RUN

Jim Butterfield Previews Plus/4, C-16

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A CWC/I Publication
November 1984

The Commodore 64 & VIC-20 Magazine

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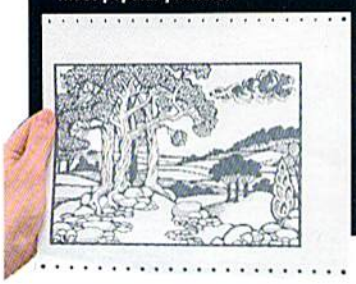

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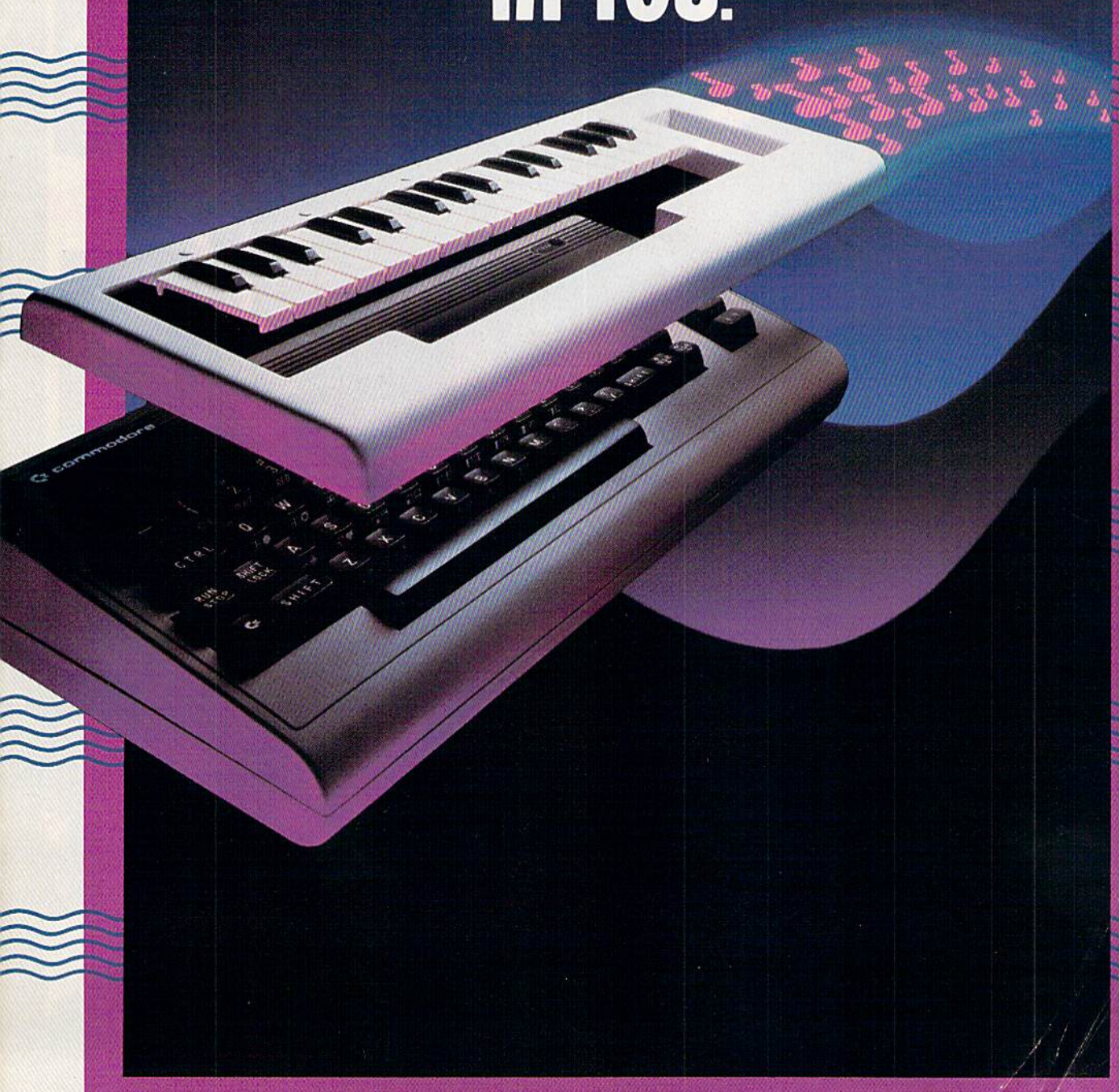

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RUN

November 1984
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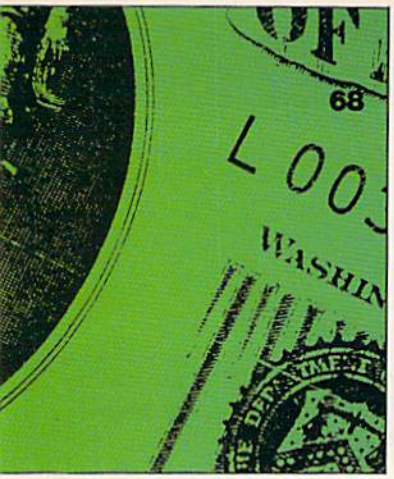

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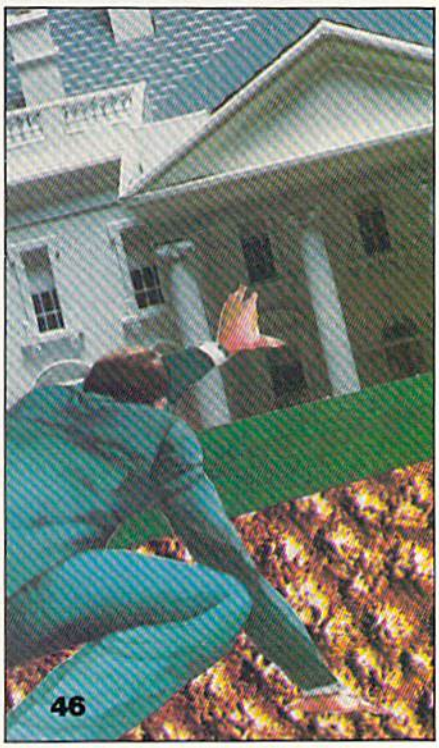

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ReRUN Revisited

The long-awaited second edition of ReRUN will be available in December.

To wrap up our first year, we are putting as many of the best programs we could possibly squeeze onto the second edition ReRUN tapes and diskettes. Games to amuse you, utility programs to help you get the most out of your Commodore computer and educational programs for young and old.

For you gamesters there are joystick gems such as Money Grubber (C-64) and Lost In Space (VIC), as well as quick-keyboard contests like Battleship War (C-64), a fast-paced battle on the spritely high seas. And for anyone who ever wanted to call the plays but avoid the bruises, there is Touchdown! (C-64 and VIC).

For the thinking gamer, there are a number of amusements. Nimbots (VIC) is an ancient take-away game with some new twists. Slide (C-64) may be one of the toughest challenges you ever slip into.

With Find the Word (C-64 and VIC) you won't have to wait for the Sunday paper to create your own puzzles. Head for the track in Playing the Ponies, and experience horse-racing action without losing your shirt.

Then somewhere between joystick action and deductive reasoning there is Mystery of Lane Manor, a multi-player or solitaire detective game for every amateur sleuth in your house.

And just for fun, we included I Am the President (VIC), a humorous conversation with an infamous, but fictitious, ex-president.

For the utility-minded Commodore users, we have programs that will make your programming life easier.

Sprite Control (C-64) gives you four new Basic commands for manipulating sprites. The Many-Colored VIC helps take the frustration out of multi-color character programming. Lister Filter (C-64 and VIC) will let you print out those listings, automatically translating all those graphics and control characters into a form that humans can understand.

And once you have that work of art created, Print Your Screen will take whatever is on the screen and print it on your printer. SIDAID (C-64) adds three Basic music commands for the musically inclined who don't feel like Poking around.

Play Me a Color (VIC) turns your computer into a colorful music maker. Post a Notice (VIC) gets your message across in handy 3×5 form. Line Squeezer and Line Expander (C-64 and VIC) are two programs for the price of one, to squeeze those long programs down to size or take scrunched programs and spread them out.

Finally, Datafile (C-64), a full-blown database, offers features found in professional software.

There are educational programs, like Morse Code Medley (C-64 and VIC), that let you teach yourself Morse code, and two programs, Speller (C-64) and Spelling Friend (VIC), that tutor with infinite patience.

No matter what you do with your C-64 or VIC-20, there is something on ReRUN to amuse, use, fascinate, educate, enlighten, solve, battle, help, provoke, hear, see, play and value. No typing, no trouble. Load them into your Commodore computer and enjoy the best from *RUN* magazine, July–December 1984. It's *RUN* all over on ReRUN.

Guy Wright
Technical Editor

How to type listings from *RUN*

Typing in listings can be difficult enough without having to worry about strange graphics characters, charts or tables. That's why we decided to make it easy to enter listings from *RUN* by translating everything we thought might be confusing in any program.

When you see something between the curly brackets, all you have to do is press the keys indicated. For example:

{SHIFT L}—means hold down the shift key and press the L key at the same time.
{COMD J}—means hold down the Commodore key (it is on the lower left side of the keyboard) and press the J key at the same time.
{SHIFT CLR}—hold down the shift key and press the CLR/HOME key.
{HOME}—press the CLR/HOME key without shifting.
{CTRL 6}—hold down the control key and press the 6 key.
{FUNCT 2}—function 2 (in this case, you hold down the shift key and press the function 1 key).
{CRSR UP} {CRSR DN} {CRSR LF} {CRSR RT}—these are the four cursor directions.
{UP ARROW}—means the arrow key (the one with the pi sign under it).
{LB.}—the British pound sign (£).
{PI}—the pi sign key (π); (shift and press the up arrow key).

In some instances, when a large number of characters or spaces are repeated in a listing, we will represent them this way: {22 spaces} or {17 CRSR LFs}.

Print vs Print#

RUN readers should be aware of difficulties that may arise when entering listings that contain the PRINT and PRINT# commands.

These two commands may look very similar, but they are different. If, for example, you use a question mark (?) to abbreviate PRINT in a line such as 10 PRINT#4,A$, then you are signaling to the Commodore computer that you are trying to print the variable #4, which is not a legal variable name.

The command PRINT#4 actually means "print to device number 4." You can abbreviate PRINT# by hitting the P key and the shift and R keys at the same time and then entering the device number. But *do not* abbreviate PRINT# with a question mark.

If you think of PRINT as one command and PRINT# as an entirely different command, then you should have no problems.

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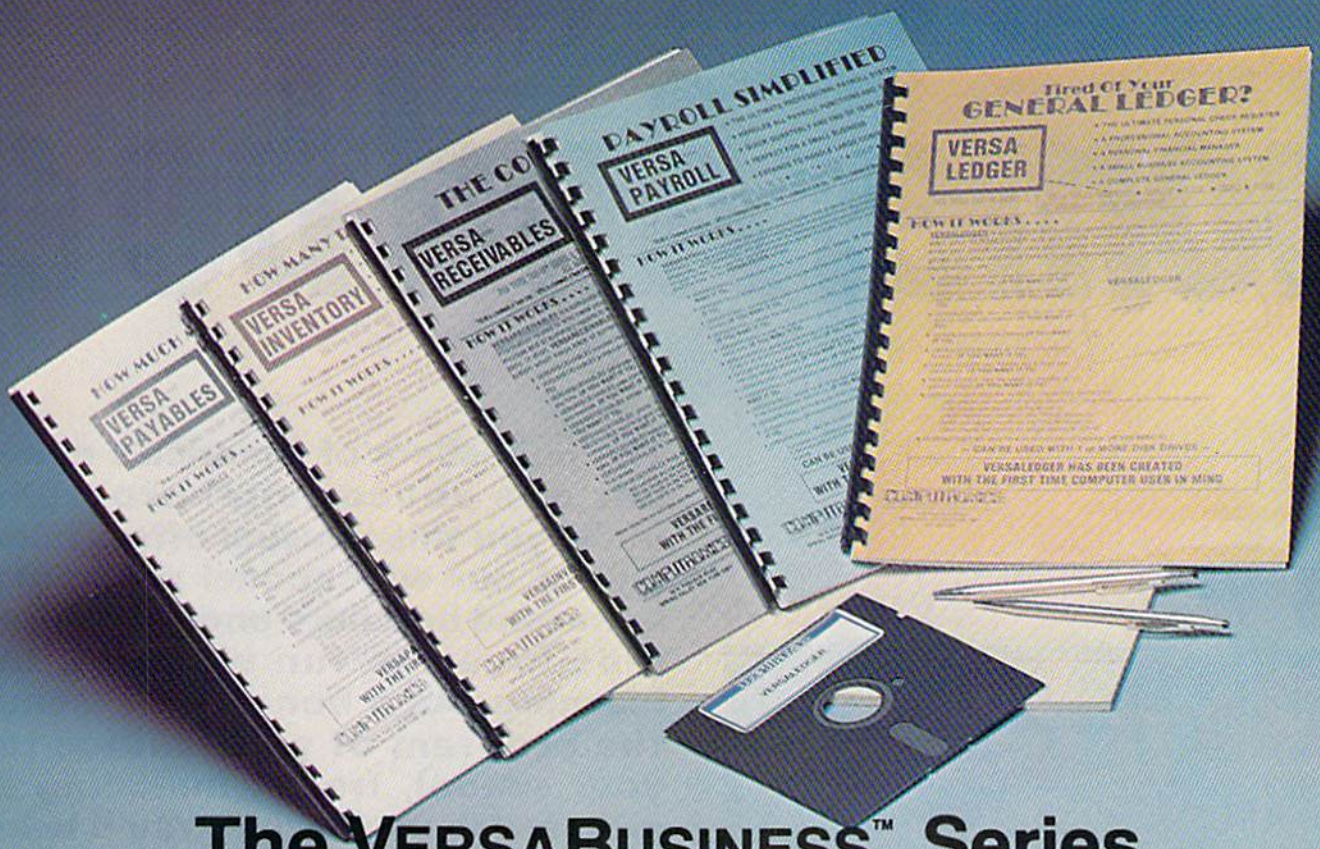

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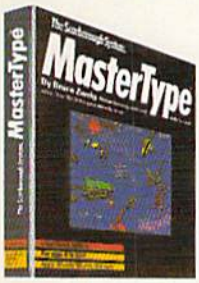

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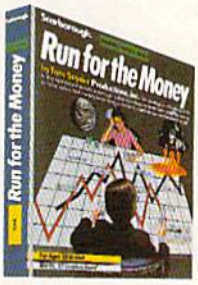

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GUIDE

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Magic

Compiled by Louis F. Sander

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November, also known as turkey month, was named by the ancient Romans, after the Latin *novem*, meaning nine. Since November is the eleventh month, it's obvious that the Romans did *not* have Commodore computers. Whatever this month's name, give thanks that its tricks are far from turkeys.

Starting with a slice of *prosciutto*, they include a tasty taco, some poi, steak-and-kidney pie, and even a Vegemite sandwich. But mainly, there are heavy helpings of tricks for music, modems, joysticks and paddles. *Bon appetit*!

$112 Automatic line deleter—When you must delete a block of lines from your Basic program, you'd like to have a delete option, but unfortunately this is not available on Commodore computers. The task may be performed by the following one-liner. Be sure to enter it exactly as listed here, because it has some unusual constructions.

```
1 ?"{SHIFT CLR}{3 CRSR DN}"F:?"F=F+1":L="L":IF F<=L
  THEN1{HOME}":POKE198,2:POKE631,13:POKE632,13:END
```

Add the line to your main program, then in Direct mode enter:

```
F=[first line #]:L=[last line #]:GOTO 1
```

For example, F=100:T=150:GOTO1 will delete all lines in the range of 100–150 inclusive. The program runs on the VIC, the C-64 and many PETs.

Carlo Borreo
Imperia, Italy

$113 Music sources—As we experiment with the musical capabilities of our computers, most of us quickly run out of melodies. Here are some excellent, readily available sources of two- and three-part songs: music textbooks used in fifth- through eighth-grade school classes; music for two or three recorders (The wooden flute-like kind, not a cassette player. Ed.); SAB (soprano, alto, bass) *a capella* choir music.

The music to the songs in these books sounds nice on the computer. The books are easier to work with than most commercial sheet music, because they're written for the proper number of voices.

Elizabeth Oman
Pharr, TX

$114 Audio hint—If you program late at night, like I do, and you use sound in your programs, you run the risk of disturbing others in the house. The answer to the problem is to use earphones instead of a speaker, and sometimes this is easier than you might think.

On the Commodore monitors, the front and rear panel audio jacks are connected internally, without going through the front/rear input switch. You can plug an 8-ohm headphone into whichever jack you're not using, turn the volume to its lowest position and work to your heart's content. If your headphone doesn't have a plug to fit the monitor jack, and most of them don't, Radio Shack and most electronics stores can sell you an adapter.

Harry Metz
New York, NY

$115 A nice sound—This one-liner will produce the sound of a silver bell on your C-64.

```
10 S=54272 : POKE S+24,15 : POKE S+1,110 : POKE S+5,9:
   POKE S+6,9 : POKE S+4,17 : POKE S+4,16
```

Albert H. Coya
Miami, FL

$116 Better-sounding sound—If your C-64 music is a bit out of rhythm, and if you can do without the screen display while the music is playing, there's an easy way to improve things. Just turn off the screen by adding the following line to your program, before the music starts.

```
POKE 53265,PEEK(53265) AND 239
```

To turn the screen back on, add:

```
POKE 53265,PEEK(53265) OR 16
```

Disabling the screen relieves the computer of having to update it, which is normally done during and between notes. The result is more perfect rhythm, but a side effect is that the music speeds up a bit. If this is bothersome, you can adjust your timing loops accordingly.

Tom Jeffries
Oakland, CA

$117 Sound filter—Page 88 of *The Commodore 64 User's Guide* shows a neat little program that lets you play songs by entering the appropriate note values into Data statements. If you find that the song contains static or is excessively noisy as each note is played back, try adding the following line after clearing the sound registers.

```
3 POKE 54295,4
```

This activates bit 4 of the resonance filter, which will weed out the noise, leaving you with a clean, pure tone. (If you don't understand the technical terms, put the line in anyway—the *computer* will know what to do! Ed.)

Lionel Sapkus
Burbank, IL

$118 Silencer—When creating sound programs on the C-64, it's not uncommon for the sounds to continue, at a low level, after they ought to have finished. To avoid this, just enter POKE 54296,0 after each sound, then enter POKE 54296,15 when you're ready for it to start again. The Pokes turn your computer's volume control from minimum to maximum, respectively.

Dan Schikore
Florissant, MO

$119 Dulcet tones—Have you been dissatisfied with the poor tonal quality of music programs you've written for your VIC-20? It's impossible to get pitches completely in tune on the VIC, but the key of G major comes closest, so try writing your music in that key. If G major puts you in the wrong range for singing the tune, transpose your music to C major—it next best approximates the well-tempered scale we're accustomed to.

Elizabeth Oman
Pharr, TX

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$11A De-clicker—When working with C-64 sound, are you annoyed by the clicks and thuds when the sounds are turned off? Below is a machine language subroutine that banishes them by gently resetting the SID registers.

Running these lines once gets the machine language into memory, where you can use it as many times as you want. At the end of each sound effect, just call the routine with a SYS 50000, and say good-bye to clicks.

```
1000 FOR X=50000 TO 50018
1010 READ A : POKE X,A
1020 NEXT X
1030 DATA 169,0,133,253,169,212,133,254
1040 DATA 160,0,152,145,253,200,192,24
1050 DATA 208,249,96
```

Bruce Jaeger
St. Paul, MN

$11B Commodore 1600 modem tip—If you experience intermittent problems with this modem, try resoldering the pc board where the connector joins it. No stress relief was provided in that area, so after repeated removal, the electrical connection may become loose.

Tom Hoppe
Spokane, WA

$11C Telephone tip—When you're using a modem, outside sound must not invade the phone line during data transmission. If it does, the modem will hang up, or data will be lost. Unfortunately, the popular *call waiting* telephone service causes this sort of problem when it signals incoming calls.

I've solved the problem by using *call forwarding* whenever I'm on the modem, forwarding all my calls to a time/temperature number or some other harmless destination. Forwarding the call disables the call-waiting tone, giving uninterrupted use of the modem. If you're uncertain about the use of these services on your own line, just ask your telephone company about them.

David W. Martin
Valrico, FL

$11D Phor phone phreaks—If you want to use a modem, but only have an old-style dial phone, here's a way around the problem. You must have touch-tone service, and you must own the dial phone. Disconnect your phone and remove the screws holding the bottom plate to the base. Trace the wires from the receiver cord to the bus bar in the base. Cut off one end of the modular extension cord you purchased, strip the four wires and match the colored wires to the wires on the bus bar coming from the receiver. Reassemble the phone.

Donald J. Ennis
Louisville, KY

$11E More phor phone phreaks—With more than one phone on a line, family members can unknowingly pick up extensions while you're using your modem, causing undesirable errors. To avoid this problem, you can make your computer phone, or modem, the priority station.

In most cases, the wire feeding your computer phone has four conductors, but only the red and green are active. Without disconnecting them from your phone, wire these two through a double-pole switch, and back to the two extra conductors (usually yellow and black). This will take the dial tone back through the wires to the entrance bridge, the connecting block where the phone wire enters the house. At the bridge, remove all wires going to telephones, except the two going to the computer phone. Then hook the disconnected wires to the yellow and black wires coming from your switch. If your extension phones won't break the dial tone after this is done, simply reverse the yellow and black wires.

Now you can use your switch to disconnect all extensions while you're using your modem.

Gerald Evans
Westminster, MD

$11F Joystick joy—If you already own an Atari 2600 game system, and who doesn't, there is no need to buy joysticks for your Commodore. The Atari units will work perfectly.

Paul Goble
Mustang, OK

$120 Joystick sorrow—Joysticks can cause problems on the C-64. If the joystick is moved or the button is pressed, it can cause the keyboard to act erratically, printing different letters than the keys that are pressed. Always make certain your joysticks are unplugged or undisturbed when not in use.

Matt Bassen
Federal Way, WA

$121 Joystick sorrow undone—When you write a C-64 program that uses both a joystick and limited character inputs, using the Get statement is a good way to read the keyboard. But the Get statement may incorrectly read the joystick as a character input. You can avoid this problem by using joystick port 2, or by properly choosing the characters to which your program responds. For example, {CRSR RT}, {space}, left arrow, * and 2 are characters commonly read from the joystick in port 1. Avoid using these characters and you'll have avoided a problem.

John Mirabella
Vienna, VA

$122 C-64 joystick button—You can use the joystick to continue the flow of a program, by waiting for the button to be pressed. WAIT 56465,16,16 will work with port 1, while WAIT 56464,16,16 will work with port 2. The following simple program illustrates the principle.

```
10 PRINT "PRESS FIRE BUTTON ON PORT 2"
20 WAIT 56464,16,16
30 PRINT "BANG!"
40 GOTO 20
```

David Covarrubias
Thousand Oaks, CA

(continued on p. 164)

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Illustration: Stephan Jobe

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Software Gallery

Compiled by Shawn Laflamme

Star Trek

This Onslaught of Klingons Is the Acid Test For Trekkies

B

Those of you who haven't seen the third Star Trek movie, *The Search for Spock*, had better sit down. I have some bad news.

The U.S.S. Enterprise has been destroyed! I'm sorry, but someone had to tell you. If it makes you feel any better, you'll be glad to know that the vessel went down in a blaze of glory, and the Starship's crew is all right.

But don't get too upset, because I also have some good news. For, although it has become apparent that Captain Kirk will never fly the Starship again, you may get a chance. How? Simply hook up your Commodore 64, plug in Sega's Star Trek Strategic Operations Simulator, and hold on to your joystick. In a near duplicate of the arcade hit (minus the vector graphics, of course), Sega has brought all the warp drive action right into your living room.

As Captain, your mission is to destroy NOMAD, a deadly, mine-laying intergallactic marauder. But first you must prove your worth in a series of menacing Klingon Battle Cruiser attacks. The contest is divided into ten different Sectors (skill levels), each with five different encounters. The first four require you to fend off Klingon attacks on your Starbases, while the finale pits you against the infamous NOMAD. Beat this baddie and you secure the Sector, gaining a load of bonus points and an advancement to a more aggressive level of play.

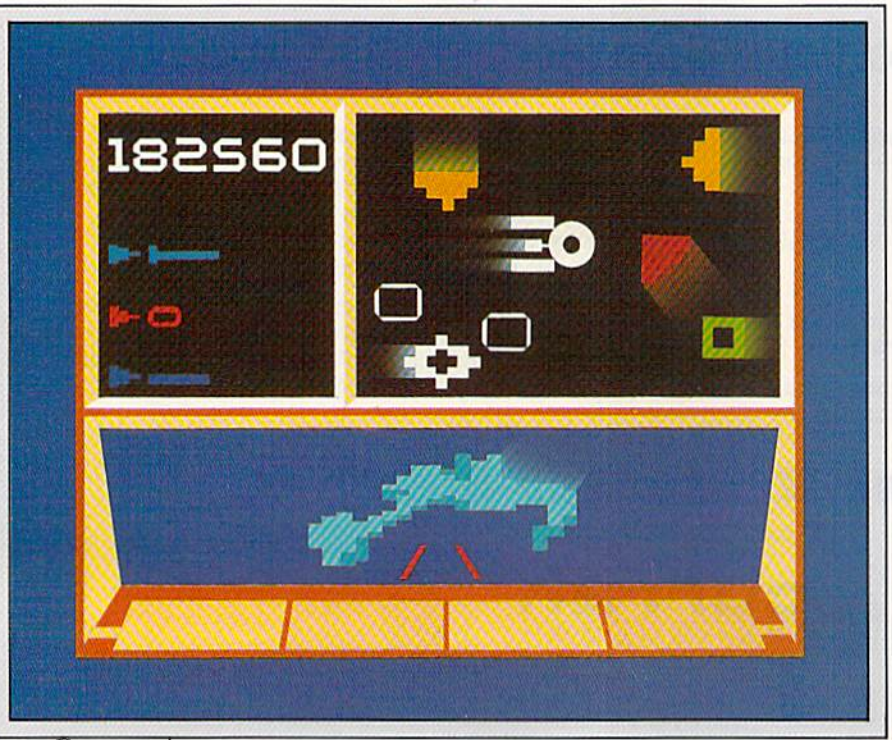
If one had to categorize this game, some might argue that Star Trek is just another shoot-'em-up—another addition to an overcrowded field. But a closer inspection shows that the game contains some subtle additions and changes that put it a cut above the usual space war contest; it's an uncommon whole that proves to be greater than the sum of its rather commonplace parts.

The most obvious innovation is the game screen. It is divided into three sections, each with its own specific purpose.

The top left portion is reserved for the ship's gauges, which are constantly monitoring your score, shield energy, photon torpedo supply and warp drive.

The top right section contains your radar scope, which gives you a bird's-eye view of the Enterprise and its relationship to surrounding Klingons, saucers, Starbases, enemy mines and NOMAD.

The bottom half of your screen gives a cockpit perspective, similar to the one made famous by the television series. Here you come in contact with the enemy, in a simulated 3-D fashion.



Report Card

A **Superb!**
An exceptional program that outshines all others.

B **Very Good.**
One of the better programs available in its category. A worthy addition to your software library.

C **Good.**
Lives up to its billing. No hassles, headaches or disappointments here.

D **Mediocre.**
There are some problems with this program. There are better on the market.

E **Poor.**
Substandard, with many problems. Should be deep-sixed!

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F-15 STRIKE EAGLE (simulator) has all the features that makes the real EAGLE the great fighter aircraft it is — afterburners, multiple radars, air to air missiles, high explosive bombs, cannon, drop tanks, Electronic Counter Measures (ECM) flares, electronic ground tracking maps, Heads Up Display (HUD), outstanding 3-dimensional cockpit visibility, and realistic F-15 maneuverability. Your mission is to take off from your base, fly to and destroy your primary target through all the dangers of enemy territory including Surface to Air Missiles and enemy aircraft. Of course, you have to get back home again, too!!

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F-15 STRIKE EAGLE is available for Commodore 64, ATARI (48K), and Apple II (64K) computers. Suggested retail price is only $34.95. Find STRIKE EAGLE at your local retailer, or call or write for MC/VISA, or COD orders. Add $2.50 for Postage and Handling (Int'l add $4.00USD). MD residents add 5% sales tax.

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Now, computer star warriors might find these components familiar. But rarely has a game displayed all of these features simultaneously. This split-screen setup enables you to keep a watchful eye on the ship's vitals, allowing for split-second battle decisions, depending upon which element of your mission deserves immediate attention. To put it in Trekkie talk, it's the equivalent of having Spock, Scottie, Chekov and Sulu within shouting distance for information and advice.

Another appealing feature is the variety of enemy ships and their multitude of attacking formations. Klingon Cruisers come in two species: blue ships and gray ships. The blue ships ignore the Enterprise, but they attempt to destroy the Starbases. The gray Klingons seek to annihilate your craft with Plasma Energy Orbs. Also, a yellow anti-matter saucer periodically appears; this must be destroyed before it attaches itself, leechlike, to the Enterprise and drains it of its warp drive energy. And, of course, there is NOMAD. The diversified attack modes of these ships present an ever-changing test of skill and strategy.

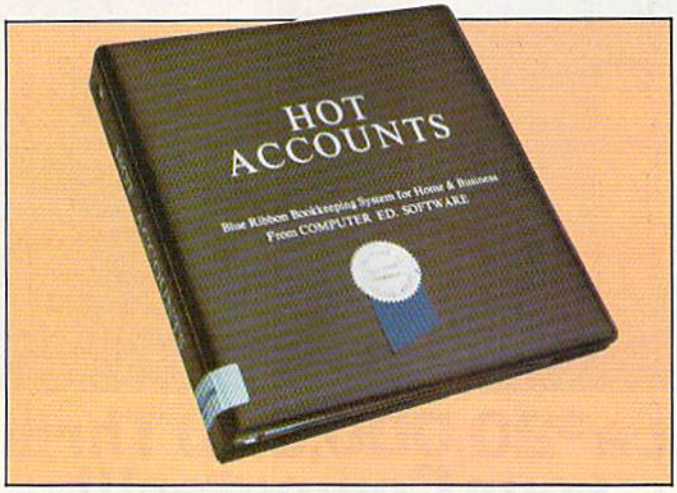
One final frill comes in the form of a Star Trek Combat Control Panel, a plastic overlay that fits on any standard joystick. It was designed to familiarize you with the operating functions. Since the original arcade game is controlled with a paddle and a series of buttons, the panel will help orientate an old coin-op pro with the new methods.

Star Trek is an appealing contest for arcade lovers of all ages, and it's well worth the retail price. The bold concept and design that pushed this game to the top of popularity charts in the arcades will surely grab just as big an audience on the home front. *(Sega Consumer Products, 360 N. Sepulveda Blvd., Suite 3000, El Segundo, CA 90245. $24.99.)*

Mark Cotone
Farmingdale, NY

Hot Accounts

Your C-64 Gets Serious with This General Ledger



Although the Commodore 64 is considered an overgrown toy by some people, it is capable of growing into a business machine. With more attention being focused on the versatility of the C-64, serious business programs are being developed. Hot Accounts is an example of what can be accomplished with good programming.

Hot Accounts is a general ledger program that will allow a small-business person to track income and expenses. The ledger information can then be printed in a number of report formats. Because of the way the program is set up, it also teaches and encourages sound bookkeeping practices.

Documentation

This is one area where the Hot Accounts package really shines. The documentation recommends that you first gather all the financial information needed; it then instructs you to classify all receipts and revenue into appropriate categories. It then tells how to create a Chart of Accounts and how to organize records in a ledger. Isn't that what accounting is all about? Monthly income statements can then be generated, allowing you to check on your business' cash flow. Ledger reports can be printed to show all transactions for a given time period (day, month or year). These reports can be sent to the printer or to the screen, as many times as needed.

The documentation is very well organized, with many sample screen displays and reports. On a typical page, you'll find the function to be performed underlined and in large, bold type. This is followed by information that you will need to understand the function, the prompts that will appear and the correct format for the responses.

The only objection I could find to the documentation was the size of the manual. It's an attractive three-ring binder. Unfortunately, with all the receipts, disks and general clutter usually found near a computer, the manual can be cumbersome. I'm one of those people who prefers a small booklet that can be held in one hand. Except for this, the documentation is marvelous.

Automatic Backup

Hot Accounts leaves nothing to chance. The program demands that you create backup data disks. When formatting the data disk, the program initializes the disk and creates files. It then expects to format the backup disk. Whether used or not, the disk is requested. The only way around it is to turn the computer off or reformat the same disk. Being sensible individuals, most people would just comply and count themselves fortunate to have a backup in case their main data disk dies. At the end of the session, the last menu gives the options of leaving the program or updating the backup disk. This makes it difficult to forget to keep your data current.

Error Trapping

The rest of the Hot Accounts package performs well, too. The error trap-

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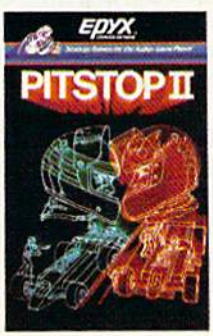
A split screen shows you your position and that of your opponent, a digital clock displays time and a lap counter gives you your race position as you race against each other in pursuit of the checkered flag. You can also play against the computer or take a few practice laps as you prepare for the real head-to-head competition. Step up to PITSTOP II because auto racing is not a solo sport.

One or two players: joystick controlled; disk or cassette.



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Hot Accounts will create bar graphs of your data, either on the screen or in print.

ping is almost perfect. It is almost impossible to crash the program. Hot Accounts ignores all inappropriate data entry. If it is looking for numbers, it locks out all alphabetic characters. When it is looking for a three-digit number, that is all it will accept. Any dates entered are checked to see if they are valid dates. If the maximum number of characters for a field is exceeded, the program prompts you to begin again. Wherever possible, it checks to be sure your entry is consistent with previously stored data. If the new entry doesn't agree, Hot Accounts lets you know and asks for the correct data. There is even an escape function if you need to quit suddenly. Three periods will end input and take you back to the main menu.

Although the program is only warranted to work on Commodore equipment, I tried printing out the monthly income statements and ledger data on another manufacturer's printer. Except for the unaligned decimal points, the printout looked like the illustrations in the documentation. Hot Accounts will create bar graphs of data in the ledger, either on the screen or in print.

Ease of Use

Since the program is completely menu driven, it is very easy to use. The menu choices have been arranged intelligently, making access to the data very simple.

Dates are entered as six-digit numbers—no slashes, no commas and no returns—just six digits. Monetary amounts are entered without dollar signs or commas. The decimal point is the only punctuation that will be accepted in numbers. Expenses can be noted as paid by check, cash, credit card or other. If paid by check, the system asks for the check number.

The program also has a function to check the amount of ledger space available for new entries. Instead of a nebulous number of sectors available, the program gives you a finite number of records possible. No guess work or figuring is involved.

Speed

Hot Accounts does not automatically sort data. It creates records on the disk in the same order in which they are entered. This doesn't mean you must enter records in alphabetical order to get a printout in that format. At the end of a session, or immediately before doing a printout, the information will be sorted at your request.

Sorting is one of the options on the main menu. Doing a sort of this nature can take up to six minutes or more, depending upon how many records there are. Waiting for sorts after each record entry could waste a lot of your day. This is one method the programmer chose to save your time.

Once the program has been loaded, the program disk is set aside. Hot Accounts only needs to get information from the ledger disk. This means that all the commands execute instantly.

Before allowing you to enter revenue or expense data, the program asks for the number of records to be added. The 20-record limit is prudent because Hot Accounts doesn't update the disk until all the entries have been made. This saves time waiting for disk access after each entry, while still not endangering a great deal of data. It only takes about 15 minutes to enter 20 records. If your power goes off or a fatal error occurs, only the last five or ten minute's records will be lost, unless, of course, the disk drive trashes everything on the disk. But that wouldn't be the fault of the program.

Limitations

The program can't handle more than a million dollars at a time (999999.99, to be exact). If your business gets a check for more than that, you'll have to break it up into two or more parts. If you spend more than a million dollars in one place, you'll have to break that down, too.

The program has to be able to deal with all records in memory at the same time, so it is limited to 300–400 records (depending upon the size of the records). Expense records require more characters than revenue records. This is why the program has a function to check available ledger space. Hot Accounts has no trouble handling a year's worth of data for a small business like mine.

For my business, I did an end-of-period statement for each year's data. This statement indicates how much money has been spent in each expense category and how much has been collected from each revenue category. The end-of-period statement also subtracts expenses from revenue to give an income total. For a larger business, the end-of-period statement might need to be done monthly or quarterly, instead of yearly. These smaller totals would then have to be combined for a year-end statement. Hot Accounts has no provision to do this for you.

This seems to be the only limiting factor in this fine program. I have entered all the data for my business into Hot Accounts, and I intend to keep using the program (at least until I find something better). Considering the excellence of the program, that may be a long while. *(Computer Ed. Software, 1002 Brookes Ave. West, San Diego, CA 92103. $64.95.)*

Cheryl Peterson
Miami Beach, FL

Voyage of the Mayflower

Sail Across the Atlantic And Establish a Colony In the New World

B

Voyage of the Mayflower, an educational game for the Commodore 64, is the first release in Cadmean Corporation's Discover America Series.

The game challenges you to sail the Mayflower across the Atlantic under conditions simulating those that confronted the 17th-century Pilgrims. The on-screen instructions, succinct though they may be, are certainly sufficient.

Ocean currents, such as the Gulf Stream, Labrador and North Equatorial have been programmed into the

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simulation. The manner in which the vessel responds to the wind, navigational changes, payload and weather (such as fierce North Atlantic storms) have also been taken into account.

Depending upon the difficulty level selected, voyagers have to determine the proper mix of food (fresh and salted), water, pickled edibles, spirits (strong drink) and stores for the trip.

The number and types of livestock, as well as their fodder, must also be chosen from a list that includes rabbits, fowl, pigs, goats, sheep, hay, grain and roots. The weight limitations of the Mayflower and transit time must be considered. Too much of something means a shortage of something else; too few provisions can mean deprivation and possible starvation.

Common to all five difficulty levels (simple, easy, medium, harder and hardest) are the compass-heading commands. Navigational changes can be plotted and their possible effects observed before actually carrying them out. This feature is useful both as a way to win the contest, and, more importantly, as an aid in illustrating the importance of exploring alternative methods of completing a task.

As a means for teaching decision making, Voyage of the Mayflower performs well. This program is much more than a simple tutor. It builds deductive reasoning and provides numerous cause/effect relationships. Though not as slickly produced as some of the better-known educational software programs, this one goes deeper than most.

Planning is interesting work on the higher levels. Stores and estimated sailing time must be considered. If the trip lasts longer than planned because of inclement weather or just poor planning, food and water must be rationed. Survival becomes the watchword, sometimes forcing a landing at a point other than Plymouth.

Naturally, an errant landfall and less than standard treatment of the passengers (rationing) counts against the captain. However, a swift passage means more supplies are left for establishment of the colony, which gives you a higher rating. Points are awarded on these bases, though real success means having the colony survive.

The graphics of the program are not particularly strong. A sprite rendition of the vessel sailing on the blue waters between continents is about all there is to it. When a storm brews, the background colors alternate and flash behind a close-up of the Mayflower. Once the disturbance finally subsides, the map screen returns, the ship having been blown off course.

