. Some of the commands do require care in their use. The FILL command, for example, can ruin your picture if you are not careful. This happens if a break occurs in the region being filled. In this case, the fill can spill over most of your image. You can protect against this by saving your image on disk or by copying it into the other work area before using FILL. The RUN/STOP key will also stop a fill.

Documentation And Upgrades

The user manual is generally well written. However, I would have appreciated a separate quick reference card that summarizes the menu functions.

Inkwell strongly recommends that you return the registration card supplied to be informed of updates. System upgrade information and new product information are periodically mailed to registered owners. Inkwell states that the cost of upgrades will be inexpensive.

The newly introduced Micron Eye digital camera is currently being tested in con-

junction with *Flexidraw*. Expect to see a telecommunication enhancement and other marvels in future products. Each addition will be priced separately.

Support Programs

Flexidraw is only one of several programs included in the set. *Flexiplot* allows you to draw lines and plot functions or geometric figures using BASIC. The shapes are fun to play with, and could be useful in learning geometry or calculus. *Flexiplot* images are accessible to *Flexidraw*. This feature makes it a snap to then label or otherwise manipulate your *Flexiplot* image.

Pen Palette, a high-res color painting program, features audio feedback and, of course, is light-pen driven. Animation of your color creation is also possible. Your artwork can be saved and recalled.

Another support program is *Transgraph*, which allows you to send and receive pictures via modem with other 64 users who have *Flexidraw*. *Transgraph* requires use of a 300-baud modem (such as the VICmodem, 1650 Auto Modem, and the HES-modem). The current version works only in black and white.

Also included are a sprite editor and animator, a light pen driven synthesizer, and a piano program. Each of these uses the light pen as a selection device, and are controlled from BASIC programs.

While *Flexidraw* is not a full-scale CAD (Computer Aided Design) tool, it is certainly an exciting development for Commodore 64 owners. *Flexidraw* is a 64 hi-res graphics system with

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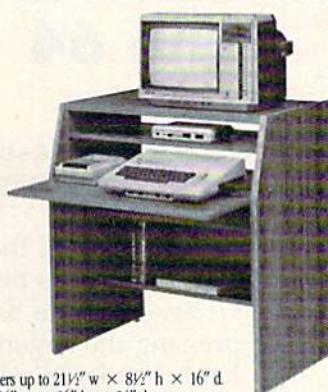
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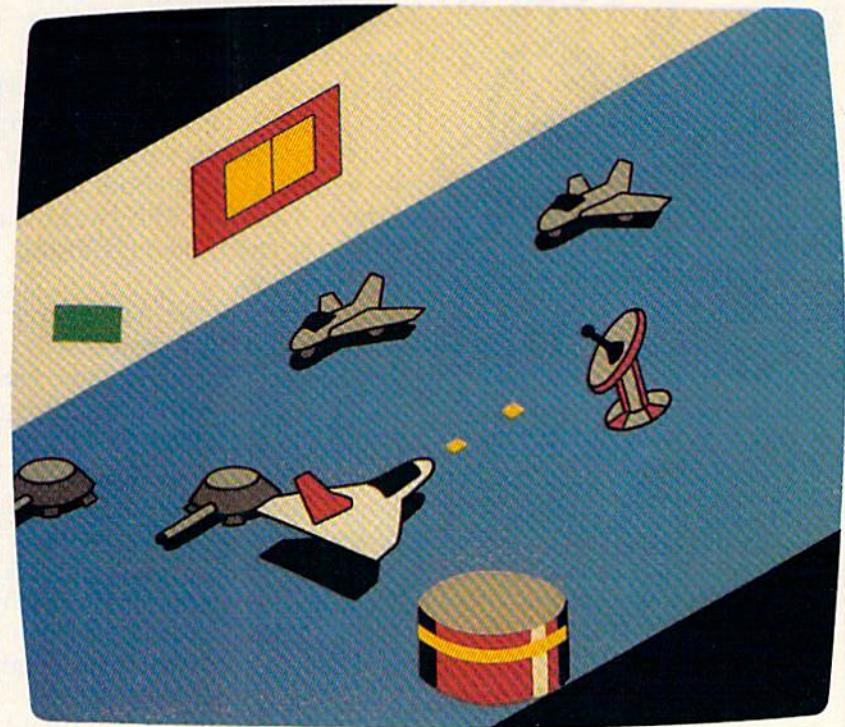
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REVIEWS

International Soccer For The 64

Gregg Keizer, Assistant Editor,
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It's the finals of the World Cup, and the score is tied at three. Holland has the ball, and is pressing the Argentinian defense hard. VanderTuig kicks to his left and passes easily to his forward, DeVries, who drives in toward the goal. He feints, throwing his hips one way, his shoulders another. The ball sails toward the goal, the goalie leaps to block, but the ball just brushes his fingertips. As it's snared by the net, the crowd jumps to its feet. The noise is deafening. And before the clock can run out, fans spill onto the field. VanderTuig embraces his teammate as they shout and scream together. The World Cup of soccer again belongs to the Netherlands.

Except for the names and the crowd-control problems, *International Soccer*, a game cartridge from Commodore for the 64, can easily duplicate this scene. Your players dodge, block, feint, run, pass, kick, and head the soccer ball. You have an entire field's length to work with, six players (one of which you control), a goalie, and a realistic soccer ball which even produces a shadow as it rises and falls over the playing field. If you've ever wanted to play soccer, but just didn't have the energy, or enough friends to field a team, or enough time to

play, you'll find this arcade-quality game addictive.

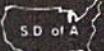
Soccer In A Slot

When you turn the computer on, you see a title screen, and then, a few moments later, two colorful soccer players. If you do nothing, the computer shows you a demonstration game. Setting up the game, however, takes only a few key presses.

The function keys control the various selections you need to make when you first start *International Soccer*. The f1 key selects the uniform color of the right player (representing the team that begins the game defending the goal to the right). Pressing the f1 key repeatedly cycles through the six available uniform colors. Hitting the f3 key chooses the uniform color for the left player. Teams cannot use the same color uniforms and the computer makes sure this doesn't happen.

Use the f5 key to select the type of game you want to play. If you want to have a two-player game, don't press the key. If you can't find an opponent, you can play the computer by hitting the f5 key. The player on the right disappears and is replaced by a number. This is the skill level of the computer's team. Level 1 is fairly easy to beat, even by a beginner, while

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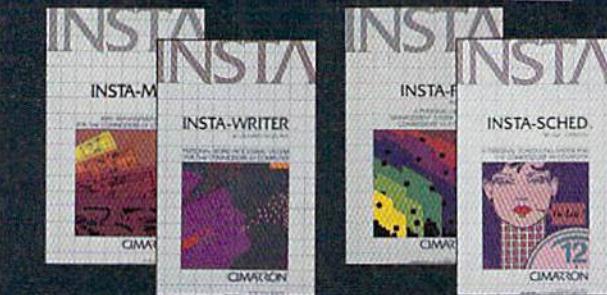
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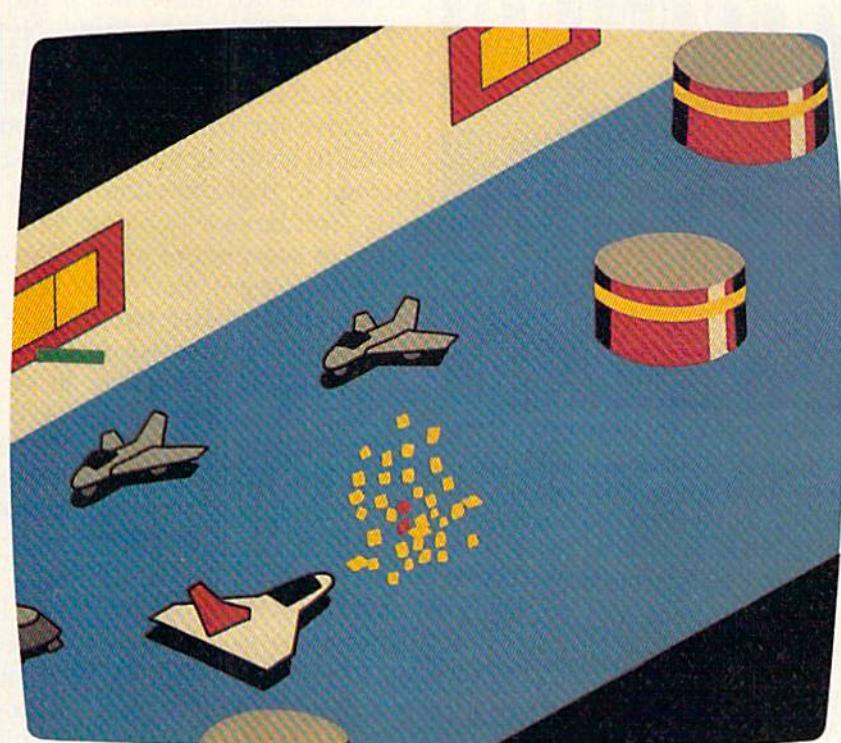


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level 9 seems to consist of the greatest players of all time. Unfortunately, since the computer is using them, you'll have a hard time of it unless you've played the game for quite a while. The last function key, f7, simply turns the players' uniforms to shades of dark and light, rather than bright colors. You could use this if you're playing on a black and white TV.

Once you've selected the colors and opponent, press the fire button on the joystick to start the game. (If you're playing against the computer, plug the joystick into port 2. You need two joysticks if you're playing against a human opponent.) The teams trot onto the field, line up, and wait for the whistle to begin the game. Note which direction your players are facing; that's the way you want to move the ball. The goal you need to score against is off the screen in that direction.

You have two halves of play to score more goals than the other team. Each half is three minutes and twenty seconds long (expressed on the clock as 200 time units). In between halves, the teams leave the field for the dressing rooms, then return. Goals are switched at the half, and possession also changes.

Run, Run, Run

The object of soccer, of course, is to score by passing, kicking, and running the ball toward your opponent's goal. You do that with the joystick. Although you have six animated players, you control only one at a time. That player, chosen by proximity to the ball,

shows in a lighter shade of your team color. If your team color is yellow, for instance, the player you directly control appears in light yellow. Move the joystick, and this player moves in the same direction. Press the fire button to kick the ball in the direction the player is facing.

Players with the ball move slower than players without. You can actually catch a player with the ball from behind, and steal it away. Stealing the ball, almost an art in itself, is something best learned through practice. Usually, if you run beside the player controlling the ball, then cut sharply to the side or kick at the ball, you can take it away. You can even "head" the ball, bounce the ball off a player's head. (Remember that in soccer, you can't use your hands to touch the ball, unless you're the goalie.)

Since the field is larger than the screen, it scrolls as the ball moves left or right. If your controlled player runs off the screen, another player, the one closest to the ball, changes shades and is then controlled by the joystick. The ball is always on the screen. While you control one player, the others move in patterns, usually within a zone. Sometimes they're in the right position for a pass or a shot, other times they're not. The goalie is also computer-controlled. He always moves in the direction of the ball. To attempt a save, all you have to do is press the fire button. The goalie then leaps and tries to block the kick.

Sometimes you'll kick the ball out of bounds. When that happens, an opposing player

REVIEWS

throws the ball back into play (overhanded, no less). Other times the goalie kicks it back into play, or a corner kick is made. To put the ball back into play, press the fire button if your team is throwing or kicking the ball. If you don't press the button, the throw or kick is made for you after a short pause.

Finesse And Timing

Winning an *International Soccer* game does not necessarily require brute strength or speed. You have to retain control of the ball, evade the defense, and pass often. Passing from one player to another is especially challenging. Timing is important here. Kicking the ball at the wrong time can give it to the other team rather than to a well-positioned member of your own team. And since a player without the ball moves faster, you have to constantly practice a downfield passing attack. If you simply run down the field with the ball, chances are your opponent will catch you before you get near the goal. However, if you pass downfield, running towards the goal at the same time, you'll have a better opportunity to get it to a player who's ready to take a shot.

Timing is just as important on defense. Waiting for the right moment to make your goalie leap for the ball, or stealing the ball at just the proper time, can force a turnover and give you the ball.

Joystick control is vital to playing a good game. You learn how to move your player, how to keep the ball away from the other team, how to pass and

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REVIEWS

catch, how to deflect a shot on goal, and how to take possession on a corner or goal kick.

Position is also important. When the ball is thrown in from out of bounds, you need to move your controlled player into an area relatively free of opponents. Otherwise, you may lose possession of the ball. Watching for your other, computer-controlled, players is something you learn with time. Seeing an open man, you can pass the ball and be confident you'll retain control.

Just as in an actual soccer match, you need fast players, good moves, tough defense, and subtle attacks to score. Strategy may seem to be relatively unimportant at first, since so much of your team is not under your direct control. However, after you've played for some time, you'll begin to pick out ways to move the ball more confidently. There do seem to be patterns to the computer-controlled players, and you can make use of those patterns in passing the ball downfield.

Electronic World Cup

Graphically, *International Soccer* is impressive. The animation is realistic and smooth. The sight of the goalie diving for a block is memorable. He even lies on the ground for a moment, as if to catch his breath, before he's back in position. Constantly moving arms and legs, the three-dimensional look of the field, and the shadow beneath the ball all contribute to the excellence of this game's graphics. Sound, though not spectacular, does provide background. The

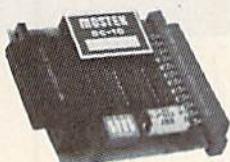
crowd roars appropriately and you can hear the sound as the players kick the ball.

Realism isn't restricted to the animation, however. The game feels like a real soccer match. Your players run up and down the field several times before a goal is even tried, much less made. Play may seem compressed, but all the aspects of actual soccer are here.

Sports games on the screen used to consist of x's and o's which you could set up and maybe even move around. Then animated characters appeared, and you saw perhaps three or four moving at the same time. The rest just seemed to stand around, as if their contracts were up and they wanted to be traded.

This game is as similar to those video dinosaurs as contact football is to that game you once had where plastic players vibrated aimlessly across a shaking metal field. *International Soccer* is a true blend of arcade action and gaming skill. You don't just twist a knob and watch the blip slide across the screen. As in reality, you have to work to win. That's the fun of it.

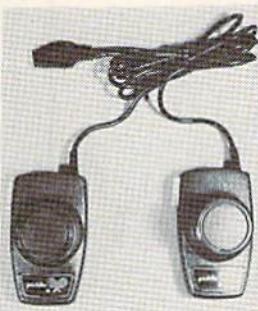
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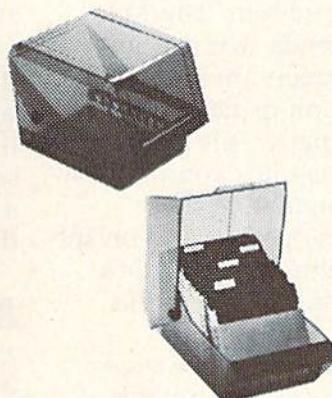
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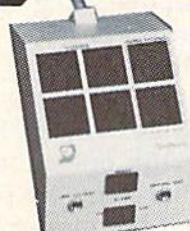
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Computer Thrillers

In Search Of A “Software” Michael Jackson

Fred D'Ignazio, Associate Editor

In my new COMPUTE! book, *Computing Together: A Parent's and Teacher's Guide to Computing with Young Children*, I introduce the concept of a computer "friend." The friend is a replacement for the average computer's dreary, unfriendly operating system (the part of the computer that helps you copy, save, and create files).

The computer friend is similar to the new Apple Macintosh's operating system. The Macintosh operating system pretends that it is an electronic desktop. On the screen are several familiar items you might see on or near a desktop, including pieces of paper, file folders, and a trash can. The Macintosh lets you perform computer operations by manipulating these familiar items by pushing a mouse around on the table. (The mouse is a cigarette-case-sized box with a "mouse tail" cord connecting it to the computer.)

The Macintosh operating system imitates a desktop. My friend operating system imitates a person. When the child turns on the computer and loads the disk, the friend's face appears automatically on the screen. At first, the friend's eyes are closed—the friend is asleep. But a bell rings and the friend wakes up and grins. "Who turned me on?" the friend asks.

The Macintosh has a *Finder* program that goes off and "finds" files for the person. The friend acts as a finder, too. The friend asks the child if he or she wants to play a game. If so, the friend presents the child with a list of games to play (a "file catalog"). Then the child gets to select his or her favorite game. The friend accepts the child's choice, goes off and finds the game and starts it running.

When the child is finished playing the game, the game automatically returns control of the computer to the friend. The friend asks the child if he or she wants to play another game. Or (with some additional commands) the friend might have a conversation with the child and talk about things that are important to the child.

A Computer With Personality

A computer friend program should not be dull. It should be loaded with personality. The friend's personality might stem from the personality of the designer. In the future we might see "designer friends"—like designer jeans. The personality of the friend would reflect the taste and interests of the friend's creator, the software design team.

We might see computer friends whose



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†Turtle Tracks also available in Atari, Apple and IBM versions.
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personality mimicked the personality of a famous movie star or cartoon hero. A family might be able to buy a Mickey Mouse computer friend, a Kermit the Frog friend, a Cat in the Hat friend, or even a Barbie-doll or G.I.Joe friend.

Or, akin to Spinnaker's *Facemaker* program and Designware's *Creature Creator* program, we might see friends that children could create themselves. There might even be a "Build-A-Friend" kit the family could use to install the friend's operating system on their computer.

A Program With Character

Of course, computer friends don't just have to reside in the computer's operating system. They can also come inside games and other programs that children run on the computer.

The key is that the character in the program must be so charming, so energetic and alive that it leaps off the screen!

How many programs have you seen with characters that do that?

In many computer programs (word processors, filing programs, and many games), there are no characters at all. All the action takes place in an artificial environment uninhabited by creatures of any kind, simulated or otherwise.

Many other computer programs contain characters, but they are so small, so narrowly defined, so one-dimensional that they are nothing that a child could warm up to. Most video games fit into this category.

There is a third class of programs that feature characters taken from personalities popular in other media. This is a type of "celebrity software." Unfortunately, in most cases the stars from film, TV, and children's picturebooks do not make a graceful transition to the computer screen. The visual appeal of the characters is substantially reduced, and the characters are relatively lifeless compared to their picturebook or cartoon counterparts. A child can move these dull, blockish characters around on the computer screen (with a touchpad, cursor key, or joystick), but what is the point? The experience, for the child, can hardly compare with the experience of a parent reading a good picturebook or watching a good film or animation.

Software clones of popular stars in other media are sure to be popular, but only because children (and adults) have a great hunger to interact with other lifelike creatures, as opposed to sterile, lifeless icons, spreadsheets, numbers, words, or geometric shapes.

What we really need is a talent hunt for fresh, new stars to grace the computer stage. We need software superstars that are as fascinating and lovable as Michael Jackson and E.T.

Stars Of The Computer Stage

We are seeing the first halting steps toward software characters with star quality. For example, there are the storybook programs, like *Robin's Halloween* and *Sammy the Sea Serpent*, from PDI, on Atari computers. There is Gertrude the Goose, who stars in *Gertrude's Puzzles* and *Gertrude's Secrets*, from The Learning Company. And there is a plump, silly dinosaur, Bagasaurus (or "Baggy"), from the *Learning with Language* package developed by the Children's Television Workshop for the Radio Shack Color Computer.

Here Comes Alf!

And then there's Alf.

Alf is the hero in a new computer game, *Alf in the Color Caves*, from Spinnaker Software. *Alf* is for children ages 3 and up. The first version of the game is for the Commodore 64. The *Alf* cartridge costs \$39.95. For more information, contact:

Spinnaker Software Corporation
215 First Street
Cambridge, MA 02142
617/868-4700

Alf was created by Joyce Hakansson and Associates, Inc. Before setting off on her own, Hakansson worked for Children's Television Workshop and helped to create the excellent Sesame Street computer programs for the Apple II computers.

A lot of work went into Alf. Alf is a simple creature—all feet, head, and nose. But, boy, can he dance! *Time* magazine recently called Michael Jackson the Duke of Dance. Jackson has probably never heard of Alf. But Jackson had better watch out. Alf is a real contender. He is certainly the electronic Duke of Dance.

Alf bounces up and down on his giant feet, spins around, then whirls around, in break dance style, on his index finger. (I have no idea where this finger comes from. After all, Alf has no hands.)

Like Jackson, Alf doesn't just dance, he acts. His body is pure plastic. It vibrates, stretches, bends, and twists to the musical beat. His eyes are hilarious. Sometimes he half-closes his eyes and peeps out at you. Then he looks sneaky and mischievous. Other times he opens his eyes wide. Then he looks charming and innocent.

Alf is a comedian. Everything he does is funny.

The music Alf dances to is just as colorful as he is. It takes full advantage of the Commodore music (SID) chip. When you finish playing this game and walk away, you find yourself humming Alf's tune. It's like whistling the theme song from your favorite movie or favorite rock video from MTV.



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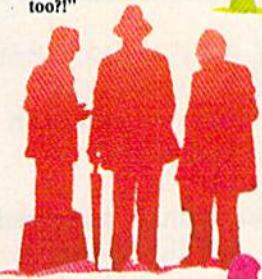
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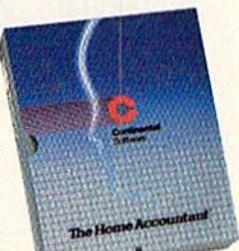
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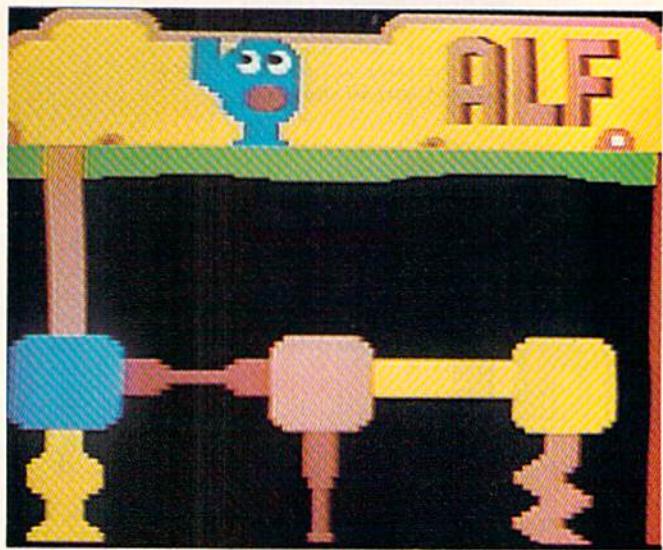
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Software Movies

The action in *Alf in the Color Caves* is important because it can be controlled by a toddler. Unlike most other video games, small children can master this one.

A child uses a joystick to maneuver Alf through the mazelike color caves, while avoiding the shifty-eyed wufflegump creatures. Each time the child takes Alf through the caves, more of the wufflegumps appear. If Alf bumps into a wufflegump he automatically whooshes back to the top of the caves.

It is fun just to watch Alf. But it is a real thrill to control Alf's basic direction (he bumps and swings in all directions, no matter how you push the joystick). Alf is such a neat character, it is exciting just to move him around.

In fact, the *Alf* game is like a small, animated movie—an interactive movie. And the special effects in this movie are terrific. For example, Alf has to climb through passages with lots of different shapes. When he passes through the passages, his body squishes together, his eyes cross, and you hear special sound effects. When Alf passes through a U-shaped passage, it revolves around and around like a swinging door, and you can see poor Alf inside, getting dizzier and dizzier.

The Alf Story

Alf in the Color Caves comes with an illustrated book that explains the educational aspects of the game—how it teaches children cause-and-effect relationships, navigation skills, prediction skills, and pattern recognition skills. The book also has a section full of activities you can do with Alf.

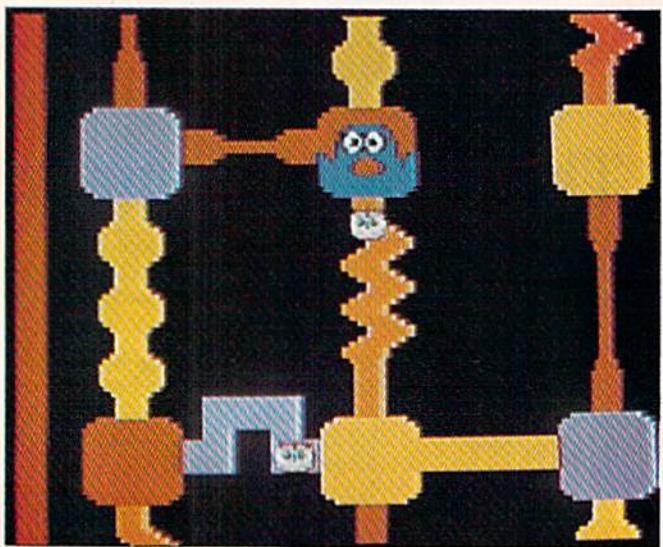
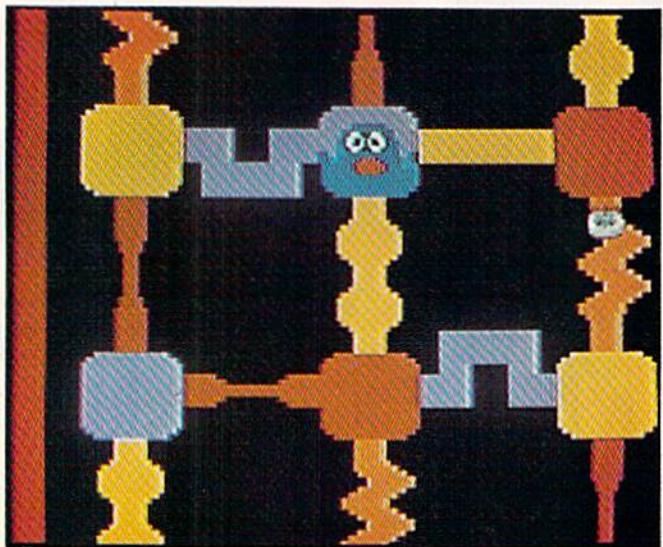
But my favorite part of the book is "The Alf Story," in which we learn, in rhyme, that the grumpy wufflegumps don't just move, they "sniggle" and "slooze."