The use of sound effects is also limited; the programmer's emphasis was on re-creating conditions as they actually existed so many years ago. Cadmean has to be lauded for resisting the "bells-and-whistles" approach. Voyage of the Mayflower is much stronger for it, and it has enough appeal to keep a young student's interest. After all, education that's fun stands a better chance of acceptance by its target market.

Though all is not perfect, as an enhancement to the classroom experience, Voyage of the Mayflower makes the grade. *(Cadmean Corp., 309 Koch, Ann Arbor, MI 48103. $29.)*

Ted Salamone
Bridgeport, CT

Computer Football Strategy

This Gridiron Strategy Game Is Perfect for the Armchair Quarterback

B

Computer Football Strategy was written with the Sunday armchair quarterback in mind. This game puts you in both the coach's shoes and the team huddle.

Strategy is Avalon Hill's strong suit, and it is well evident in this offering for football lovers. If you know the difference between a screen pass and a buttonhook, then this is your game. It's the perfect disk to boot up during Howard Cossell's halftime lip-flapping on Monday night football.

One of the best things about Computer Football Strategy is the opponent options. You can play against another football fan, against the computer, or you can even have the computer play itself, which is handy to familiarize you with the gameplay. If you play against the computer, beware—it plays tough.

After the coin toss, the kicking team is given the option of either a normal or onside kick. With the kickoff, the clock begins ticking down the first quarter. The receiving team catches the ball, if it's in play, and makes its return. But watch out—each team has a return specialist. They don't break free very often, but when they do, they can be devastating. Each team has three time-outs per half. These are very important, just as they are in the real game.

You are wise to familiarize yourself with the play chart before you take your team onto the field. The team on offense has 21 possible plays from which to choose. The defense has ten basic formations. You don't have to memorize them to play. The computer displays each team's options, and each team is prompted to input a play or formation. But to succeed, it helps to know what chance of success each play has against each defensive formation. That's where the play chart included with the 16-page manual serves as a play book.

If you want to pass, you can choose a flair, sideline, look-in, screen, pop, buttonhook, down & out, bomb and razzle-dazzle. Option passes are also included, as well as solid, up-the-middle running plays. How about a reverse or draw? Sounds like real football, doesn't it?

If you insist upon realism, just wait until you get your first five-yard penalty. Or worse, you could be trapped for a safety. You might also experience the frustration of an easy field goal attempt that hits the upright.

On defense, you can blitz, cover long or defend against a run, to name just a few of the options. An aggressive defense can also come up with fumbles and intercept passes. But you have to play heads-up football. If the opposing team's super receiver breaks loose and you allow the quarterback too much time, you could very quickly be six

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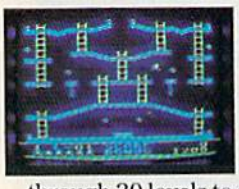

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points down. Whether you're on offense or defense, always keep one eye on the clock and use your time-outs wisely.

After each quarter, both team's stats are displayed. Do you rely too much on the run? How much yardage is your passing game picking up? Should you go up the middle more often? Which plays are your opponents using most often? The stats are helpful in answering these questions and planning strategy.

The final stats are listed at the end of the game. Playing time averages around 45 minutes to an hour. Avalon Hill did not include an option to save a game in progress.

The sound and color are about average for an arcade-type game. There is a victory tune when either team scores, and other sound enhancements are included.

The strategy involved in this game is engrossing. Computer Football Strategy surpasses any football board games I've seen, and I've tried to play them all.

The program is written in Basic, and it's huge, filling 100 blocks on a disk. Cassette owners may want to start loading their version long before they're ready to play—it takes a long time to load a game of this size from cassette.

With Computer Football Strategy, you don't have to worry about being cut from the team. You are the owner, coach, quarterback and the rest of the team all rolled into one! *(Avalon Hill Game Co., 4517 Harford Road, Baltimore, MD 21214. $21.)*

Gary B. Fields
Asheville, NC

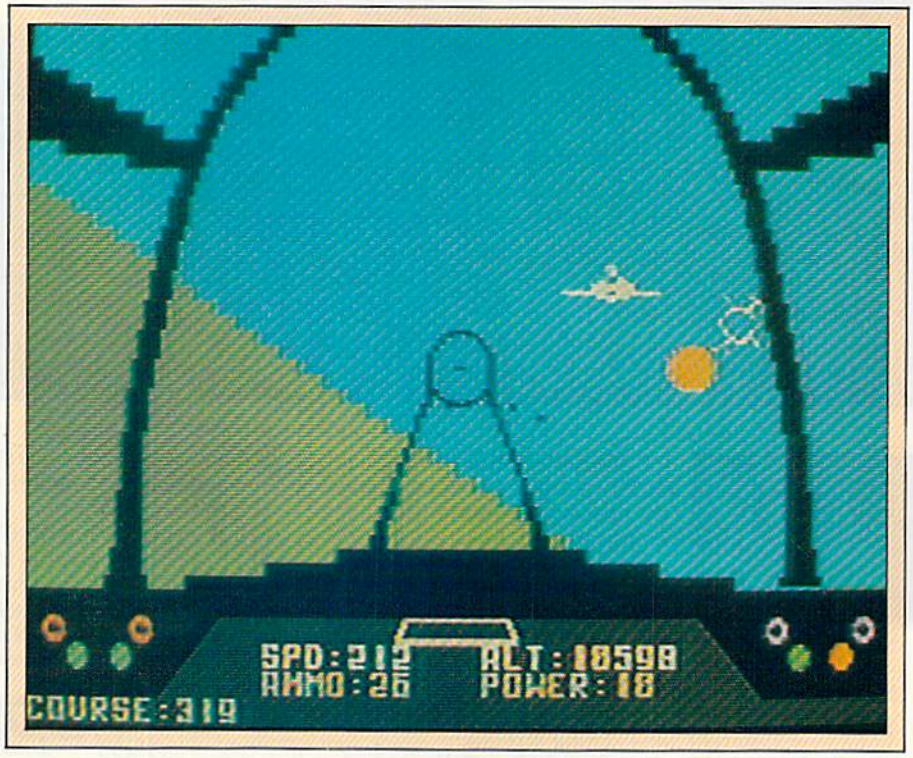
Spitfire Ace

Strap on Your Parachute And Battle the Luftwaffe In the Skies of Europe

C

If you've grown tired of the typical shoot-'em-ups and maze games on the market for the C-64, then consider Spitfire Ace.

Spitfire Ace is billed as a "game that challenges your nerve, flying skill and knowledge of air-to-air combat tactics." In this game, you fly World War II planes against computer-controlled



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planes, with 14 combat scenarios from which to choose. Your goal is to complete five missions and become an Ace.

Spitfire Ace is a very complex, interesting program. Here's a sampling of the 14 scenarios:

Dunkirk. As German Panzer divisions roll through Allied defenses, the British Expeditionary Force retreats to Dunkirk; the troops must await evacuation to England. German bombers and RAF fighters tangle over the crowded beach. Ahead of you, a Stuka dive bomber begins a screaming dive. Get him!

London. Bombers are accompanied by strong fighter groups in many of the Luftwaffe's night raids. The speedy Spitfires engage the German fighters, while the RAF Hurricanes attack the bombers. As your Spitfire climbs to intercept an enemy formation, Me-109s drop down to meet you. Gook luck!

D-Day. You're flying a ground-suppression mission as part of massive air support for the D-Day invasion. As you begin a low strafing run on a Luftwaffe airfield, you spot an FW-190 fighter lifting off the end of the runway. Combat begins.

V-1. The successful D-Day invasion spells the beginning of the end for the Third Reich. In a desperate attempt to reverse the tide, V-1 "Buzz Bombs" are launched against London. RAF fighter patrols are kept airborne in an attempt to shoot down these speedy, pilotless drones.

Depending upon the particular scenario, you can fly planes such as Spitfires, Baltimore Bombers and Blenheim Bombers. Your plane's instruments appear at the bottom of the screen. These include a mirror (which is only useful in daylight), speed indicator, altitude indicator, course plotter (degrees), ammunition counter and throttle (power) setting.

As you start the first round, you can choose the number of players, the scenario and one of four difficulty levels. The C-64's function keys are used well; the f7 key functions as a pause and restart button.

Perhaps the most challenging aspect of Spitfire Ace is learning to fly your plane. The manual gives you some help, but it'll take lots of practice. You can use two joysticks (one to fly and fire your ammo and the other to control your throttle and bail out, if necessary). If you do not have two joysticks, you can use the keyboard in place of the second joystick. As you learn to fly, you'll come to appreciate the realistic graphics display, which simulates three-dimensional flying. Your plane can bank, turn, climb, dive and do other fancy maneuvers, just like real planes. In fact, the manual shows you how to do Loops, Split-Ss and Immelmann Turns.

You'll need all the flying tricks you can learn to do well with this program. The instruction manual also provides some combat tactics, but the computer-controlled planes already have them down pat.

The ultimate object of Spitfire Ace is to accumulate five victories and become an Ace. At the end of each game, you receive a ranking based on victories, fuel used, elapsed time, damage to your plane and ammunition used. Rankings are Rookie, Wingman, Pilot, Ace and W.G.F.P. (World's Greatest Fighter Pilot).

Spitfire Ace has many good features, including color graphics and good sound effects. The flying sensation is very realistic.

As for shortcomings, there are a few. The first is the manual. The version I reviewed was written for the Atari computer, and it contains an insert card for Commodore 64 users. While this is adequate, there are some confusing points; for example, the joystick numbers in the manual differ from those in the insert card.

The use of two joysticks can be awkward, depending upon the type of joysticks you have. But, since you can also use the keyboard, this is only a minor drawback.

Since the game is rather complex, it's not for younger kids. I estimate the lower age level to be about eight to ten. Since there are many scenarios, including day and night battles, it'll take a long time to master and outgrow this game.

Overall, I recommend Spitfire Ace as a refreshing variation over most of the other games on the market for the Commodore 64. For pilots and other people interested in flying, it should provide even more enjoyment. *(MicroProse Software, 10616 Beaver Dam Road, Hunt Valley, MD 21030. $29.95.)*

Larry Bihlmeyer
Pontiac, MI

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VIDEO CASINO

By David D. Busch

Here's another word game for you: In this one, you must discover the hidden word without knowing the word's length.

The words in Probe contain 12 letters or less, and both blanks and letters are displayed as dashes in the clue. For example, "PROGRAM" would appear as "– – – – – – – – – – – –", but would ultimately be revealed as "xxx-PROGRAMxx".

You must guess blanks as well as letters, and you are allowed only eight wrong guesses before the game ends. Twelve words have been provided. You may add your own words by typing new data lines. You need not make any other changes.

Probing the Program

Following the instructions, the program reads the next word (line 220 in the Commodore 64 listing) and determines its length, A. The number of spaces that will be required to fill out the 12-letter clue is calculated as variable B. Then a starting position within the row, PO, is chosen randomly. To ensure that a word will not start so far into the clue that there won't be enough spaces left to hold it, the value of B is used to limit a word's starting position.

Next, an array, WRD(n), is filled with the ASCII values of the letters, plus leading and trailing blanks. All elements of the array, up to the starting position of the word (from position 1 to PO-1), are given the value 32 (space). A counter, CU, keeps track of the current element of the array.

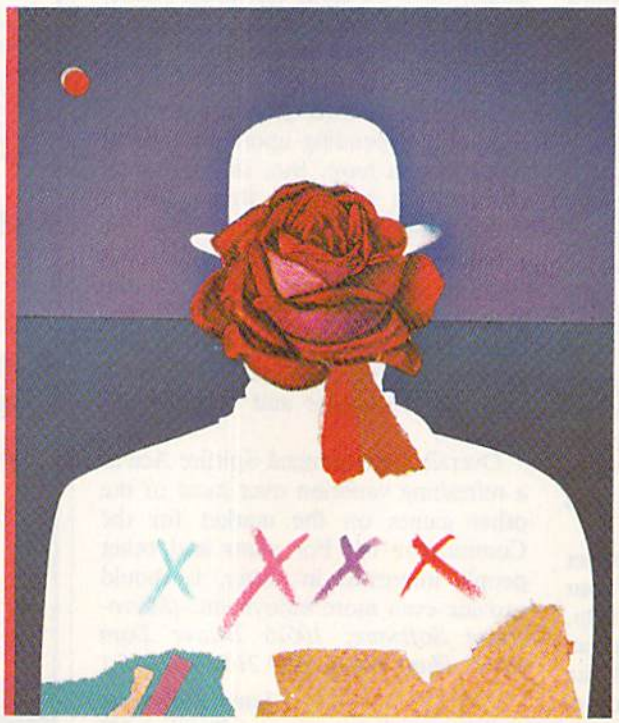
Next, a For...Next loop, from 1 to A (the length of the word), is run, with the ASCII value of each successive character of the word (MID$(WRD$, N,1)) placed in WRD(CU) position. Finally, the remaining elements, starting at CU + 1 and progressing to 12, are given the value 32. CLUE$ is defined as "– – – – – – – – – – – –", or 12 dashes.

A GET A$ loop takes player input, and this letter is added to a string that stores the letters already guessed, G$. The current guess is then checked against each of the 12 characters in WRD(n) to see if there is a match.

If not, a counter that keeps track of bad guesses, NG, is incremented by 1. If NG is larger than 7, meaning you've made eight wrong guesses, the program branches to the "you lose!" routine at line 680.

A correct guess causes the letter to be deposited in CLUE$, in place of the appropriate hyphen. As the program leaves the For...Next loop when a match is made, the value of N indicates the position of the guessed letter. The computer makes the replacement by taking the LEFT$ portion of CLUE$ up to N – 1, adding the guessed letter, A$, and then adding the rest of CLUE$, MID$ (CLUE$,N + 1). For example, a guess of P would produce the following clue next round: – – – P – – – – – – – –.

You may guess the positions of spaces, and they will appear in the clue just like any other character. You must guess all the spaces before the word is considered completed. After you correctly guess a word, you may go back and try again with a new word.



Phillip Geraci

RUN It Right
Commodore 64/VIC-20

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You are allowed only eight wrong guesses before the game ends.

Modifying the Program

As written, Probe will always choose the words in the same order, because they are read directly from data lines. Can you think of a way to have them presented in random order?

Try reading the words into a string array, then choose a word at random, using RND. Assign the given word a null value, so that it will not be selected twice. To see if a chosen word exists, enter the following:

```
100 R=INT(RND(1)*NUMBERWRDS)+1
110 WRD$=LIST$(R)
120 IF LIST$(R)="" THEN GOTO 100
130 LIST$(R)=""
```

You might also change the program to allow for longer words, or even phrases. As written, the program will change only the first appearance of a guessed letter in the word. So, since R appears twice in PROGRAM, you must guess it twice. By having the "check guess" routine as a subroutine, you can access it several times for one letter guessed, and so find all occurrences of a letter.

Or, by changing the For...Next loop, which currently runs from 1 to 12, to a reversed loop, the word will be checked from the end forward. Then, the *last* appearance of a letter in the word will be found. You can do this by using a line like:

```
470 FOR N=12 TO 1 STEP -1
```

Those are all the changes for this month. My thanks to those of you who have written with suggestions for changing some of the previously published Video Casino games. A special thanks to the reader who provided me with detailed plans for changing Masterpiece into a two-player game. R

Address all author correspondence to David D. Busch, 5217-C Cline Road, Kent, OH 44240.

Listing 1. *Word Probe program for the VIC-20.*

```
10 REM *********
20 REM *{7 SPACEs}*
30 REM * PROBE *
40 REM *{7 SPACEs}*
50 REM *********
60 PRINT"{SHFT CLR}{2 CRSR DNs}"
70 PRINTTAB(8)"{CTRL 9}{CTRL 6}PROBE{CTRL 7}{2 CRSR DNs
   }"
80 PRINTTAB(1)"YOU MUST GUESS THE"
90 PRINTTAB(1)"WORD WITH FEWER"
100 PRINTTAB(1)"THAN EIGHT WRONG "
110 PRINTTAB(1)"GUESSES.{2 SPACEs}LEADING "
120 PRINTTAB(1)"AND TRAILING SPACES"
130 PRINTTAB(1)"MUST ALSO BE GUESSED.{2 CRSR DNs}"
140 PRINTTAB(6)"{CTRL 9}{CTRL 3}HIT ANY KEY{CTRL 7}"
150 GET A$:IF A$="" GOTO 150
160 DIM WRD(13)
170 DATA PROGRAM,CASSETTE,STATEMENT
180 DATA COMMAND,INTEGER,KEYBOARD
190 DATA JOYSTICK,OPERATOR,RANDOM
200 DATA MEMORY,SUBTRACT,VARIABLE
210 READ WRD$
220 A=LEN(WRD$)
230 B=12-A
240 PO=INT(RND(1)*B)+1
250 FOR N=1 TO PO-1
260 CU=CU+1
270 WRD(N)=32
280 NEXT N
290 FOR N=1 TO A
300 CU=CU+1
310 WRD(CU)=ASC(MID$(WRD$,N,1))
320 NEXT N
330 FOR N=CU+1 TO 12
340 WRD(N)=32
350 NEXT N
360 CLUE$="------------"
370 PRINT"{SHFT CLR}{2 CRSR DNs}"
380 PRINTTAB(5)CLUE$
390 PRINT"{2 CRSR DNs}"
400 PRINTTAB(3)"LETTERS GUESSED:"
410 PRINTTAB(1)G$
420 PRINT"{2 CRSR DNs}"
430 PRINTTAB(5)"GUESS LETTER:"
440 GET A$:IF A$="" GOTO 440
450 G$=G$+A$
460 FOR N=1 TO 12
470 IF ASC(A$)=WRD(N) GOTO 540
480 NEXT N
490 PRINT"{2 CRSR DNs}";TAB(2)"SORRY, WRONG GUESS.{2 CR
   SR DNs}"
500 NG=NG+1:IF NG>7 GOTO 670
510 PRINTTAB(6)"{CTRL 9}{CTRL 3}HIT RETURN{CTRL 7}"
520 INPUT T$
530 GOTO 370
540 CLUE$=LEFT$(CLUE$,N-1)+A$+MID$(CLUE$,N+1)
550 WRD(N)=1
560 T=0
570 FOR N=1 TO 12
580 T=T+WRD(N)
590 IF T=12 GOTO 620
600 NEXT N
610 GOTO 370
620 PRINT"{SHFT CLR}{2 CRSR DNs}"
630 PRINTTAB(5)CLUE$
640 PRINT"{2 CRSR DNs}"
```

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Listing 1 continued.

```
65Ø PRINTTAB(1)"THAT IS CORRECT!!"
66Ø GOTO 71Ø
67Ø PRINT"{SHFT CLR}{2 CRSR DNs}"
68Ø PRINTTAB(1)"SORRY, BUT YOU DID"
69Ø PRINTTAB(1)"NOT GUESS THE WORD."
7ØØ PRINTTAB(1)"IT WAS ";WRD$
71Ø PRINT"{2 CRSR DNs}":NG=Ø
72Ø PRINTTAB(6)"{CTRL 9}{CTRL 6}PLAY AGAIN?{CTRL 7}"
73Ø GET A$:IF A$="" GOTO 73Ø
74Ø CU=Ø:T=Ø:G$=""
75Ø IF A$="Y" THEN GOTO 21Ø
```

Listing 2. *Word Probe program for the C-64.*

```
1Ø REM *********
2Ø REM *{7 SPACEs}*
3Ø REM * PROBE *
4Ø REM *{7 SPACEs}*
5Ø REM *********
6Ø POKE 53281,1
7Ø PRINT"{SHFT CLR}{2 CRSR DNs}"
8Ø PRINTTAB(12)"{CTRL 9}{CTRL 6}PROBE{CTRL 7}{2 CRSR DN
   s}"
9Ø PRINTTAB(8)"YOU MUST GUESS THE"
1ØØ PRINTTAB(8)"WORD WITH FEWER"
11Ø PRINTTAB(8)"THAN EIGHT WRONG "
12Ø PRINTTAB(8)"GUESSES.{2 SPACEs}LEADING "
13Ø PRINTTAB(8)"AND TRAILING SPACES"
14Ø PRINTTAB(8)"MUST ALSO BE GUESSED.{2 CRSR DNs}"
15Ø PRINTTAB(11)"{CTRL 9}{CTRL 3}HIT ANY KEY{CTRL 7}"
16Ø GET A$:IF A$="" GOTO 16Ø
17Ø DIM WRD(13)
18Ø DATA PROGRAM,CASSETTE,STATEMENT
19Ø DATA COMMAND,INTEGER,KEYBOARD
2ØØ DATA JOYSTICK,OPERATOR,RANDOM
21Ø DATA MEMORY,SUBTRACT,VARIABLE
22Ø READ WRD$
23Ø A=LEN(WRD$)
24Ø B=12-A
25Ø PO=INT(RND(1)*B)+1
26Ø FOR N=1 TO PO-1
27Ø CU=CU+1
28Ø WRD(N)=32
29Ø NEXT N
3ØØ FOR N=1 TO A
31Ø CU=CU+1
32Ø WRD(CU)=ASC(MID$(WRD$,N,1))
33Ø NEXT N
34Ø FOR N=CU+1 TO 12
35Ø WRD(N)=32
36Ø NEXT N
37Ø CLUE$="-----------"
38Ø PRINT"{SHFT CLR}{2 CRSR DNs}"
39Ø PRINTTAB(9)CLUE$
4ØØ PRINT"{2 CRSR DNs}"
41Ø PRINTTAB(9)"LETTERS GUESSED:"
42Ø PRINTTAB(8)G$
43Ø PRINT"{2 CRSR DNs}"
44Ø PRINTTAB(1Ø)"GUESS LETTER:"
45Ø GET A$:IF A$="" GOTO 45Ø
46Ø G$=G$+A$
47Ø FOR N=1 TO 12
48Ø IF ASC(A$)=WRD(N) GOTO 55Ø
49Ø NEXT N
5ØØ PRINT"{2 CRSR DNs}";TAB(8)"SORRY, WRONG GUESS.{2 CR
   SR DNs}"
51Ø NG=NG+1:IF NG>7 GOTO 68Ø
52Ø PRINTTAB(12)"{CTRL 9}{CTRL 3}HIT RETURN{CTRL 7}"
53Ø INPUT T$
54Ø GOTO 38Ø
55Ø CLUE$=LEFT$(CLUE$,N-1)+A$+MID$(CLUE$,N+1)
56Ø WRD(N)=1
57Ø T=Ø
58Ø FOR N=1 TO 12
59Ø T=T+WRD(N)
6ØØ IF T=12 GOTO 63Ø
61Ø NEXT N
62Ø GOTO 38Ø
63Ø PRINT"{SHFT CLR}{2 CRSR DNs}"
64Ø PRINTTAB(9)CLUE$
65Ø PRINT"{2 CRSR DNs}"
66Ø PRINTTAB(8)"THAT IS CORRECT!!"
67Ø GOTO 72Ø
68Ø PRINT"{SHFT CLR}{2 CRSR DNs}"
69Ø PRINTTAB(8)"SORRY, BUT YOU DID"
7ØØ PRINTTAB(8)"NOT GUESS THE WORD."
71Ø PRINTTAB(8)"IT WAS ";WRD$
72Ø PRINT"{2 CRSR DNs}":NG=Ø
73Ø PRINTTAB(12)"{CTRL 9}{CTRL 6}PLAY AGAIN?{CTRL 7}"
74Ø GET A$:IF A$="" GOTO 74Ø
75Ø CU=Ø:T=Ø:G$=""
76Ø IF A$="Y" THEN GOTO 22Ø
```

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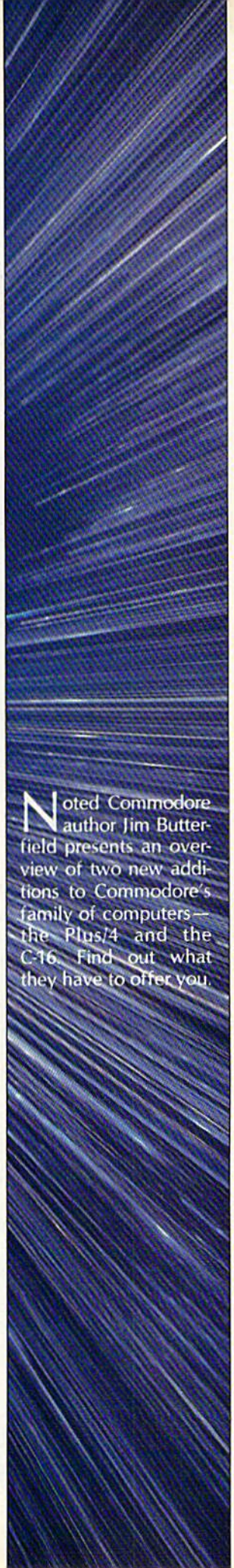
Introducing the Plus/4 and C-16



Noted Commodore author Jim Butterfield presents an overview of two new additions to Commodore's family of computers—the Plus/4 and the C-16. Find out what they have to offer you.

Commodore's newly announced home computers are the Plus/4 and its compatible junior companion, the C-16. The two machines are easy to distinguish: They look different, are fitted with differing amounts of memory, and the Plus/4 has a communications port that is missing from the smaller computer. Their inner workings are quite similar, except for the presence of four inherent software programs in the Plus/4.

Appearance

The Plus/4 has a new streamlined style. It's physically small and wedgeshaped, but the keyboard is still full size, and the cursor movement keys are arranged in an attractive and convenient diamond configuration on the lower right. The function keys are arranged above the main keyboard.

The C-16, on the other hand, looks much like the VIC-20 or C-64, but the case is dark gray. The cursor movement keys are located on the top row. The function keys are located in the same position as they are on the VIC-20 and C-64.

While the number of function keys remains the same as on the VIC-20 and C-64, there are two new differences. First, one function key is marked *help*. If you encounter an error during the run of a Basic program, pressing the help key will show the offending line, with an indication of where the computer stopped. Second, most of the software that Commodore has ready for the new machines will recognize the help key and give appropriate suggestions.

The function keys are predefined. Key F3, for example, displays the disk directory. Any key can be redefined by a simple command. Typing

```
KEY 3,"MERRY XMAS"
```

will cause key F3 to print the defined message whenever it is touched. All keys can be redefined within a program or by direct commands.

There's a reset button near the on/off switch that allows you to restart the machine without having to cut the power.

The Plus/4 will come with built-in software. This will be Commodore's 3-Plus-1 package, which combines integrated word processing, spreadsheet, database and graphics applications. The F1 key will activate the word processing program, and from there you can access the others. You can also plug programs into a cartridge port, similar to but not compatible with the one on the Commodore 64.

BY JIM BUTTERFIELD

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Programming

From a programmer's standpoint, the main difference between these new machines and the C-64 and VIC-20 is the enhanced Basic. Basic is rich with new commands. There are structured commands to make programming loops more flexible and If...Then...Else and Print Using commands to get reports out faster and easier. Graphics commands, such as Box, Circle, Paint, Draw and Color are available for drawing charts or graphs.

For program writers, there are editing commands such as Delete, Renumber and Auto for automatic line numbering. There is also a Restore command, which restores specific line numbers. For debugging, there's a trace feature, which can be invoked with the Tron command, and an error-trapping facility, which is implanted with the Trap command.

There's a good deal of Basic workspace, too. Although the Plus/4 has the same amount of RAM memory as the Commodore 64 (64K, of course), there's more access from the new Basic. Instead of a meager 38911 bytes free, the Plus/4 makes over 60,000 bytes available to Basic. Many programs won't need the extra 20K, but it's there when needed.

A good machine language monitor, TEDMON, is built into both computers; type the word MONITOR from Basic to activate TEDMON. Commands available to you are: Assemble, Compare, Disassemble, Fill, Go, Hunt, Load, Memory, Registers, Save, Transfer and Verify. You can also modify memory and registry displays. The monitor is similar to many existing packages for the 64, such as SUPERMON; if you've worked in machine language, you'll find it fairly familiar.

A word on machine language: Although the processor chip is now called a 7501, it has exactly the same instructions as the well-known 6502 or 6510. And programmers will find the same Kernal functions already in place: JSR CHROUT (or $FFD2) will output a character, just as in previous machines.

Architecture

The new machines have a more sophisticated architecture; that's how Basic can get at much more RAM space than was formerly possible. The secret to this is in the processor chip and in the architecture of the memory bus. The memory system knows whether the processor is retrieving a machine language instruction or is executing an instruction (it must be doing one or the other). It arranges things so that instructions can be retrieved from one type of memory, and data can be obtained or stored optionally from an entirely different type of memory, even though the two types of memory access use the same address!

The "traffic cop" of the Commodore 64 is called the PLA (Programmable Logic Array) chip. It decides, based on who is asking for a memory address and other considerations, what memory chip will do the job. In the new machines, there's a much more subtle chip, called the TED. It not only organizes the memory architecture, but also does most of the input/output, timing, video and sound.

The Plus/4 also has a chip called an ACIA. This will allow more sophisticated communications than is possible on the VIC-20 and Commodore 64. The Commodore 16, on the other hand, doesn't have a communications port at all.

External Devices

The new machines have the same serial bus as the Commodore 64. All existing serial bus peripherals—primarily disk and printer—should work without modification.

There's a cassette tape interface. In principle, it works the same way as on previous Commodore machines. In practice, cassette tape is incompatible with previous units, since it reads and writes at a lower speed. The connector is different, too.

The joystick ports are in place, but the connectors have been changed. Small circular connectors, called shield connectors, are used; they are similar to the video and serial bus connectors, but smaller, and there's a similar small connector for cassette tape.

Why the small connectors? This type of connector is free from radiation emission problems, thus enabling Commodore to obtain approval for the machines more quickly. There will undoubtedly be adapters available soon.

A fast disk, which plugs into the cartridge-port connector, will be available; at trade shows, it was labeled the SFS 481, but the name and number are likely to change. The new disk has the general appearance of a 1541, but exchanges information with the new machines at a much higher rate.

With expanded Basic and built-in software, the Plus/4 and C-16 will be handy for getting tasks done quickly.

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The Commodore 16 is a good machine for beginners, and is highly compatible with the Plus/4.

Pros and Cons

The new computers don't have all the features of the Commodore 64. The rich ADSR sound of the 64 has been replaced by two square wave voices in the new machines. If you want to make beautiful music with your computer, you'll still go for the 64.

Similarly, sprites, or movable object blocks, are absent from the new computers. Shooting games are likely to be hard to translate from the 64. You still have high resolution and a better than ever choice of colors, but to do animation, you must program it the hard way—making an object disappear from its old location to reappear at a new spot.

One rather technical feature I'll miss on the new machines is the ability to find empty parts of memory. Basic on the 64 left 20K of free memory lying around, which an ingenious user could put to work in a variety of ways: defining new screens or character sets, or even writing an alternative Basic language into RAM. That will be a little harder to do on the new machines—all RAM is available to Basic, and you'll need to do extra work to take it away.

Commodore calls the Plus/4 and C-16 their productivity machines: With expanded Basic, built-in software and user-convenience features, they will be handy for getting tasks done quickly. I think they are also good learning computers. I prefer the 64 because of it's marvelous ADSR (attack-decay-sustain-release) sound and entertaining sprites. To get a data processing job done, I'd reach for a Plus/4 or a Commodore 16; this includes business graphics such as drawing pie charts (yes, you can do it easily in Plus/4 Basic, in up to 16 colors and 8 levels of brightness).

Is it compatible with the C-64? It has the same 40 × 25 screen, including the same high-resolution size; it has upwardly compatible Basic, but Poke statements must be changed; it has the same machine language, but you'll probably want to adjust the addresses. In other words, it's not unfamiliar to 64 users, but it's not totally compatible on all existing programs. As for cartridges, there isn't much likelihood of compatibility there.

The Commodore 16 is a good, inexpensive machine for beginners. It's highly compatible with its bigger brother, the Plus/4. Both are good for programmers with "serious" applications, since effective programs may be developed quickly. R

Address all author correspondence to Jim Butterfield, 14 Brooklyn Ave., Toronto, Ontario, Canada M4M 2X5.

Table 1. Specifications.

	Plus/4	C-16
RAM	64K	16K
ROM	32K	32K
Bytes free available to Basic	60671	11519
RS-232 communications interface	Yes	No
Built-in software	Yes	No
Price	around $300	around $100
	Both	
Serial interface (disk, printer)	Yes	
Cassette interface (not 64-compatible)	Yes	
Screen size (rows, columns)	25 × 40	
High resolution (pixels)	200 × 320	
Multicolor (MCM)	Yes	
Extended color (ECM)	Yes	
Sound	two-voice square wave	
Function keys	four keys, eight functions	
Cursor movement keys	four individual	
Reset switch	Yes	
Screen colors	15, each with eight hues	

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Table 2. The Plus/4 and Commodore 16 versus the Commodore 64.

Advantages of Commodore 64

Much richer sound/music
Sprites for easy animation
Faster cassette tape
Simpler architecture (easier hacking)

Advantages of Plus/4 and Commodore 16

Vastly expanded Basic, including:
—Disk commands
—Print Using command
—Structured Statements
—Graphics and sound commands
—Error trapping, tracing, renumbering
More powerful communications port (Plus/4 only)
Individual cursor movement keys;
Wider choice of colors;
Screen windowing, character flashing;
No "garbage collection" pauses.

Table 3. Myths about the new computers.

Myth 1: The Plus/4 and C-16 are downgrades of the Commodore 64.

Fact: They are a new kind of computer, not intended to replace the 64. Some users will prefer the 64, some will like the new machines. Each machine has its own special advantages. The Plus/4 and Commodore 16 are especially suited for easy programming of useful applications.

Myth 2: The Commodore 64 will be discontinued.

Fact: The 64 will continue to be available. Sales of VIC-20 may be affected by the low-priced Commodore 16, but the VIC's communications capability may allow it to survive for a while yet. The C-16 has no equivalent feature.

Myth 3: Software for the Plus/4 and C-16 is not compatible with the C-64 and the VIC-20.

Fact: Basic on the new machines is the same, but enhanced. Basic programs from earlier computers will load and may run. The major job in converting a C-64 program is to get rid of the Peek and Poke commands by replacing them with the corresponding extended Basic commands. Machine language is the same as before, but you may have to relocate addresses, and the advanced programmer will need to know more about the sophisticated architecture of the new machines. Cartridges that plug into the C-64 are definitely not compatible with the new machines.

Myth 4: The new machines are harder to program.

Fact: Basic programs are much easier; there are more commands, and there's more workspace on the Plus/4. Depending on program complexity, machine language programs might be about the same level of difficulty, or could call for greater understanding of the architecture.

Myth 5: The new machines have no market; alternatively, they will kill C-64 sales.

Fact: We'll need to see how the marketplace reacts, of course. The Plus/4 and C-16 will be useful in a variety of applications. Some purchasers who might otherwise have chosen a C-64 will switch to the new computers; but there will be new markets. Ease of programming, more screen colors and features and new software will generate interest in the Plus/4 and C-16 within the small-business and educational communities.

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Table 4. Basic keywords for the Plus/4 and Commodore 16. Those keywords not available on the Commodore 64 are shown in bold.

General Basic		I/O Commands	Graphics and Sound Commands	Programming Aids	Functions (same as those for the C-64, plus the following)
CLR	**PRINT#...USING**				
NEW	**PUDEF**	LOAD	**BOX**	AUTO	**DEC**
CMD	READ	SAVE	**CHAR**	DELETE	**HEX$**
CONT	DATA	VERIFY	**CIRCLE**	HELP	**ERR$**
DIM	RESTORE	**DLOAD**	**COLOR**	KEY	**INSTR$**
LET	**RESTORE <line number>**	DSAVE	**GRAPHIC**	TRON	**RCLR**
LIST	**TRAP**	**DIRECTORY**	**SSHAPE**	TROFF	**RDOT**
REM	**RESUME**	**BACKUP**	**GSHAPE**	MONITOR	**RGR**
RUN	**DO**	**COLLECT**	**LOCATE**	RENUMBER	**RLUM**
STOP	**LOOP**	**COPY**	**PAINT**		**JOY**
END	**UNTIL**	**HEADER**	**SCALE**		**DS**
CONT	**WHILE**	**RENAME**	**SOUND**		**DS$**
SYS	**EXIT**	**SCRATCH**	**VOLUME**		**PI**
WAIT	**FOR**				
OPEN	**TO**				
CLOSE	**STEP**				
GETKEY	**NEXT**				
GET	**IF**				
GET#	**THEN**				
INPUT	**ELSE**				
INPUT#	GOTO				
PRINT	ON..GOTO				
PRINT#	GOSUB				
PRINT USING	ON..GOSUB				

COMMODORE DOES IT AGAIN!

BY TOM BENFORD

The Plus/4

Before its release, it was first called the TED, an acronym for Text Editing Device (see *RUN*'s review, "Unveiling of the TED," in the March 1984 issue of *RUN*). Then it was called the 264, a name that caused it to be incorrectly associated with the popular C-64. Now, it's finally here, and it's called the Plus/4, which alludes to the four interactive applications programs contained within the machine itself. I call it terrific!

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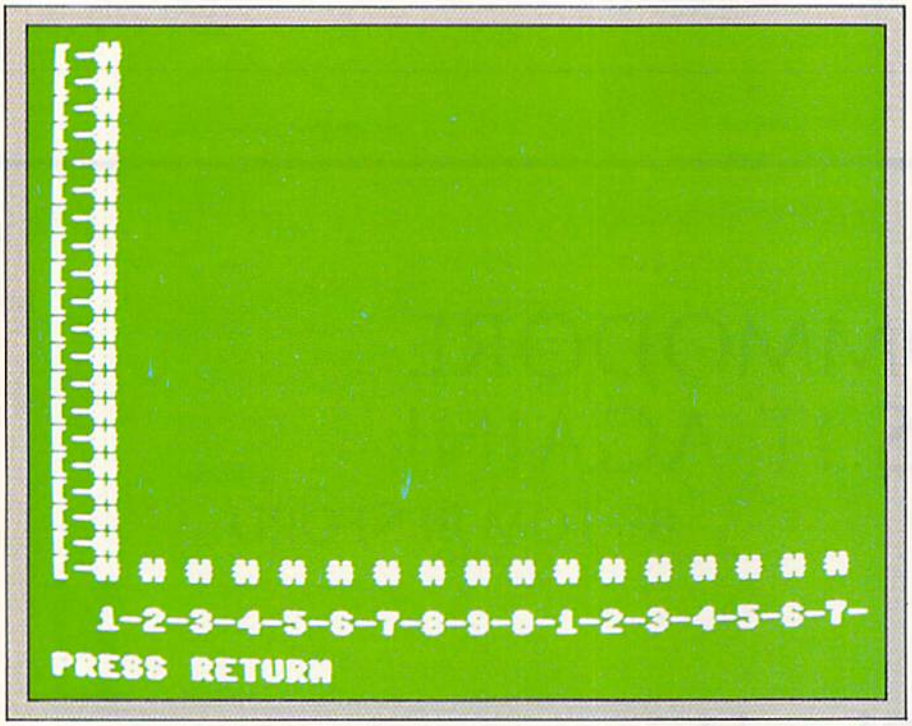

Compatibility

A major source of concern and curiosity has been the compatibility of the Plus/4 with the other Commodore computers, peripherals and software. It is, at best, partly compatible.

I'll begin with what is compatible. The audio/video port is compatible with the same cable/monitor you've been using with your VIC or C-64.