The story book is very brief, but it further convinces you that Alf is a real character. It is like the novelization of a good movie.

Good For Adults, Too!

It would be nice if children weren't the only people who got to meet Alf. Computer-anxious adults should also get the chance. Alf is so charming he might be able to help them forget their fears about computers.

Also (this is the idea of my friend Mary Umans), since it is easy for adults to maneuver Alf through the color caves, they can concentrate on interacting with Alf himself. Alf is so easy to move around that the adult doesn't have to worry about making a fool of himself. Instead he can concentrate on Alf and his funny twisting,



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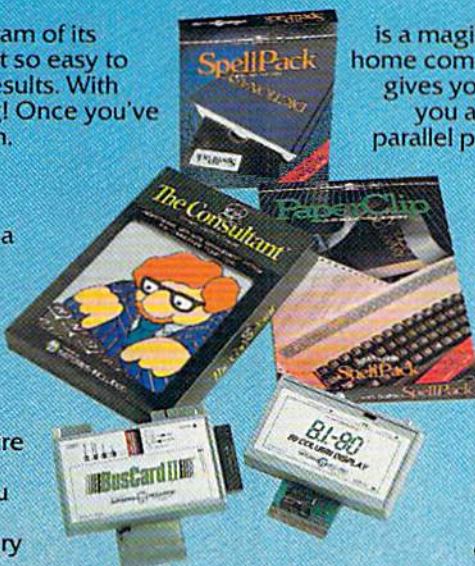
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bumping, and dancing.

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Software characters could be very profitable for a software publisher. If the character delights the public, they will be hungry for sequels, trilogies, even sagas, all involving that same character and set in that character's world.

So, Joyce, what are your plans for Alf? He's cute enough to star in his own series. Hopefully he'll be back soon, dancing across our computer screens. ☺

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SIMPLE ANSWERS TO COMMON QUESTIONS

TOM R. HALFHILL
STAFF EDITOR

QA

Each month, COMPUTE!'s GAZETTE tackles some questions commonly asked by new VIC-20/Commodore 64 users and by people shopping for their first home computer.

Q. What exactly is a memory map?

A. The term implies that it is some kind of road map of the computer's memory. Actually, a memory map is more comparable to a telephone book or city directory. A memory map tells you what occupies each *memory address* in the computer.

There's a common analogy for explaining computer memory addresses. Imagine a very long street lined with houses. The house numbers range from 0 to 65535. That is, the first house on the street is numbered 0, the second house 1, and so on—up to the last house, which is numbered 65535.

The memory inside your Commodore 64 or VIC-20 is arranged very similarly. There is a long series of memory locations ("houses") numbered sequentially from 0 to 65535. Each number is a memory address corresponding to a certain memory location (just as a street number corresponds to a certain house). The terms memory address and memory location are used synonymously.

A memory map tells you the significance of those memory locations. Each house along our imaginary street has a mailbox for sending and receiving letters. In the same way, each memory location is like a mailbox which holds a number between 0 and 255. Do not confuse this number with the memory address. Think of it as a mailbox with the street address on the outside and a piece of mail (a number) inside.

For example, memory location 211 in the VIC-20 and Commodore 64 normally contains a 0 when you first switch on the computer. You can see this for yourself. BASIC has a command

called PEEK which lets you "peek" at the contents of any memory location (picture yourself peeking into the mailbox of the house with street number 211 on our imaginary street). After you first switch on the computer, type:

PRINT PEEK(211)

Now press RETURN. The number 0 is printed on the screen. That means memory location 211 is occupied by a 0. But what does this signify? Without a memory map, you don't know.

Memory maps are available in the VIC or 64 *Programmer's Reference Guide* and in many other books. (We also publish maps from time to time in our magazines.) By consulting one of these maps, you can learn that memory location 211 always contains a number which indicates the current horizontal position of the cursor. The number 0 indicates the left margin of the screen. The right screen margin would be 21 on the VIC-20 and 39 on the Commodore 64. Sure enough, if you look at your screen, the cursor is blinking on the left margin—position 0.

Maybe you're still wondering why it might be important to know this. Who cares which numbers are at which memory locations? People who write programs care, because it's also possible, in most cases, to *change* the number which occupies each memory location. By changing a number, sometimes you can modify the operation of the computer to suit your own purposes. Type this:

PRINT "HELLO" [press RETURN]

The word HELLO is printed at the left screen margin. That's because the number 0 which occupies memory address 211 told the computer to print the word at position 0 on the screen. But you can control the computer. There's a BASIC command called POKE which lets you put a number into a memory address (like delivering mail to a house on our imaginary

street). Here's how to put the number 5 into memory address 211 and make the computer print the word HELLO indented five spaces:

POKE 211,5:PRINT "HELLO" [press RETURN]

The colon is just a separator which lets you put more than one command on a single line. When you press RETURN, the computer prints HELLO five spaces from the left screen margin. (However, the blinking cursor returns to the left margin, because the computer automatically puts the number 0 back in address 211 after it's done. You can check this by entering PRINT PEEK(211) again; the 5 you put there is gone, replaced by the 0.)

There are many tricks you can perform by changing numbers in memory locations. Because there are no sound and graphics commands in Commodore BASIC, you must use this method to play music, create sound effects, draw and move sprites, and so forth. The best way to learn these techniques is to read books and articles which describe how programs work, to study programs, and to experiment on your own. A memory map is an invaluable guide to learning your way around your computer. ☺

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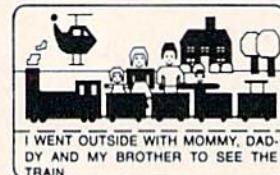
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THE BEGINNER'S CORNER

C. REGENA

Quilt Squares

Have you ever drawn a small pattern, then wondered how several repetitions of the pattern would look? A patchwork quilt, for example, can consist of a few small designs repeated in different combinations. This month, we'll use the graphics and color capabilities of the computer to let you choose possible patterns, change them if you wish, then see your pattern repeated on the screen.

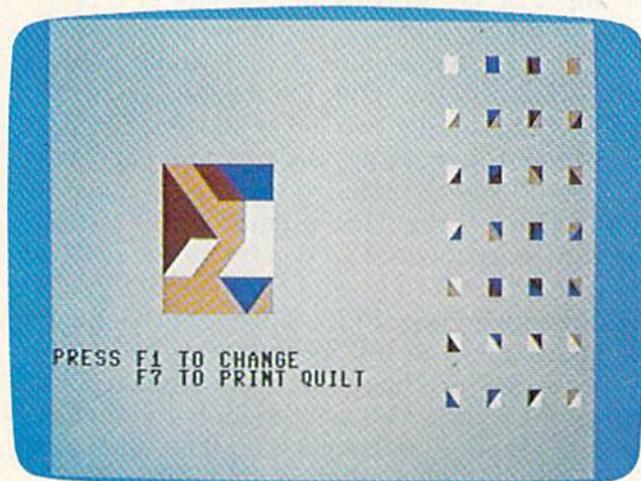
First you are asked how many colors you want to use. You have your choice of two, three, or four colors. On the VIC-20, one color must be white, so you can choose one, two, or three more colors. Next you choose which colors you want—press a number which corresponds to the colored square shown. On the 64 you may choose from 0 to 9, and on the VIC you may choose from 1 to 7.

Two Basic Patterns

The screen clears, and all possible combinations of the colors appear on the screen. Only squares and right triangles are used in this quilt design. In the center of the screen is an enlarged quilt square which is made up of 16 smaller patterns (each 2 by 2). One by one you place patterns in each of the 16 blocks. A question mark appears on a block of the enlarged pattern. You choose one of the small patterns to place in the block.

Press f1 to move the cursor to the pattern you want, then press RETURN. The cursor always begins at the first pattern and cycles through all the patterns. After the last pattern the cursor goes back to the first. When you press RETURN to indicate your choice, that pattern is placed on the main block. The question mark then moves to the next square. This process continues for the 16 squares.

After you have completed your pattern, you may alter it if you wish. Press f1 if you want to



First, you design a quilt square, using a variety of shapes.

make any changes, and f7 if you are happy with your design as it is. If you press f1 to change the pattern, the computer will go through the 16 blocks again. If you want to leave the block the way it is, press RETURN. If you want to change the block, press f1.

You may choose another pattern by repeatedly pressing f1 until the cursor is on the pattern you want. Then press RETURN, just as you did when you initially designed the quilt square. After you have had a chance to change all 16 squares, the computer again asks if you want to change the pattern (f1) or print the quilt (f7).

When you are satisfied with your pattern, press f7 to print the quilt. The squares are repeated on the whole screen. Now you can have fun "quilting" on your computer without all the hassle of cutting little squares and triangles then piecing them together (hoping the seams will match).

PEEKing And POKEing The Graphics Shapes

The variable M in the VIC version and LF in the 64 version relate the screen memory map to the color memory map. To display a graphics character on the screen, you need to POKE the screen memory location with a number representing the screen display code.

You also need to make the character appear by POKEing the color memory location with a color number. In the "Quilt Squares" programs, the screen memory locations for the possible patterns are in the Q array, and the screen memory locations for the main designing square are in the S array. The screen display codes or character codes of the possible patterns are in the R array.

In the subroutines to draw the graphics on the larger design squares, the variable A is set equal to the S() location, the upper left location of the two-by-two square. A + 1 would be the next location to the right. On the VIC, A + 22 and A + 23 are the two lower squares. On the 64, A + 40 and A + 41 are the two lower squares.

The PEEK command is used to see what is in a certain location. The program PEEKs at the color memory location to determine the color of the pattern piece so it can be transferred to the main design square. PEEK is used in changing the quilt pattern to get the characters in a two-by-two square so the square can be blinked and replaced. PEEK is also used to look at the character in the main design square so the design can be repeated in other areas of the screen.

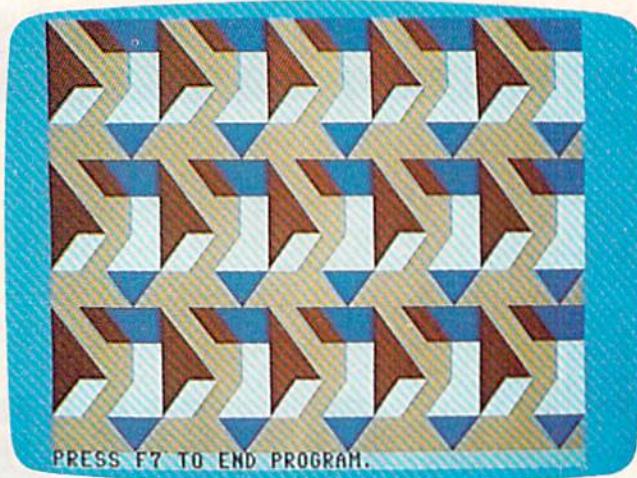
Extended Background Colors

I wanted to use squares and triangles for the basic quilt pattern pieces since they are the most common shapes in real quilts. Notice, however, that if you have more than two colors, you need to have several different combinations of colors in the triangles. Usually you can POKE a graphic character on the screen (such as 95 for a triangle) then POKE a color number.

The triangle will be the color POKEd, and the rest of the square of that character is the regular background color. The extended background color mode is used to get a square with two different colored triangles on the 64.

This type of graphics is slightly different because, instead of 128 screen display codes of the alphabet and graphics symbols (or 256 with the reversed mode), we are limited to the first 64 characters. By POKEing multiples of 64 plus graphics character numbers, we can display the character with different background colors.

For example, if we POKE a screen location with 18 (and the color memory location with a color number), we'll see an R with the regular



The screen is then filled with your pattern in the 64 version (VIC version similar).

background. In extended background color mode, if we POKE a location with 18 + 64, we'll see an R with background color #2. If we POKE the location with 18 + 128, well get an R with background color #3. You can see this is exactly what we need to be able to use four different colors in a quilt design with all possible combinations in the triangles.

```
POKE 53282,C(2)  
POKE 53283,C(3)  
POKE 53284,C(4)
```

puts the colors C(2), C(3), and C(4) into the different color registers.

```
POKE 53265,PEEK(53265) OR 64
```

activates this extended background mode.