The user port is 99 percent compatible, although a "jumper" wire may be necessary to use some direct-connect modems. Information on this port is sketchy at this point; I have yet to see any technical information on it.

The serial port is 100 percent compatible with your 1541 disk drive and/or Commodore printers. This port will also accommodate the new, faster disk drive that Commodore has shown (called the SFS-481 so far) but has not yet released.

The cassette port is different, with a round miniature DIN-style connector to accept the new model 1531 Datassette. This means that you will have difficulty using printer interfaces that connect to this port, such as Cardco.

Tutorial Cartridge

The Plus/4 comes packed with the power supply, computer/TV switchbox, connecting cable, two user's manuals and a tutorial cartridge that gives you a guided tour of the machine's keyboard.

The tutorial is replete with nice music (surprisingly nice for a machine without a SID chip!), outstanding graphics and animation (surprisingly good without sprite capability), and it's very user-interactive.

After the opening musical sequence, you are asked to type in your name. From that point on, the program addresses you by name and offers continual encouragement.

The tutorial first covers the cursor, insert, delete and return keys, then branches off into the other keys on the keyboard. On power-up, you may go through the entire tutorial one step at a time or simply hit the key about which you would like to know more. If, for example, you hit the help key, the computer will respond "See page 1 of the user's manual."

There are other "branch" options, such as hitting the f2 key to learn about color and reverse controls. If you have difficulty at any point during the tutorial, just hit the help key and you'll be directed to the corresponding section of the manual for a more elaborate explanation of that particular function. This is the best tutorial package I've seen on any system thus far. Credit must go to John Mathias, who conceived and designed it; Barbara Feldman, who developed and coded the software; and Dan

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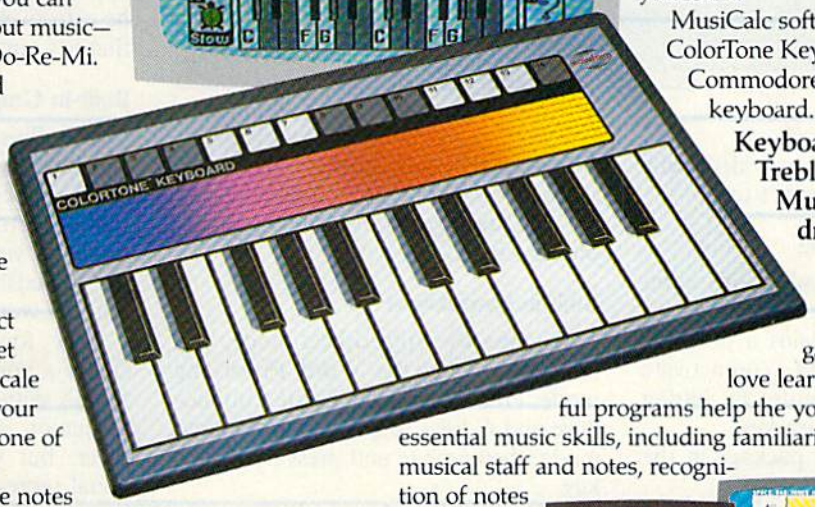
The ColorTone Keyboard comes with software that makes discovering music a simply marvelous and marvelously simple experience. To begin playing you simply touch one of the graphic symbols on the keyboard. Just point to select one of the ColorTone's preset songs, change the musical scale you're playing in or make your Commodore 64 sound like one of eight different instruments.



As you play, you'll see the notes you're hearing displayed on a musical staff. That's something no other musical software can do! And with the ColorTone system you can record your musical creations to listen to them again and again.

With Waveform's ColorTone Keyboard, your very first musical experience can be fun and rewarding. Every time you play you'll develop greater musical competence. And confidence.

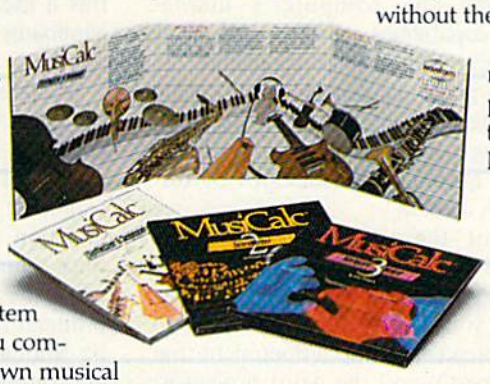
While you can use the ColorTone Keyboard by itself, it will also add new dimensions to the other software products in Waveform's creative music system.

MusiCalc™—The World's Most Exciting Musical Software

Waveform's MusiCalc™ system includes programs that let you compose, edit and perform your own musical creations using the Commodore 64. You can also turn your improvisations into musical notation and create your own keyboard scales.

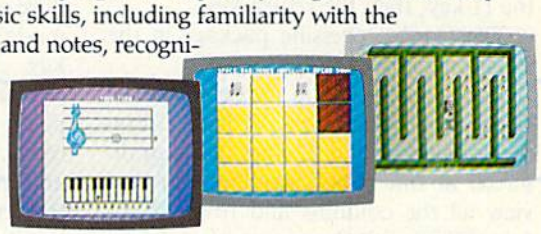
The newest member of the MusiCalc family is the MusiCalc Synthesizer with Sound Teacher.™ With it you can learn all about sound synthesis and then use its performance-oriented synthesizer program to apply what you learn.

MusiCalc software works with the ColorTone Keyboard or with the Commodore 64's typewriter keyboard.



Keyboard Krazy With Treble Clef Cat—Making Music Play For Children 4 Years And Up

This unique software package makes music a game your children will love learning. Four fun, colorful programs help the youngest child develop essential music skills, including familiarity with the musical staff and notes, recognition of notes on the keyboard, and ear training. All in a fun way that'll make your young, potential musicians eager to learn more.



Keyboard Krazy works on the Commodore 64 with or without the ColorTone Keyboard.

Discover the growing family of computerized music products from Waveform and make music play for every member of the family. Look for the ColorTone Keyboard and the entire Creative Music System at a store near you.

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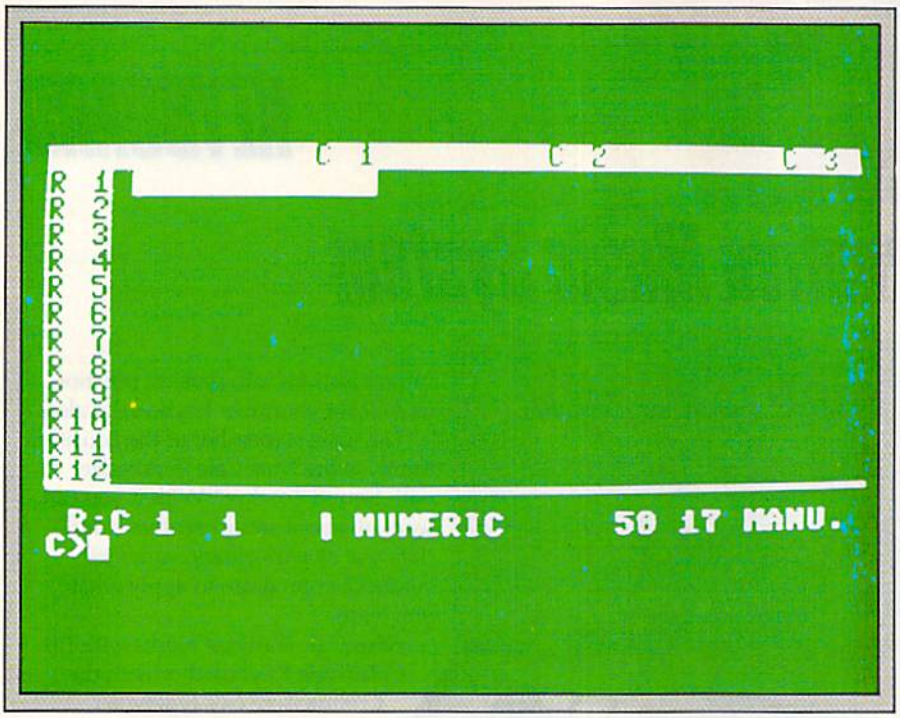

Kunz, who assisted and provided some of the ideas for the tutorial's text.

Built-in Word Processing

The Plus/4 is an applications computer. Word processing is one of its applications, since it contains a program for this on internal ROM. You activate the word processing feature by hitting the f1 key, then the return key.

The word processing package in the Plus/4 is fairly easy to use.

The display holds a maximum of 99 lines, with 77 characters per line. Thirty-seven columns and 22 lines are seen on screen at one time. Scrolling, used to view all the columns and rows, is accomplished with the cursor keys. Word processing features include: word wrapping, automatic repeat, margin settings, justification, centering, moving blocks of text, merging documents and files, search with replace, as well as saving and loading files, inserting and deleting text. Formatting commands for your particular printer can be set using ASCII values.

All commands are entered while in the Command mode, which is accessed by hitting the Commodore and C keys. Most of the commands are mnemonically coded to make them easy to understand (e.g., "lmarg," for setting the left margin, "rmarg," for setting the right margin and so on).

Overall, the built-in word processing software should be more than adequate for the average home and/or small-business user.

Built-in Spreadsheet

To enter the Spreadsheet mode, you must first be in the Word Processing mode. From there, you hit the Commodore and C keys to get into Command mode, then type tc and press the return key.

The spreadsheet has a maximum capacity of 850 cells (17 columns by 50 rows). It will not only perform the basic arithmetic functions of addition, subtraction, multiplication and division, but it also will perform advanced calculations according to your own specified formulas. The computer's mathematical capabilities can be tapped by this program. Other features include accessing a particular cell for modification of viewing, entering data, copying data, modifying a formula to suit a particular cell and automatic calculations of formulas on all cells.

One of the real strengths of the Plus/4 is the integration of the built-in software modules. This is especially useful if you wish to combine a portion of the spreadsheet into a document that you're creating on the word processor. By entering the Command mode and typing in "blkmap," the contents of the spreadsheet are transferred to the word processor, ready for print-out and/or storage to disk. When you integrate the spreadsheet with the word processor, you have split-screen capabilities. The manual takes you through all facets of this mode, and gives some excellent examples of possible uses for the spreadsheet.

Most folks don't feel they have a need for a spreadsheet program, and many don't even know what a spreadsheet is, let alone what to do with it. But when you consider uses like the household budget, checkbook register, loan/mortgage payment calculations, expense reports, income tax preparation and myriad other tasks for which it can be effectively used, you start to realize that it's quite a handy program.

Built-in Graphics

The Plus/4 has a built-in graphics software package that effectively combines the best features of the Super Expander cartridges for the VIC and C-64. It allows you to graph any row inside the spreadsheet, view it and transfer it into the word processor.

Take, for example, a sales report that charts a company's business for a six-month period. You have all of the information already stored in a spreadsheet, but you'd really like to give a visual representation of how sales have increased in the last two months. Once the information is called up, by entering the Command mode and typing gr (for graph), this information is mapped for the word processor. Once it's mapped into word processing, it can be edited or handled like any other text. Not only is this a great time-saver, but it virtually eliminates mistakes caused by retyping the data.

It's interesting to note that although the Plus/4 has very high resolution graphics, all of the information generated with this software mode will be *character* graphics. This was a logical direction for Commodore to follow, since some users of the Plus/4 will be using daisywheel or other letter-quality printers. In those cases, the output *must* be standard character graphics, which are found on every printer. So, instead of getting nice solid bars on your graph, you might have to settle for Xs or #s,

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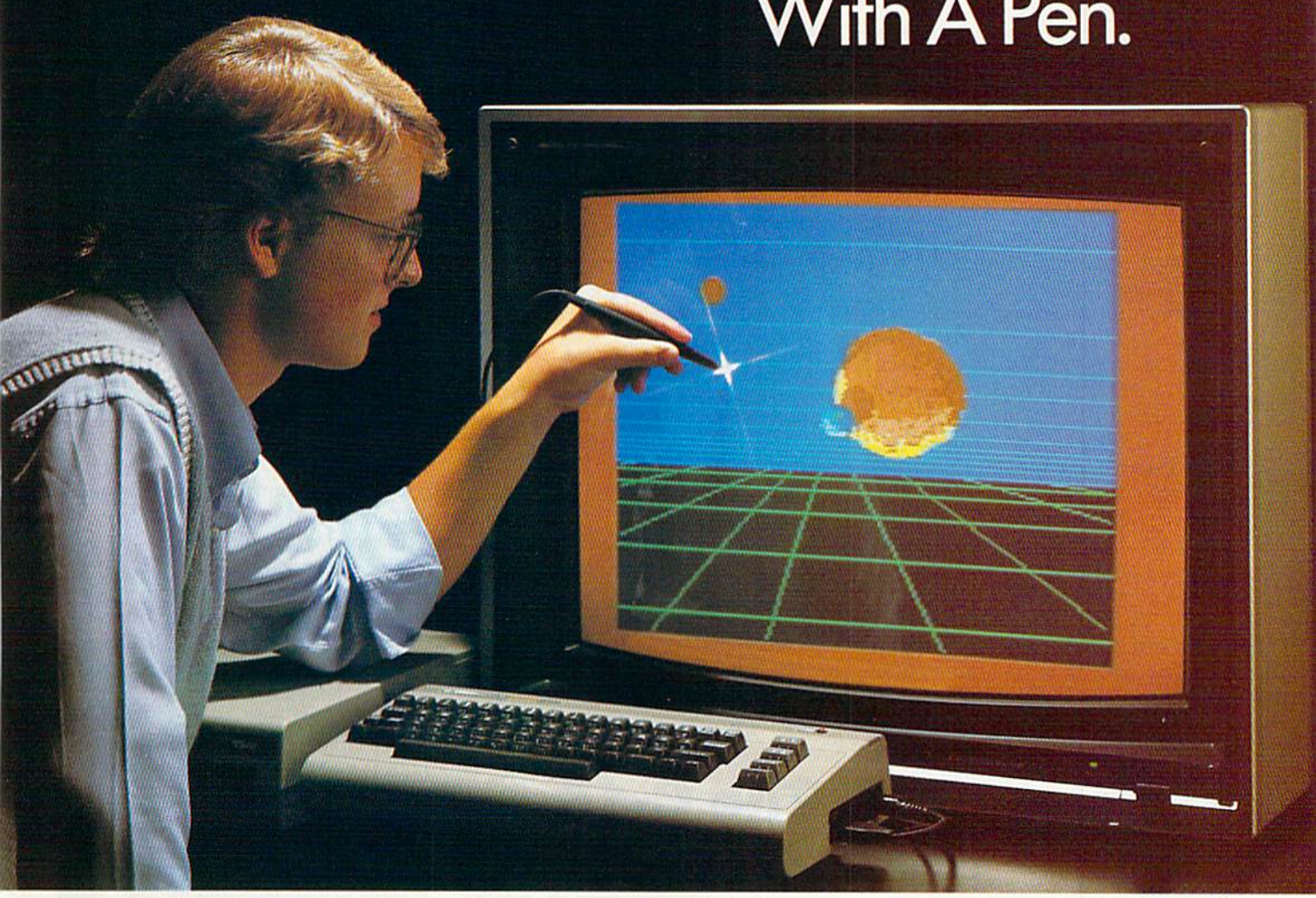

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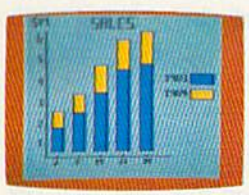
We've packed all the electronics in the streamlined Koala Pen, using the most advanced miniaturization techniques. This means clearer, smoother, more precise graphics—and, unlike other C-64 graphics products, you can use the full range of the C-64's colors. It also has an easy-to-use tip-switch.



A Complete Graphics Package

Koala, well known for our graphics systems, has created the premier

C-64 graphics package. It contains a complete array of graphics capabilities. In addition, you can dip into a palette of 16 colors—and over 3,000 textured patterns. Point to "mirror" and a kaleidoscope of colorful images bursts onto the screen. Zoom in for 320 x 200 resolution. "Rubber band" lines and shapes.

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but that's a small price to pay for the convenience of having this capability and for the dramatic visual impact that only a graph can provide.

Built-in File Manager

The database is the fourth plus of the Plus/4! In the manual, it is referred to as a file manager. To access this program, press the Commodore and C keys, then press tf, followed by the return key.

The file manager allows you to design your own form for storing data. It has the capacity to accept 17 fields per record, up to 38 characters per field, and up to 999 records per file. Features include creating files, adding records, updating records and disk formatting. The manager has a search option that will search one field within a file. It also has a sort option that can sort up to three fields at one time.

The real beauty of the file manager is its integration with the word processing software. By merging the capabilities of both modes, you can print form letters, mailing lists and other documents. Easy Script users know and love this capability, which is called Mail Merge in that program.

Like the other three software modes built into the Plus/4, the file manager is simple to use, and the manual gives lucid explanations and examples.

Conclusion

Two manuals are supplied with the Plus/4: one is for the machine itself, the other is for the built-in software. Used in conjunction with the tutorial cartridge, the Plus/4 is very easy to learn, even for a new computer user.

With the release of the Plus/4, we're into a whole new phase of personal computers: the productivity phase. The Plus/4 is a bold step in the direction that many people have been waiting for—a computer that will let you do something, in addition to Basic programming, without having to load a disk or cartridge.

This computer will find a place among a variety of people. It will satisfy those who have particular tasks for home and business and who want instant access to programs necessary to accomplish them. It will also be a welcome improvement for those who want more sophisticated Basic programming features and machine language options.

I think Commodore has a real winner here, in the Plus/4. In future issues, *RUN* will publish reviews of the various built-in applications software and how to use them.

The C-16

If you are a new computer user, have a limited budget and want to get the most memory and features for your money, the new Commodore Model C-16 might be the machine for you.

According to sources within the company, the C-16 will be aimed at both the first-time computer purchaser and the educational market.

Commodore believes that the C-16 will have a pronounced impact on computing in schools; the low-price factor will allow educators to furnish the entire class with C-16s for a fraction of what other computers cost.

The C-16's name derives from the internal RAM capacity of the machine. The 16K translates into 12,277 bytes, available for use in Basic programming, with the remainder handling screen mapping, I/Os and so on. In many respects, the C-16 reminds me of a VIC-20, with both a Super Expander and an 8K RAM expander in place.

Except for its color, the C-16 could double for either a VIC or a C-64! It's the same size, about the same weight and has the same feel as the other two machines. The color is dark charcoal gray with lighter gray keys. Keyboard touch is the same as the VIC or 64.

On the right side of the C-16 are the power-input jack, on/off switch, reset button (for warm boots) and dual joystick ports.

On the back of the machine (from left to right) are the memory expansion/cartridge port, RF jack, channel selector switch, video/audio port, serial port and cassette port.

Where's the user port? There is no user port. To keep the machine around $100, the cost of producing the machine had to be cut, thus eliminating the user port. The reasoning on this is fairly easy to understand: The first-time computerist and the classroom computer student won't need to connect to a modem or other user-port peripheral. If and when the need arises, the user will probably be ready to move up to a more sophisticated machine—both the C-64 and Plus/4 are logical choices, and both have user ports.

There have been minor changes to the keyboard layout, but the big change is the location of the cursor keys. They now occupy the four spaces to the right of the 0 on the top row, and each key

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controls a direction, whether shifted or unshifted. Since there's a reset button, the restore key has been replaced by the clear/home key. There are also a few minor location changes on infrequently used keys, which might take a bit of getting used to if you're coming from a VIC or C-64.

In regard to software, the C-16 is compatible with any Plus/4 software that its 16K can support. A good example of this is the Jack Attack game, which is a cartridge. The same cartridge will fit and work on both the C-16 and Plus/4, but not on the VIC or C-64 (there is, however, a C-64 version available).

Tutorial Cartridge

A tutorial cartridge has been developed for the C-16, and the advance copy I received was quite remarkable. As of this writing, a decision has not been made as to whether this tutorial cartridge will be packed with the machine or offered as an inexpensive optional item. If the company does decide to charge for the cartridge, I am told it will be a nominal price.

The tutorial is well done, taking you on a guided tour of the C-16's keyboard and giving brief, but clear, explanations of the functions. By hitting the help key, you can find out more about that particular key's function. In most instances, you will be referred to the manual for additional information.

The tutorial is user-friendly and interactive. You are asked to input your name, and during the exercises, the program will then address you by name. The tutorial is a scaled-down version of the Plus/4 tutorial, tailored to the features of the C-16. As far as tutorials go, it's top-notch.

Expanded Basic: Version 3.5

Earlier in this article, I alluded to the VIC with expansion. If you're familiar with the Super Expanders for the VIC or C-64, then you know the usefulness of those extra programming commands, such as Sound and Graphic. The C-16 has all of the Super Expander's commands, plus those offered by V3.5.

If you added an 8K RAM expander to the VIC, you'd have almost 12K of usable RAM; the C-16 comes with 12,277 bytes available on power-up. Commodore has no plans to offer a RAM expander cartridge; again, the reasoning is that when you need more than the C-16 has on board, it's time to move up the computer ladder.

Like the VIC, the C-16 offers music and sound capability with three voices and a "noise" voice. Judging from the music on the tutorial, the sound is very good. More advanced sound capabilities will continue to be the domain of the C-64, with its marvelous SID chip.

The C-16 is a bold statement on the future of computers: continued lower prices, with more memory and features. It's an excellent machine, and the low price almost guarantees it will be highly successful, since nothing else on the market even comes close to giving you this kind of power for so little money. R

Address all author correspondence to Tom Benford, PO Box 4125, Osborneville, NJ 08723.

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

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

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

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

SUPER DISK II DESIGN ASSETS

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

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SUPER DISK II Features and Specifications

COMPATIBILITY	Commodore 64,™ VIC-20,™ PET® CBM
BUFFER MEMORY CAPACITY	6K
COMPLETE DUPLICATION TIME: Format, Copy & Verify a Full Disk.	Less than 2 minutes. (Compare to 30-40 minutes with two 1541s).
TIME TO FORMAT	17 seconds. (Compare to 1 min/20 sec. with 1541).
SERIAL BUS	YES, 2 connectors.
PARALLEL BUS	YES, for enhanced speed, IEEE for Commodore compatibility.
DAISYCHAIN	Up to 4 drives
OPERATIONAL SUPPORT	• Power-on diagnostics to ensure proper disk drive operation. • LED status lights display where error is occurring. • Easy to understand instruction manual.
OVERHEAT TIME	NONE. Tested for weeks of continual operation.
WARRANTY	• 6 MONTHS. (Compare to 3 months for 1541). • 48 hour factory repair service. • Local service centers.

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RELIABLE SINGLE DRIVE READILY AVAILABLE

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

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

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

MSD SUPER DISK DRIVE TECHNICAL SPECIFICATIONS

STORAGE*

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

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

SOFTWARE

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

PHYSICAL DIMENSIONS

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

INTERFACE

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

ELECTRICAL REQUIREMENTS

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

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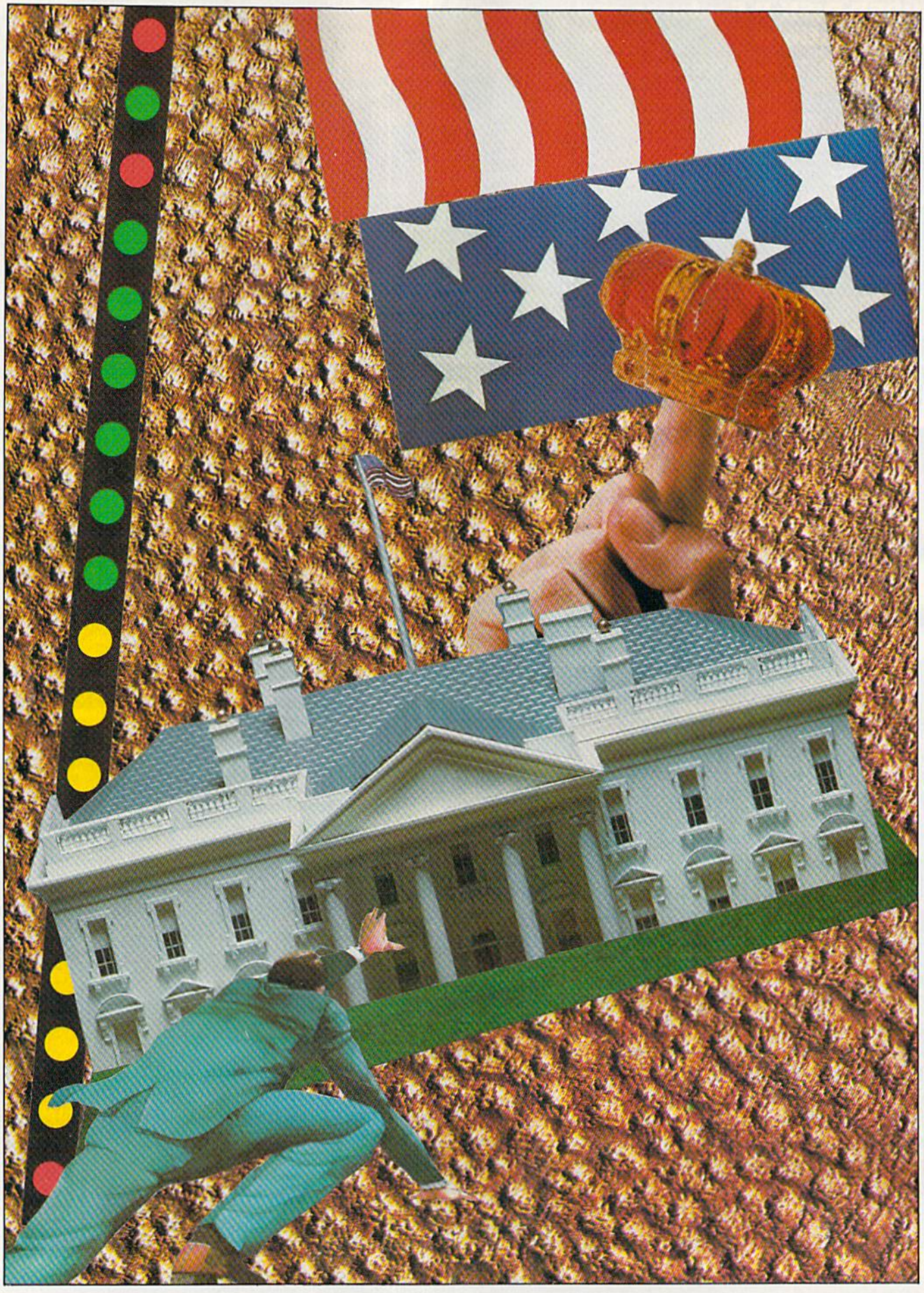

Illustration By Rick Fuehte

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With this satirical program that simulates intelligence, you and your friends can talk with a former President of the United States. Make no mistake about it!

When I bought my VIC-20 about a year ago, it was my first hands-on experience with a computer, and although the VIC is exceptionally user-friendly, I didn't think it was friendly at all.

It didn't say hello, didn't ask how I was, didn't even wish me a happy day. The cursor blinked on and off, waiting for me to do something. The machine said it was ready, but I sure wasn't.

Like any good VIC user, I then read my user's manual. I discovered that if I wanted the computer to say hello, I had to make it print hello. I started tagging Print statements onto programs so they would begin on a friendly note. My VIC-20 was hardly HAL from *2001*, but I'd made a start.

By using Get and Input statements, you can simulate intelligence fairly easily. A Get statement will accept a single letter or number and act on that information. An Input statement will accept a string of information—words or a sentence. You can program the computer to recognize that data and respond appropriately.

Create a Conversationalist

Simulated intelligence is used in many programs to accept information, and in video games to find out the number of players, skill level and so on. Although programs that use artificial intelligence are written for some computers with more memory, I've seen few for the VIC-20. The computer's memory constraints make it difficult to include enough alternatives in an

I AM THE PRESIDENT

BY SCOTT CALAMAR

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Listing of the I Am the President program.

```
2 E=36879:POKEE,26
5 S2=36875:V=36878:S=36877
1Ø GOSUB1ØØØØ
33 PRINT"{SHFT CLR}{2 CRSR DNs}":PRINT"{CTRL 7}HELLO."
35 PRINT"{CRSR DN}I AM THE PRESIDENT.":GOSUB2ØØ1Ø
36 PRINT"{CRSR DN}MAKE NO MISTAKE ABOUT THAT.":GOSUB2ØØ
   1Ø
37 PRINT"{CRSR DN}I AM NOT A CROOK."
38 INPUT"{CRSR DN}WHO ARE YOU";A$
39 PRINT"{CRSR DN}WELL, HELLO "A$
4Ø PRINT"HAVE YOU BEEN A GOOD{2 SPACEs}AMERICAN? Y OR N
   ?"
41 GETB$:IFB$=""THEN41
45 IFB$="Y"THEN48
46 IFB$="N"THEN49
48 PRINT"{CRSR DN}I'M VERY PROUD OF YOU.":PRINT"YOU MAK
   E AN OLD MAN{3 SPACEs}VERY HAPPY.":GOTO5Ø
49 PRINT"{CRSR DN}REMEMBER, "A$"...":PRINT"BETTER {CTRL
    1}DEAD{CTRL 7} THAN {CTRL 3}RED{CTRL 7}!":GOSUB2ØØ1
   Ø
5Ø PRINT"{2 CRSR DNs}WHERE ARE YOU FROM,":PRINTA$
52 INPUT G$
53 IFG$="CALIFORNIA"THEN64
54 IFG$="NEW YORK"THEN64
55 IFG$="NEW JERSEY"THEN64
56 IFG$="WASHINGTON D.C."THEN63
57 IFG$="D.C."THEN63
58 IFG$="WASHINGTON"THENPRINT"{CRSR DN}D.C. OR THE STAT
   E":INPUTG$:GOTO57
59 IFG$="MASSACHUSETTS"THEN63
6Ø IFG$="MASS"THEN63
61 IFG$="STATE"THENPRINT"I CARRIED WASHINGTON{2 SPACEs}
   IN 1972.":GOTO65
62 PRINT"{CRSR DN}I CARRIED ":PRINTG$" IN 1972":GOTO65
63 PRINT"{CRSR DN}I'LL BET YOU DIDN'T{3 SPACEs}VOTE FOR
    ME IN 1972.":PRINT"{CRSR DN}GO AWAY!":GOTO65
64 PRINT"{CRSR DN}AH, MY HOME STATE!":GOTO65
65 GOSUB2ØØ2Ø:PRINT"{CRSR DN}YOU KNOW, "A$"...":PRINT"{
   CRSR DN}I THINK WITH ALL THE":GOSUB2ØØØØ
67 PRINT"INTERNATIONAL TENSIONS":GOSUB2ØØØØ
68 PRINT"THE TIME MAY{CRSR RT}BE RIGHT":PRINT"FOR A COM
   EBACK{CRSR DN}":GOSUB2ØØ25
69 PRINT"{CRSR DN}DO YOU THINK I SHOULD RUN AGAIN,":PRI
   NTA$"?":PRINT"Y OR N?"
71 GETC$:IFC$=""THEN71
73 IF C$="Y"THEN 75
74 IF C$="N" THEN 8Ø
75 PRINT"{2 CRSR DNs}GREAT!":PRINT"TODAY "G$:PRINT"TOMO
   RROW THE WORLD!":GOTO86
8Ø PRINT"{CRSR DN}WHAT DO YOU KNOW,{5 SPACEs}ANYWAY?"
86 GOSUB2ØØ25:PRINT"{CRSR DN}I WANT TO MAKE"SPC(8)"ONE
   THING"
87 PRINT "{CTRL 9}PERFECTLY CLEAR...{CTRL Ø}":GOSUB2ØØ1
   Ø
9Ø PRINT "{CRSR DN}EVEN THOUGH I MAY NOT BE THE PRESIDE
   NT NOW..":GOSUB2ØØ1Ø
92 PRINT "{CRSR DN}EVEN THOUGH AN ACTOR{2 SPACEs}MAY BE
    IN THE WHITE{3 SPACEs}HOUSE..":GOSUB2ØØ15
93 PRINT"{CRSR DN}{CTRL 9}{CTRL 7}I AM THE PRESIDENT!"
```

→

intelligence program to be convincing.

I Am the President is a demonstration program that shows how effectively Input and Get statements can simulate intelligence. When you run the program, any expanded VIC-20 will assume the personality of a former President of the United States. You'll be in for a brief meeting with the elder statesman, but watch what you say! He's grown very sensitive in recent years.

Just a brief disclaimer: I Am the President is meant as satire—the president is a caricature and not intended to tarnish the memory of any person, living or dead.

Those of you who own VICs with 3K expansion should be careful not to type any additional spaces when entering the program. I Am the President is about 100 bytes short of filling your memory. Users of larger expanders should feel free to modify and add to the program.

I Am the President should provide you with a few moments of entertainment and show your friends what your computer can do.

If you'd rather not type the program, send me a blank cassette, a self-addressed, stamped envelope and $3, and I'll be glad to send you a copy. R

Address all author correspondence to Scott Calamar, 917 San Anselmo Ave. #5, San Anselmo, CA 94960.

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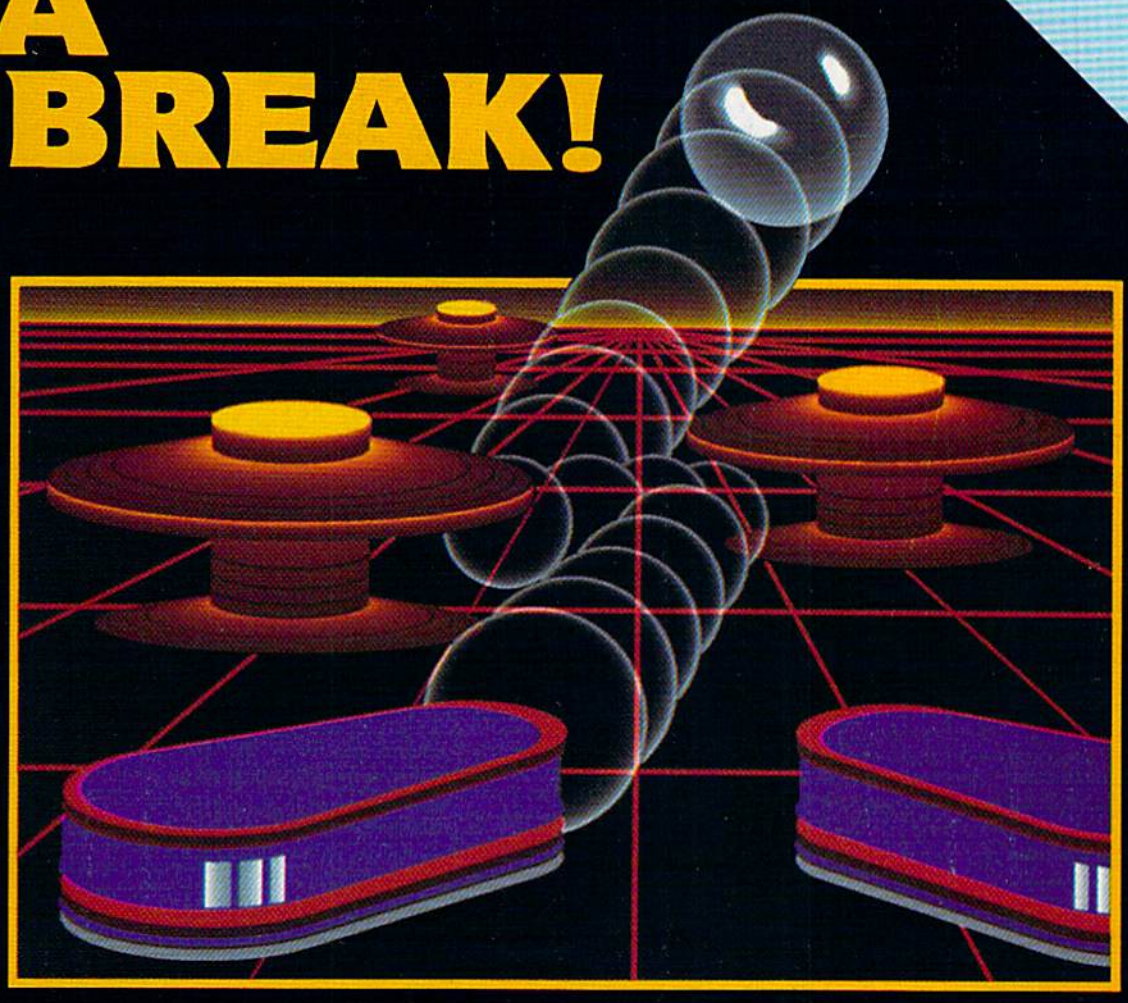

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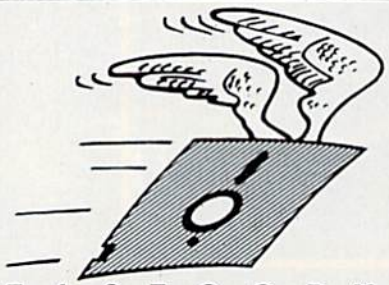