Using Custom Characters

There is a limitation, however. To use these extra backgrounds, we have only the first 64 characters of our screen display characters—the alphabet, some symbols, and the numbers, but no triangles. Custom characters to the rescue! Since I wasn't going to print any symbols in the program, I can change #, \$, %, and & to the triangles I need. These are character codes 35, 36, 37, and 38. While I was at it, I changed () [] and £ to graphics used in other parts of the program.

To use custom characters, we transfer the regular character definition set from ROM to RAM, and alter the characters we need. We then tell the computer to look to the new location in RAM instead of ROM to find any character definitions—any letters we print or any characters we POKE onto the screen.

This process is contained in lines 330–380 of the 64 version of the program. POKE 56334,0: POKE 1,51 turns off the interrupts and turns off the video chip to expose the character generator; and POKE 1,55: POKE 56334,129 turns them

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back on. Lines 350 to 370 look at each address in ROM and transfer the number to RAM. It takes a little over 40 seconds. POKE 53272,19 tells the computer to look to the new addresses in RAM for the characters.

Reserving Character RAM

Before we can use this process, we need to save a place in RAM for the new character set and make sure it is protected from the BASIC program. Therefore, you must type in

POKE 8192,0: POKE 44,32: NEW

before you use the procedure. This sets the start of BASIC pointer to 8192. Notice that we start our new character set at 2048.

Before you start typing this program, type the above commands in. Also, after you have saved the program and later want to use it, the procedure would be:

1. Turn computer on.
2. Type POKE 8192,0 and press RETURN.
3. Type POKE 44,32 and press RETURN.
4. Type NEW and press RETURN.
5. Type LOAD "QUILT",8 to load the program from disk, or LOAD "QUILT" to load from tape.
6. Wait for the program to load.
7. Type RUN and press RETURN.

Defining New Characters

The new characters are defined using lines 460–500 and the data in lines 510–600. Each character is made up of 8 dots by 8 dots. The numbers in the DATA statements indicate which dots are colored in. As you are typing in the DATA statements, be sure that each line has eight numbers separated by commas. Be sure there is not a comma at the end of a line.

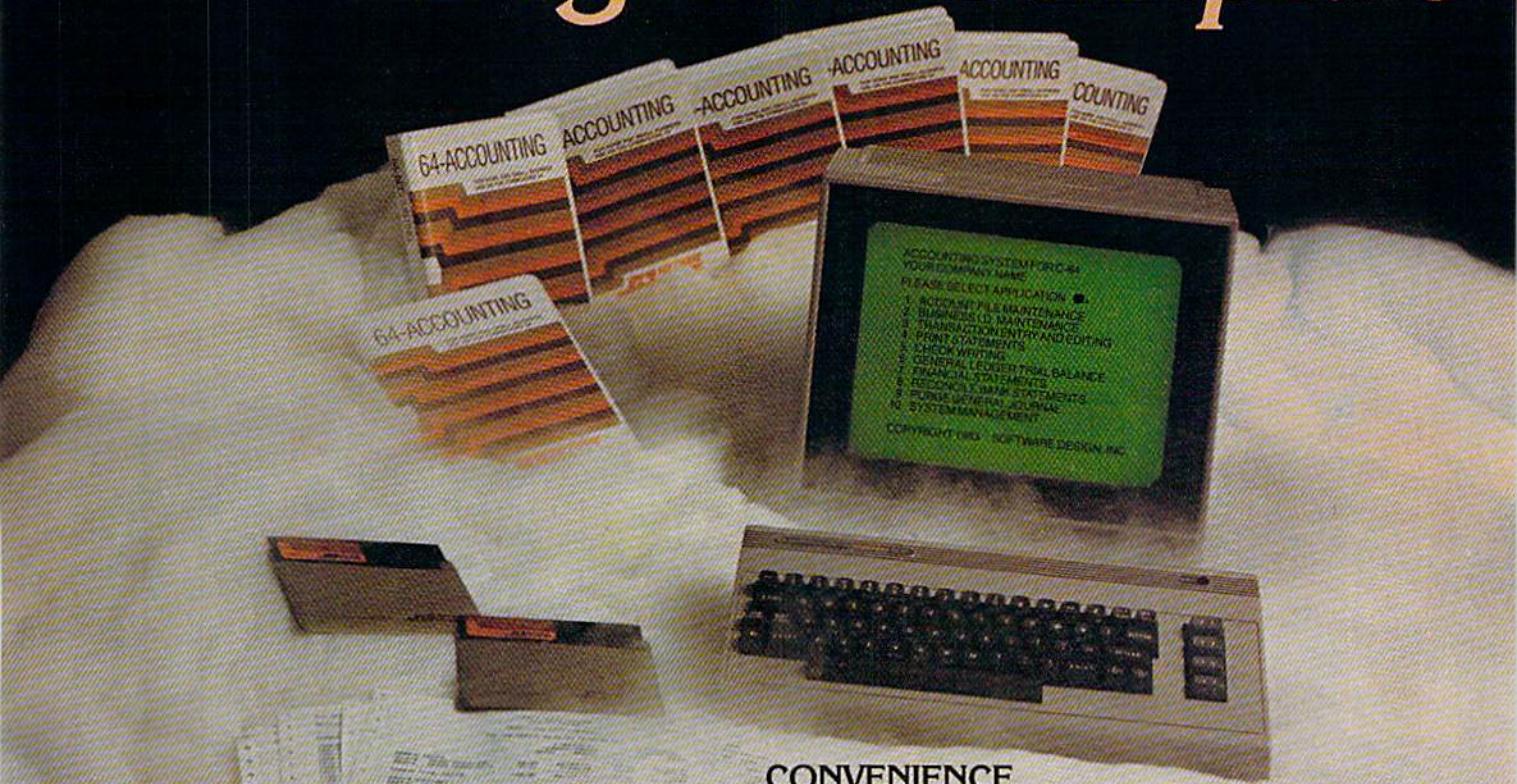
With the new characters designed now, we can use the character number to POKE the design to the screen. With the different background colors, we need to be careful which numbers we choose. For example, character 35 will be a triangle with the regular screen background color. 35 + 64, or 99, will be a triangle of the POKED color with the second background color. 35 + 128, or 163, will be the triangle with the third background color. 35 + 192, or 227, will be a triangle with the fourth background color.

The subroutines in lines 30 to 300 could be written more efficiently using mathematical relationships, but I kept each subroutine separate so you could see how the color numbers CC and the character numbers are used to get different combinations.

VIC-20 Program Flow

Lines	Explanation
2	Branches past subroutines.
3	Subroutine to clear keyboard buffer and play tone.
4-9	Subroutines to draw shape on larger square.
10	Subroutine to keep track of shape in larger square.
11	Subroutine to draw shape on four squares either replacing the basic square or printing the repeating design.
12	Subroutine to draw large cursor to indicate which square is being changed.
13	Subroutine to put color on large square.
14	Subroutine to clear messages.
15	Prints title.
16	Dimensions variables. S() is screen location of large square (upper left location). Q() is screen location of possible quilt shape at top of screen. R() is character number of the shape. QQ() is the number of possible shapes for 1, 2, or 3 colors chosen.
17-18	Print instructions.
19-23	Read data to define variables.
24	Initializes variables QQ(), V for sound, and M for relating screen location to color memory location. Turns on volume for sound.
25	Defines A\$ and B\$ used for printing the basic sixteen squares.
26-29	Ask for number of colors N to be used in design.
30-38	Receive your color choices.
39-40	Clear screen, print squares to be designed.
41-45	Draw possible shapes that can be used in design.
46-54	Basic loop to choose design for 16 squares.
46	Clears keyboard buffer, beeps, prints question mark on current square.
47	Cursor moves among possible designs. P is the color.
48-49	Blink shape while waiting for your response.
50	If you press RETURN, branches out of loop.
51-52	If you press f1, goes to next shape. After going through all shapes, the process starts with the first shape again.
53	A is the screen location. I is the shape number chosen. The appropriate subroutine draws the right shape in the large square.
54	Colors the square; goes to next square.
55-57	Present the option to change the pattern or to print the quilt.
58-59	If option to change is chosen, clear question and print new instructions.
60-73	For each of the 16 squares, you can press f7 to leave the square as it is or f1 to change. If f1 is pressed, you then choose one of the possible shapes as before, pressing RETURN when the new choice is made. After all 16 squares, the instructions are erased and the program goes back to line 55.
74-86	If you press f7 to print the quilt, the computer checks each of the 16 squares and draws the shape in other positions on the screen to create the repeating design. Three loops and IF statements are used because all 16 squares are not repeated in each section of the screen.
87	Moves cursor to the next-to-the-bottom line.
88	END.

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64 Program Flow

Lines	Explanation
20	Branches past subroutines.
30-300	Subroutines to draw shape in 2 × 2 square.
310-320	Print message.
330-380	Transfer character set from ROM to RAM.
390-410	Change screen to light grey and print title.
420	Dimensions variables. S() is the screen location for the 16 basic design squares (upper left square). Q() is the screen location for the possible design patterns. R() is the character number for the possible design patterns.
430-450	Print instructions.
460-600	Redefine custom characters for triangles and cursor shapes.
610-620	Clear sound memory locations.
630	Turns on volume and sets type of sound.
640	Defines high frequency HF, low frequency LF, and waveform W.
650-660	Define A\$ and B\$ for drawing basic design square.
670-750	Define variables S(), Q(), and R().
760	Defines QQ() as the number of possible patterns depending on the number of colors chosen.
770-800	Determine number of colors desired.
810-890	Determine colors desired.
900	Clears screen.
910	Sets alternate "background" colors.
920	Sets extended background color mode.
930-1250	Print possible patterns for squares.
1260-1290	Print basic square for designing.
1300-1490	Basic loop for choosing pattern and printing it on main square for 16 squares.
1310	Sounds prompter tone.
1320	Prints question mark on square.
1330	Goes through possible patterns.
1340	Sounds prompter tone.
1350-1360	Determine color of pattern.
1370-1380	Blink pattern square while waiting for response.
1390	If you press RETURN, branches out of loop.
1400-1410	If you press f1, goes to the next pattern square.
1420	After going through all possible patterns, cycles back to first pattern square.
1430	Sets A for starting coordinate to draw main square.
1440-1470	Draw appropriate pattern.
1480	Colors pattern on main square.
1490	Goes to next square.
1500-1550	Present option to change pattern or print quilt and branch appropriately.
1560	Clears printing.
1570-1590	Print instructions for changing pattern.
1600-1850	For each of the 16 squares, lets the user press RETURN for no change or goes through the possible patterns to change a square; procedure is similar to previous selection.
1860	Clears printing.
1870	Branches back to line 1500 for option to change.
1880-1960	Loop to repeat pattern to draw quilt on screen.
1890	Sets coordinate A for screen location.
1900	Determines four characters for the design in one square.
1910	Determines color.
1920-1950	Draw square in other positions on screen.
1960	Repeats for 16 squares.
1970-2010	Wait for you to press f7 to continue.
2020-2030	Subroutine to clear keyboard buffer and sound prompting tone.
2040	Subroutine to color design square.
2050	Subroutine to determine characters used in design square.
2060	Subroutine to draw design square; used either in blinking square during change option or repeating pattern on whole screen.
2070-2090	Prints ending message.
2100	END.

Saving VIC Memory

I like to write programs using the computer with no extra peripherals or extra memory. This program is no exception. It works with the standard VIC with no memory expansion. Naturally, it cannot be the same as the Commodore 64 version. I decided to conserve memory by not using multi-color mode and custom characters (although both are available on the VIC), so this limits your design to all triangles adjacent to white, which is the screen color. (You can, if you prefer, add a line or two to change the screen color.)

This means that there are only four possible triangle designs for each color, which simplifies the number of subroutines needed to draw the main triangular design squares (lines 6 to 9). The solid squares are drawn in lines 4 and 5.

If you prefer not to have READY appear on the screen at the end of the program, you may change line 87 to 87 GOTO 87, then press RUN/STOP to end the program, or change lines 87-88 to

```
87 GOSUB 3
88 GET E$:IF E$=""THEN 88
89 PRINT "{CLR}":END
```

The program waits until you press a key before clearing the screen and ending.

When you type in the VIC version, be sure to leave out all unnecessary spaces to conserve memory.

If you prefer to save typing effort, you may receive a copy of this program by sending a copying fee of \$3 plus a blank cassette or diskette and stamped, self-addressed mailer to C. Regena, P.O. Box 1502, Cedar City, Utah 84720. Please be sure to specify the title and which computer version you want.