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Listing continued.

```
 95 PRINT"{CRSR DN}{CTRL 9}{CTRL 3}MAKE NO MISTAKE ABOUT
    THAT.{CTRL Ø}{CTRL 7}":GOSUB2ØØ25
 2ØØ PRINT"{2 CRSR DNs}YOU KNOW, "A$:PRINT"IT'S NOT EASY
     HOLDING"
 2Ø1 PRINT"THE FATE OF THE WORLD IN YOUR HANDS":GOSUB2ØØ
    2Ø
 2Ø2 PRINT"{CRSR DN}HOLDING YOUR HAND OVERTHAT AWESOME R
    ED{6 SPACEs}BUTTON...":GOSUB2ØØ2Ø
 2Ø4 PRINT"{CRSR DN}SOMETIMES I USED TO{3 SPACEs}WAKE UP
     IN THE WEE{4 SPACEs}HOURS OF THE MORNING,"
 2Ø6 PRINT"{CRSR DN}SIT BEHIND MY DESK IN THE OVAL OFFIC
    E":GOSUB2ØØ3Ø
 2Ø8 PRINT"{CRSR DN}AND DANGLE MY FINGER{2 SPACEs}OVER T
    HAT BUTTON":GOSUB2ØØ3Ø
 21Ø PRINT"{CRSR DN}IT'S AN OVERPOWERING{2 SPACEs}FEELIN
    G":GOSUB2ØØ3Ø
 212 PRINT"{2 CRSR DNs}HOW WOULD YOU LIKE TO SEE HOW IT
    FEELS,{5 SPACEs}Y OR N?"
 215 GETD$:IFD$=""THEN215
 218 IFD$="Y"THEN 225
 22Ø IFD$="N"THEN 3ØØ
 225 PRINT"{CRSR DN}HERE GOES, OH I LOVE{2 SPACEs}THIS..
    .":GOSUB2ØØØØ
 226 PRINT"{SHFT CLR}"
 227 FORL=1ØTO1STEP-1
 228 PRINTL:GOSUB1999Ø:NEXTL
 23Ø POKEV,15:POKES,22Ø
 232 POKEE,127:GOSUB1999Ø:POKEE,143:GOSUB1999Ø:POKEE,42:
    GOSUB1999Ø
 235 POKEE,76:GOSUB1999Ø:POKEE,11Ø:GOSUB1999Ø:POKEE,8
 25Ø POKEV,Ø:POKES,Ø:POKEE,26:GOTO29Ø
 29Ø PRINT"{SHFT CLR}{2 CRSR DNs}HA,HA,HA...HOW DID YOUL
    IKE THAT "A$"?"
 291 PRINT"{2 CRSR DNs}IT'S A LITTLE GAME{4 SPACEs}I USE
    D TO PLAY"SPC(8)"WITH THE CABINET.":GOSUB2ØØ2Ø
 292 PRINT"{2 CRSR DNs}I HOPE I DIDN'T SCARE YOU":GOTO3Ø
    1
 3ØØ PRINT"{SHFT CLR}{2 CRSR DNs}WHAT A CHICKEN!"
 3Ø1 PRINT"{CRSR DN}YOU HAVE TO BE BRAVE{2 SPACEs}TO BE
    PRESIDENT":PRINTA$:GOSUB2ØØ25
 31Ø PRINT"{2 CRSR DNs}HERE'S ANOTHER":PRINT"{CRSR DN}{C
    TRL 3}PRESIDENTIAL{CRSR DN}SIMULATION{CTRL 7}":PRIN
    T"FOR YOU":GOSUB2ØØ2Ø
 32Ø PRINT"{CRSR DN}THE SITUATION IS:":GOSUB2ØØ2Ø
 325 POKEE,122:PRINT"{SHFT CLR}{2 CRSR DNs}{CTRL 9}{CTRL
     3}SERIOUS{CTRL Ø}":GOSUB2ØØ1Ø
 33Ø PRINT"{CRSR DN}A RUSSIAN MISSILE IS{2 SPACEs}ON THE
     WAY":GOSUB2ØØ2Ø
 34Ø PRINT"{CRSR DN}YOU MUST EITHER CALL{2 SPACEs}THE RU
    SSIANS ON THE{3 SPACEs}HOT LINE":GOSUB2ØØ2Ø
 345 PRINT"{CRSR DN}OR FIRE BACK AND":PRINT"DESTROY THEI
    R CITIES":GOSUB2ØØ2Ø
 35Ø PRINT"{CRSR DN}THE MISSILE DRAWS NEAR":GOSUB2ØØ2Ø
 352 PRINT"{CRSR DN}(IT COULD BE A"SPC(8)"RADAR ERROR)":
    GOSUB2ØØ3Ø
 355 POKEE,47:PRINT"{CTRL 1}{SHFT CLR}{2 CRSR DNs}TO CAL
    L THE KREMLIN":PRINT"TYPE {CTRL 9}HOT-LINE{CTRL Ø}"
    :GOSUB2ØØ1Ø
 36Ø PRINT"{CRSR DN}TO FIRE MISSILES, TYPE {CTRL 9}KILL{
    CTRL Ø}"
 365 INPUTH$
 37Ø IFH$="HOT-LINE"GOTO38Ø
 372 IFH$="KILL"THEN375
 373 GOSUB2ØØ3Ø:GOTO375
 375 POKEE,8:GOSUB2ØØ2Ø:PRINT"{SHFT CLR}{CTRL 3}{7 CRSR
```

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```
    DNs}YOU DESTROYED":PRINT"THE WORLD!":GOTO39Ø
 38Ø POKEE,25:PRINT"{SHFT CLR}{2 CRSR DNs}THAT ENDS THAT
    !!":GOSUB2ØØ2Ø
 382 PRINT"{2 CRSR DNs}I KNEW YOU WERE WEAK.{CRSR DN} YO
    U HAVE TO FIGHT FIREWITH FIRE!"
 39Ø GOSUB2ØØ3Ø:POKEE,26:PRINT"{SHFT CLR}{2 CRSR DNs}{CT
    RL 9}{CTRL 7}YOU LOSE!{CTRL Ø}"
 394 PRINT"{2 CRSR DNs}IT'S JUST LIKE BEING{2 SPACEs}IN
    OFFICE":GOSUB2ØØ2Ø
 395 PRINT"{2 CRSR DNs}NO MATTER WHAT YOU DO YOU LOSE!":
    GOSUB2ØØ2Ø
 4ØØ PRINT"{2 CRSR DNs}WHAT'S YOUR POLITICAL PARTY?"
 4Ø5 INPUTE$
 41Ø IFE$="REPUBLICAN"THEN45Ø
 415 IFE$="DEMOCRAT"THEN455
 42Ø IFE$="LIBERAL"THEN455
 425 IFE$="CONSERVATIVE"THEN45Ø
 43Ø IFE$="LIBERTARIAN"THEN46Ø
 435 IFE$="SOCIALIST"THEN47Ø
 44Ø IFE$="COMMUNIST"THEN47Ø
 445 PRINT"{CRSR DN}I NEVER HEARD OF IT":PRINT"{CRSR DN}
    MUST BE SUBVERSIVE":GOTO48Ø
 45Ø PRINT"{CRSR DN}YOU'RE A VERY BRIGHT{2 SPACEs}PERSON
    . I LIKE YOU.":GOTO48Ø
 455 PRINT"{CRSR DN}YOU WERE PROBABLY{5 SPACEs}AGAINST T
    HE":PRINT"VIETNAM WAR":GOTO48Ø
 46Ø PRINT"{CRSR DN}WE AGREE ON":PRINT"MANY THINGS, FRIE
    ND":GOTO48Ø
 47Ø PRINT"{CRSR DN}{CTRL 3}{CTRL 9}A SPY!{CTRL Ø}{CTRL
    7} I THOUGHT SO!":PRINT"WHY DON'T YOU GO BACK
 472 PRINT"TO RUSSIA --WHERE YOU BELONG"
 48Ø GOSUB2ØØ2Ø:PRINT"{2 CRSR DNs}BY THE WAY, TAPES OF{2
     SPACEs}THIS CONVERSATION"
 485 GOSUB2ØØ2Ø:PRINT"WILL BE ON SALE"SPC(7)"IN THE LOBB
    Y.":GOSUB2ØØ2Ø
 5ØØ PRINT"{2 CRSR DNs}DON'T YOU THINK THAT{2 SPACEs}WIT
    H MY EXPERIENCE":GOSUB2ØØ1Ø
 5Ø3 PRINT"{CRSR DN}I SHOULD AT LEAST":PRINT"BE APPOINTE
    D":GOSUB2ØØ1Ø
 5Ø5 PRINT"{CTRL 3}AMBASSADOR TO CHINA?{CTRL 7}":GOSUB2Ø
    Ø1Ø
 51Ø PRINT"{2 CRSR DNs}THE PRESIDENT'S":PRINT"RED CHINA
    POLICY":GOSUB2ØØ1Ø
 515 PRINT"IS THAT HIS WIFE"SPC(6)"THINKS IT LOOKS GOOD"
    :GOSUB2ØØ1Ø
 52Ø PRINT"ON A BLUE TABLECLOTH":GOSUB2ØØ1Ø
 525 PRINT"{2 CRSR DNs}MY WIFE AND I PREFER{2 SPACEs}PLA
    IN WHITE DISHES":GOSUB2ØØ1Ø
 535 PRINT"{CRSR DN}I COME FROM":PRINT"HUMBLE BEGINNINGS
    ":GOSUB2ØØ1Ø
 54Ø PRINT"{CRSR DN}LIKE ABE LINCOLN":GOSUB2ØØ1Ø
 55Ø PRINT"{SHFT CLR}":POKES,135:POKEE,25:POKEV,13:GOSUB
    2ØØ1Ø
 555 POKES,Ø:POKEV,Ø:POKEE,26
 56Ø PRINT"{SHFT CLR}{2 CRSR DNs}{CTRL 7}OH, DON'T MIND
    THAT.":GOSUB2ØØ1Ø
 565 PRINT"{2 CRSR DNs}IT WAS JUST A":PRINT"SMALL GAP.":
    GOSUB2ØØ1Ø
 57Ø PRINT"{2 CRSR DNs}THERE SEEM TO BE A FEWOF THEM FOL
    LOWING ME{2 SPACEs}AROUND":GOSUB2ØØ2Ø
 95Ø POKEE,26:PRINT"{SHFT CLR}{2 CRSR DNs}{CTRL 7}I SUPP
    OSE YOU MUST BE VERY THRILLED":GOSUB2ØØ15
 955 PRINT"TO MEET ME,"
 956 PRINT"{CTRL 9}THE PRESIDENT{9 SPACEs}{CTRL Ø}":GOSU
    B2ØØ15
```

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Listing continued.

```
 959 PRINT"AND I AM THE PRESIDENT"
 96Ø PRINT"MAKE NO MISTAKE ABOUT THAT":GOSUB2ØØ15
 965 PRINT"{2 CRSR DNs}AND I SUPPOSE A TRUE{2 SPACEs}AME
     RICAN LIKE YOU"
 966 PRINT"MIGHT HAVE A QUESTION FOR ME"
 97Ø PRINT"{CRSR DN}WELL,GO AHEAD,"SPC(8)"ASK ANYTHING!"
     :INPUT F$
 975 IFF$="WHY AREN'T YOU DEAD"THENPRINT"{3 CRSR DNs}{CT
     RL 3}WHY AREN'T YOU?{CTRL 7}":GOTO997
 98Ø PRINT "{2 CRSR DNs}WHAT???!!!"
 985 PRINTF$"?"
 99Ø PRINT"I'M AFRAID THAT'S A{3 SPACEs}QUESTION":PRINT"
     OF NATIONAL SECURITY."
 994 PRINT"I CAN'T ANSWER THAT!":GOSUB2ØØ3Ø
 996 PRINT"{2 CRSR DNs}IN FACT, YOU HAVE SOMENERVE ASKIN
     G ME":PRINTF$"?":GOSUB2ØØ3Ø
 997 PRINT"{2 CRSR DNs}YOU SNEAKY "E$"!!!":GOSUB2ØØ2Ø
 998 PRINT"{2 CRSR DNs}GET OUT!!!":PRINT"YOU HAVE SOME N
     ERVE!!!"
 999 PRINT"{CRSR DN}I SAID":PRINT"{CRSR DN}{CTRL 9}{CTRL
      3}GET OUT!!!":GOSUB2ØØ3Ø
 99ØØ RESTORE:GOSUB1ØØØØ
 99Ø2 PRINT"{14 CRSR UPs}{CTRL 9}{CTRL 3}I AM THE PRESID
     ENT{2 SPACEs}"
 99Ø4 PRINT"{2 CRSR DNs}{CTRL Ø}{CTRL 3}BY SCOTT CALAMAR
     -1984{CTRL 9}{CTRL 3}{CRSR DN}":END
1ØØØØ PRINT"{SHFT CLR}{CTRL 9}{CTRL 7}* * * * *{CTRL Ø}
     {11 SPACEs}"
1ØØØ2 PRINT"{CRSR UP}{CTRL 9}{CTRL 7} * * * * {CTRL 3}{
     13 SPACEs}"
1ØØØ4 PRINT"{CRSR UP}{CTRL 9}{CTRL 7}* * * * *{CTRL Ø}{
     11 SPACEs}"
1ØØØ6 PRINT"{CTRL 9}{CTRL 7} * * * * {CTRL Ø}{11 SPACEs
     }"
1ØØØ8 PRINT"{CTRL 9}{CTRL 7}* * * * *{CTRL 3}{13 SPACEs
     }"
1ØØ1Ø PRINT"{CRSR UP}{CTRL 9}{CTRL 7} * * * * {CTRL 3}{
     13 SPACEs}"
1ØØ12 PRINT"{CRSR UP}{CTRL 9}{CTRL 7}* * * * *{CTRL Ø}{
     1Ø SPACEs}"
1ØØ14 PRINT"{CTRL 9}{CTRL 7} * * * * {CTRL Ø}{11 SPACEs
     }"
1ØØ16 PRINT"{CTRL 9}{CTRL 7}* * * * *{CTRL 3}{35 SPACEs
     }"
1ØØ18 PRINT"{CTRL 9}{CTRL 3}{44 SPACEs}"
1ØØ2Ø PRINT"{CTRL 9}{CTRL 3}{44 SPACEs}"
1ØØ22 PRINT"{CTRL 9}{CTRL 3}{44 SPACEs}"
1ØØ24 PRINT"{CTRL 9}{CTRL 3}{44 SPACEs}{2 CRSR UPs}"
1ØØ35 POKEV,13
1ØØ4Ø READ P
1ØØ45 IFP=-1THENPOKEV,Ø:RETURN
1ØØ5Ø READ D
1ØØ55 POKES2,P
1ØØ6Ø FORN=1TOD:NEXTN:POKES2,Ø
1ØØ7Ø FORN=1TO2Ø:NEXTN:GOTO1ØØ4Ø
1ØØ85 DATA 225,425,228,15Ø,231,15Ø,232,4ØØ,231,15Ø
1ØØ9Ø DATA 228,2ØØ,225,2ØØ,228,2ØØ,225,2ØØ,219,2ØØ,215,
     4ØØ,2Ø9,7ØØ,-1
1999Ø FORT=1TO1ØØ:NEXT:RETURN
2ØØØØ FORT=1TO2ØØØ:NEXT:RETURN
2ØØ1Ø FORT=1TO25ØØ:NEXT:RETURN
2ØØ15 FORT=1TO3ØØØ:NEXT:RETURN
2ØØ2Ø FORT=1TO4ØØØ:NEXT:RETURN
2ØØ25 FORT=1TO5ØØØ:NEXT:RETURN
2ØØ3Ø FORT=1TO6ØØØ:NEXT:RETURN
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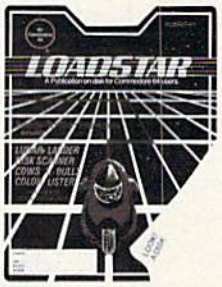

In this issue!

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HOPPER Bet you can't leave just one (peg, that is...)
COWS & BULLS Not an agricultural program; it helps to be a MASTERMIND.
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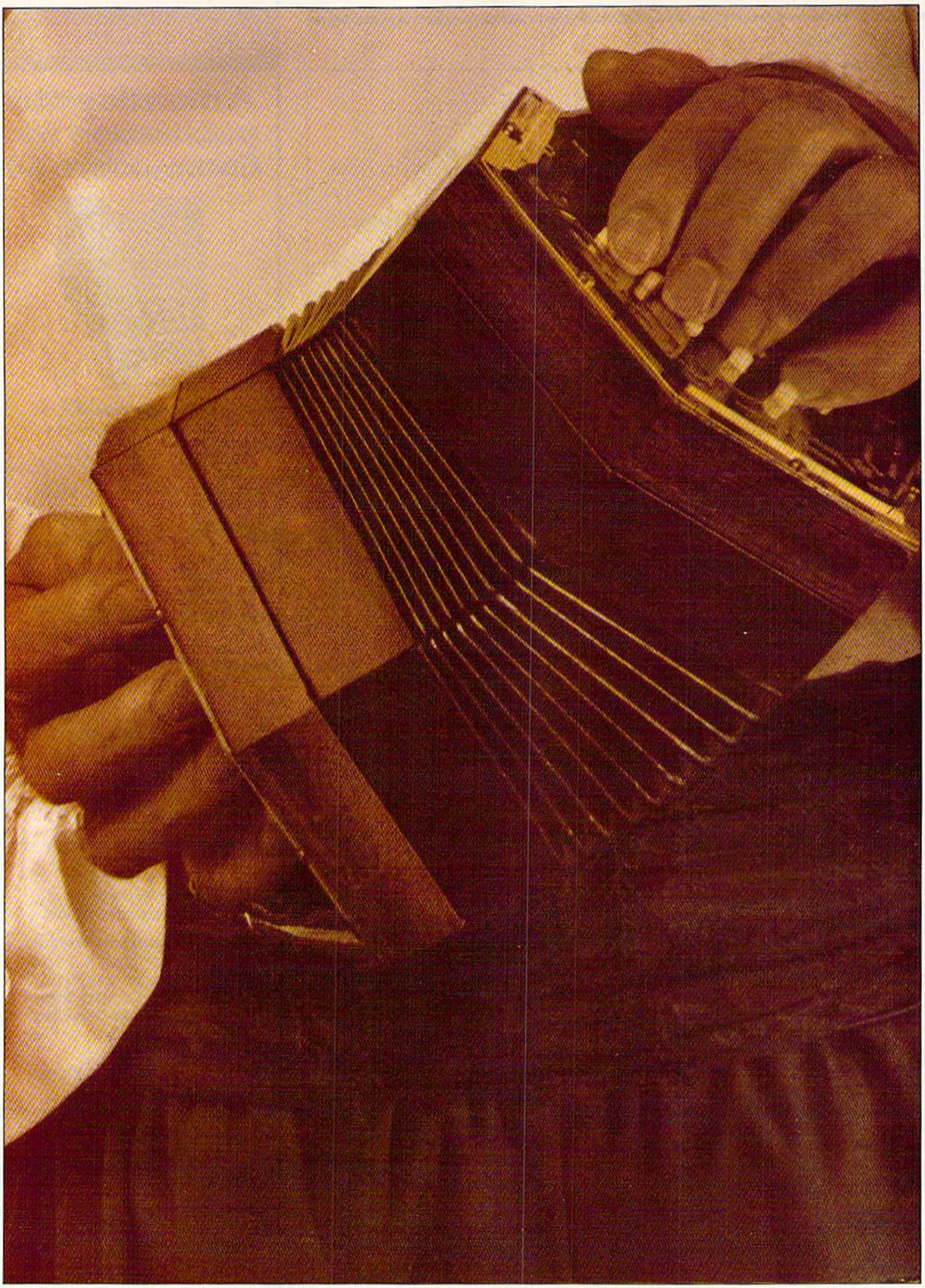

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RUN It Right

Commodore 64 VIC-20 with 16K expansion

Here's a handy utility that allows you to squeeze your programs, thus gaining more memory and in most cases allowing your programs to run faster.

This program was originally written for the Commodore PET, but I've made several improvements and have updated the program to run on the Commodore 64 and VIC-20 (with 16K expansion memory).

Compactor II reads a Basic program that has been saved on disk and creates a new, compacted copy. Compactor II deletes all REM statements, unnecessary spaces and leading colons.

This program, however, goes one step further. Whenever possible, it combines program lines to eliminate the link, line number and line-end-flag overheads normally associated with each Basic program line. It makes a program as small as possible and usually faster running.

To give you an idea of what it can do, the Compactor II program is over 3100 bytes long (13 blocks on disk), and when compacted by itself, the new version is about 1800 bytes (8 blocks on disk), or approximately 58% smaller. Admittedly, the Compactor II program does contain a large number of spaces and several remarks, but the savings you get on any particular program depend on how it was written.

While writing the original version of this program, I came across a few of Commodore Basic's undocumented quirks. Since many of you like to experiment with the capabilities of having pro-

LINE SQUEEZER

BY ROBERT W. BAKER

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grams write other programs to disk, the following information may be of interest to you.

Zero-Length and Long Lines

Normally, it is impossible to create a zero-length line when you use the screen editor on any Commodore system. By zero-length line, I mean a line with a link, line number and end-of-line flag, but with no Basic commands or text. If you were to type just a line number using the screen editor, you would actually delete a line instead of entering a zero-length line.

When you write a Basic program on disk as a datafile, there is nothing to prevent you from entering a zero-length line. Basic, however, cannot correctly link the program lines when a program contains a zero-length line. Therefore, if you want the program to run, you cannot have any zero-length lines in your program.

At the other extreme, you cannot create a Basic line that is longer than 255 bytes. However, the Commodore 64 screen editor furthermore limits you normally to a maximum of 78 characters, because of the line-wrapping characteristics and the need for at least a one-digit line number.

When you're writing a datafile to disk, be careful not to create a line greater than 255 bytes, as the program usually won't load back from the disk. If it does load, the program will normally be completely destroyed.

How the Program Works

When you run the Compactor II program, you have some control over the size of the program lines. The first input prompt (lines 410–420) will ask for the maximum line length. This must be a positive number between 1 and 255—the default value is 255 if you just hit the return key. When entering small numbers, be sure to use spaces to remove unwanted digits from the default number.

After you select the maximum line length, you are asked the name of the Basic program file you want compacted (lines 440–450). (Remember that the program must be on disk.) If the file is not found or if any disk errors are encountered, they will be reported and the program will abort.

Next, you're asked to enter the name of the compacted program to be created (lines 460–470). This name cannot be the same as the original program name or any other file currently on the disk. If any file with the same name already exists, or if any disk errors are encountered, the program will likewise abort.

Compactor II makes programs as small as possible—and usually faster running.

Compactor II reads the program as a sequential disk datafile, and the file is read twice. The first pass (lines 480–820) checks for line numbers that are the targets of GOTO, GOSUB, Run, or If... Then statements (lines 590–690). When it finds a target line number, that number is saved in matrix TL, if it's not already saved (lines 730–760). It also checks for multiple target lines in ON...GOTO and ON...GOSUB statements (lines 800–820).

As the first pass progresses, each target line is displayed in the order found (line 750). This gives you some indication of the scanning progress, since it can be rather slow. At the end of the first pass, the target lines are sorted into numerical order, to help speed up later processing (lines 860–890).

During the second pass (lines 930 1420), each line is copied, deleted or compacted according to the Compactor's rules. Again, the line number is displayed as each line of the original program is processed, to let you know how the program is progressing. The rules followed by the Compactor are as follows.

- Any leading colons and/or spaces on a line are deleted (line 1010).
- A line that has only remarks is deleted if it is not a target line (lines (1020–1040). If the line is a target line, the remark will be replaced with a single colon, which must be retained (line 1050). This may produce a leading colon if the next line is not a target line and is combined with this line. The line cannot be reduced to a zero-length line, since Basic cannot link a program correctly with a zero-length line, as mentioned earlier.
- If any line contains a GOTO, Run or If...Then statement, it cannot be combined with another line. Line 1130 makes the check for these tokens and sets a flag in variable F whenever one is found. This flag forces the current line to be written to disk and the next line to be read without combining the two. Any line combined after these Basic commands would never be executed; thus the compacted program would not function properly.
- Any spaces within a line that are not enclosed in quotes are deleted (line 1110).
- Any remarks at the end of a Basic line are deleted to the end of the line (line 1140).
- Anything within quotes is copied untouched (lines 1180–1200). If an ending quote is missing from a line that could be combined with another line, then an ending quote is added (lines 1210–1220).
- When a colon is found within a Basic line and not within quotes, the Compactor program checks the next non-space character before it copies the colon (line 1260). If a remark follows the colon, the colon and the rest of the line are deleted. Otherwise, the colon is copied, and processing continues as normal (line 1270).
- At the end of each Basic line, the Compactor checks to see if the next line can be combined with this one (line 1310). If there aren't any GOTO, Run or If...Then commands, and if the next line is not a target line, the lines are combined (lines 1320–1360). When this happens, the link and line number are discarded, a colon is written, and the next line is processed as part of the previous line.
- If the second line cannot be combined with the first line, the first line is written to disk with the correct link. This is the major difference between the original Compactor and this new version. Compactor II uses a line buffer to construct the entire line before it is actually written to disk. This allows the program to construct an accurate link value, which it will write at the front of each line.
- When the end of the program is found, the last line is written to disk, along with the ending zero link, and all files are properly closed (lines 1400–1420).

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Listing 1. *Compactor II program for the VIC-20 and C-64.*

```
100 REM ****************************
110 REM
120 REM{5 SPACEs}C O M P A C T O R{3 SPACEs}II
130 REM
140 REM{6 SPACEs}BY: ROBERT W. BAKER
150 REM 15 WINDSOR DR, ATCO, NJ 08004
160 REM
170 REM ****************************
180 :
190 DIM TL(1000),C(256): GOTO 400
200 :
210 REM *****{2 SPACEs}S U B R O U T I N E S{2 SPACEs}*
    ***
220 :
230 GOSUB 240: V1=V
240 GET#5,C$: GOSUB 270
250 V=0: IF C$<>"" THEN V=ASC(C$)
260 RETURN
270 INPUT#15,EN,EM$,ET,ES: IF EN=0 THEN RETURN
280 PRINT: PRINT"DISK ERROR": PRINT
290 PRINT EN;EM$;ET;ES: GOTO 1420
300 IF L$="" THEN RETURN
310 LA=LA+LEN(L$)+3: A1=INT(LA/256): A2=LA-(A1*256)
320 PRINT#6,CHR$(A2);CHR$(A1);L$;CHR$(0);: L$="": RETUR
    N
330 P=1: GOSUB 230: LN=V1+(256*V): L1=V1: L2=V
340 PRINT LN;"{6 SPACEs}": PRINT"{CRSR UP}";
350 GOSUB 240: C(P)=V: IF V>0 THEN P=P+1: GOTO 350
360 F=0: PL=P: P=1: RETURN
370 :
380 REM *** READY DISK FILES
390 :
400 PRINT"{SHFT CLR}{5 SPACEs}C O M P A C T O R{3 SPACE
    s}II": PRINT
410 PRINT: PRINT"MAX LINE LENGTH TO CREATE"
420 INPUT"{3 SPACEs}255{5 CRSR LFs}";ML: IF ML<1 OR ML>
    255 THEN 410
430 CLOSE 15: OPEN 15,8,15
440 PRINT: PRINT"INPUT FILENAME": INPUT F1$
450 OPEN 5,8,5,"0:"+F1$+",P,R": GOSUB 270
460 PRINT: PRINT"OUTPUT FILENAME": INPUT F2$
470 OPEN 6,8,6,"0:"+F2$+",P,W": GOSUB 270
480 PRINT: PRINT"OK, SCANNING PROGRAM"
490 PRINT"{3 SPACEs}FOR TARGET LINES.....": PRINT
500 :
510 REM *** READ LOAD ADR, LINK & LINE#
520 :
530 GOSUB 230
540 GOSUB 230: IF V+V1=0 THEN 860
550 GOSUB 230: LN=V1+(256*V)
560 :
570 REM ***{2 SPACEs}SCAN BASIC LINES FOR GOTO, GOSUB,
    RUN & THEN TOKENS
580 :
590 GOSUB 240
600 IF V=0 THEN 540
610 IF V=137 OR V=141 OR V=138 THEN 660
620 IF V<>167 THEN 590
630 :
640 REM *** GET TARGET LINE#
650 :
660 LT=0
670 GOSUB 240: IF V=32 THEN 670
```

→

Lines on Lines

I skipped over the subroutines, which are located near the front of the program at lines 230–360. A GOSUB to line 240 will read a byte and return the character code established in the variable V, while starting at line 230 will read two bytes. Lines 270–290 check for disk errors and report any findings before aborting the program.

Lines 300–320 compute the link value for a program line in L$ and then write to disk the link, program line and ending flag (0). Lines 330–360 read an entire Basic program line, saving each byte in the C matrix and the line length in PL. It also computes the program line number, saves it in the LN variable and displays the line number, overwriting any previous number.

The line length that you specify at the program's beginning prevents Compactor II from combining lines that would exceed the specified limit. However, any lines already greater than the limit will be copied without being combined with other lines. If you select a small limit, then the program will copy most of the lines without combining them. It will, however, compact each line by removing spaces, remarks or leading colons.

Keep in mind that the newly compacted program may have lines that cannot be edited with the screen editor. On the C-64, any program line that exceeds two screen lines cannot be edited. (See my Uncompactor program, following, which allows you to break and shorten program lines to allow for easier editing.)

One quick word of caution. When you enter the Print# command, do *not* use the Print statement's abbreviation, which is a question mark. If you do, the line will still list correctly, but internally the code is incorrect and will generate a syntax error. Always type the entire command—PRINT#.

If you don't want to type in this program, send me $5 and I will supply you with a copy of the program on a VIC-1541 disk. I'll even include a copy of my Uncompactor program. R

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A Printer For All Reasons

Search For The Best High Quality Graphic Printer

If you have been looking very long, you have probably discovered that there are just too many claims and counter claims in the printer market today. There are printers that have some of the features you want, but do not have others. Some features you probably don't care about, others are vitally important to you. We understand. In fact, not long ago, we were in the same position. Deluged by claims and counter claims. Overburdened by rows and rows of specifications, we decided to separate all the facts — prove or disprove all the claims to our own satisfaction. So we bought printers. We bought samples of all major brands and tested them.

Our Objective Was Simple

We wanted to find that printer which had all the features you could want and yet be sold directly to you at the lowest price. We wanted to give our customers the best printer on the market today at a bargain price.

The Results Are In

The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the GP-550CD from Seikosha, a division of Seiko (manufacturers of everything from wrist watches to space hardware). We ran this printer through our battery of tests and it came out shining. This printer *can* do it all. Standard draft printing up to a respectable (and honest) 86 characters per second, and with a very readable 9 (horizontal) by 8 (vertical) character matrix. At this rate, you will get an average 30 line letter printed in only 28 seconds.

"NLQ" Mode

One of our highest concerns was about print quality and readability. The GP-550CD has a print mode termed Near Letter Quality printing (NLQ mode). This is where the GP-550CD outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 9 (horizontal) by 16 (vertical). This equates to 14,400 addressable dots per square inch. Now we're talking ***quality*** printing. You can even do graphics in the high resolution mode. The results are the best we've ever seen. The only other printers currently available having resolution this high go for $500 and more *without* the interface or cable needed to hook up to your Commodore!

Features That Won't Quit

With the GP-550CD your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 18 font styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print H_2O or X^2. This fantastic machine will do it automatically, through easy software commands right from your keyboard.

One of the fonts we like best is "Proportional" because it looks most like typesetting. The spacing for thin characters like "i" and "l" are given less space which "tightens" the word making reading easier and faster. This is only one example of the careful planning put into the GP-550CD.

Do you sometimes want to emphasize a word? It's easy, just use **bold** (double strike) to make the words stand out. Or, if you wish to be even more emphatic, underline the words. Or do both. You may also wish to "headline" a title. Each basic font has a corresponding elongated (double-wide) version. You can combine any of these modes to make the variation almost endless. Do you want to express something that you can't do with words? Use graphics with your text — even on the same line.

You can now do virtually any line spacing you want. You may select 6, 8, 7½ or 12 lines per inch. PLUS you have variable line spacing of 1.2 lines per inch to infinity (no space at all) and ***97*** other software selectable settings in between. You control line spacing on a dot-by-dot basis. If you've ever had a letter or other document that was just a few lines too long to fit a page, you can see how handy this feature is. Simply reduce the line spacing slightly and . . . VOILA! The letter now fits on one page.

Forms? Yes! Your Letterhead? Of Course!

Do you print forms? No problem. This unit will do them all. Any form up to 10 inches wide. The tractors are adjustable from 4½ to 10 inches. Yes, you can also use single sheets. Plain typing paper, your letterhead, short memo forms, anything you choose. Any size under 10" in width. Multiple copies? **Absolutely!** Put forms or individual sheets with carbons (up to 3 deep), and the last copy will be as readable as the first. Spread sheets with many columns? **Of course!** Just go to condensed mode printing and print a full 136 columns wide. Forget expensive wide-carriage printers and changing to wide carriage paper. You can now do it all on a standard 8½" page.

Consistent Print Quality

Most printers have a continuous loop ribbon cartridge or a single spool ribbon which gives nice dark printing when new, but quickly starts to fade after a while. To keep the printers' output looking consistently dark, the ribbons must be changed more often than is healthy for the pocketbook. The GP-550CD solves this problem completely by using a replaceable, inexpensive ink cassette which is separately replaceable from the actual ribbon. It keeps the ribbon loaded with ink at all times. You only replace the ribbon when it truly wears out, not when it starts to run low on ink. Just another example of the superb engineering applied to the GP-550CD. (When you finally do wear out your ribbon, replacement cost is only $14.95. Ink cassette replacement cost is only $6.95, and each will last for over 1,000 pages.)

The Best Part

When shopping for a quality printer with all these features, you could expect to pay around $500 or more. *Not any more!* We have done our homework. You don't have to worry about interfaces or cables. Everything is included. We are now able to sell this fantastic printer for **only $259.95!** The GP-550CD is built especially for the Commodore 64 and the VIC-20. All Commodore graphics are included. This printer does everything the Commodore printers do but has more features. **You need absolutely nothing else to start printing – just add paper.** We also have specific models for other computers. Call for details.

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The Bottom Dollar

The GP-550CD is only $259.95. Shipping and insurance is $8.00 — UPS within the continental USA. If you are in a hurry, UPS Blue (second day air) is $18.00. Canada, Alaska, Mexico are $25.00 (air). Other foreign is $60.00 (air). California residents add 6% tax. These are cash prices — VISA and MC add 3% to total. We ship the next business day on money orders, cashiers' checks, and charge cards. A 14-day clearing period is required for checks.

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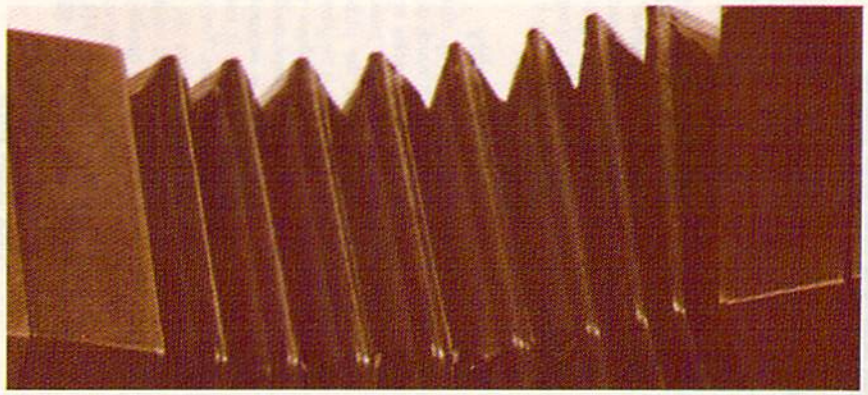
Listing 1 continued.

```
68Ø IF V<48 OR V>57 THEN 73Ø
69Ø LT=(1Ø*LT)+VAL(C$): GOSUB 24Ø: GOTO 68Ø
7ØØ :
71Ø REM *** CHECK IF ALL READY FOUND
72Ø :
73Ø FOR X=Ø TO N: IF TL(X)=LT THEN 8ØØ
74Ø NEXT X
75Ø TL(N)=LT: N=N+1: PRINT LT;"{6 SPACEs}": PRINT"{CRSR
    UP}";: IF N<1ØØØ THEN 8ØØ
76Ø PRINT: PRINT: PRINT"TOO MANY TARGET LINES!": GOTO 1
    42Ø
77Ø :
78Ø REM *** CHECK FOR 'ON...GOTO/GOSUB'
79Ø :
8ØØ IF V=44 THEN 66Ø
81Ø IF V<>32 THEN 6ØØ
82Ø GOSUB 24Ø: GOTO 8ØØ
83Ø :
84Ø REM *** SORT TARGET LINES
85Ø :
86Ø IF N<2 THEN 93Ø
87Ø FOR X=Ø TO N-1: FOR Y=Ø TO N-2
88Ø IF TL(X)<TL(Y) THEN V=TL(Y): TL(Y)=TL(X): TL(X)=V
89Ø NEXT Y,X
9ØØ :
91Ø REM *** GET READY FOR COMPACT
92Ø :
93Ø PRINT: PRINT: PRINT "COMPACTING LINES....": PRINT
94Ø CLOSE 5: OPEN 5,8,5,"Ø:"+F1$+",P,R": GOSUB 27Ø
95Ø GOSUB 23Ø: PRINT#6,CHR$(V1);CHR$(V);: LA=V1+(256*V)
    : L$=""
96Ø :
97Ø REM *** READ PROGRAM LINE
98Ø :
99Ø GOSUB 23Ø: IF V+V1=Ø THEN 14ØØ
1ØØØ GOSUB 33Ø
1Ø1Ø V=C(P): P=P+1: IF V=32 OR V=58 THEN 1Ø1Ø
1Ø2Ø L$=CHR$(L1)+CHR$(L2): IF V<>Ø AND V<>143 THEN 111Ø
1Ø3Ø FOR X=Ø TO N: IF TL(X)<LN THEN NEXT X
1Ø4Ø IF TL(X)<>LN THEN 99Ø
1Ø5Ø L$=L$+":": GOTO 131Ø
1Ø6Ø :
1Ø7Ø REM ****{2 SPACEs}SCAN BASIC LINE & COMPACT PROGRA
    M
1Ø8Ø :
1Ø9Ø L$=L$+CHR$(V)
11ØØ V=C(P): P=P+1
111Ø IF V=32 THEN 11ØØ
112Ø IF V=58 THEN 126Ø
```



```
113Ø IF V=137 OR V=138 OR V=139 OR V=167 THEN F=1: GOTO
     1Ø9Ø
114Ø IF V=Ø OR V=143 THEN 131Ø
115Ø :
116Ø REM *** QUOTE - COPY TILL NEXT OR LINE END
117Ø :
118Ø IF V<>34 THEN 1Ø9Ø
119Ø L$=L$+CHR$(V): V=C(P): P=P+1: IF V=34 THEN 1Ø9Ø
12ØØ IF V>Ø THEN 119Ø
121Ø IF F=Ø THEN L$=L$+CHR$(34)
122Ø GOTO 131Ø
123Ø :
124Ø REM *** IF COLON - CHK NEXT CHAR, ELSE COPY CHAR
125Ø :
126Ø V=C(P): P=P+1: IF V=32 OR V=58 THEN 126Ø
127Ø IF V<>Ø AND V<>143 THEN L$=L$+":": GOTO 111Ø
128Ø :
129Ø REM *** END OF LINE - CAN WE COMPACT THESE LINES ?
13ØØ :
131Ø IF F=1 THEN GOSUB 3ØØ: GOTO 99Ø
132Ø GOSUB 23Ø: IF V+V1=Ø THEN 14ØØ
133Ø GOSUB 33Ø: IF (LEN(L$)+PL+4)>ML THEN GOSUB 3ØØ: GO
    TO 1Ø1Ø
134Ø FOR X=Ø TO N: IF TL(X)<LN THEN NEXT X
135Ø IF TL(X)<>LN THEN 126Ø
136Ø GOSUB 3ØØ: GOTO 1Ø1Ø
137Ø :
138Ø REM *** END OF COMPACT - WRITE END OF PROGRAM
139Ø :
14ØØ GOSUB 3ØØ: PRINT#6,CHR$(Ø);CHR$(Ø);
141Ø PRINT: PRINT: PRINT"DONE": PRINT
142Ø CLOSE 5: CLOSE 6: CLOSE 15
```

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Are your program lines overcrowded with multiple statements? This program breaks up and shortens those lines, making them easier for you to edit.

Just as with Compactor II, the program in "Line Squeezer" (p. 54 of this issue), this program was originally written for the Commodore PET. I've now updated it to run on the Commodore 64 and VIC-20.

Uncompactor, a companion to Compactor II, reads a Basic program that was saved on disk and creates a new, uncompacted, or expanded copy. It does this by taking any multistatement lines (statements separated by colons) and breaking them into separate program lines with new line numbers. Long lines created by Compactor II can now be edited and the program recompacted.

When you split multistatement lines, the new line numbers are created by incrementing the original line numbers by 1. This procedure is followed until a line number reaches the next original line number in the program. At that point, the remainder of the original line is copied as part of the last line generated, with any appropriate separating colons.

The program must take into account certain Basic tokens, or keywords, since they determine whether or not a particular line can be broken into separate lines. Thus, any data following a GO-TO, End, Run, If, Return, REM, Stop, List or CONT token is copied unchanged to the end of the current program line. Also, once a program detects a quote, it must copy the line until it reaches another quote or the end of the program line.

LINE EXPANDER

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Listing 1. *Uncompactor program for the C-64 and VIC-20.*

```
10Ø REM ******************************
11Ø REM
12Ø REM{3 SPACEs}U N C O M P A C T O R{3 SPACEs}II
13Ø REM
14Ø REM{6 SPACEs}BY: ROBERT W. BAKER
15Ø REM 15 WINDSOR DR., ATCO, NJ Ø8ØØ4
16Ø REM
17Ø REM ******************************
18Ø :
19Ø GOTO 36Ø
2ØØ :
21Ø REM >>>>>> SUBROUTINES <<<<<<<
22Ø :
23Ø GOSUB 24Ø: V1=V
24Ø GET#5,C$: GOSUB 27Ø
25Ø V=Ø: IF C$<>"" THEN V=ASC(C$)
26Ø RETURN
27Ø INPUT#15,EN,EM$,ET,ES: IF EN=Ø THEN RETURN
28Ø PRINT: PRINT "DISK ERROR":PRINT
29Ø PRINT EN;EM$;ET;ES: GOTO 1ØØØ
3ØØ IF L$="" THEN RETURN
31Ø LA=LA+LEN(L$)+2: L1=INT(LA/256): L2=LA-(L1*256)
32Ø PRINT#6,CHR$(L2);CHR$(L1);L$;: L$="": RETURN
33Ø :
34Ø REM ***** INITIALIZATION *****
35Ø :
36Ø PRINT"{SHFT CLR}{5 SPACEs}U N C O M P A C T O R{3 S
    PACEs}II": PRINT: PRINT
37Ø PRINT"MIN LINE LENGTH TO TRY UNCOMPACTING": INPUT"{
    3 SPACEs}1{3 CRSR LFs}";XL
38Ø DIM C(256): CLOSE 15: OPEN 15,8,15
39Ø PRINT: PRINT"INPUT FILENAME": INPUT F1$
4ØØ OPEN 5,8,5,"Ø:"+F1$+",P,R": GOSUB 27Ø
41Ø PRINT: PRINT"OUTPUT FILENAME": INPUT F2$
42Ø OPEN 6,8,6,"Ø:"+F2$+",P,W": GOSUB 27Ø
43Ø PRINT:PRINT"OK, WORKING ON LINE# .....": PRINT
44Ø GOSUB 23Ø: PRINT#6,CHR$(V1);C$;
45Ø LA=V1+(256*V): L$="": GOTO 6ØØ
46Ø :
47Ø REM ***** OUTPUT THIS LINE#
48Ø :
49Ø GOSUB 3ØØ: IF LK=Ø THEN 98Ø
5ØØ LN=NL: PRINT LN;"{6 SPACEs}": PRINT"{CRSR UP}";
51Ø L$=CHR$(LL)+CHR$(LH)
52Ø :
53Ø REM ***** READ THIS BASIC PGM LINE
54Ø :
55Ø X=1
56Ø GOSUB 24Ø: C(X)=V: IF V>Ø THEN X=X+1: GOTO 56Ø
57Ø :
58Ø REM ***** GET NEXT LINK & LINE#
59Ø :
6ØØ GOSUB 23Ø: LK=V+V1: IF LK=Ø THEN NL=64ØØØ: GOTO 62Ø
61Ø GOSUB 23Ø: NL=V1+(256*V): LL=V1: LH=V
62Ø IF L$="" THEN 49Ø
63Ø :
64Ø REM ***** BREAK UP LINE IF POSSIBLE
65Ø :
66Ø V=X: X=1: IF V<XL THEN 86Ø
67Ø :
68Ø REM SKIP IF NOT COLON
69Ø :
7ØØ IF C(X)<>58 THEN 82Ø
```

→

Program Description

When you run the Uncompactor II program, you have some control over what size program lines will be uncompacted. The first input prompt (line 370) will ask for the minimum line length to try uncompacting. This should be a positive number between 1 and 255, but there is no check of the value entered. If you simply press the return key when prompted, the default will force the program to try and break every single line, where possible. Selecting a number like 20 will cause small lines (with 20 or fewer characters) to be left untouched, while longer lines are uncompacted.

After you select the minimum line length, you're then asked the name of the Basic program file to be uncompacted (lines 390–400). The program must be on disk, as program files cannot be read from tape. If the file is not found, or if any disk errors are encountered, the program will terminate.

Next, you're asked to enter the desired name of the uncompacted program to be created (lines 410–420). This name cannot be the same as the original program name or that of any other file currently on the disk. If any file with the same name already exists, or if any disk errors are encountered, the computer will report these errors, and the program will terminate.

Uncompactor II treats the program to be uncompacted as a sequential disk datafile, which it reads only once. As it reads the original program, each line number is displayed on the screen (lines 490–510). This gives you some indication of how things are progressing as Uncompactor II runs; it can be rather slow.

After Uncompactor II copies the original line number, it reads the actual line into the C matrix (lines 550–560) and then reads the next link and line number (lines 600–620). When it finds the zero link at the end of the program, the next line number is forced to 64000. This number exceeds any possible Basic program line number, thus forcing proper handling of the last line of the program read.

Once the entire line has been read, and if it's longer than the limit you selected, it is scanned for colons and certain Basic tokens (lines 660–940). If the line is shorter than the specified

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Listing continued.

```
71Ø IF X=1 THEN L$=L$+CHR$(C(X)): GOTO 75Ø
72Ø LN=LN+1: IF LN>=NL THEN 86Ø
73Ø H=INT(LN/256): L=LN-(256*H)
74Ø L$=L$+CHR$(Ø): GOSUB 3ØØ: L$=CHR$(L)+CHR$(H)
75Ø X=X+1: IF C(X)=32 OR C(X)=58 THEN 75Ø
76Ø GOTO 7ØØ
77Ø :
78Ø REM COPY REST OF LINE IF ---
79Ø REM{2 SPACEs}GOTO, END, RUN, IF, RETURN
8ØØ REM{2 SPACEs}REM, STOP, LIST, CONT
81Ø :
82Ø IF C(X)<128 OR C(X)>155 THEN 91Ø
83Ø IF C(X)=128 OR C(X)>153 THEN 86Ø
84Ø IF C(X)<137 OR C(X)>144 THEN 93Ø
85Ø IF C(X)=14Ø OR C(X)=141 THEN 93Ø
86Ø L$=L$+CHR$(C(X)): IF C(X)>Ø THEN X=X+1: GOTO 86Ø
87Ø GOTO 49Ø
88Ø :
89Ø REM SKIP IF NOT QUOTE
9ØØ :
91Ø IF C(X)<>34 THEN 93Ø
92Ø L$=L$+CHR$(C(X)): X=X+1: IF C(X)<>34 AND C(X)<>Ø TH
    EN 92Ø
93Ø L$=L$+CHR$(C(X)): IF C(X)>Ø THEN X=X+1: GOTO 7ØØ
94Ø GOTO 49Ø
95Ø :
96Ø REM *** END OF BASIC PROGRAM
97Ø :
98Ø PRINT#6,CHR$(Ø);CHR$(Ø);
99Ø PRINT: PRINT: PRINT"DONE":PRINT:PRINT
1ØØØ CLOSE 5: CLOSE 6: CLOSE 15
```

limit, it's copied untouched (line 860). If one of the special Basic tokens is found (lines 820–850), the remainder of the line is copied untouched.

When a colon is found, the line is split, as long as the current line number plus one is less than the next original line number (lines 700–760). The current line is written to disk with the proper link and ending flag. Single leading colons at the start of any line are retained, while spaces or extra colons following any colon in the middle of a line are deleted (line 750).

Whenever quotation marks are encountered, the remainder of the line is copied untouched until the quote closes or end of line is found (lines 910–940). At the end of the program, a zero link is written to disk to properly terminate the new program, and all files are closed.

The subroutines are near the front of the program to help speed things up. The subroutine at line 230 reads two bytes, while 240 reads a single byte from the original program file. When the program returns from this subroutine, the last character read is in C$, with the character codes in V and V1. Lines 270–290 check for disk errors and either return to the calling line or display the disk error and stop the program. Lines 300–320 calculate the correct link for the line in L$ and write the entire line, along with the link, to the new program file.

Newly created, uncompacted programs are fully linked and ready to run. You can use the Uncompactor II and Compactor II on any standard Basic program that does not contain embedded assembly language routines.

As I mentioned in the Compactor II article, don't use a question mark as an abbreviation for Print in Print# commands. The line will still list correctly, but internally the code is incorrect and will generate a Syntax error if executed. Be sure you always type the entire command—PRINT#—to avoid problems.

If you have trouble entering either program, I will supply you with copies of both of them on a VIC 1541 disk for $5 to cover costs. R

Address all author correspondence to Robert W. Baker, 15 Windsor Drive, Atco, NJ 08004.

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Listing 2. *Sample program.*

```
1Ø REM THIS PROGRAM DOES NOTHING MUCH
15 :
2Ø A=1:B=2:C=3
3Ø D=4 : E=5: F=6 :REM NOTICE EXTRA SPACES
4Ø N$ = "{2 CRSR DNs}SUM = "
5Ø PRINT "{SHFT CLR}{3 CRSR DNs}WOULD YOU LIKE TO SEE S
   OMETHING?":PRINT:INPUT" 'Y' OR 'N' ";M$
6Ø IF M$ = "N" THEN 1ØØ
7Ø IF M$ = "Y" THEN 8Ø
75 IF M$<>"Y" OR M$<>"N" THEN GOTO 5Ø
8Ø N=VAL(N$):LET N = A + B + C + D + E + F
85 :
9Ø REM HERE IS SOMETHING TO SEE.
95 PRINT N$;N
1ØØ END
```

Listing 3. *Compacted sample program.*

```
2Ø A=1:B=2:C=3:D=4:E=5:F=6:N$="{2 CRSR DNs}SUM = "
5Ø PRINT"{SHFT CLR}{3 CRSR DNs}WOULD YOU LIKE TO SEE SO
   METHING?":PRINT:INPUT" 'Y' OR 'N' ";M$:IFM
   $="N"THEN1ØØ
7Ø IFM$="Y"THEN8Ø
75 IFM$<>"Y"ORM$<>"N"THENGOTO5Ø
8Ø N=VAL(N$):LETN=A+B+C+D+E+F:PRINTN$;N
1ØØ END
```

Listing 4. *Uncompacted sample program.*

```
1Ø REM THIS PROGRAM DOES NOTHING MUCH
15 :
2Ø A=1
21 B=2
22 C=3
3Ø D=4
31 E=5
32 F=6
33 REM NOTICE EXTRA SPACES
4Ø N$ = "{2 CRSR DNs}SUM = "
5Ø PRINT "{SHFT CLR}{3 CRSR DNs}WOULD YOU LIKE TO SEE S
   OMETHING?"
51 PRINT
52 INPUT" 'Y' OR 'N' ";M$
6Ø IF M$ = "N" THEN 1ØØ
7Ø IF M$ = "Y" THEN 8Ø
75 IF M$<>"Y" OR M$<>"N" THEN GOTO 5Ø
8Ø N=VAL(N$)
81 LET N = A + B + C + D + E + F
85 :
9Ø REM HERE IS SOMETHING TO SEE.
95 PRINT N$;N
1ØØ END
```


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Address all author correspondence to Doug Smoak, 303 Heyward St., Columbia, SC 29201.

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Listing 1. *Taxman Loader program.*

```
5 PRINT"{SHFT CLR}{CRSR DN}{CRSR RT}LOADING DATA..."
10 FORI=0TO46:READA:POKE828+I,A:CK=CK+A:NEXT
20 IFCK<>6871THENPRINT"ERROR IN FIRST 5 DATA LINES":END
30 SYS828
40 FORI=10456TO10487:READA:POKEI,A:NEXT
50 FORI=10712TO10743:READA:POKEI,A:NEXT
60 FORI=10960TO10991:READA:POKEI,A:NEXT
70 POKE157,128:LOAD"TAXMAN":REM ** ,8 FOR DISK --NO COM
   MA OR NUMBER FOR TAPE **
80 DATA120,165,1,41,251,133,1,169,0,133
90 DATA251,133,253,169,40,133,252,169,208,133
100 DATA254,162,8,160,0,177,253,145,251,136
110 DATA208,249,230,252,230,254,202,208,240,165
120 DATA1,9,4,133,1,88,96
130 DATA24,200,126,27,24,63,13,28,24,200
140 DATA126,27,24,24,31,57,24,200,126,27
150 DATA24,60,55,113,24,200,126,27,60,102
160 DATA99,194
170 DATA24,19,126,216,24,252,176,56,24,19
180 DATA126,216,60,102,198,67,24,19,126,216
190 DATA24,60,236,134,24,19,126,216,24,24
200 DATA248,156
210 DATA28,55,126,240,240,120,31,0,0,28
220 DATA119,254,224,127,62,0,0,56,238,127
230 DATA7,254,124,0,56,236,126,15,15,30
240 DATA252,0
```

Listing 2. *Taxman Basic program.*

```
1 POKE45,PEEK(174):POKE46,PEEK(175):CLR
2 REM*********************************
3 REM*{6 SPACEs}THE TAXMAN{2 SPACEs}(C) 1984{2 SPACEs}B
  Y{2 SPACEs}*
4 REM*{6 SPACEs}DOUG SMOAK{16 SPACEs}*
5 REM*{6 SPACEs}303 HEYWARD ST.{11 SPACEs}*
6 REM*{6 SPACEs}COLUMBIA, SC 29201{8 SPACEs}*
7 REM*{6 SPACEs}803 765 1189{14 SPACEs}*
8 REM*{32 SPACEs}*
9 REM*********************************
10 PRINT"{SHFT CLR}{4 CRSR DNs}{3 CRSR RTs}{COMD 5}THE{
   CRSR DN}{COMD 3}":POKE53272,(PEEK(53272)AND240)OR10
20 DIMTP(5),HO$(5),MN$(5):DW$="{4 CRSR DNs}":OT=828:OM=
   OT
30 TP(1)=55:TP(2)=110:TP(3)=165:TP(4)=165:TP(5)=165:C=2
   53:DM=254:SP=32
40 M=1525:S=1104:DB=80:HA=.5:BG=53281:BO=BG-1:POKEBO,11
   :POKEBG,0
50 R=40:RT=49152:TP=0:WL=209:HL=36:SID=54272:CD=SID:NW=
   SID+11:BN=2000
60 GOSUB1110:G$="{6 SPACEs}TAXMAN!":GOSUB1530:PRINTDW$:
   GOSUB820
70 GOSUB1560:PRINT"{COMD 5}{CRSR DN}{19 SPACEs}BY"
80 PRINT"{CRSR DN}{15 SPACEs}DOUG SMOAK"
90 ML=51200
100 READA:IFA>=0THENPOKEML,A:ML=ML+1:GOTO100
110 SYS51200
120 ML=49152
130 READA:IFA>=0THENPOKEML,A:ML=ML+1:GOTO130
140 ML=49223
150 READA:IFA>=0THENPOKEML,A:ML=ML+1:GOTO150
160 PRINTDW$"{10 SPACEs}PRESS ANY KEY TO PLAY{CTRL 0}"
170 GOSUB590
180 GETD$:ON-(D$="")GOTO170:SYS51253
190 GOSUB800:PRINT"{SHFT CLR}":GOSUB370
```

→

The Game's Ingredients

One of this game's interesting features is the music, which plays continuously throughout the game. It is in machine language and driven by interrupt, so it doesn't slow down the game.

Another interesting feature is the large alphabet, which is used in the title and score displays. It is made of strings that print graphics characters to build each letter. The program doesn't use every letter, but all the letters are included in lines 1110–1510.

The routine at lines 1530–1540 performs the actual conversion of G$ to large letters. By using this routine and the string array of the alphabet and numbers, you can print large text in your own programs.

To give the illusion of a man running, I use four custom characters for each direction (left or right). To determine which character to display, I use an interesting technique. In line 310, the character is chosen by the expression CH = PEEK(C) + (MEAND3). The value of PEEK(C) is set by the machine language routine that reads the joystick and determines whether or not you have moved. The (MEAND3) is what makes the character change.

As ME changes, ME AND 3 go through the sequence 0,1,2,3 or 3,2,1,0, so the character that is displayed is changed as ME is changed. Since ME is the runner's position on the screen, the runner is animated as he runs. A similar method is used in line 300, to animate the taxman through his two positions.

You must actually enter two programs to get Taxman off and running. The first one, Tax Loader, sets up the custom character set that will be used in the game, and then loads and runs the game program.

Since only 12 custom characters are used, I wrote a short machine language routine that first moves the entire ROM character set into the RAM area that the game will use. I then poke in the data for the 12 redefined characters from Basic. The first five data lines of the Tax Loader hold the machine language routine, and if you don't enter it correctly, line 20 will end the program and tell you the checksum is in error.

You don't want an error in these lines, since the machine language routine disturbs interrupts and changes lo-

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Listing continued.

```
200 LV=3:SC=0
210 POKE49301,255:GOSUB820:SYS49223:POKE253,27
220 TP=0:ME=M:OM=ME:OT=828:CH=27
230 POKEME,CH:POKEME+CD,1:GOSUB500
240 J=0:K%=HA+(ME-S)/DB:ET=K%*DB+S:DE=1:E=90:CE=14
250 IFRND(1)<.5THENET=ET+39:DE=-1:E=92:CE=14
260 IFPEEK(ME)=HLTHENTP=TP+1:SC=SC+10:GOSUB640:POKENW,1
    28
270 IFPEEK(ET)=HLTHENTP=TP+1:SC=SC-10:GOSUB640
280 POKEOM,SP:POKEME,CH:POKEME+CD,1
290 IFPEEK(ET)=CHTHENPOKENW,129:LV=LV-1:GOSUB640:POKENW
    ,128
300 POKEOT,SP:POKEET+CD,CE:POKEET,E+(JAND1)
310 SYSRT:CH=PEEK(C)+(MEAND3)
320 IFTP=>TP(SK)THENSK=SK-(SK<5):GOSUB490:GOTO220
330 OM=ME:ME=OM+PEEK(DM)-R
340 IFPEEK(ME)<>SPANDPEEK(ME)<>HLTHENME=OM
350 OT=ET:ET=ET+DE:J=J+1:IFJ=40THEN240
360 GOTO260
370 DN$="{HOME}{24 CRSR DNs}":OV$="{37 CRSR RTs}"
380 MN$(3)="{CTRL 6}$ ${2 SPACEs}$ ${2 SPACEs}$ $$ $ $
    $ ${2 SPACEs}$ $$ $"
390 MN$(4)="{CTRL 6}$ ${2 SPACEs}$ ${2 SPACEs}$ $$ $ $
    $ ${2 SPACEs}$ $$ $"
400 MN$(5)="{CTRL 6}$ ${2 SPACEs}$ ${2 SPACEs}$ $$ $ $
    $ ${2 SPACEs}$ $$ $"
410 MN$(2)="{CTRL 6}$ ${3 SPACEs}${2 SPACEs}${3 SPACEs}
    ${3 SPACEs}${3 SPACEs}$ ${2 SPACEs}${2 SPACEs}$"
420 MN$(1)="{CTRL 6}${5 SPACEs}${6 SPACEs}${7 SPACEs}${
    7 SPACEs}$"
430 HO$(3)=" {9 CRSR RTs} {9 CRSR RTs} "
440 HO$(2)=" {8 CRSR RTs}{2 SPACEs}{9 CRSR RTs} "
450 HO$(1)=" {8 CRSR RTs}{3 SPACEs}{8 CRSR RTs} "
460 HO$(4)="{10 CRSR RTs} {9 CRSR RTs} "
470 HO$(5)="{10 CRSR RTs} {9 CRSR RTs}"
480 RETURN
490 POKEOT,SP:POKEOM,SP:POKEME,SP:POKEET,SP:RETURN
500 PRINT"{HOME}{CRSR DN}";
510 FORI=1TO11:PRINT"{COMD 4}{CTRL 9}{40 SHFT Qs}{CTRL
    0}":NEXT
520 PRINT"{CTRL 9}{40 SHFT Qs}{CTRL 0}{HOME}"
530 FORI=4TO22STEP2
540 PRINTLEFT$(DN$,I)LEFT$(OV$,RND(0)*17+1)HO$(SK):NEXT
550 FORI=3TO23STEP2
560 PRINTLEFT$(DN$,I)LEFT$(OV$,RND(0)*8+1)MN$(SK):NEXT
570 PRINT"{HOME}{COMD 4}{CTRL 8}SCORE{8 SPACEs}"TAB(17)
    "LIVES"TAB(33)"SKILL{CTRL 0}"
580 RETURN
590 MD=MD+1:IFMD=38THENMD=0
600 ET=1464+MD:ME=1466+MD:POKEOT,32:POKEET+CD,14:POKEET
    ,90+(MEAND1)
610 POKEOM,32:POKEME,59+(MDAND3):POKEME+CD,1
620 OM=ME:OT=ET:FORI=1TO60:NEXT
630 RETURN
640 IFSC>=BNTHENIFNL=0THENPOKENW,33:NL=1:LV=LV+1
650 PRINT"{HOME}{COMD 8}"TAB(5)SC" {2 CRSR LFs} ";TAB(2
    2)LV;TAB(38)SK
660 IFLV<>0THENRETURN
670 POKEOT,SP:POKEET,E:POKEET+CD,3:SYS49287:GOSUB820:PR
    INT"{SHFT CLR}";
680 G$=STR$(SC):GS=LEN(G$)-1:GS=(40-4*GS)/2
690 PRINT"{COMD 1}{2 CRSR DNs}"DW$LEFT$(OV$,GS-1);:GOSU
    B1530:PRINTDW$"{CTRL 6}"
700 IFSC>HSTHENHS=SC:GOSUB770:GOTO720
710 G$="{7 SPACEs}WHOOPS!":GOSUB1530:PRINTDW$
```

(Listing continued on p. 167)

cation 1 to "bank out" (switch out) I/O memory and switch in the ROM, so it can be read. Be sure, therefore, to get these five lines correct. If the rest of the data is not correct, the characters will not be correct, but the program will not bomb.

Also note that line 70 must be set for either tape or disk, and if you are using a tape machine, you *must* have the Taxman game program as the next program on tape after the Tax Loader. You might even want to put two copies of the program after the loader, in case the recorder misses the first one.

You should also be careful with the data in the game program, since most of it is for machine language routines and could cause the 64 to crash if you don't enter it properly. I won't try to explain the program in detail, but will give you a brief description of what each section does.

Line by Line

Line 0 correctly sets the end-of-program pointers after you've loaded the loader program and run the game program.

Lines 10–180 set up variables, print the title and read and Poke in the data for the machine language routines that are used.

Lines 190–360 make up the play loop.

Lines 370–480 set up the strings that put the money and the "holes" on the screen.

Lines 490–580 print the play screen for each level of play.

Lines 590–630 animate the characters on the screen.

Lines 640–790 update the score, check for end of game, check for "bonus life" and display the score at the end of the game.

Lines 800–810 determine the skill level at which you start.

Lines 820–830 initialize the SID chip.

Lines 840–1100 are the data for the machine language routines.

Lines 1110–1520 are the strings that contain the large alphabet.

Lines 1530–1540 print the large letters from G$.

Lines 1560–1580 play the opening fanfare.

If you don't have the time or inclination to do the typing, I'll send you both the loader and game programs on tape for $5, or on disk for $8. I hope you enjoy beating the Taxman! R

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DATAFILE

If you want to computerize all those records you have to keep track of, here's a dandy database program that will give you information in a jiffy. (The first of two parts.)

BY MIKE KONSHAK

A database is one of the more practical and useful programs that a computer owner can have. Information storage has always been one of the major areas of emphasis in the computer industry, and for the personal computerist there are many applications, particularly in maintaining files such as family records, Christmas card lists, recipe files, inventories of personal possessions and anything else you might want to keep track of in a handy and organized manner.

Databases take many forms and may be programmed in several ways according to your needs and the extent of the data to be organized and stored. Databases normally require some type of mass storage device, such as a tape or disk drive that will keep the records for later processing.

Printers are also a major peripheral used with databases. They produce the hardcopy reports without which the accumulation of records would be extremely hard to analyze. After all, what good is the computer without output?

Relative Records

A database is essentially a program that creates a program that collects and processes records according to your wishes and needs. It consists of records and fields. A record is basically a collection of information in the

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form of fields, each one containing information unique to that record. All records in a particular database have the same number of fields containing the same types of information.

For example, consider the following database, containing a list of family members and friends with their birthdays and gift preferences:

DATABASE:Birthdays

1. Name: Mike K.
   Born: 05-28-47
   Likes: Computers

2. Name: Becky K.
   Born: 06-27-58
   Likes: Clothes

3. Name: Sarah K.
   Born: 09-10-75
   Likes: Drawing

4. Name: George S.
   Born: 07-03-50
   Likes: Wine

5. Name: Leslie Z.
   Born: 01-18-43
   Likes: Books

In this database, called Birthdays, there are currently five records. Each record contains three fields, entitled Name, Born and Likes. The information in each field is the actual data that's being recorded and organized. Such data is sometimes called an item.

As you can see, the data is not listed in any particular sequence or order. One of the features of a database program is the ability to manipulate or sort records in alphanumeric sequence, according to a particular field. Obvious sorts would be into lists by name or by birthday. In this way you'd be able to print out a list of records in any convenient order.

For example, if a sort were performed on the first field (Name), the order of the records would be 2-4-5-1-3. Notice that the sort was keyed from the first name, not the initial of the last name. Sorts always start with the leftmost words and characters. If the key field was Born, the order would be 5-1-2-4-3. Notice that this sort is determined by the first numeric character, which happens to be the month, not the year.

Main Database Features

Features found in most databases include:

- ADD additional records.
- MODIFY existing records.
- DELETE records from database.
- SORT records by field.
- LIST records on the screen.
- PRINT list of records on the printer.
- SEARCH for one or more similar records.

When the Print feature is chosen, you typically have the ability to format the list of records in various forms and arrangements. Mailing labels and reports are examples of common uses. Reports typically have headings at the top of the page, with the data items listed in columns below the headings.

Not every field of a record needs to be printed if the information in some fields is not useful for the report. You normally design the format for a particular report or type of mailing label and save it on disk for later use. You usually store formats separately from the information in the database.

The records in a database are normally stored on disk. Tape drives are also used, but are very slow, especially when dealing with a large number of records. Tape drives always store the database in the form of a sequential file, while disk-based systems can store the records in either a sequential or a relative file.

Sequential files involve loading the entire database from the disk into the computer's memory. You then manipulate the records, and the information is printed out while the memory contains the database. When you've completed all desired operations, the updated database is saved back to the disk. You normally scratch the old information before saving the new.

Sequential files loaded into memory allow very fast operations on the data. The major drawback is that the computer's memory capacity limits the size of the database or the number of records. It's very important to keep the number of fields in a record small, as well as to keep the length of the items in each field to a minimum. This will allow the maximum number of records.

In contrast to sequential files, relative files store data in specified disk areas called sectors. You can access and manipulate each record without affecting other records. Since you can only perform operations directly on the disk, instead of in memory, these systems may be very slow, especially when you perform sorting operations.

Printing operations pull the data directly from the disk one record at a time. This also takes longer than it would with a memory-based system. The main advantage of relative files is that the database can store over three times as many records as a memory system.

Another advantage is that you can develop a more complex and extensive database program, since memory space is not needed for loading records. Relative file systems can add features such as mathematical calculations of records, graphics routines to plot out data and screen formatting to aid in entering data.

Datafile Description

Datafile is a memory-based, multiple-program database system for the Commodore 64. It utilizes sequential files on a 1541 disk drive, and any ASCII or Commodore printer. I chose a memory-controlled system because most home users of personal computers don't need a large number of records. Also, you could probably better use the time spent in front of the computer for more recreational activities, like programming, than in waiting for a disk-based system to perform, especially when using the slow 1541.

Datafile allows you to create your own database, choosing the number and length of fields, as well as their titles. The program will calculate the maximum number of records that can be retained in memory according to the criteria you established. After you've created a database and added records, you can perform standard operations on the data and save to disk or print out the results in various formats.

Datafile uses several techniques to save time and memory space. The main Basic program, Datafile, is typically loaded first at the beginning of RAM. When run, the program establishes the existence of every variable that Datafile and its subprograms will use, by setting each variable to a dummy value.

String variables are set to a null [A$=CHR$(0)] or some value pertinent to the program, and floating point and integer variables are assigned a val-

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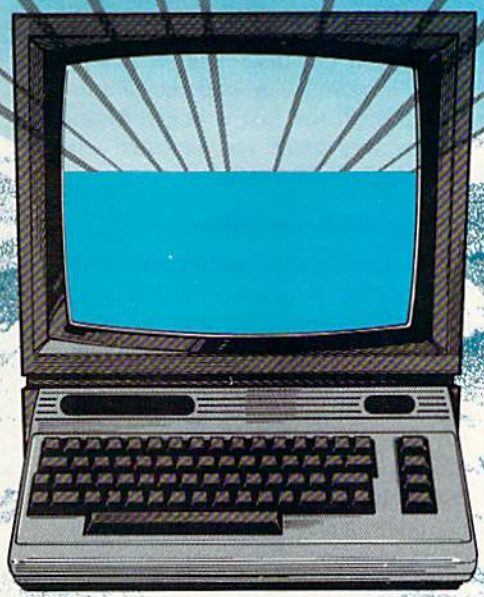

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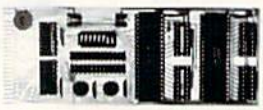

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ue of zero [A=0]. Finally, whether a file of data is created at the start of the program or by loading an existing file, the arrays are dimensioned last. This has a two-fold purpose. It allows programs to load other programs and also minimizes the time the computer has to spend managing the memory.

The main program can load other subprograms from the disk, removing itself from memory to allow room for the new program in the same memory cells. The new program will then be able to use the same variable values and data which were set and retained during the operation of the first program.

This only works as long as the second program is smaller in memory requirements than the first. The second program, however, can load the *first* one, even though the first is larger, because the memory space was allocated when Datafile first was loaded.

Garbage Collection Time

The Commodore architecture is such that as the program encounters variables during execution and, except for strings, gives them values, those values are stored directly above the Basic program. When an array is dimensioned, the computer will assign the empty cells directly above the variable values to array data.

Consequently, as the computer encounters a new variable that it has not seen before, it will start shoving the array higher up in memory, cell by cell, until enough room is available for the new variable. (Evidently, variables get lonely if they're not together.)

After the arrays, strings are stored. Basic has a nasty habit of reappropriating memory space that's holding strings, in order to free up the memory for possible future needs. This procedure, called garbage collection, is normally invoked when the Basic statement FRE(0) is in use. Garbage collection takes time, especially when dealing with large arrays consisting of strings, such as those created by Datafile.

It's possible to lose control of your computer for several minutes when this happens, and it will occur every time another new variable comes along. I advise you to keep this in mind when programming with arrays. It's best to keep the number of variables to a minimum and to predefine them before dimensioning arrays.

As just mentioned, the program retains all the record data inside memory, even though programs are being removed and replaced with other programs. The subprograms perform operations and manipulate the record data as utilities serving the main program. If the routines and services provided by the subprograms DFReport and DFMail were combined with Datafile into one large program, there would be less space left for records.

The Subprograms

The following is a brief description of the function of each of the subprograms. (Note: For reasons of space, the subprograms DFReport and DFMail will appear next month, along with a detailed description of each.)

The Datafile main program creates the database, defining the number of fields per record, the titles and lengths of fields, and the number of possible records, based on how the fields were set up. Datafile also sorts the fields in alphanumerical order, depending on which field is chosen.

Datafile also acts as the controlling program for disk-related operations, such as loading (reading) and saving (writing) datafiles, formatting blank disks, reading the directory and choosing which subprograms to advance to.

The DFMail subprogram is designed to print mailing labels and has the capacity to determine which fields will be printed on which lines of the label. DFMail prints on any single-row, tractor-feed labels, and can adjust the number of lines per label and the number of characters per line.

Once the label's format is designed and saved for future use (in special format files), you have the ability to search through the datafiles for selected records with common fields (e.g., Name=Smith) or to print the entire datafile. In other words, you can pick and choose as you like.

The DFReport subprogram is designed to print reports on the Commodore 1525E or MPS801 printer, as well as any ASCII-type printer with suitable interface. DFReport has been tested satisfactorily on Okidata, Epson and Gemini dot-matrix printers, as well as on the Brother daisywheel typewriter/printer. A Cardco interface was used with all of the above hardware.

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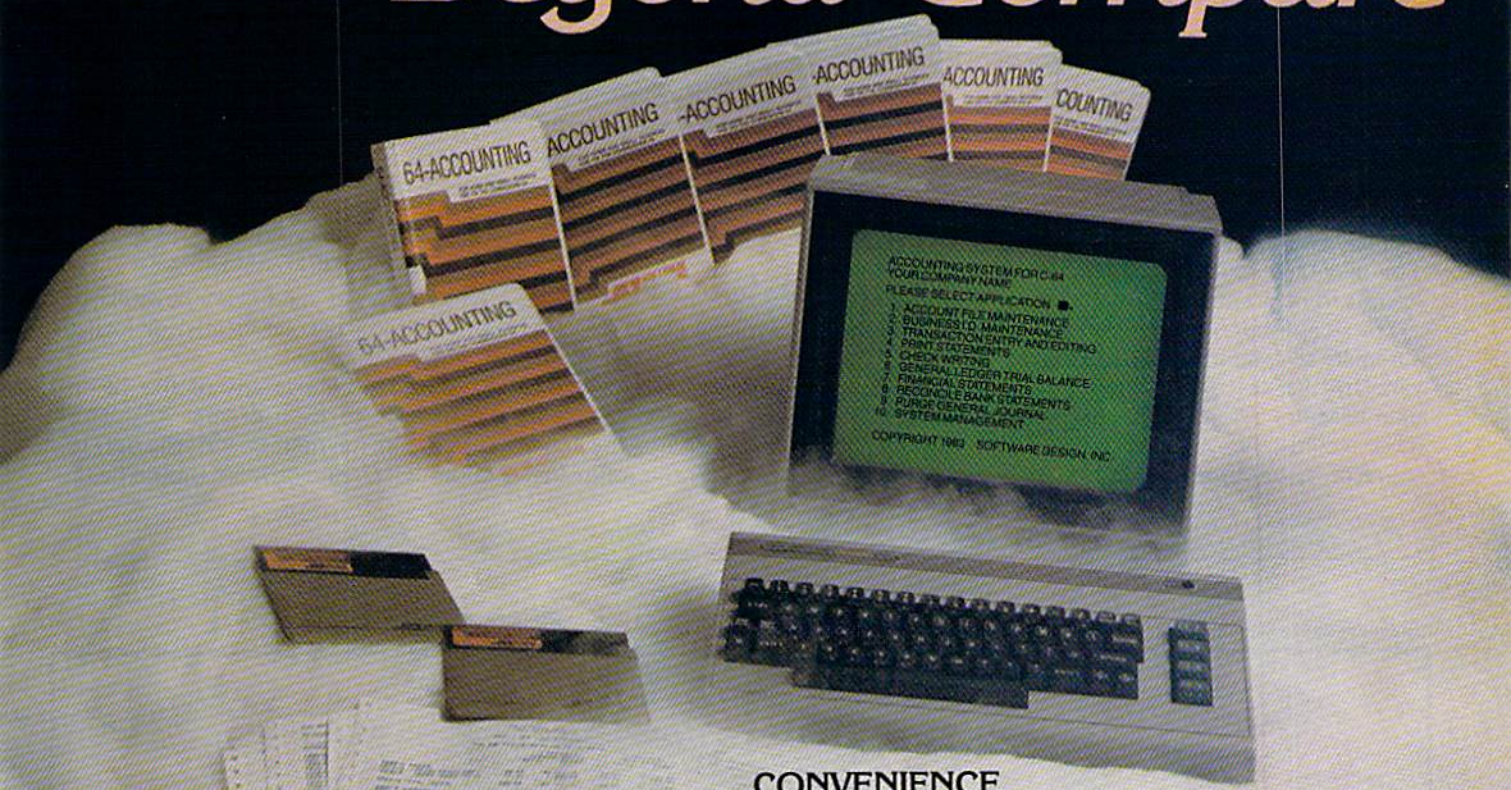
64 Software Beyond Compare



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You have the capability to format the report in order to present the records in the way best suited to your needs. You can save the format for recall when another report must be printed. You can print up to 136 characters across the page, depending on the capacity of your printer. The Commodore printers will only print reports up to an 80-character width.

A title consisting of four lines will be centered at the top of the page, followed by column headings. You can define up to eight columns with the width and location of each. You can also define the column titles, although these normally have the same names as the record fields that will be printed below the headings. You may then search selectively for the records to be printed in the columns.

For long reports, the printer will automatically number the page, advance to the next page, and print column headings before beginning to print more records. For a faster printout of the records, a nonformatted print utility is provided that lists each record and every field within the record in rows instead of columns. This printout can be cut and pasted on 3 × 5 cards.

All the above programs save datafiles or format files under special names that can be loaded only by the program that saved the file. In many cases the name given to the original datafile when the database was created will also be used as a reference on format files created by DFReport and DFMail. This feature helps you keep track of which format went with which datafile. Consequently, Datafile, DFReport and DFMail could each have a file named Xmas Mail, but would load only their respective file.

Datafile Instructions

You begin by typing LOAD"DATAFILE",8 <RETURN>. When the disk drive stops running, type RUN <RETURN>.

The screen then displays the main menu, which resembles the following. (Text or letters surrounded by brackets denote reversed video characters, normally identifying a key to be pressed.)

```
[ DATAFILE MENU ]

[C]REATE NEW FILE
[A]DD RECORD TO CURRENT FILE
[M]ODIFY RECORD IN CURRENT FILE
[D]ELETE RECORD IN CURRENT FILE
[R]EAD OLD FILE FROM DISK
[P]RINT RECORDS BY SELECTION
[V]IEW FILE ON SCREEN
[S]ORT RECORDS BY FIELD
[W]RITE NEW FILE TO DISK
[F]ORMAT DISK
[$] DISK DIRECTORY
[Q]UIT PROGRAM
[ PRESS THE APPROPRIATE KEY ]
THERE ARE 0 RECORDS IN MEMORY
SPACE FOR 0 MORE RECORDS
```

(Note: The last line will not be displayed until a file has been created or loaded from disk.)

You can choose any of the 12 options by pressing the key that represents the first letter of the option, although Create or Read should be the

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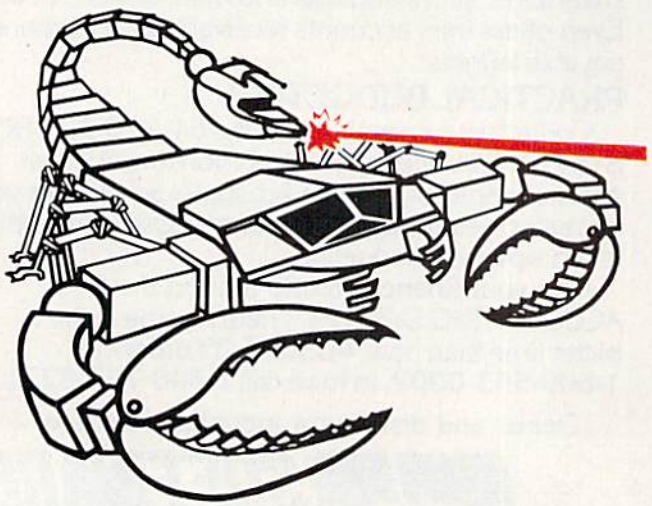

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It's a good idea to create a small database first, in order to become familiar with the operation of the Datafile program.

first one chosen when you begin. The program will jump to the respective subroutine without your having to press the return key. When a particular subroutine has completed its chores, it will always return to this menu.