See program listings on page 149.

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Robot Math

Bob Stewart

Learning arithmetic can be exciting and fun, as well as a visual delight for children when you use this educational program. Originally written for the VIC, we've added a version for the 64.

Although the popular use of computers in schools and homes has created a barrage of educational software, much of it fails to take into account many factors which make a learning program truly valuable.

Is the program inflexible—the same drill over and over? Is it easy to use? Are there options to streamline the program for children of various learning levels? And, just as importantly, is it fun for the child? "Robot Math" tries to answer each of these questions in a positive way.

Defining The Program From The Menu

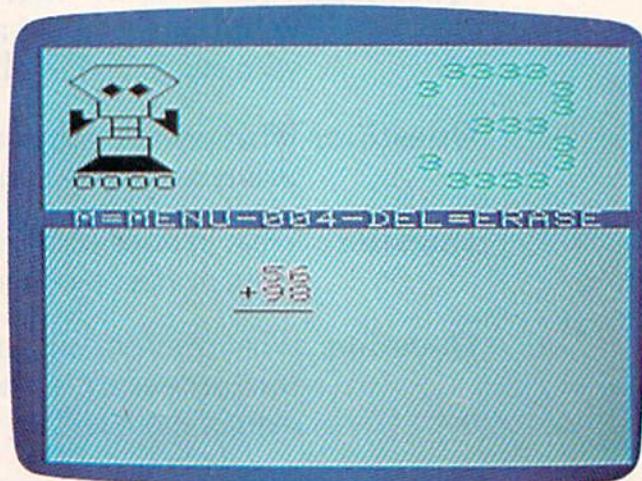
After typing in and running the program, you'll see a menu with instructions on how to use it. Cursor up or down to choose one of the menu items: operation (+ or -), number of digits (up to six), carry/borrow (yes or no), and number of problems (up to nine).

Simply press RETURN to change the operation or carry/borrow options after you've cursoried to those items. You can also change the number of digits or number of problems. When you're satisfied with the menu choices, press B to begin.

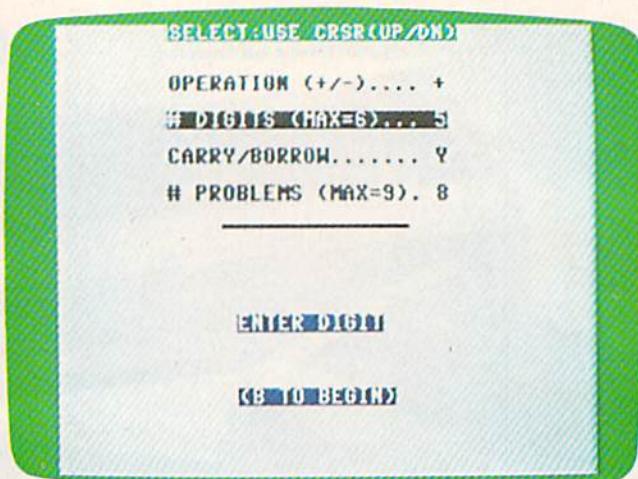
The Shifty-Eyed Robot

After the first problem is presented, the timer begins. The number of the problem appears at the upper right corner of the screen, directly across from a shifty-eyed robot. Three minutes or three tries are allowed for each problem. A correct answer is rewarded by the robot, who toddles across the screen and introduces the next problem by updating the number.

If time runs out or if three incorrect answers



A correct answer to a problem is rewarded by the robot, who toddles across the screen and changes the problem number (VIC version).



The menu lets you tailor the program to the child's learning level (64 version).

are entered, the right answer is given, and a new problem is presented.

You can return to the menu at any time by pressing M, or you can delete any digits in your answer with the DELETED key.

VIC Notes

In the VIC version, very little memory is available after the program is run. In fact, you'll need to use abbreviations to get some of the lines to fit. In line 9, use the abbreviation T SHIFT-H for THEN.

The program is self-modifying. This means that once you have configured the program with the menu and have entered the drill mode by pressing B, you may interrupt the program using RUN/STOP and then save the program along with the selections you've made. This self-modifying feature can be found in lines 75 and 76. These lines change the data contained in line 91 by printing a new line 91 on the screen in white letters (which aren't visible) followed by the command RUN1.

Line 76 POKEs three RETURNS (CHR\$(13)) into the keyboard buffer followed by an END. The program is actually stopped by the END statement, which then causes BASIC to look into the keyboard buffer for further instructions. The first RETURN encountered by BASIC enters the new version of line 91 previously placed on the screen by line 75. The second RETURN skips one line, and the third enters the RUN1 command just as if you entered it from the keyboard. This causes the program to start at the beginning.

See program listings on page 153. ☐

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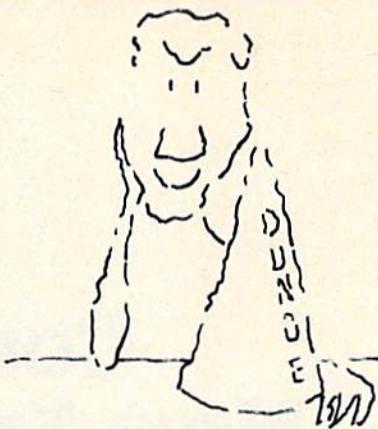
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Commodore's New Speech Module: Magic Or Technology?

Betsy Byrne

Until very recently, speech simulation devices for home use were not much more than curiosities—and very expensive ones at that. Two years ago, a speech synthesizer box cost around \$300, and was only useful to the person willing to invest a large amount of time into learning the complex programming skills needed to coax semi-intelligible words from it.

A year ago the prices dropped somewhat, and to make your synthesizer speak you now had a rather cumbersome "editor" program based on creating words from parts of speech known as phonemes. If you had a good ear, and a knack for phonics as a child, you could construct phrases and speeches to amaze your spouse and amuse your friends.

Like the original Model T Fords, your computer's voice came in any style you wished as long as it was monotone—with little or no variation in pitch or inflection. It was also difficult to have anything else going on while the computer was orating, since the speech synthesis methods ate up huge chunks of the computer's memory.

As a Commodore owner, I wish that Commodore could take credit for being the first to come up with the revolutionary technology that is changing the way that people think about personal computer voice synthesis—but the laurels go to Texas Instruments. The type of chip that was designed for *Speak and Spell*, and later used with the TI-99/4A, was refined and perfected by

a group of wizards in Texas. It is not an exaggeration to say that when *Speak and Spell* hit the market, it set up a ripple that has become a sizable wave, and before it is finished, may very well become a veritable tsunami of new ideas and products "speaking" in schools and homes, factories and businesses.

Commodore did the next best thing to inventing the technology—they hired a chief wizard and some of his friends from Texas Instruments. Richard Wiggins was installed as head of the Commodore Speech Technology Division in Texas to design and perfect a speech module for Commodore computers. The result is the Commodore Magic Voice Speech Module, and I think that Commodore users will be very pleased indeed when it becomes widely available this summer.

Modeled On The Human Voice

Wiggins used a chip that is based on a technique called Linear Predictive Coding (LPC)—a totally different process than that of the Votrax chip that most of us are familiar with from the speech synthesizers of years gone by. In general terms, the LPC process is designed to model the vocal tract, to which is added the actual digitized recording of a real human voice. After the digitized recording has been entered, it's then possible to analyze and change the pitch, volume, and frequency content of the signal—and generate very high quality speech. It is the LPC method that allows the

Magic Voice to be able to speak as a variety of characters: man, woman, child, or monster. And all may be programmed from one set of data.

Asked why the LPC technique was chosen, Wiggins said, "We didn't want to produce a 'curiosity,' something that is just purchased as a gimmick." He elaborated, "We wanted a work-horse speech module that would do useful things—teach young people to read, or enable them to learn foreign languages."

The Magic Voice itself has a few surprises in store for Commodore users who up to now have only seen Votrax-based units or the clever, disk-based SAM for their computers. Magic Voice is as clearly understandable as the magic toys from TI—but it speaks with the voice of a woman when you install it in your 64. This may or may not be a revolutionary move on Commodore's part, but it is an educationally sound decision. Numerous studies have shown that at the elementary school level, children respond better to, and learn significantly more, with a woman's voice instructing. According to a spokesperson at Commodore, "Education is one of the major uses we foresee for the Magic Voice."

Added Commands

The voice comes with a built-in vocabulary of 235 phrases, and adds additional commands to Commodore BASIC to make it easily programmable. It's programmed using complete words—or a number that is associated with each word—and the most useful added command is "SAY." SAY is used with syntax almost identical to PRINT, with a few important exceptions. In a program (or direct mode), you cannot use a string of vocabulary words with SAY:

10 SAY "HI THERE"

will not work. You must set up a separate statement for each word, as in:

10 SAY "HI":SAY "THERE"

A way around this is to use DATA statements or look-up tables.

Another new entry on the BASIC list is the RATE command, which varies the speed at which the word is spoken. This is a very important capability—you only have to listen to the variations in speed in your own speech to understand how important. Careful use of the RATE command can make all the difference in the naturalness and understandability of the sentences you program with Magic Voice.

RDY (ready) is a command that allows you to check from within a BASIC program to see if the module is "ready." Wiggins had some advice to programmers about using the RDY feature: For your program to work on systems that do not

have the module inserted, you must set RDY to zero, and save the program *without* the module plugged into your 64. The program will then run with or without the Magic Voice.

Software Support

Commodore has also developed talking software for the Magic Voice. Two Bally Midway arcade games, *Wizard of Wor* and *Gorf*, will soon be talking back to their owners. These games illustrate the character-voice capability of the module as they sound off with phrases sure to inspire competitive zeal. Included is the most sinister and bone-chilling laughter I have ever heard.

Next comes the first in a series of programs for preschoolers starring the Commodore bee. Dubbed *A Bee Cs*, this cartridge program teaches children to recognize both capital and lowercase letters. Kids use the joystick to fly the bee to the letter as directed by the voice—and when "Terrific!" is heard for a job well done, little faces shine with a glow of confidence. You may have guessed that my kids liked it. Available soon will be *Spelling Bee* and *Counting Bee*.

The Magic Voice module plugs into the game port (not the user port) and has a slot in the top to allow you to "piggyback" cartridges. All the software designed for the module is slated to appear on cartridge.

Although phoneme-based speech construction and text-to-speech are well within the capabilities of the Magic Voice, it will be a few months until software unlocking these features is available. A prototype of the text-to-speech program was introduced at last January's Consumer Electronics Show.

The impressive capabilities of Commodore's Magic Voice seem to prove that speech technology is now emerging from a long infancy, and is taking the first strides toward the day when we will not remember that, once upon a time, our computers could not speak. ☺

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MACHINE LANGUAGE FOR BEGINNERS

RICHARD MANSFIELD, SENIOR EDITOR

What Is Machine Language?

If you've had a computer for even a short time, you've heard about machine language (ML). You know that most popular commercial software—games, word processors, spreadsheets—is written in ML. You may also know that there are dozens of computer languages in which to write programs for Commodore microcomputers, including Forth, Pascal, C, Logo, even mutants like COMAL. Why, then, do the professionals nearly always choose to program in machine language?

The answer is simple: speed. Computers are, by nature, fast. But, if you ever try to write an arcade style game in BASIC, you'll soon discover that you cannot construct a BASIC game which executes swiftly enough. No matter how efficiently you write your game in BASIC, no matter how much you optimize it for speed, it won't be fast enough. That's because many events are going on simultaneously in a complex program. And professional games and other commercial software are usually full of features and events. The one thing which distinguishes professional from amateur programming is the rich complexity of the former. And the speed which supports such complexity.

Why is ML so fast? Because it's the only language which doesn't need some kind of translating before the 6502 chip can understand it. This chip is the "brain" of Commodore machines, and ML is the machines' language. BASIC, by contrast, is designed to interact comfortably with humans. BASIC has English words like STOP and END for its commands; ML uses less obvious commands like LDA and STX.

Imagine Zanzibar

Imagine that you've accepted a job in Zanzibar. Should you learn the language? It depends, of course, on your job. If you're going to be painting the sunsets, you can probably get by with an interpreter. If you're going to be in charge of heli-

copter rescue missions, you'd better learn to speak the language—there won't be time for hand signals and charades during an emergency.

Likewise, whether or not you go beyond BASIC to learn your machine's native language depends on what your purposes are in working with your computer.

Perfectly respectable budgeting, household management, recipe file, and checkbook balancing programs can be written in BASIC. Most such programs spend most of their time waiting for a human to INPUT information. Speed never becomes an issue. In fact, millions of people are comfortable with the things they can accomplish in BASIC. It is the first and only computer language they will ever learn.

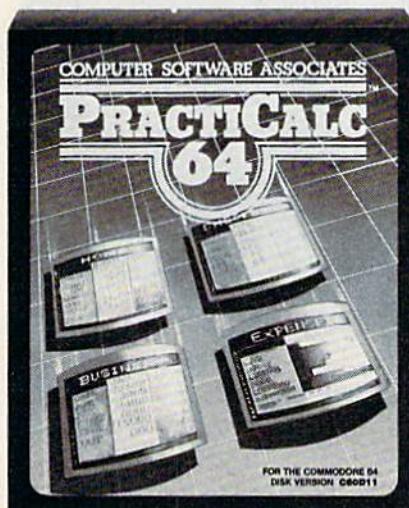
If, instead, you are interested in writing more sophisticated programs—programs with the ultimate in speed, grace, and power—you must learn the machine's language. Only then can you take it to its limit.

How Hard Is It To Learn?

ML is much easier to learn than most people suspect. Anything not yet understood seems forbidding and complicated. It's interesting that the first microcomputer programmers (circa 1977) bought computers like the venerable AIM and SYM which had so little memory space that there wasn't any room for luxuries like BASIC. These programmers had to learn ML. It took them, on average, about as long to learn ML as BASIC takes most of us to learn today. And when they went on to BASIC, they found that it took the same amount of time to learn BASIC. Conclusion: Both languages can take as long to learn.

That's not too surprising when you consider some of their similarities. They both have about 50 command words. Of that 50, only about half are commonly used. (When was the last time that you used WAIT or ATN in a BASIC program?)

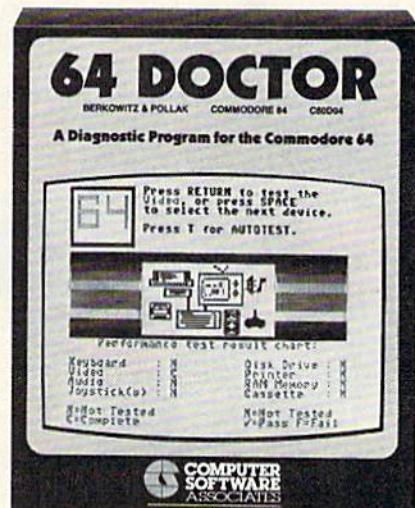
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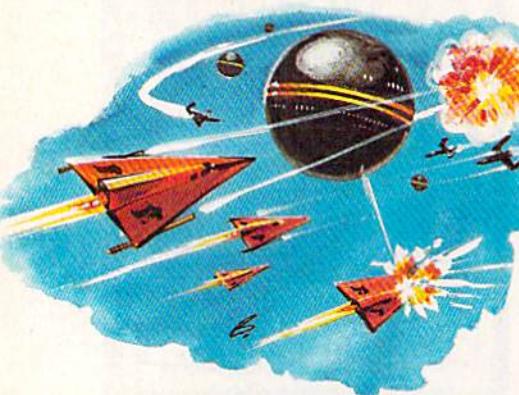
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And, like any computer language, they are both composed of various combinations of the three primary computer structures: loops, branches (like GOTO), and variables. Part of the process of learning BASIC involves grasping these fundamental structures. And, just as it's easier to learn French if you already know Spanish, it's easier to learn ML if you already understand what loops and branches and variables do in a computer program.

How Is It Done?

It's getting easier all the time. The latest assemblers (the ML programming language) are so close to the environment in which BASIC is programmed that many tasks are accomplished automatically now. In the pioneer days (1977 and earlier), the tiny home computers didn't have memory space for an assembler either. So ML programs were hand assembled. This meant that each instruction had to be entered as a number rather than as a command.

Here's how it works. Suppose you want to put the letter A on the screen and your screen RAM starts at address 1024 (as on the Commodore 64). In BASIC you could do it several ways:

```
10 PRINT "A"  
10 PRINT CHR$(65)  
10 POKE 1024,65
```

The number 65 is the code for the letter A. In ML, you would do something similar to the third example above: 169 65 141 0 4. This series of numbers is an ML program which contains commands to the 6502 chip. Mixed in with the commands are addresses and numbers. Just as POKE 1024 is a command/address pair, the ML numbers are in pairs. The 169 65 pair means LDA #65 (LoAD the Accumulator with the number 65) and the 141 0 4 means STA 1024 (STore the Accumulator at address 1024). This series of numbers might not mean much to us, but they are very clear to the 6502 chip. If you POKE in that number series (anywhere there is some free RAM memory to hold it) and then SYS to that address—you'll see an A appear on screen.

An advanced assembler lets you write an ML program like:

```
10 LDA #65:STA 1024
```

which is a lot easier than writing it in pure numbers like 169 65 141 0 4. Just as BASIC can compose a program out of POKE and PRINT instructions, an assembler puts together an ML program out of instructions like LDA and STA. To learn ML, you need to learn its instructions and the ways that you can use numbers and addresses with those instructions.

An Undeserved Reputation

ML's reputation for difficulty derives from the fact that doing it without an assembler used to require tremendous patience and attention to detail. Also, many of the earlier assemblers were not especially considerate of the programmer's needs. There were no variables (called labels in ML lingo), no line numbers, and, above all, few error messages.

BASIC shows you where you made a mistake. It says SYNTAX ERROR IN 675 and you can just study line 675 until you spot the oddity. But assemblers have been improved so much that now the better ones will provide you with similar error messages. They will show you exactly where many kinds of problems are located. They also allow unlimited variable names, they use line numbers, and they include many other conveniences and kindnesses.

Some highly evolved assemblers even let you use your BASIC utilities with them like line renumbering, variable find/replace, autonumbering, program merge, and any other programming aids that you've found helpful when writing in BASIC.

Try ML. You'll discover that it's not significantly harder to learn, to understand, or to use than BASIC. 



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New Hardware

We've been using Commodore's new SX-64 portable computer for about a month. It's a very interesting product. Basically, the SX-64 (sometimes called the Executive 64) is a combination of a Commodore 64, a 1541 disk drive, and a scaled-down 1702 color monitor, all in one box that can be snapped together and carried away with a handle. It weighs 20 pounds, which doesn't sound like much until you heft it—it's one heavy load to cart around.

The SX-64 is almost completely compatible with the 64, and is almost identical in terms of hardware. Commodore has changed the operating system in trivial ways—the default screen colors are blue on white (like the VIC-20), which seems to be a better color combination on the small 5-inch monitor (more about that later).

Setting up the SX-64 is easy. The keyboard is like a faceplate that snaps off, revealing the screen and disk drive. A short cable connects the keyboard to the main unit. Plug it in, turn it on, and you have a ready-to-run computer system.

The SX-64 is available in many places for under \$800. This makes it comparable to the price of a 64 put together a component at a time: \$200 for the computer, \$250 for the drive, and \$250 for the 1702 color monitor add up to \$700. So for a little more money, you can have a 64 you can take anywhere.

It's worthwhile to mention that the SX-64 is portable in the same sense as a portable television. You can carry it to any location with a wall outlet, but don't expect to use it in your car or on the beach. A better word for this type of computer is *transportable*. True portable computers, such as the Radio Shack Model 100 or the Gavilan Mobile computer, can run off of internal batteries and can truly be used anywhere.

The disk drive acts just like an in-line 1541. But no, it's not faster. There's still a serial cable somewhere inside connecting the drive to the computer. I suppose that adding a parallel, direct-

circuitry connection would introduce differences in the memory layout and operating system so that some programs written for the 64 would not work on the SX-64. The only programs we've had trouble with are those that depend on the default screen colors to be light blue on dark blue, as on the 64, or those that call for cassette access.

That's right. The SX-64 has no cassette port. As a matter of fact, the operating system has been changed to give an ?ILLEGAL DEVICE NUMBER ERROR when you try to load or save to tape. This is understandable. If you have a built-in disk drive, why add to the cost of the SX-64 by making the cassette port available? On the other hand, this limitation may matter to you.

Passing The Endurance Test

We've worried about the reliability of a disk drive that is carried around a lot. 1541s don't like to be moved—some of the drives here at our offices have died from being transported back and forth to work. Disk drives in general can be rather delicate. Even the drives in the original Osborne 1 would sometimes need readjustment after a lot of toting about. Well, after a month of testing, our fears seem to be unfounded. To thoroughly test reliability, various staff members took the SX-64 home with them every evening, and brought them back the next morning. After much use (and inevitably, some abuse) the SX-64 is still going strong. It has no problems with either reading or writing to disks. If the drive is not identical to the 1541 (which some service technicians have noticed), it is definitely compatible with disks formatted on other 1541s (within reasonable limits).

The keyboard has a different feel than a 64. The keys are half as high, and tend to make a clacking sound, whereas the 64 keyboard has a very soft touch. Some editors here disliked the keyboard until they got used to it. People tend to seize upon differences and make them into issues.

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Dear Pepper,

11:15:26

You're right. This VIP Terminal is the only terminal for the C64 worth owning. That freebie software that came with my modem just didn't work, especially with my new smartmodem. The 80 column display alone was well worth the \$49.95 - much less the 40, 64 and 106 character displays - and it doesn't need any hardware changes. Imagine 106 characters on 25 lines. Heck, there's more text on my screen than on my uncle's Apple or my dad's IBM - PC!

I put auto-dial to work right away. I auto-dialed Compuserve, but couldn't get through, so I had VIP Terminal redial 'til it got through - it dialed five minutes straight! Then I auto-logged on with one of my 20 programmable keys, and downloaded some graphics screens, and stock quotes for dad. I printed it and saved it to disk as it came on the screen. Wow! And now I can send you my programs automatically. I got yours and they worked right off.

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

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

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

- Lone

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Hi-res technology and sprites allow **VIP Library** programs to bring you task Icons, made famous by the Apple Lisa™ and the Xerox Star™. With these advanced sprite representations of the task options open to the user, even the total novice can, at a glance, perform every task with ease. Just look at the icon and press a key! No programs are easier or more fun to learn and use!

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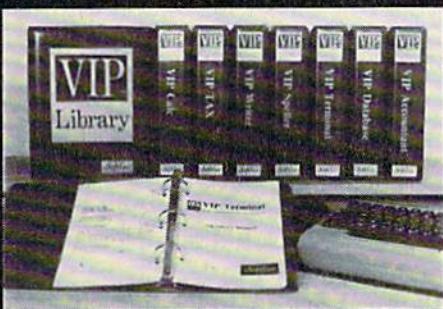
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The 40-characters-per-line display of the Commodore 64 is inadequate for serious computing. An 80-column display is the industry standard. **VIP Library** programs bring this standard to your Commodore 64 with state-of-the-art graphics, without need for costly hardware modifications. With **VIP Library** programs you can freely choose from four displays: the standard 40 column display, plus a 64, 80 and even a 106 column by 25 line display. With these programs you can have more text on your screen than on an IBM PC or an Apple IIe with an 80-column board! Welcome to the professional world!

Who Is Softlaw?

Softlaw Corporation has years of software experience in micros. We currently offer the full-line **VIP Library** for other micros in the U.S. and in Europe. Now we are bringing this experience to the Commodore 64 so you get ultra-high quality software at very affordable prices.



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In practice, the keyboard is just as usable and has a good feel. But the 5-inch screen is a different matter—some people cannot adapt to it, others find it acceptable.

A Trade-Off?

The SX-64 screen is often complained about. Subtracting the border area gives you less than four inches (diagonally) of screen space. The text is readable, but I find it very difficult to distinguish slashed 0s from 8s. No other portable computer, however, has a color screen. If Commodore had used a monochrome screen, the text would be quite readable. As it is, cramming forty columns into four inches makes things a little tight. Playing games is also strange with all the action shrunk down. The SX-64 can still be attached to a color monitor, such as the 1702 (or 1703, nowadays), but there is no built-in RF modulator to let you attach it to a home television.

Another caveat is the built-in speaker. It seems a crime to attach a synthesizer chip to a tiny, noisy speaker. The first time I heard the SX-64 playing music, I thought the speaker was broken, until I heard another unit that was just as bad. Again, there is nothing to prevent you from playing the sound through your stereo with the appropriate cable.

The cartridge port is not in the back where you'd look for it, but under a trap door on the top of the unit. The doors open as you insert a cartridge. I've tried several cartridge games, as well as the CP/M cartridge, and all work properly. Some large expansion cards designed to rest horizontally don't look right sticking up into the air, but that's just aesthetics, I guess, unless you want to plug in one of those card-cage expansion boxes.

Commodore hasn't been manufacturing very many SX-64s, given the demand for VICs and 64s, but there seem to be more of them every day. If the SX-64 catches on, Commodore may find they have another big money maker. If I hadn't already purchased a home 64 system, I would probably have bought a portable version instead. We're still working with the SX-64, and I'll let you know if we find anything more of note. In the meantime, if you have an SX-64, write me and tell me how it's working out for you.