It's a good idea to create a small database at first, in order to become familiar with Datafile. Don't put too much effort into the first go-around. Experiment a bit to check out the program's capabilities. The following is a step-by-step description of what to expect when you select options from the main menu.

Create New File

Try to maximize the available memory space by keeping the number of fields and the lengths of the names to a minimum. The lengths of the fields should always be restricted to less than 75 characters.

Here's a practice file, which we'll call Names and Ages. It will have two fields, the first one to be called Name, and the second one Age. We'll only be putting first names in our database, so a length of ten characters for field 1 should be adequate. We will be putting the person's age in field 2, so two characters should suffice. Press the return key after every prompt. The program continues with:

```
HOW MANY FIELDS IN EACH RECORD? 2

FIELD#1
TITLE? NAME
LENGTH? 10

FIELD#2
TITLE? AGE
LENGTH? 2
```

The computer will then calculate as closely as possible the number of records that can be stored:

```
YOUR SELECTIONS WILL ALLOW 1110
MAX RECORDS. [A]CCEPT OR [R]EJECT?
```

Press A. If R is pressed, the program will return to the point where you are asked for the number of fields in each record. This gives you the chance to change the fields in case you didn't get as many records as you were expecting.

If you press A, the main menu should appear, and the bottom line should tell you again how many records the memory can hold. This will decrease by one every time you add a new record.

Add Record to Current File

After pressing A on the main menu, the screen displays:

```
PRESS THE [RETURN] KEY AFTER EACH
  ENTRY
PRESS [RETURN] WITHOUT ANY ENTRY
  TO STOP

[RECORD NUMBER 1]

NAME? MIKE
AGE? 36
```

Now type in about ten records so you'll have something to play with. If you try to enter into any field more characters than that field was initialized for, you'll receive an error message. You will notice the dummy character behind each input statement. This is used to reserve the space while the computer is writing the sequential file to the disk.

You stop adding records by pressing the return key without making an entry in the first field. This doesn't work on succeeding fields because it's assumed there's some data there that needs to be saved. This also allows you to fill in blanks later if information is unknown at the time.

It's important to note that Datafile uses Input statements that do not allow the use of quotation marks, commas, semicolons or colons as part of data in the fields. All other alphanumeric characters are acceptable.

Modify Record in Current File

If you press M, you will see:

```
MODIFY WHICH RECORD? ENTER [#]
  OR [A]LL
?
```

If you want to change just one particular record, enter the number of the record (try 1), then press the return key. Pressing A will display all the records in the file one at a time. Pressing 1 brings this to the screen:

```
TO MODIFY RECORD NUMBER 1, MAKE
  CHANGES AS EACH FIELD IS
  DISPLAYED, THEN [RETURN]

NAME? MIKE
AGE? 36
```

As you can see, this format is similar to the Add operation, except that the data is preprinted for you on the screen. Press the return key once, accepting the

Listing of Datafile main program. *Subprograms will appear next month.*

```
1Ø REM DATAFILE 2.6          BY MIKE KONSHAK
12 POKE5328Ø,13:POKE53281,11:PRINT"{CTRL 8}":GOSUB16:IF
   X=ØTHENGOTO66
14 GOTO68
16 D$=CHR$(Ø):MR$=D$:DR$=D$:S=Ø:B1$=CHR$(1Ø):PW=Ø:CW=Ø:
   B$=CHR$(32)
18 NC=Ø:NL=Ø:PG=Ø:F1=Ø:F2=Ø:F3=Ø:L$=D$:RL=Ø:SB$=D$:CR$=
   CHR$(13):HN$=D$:ID$=D$
2Ø A$=D$:C$=D$:T%=Ø:I$=D$:CK=Ø:I=Ø:J=Ø:K=Ø:L=Ø:M=Ø:N=Ø:
   RW=5:SF=Ø:Z=Ø:E$="EOF"
22 MEM=31ØØØ:EN=Ø:EM$=D$:ET=Ø:ES=Ø:A1$=D$:A2$=D$:A3$=D$
   :RETURN
24 DIM F$(F+1),T%(F+1),L%(F+1):RETURN
26 DIM REC$(R+1,F+1),ML$(9,4),PC(1Ø),TT$(5),HC$(9),K%(R
   +1):RETURN
28 REM--GET
3Ø GETA$:IFA$=""THEN3Ø
32 RETURN                                    →
```


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name, then update the age by typing over the 36 with a 37; press the return key.

The main menu should reappear again. If the entire file is going to be modified, holding the return key down will scroll through the data. It is best, though, to find the record you want with the View function.

Delete Record in Current File

Pressing D gives you:

```
DELETE WHICH RECORD? ENTER [#] OR
  [A]LL
?
```

Don't be afraid to press A on this one. Records will not be deleted unless you've given the go-ahead to do so first. For this example, enter 1, then press the return key, which displays:

```
TO DELETE RECORD NUMBER 1, PRESS
  [SHIFT] [D], PRESS [SPACE BAR] TO
  ADVANCE
```

The entire record is displayed so that you'll be aware of the total contents of the record before you try to delete it. If you want to delete the record, hold the shift key down while you press the D key.

The total number of records in the file will be decreased by one, and all the records after the one you deleted will be renumbered accordingly. If you decide not to delete the record after all, just press the space bar and it will advance you to the next record or bring you back to the main menu. Remember to save your revised file.

Read Old File from Disk

This utility is normally performed at the start of Datafile to load a previously stored file. The program prompts with:

```
ENTER NAME OF FILE TO BE LOADED
?
```

Type in the name of the datafile and press the return key. The file will load and you'll return to the main program. If the return key is pressed without a file-name present, the program will also exit safely back to the main program.

Print Records by Selection

This utility advances you to another menu, designed to load subprograms that will actually perform the printing operations. If no records are present in

Listing continued.

```
 34 REM--CREATE
 36 IFCK<>ØTHENGOSUB394
 38 PRINT"{SHFT CLR} {CTRL 9}{9 SPACEs}INITIALIZE DATAFI
    LE{1Ø SPACEs}"
 4Ø CLR:GOSUB16:INPUT"{CRSR DN}HOW MANY FIELDS IN EACH R
    ECORD? Ø {4 CRSR LFs}";F:IFF=ØTHEN68
 42 GOSUB24:FORI=1TOF
 44 PRINT"{HOME}{4 CRSR DNs}{CTRL 9}FIELD #";I:PRINT"{CR
    SR DN}TITLE ?{29 SPACEs}"
 46 PRINT"LENGTH?{29 SPACEs}{HOME}"
 48 PRINT"{5 CRSR DNs}";TAB(6);:INPUTF$(I):PRINTTAB(6);:
    INPUTL%(I):NEXTI
 5Ø REM--COMPUTE # RECORDS
 52 FORJ=ØTOF:RL=RL+L%(J):NEXTJ:RL=RL+3*(F+1)+5:R=INT((M
    EM-12*(F+1)-21ØØ)/RL)
 54 PRINT"{CRSR DN} YOUR SELECTIONS WILL ALLOW APPROX"
 56 PRINTR;"RECORDS.{2 SPACEs}{CTRL 9}A{CTRL Ø}CCEPT OR
    {CTRL 9}R{CTRL Ø}EJECT?"
 58 GOSUB3Ø:IFA$="R"THEN38
 6Ø IFA$="A"THENGOSUB26:CK=1:GOTO68
 62 GOTO58
 64 REM--MENU
 66 PRINT"{SHFT CLR} {CTRL 9} DATAFILE 2.6 (C)1983 BY MI
    KE KONSHAK ":GOTO7Ø
 68 PRINT"{SHFT CLR} {CTRL 9}{11 SPACEs}DATAFILE MENU{14
     SPACEs}"
 7Ø PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}C{CTRL Ø}REATE NEW
    FILE{2 SPACEs}{CTRL 9}Q{CTRL Ø}UIT PROGRAM
 72 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}A{CTRL Ø}DD RECORD
    TO CURRENT FILE"
 74 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}M{CTRL Ø}ODIFY RECO
    RD IN CURRENT FILE"
 76 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}D{CTRL Ø}ELETE RECO
    RD IN CURRENT FILE"
 78 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}R{CTRL Ø}EAD OLD FI
    LE FROM DISK"
 8Ø PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}P{CTRL Ø}RINT RECOR
    DS BY SELECTION
 82 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}V{CTRL Ø}IEW FILE O
    N SCREEN
 84 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}S{CTRL Ø}ORT RECORD
    S BY FIELD
 86 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}W{CTRL Ø}RITE NEW F
    ILE TO DISK
 88 PRINT"{CRSR DN}{5 SPACEs}{CTRL 9}F{CTRL Ø}ORMAT A DI
    SK{2 SPACEs}{CTRL 9}${CTRL Ø} DISK DIRECTORY
 9Ø PRINT"{CRSR DN} {CTRL 9}{6 SPACEs}PRESS THE APPROPRI
    ATE KEY{7 SPACEs}"
 92 PRINT"{2 SPACEs}THERE ARE";X;"RECORDS IN MEMORY"
 94 IFR>ØTHENPRINT"{2 SPACEs}SPACE FOR";R-X;"MORE RECORD
    S{CRSR UP}"
 96 GOSUB3Ø:IFA$="A"THENGOSUB35Ø:GOTO124
 98 IFA$="M"THENGOSUB35Ø:GOTO244
 1ØØ IFA$="D"THENGOSUB35Ø:GOTO272
 1Ø2 IFA$="C"THEN36
 1Ø4 IFA$="R"THEN170
 1Ø6 IFA$="P"THENGOSUB354:GOTO356
 1Ø8 IFA$="V"THENGOSUB35Ø:GOTO192
 11Ø IFA$="W"THENGOSUB35Ø:GOTO144
 112 IFA$="S"THENGOSUB35Ø:GOTO3Ø4
 114 IFA$="Q"THEN342
 116 IFA$="F"THEN4Ø2
 118 IFA$="$"THEN422
 12Ø GOTO96
 122 REM--ADD RECORDS
```

→

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memory, you'll be directed back to the main menu.

```
[ PRINTER MAIN MENU ]

PRINT RECORDS USING:

[R]EPORTS AND LISTS
[M]AILING LABELS
[U]SER DEFINED SUBPROGRAM
[E]XIT TO MAIN MENU

[ PRESS THE APPROPRIATE KEY ]
```

E returns the program to the main menu, R loads up DFReport and M will load DFMail. Pressing U results in:

```
ENTER NAME OF SUBPROGRAM
?
```

Here you can load up programs that might perform other operations on your data that Datafile does not provide. Not entering any filename at all will get you back to the printer menu.

User-Defined Subprogram serves to load a program that you might write to enhance your particular datafile. One example might be a program that adds up all the numeric values in one field of a datafile. This could, for example, be a field that holds the current value for household inventory items, giving you quickly the total value for insurance purposes.

Many variations are possible. You will have to study the program listings to find the variable names required to get the correct data. More on this later.

View File on Screen

Entering this routine displays the first record in the datafile with the following commands below the record:

```
[RECORD NUMBER 1] IN FILE (name of
  datafile)

(Record Data)

[N]EXT, [L]AST, [J]UMP, [F]IND, [E]XIT
```

Pressing N causes the screen to step to the next record. You can walk through your entire datafile, one record at a time, up to your end record with this command. L steps you backwards, decrementing each record number by one, to previous records.

J allows you to jump directly to a particular record number, instead of stepping one by one. You'll be asked for the record number; then enter your choice and press the return key.

F is a search function that allows you to find record fields that share common items or data. The screen displays a list of the field names of the current datafile, then asks you to enter the number of the field you wish to search. The field name is then displayed and you're asked to ENTER [COMMON ITEM]. Enter the string of text that is to be searched and press the return key.

For example, if you chose a field which was named First Name, you might enter the string JIM. The computer will search out all records that begin with JIM in the First Name field.

Not only would JIM come up, but JIMMY would also be displayed because it begins with JIM. Entering A would cause a search of all strings in a particular field that began with A and so on. Press N to continue to the next record in the search.

Sort Records by Field

The field names will be displayed, each preceded by a number, and the list will be followed by a prompt:

```
WHICH FIELD IS TO BE SORTED?
```

Entering one of the numbers shown, followed by RETURN, will send the computer off to sort out that particular field in ascending alphanumerical order. The computer will tell you how it's doing during the process by flashing the number of the record it's currently working on.

Datafile uses a Shell-Metzler sort routine. All the data items entered into Datafile are stored as string values in the arrays, whether the value is in the form of alphabetical characters or numbers. Therefore, here is a point to consider in the sorting of string variables that are numbers: The first number encountered will be considered the first character used for comparing against another number.

Given the numbers 2000, 35 and 156, the sort routine will compare the 2 in 2000 with the 3 in 35 and the 1 in 156. The result will be shown as the sequence 156, 2000 and 35.

This is obviously not the intention.

Listing continued.

```
 124 FORI=X+1TOR:PRINT"{SHFT CLR}{CRSR DN}PRESS THE {CTR
     L 9}RETURN{CTRL Ø} KEY AFTER EACH ENTRY{CRSR DN}"
 126 PRINT"PRESS {CTRL 9}RETURN{CTRL Ø} WITHOUT ANY ENTR
     Y TO STOP{2 CRSR DNs}"
 128 PRINT"{CTRL 9}RECORD NUMBER ";I;"{CRSR DN}"
 13Ø FORN=1TOF
 132 PRINTF$(N);"{3 SPACEs}>{3 CRSR LFs}";:INPUTREC$(I,N
     ):IFREC$(I,N)=""THENREC$(I,N)=">"
 134 IFLEN(REC$(I,N))>L%(N)THENGOSUB14Ø:GOTO132
 136 IFREC$(I,1)=">"THEN X=I-1:CK=1:GOTO68
 138 NEXTN:K%(I)=I:NEXTI:X=R:CK=1:GOTO68
 14Ø PRINT"CANNOT EXCEED{CTRL 9}";L%(N);" CHARACTERS":RE
     TURN
 142 REM--SAVE
 144 PRINT"{SHFT CLR}{CRSR DN}ENTER NAME OF CURRENT FILE
      TO BE SAVED"
 146 PRINT"(12 CHARACTERS MAX).{2 SPACEs}ANY EXISTING FI
     LE"
 148 PRINT"WITH THE SAME NAME WILL BE SCRATCHED.{2 CRSR
     DNs}"
 15Ø PRINT"{2 SPACEs}";NF$:INPUT"{CRSR UP}";NF$:IFNF$=""
     THEN68
 152 OPEN15,8,15:PRINT#15,"SØ:DF] "+LEFT$(NF$,8)+"!OLD":
     GOSUB414
 154 PRINT#15,"RØ:DF] "+LEFT$(NF$,8)+"!OLD=DF] "+NF$:GOS
     UB414
 156 OPEN5,8,5,"Ø:DF] "+NF$+",S,W":GOSUB414
 158 PRINT#5,R;CR$;F;CR$;X:GOSUB414:FORN=1TOF:PRINT#5,F$
     (N);CR$;L%(N):NEXTN
 16Ø FORI=1TOX:PRINT"{CRSR DN}SAVING RECORD #";I;"{2 CRS
     R UPs}"
 162 FORN=1TOF:PRINT#5,REC$(I,N):NEXTN:GOSUB414:NEXTI:PR
     INT
 164 FORI=1TOX:PRINT"{CRSR DN}SAVING POINTERS";I;"{2 CRS
     R UPs}":PRINT#5,K%(I):NEXTI:GOSUB414
 166 PRINT#5,E$:CLOSE5:CLOSE15:CK=Ø:GOTO68
```


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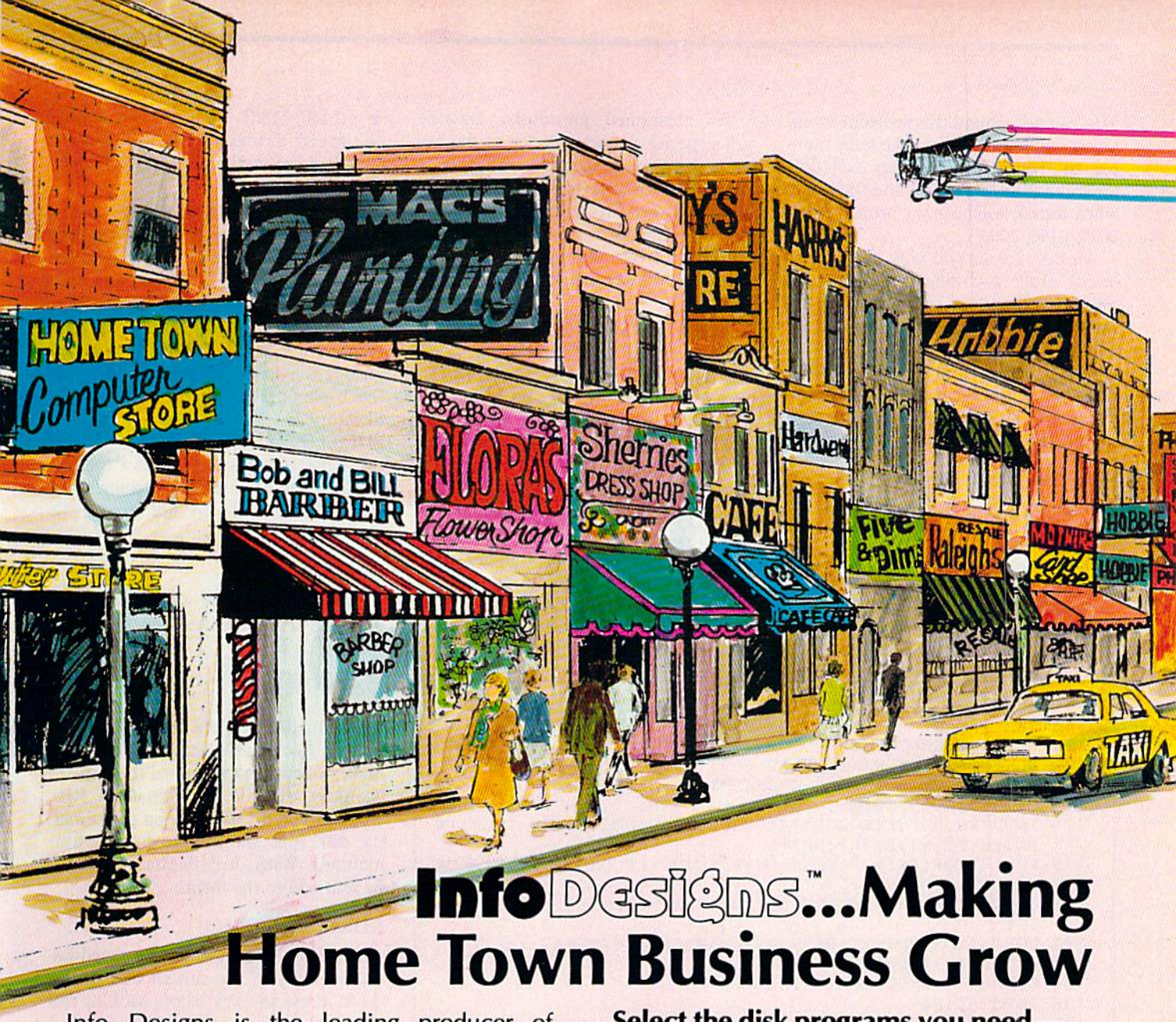

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You can get around this problem by entering numbers that have the same number of digits. The numbers will now look like this: 2000, 0035 and 0156, and when sorted, will be in the proper order: 0035, 0156, 2000.

All the records will now be in a different order according to the chosen field. If you want to keep the file in this order you must write it back onto the disk.

(Note: Any desired sorting should be done before advancing to the Print subprograms. There is no facility for sorting the records in those programs.)

Write New File to Disk

Entering this routine produces this display:

```
ENTER NAME OF CURRENT FILE TO BE
  SAVED (12 CHARACTERS MAX). ANY
  EXISTING FILE WITH THE SAME NAME
  WILL BE SCRATCHED
?
```

As mentioned previously, Datafile adds special character codes to the beginning of your datafiles and format files. This ensures that programs will load their own files and allow the multiple use of the same filenames.

Writing your current datafile onto the disk invokes the following operations:

- Datafile Mail List was read into memory from the disk. It appears on the disk directory as DF] MAIL LIST.
- The current file has been updated and the file is entered, for writing the file to the disk, exactly as the name that it was read from, MAIL LIST.
- The program will change the name of the last file on the directory named DF] MAIL LIST to DF] MAIL LIS!OLD. Notice that the last four characters in the 16-character filename will be replaced with !OLD.
- The current updated file will then be saved as DF] MAIL LIST.
- If DF] MAIL LIS!OLD was already on the disk directory, that file would be scratched before the MAIL LIST file is renamed.

In essence, Datafile always keeps your current datafile as well as your last datafile. This gives you the opportunity to recapture the last version of your data. If you desire to load the last version from the Read Old File on the menu, enter MAIL LIS!OLD. Do *not* include the special characters shown at the beginning of the filename on the directory.

If for some reason you desire to keep the !OLD files, you must give them a new name to keep from scratching them later. (Remember, do not exceed 12 characters.)

Format a Disk

This feature allows you to format a blank disk for use later on in saving files.

```
[DISK NAME,ID]?
```

Insert a disk into the disk drive. Enter up to a 16-character header for the disk name, followed by a comma, then a two-character disk ID, and finally a RETURN. The drive will begin to format the disk (this takes approximately 3½ minutes). When it is finished, you will be returned to the menu.

$ Disk Directory

Pressing the shift and 4 keys will list the directory of the current disk in the drive. Press any key to get back to the menu.

Quit Program

This command makes a clean exit out of the program. It closes all the files, performs a housekeeping function and lets you know if you've forgotten to save your current file. Any modifications to a file will trigger a flag that will prevent you from immediately leaving the program.

If you don't want to type in the listings, send me your name and address and $8, and I'll be glad to send you, postage paid, a disk with Datafile, DFMail and DFReport. R

Listing continued.

```
168 REM--LOAD
170 IFCK<>0THENGOSUB394
172 CLR:GOSUB16:PRINT"{SHFT CLR}{CRSR DN}ENTER NAME OF
    FILE TO BE LOADED{2 CRSR DNs}":INPUTNF$
174 OPEN15,8,15:OPEN5,8,5,"0:DF] "+NF$+",S,R":GOSUB414
176 INPUT#5,R,F,X:GOSUB414:GOSUB24:GOSUB26:FORN=1TOF:IN
    PUT#5,F$(N),L%(N):NEXTN
178 FORI=1TOX:PRINT"{CRSR DN}READING RECORD #";I;"{2 CR
    SR UPs}"
180 FORN=1TOF:INPUT#5,REC$(I,N):NEXTN:GOSUB414:NEXTI:PR
    INT
182 FORI=1TOX:PRINT"{CRSR DN}READING POINTERS";I;"{2 CR
    SR UPs}":INPUT#5,K%(I):NEXTI
184 GOSUB414:S=ST:IFS<>0THEN188
186 INPUT#5,E$
188 CLOSE5:CLOSE15:GOTO68
190 REM--VIEW
192 I=1
194 IFI=0THEN68
196 IFI>XTHEN68
198 PRINT"{SHFT CLR}{2 CRSR DNs}{CTRL 9}RECORD NUMBER{C
    TRL 0}";I;" {CTRL 9}IN FILE{CTRL 0} ";NF$;"{2 CRSR
    DNs}"
200 FORN=1TOF:PRINT F$(N);": {CTRL 9}";REC$(K%(I),N):NE
    XTN
202 PRINT"{CRSR DN} {CTRL 9}N{CTRL 0}EXT, {CTRL 9}L{CTR
    L 0}AST, {CTRL 9}J{CTRL 0}UMP, {CTRL 9}F{CTRL 0}IND
    , {CTRL 9}E{CTRL 0}XIT TO MENU"
204 GOSUB30:IFA$="N"THENI=I+1:GOTO194
206 IFA$="L"THENI=I-1:GOTO194
208 IFA$="J"THEN216
210 IFA$="F"THEN218
212 IFA$="E"THEN68
214 GOTO204
216 INPUT"{CRSR DN}JUMP TO RECORD NUMBER";I:GOTO194
218 PRINT"{SHFT CLR}{4 SPACEs}{CTRL 9}FIND RECORDS WITH
     COMMON ITEMS {CRSR DN}"
```

→

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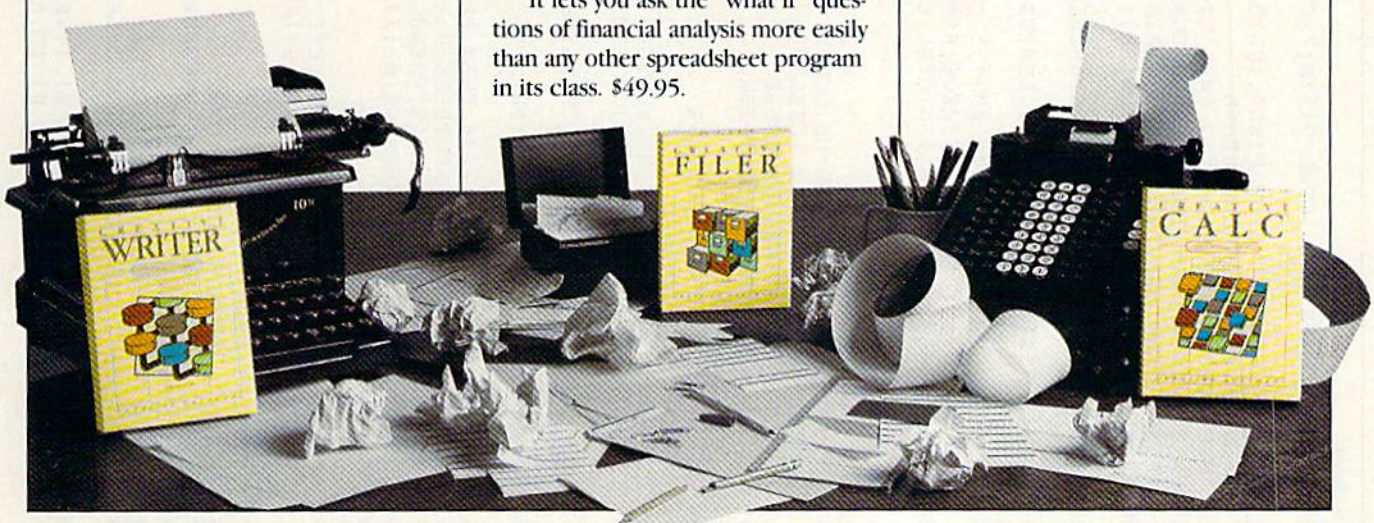

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Listing continued.

```
22Ø FORN=1TOF:PRINT" {CTRL 9}";N;"{CTRL Ø} ";F$(N):NEXT
    N
222 INPUT"{CRSR DN}WHICH FIELD IS TO BE SEARCHED? Ø {4
    CRSR LFs}";SF:IFSF=ØTHEN68
224 IFSF<1ORSF>FTHENPRINT"{3 CRSR UPs}":GOTO222
226 PRINT"{CRSR DN}ENTER {CTRL 9}COMMON ITEM{CTRL Ø} ":
    PRINT"{CRSR DN}(THE ENTIRE STRING IS NOT REQUIRED)"
228 PRINT"{CRSR DN}{CTRL 9}";F$(SF);"{CTRL Ø} ";:INPUTT
    $
23Ø FORI=1TOX:PRINT"{CRSR DN}SEARCHING RECORD";I;"{2 CR
    SR UPs}"
232 IFT$=LEFT$(REC$(K%(I),SF),LEN(T$))THEN236
234 GOTO24Ø
236 PRINT"{SHFT CLR} RECORD #";I;"{CRSR DN}":FORN=1TOF:
    PRINTF$(N);": {CTRL 9}";REC$(K%(I),N):NEXTN
238 PRINT"{CRSR DN} {CTRL 9}N{CTRL Ø}EXT RECORD":GOSUB3
    Ø
24Ø NEXTI:GOTO68
242 REM--MODIFY
244 PRINT"{SHFT CLR}{CRSR DN}MODIFY WHICH RECORD? ENTER
     {CTRL 9}#{CTRL Ø} OR {CTRL 9}A{CTRL Ø}LL{2 CRSR DN
    s}":INPUTMR$:IFMR$=D$THEN68
246 IFMR$="A"THENMR$=D$:GOTO254
248 I=VAL(MR$):MR$=D$
25Ø IFI>XTHENGOSUB348:GOTO244
252 GOSUB256:GOTO68
254 FORI=1TOX:GOSUB256:NEXTI:GOTO68
256 PRINT"{SHFT CLR}{CRSR DN}TO MODIFY RECORD NUMBER";I
    ;", MAKE CHANGES"
258 PRINT"AS EACH FIELD IS DISPLAYED, THEN {CTRL 9}RETU
    RN{CTRL Ø}{CRSR DN}"
26Ø FORN=1TOF:PRINTF$(N)":":PRINT"{3 SPACEs}{CTRL 9}";R
    EC$(K%(I),N)
261 IF LEN(REC$(K%(I),N))>36 THEN PRINT"{CRSR UP}";
262 PRINT"{CRSR UP} ";:INPUTREC$(K%(I),N)
264 IFLEN(REC$(K%(I),N))>L%(N)THENGOSUB14Ø:GOTO26Ø
266 IFREC$(K%(I),N)=""THENREC$(K%(I),N)=">"
268 NEXTN:CK=1:RETURN
27Ø REM--DELETE
272 PRINT"{SHFT CLR}{CRSR DN}DELETE WHICH RECORD? ENTER
     {CTRL 9}#{CTRL Ø} OR {CTRL 9}A{CTRL Ø}LL{2 CRSR DN
    s}"
274 INPUTDR$:IFDR$=D$THEN68
276 IFDR$="A"THENDR$=D$:GOTO282
278 I=VAL(DR$):DR$=D$:IFI>XTHENGOSUB348:GOTO274
28Ø GOSUB284:GOTO68
282 FORI=1TOX:GOSUB284:NEXTI:GOTO68
284 PRINT"{SHFT CLR}{CRSR DN}TO DELETE RECORD NUMBER";I
    ;", PRESS"
286 PRINT"{CTRL 9}SHIFT{CTRL Ø} {CTRL 9}D{CTRL Ø}, PRES
    S {CTRL 9}SPACE BAR{CTRL Ø} TO ADVANCE{CRSR DN}"
288 FORN=1TOF:PRINTF$(N);"{3 SPACEs}{CTRL 9}";REC$(K%(I
    ),N):NEXTN
29Ø GOSUB3Ø:IFA$="{SHFT D}"THEN294:REM SHIFTED D
292 CK=1:RETURN
294 PRINT"{2 CRSR DNs}DELETING RECORD";I:PRINT"{CRSR DN
    }{CTRL 9}RECORDS MAY NOW BE OUT OF ORDER"
296 FORN=1TOF:REC$(K%(I),N)=REC$(X,N):REC$(X,N)="":NEXT
    N
298 FORJ=1TOX:IFK%(J)=XTHENK%(J)=K%(X):K%(X)=Ø:X=X-1:GO
    TO292
3ØØ NEXTJ
3Ø2 REM--SORT
3Ø4 PRINT"{SHFT CLR}{CRSR DN} {CTRL 9}{4 SPACEs}SORT RE
    CORDS IN ASCENDING ORDER{3 SPACEs}{CRSR DN}"
3Ø6 FOR N=1TOF:PRINT" {CTRL 9}";N;"{CTRL Ø} ";F$(N):NEX
    TN
3Ø8 INPUT"{CRSR DN}WHICH FIELD IS TO BE SORTED? Ø {4 CR
    SR LFs}";SF:IFSF=ØTHEN68
31Ø IFSF>F THENPRINT"{3 CRSR UPs}":GOTO3Ø8
312 PRINT"{CRSR DN} {CTRL 9}PLEASE WAIT{CTRL Ø}{CRSR DN
    }":M=X
314 M=INT(M/2):IFM=ØTHENCK=1:GOTO68
316 J=1:K=X-M
318 I=J
32Ø L=I+M
322 PRINT"SORTING{7 SPACEs}{5 CRSR LFs}";I;"{CRSR UP}"
324 IF REC$(K%(I),SF)<=REC$(K%(L),SF) THEN328
326 T%(N)=K%(I):K%(I)=K%(L):K%(L)=T%(N):I=I-M:IFI>ØTHEN
    32Ø
328 J=J+1:IFJ>KTHEN314
33Ø GOTO318
332 REM--QUIT
334 PRINT"{SHFT CLR}{2 CRSR DNs} {CTRL 9}YOU HAVE NOT S
    AVED YOUR CHANGES!
336 PRINT"{2 CRSR DNs} DO YOU REALLY WANT TO QUIT? {CTR
    L 9}Y{CTRL Ø} OR {CTRL 9}N{CTRL Ø}
338 GOSUB3Ø:IFA$="Y" THEN344
34Ø GOTO68
342 IFCK<>ØTHEN334
344 PRINT"{SHFT CLR}{2 CRSR DNs}DATAFILE TERMINATED":EN
    D
346 REM--ERROR CHECK
348 PRINT" NO SUCH RECORD EXISTS":RETURN
35Ø IFR>ØTHENRETURN
352 PRINT"{SHFT CLR}{CRSR DN} NO FILES IN MEMORY":FORI=
    1TO1ØØØ:NEXTI:GOTO68
354 IFX<1THENGOSUB352:GOTO68
356 REM--LOAD PRINT
358 PRINT"{SHFT CLR} {CTRL 9}{12 SPACEs}PRINTER MAIN ME
    NU{9 SPACEs}"
36Ø PRINT"{2 CRSR DNs}{2 SPACEs}PRINT RECORDS USING:
```

→

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Listing continued.

```
  362 PRINT"{CRSR DN}{6 SPACEs}{CTRL 9}R{CTRL Ø}EPORTS AN
      D LISTS
  364 PRINT"{CRSR DN}{6 SPACEs}{CTRL 9}M{CTRL Ø}AILING LA
      BELS
  366 PRINT"{CRSR DN}{6 SPACEs}{CTRL 9}U{CTRL Ø}SER DEFIN
      ED SUBPROGRAM
  368 PRINT"{CRSR DN}{6 SPACEs}{CTRL 9}E{CTRL Ø}XIT TO MA
      IN MENU
  370 PRINT"{CRSR DN} {CTRL 9}{6 SPACEs}PRESS THE APPROPR
      IATE KEY{7 SPACEs}"
  372 GOSUB3Ø:IFA$="R"THEN384
  374 IFA$="E"THEN68
  376 IFA$="U"THEN386
  378 IFA$="M"THEN382
  380 GOTO372
  382 PRINT"{SHFT CLR}{3 CRSR DNs}{3 SPACEs}LOADING MAILI
      NG LABEL SUBPROGRAM":LOAD"DFMAIL",8
  384 PRINT"{SHFT CLR}{3 CRSR DNs}{3 SPACEs}LOADING REPOR
      T/LISTING SUBPROGRAM":LOAD"DFREPORT",8
  386 PRINT"{SHFT CLR}{3 CRSR DNs} ENTER NAME OF SUBPROGR
      AM"
  388 PRINT"{CRSR DN}";SB$:INPUT"{CRSR UP}";SB$:IFSB$=D$T
      HEN358
  390 LOADSB$,8
  392 REM--WARNING
  394 PRINT"{SHFT CLR}{CRSR DN} {CTRL 9}THIS WILL DESTROY
      THE FILE IN MEMORY!
  396 PRINT"{2 CRSR DNs} SAVE THE FILE FIRST? {CTRL 9}Y{C
      TRL Ø} OR {CTRL 9}N{CTRL Ø}":GOSUB3Ø:IFA$="N"THENRE
      TURN
  398 GOTO68
  4ØØ REM--NEW DISK
  4Ø2 PRINT"{SHFT CLR}{CRSR DN} ARE YOU SURE? {CTRL 9}Y{C
      TRL Ø} OR {CTRL 9}N{CTRL Ø}
  4Ø4 GOSUB3Ø:IFA$="N"THEN68
  4Ø6 IFA$<>"Y"THEN68
  4Ø8 INPUT"{CRSR DN} {CTRL 9}DISK NAME,ID{CTRL Ø}";HN$,I
      D$:IFHN$=D$THEN68
  41Ø OPEN15,8,15:PRINT#15,"NEWØ:"+HN$+","+ID$:GOSUB414:C
      LOSE15:GOTO68
  412 REM--DISK ERROR
  414 INPUT#15,EN,EM$,ET,ES:IF(EN<2Ø)OR(EN=62)THENRETURN
  416 PRINT"{CTRL 9}{CRSR DN}DISK ERROR{CTRL Ø}"EN"{CRSR
      LF}","EM$","ET"{CRSR LF},"ES
  418 PRINT"{CRSR DN}PRESS {CTRL 9}ANY KEY{CTRL Ø} TO RET
      URN TO MENU":GOSUB3Ø:CLOSE5:CLOSE15:GOTO68
  42Ø REM--DIRECTORY
  422 OPEN15,8,15:OPEN1,8,Ø,"$Ø":PRINT"{SHFT CLR}":GOSUB414
  424 GET#1,A1$,A2$
  426 GET#1,A1$,A2$
  428 GET#1,A1$,A2$
  43Ø IFA1$<>""THENAØ=ASC(A1$)
  432 IFA2$<>""THENAØ=AØ+ASC(A2$)*256
  434 PRINTMID$(STR$(AØ),2);TAB(3);
  436 GET#1,A2$:IFST<>ØTHEN454
  438 IFA2$<>CHR$(34)THEN436
  44Ø GET#1,A2$:IFA2$<>CHR$(34)THENPRINT"{CTRL 9}"A2$"{CT
      RL Ø}";:GOTO44Ø
  442 GET#1,A2$:IFA2$=CHR$(32)THEN442
  444 PRINTAB(2Ø);:A3$=""
  446 A3$=A3$+A2$:GET#1,A2$:IFA2$<>""THEN446
  448 PRINTLEFT$(A3$,3)
  45Ø GETA$:IFA$<>""THENGOSUB458
  452 IFST=ØTHEN426
  454 PRINT" BLOCKS FREE";:AØ=Ø
  456 CLOSE1:CLOSE15:PRINTAB(25)"PRESS {CTRL 9}ANY KEY{C
      TRL Ø}":GOSUB3Ø:GOTO68
  458 GOSUB3Ø:RETURN
```


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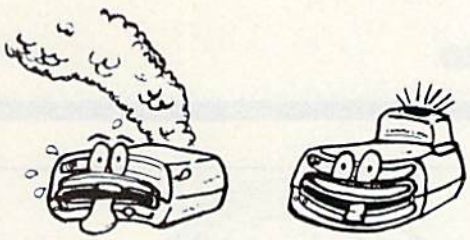

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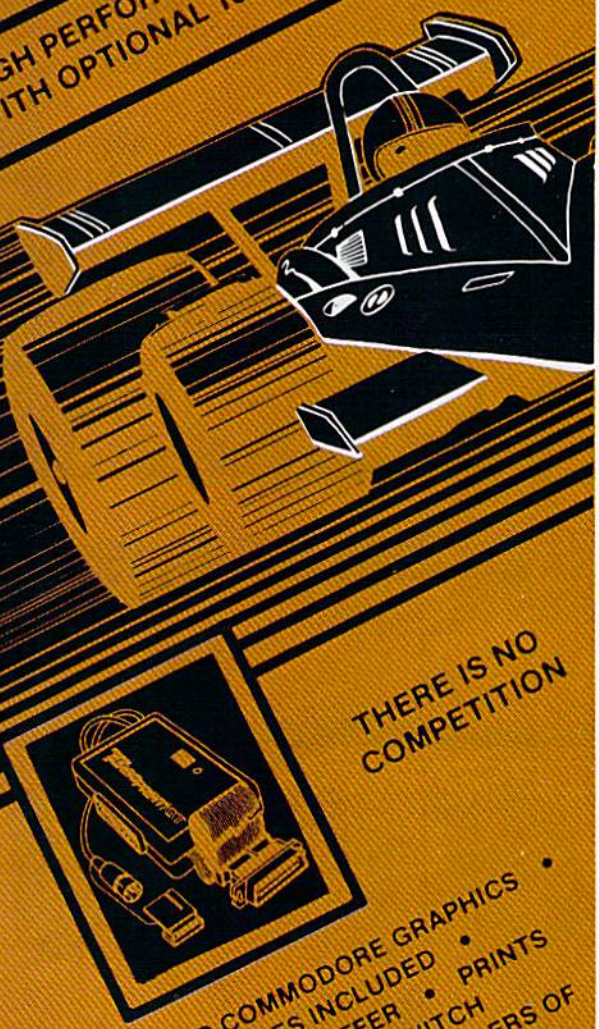

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The first major peripheral that most of you Commodore users purchased was probably a line printer, even before you bought a disk drive. There are many good reasons for this, with the ability to list programs and possess hard copies of data figuring in prominently.