More New Hardware

For those of you who like "neat hardware," you'll want to take a look at a new kind of voice synthesizer. We've watched the price of hardware speech synthesizers continually go down as the features go up. There's the Votrax Type-N-Talk, one of the first affordable speech boxes, the Voice Box from the Alien Group, even a speech synthesizer that requires no additional hardware—

Software Automatic Mouth from Don't Ask Software. And there's Commodore's own Magic Voice module (due to be released any time now). These voice synthesizers accept *phonemes*, the basic phonetic units of speech, which are used to build words. Some units have built-in hardware that translates ordinary English text to speech. But the Covox Voice Master takes a different approach. It lets your 64 talk—in your own voice!

The Voice Master system is like a digital tape recorder that can record up to ten seconds of speech, then play it back in any order. The hardware is about twice the size of a pack of cigarettes, and plugs into the user port. A cheap plastic microphone plugs into the box, but it's easy enough to attach a high-quality microphone. The work of the box is to translate analog speech signals, which are various amplitudes of volume, into discrete four-bit volume numbers that can be stored and processed by the computer. To get any reasonable quality, however, you have to analyze the incoming speech at a very high rate. The volume changes in a given sample of speech very quickly. So the hardware is capable of translating input at a rate of 11900 times per second.

At the heart of the hardware is an analog-to-digital (A/D) converter. The paddle ports on your 64 are also A/D converters, which translate a continuous sweep of voltage from the paddle (which ranges from 0 to 100 ohms) to a single binary number from 0-255. So you could use the paddle ports (which are attached to the SID chip, of all things) for the same purpose.

As a matter of fact, Covox will have a simplified version of the Voice Master that uses the paddle ports to attach a microphone.

So the Voice Master hardware is mainly a high-speed analog-to-digital converter. The Voice Master software reads the incoming digital signals and stores them into memory. There is only so much memory available on your 64. The Voice Master gives you 16K of BASIC space, and uses the rest for ten glorious seconds of speech. I know that ten seconds doesn't sound like much, but take out your stopwatch and talk for ten seconds. You can read a paragraph in that much time.

The Voice Master software lets you partition sounds as words. Recording starts when a sound is heard, and stops when you stop. Each segment can be stored as one of 64 words. This is where the software interface really shines. Look at this simple program:

```
10 CLEAR  
20 LEARN 0  
30 SPEAK 0  
40 GOTO 20
```

When run, this program repeats everything you say. The SID chip is used to output the

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sound, so you hear it from your TV or monitor. New commands, such as LEARN and SPEAK, are added to BASIC to make programming very easy. With SPEED, you can vary the speed of playback from 1 (slowwww) to 9 (remember the Chipmunks?). VOLUME is used to clip the output volume from a range of 1 to 15. Fifteen is the normal setting. If you use VOLUME 10, all sounds recorded with volumes greater than 10 will be forced to a volume of 10. This can improve a noisy recording. With various POKEs, you can modify the recording rate (the faster you sample, the better the quality; but at higher speeds, memory is used faster, and you have less recording time).

Whatever You Want To Sound Like

I've heard of similar devices that cost many times more than the Voice Master's modest \$90, but I was really surprised at the quality of speech. At the default sampling rate, the voice sounds like one from an out-of-town AM radio station, or the Space Shuttle calling to Houston. At the fastest rate, the sound is very intelligible and clear. It really is like a digital tape recorder.

You can do more with the Voice Master than write a copycat program. Several interesting programs are included on the disk. One is a talking calculator. When you first run it, you "teach" the software how to say the digits from 0 to 9, decimal point, multiply, divide, etc. You can then type out simple calculations, with your typing spoken to you, as well as a spoken answer. Again, it's in your own voice, which is an interesting psychological experience.

An extension of this concept is the talking clock. After you give it all the pronunciations of numbers and AM/PM, as well as an alarm message, you can have the spoken time of day by pressing the space bar. Your own voice tells you the time of day.

It's important to note that you only need the hardware to record. The Voice Master hardware is not required for playback. The software alone plays the recorded speech from memory. So you could really surprise a friend by sending him a program of yours that talked to him in your own voice! There is the complication of copyrights. The software that plays back speech is still copyrighted by Covox, although it is strictly one-way without the hardware. Covox is working on licensing the software to developers for a royalty of something like 25 cents per disk.

Music And Sound Effects

You are not limited to speech. The Voice Master box will accept any input and play it as a word.

I've recorded short songs from the radio, and invented a vocabulary of special effects—boings, beeps, whizzes, and explosions. If only so much memory wasn't used, it would be the perfect way to design sound effects for games. The Voice Box works with the same principle used in those new audio compact discs. The music is encoded digitally, but at a much higher rate, of course.

In the future, Covox will be offering new software that allows voice recognition. That's right—your 64 will be able to act on spoken commands. Here's how it might work. You speak the same word ten times. Although we say the same word differently every time, there are similarities. So the software analyzes the ten samples and finds the correlations. The next time you speak, the word is compared to the library to find the word in memory that matches most closely. Sure, it's limited and arbitrary, but even limited voice recognition is fascinating. And it won't take any more hardware. Covox already has a system working that can recognize the digits and other simple words.

Some voice synthesizers have a built-in library of words that were recorded digitally, then analyzed by mainframes to remove all unnecessary information in order to compact the speech into a minimum of ROM space. With the Voice Master, you aren't limited to an arbitrary vocabulary. You can create special vocabularies for different applications. I wrote a program with the Voice Master software that lets you create a general-purpose vocabulary. You type in a word, then speak it. The word is played back, and you can re-record it to get it to sound right. Then, after you've built up a list of words, you can type sentences using the words, which are then spoken as a complete sentence.

The implications are interesting. Using someone's own voice and a sample of his vocabulary, you can invent statements that appear to have been said by the person you previously recorded. This is not just playing back what they've said, but creating new sentences from individual words that the person may have never actually spoken. Of course, the sound quality wouldn't fool anyone, but what could be done with million dollar equipment? It's a little frightening, the idea of a computer being used to put words into your mouth. That's why it's important for everyone to be aware of current trends in computer science—to prevent abuse of this technology. And with microcomputers available to a growing number of people, we control this technology.

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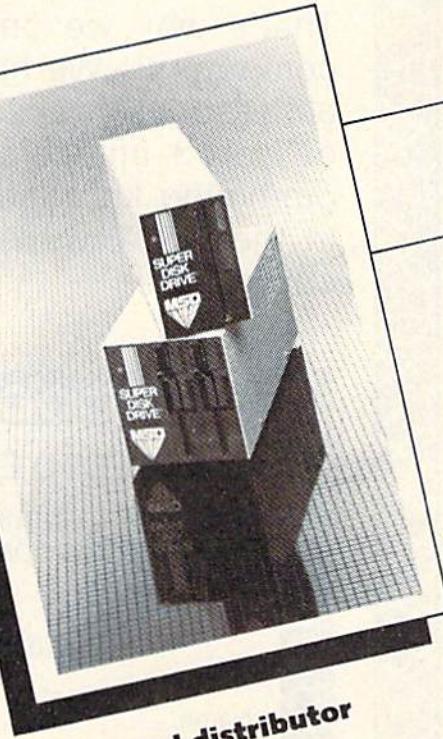


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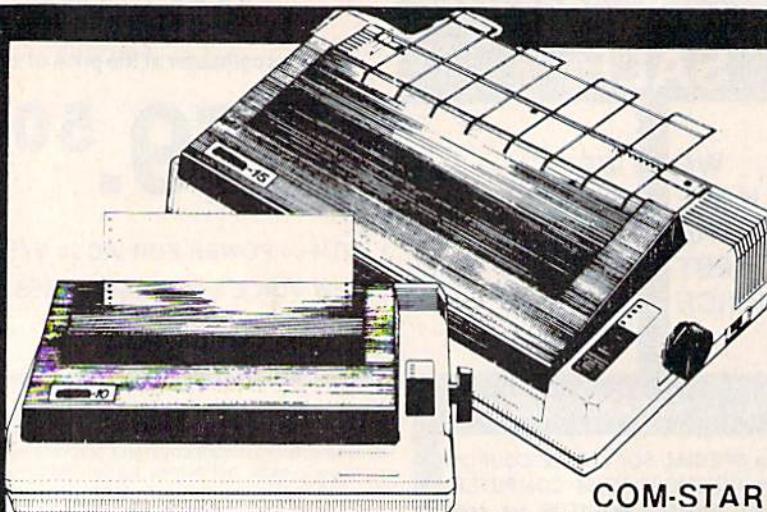
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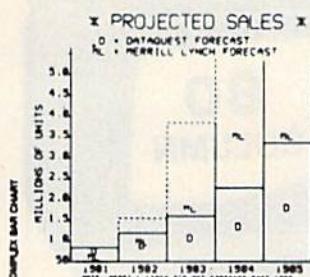


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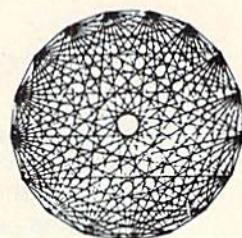
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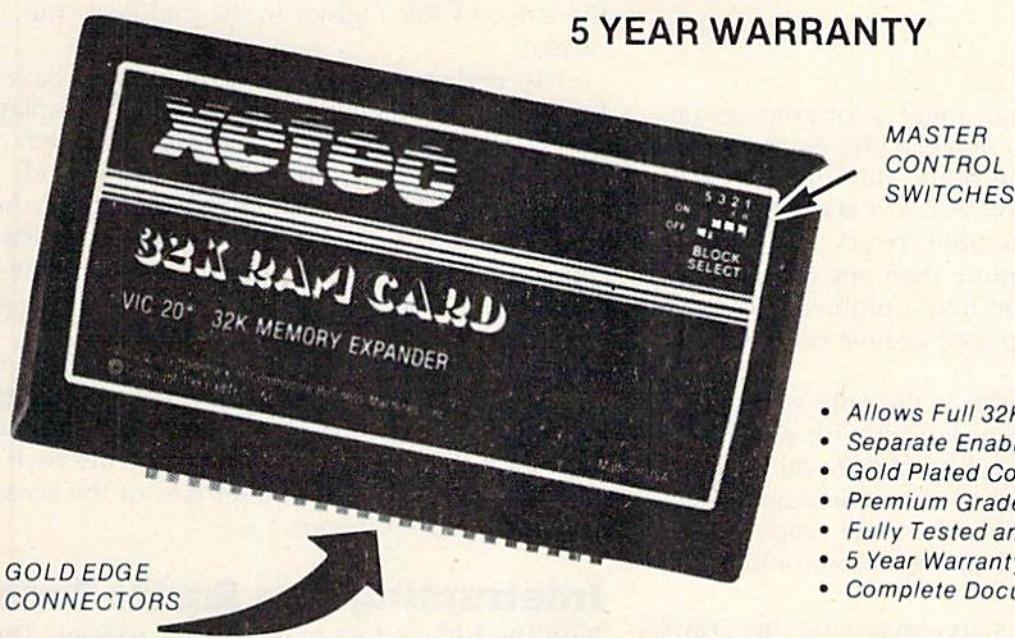
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Color Chart

Sheldon Leemon

Check out all the possible combinations of character colors and background colors with "Color Chart." For the VIC and Commodore 64.

One of the nicest things about color graphics on the VIC and 64 is that you can choose the color of each character that you print. This allows you to place many different colored text statements on the same screen at one time. When you begin to design a screen with more than one text color, however, you often run into a problem. Many text colors do not show up well against certain background colors.

Often, trial and error is the only way to discover which text color goes well with which background color. Wouldn't it be nice if you could see all of the combinations of text colors and background colors on the screen at one time? You could then see which combinations would work best in your program.

The two programs accompanying this article, one for the VIC and one for the 64, do just that. The VIC version has sixteen rows of eight characters each. The top row has a black background (color 0), and each row below has a different background color with a higher color value. The column at the extreme left has a black text character, and each column to its right has a different color text character with a higher color value. The 64 version is the same, except that on the 64 there are 8 additional text colors, so there are sixteen columns, and a total of 256 color combinations.

Using The Computer's Speed

But how is it possible to show more than one background color on the screen at one time? After all, the background color is determined by the value in a memory location called the color register (the 64 uses location 53281, while the VIC

uses 36879). Since this register can only hold one number at a time, the only way to have more than one background color at a time is to change the value of this register in the middle of the display.

To understand how this is done, you have to know something about how a picture is displayed on your TV. An electron beam called a raster starts at the top left corner of the screen, and moves in a horizontal line from left to right. As this beam moves, it lights up appropriate parts of the screen line. When it gets to the end of the line, it goes back to the left side, drops down a bit, and starts all over again.

It takes about two hundred of these lines to complete your computer display, and the raster scans all of these lines sixty times every second. If you tell it the exact instant to change the background color, it can do it after part of the screen has already been drawn.

Interrupting The Raster Scan

Both the VIC and 64 have a raster register. This is a memory location which holds the number of the line which is currently being scanned. The short machine language program in each of the examples just loops around, waiting for a particular line at the top to be scanned. When that happens, it changes the background color, and waits for a few more lines to be scanned until it changes the background color again. When all of the changes are done, it goes back to the beginning and waits for that first change again.

Type the program in carefully and save it before you run it. The program will loop around continuously, displaying all of the color combinations available to you. See which combination you think will be the best for your particular program, make a note of it, and then press RUN/STOP-RESTORE to break out of the program.

See program listings on page 135. ☺

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ROBERT SIMS, ASSISTANT EDITOR

Downloading

On the face of it, downloading is a simple procedure by which you receive data from a remote computer via modem, and store it to disk or tape for later use.

That's the theory, anyway. The trouble with the theory is that downloading is simple the way wrestling an alligator is simple: All you have to do is hold its mouth shut and sit on its back—a simple, two-step procedure. But anyone who thinks it's easy has never wrestled an alligator fresh from the swamp.

To make downloading easy, you have to wrestle with *conversion* and *integration*.

In home telecommunications, most information is transmitted as ASCII (American Standard Code for Information Interchange) characters. As the name indicates, these character codes are a standard by which different brands of computers can communicate.

Transparent Conversions

When you are on-line, your computer (called the *terminal*) is connected to a remote computer (the *host*). The information transmitted between the two is converted at least twice. When the host sends information, it converts the data from the computer's internal code into ASCII, which it then transmits to your computer. Your terminal software converts ASCII into a Commodore variation called CBM ASCII (or PETASCII), which your VIC-20 or 64 can process. When your computer sends data to the host, the process is reversed.

These conversions are *transparent*, which means they take place without any intervention on the part of the user.

Downloading, however, is not transparent; it requires that the user have a basic understanding of how and where data is stored on the host, how the data is processed by terminal software, and how the data is converted after it is downloaded.

Information on bulletin boards and information networks comes in three forms: files containing text, files containing program listings, and loose data. Loose data includes the bulletin board messages, menus and prompts, help files, and command descriptions which tell you how to use the system.

A Dead Volkswagen

The whole purpose of downloading is to retrieve such information for your own uses. Often, this means the data must be manipulated in some way, edited perhaps, or merged into another file. And this is where the wrestling match takes place.

To illustrate the problems that may arise, let's suppose that one afternoon my Volkswagen dies; the fuel pump just quits working. That night, I log on to the local bulletin board to read the messages and find one that contains detailed instructions on how to repair a Volkswagen fuel pump.

This is important information, and I desperately need a copy. But it's too long to copy by hand; I can't take the computer to the garage so I can read the instructions while I work on the car; and my landlord won't let me bring a Volkswagen into my apartment. Fortunately, my terminal program has download capability.

Capturing The Data

Most terminal software downloads data through the *capture buffer*. I type in the control sequence which opens the buffer (with my software, I hold down the Commodore key and press the letter O). When the buffer is open, the terminal program notifies me by displaying an arrow or a BUFFER OPEN prompt. When I'm sure the buffer is open, I type in the bulletin board commands to have the Volkswagen message displayed again. When the host transmits the message, the terminal program displays it on the screen and stores it in the buffer.

While the buffer is open, I also download a message announcing the date of the next user group meeting. Then I close the buffer, SAVE the contents to disk, and log off. (Some software saves the buffer to disk after you log off.)

Next I load and run a word processing program, call up the message file from disk, make a note of the user group meeting in my appointment book, and erase everything except the Volkswagen repair tips. These I send to the printer. Now I'm ready to take the printed instructions out to the garage and bring my Volkswagen back to life.

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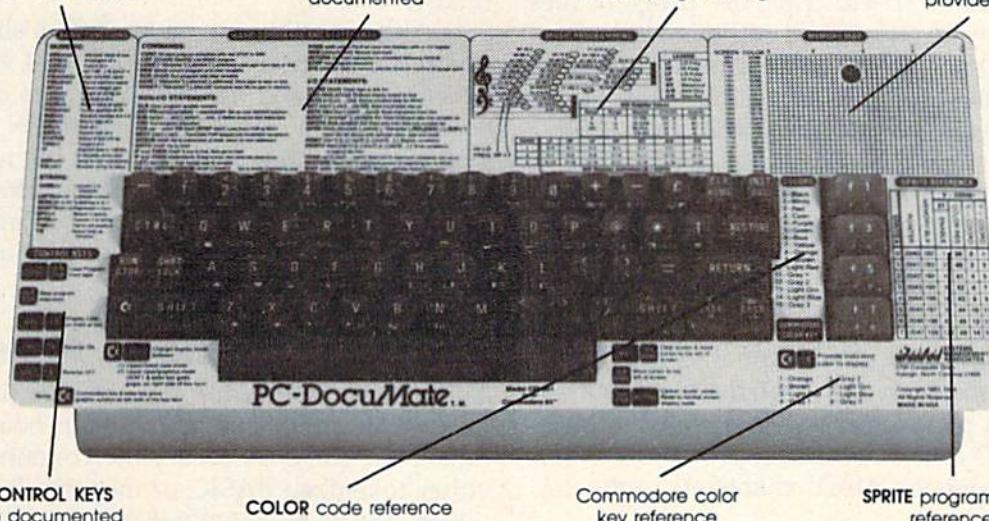
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I'm ready, that is, if my word processor were able to read the message file created by the terminal program.

Word processors usually store text either in sequential files or program files. In order to edit downloaded files (and to prepare text files for uploading), the terminal software and the word processor must read and write the same type of file.

If your terminal program and word processor use disk storage, check your word processor's documentation. If it doesn't tell you the file type, there's a simple (and easy) way to find out. Create a file using your word processor, and store it to disk. Then type NEW to clear BASIC memory, and load the disk directory (LOAD "\$",8). LIST the directory and look to the right of the filename you created earlier. You will see PRG (program) or SEQ (sequential). That's the type of file your word processor uses.

If the word processor works with sequential files, you're in good shape, because all terminal programs with download capability will process sequential files.

Storing Text In Program Files

However, many word processors (including *WordPro 3 Plus* and *SpeedScript*) use program files because text can be stored and retrieved either with the LOAD and SAVE commands commonly used with BASIC programs, or the files can be OPENed for reading and writing as if they were sequential text files.

If the word processor generates program files, check your terminal software's documentation to see if it can store downloaded text as a program file. If it can, your terminal software and word processor probably are compatible.

Keep in mind that even if the disk file is called a program file, it still contains text. You cannot create a program file with a word processor, then LOAD and RUN it as a program, because the file contains ASCII characters, not BASIC tokens.

One other conversion snafu is possible. Some word processors use unique control characters for indentation, centering, and the like. These control characters make sense to the word processor, but they may mean something entirely different to the terminal program. Also, some word processors store text as screen codes rather than as ASCII characters. If your word processor and terminal program use the same file type but you're still having problems editing downloaded files, you may need a program which can convert the downloaded files from CBM ASCII into the screen codes and unique control characters which the word processor can read.

Downloading Files

Bulletin boards and networks maintain data bases, or access areas, where you will find three types of files: text (TXT), binary (BIN), and image (IMG) files.

The most common, and the type most often used by bulletin boards, is the text file. Here, as with disk program files containing text, the name is misleading. You might expect to find only words and sentences in a text file. Not so; some text files contain BASIC program listings. Less frequently, text files hold disassembled machine language listings.

If the file does contain text, it is downloaded and edited the same way as the Volkswagen repair tips were handled.

If a text file contains a program listing, however, you can't just download it and run it as is. It is not true BASIC, but rather a character-by-character ASCII representation of a BASIC listing. Before it can be loaded and run as a program, it must be converted from ASCII characters into tokenized BASIC form.

Your terminal software should include an auxiliary program which performs the conversion. This program will have a filename like FILE.PROG (sequential file to BASIC) or TXTBAS (text to BASIC).

Although the procedure differs slightly from one terminal to another, the general idea is to download the text file and store it to disk as a sequential file. Then LOAD and RUN the conversion program. You will be asked the name of the sequential file to be converted and the name of the BASIC program to be created. The conversion program will then translate the text into tokenized BASIC and store it on disk.

Binary And Image Files

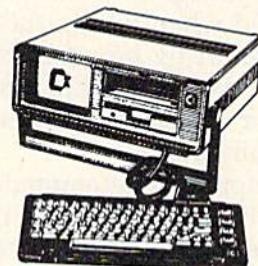
The second type of file you will see (in network data bases rather than on bulletin boards) is the binary file (BIN). A binary file contains a program, either tokenized BASIC or machine language, which has been converted into ASCII characters. If you download a binary file, your screen will fill with a progression of lines beginning with a colon, followed by a series of numbers and letters like the hexadecimal numbers you see when you use a machine language monitor to display your computer's memory contents.

As with text files, binary files must be converted, and your software should include an ASCII-to-binary conversion program.

The third type of file is called an image file. Image files are downloaded in the same format as binary files. In fact, the only real difference between the two is that image files contain unique error-detection codes used by CompuServe, to

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provide its subscribers with error-free, direct-to-disk program downloading.

Several small software houses have adopted CompuServe's image file formats for their own terminal programs. For the computer user, this provided a degree of standardization which was applauded when first introduced. The ovation was cut short by progress, however, when CompuServe changed its formats, and image files created or converted by other software were no longer compatible.

CompuServe attempted to clear up some of the ensuing mess by going through the files in its data bases and relabeling those now-obsolete image files as binary files. And the small software houses, for their part, began updating their programs to fit the new format.

Confusing Names And Formats

Some confusion still lingers, though. In the first place, many terminal programs still refer to binary files as image files in the sections of their documentation which deal with converting the files to binary form. And some terminal programs have been updated to convert according to the new format, while others still convert according to the old format.

In the best of all possible worlds, all this experimenting and detective work would be unnecessary. A user could buy a Brand X word processor and a Brand Y terminal program, and still get transparent conversions and file compatibility.

In the real world, the lack of standardization is not merely a matter of poor planning, or of hostility between hardware and software manufacturers. The patchwork of competing standards may be a source of frustration for home computer owners, but it's a source of profits for home computer manufacturers. Our economy is based on competition; trade secrets and unique formats give a company a competitive edge.

A Step Toward Integration

Competition makes universal compatibility an unlikely prospect. But as home telecomputing becomes more popular, we will certainly see the second-best possible world: integrated software. The CompuServe Information Service has moved in this direction by marketing a sophisticated terminal package, *Vidtex*, which is integrated with CompuServe's network software. This means that *Vidtex* and CompuServe's software can interact transparently, providing such advanced features as error-free file transfers and automatic transfer of data from CompuServe directly to your disk drive (and all you have to do is supply a filename).

Vidtex is available from CompuServe or from Commodore Business Machines for the Commodore 64, with both disk and tape versions. The price is \$39.95. Unfortunately, there is no version for the VIC-20.

Terminal packages before *Vidtex* (and even some of its current competitors) were conglomerations, consisting of a terminal program supported by several auxiliary programs which were used off-line to convert files. *Vidtex* makes it possible to perform most conversion and storage tasks on-line automatically, using a single program.

Using two sets of special-function keys, a user can download and store a file without logging off or losing any transmission from the host. You can interrupt an on-line session anytime to check the disk directory or to perform such disk housekeeping tasks as scratching files, copying files, or converting them from one form to another.

Before *Vidtex*, functions like these required extensive involvement of the user, and extensive technical knowledge. If a user wanted to download several files, for example, he would have to log off and convert each file as it was downloaded, then log back on and repeat the process.

Automatic Telecomputing

Vidtex has an autofile feature that allows the user to instruct the program to dial the host computer, log on, go directly to a data base, download one or more files, store them to disk, and log off. After setting up the autofile, all the user has to do to initiate this process is hold down the Commodore key and press J.

Vidtex will convert files to standard ASCII or CBM ASCII as they are transferred to disk. It also allows a user to choose whether data will be stored in a sequential or a program file.

If you are not already familiar with a terminal program, and your technical skills don't include a thorough grounding in file conversion, your safest bet is to use *Vidtex* to download binary or image files from CompuServe's data bases.

With *Vidtex*, most of the confusion will evaporate, and you'll also get color, graphics, and other special features made possible by the integrated relationship between *Vidtex* and CompuServe.

The only real shortcoming of this software is the lack of an off-line word processor which would create and edit text files for uploading and downloading.

CompuServe has a good business reason for not including such a word processor in the package; the network offers text editors and word processors as part of its on-line service. If the company included a word processor on the disk