The VIC-20 and C-64 feature ports that accommodate line printers. Deviating from the two main protocols for transmitting data from the computer—RS-232 (serial) and Centronics (parallel)—the VIC and 64 transmit data in a hybrid protocol known as Commodore (Pet) Serial. Let's take a look at these protocols individually, and then their differences will become more understandable.

A Difference in Bytes

Data is transmitted to a printer or modem in a binary format of 1s and 0s known as ASCII (American Standard Code for Information Interchange). ASCII is the industry standard. ASCII codes can be transmitted by either serial or parallel means.

In the serial protocol, data is transmitted one bit at a time. A bit is the smallest possible piece of information—a 1 or a 0, with the 1s meaning yes, or on, and the 0s meaning no, or off. A grouping of eight bits constitutes a byte. A byte usually represents one character (alpha or numeric) of information. So when the serial protocol is used, it takes eight individual transmissions to send one character.

In the parallel protocol, however, things are speeded up, since a whole byte, rather than individual bits, is transmitted.

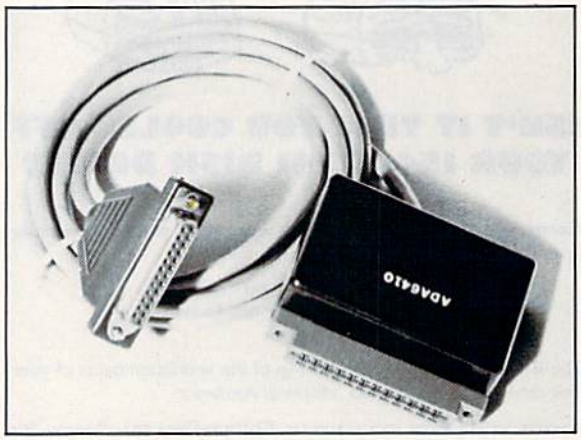
Commodore Serial uses Commodore ASCII, which is basically standard ASCII with a few subtle changes made by Commodore for its own purposes. It differs from standard ASCII in the same way that English spoken in Australia differs from English spoken in Alabama—the two areas speak the same language, but with enough dialectical differences to make communication difficult.

BRIDGING

Commodore-to-Printer Interfaces

BY TOM BENFORD

The MW-350 interface from Micro World Electronix.



Connecticut Microcomputer's RS-232 serial interface.

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Commodore printers understand the same dialect as Commodore computers, so the two devices don't have any problems communicating with one another. Just plug in a Commodore printer and you're ready to roll.

If, however, you decide not to use a Commodore printer, you're bound to run into some problems, since the two machines won't be "speaking" the same language. What you'll need in this case is a translator—an interface.

An Electronic Clearing House

Look closely at the back of your VIC or 64. There's the serial port into which you plug your disk drive or printer, and there's also the user port. The user port accommodates either an RS-232 serial interface or an IEEE-488 interface (a form of parallel interface). Most of the interfaces covered in this article use Commodore's serial port, although I'll also touch upon some that utilize the user port.

The majority of available line printers use a Centronics parallel port to handle incoming data, mainly because of the economics of manufacturing and the efficiency of this protocol. The obvious problem is that the Commodore computer is sending out bits, and the printer is waiting for bytes.

The printer interface acts as an electronic clearing house in that it receives the data, bit by bit, from the computer, assembles it and performs any necessary translations in coding, and then passes it along to the printer in the form of bytes. Most of these magical boxes have a serial plug at one end and a parallel connector at the other, with a plastic case containing the necessary circuitry in the middle.

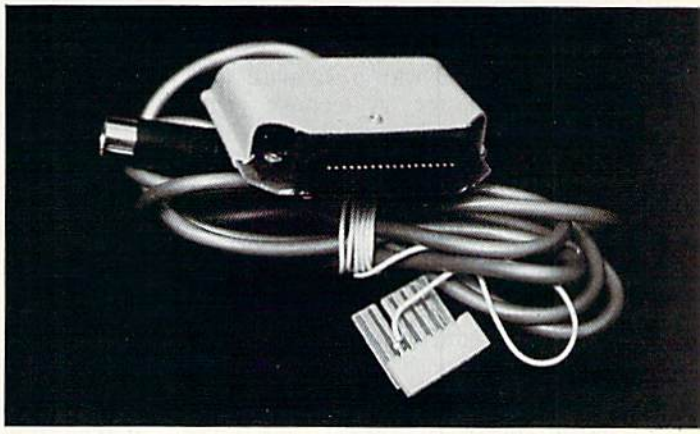
Interfaces must perform a demanding task fast and efficiently. As you'll soon find out, however, all interfaces are *not* created equal. I'll begin by discussing Cardco's printer interfaces, which are probably the best known and most widely used units around.

Address all author correspondence to Tom Benford, PO Box 4125, Osborneville, NJ 08723.

THE GAP

If you own a Commodore computer and a non-Commodore printer, you need an interface to bridge the communication gap. This article explains why you need printer interfaces, how they work and what's available for you.

Micro World Electronix MW-302C.



The Cardco/?B interface.

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The Printer Card from Xetec.

The Connection from Tymac.

Before I do, however, I should mention that Cardco also offers three letter-quality printers that are 100% Commodore-compatible right out of the box—the necessary interfaces and circuitry are built into these printers. If you're interested, they are the LQ-1, LQ-2 and LQ-3, and all three are very nice units. They're also equipped with the Centronics parallel port for non-Commodore users' applications.

CARD/?B

This is Cardco's basic parallel printer interface. It plugs into the VIC-20 or C-64 serial port and outputs standard ASCII codes to the printer, taking care of the CBM ASCII conversions internally.

All functions on this interface are controlled through the computer's keyboard, and the printer end of the interface is outfitted with a standard Centronics connector. A separate pigtail connector fits into the cassette port, to pick up the necessary operating voltage to power the interface. This interface is ideally suited to text-processing applications, but, unfortunately, it has sparse provisions for printing out the Commodore graphics characters.

This is Cardco's meat-and-potatoes interface, completely devoid of the gravy. If you're on a budget, it should prove entirely satisfactory, unless you desire printing of the graphics character set. The Cardco/?B interface carries a lifetime guarantee to the original owner against defects in material and workmanship, and it's made right here in the U.S.A.

CARD/?+G

This parallel printer interface is essentially the same as the Cardco/?B, but the "+G" designation means that it has graphics capabilities added. As with the B model, the +G plugs into the serial port on the computer and utilizes the pigtail connector to the cassette port for the necessary operating voltage.

In addition to offering full software control, the +G also offers functions such as conversion of Commodore to standard ASCII and selection or deselection of automatic line feeds.

The +G features the ability to print the full Commodore character set, including all of the graphics, reversed and reversed graphics characters. The graphics printing functions work well, although somewhat slower than other interfaces covered here, and the +G is compatible with a large number of popular printers.

As with the Cardco/?B interface, Cardco/?+G is manufactured in the U.S. and carries the Cardco lifetime guarantee to the original owner.

ADA 6410

The Connecticut Microcomputer ADA 6410 RS-232 serial interface plugs into the user port rather than the serial port on the VIC or C-64. The ADA 6410 handles the translation of Commodore ASCII to true ASCII by using the RS-232 serial protocol. This is important to note, since this interface *will not* allow you to use a parallel printer. If, however, you are using a printer with a true RS-232 serial port, this is a compact unit that will perform well for you.

You must consider, too, whether or not your applications software will be able to handle data transmission out of the user port—many popular word processing programs do not have any provision for using this port.

On the positive side, this interface may be used not only for an RS-232 printer, but also for an RS-232 modem or other peripheral device. It is also possible to manually open up a data transmission channel to the user port via a short program (consult your programmer's reference guide for details), but this, once again, may conflict with the applications software you intend to use.

The Connection

After testing out The Connection, by Tymac Controls Corp., I'm inclined to agree with Tymac's claim that this is the ultimate parallel interface for the VIC and C-64. This interface has all the goodies built in: 2K RAM buffer, printer self-test, LED status indicators, a reset switch and other niceties.

This interface can be customized to your particular printer. Since this custom-tailoring is done via an internal ROM chip, if and when you change printers, you need only purchase the appropriate ROM to keep both printer and interface talking the same language.

The internal 2K buffer really speeds things up and smooths them out, particularly when printing graphics. At a suggested retail price of $119, it's one of the more expensive units, but, for what it offers, it's well worth the price.

MW-302C

The MW-302C, from Micro World Electronix, is a basic interface that hooks up directly to your VIC or C-64 and satisfies most non-graphics applications. Via an exposed DIP switch, you can select device addresses of 4, 5, 6 or 7, as well as CBM ASCII or standard ASCII. Also, you can select 7-bit or

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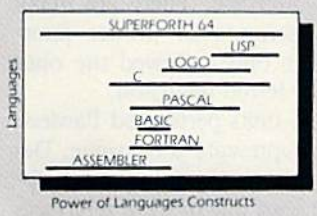

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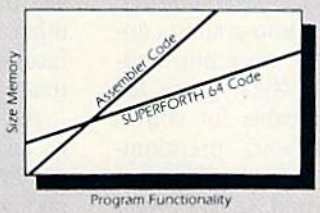

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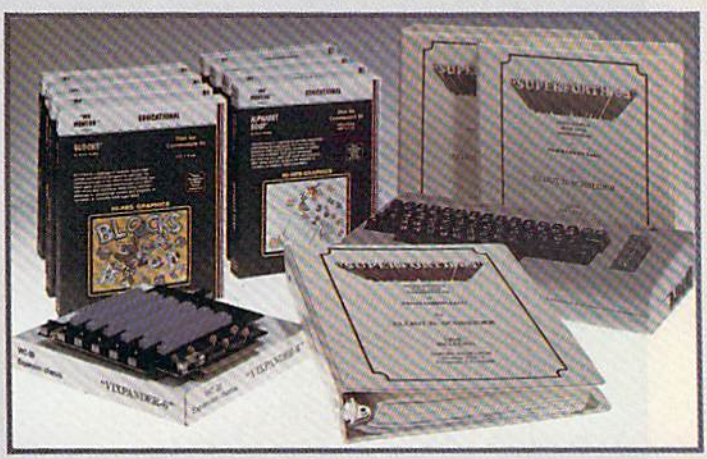

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This unit, as well as its sister, the MW-350, are the only two I tested that come with an all-steel DIN connector, rather than with the plastic and tin connectors on the other units, and a 5-foot cable allows a comfortable placement of your printer. Quality workmanship is evident throughout, backed by a 90-day warranty. Micro World Electronix also offers full technical support, should you need it.

MW-350

Micro World Electronix's MW-350 is Micro World's "full boat" interface. It allows extensive graphics printing, there's a provision for adding a RAM buffer, should you desire one, and it features switch-selectable configuration, to allow matching to most popular dot-matrix printers for Commodore-emulated graphics.

The MW-350 can be configured for true ASCII conversion, total test, emulation and transparent modes, and it has a self-test with status report. Although I didn't test it with the optional RAM chip in place, the additional buffer memory will most likely enhance the speed and smoothness of this interface.

Consider your needs and intended applications before you select a printer interface.

As with the MW-302, the MW-350 comes with a 5-foot cable and steel DIN connector. The DIP switches for printer configuration are exposed, to allow quick change of settings for different applications, and it's covered by Micro World's warranty and tech support.

Xetec's S Printer Card

This is a high-quality basic interface intended primarily for non-graphics applications. Among the more outstanding features of the S, which stands for serial, are the 6-foot cable for convenient printer placement, premium-grade electronic components, including gold-plated contacts, and Xetec's 5-year warranty.

DIP switches are provided for selecting the device address, and the user's manual is really top-notch, providing all kinds of useful examples of the various operating modes.

Xetec's G Printer Card

The G stands for graphics. While the G model contains all of the above-mentioned features of the S interface, it adds on some additional DIP switches for custom tailoring to your individual printer. More than six modes of operation are available, all clearly explained in the excellent documentation, which provides clear examples to cover most applications. Xetec backs this unit with their 5-year warranty to the original purchaser.

In addition to these interfaces, Commodore also offers its versions of the RS-232 serial interface and the IEEE-488 parallel interface. There are many other manufacturers of printer interfaces, but I've only reviewed the ones that I actually tested hands-on.

All of these units performed flawlessly, and each represents good value. Depending on your needs and intended applications, at least one of these interfaces will be right for you. Happy printing! R

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Computer image by William C. Bramble III

TOUCHDOWN!

It's first and ten, do it again! Surprise! You've been drafted into the NFL as a starting quarterback. How well can you rack up those points and smother your computer opponent?

If you're tired of shooting at or being chased by aliens, you might like to try quarterbacking an NFL football team.

Touchdown, a game that runs on the C-64 or on the VIC-20 with any memory expansion, simulates the situations that commonly occur in professional football games. While the graphics usage is not astounding, the computer is a competent opponent and will maintain your interest as you lead your team to either victory or defeat.

The use of the Kernal plot routine for positioning the cursor, and of the random-number techniques for simulating the statistics of a football game, are programming tips you may want to extract. The computer is well informed about the game of football, and the game situations are so realistic that you'll probably find yourself following the strategies of the pros.

Table 1 lists the offensive and defensive plays available to you and the computer. As the table illustrates, the offensive player has six plays to choose from: two running plays, two passing plays and two kicking plays. The defensive player may choose to defend any of the running or passing plays.

From the draw play to the long pass, the plays increase in yardage

BY LARRY D. SMITH

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Listing 1. *Touchdown program for the VIC-20 with 3K, 8K or 16K expansion.*

```
1Ø DEF FNA(Z)=INT(Z*RND(1)*(RND(1)-.2))
2Ø DEF FNB(Z)=INT(Z*RND(1)*(RND(1)-.5))
3Ø Z=RND(-TI):REM SET SEED
4Ø DIM F(2Ø,3):REM POSITIONS
5Ø GOSUB 142Ø:REM SETUP
6Ø INPUT"{SHFT CLR}{9 CRSR DNs}HEADS OR TAILS";FLIP$:PR
   INT"{SHFT CLR}"
7Ø COIN$(1)="H":COIN$(2)="T":T=1ØØ:YOU=Ø:ME=Ø
8Ø R=INT(2*RND(1))+1
9Ø IF LEFT$(FLIP$,1)=COIN$(R) THEN Ø13Ø
1ØØ PRINT"{9 CRSR DNs}YOU LOST THE TOSS,":PRINT"I RECEI
    VE!"
11Ø FOR J=1TOWT:NEXT
12Ø P=1:GOSUB 121Ø:GOTO Ø17Ø
13Ø PRINT"{9 CRSR DNs}YOU WON THE TOSS,":PRINT"YOU RECE
    IVE!"
14Ø FOR J=1TOWT:NEXT
15Ø P=2:GOSUB 121Ø:GOTO Ø17Ø
16Ø GOSUB 121Ø
17Ø T=T-1:REM COUNT
18Ø IF T>Ø THEN Ø21Ø
19Ø PRINT"{SHFT CLR}GAME OVER":PRINT:PRINT"FINAL SCORE:
    ":PRINT" YOU ";YOU:PRINT" ME{2 SPACEs}";ME
2ØØ END
21Ø FS$=STR$(FST-YD)
22Ø IF FST>99 THEN FS$=" GOAL"
23Ø PRINT"{HOME}{CTRL 7}";B$;"TIME";T:PRINT B$;"YOU";YO
   U;", ME";ME:PRINTB$;D$(DWN);" AND";FS$;
24Ø SYSPS:PRINTB$:PRINTB$;"{CRSR UP}";
25Ø IF P=1 THEN PRINT"PLAY?"
26Ø IF P=2 THEN PRINT"DEFENSE?"
28Ø GET A$:IF A$="" THEN Ø28Ø
29Ø IF A$="?" THEN GOSUB 2Ø6Ø:GOSUB 166Ø:GOTO Ø21Ø
3ØØ IF (A$<"Ø") OR (A$>"6") THEN Ø28Ø
31Ø PLAY=VAL(A$)
32Ø PRINT"{CRSR UP}{2Ø SPACEs}"
33Ø IF P=1 THEN Ø44Ø
34Ø DF=PLAY
35Ø PLAY=INT(4*RND(1))+1
36Ø IF DWN<4 THEN IF PLAY<4 THEN IF ME<YOU THEN PLAY=PL
   AY+1
37Ø IF DWN<4 THEN Ø47Ø
38Ø Z=PLAY
39Ø IF Z=4 THEN Z=3
4ØØ PLAY=5
41Ø IF 1ØØ-YD<=3Ø THEN PLAY=6
42Ø IF T<25 THEN IF FST-YD<4 THEN IF ME<YOU THEN PLAY=Z
   +1
43Ø GOTO Ø47Ø
44Ø DF=INT(4*RND(1))+1
45Ø IF DF<4 THEN IF FST-YD>5 THEN DF=DF+1
46Ø IF YOU<ME THEN IF DF<4 THEN DF=DF+1
47Ø D=PLAY-DF
48Ø IF D<Ø THEN D=-D
49Ø D=(D-1)*3Ø
5ØØ IF PLAY>4 THEN ON PLAY-4 GOTO Ø8ØØ,Ø89Ø
51Ø SYS PS
52Ø IFP=1THEN PRINT "PLAY ";PL$(PLAY)
53Ø IFP=2 THEN PRINT"DEF{2 SPACEs}";DF$(DF)
54Ø FOR J=1TOWT:NEXT
55Ø IFP=1THEN PRINT"DEF{2 SPACEs}";DF$(DF)
56Ø IFP=2THEN PRINT"PLAY ";PL$(PLAY)
57Ø FOR J=1TOWT:NEXT
58Ø PRINT"{2 CRSR UPs}{2Ø SPACEs}":PRINT"{2Ø SPACEs}"
59Ø M=MX(PLAY)
```

→

CODE	PLAY
1	Draw play
2	End sweep
3	Short pass
4	Long pass
5	Punt (offensive play only)
6	Field goal (offensive play only)

Table 1. *The offensive and defensive plays available to you and the computer, with their numeric codes.*

potential. However, with the potential comes risk, as the possible yardage loss also increases. For example, the draw play typically makes a three- to five-yard gain or a one- or two-yard loss. The long pass, on the other hand, may make as much as 70 yards, but could result in a ten- to 15-yard loss. Also, the computer generates occasional turnovers, with increasing turnover frequency for the plays with the greater yardage potential.

The computer determines the kicking game purely from random numbers, though it uses a non-uniform distribution to typify a professional game. The running and passing play yardage is determined both by random numbers and the match or mismatch between the chosen offense and defense.

If the chosen defense matches the offense, the yardage gains are substantially reduced. If the offense and defense are considerably mismatched (like defending for a long pass when the opponent runs a draw), then the yardage gain is generally increased. This provides a good mixture of chance and strategy.

Get a Kick Out of It

The computer plays the field goal kicking game by professional rules. If a field goal attempt is missed outside the

RUN It Right

Commodore 64 or VIC-20 with 3K, 8K or 16K expansion

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Listing 1 continued.

```
600 X=INT(D*M/700)
610 X=X+FNA(M):IF X+YD>100 THEN X=101-YD
611 FOR I=0 TO X STEP SGN(X)
612 SYS PS:PRINT I;
613 FOR J=1TO150:NEXT
614 NEXT
615 PRINT" YARDS";"{CTRL 2}"
617 FOR J=1TOWT:NEXT
618 PRINT"{CRSR UP}{12 SPACEs}"
620 YD=YD+X
630 IF YD>100 THEN 1060
640 IF YD<0 THEN 1280
650 Q=INT(100*RND(1))
660 IF Q<PLAY*5/2 THEN 1330
670 IF YD<FST THEN YD=YD-X:GOSUB 1930:GOTO 0710
680 FST=YD+10
690 DWN=0
700 GOSUB 1660
710 DWN=DWN+1
720 IF DWN<5 THEN 0170
730 SYSPS:PRINT B$;"{CTRL 7}OUT OF DOWNS!{CTRL 2}"
740 FOR J=1TOWT:NEXT
750 YD=100-YD
760 FST=YD+10
770 DWN=1
780 P=3-P:GOSUB 1660
790 GOTO 0170
800 X=40+FNB(40)
810 SYSPS:PRINT B$;"{CTRL 7}PUNT WAS ";X;" YARDS{CTRL 2
    }"
820 FOR J=1TOWT:NEXT
830 YD=100-(YD+X)
840 IF YD<0 THEN YD=20
850 FST=YD+10
860 DWN=1
870 P=3-P:GOSUB 1660
880 GOTO 0170
890 SYSPS:PRINT B$;"{CTRL 7}FIELD GOAL ";
900 FOR J=1TOWT:NEXT
910 X=20+FNA(50)
920 IF 100-YD<X THEN 1010
930 PRINT"WIDE!{CTRL 2}"
940 FOR J=1TOWT:NEXT
950 IF YD>80 THEN YD=80
960 YD=100-YD
970 P=3-P
980 FST=YD+10
990 DWN=1:GOSUB 1660
1000 GOTO 0170
1010 PRINT"GOOD!{CTRL 2}"
1020 FOR J=1TOWT:NEXT
1030 IF P=1 THEN YOU=YOU+3
1040 IF P=2 THEN ME=ME+3
1050 GOTO 0160
1060 SYS PS:PRINT B$;"{CTRL 7}TOUCHDOWN!!!!"
1070 SC=6
1080 FOR J=1TOWT:NEXT
1090 SYS PS:PRINT B$;"EXTRA POINT ";
1100 FOR J=1 TO WT:NEXT
1110 X=10+FNA(50)
1120 IF X<10 THEN 1160
1130 PRINT"GOOD!!{CTRL 2}"
1140 SC=SC+1
1150 GOTO 1170
1160 PRINT"BLOCKED!!{CTRL 2}"
1170 IF P=1 THEN YOU=YOU+SC
1180 IF P=2 THEN ME=ME+SC
```

→

20-yard line, the opponent receives the ball at the line of scrimmage. If the field goal is missed inside the 20-yard line, the opponent gets the ball on the 20.

The computer also knows about safeties, so be careful when running the ball from deep in your own territory. Punts that go into the end zone are placed on the 20-yard line.

While the computer randomly chooses its offensive and defensive plays, it is aware of the time remaining, the score and the field position. On fourth down, the computer generally will punt (or if close enough, try for a field goal), but if it's behind late in the game, it may go for the first down. The computer also knows that a trailing human opponent is apt to throw a few long bombs, so when it's ahead, it tends to defend against the longer potential plays.

The screen display consists of a 20- to 30-yard section of field around the scrimmage line, the first down markers and a scrimmage-line marker. It also displays the time (number of plays) remaining and the number of downs.

When you're prompted for a play, you enter the numeric code (from Table 1) of the desired play, or a question mark if you've forgotten the plays. A question mark will result in the computer displaying a list of options.

Choose Your Foe

You can customize Touchdown to play against your favorite opponent. Just replace all occurrences of "ME" and "I" in the program listing with the name of your chosen opponent. Try to retain the same spacing before and after the name so that the display will look well. Caution: Do not change the numeric variable ME, which is *not* inside quotation marks and, if changed, will cause untold problems.

C-64 occurrences of "ME" and "I" are in lines 100, 195 and 230. VIC-20 occurrences of "ME" and "I" are in lines 100, 190 and 230.

After you insert your opponent's name, just run the program and enjoy the thrill of battling to win the Big Game. R

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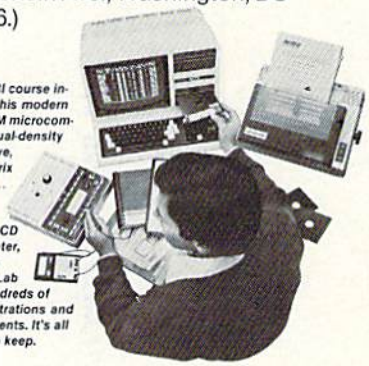

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Listing 1 continued.

```
1190 FOR J=1TOWT:NEXT
1200 GOTO 0160
1210 REM KICKOFF
1220 YD=20
1230 YD=YD+FNB(40)
1240 FST=YD+10
1250 P=3-P
1260 DWN=1:GOSUB 1660
1270 RETURN
1280 SYS PS:PRINT B$;"{CTRL 7}SAFETY!!{CTRL 2}"
1290 FOR J=1TOWT:NEXT
1300 IF P=1 THEN ME=ME+2
1310 IF P=2 THEN YOU=YOU+2
1320 GOTO 0160
1330 IF PLAY<3 THEN SYS PS:PRINT B$;"{CTRL 7}FUMBLE!!{C
     TRL 2}"
1340 IF PLAY>2 THEN SYS PS:PRINT B$;"{CTRL 7}INTERCEPTI
     ON!!{CTRL 2}"
1350 FOR J=1TOWT:NEXT
1360 YD=100-YD
1370 FST=YD+10
1380 DWN=1
1390 P=3-P
1400 GOSUB 1660
1410 GOTO 0170
1420 REM
1430 REM SET UP LABELS
1440 REM
1450 DATA 0,5,10,15,20,25,30,35,40,45,50,55,60,65,70,75
     ,80,85,90,95,100
1460 DATA 0,5,10,15,20,25,30,35,40,45,50,45,40,35,30,25
     ,20,15,10,5,0
1470 FOR I=0 TO 20
1480 J=20-I
1490 READ F(I,1):F(J,2)=F(I,1)
1500 NEXT
1510 FOR I=0 TO 20:READ F(I,3):NEXT
1520 DATA 25,38,25,75
1530 FOR I=1 TO 4
1540 READ MX(I)
1550 NEXT
1560 POKE 782,0:POKE 781,19:PS=65520
1570 B$="{21 SPACEs}{21 CRSR LFs}"
1580 WT=2000
1590 POKE 36879,94:PRINT"{CTRL 2}";
1600 P$(1)=">":P$(2)="<"
1610 D$(1)="1ST":D$(2)="2ND":D$(3)="3RD":D$(4)="4TH"
1620 DATA DRAW,SWEEP,S. PASS,L. PASS,PUNT,F. GOAL
1630 FOR I=1 TO 6
1640 READ PL$(I):DF$(I)=PL$(I):NEXT
1650 RETURN
1660 REM
1670 REM PRINT FIELD
1680 REM
1690 S=INT(YD/5+.5):IF P=2 THEN S=20-S
1700 IF P=1 THEN S=S-1
1710 IF P=2 THEN S=S-3
1720 IF S<0 THEN S=0
1730 IF S>16 THEN S=16
1740 PRINT"{HOME}";B$:PRINTB$:PRINTB$
1750 PRINT"{COMD D}{20 COMD Is}"
1760 FOR I=1 TO 12
1770 PRINT"{CTRL 9}{COMD K}{CTRL 0}{4 SPACEs}{CTRL 9}{C
     OMD K}{CTRL 0}{4 SPACEs}{CTRL 9}{COMD K}{CTRL 0}{4
      SPACEs}{CTRL 9}{COMD K}{CTRL 0}{4 SPACEs}{CTRL 9}
     {COMD K}{CTRL 0}"
1780 NEXT
1790 PRINT"{COMD C}{CTRL 9}{20 COMD Is}{CTRL 0}"
1795 PRINT B$;
1800 FOR I=0 TO 4
1810 F$=STR$(F(S+I,3)):F$=RIGHT$(F$,LEN(F$)-1)
1820 PRINT TAB(I*5);F$;
1825 IF LEN(F$)=1 THEN PRINT" ";
1830 NEXT
1840 IF P=1 THEN TB=FST-F(S,P)-10
1850 IF P=2 THEN TB=F(S,P)-FST
1860 PRINT"{HOME}{8 CRSR DNs}";
1870 IF TB>=0 AND TB<21 THEN PRINT TAB(TB);"{CTRL 3}{SH
     FT X}{CTRL 2}";
1880 IF TB+10>=0 AND TB+10<21 THEN PRINT TAB(TB+10);"{C
     TRL 3}{SHFT X}{CTRL 2}";
1890 IF P=1 THEN TB=YD-F(S,P)
1900 IF P=2 THEN TB=F(S,P)-YD
1910 PRINT "{HOME}{10 CRSR DNs}{CTRL 3}";TAB(TB);P$(P);
     "{CTRL 2}"
1920 RETURN
1930 REM
1940 REM MOVE PLAYER
1950 REM
1960 IF P=1 THEN TB=YD-F(S,P)
1970 IF P=2 THEN TB=F(S,P)-YD
1980 PRINT"{HOME}{10 CRSR DNs}";TAB(TB);" ";
1990 YD=YD+X
2000 IF P=1 THEN TB=YD-F(S,P)
2010 IF P=2 THEN TB=F(S,P)-YD
2020 IF TB<0 OR TB>20 THEN GOSUB 1660:RETURN
2030 FOR J=1 TO WT/4:NEXT
2040 PRINT"{HOME}{10 CRSR DNs}{CTRL 3}";TAB(TB);P$(P);"
     {CTRL 2}"
2050 RETURN
```

→

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Listing 1 continued.

```
2Ø6Ø REM
2Ø7Ø REM DISPLAY PLAYS
2Ø8Ø REM
2Ø9Ø PRINT"{SHFT CLR}"
21ØØ PRINT"{8 SPACEs}{CTRL 9}PLAYS{CTRL Ø}"
211Ø PRINT
212Ø PRINT"1 = DRAW"
213Ø PRINT"2 = SWEEP"
214Ø PRINT"3 = SHORT PASS"
215Ø PRINT"4 = LONG PASS"
216Ø PRINT"5 = PUNT(OFFENSE ONLY)"
217Ø PRINT"6 = F.G.(OFFENSE ONLY)"
218Ø PRINT:PRINT"(HIT ANY KEY TO CONT)"
219Ø GET A$:IF A$=""THEN 219Ø
22ØØ PRINT"{SHFT CLR}{CTRL 2}":RETURN
```

Listing 2. *Touchdown program for the C-64.*

```
1Ø DEF FNA(Z)=INT(Z*RND(1)*(RND(1)-.2))
2Ø DEF FNB(Z)=INT(Z*RND(1)*(RND(1)-.5))
3Ø Z=RND(-TI):REM SET SEED
4Ø DIM F(2Ø,3):REM POSITIONS
5Ø GOSUB 142Ø:REM SETUP
6Ø INPUT"{SHFT CLR}{1Ø CRSR DNs}{1Ø SPACEs}HEADS OR TAI
   LS";FLIP$:PRINT"{SHFT CLR}"
7Ø COIN$(1)="H":COIN$(2)="T":T=1ØØ:YOU=Ø:ME=Ø
8Ø R=INT(2*RND(1))+1
9Ø IF LEFT$(FLIP$,1)=COIN$(R) THEN Ø13Ø
1ØØ PRINT"{1Ø CRSR DNs}{5 SPACEs}YOU LOST THE TOSS,";:P
    RINT" I RECEIVE!"
11Ø FOR J=1TOWT:NEXT
12Ø P=1:GOSUB 121Ø:GOTO Ø17Ø
13Ø PRINT"{1Ø CRSR DNs}{5 SPACEs}YOU WON THE TOSS,";:PR
    INT" YOU RECEIVE!"
14Ø FOR J=1TOWT:NEXT
15Ø P=2:GOSUB 121Ø:GOTO Ø17Ø
16Ø GOSUB 121Ø
17Ø T=T-1:REM COUNT
18Ø IF T>Ø THEN Ø21Ø
19Ø PRINT "{SHFT CLR}{8 CRSR DNs}";SPC(15);"GAME OVER":
    PRINT:PRINT SPC(15);"FINAL SCORE:"
195 PRINT SPC(15);" YOU ";YOU:PRINT SPC(15);" ME{2 SPAC
    Es}";ME
2ØØ END
21Ø FS$=STR$(FST-YD)
22Ø IF FST>99 THEN FS$=" GOAL"
23Ø PRINT"{HOME}{CTRL 7}";B$;"{5 SPACEs}TIME";T:PRINT B
    $;"{5 SPACEs}YOU";YOU;", ME";ME
235 PRINT B$;"{5 SPACEs}";D$(DWN);" AND";FS$;
24Ø SYSPS:PRINTB$:PRINTB$;"{CRSR UP}";
25Ø IF P=1 THEN PRINT"{5 SPACEs}PLAY?"
26Ø IF P=2 THEN PRINT"{5 SPACEs}DEFENSE?"
28Ø GET A$:IF A$="" THEN Ø28Ø
29Ø IF A$="?" THEN GOSUB 2Ø6Ø:GOSUB 166Ø:GOTO Ø21Ø
3ØØ IF (A$<"Ø") OR (A$>"6") THEN Ø28Ø
31Ø PLAY=VAL(A$)
32Ø PRINT"{CRSR UP}{2Ø SPACEs}"
33Ø IF P=1 THEN Ø44Ø
34Ø DF=PLAY
35Ø PLAY=INT(4*RND(1))+1
36Ø IF DWN<4 THEN IF PLAY<4 THEN IF ME<YOU THEN PLAY=PL
   AY+1
37Ø IF DWN<4 THEN Ø47Ø
38Ø Z=PLAY
39Ø IF Z=4 THEN Z=3
4ØØ PLAY=5
41Ø IF 1ØØ-YD<=3Ø THEN PLAY=6
42Ø IF T<25 THEN IF FST-YD<4 THEN IF ME<YOU THEN PLAY=Z
   +1
43Ø GOTO Ø47Ø
44Ø DF=INT(4*RND(1))+1
45Ø IF DF<4 THEN IF FST-YD>5 THEN DF=DF+1
46Ø IF YOU<ME THEN IF DF<4 THEN DF=DF+1
47Ø D=PLAY-DF
48Ø IF D<Ø THEN D=-D
49Ø D=(D-1)*3Ø
5ØØ IF PLAY>4 THEN ON PLAY-4 GOTO Ø8ØØ,Ø89Ø
```

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Listing 2 continued.

```
51Ø SYS PS
52Ø IFP=1THEN PRINT "{5 SPACEs}PLAY ";PL$(PLAY)
53Ø IFP=2 THEN PRINT"{5 SPACEs}DEF{2 SPACEs}";DF$(DF)
54Ø FOR J=1TOWT:NEXT
55Ø IFP=1THEN PRINT"{5 SPACEs}DEF{2 SPACEs}";DF$(DF)
56Ø IFP=2THEN PRINT"{5 SPACEs}PLAY ";PL$(PLAY)
57Ø FOR J=1TOWT:NEXT
58Ø PRINT"{2 CRSR UPs}{2Ø SPACEs}":PRINT"{2Ø SPACEs}"
59Ø M=MX(PLAY)
6ØØ X=INT(D*M/7ØØ)
61Ø X=X+FNA(M):IF X+YD>1ØØ THEN X=1Ø1-YD
611 FOR I=Ø TO X STEP SGN(X)
612 SYS PS:PRINT "{5 SPACEs}";I;
613 FOR J=1TO15Ø:NEXT
614 NEXT
615 PRINT" YARDS";"{CTRL 2}"
617 FOR J=1TOWT:NEXT
618 PRINT"{CRSR UP}{17 SPACEs}"
62Ø YD=YD+X
63Ø IF YD>1ØØ THEN 1Ø6Ø
64Ø IF YD<Ø THEN 128Ø
65Ø Q=INT(1ØØ*RND(1))
66Ø IF Q<PLAY*5/2 THEN 133Ø
67Ø IF YD<FST THEN YD=YD-X:GOSUB 193Ø:GOTO Ø71Ø
68Ø FST=YD+1Ø
69Ø DWN=Ø
7ØØ GOSUB 166Ø
71Ø DWN=DWN+1
72Ø IF DWN<5 THEN Ø17Ø
73Ø SYSPS:PRINT B$;"{CTRL 7}{5 SPACEs}OUT OF DOWNS!{CTR
    L 2}"
74Ø FOR J=1TOWT:NEXT
75Ø YD=1ØØ-YD
76Ø FST=YD+1Ø
77Ø DWN=1
78Ø P=3-P:GOSUB 166Ø
79Ø GOTO Ø17Ø
8ØØ X=4Ø+FNB(4Ø)
81Ø SYSPS:PRINT B$;"{CTRL 7}{5 SPACEs}PUNT WAS ";X;" YA
    RDS{CTRL 2}"
82Ø FOR J=1TOWT:NEXT
83Ø YD=1ØØ-(YD+X)
84Ø IF YD<Ø THEN YD=2Ø
85Ø FST=YD+1Ø
86Ø DWN=1
87Ø P=3-P:GOSUB 166Ø
88Ø GOTO Ø17Ø
89Ø SYSPS:PRINT B$;"{CTRL 7}{5 SPACEs}FIELD GOAL ";
9ØØ FOR J=1TOWT:NEXT
91Ø X=2Ø+FNA(5Ø)
92Ø IF 1ØØ-YD<X THEN 1Ø1Ø
93Ø PRINT"WIDE!{CTRL 2}"
94Ø FOR J=1TOWT:NEXT
95Ø IF YD>8Ø THEN YD=8Ø
96Ø YD=1ØØ-YD
97Ø P=3-P
98Ø FST=YD+1Ø
99Ø DWN=1:GOSUB 166Ø
1ØØØ GOTO Ø17Ø
1Ø1Ø PRINT"GOOD!{CTRL 2}"
1Ø2Ø FOR J=1TOWT:NEXT
1Ø3Ø IF P=1 THEN YOU=YOU+3
1Ø4Ø IF P=2 THEN ME=ME+3
1Ø5Ø GOTO Ø16Ø
1Ø6Ø SYS PS:PRINT B$;"{CTRL 7}{5 SPACEs}TOUCHDOWN!!!!"
1Ø7Ø SC=6
1Ø8Ø FOR J=1TOWT:NEXT
1Ø9Ø SYS PS:PRINT B$;"{5 SPACEs}EXTRA POINT ";
11ØØ FOR J=1 TO WT:NEXT
111Ø X=1Ø+FNA(5Ø)
112Ø IF X<1Ø THEN 116Ø
113Ø PRINT"GOOD!!{CTRL 2}"
114Ø SC=SC+1
115Ø GOTO 117Ø
116Ø PRINT"BLOCKED!!{CTRL 2}"
117Ø IF P=1 THEN YOU=YOU+SC
118Ø IF P=2 THEN ME=ME+SC
119Ø FOR J=1TOWT:NEXT
12ØØ GOTO Ø16Ø
121Ø REM KICKOFF
122Ø YD=2Ø
123Ø YD=YD+FNB(4Ø)
124Ø FST=YD+1Ø
125Ø P=3-P
126Ø DWN=1:GOSUB 166Ø
127Ø RETURN
128Ø SYS PS:PRINT B$;"{CTRL 7}{5 SPACEs}SAFETY!!{CTRL 2
    }"
129Ø FOR J=1TOWT:NEXT
13ØØ IF P=1 THEN ME=ME+2
131Ø IF P=2 THEN YOU=YOU+2
132Ø GOTO Ø16Ø
133Ø IF PLAY<3 THEN SYS PS:PRINT B$;"{CTRL 7}{5 SPACEs}
    FUMBLE!!{CTRL 2}"
134Ø IF PLAY>2 THEN SYS PS:PRINT B$;"{CTRL 7}{5 SPACEs}
    INTERCEPTION!!{CTRL 2}"
135Ø FOR J=1TOWT:NEXT
136Ø YD=1ØØ-YD
```

→

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Listing 2 continued.

```
137Ø FST=YD+1Ø
138Ø DWN=1
139Ø P=3-P
14ØØ GOSUB 166Ø
141Ø GOTO Ø17Ø
142Ø REM
143Ø REM SET UP LABELS
144Ø REM
145Ø DATA Ø,5,1Ø,15,2Ø,25,3Ø,35,4Ø,45,5Ø,55,6Ø,65,7Ø,75
     ,8Ø,85,9Ø,95,1ØØ
146Ø DATA Ø,5,1Ø,15,2Ø,25,3Ø,35,4Ø,45,5Ø,45,4Ø,35,3Ø,25
     ,2Ø,15,1Ø,5,Ø
147Ø FOR I=Ø TO 2Ø
148Ø J=2Ø-I
149Ø READ F(I,1):F(J,2)=F(I,1)
15ØØ NEXT
151Ø FOR I=Ø TO 2Ø:READ F(I,3):NEXT
152Ø DATA 25,38,25,75
153Ø FOR I=1 TO 4
154Ø READ MX(I)
155Ø NEXT
156Ø POKE 782,Ø:POKE 781,19:PS=6552Ø
157Ø B$="{26 SPACEs}{26 CRSR LFs}"
158Ø WT=2ØØØ
1585 POKE 5328Ø,6
159Ø POKE 53281,5:PRINT"{CTRL 2}";
16ØØ P$(1)=">":P$(2)="<"
161Ø D$(1)="1ST":D$(2)="2ND":D$(3)="3RD":D$(4)="4TH"
162Ø DATA DRAW,SWEEP,S. PASS,L. PASS,PUNT,F. GOAL
163Ø FOR I=1 TO 6
164Ø READ PL$(I):DF$(I)=PL$(I):NEXT
165Ø RETURN
166Ø REM
167Ø REM PRINT FIELD
168Ø REM
169Ø S=INT(YD/5+.5):IF P=2 THEN S=2Ø-S
17ØØ IF P=1 THEN S=S-2
171Ø IF P=2 THEN S=S-4
172Ø IF S<Ø THEN S=Ø
173Ø IF S>14 THEN S=14
174Ø PRINT"{HOME}";B$:PRINTB$:PRINTB$
175Ø PRINT"{5 SPACEs}{COMD D}{3Ø COMD Is}"
176Ø FOR I=1 TO 12
177Ø PRINT"{5 SPACEs}{CTRL 9}{COMD K}{CTRL Ø}{4 SPACEs}
     {CTRL 9}{COMD K}{CTRL Ø}{4 SPACEs}{CTRL 9}{COMD K}
     {CTRL Ø}{4 SPACEs}{CTRL 9}{COMD K}{CTRL Ø}{4 SPACE
     s}{CTRL 9}{COMD K}{CTRL Ø}{4 SPACEs}{CTRL 9}{COMD
     K}{CTRL Ø}{4 SPACEs}{CTRL 9}{COMD K}{CTRL Ø}"
178Ø NEXT
179Ø PRINT"{5 SPACEs}{COMD C}{CTRL 9}{3Ø COMD Is}{CTRL
     Ø}"
1795 PRINT B$;
18ØØ FOR I=Ø TO 6
181Ø F$=STR$(F(S+I,3)):F$=RIGHT$(F$,LEN(F$)-1)
182Ø PRINT TAB(I*5+5);F$;
1825 IF LEN(F$)=1 THEN PRINT" ";
183Ø NEXT
184Ø IF P=1 THEN TB=FST-F(S,P)-5
185Ø IF P=2 THEN TB=F(S,P)-FST+5
186Ø PRINT"{HOME}{8 CRSR DNs}";
187Ø IF TB>=5 AND TB<36 THEN PRINT TAB(TB);"{CTRL 3}{SH
     FT X}{CTRL 2}";
188Ø IF TB+1Ø>=5 AND TB+1Ø<36 THEN PRINT TAB(TB+1Ø);"{C
     TRL 3}{SHFT X}{CTRL 2}";
189Ø IF P=1 THEN TB=YD-F(S,P)+5
19ØØ IF P=2 THEN TB=F(S,P)-YD+5
191Ø PRINT "{HOME}{1Ø CRSR DNs}{CTRL 3}";TAB(TB);P$(P);
     "{CTRL 2}"
192Ø RETURN
193Ø REM
194Ø REM MOVE PLAYER
195Ø REM
196Ø IF P=1 THEN TB=YD-F(S,P)+5
197Ø IF P=2 THEN TB=F(S,P)-YD+5
198Ø PRINT"{HOME}{1Ø CRSR DNs}";TAB(TB);" ";
199Ø YD=YD+X
2ØØØ IF P=1 THEN TB=YD-F(S,P)+5
2Ø1Ø IF P=2 THEN TB=F(S,P)-YD+5
2Ø2Ø IF TB<5 OR TB>35 THEN GOSUB 166Ø:RETURN
2Ø3Ø FOR J=1 TO WT/4:NEXT
2Ø4Ø PRINT"{HOME}{1Ø CRSR DNs}{CTRL 3}";TAB(TB);P$(P);"
     {CTRL 2}"
2Ø5Ø RETURN
2Ø6Ø REM
2Ø7Ø REM DISPLAY PLAYS
2Ø8Ø REM
2Ø9Ø PRINT"{SHFT CLR}"
21ØØ PRINT"{8 SPACEs}{CTRL 9}PLAYS{CTRL Ø}"
211Ø PRINT
212Ø PRINT"1 = DRAW"
213Ø PRINT"2 = SWEEP"
214Ø PRINT"3 = SHORT PASS"
215Ø PRINT"4 = LONG PASS"
216Ø PRINT"5 = PUNT(OFFENSE ONLY)"
217Ø PRINT"6 = F.G.(OFFENSE ONLY)"
218Ø PRINT:PRINT"(HIT ANY KEY TO CONT)"
219Ø GET A$:IF A$=""THEN 219Ø
22ØØ PRINT"{SHFT CLR}{CTRL 2}":RETURN
```

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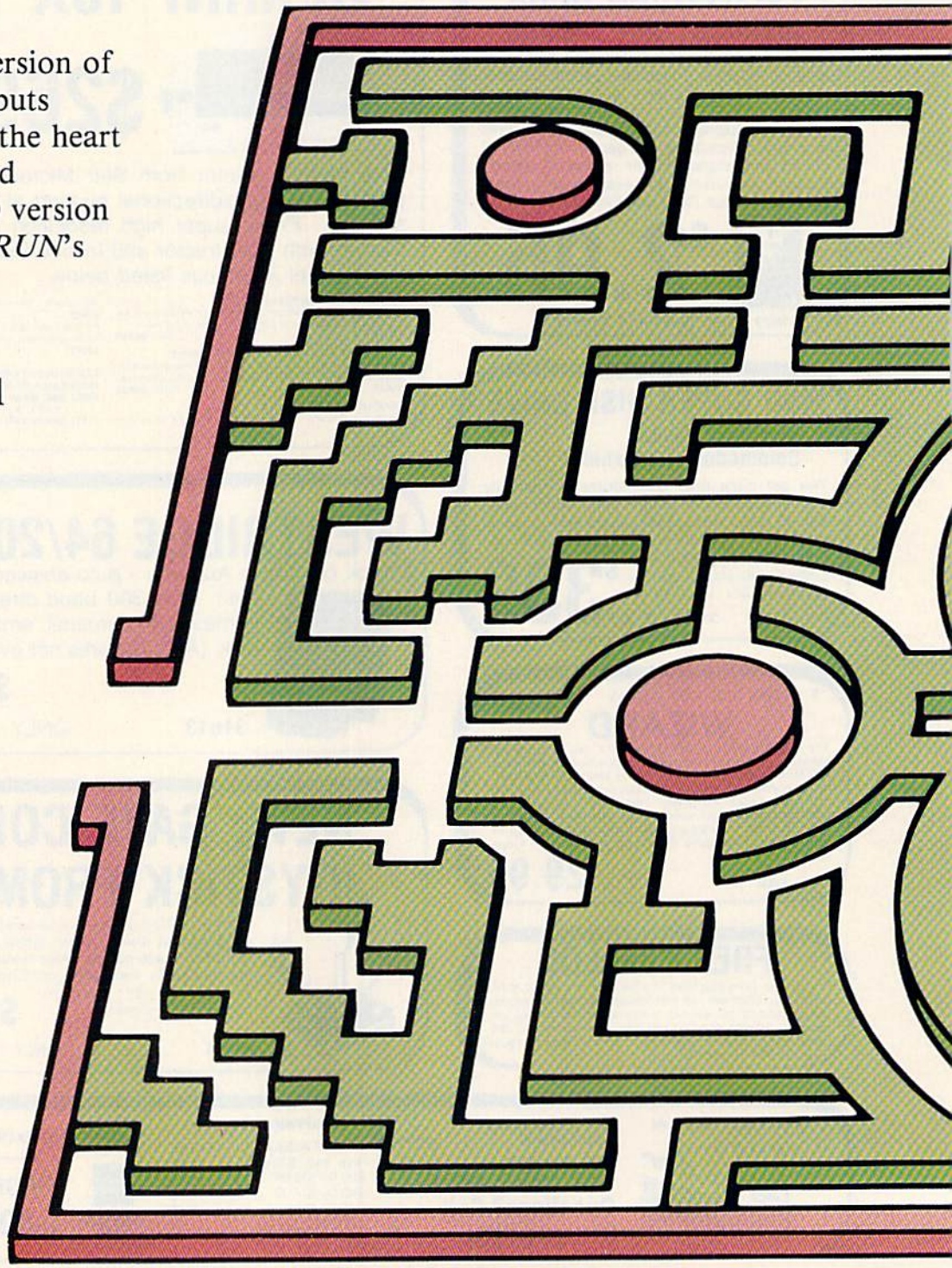
Maze of Intrigue

Here's the C-64 version of the program that puts you right there in the heart of your self-created maze. The VIC-20 version was published in *RUN*'s April issue.

By John Stilwell



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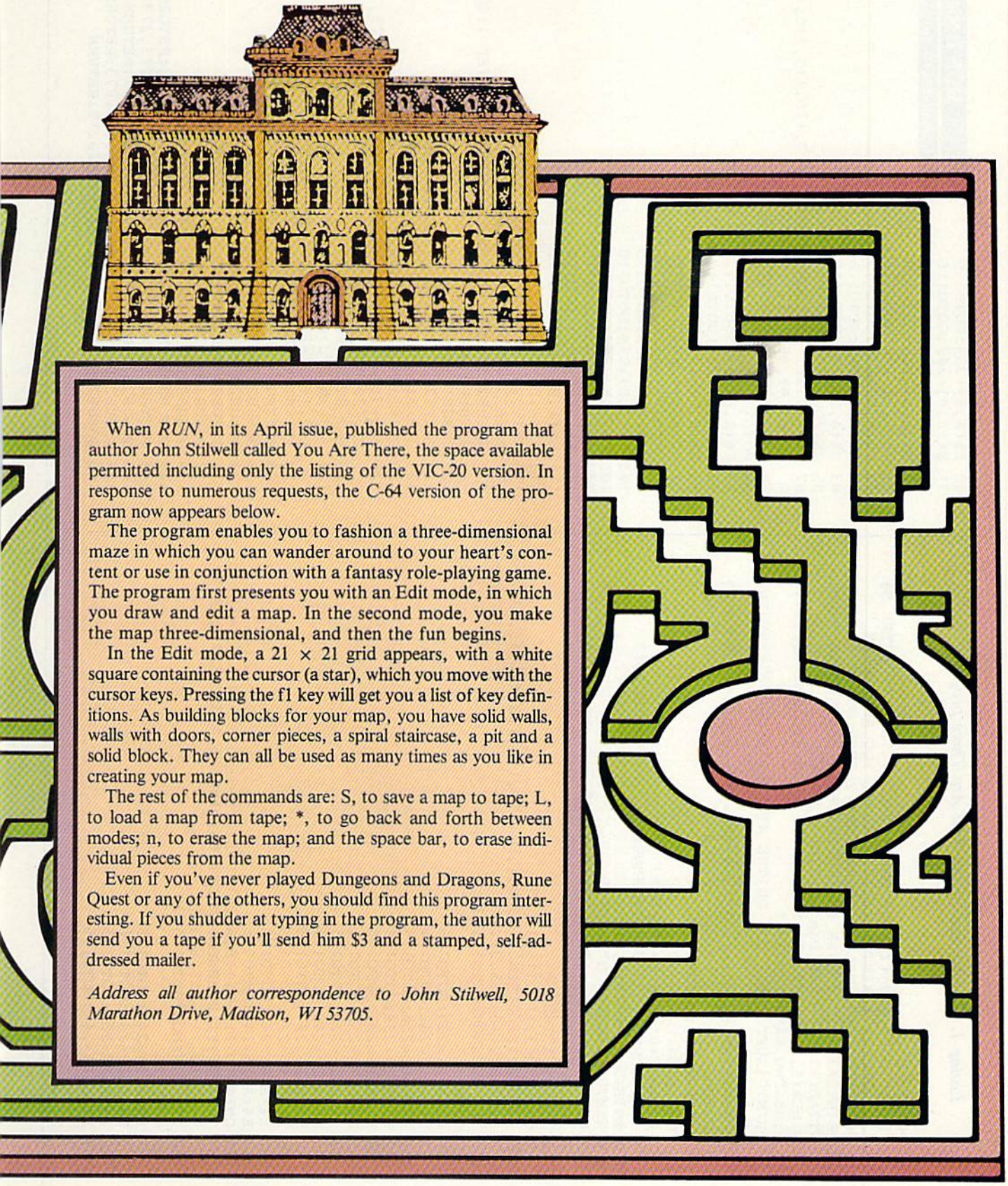

When *RUN*, in its April issue, published the program that author John Stilwell called You Are There, the space available permitted including only the listing of the VIC-20 version. In response to numerous requests, the C-64 version of the program now appears below.

The program enables you to fashion a three-dimensional maze in which you can wander around to your heart's content or use in conjunction with a fantasy role-playing game. The program first presents you with an Edit mode, in which you draw and edit a map. In the second mode, you make the map three-dimensional, and then the fun begins.

In the Edit mode, a 21 × 21 grid appears, with a white square containing the cursor (a star), which you move with the cursor keys. Pressing the f1 key will get you a list of key definitions. As building blocks for your map, you have solid walls, walls with doors, corner pieces, a spiral staircase, a pit and a solid block. They can all be used as many times as you like in creating your map.

The rest of the commands are: S, to save a map to tape; L, to load a map from tape; *, to go back and forth between modes; n, to erase the map; and the space bar, to erase individual pieces from the map.

Even if you've never played Dungeons and Dragons, Rune Quest or any of the others, you should find this program interesting. If you shudder at typing in the program, the author will send you a tape if you'll send him $3 and a stamped, self-addressed mailer.

Address all author correspondence to John Stilwell, 5018 Marathon Drive, Madison, WI 53705.

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Listing 1. C-64 version of the You Are There program.

```
1 POKE53281,1
2 PRINT"{SHFT CLR}{2 CRSR DNs}{CTRL 1}"TAB(13)"{CTRL 9}
  {15 SPACEs}":PRINTTAB(13)"{CTRL 9} YOU ARE THERE "
3 PRINTTAB(13)"{CTRL 9}{15 SPACEs}{2 CRSR DNs}"
4 PRINTTAB(13)"{3 CRSR DNs}COPYRIGHT{2 SPACEs}1982":PRI
  NTTAB(13)"{6 CRSR DNs}BY JOHN STILWELL
5 DIME%(5,5),M%(2Ø,2Ø):FORI=ØTO2Ø:FORJ=ØTO2Ø:M%(I,J)=16
  Ø:N$="NO NAME":NEXTJ,I
6 PRINT"{SHFT CLR}{CRSR DN}THE NEW MAP'S NAME?":INPUTN$
  :G=1
7 Q=3:P=5:Z=Ø:Y=-1:AI=-1:AJ=Ø:DI$="N":GOSUB499:GOSUB5Ø7
  :GOTO9
8 POKE53281,1:GOSUB5Ø4
9 FORA=ØTO4:FORB=-2TO2
11 H=Q+A*Z+B*AI:M=P+A*Y+B*AJ
13 IFH>2ØORM>2ØORH<ØORM<ØTHENE%(B+3,A+1)=Ø:GOTO17
15 E%(B+3,A+1)=M%(H,M)
17 NEXTB,A:IFDI$="N"THEN117.
19 FORA=1TO5:FORB=1TO5:I=E%(A,B)-2Ø3:IFI<1THEN115
21 IFDI$="W"THEN85
23 IFDI$="E"THEN55
25 ONIGOTO43,115,115,35,47
27 I=I-3Ø:IFI>ØTHENONIGOTO51,53,115,115,115,45,115,33,4
   9,41,37,115,115,31,115
28 IFI>ØTHENONIGOTO115,39
29 GOTO115
31 E%(A,B)=239:GOTO115
33 E%(A,B)=242:GOTO115
35 E%(A,B)=25Ø:GOTO115
37 E%(A,B)=234:GOTO115
39 E%(A,B)=2Ø7:GOTO115
41 E%(A,B)=235:GOTO115
43 E%(A,B)=2Ø8:GOTO115
45 E%(A,B)=247:GOTO115
47 E%(A,B)=2Ø4:GOTO115
49 E%(A,B)=241:GOTO115
51 E%(A,B)=244:GOTO115
53 E%(A,B)=243:GOTO115
55 ONIGOTO77,115,115,65,71
57 I=I-3Ø:IFI>ØTHENONIGOTO81,83,115,115,115,73,115,63,7
   9,67,69,115,115,61,115
58 IFI>ØTHENONIGOTO115,75
59 GOTO115
61 E%(A,B)=244:GOTO115
63 E%(A,B)=243:GOTO115
65 E%(A,B)=2Ø4:GOTO115
67 E%(A,B)=242:GOTO115
69 E%(A,B)=239:GOTO115
71 E%(A,B)=2Ø7:GOTO115
73 E%(A,B)=234:GOTO115
75 E%(A,B)=2Ø8:GOTO115
77 E%(A,B)=25Ø:GOTO115
79 E%(A,B)=235:GOTO115
81 E%(A,B)=247:GOTO115
83 E%(A,B)=241:GOTO115
85 ONIGOTO1Ø9,115,115,97,1Ø1
87 I=I-3Ø:IFI>ØTHENONIGOTO111,113,115,115,115,1Ø3,115,9
   3,1Ø7,99,95,115,115,91
88 IFI>ØTHENONIGOTO115,115,1Ø5
89 GOTO115
91 E%(A,B)=234:GOTO115
93 E%(A,B)=235:GOTO115
95 E%(A,B)=247:GOTO115
97 E%(A,B)=2Ø8:GOTO115
99 E%(A,B)=241:GOTO115
1Ø1 E%(A,B)=25Ø:GOTO115
1Ø3 E%(A,B)=244:GOTO115
1Ø5 E%(A,B)=2Ø4:GOTO115
1Ø7 E%(A,B)=243:GOTO115
1Ø9 E%(A,B)=2Ø7:GOTO115
111 E%(A,B)=239:GOTO115
113 E%(A,B)=242
115 NEXTB,A
117 POKE53265,PEEK(53265)AND239
118 GOSUB275:FORA=5TO1STEP-1:FORB=2TO1STEP-1:GOSUB121:N
    EXTB:FORB=-2TOØ
119 GOSUB121:NEXTB,A
12Ø POKE53265,PEEK(53265)OR16:GOTO161
121 D=B+3:J=E%(B+3,A):IFJ=16ØTHENRETURN
123 IFJ=137THENONAGOSUB231,233,235,237,273
125 D=B+3:J=J-2Ø3:IFJ>ØTHENONJGOTO151,129,129,155,157,1
    29,129,129,129,129,153
126 IFJ>ØTHENONJGOTO139
127 J=J-3Ø:IFJ>ØTHENONJGOTO137,147,129,129,129,135,129,
    141,145,143,133,129,129
128 IFJ>ØTHENONJGOTO131,129,129,149
129 RETURN
131 GOSUB223:RETURN
133 GOSUB225:RETURN
135 GOSUB227:RETURN
137 GOSUB229:RETURN
139 ONAGOSUB239,241,243,245,273:RETURN
141 GOSUB223:ONAGOSUB247,249,251,273,273:RETURN
143 GOSUB225:D=B+3:ONAGOSUB273,253,261,273,273:RETURN
145 GOSUB227:ONAGOTO273,247,249,251,273:RETURN
147 GOSUB229:ONAGOSUB273,263,265,273,273:RETURN
149 GOSUB229:GOSUB227:D=B+3:GOSUB215:RETURN
```

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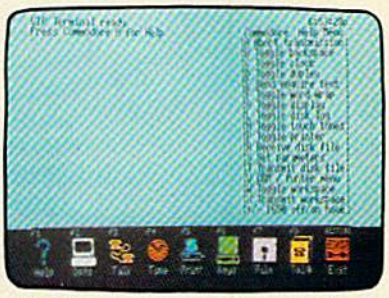

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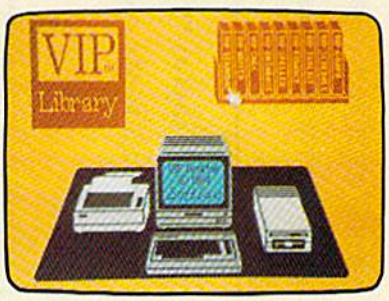

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Listing continued.

```
151 GOSUB225:D=B+3:IFD<>ØTHEN:GOSUB227:D=B+3:GOSUB219:R
    ETURN
153 GOSUB223:GOSUB225:D=B+3:GOSUB229:GOSUB227:GOSUB215:
    GOSUB219:RETURN
155 GOSUB223:GOSUB225:RETURN
157 GOSUB223:GOSUB229
159 RETURN
161 GETA$:PRINT"{HOME}{CRSR DN}"TAB(1Ø)""DI$:IFA$=""THE
    N161
163 IFA$="N"THENZ=Ø:Y=-1:AI=-1:AJ=Ø:DI$="N":GOTO9
165 IFA$=DI$THEN161
167 IFA$=" "THEN655
169 IFA$="{FUNCT 7}"THEN659
171 IFA$="*"THEN8
173 IFA$="E"THENZ=1:Y=Ø:AI=Ø:AJ=-1:DI$="E":GOTO9
175 IFA$="S"THENZ=Ø:Y=1:DI$="S":AI=1:AJ=Ø:GOTO9
177 IFA$="{FUNCT 2}"THENDC=4:GOSUB645
179 IFA$="{FUNCT 4}"THENDC=6:GOSUB645
181 IFA$="{FUNCT 6}"THENDC=2Ø:GOSUB645
183 IFA$="{FUNCT 5}"THENDC=1Ø:GOSUB645
185 IFA$="{FUNCT 8}"THENDC=1ØØ:GOSUB645
187 IFA$="{FUNCT 1}"THENGOSUB441
189 IFA$="{FUNCT 3}"THENGOSUB411
191 IFA$="W"THENZ=-1:Y=Ø:DI$="W":AI=Ø:AJ=1:GOTO9
193 GOTO161
195 RETURN
197 ONDGOTO273,273,359,357,273,273
199 ONDGOTO273,351,353,345,273
2Ø1 ONDGOTO273,273,347,341,273,273
2Ø3 ONDGOTO273,327,331,321,319,273
2Ø5 ONDGOTO273,335,337,325,159
2Ø7 ONDGOTO273,3Ø7,311,3Ø1,297,273
2Ø9 ONDGOTO3Ø9,315,317,3Ø5,299
211 ONDGOTO273,287,293,283,279,273
213 ONDGOTO285,289,295,281,277
215 K=E%(D-1,A):IFK=239ORK=2Ø4ORK=214ORK=25ØTHENONAGOTO
    273,255,257,259,273
217 RETURN
219 D=B+4:IFD<6THENK=E%(D,A):D=D-1
22Ø IFK=239ORK=2Ø4ORK=214ORK=25ØTHENONAGOTO273,267,269,
    271,273
221 RETURN
223 ONAGOTO199,2Ø5,2Ø9,213,159
225 D=B+4:ONAGOTO197,2Ø1,2Ø3,2Ø7,211
227 ONAGOTO159,199,2Ø5,2Ø9,213,159
229 ONAGOTO197,2Ø1,2Ø3,2Ø7,211
231 ONDGOTO273,273,485,273,273
233 ONDGOTO273,273,481,273,273
235 ONDGOTO273,477,475,473,273
237 ONDGOTO471,469,465,461,463
239 ONDGOTO273,421,411,4Ø9,273
241 ONDGOTO273,4Ø7,4Ø3,4Ø1,273
243 ONDGOTO399,397,393,391,389
245 ONDGOTO379,377,365,363,361
247 ONDGOTO273,273,441,273,273
249 ONDGOTO273,439,435,433,273
251 ONDGOTO273,429,427,425,273
253 ONDGOTO273,459,457,273,273
255 ONDGOTO273,273,367,273,273
257 ONDGOTO273,273,369,273,273
259 ONDGOTO273,371,373,273,273
261 ONDGOTO453,451,447,445,273
263 ONDGOTO273,273,459,457,273
265 ONDGOTO273,453,451,447,445
267 ONDGOTO273,273,381,273,273
269 ONDGOTO273,273,383,273,273
271 ONDGOTO273,273,385,387,273
273 RETURN
275 PRINT"{SHFT CLR}":RETURN
277 PRINT"{HOME}"TAB(255)TAB(121)"{3 COMD Ts}{SHFT P}{C
    RSR DN}{4 CRSR LFs}{3 COMD @s}{SHFT @}":RETURN
279 PRINT"{HOME}"TAB(255)TAB(125)"{CTRL 9}{COMD *}{CRSR
     DN}{CRSR LF}{CTRL Ø}{SHFT LB.}":RETURN
281 PRINT"{HOME}"TAB(255)TAB(125);:GOTO291
283 PRINT"{HOME}"TAB(255)TAB(13Ø)"{CTRL 9}{COMD *}{CRSR
     DN}{CRSR LF}{CTRL Ø}{SHFT LB.}":RETURN
285 PRINT"{HOME}"TAB(255)TAB(137)"{SHFT O}{3 COMD Ts}{C
    RSR DN}{4 CRSR LFs}{SHFT L}{3 COMD @s}":RETURN
287 PRINT"{HOME}"TAB(255)TAB(136)"{CTRL 9}{SHFT LB.}{CR
    SR DN}{CRSR LF}{CTRL Ø}{COMD *}":RETURN
289 PRINT"{HOME}"TAB(255)TAB(132);
291 PRINT"{SHFT O}{3 COMD Ts}{SHFT P}{CRSR DN}{5 CRSR L
    Fs}{SHFT L}{3 COMD @s}{SHFT @}":RETURN
293 PRINT"{HOME}"TAB(255)TAB(131)"{CTRL 9}{SHFT LB.}{CR
    SR DN}{CRSR LF}{CTRL Ø}{COMD *}":RETURN
295 PRINT"{HOME}"TAB(255)TAB(13Ø)"{SHFT O}{SHFT P}{CRSR
     DN}{2 CRSR LFs}{SHFT L}{SHFT @}":RETURN
297 PRINT"{HOME}"TAB(255)TAB(42);:GOTO3Ø3
299 PRINT"{HOME}"TAB(255)TAB(41)"{COMD T}{SHFT P}{CRSR
    DN}{CRSR LF}{COMD M}{CRSR DN}{2 CRSR LFs} {COMD M}{
    CRSR DN}{2 CRSR LFs} {COMD M}{CRSR DN}{CRSR LF}{COM
    D M}{CRSR DN}{2 CRSR LFs}{COMD @}{SHFT @}":RETURN
3Ø1 PRINT"{HOME}"TAB(255)TAB(47);
3Ø3 PRINT"{COMD M}{SHFT M}{CRSR DN}{CRSR LF}{COMD G}{SH
    FT M}{CRSR DN}{2 CRSR LFs}{COMD G}{COMD M}{CRSR DN}
    {2 CRSR LFs}{COMD G}{COMD M}{CRSR DN}{2 CRSR LFs}{C
    OMD G}{SHFT N}{CRSR DN}{3 CRSR LFs}{COMD M}{SHFT N}
    ":RETURN
3Ø5 PRINT"{HOME}"TAB(255)TAB(43)"{SHFT O}{3 COMD Ts}{SH
    FT P}":FORI=1TO4:PRINTTAB(3)"{COMD G}{3 SPACEs}{COM
    D M}"
```

→

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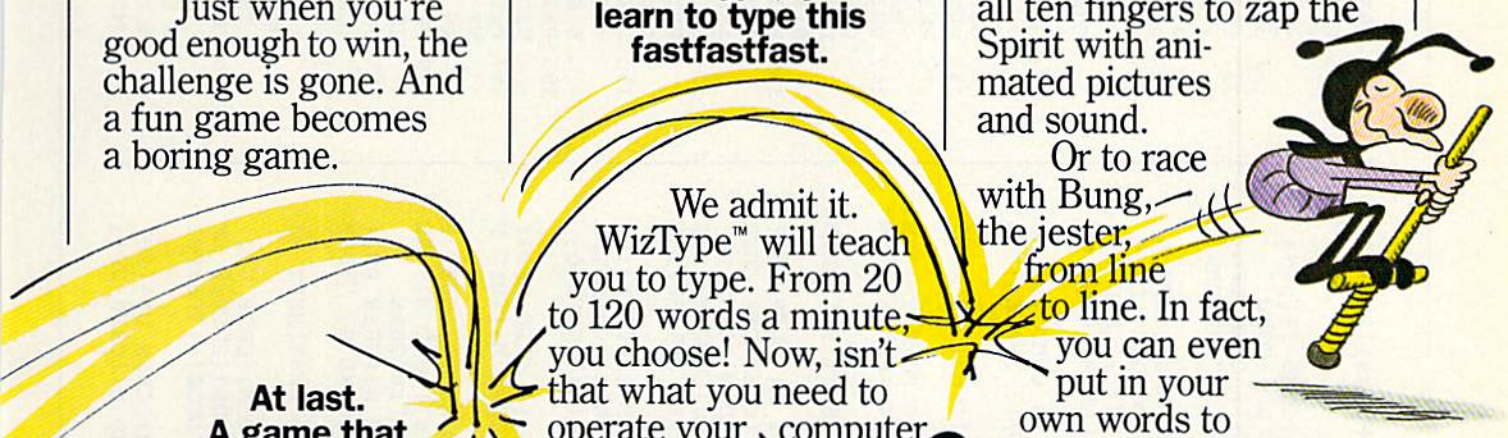

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Listing continued.

```
306 NEXTI:PRINT"{3 CRSR RTs}{SHFT L}{3 COMD @s}{SHFT @}
    ":RETURN
307 PRINT"{HOME}"TAB(255)TAB(58);:GOTO313
309 PRINT"{HOME}"TAB(255)TAB(59)"{SHFT O}{COMD T}{CRSR
    DN}{2 CRSR LFs}{COMD G}{CRSR DN}{CRSR LF}{COMD G} {
    CRSR DN}{2 CRSR LFs}{COMD G} {CRSR DN}{2 CRSR LFs}{
    COMD G}{CRSR DN}{CRSR LF}{SHFT L}{COMD @}":RETURN
311 PRINT"{HOME}"TAB(255)TAB(53);
313 PRINT"{SHFT N}{COMD G}{CRSR DN}{3 CRSR LFs}{SHFT N}
    {COMD M}{CRSR DN}{2 CRSR LFs}{COMD G}{COMD M}{CRSR
    DN}{2 CRSR LFs}{COMD G}{COMD M}{CRSR DN}{2 CRSR LFs
    }{SHFT M}{COMD M}{CRSR DN}{CRSR LF}{SHFT M}{COMD G}
    ":RETURN
315 PRINT"{HOME}"TAB(255)TAB(54)"{SHFT O}{3 COMD Ts}{SH
    FT P}":FORI=1TO4:PRINTTAB(14)"{COMD G}{3 SPACEs}{CO
    MD M}"
316 NEXTI:PRINTTAB(14)"{SHFT L}{3 COMD @s}{SHFT @}":RET
    URN
317 PRINT"{HOME}"TAB(255)TAB(48)"{SHFT O}{4 COMD Ts}{SH
    FT P}":FORI=1TO4:PRINTTAB(8)"{COMD G}{4 SPACEs}{COM
    D M}"
318 NEXTI:PRINTTAB(8)"{SHFT L}{4 COMD @s}{SHFT @}":RETU
    RN
319 PRINT"{HOME}{CRSR RT}{5 CRSR DNs}{SHFT M}{CRSR DN}{
    SHFT M}{CRSR DN}{2 CRSR LFs} {COMD M}{CRSR DN}{CRSR
     LF}{COMD M}{CRSR DN}{2 CRSR LFs} {COMD M}{CRSR DN}
    {2 CRSR LFs} {COMD M}{CRSR DN}{CRSR LF}{COMD M}{CRS
    R DN}{2 CRSR LFs} {COMD M}{CRSR DN}{CRSR LF}{SHFT N
    }{CRSR DN}{2 CRSR LFs}{SHFT N}":RETURN
321 PRINT"{HOME}"TAB(4)"{4 CRSR DNs}{COMD M}{SHFT M}{CR
    SR DN}{CRSR LF}{COMD G}{SHFT M}{CRSR DN}{2 CRSR LFs
    }{COMD G} {SHFT M}":FORI=1TO6:PRINTTAB(5)"{COMD G}
    {COMD M}":NEXTI
323 PRINTTAB(5)"{COMD G} {SHFT N}{CRSR DN}{3 CRSR LFs}{
    COMD G}{SHFT N}{CRSR DN}{3 CRSR LFs}{COMD M}{SHFT N
    }":RETURN
325 PRINT"{HOME}{CRSR RT}{4 CRSR DNs}{3 COMD Ts}{SHFT P
    }":FORI=1TO10:PRINT"{CRSR RT}{3 SPACEs}{COMD M}":NE
    XTI:PRINT"{CRSR RT}{3 COMD @s}{SHFT @}":RETURN
327 PRINT"{HOME}"TAB(20)"{5 CRSR DNs}{SHFT N}{CRSR DN}{
    2 CRSR LFs}{SHFT N}{CRSR DN}{CRSR LF}{COMD G} ":FOR
    I=1TO4:PRINTTAB(19)"{COMD G} ":NEXTI
329 PRINTTAB(19)"{COMD G} {CRSR DN}{2 CRSR LFs}{SHFT M}
    {CRSR DN}{SHFT M}":RETURN
331 PRINT"{HOME}"TAB(14)"{6 CRSR DNs}{SHFT N}{CRSR UP}{
    SHFT N}{CRSR UP}{SHFT N}{COMD G}{CRSR DN}{2 CRSR LF
    s}{COMD M}{CRSR DN}{CRSR LF}{COMD M}":FORI=1TO6:PRI
    NTTAB(14)"{COMD G} {COMD M}":NEXTI
333 PRINTTAB(14)"{SHFT M}{CRSR DN}{SHFT M}{CRSR DN}{SHF
    T M}{COMD G}{CRSR UP}{2 CRSR LFs}{COMD M}{CRSR UP}{
    CRSR LF}{COMD M}":RETURN
335 PRINT"{HOME}"TAB(17)"{4 CRSR DNs}{SHFT O}{3 COMD Ts
    }":FORI=1TO10:PRINTTAB(17)"{COMD G}{3 SPACEs}":NEXT
    I
336 PRINTTAB(17)"{SHFT L}{3 COMD @s}":RETURN
337 PRINT"{HOME}"TAB(5)"{4 CRSR DNs}{SHFT O}{10 COMD Ts
    }{SHFT P}":FORI=1TO10:PRINTTAB(5)"{COMD G}{10 SPACE
    s}{COMD M}":NEXTI
339 PRINTTAB(5)"{SHFT L}{10 COMD @s}{SHFT @}":RETURN
341 PRINT"{HOME}{CRSR DN}{CRSR RT}{COMD M}{SHFT M}{CRSR
     DN}{CRSR LF}{COMD G}{SHFT M}{CRSR DN}{2 CRSR LFs}{
    COMD G} {SHFT M}":FORI=1TO12:PRINT"{2 CRSR RTs}{COM
    D G} {COMD M}":NEXTI
343 PRINT"{2 CRSR RTs}{COMD G} {SHFT N}{CRSR DN}{3 CRSR
     LFs}{COMD G}{SHFT N}{CRSR DN}{3 CRSR LFs}{COMD M}{
    SHFT N}":RETURN
345 PRINT"{HOME}{CRSR DN}{CRSR RT}{SHFT P}":FORI=1TO16:
    PRINT"{CRSR RT}{COMD M}":NEXTI:PRINT"{CRSR RT}{SHFT
     @}":RETURN
347 PRINT"{HOME}"TAB(17)"{3 CRSR DNs}{SHFT N} {COMD M}{
    CRSR UP}{2 CRSR LFs}{SHFT N}{COMD M}{CRSR UP}{CRSR
    LF}{SHFT N}{COMD G}{2 CRSR DNs}":FORI=1TO12:PRINTTA
    B(17)"{COMD G} {COMD M}":NEXTI
349 PRINTTAB(17)"{SHFT M} {COMD M}{CRSR DN}{2 CRSR LFs}
    {SHFT M}{COMD M}{CRSR DN}{CRSR LF}{SHFT M}{COMD G}"
    :RETURN
351 PRINT"{HOME}"TAB(20)"{CRSR DN}{SHFT O}":FORI=1TO16:
    PRINTTAB(20)"{COMD G}":NEXTI:PRINTTAB(20)"{SHFT L}"
    :RETURN
353 PRINT"{HOME}{2 CRSR RTs}{CRSR DN}{SHFT O}{16 COMD T
    s}{SHFT P}":FORI=1TO16:PRINT"{2 CRSR RTs}{COMD G}{1
    6 SPACEs}{COMD M}":NEXT
355 PRINT"{2 CRSR RTs}{SHFT L}{16 COMD @s}{SHFT @}":RET
    URN
357 PRINT"{HOME}{CRSR RT}{SHFT M}":FORI=1TO18:PRINT"{CR
    SR RT}{COMD M}":NEXTI:PRINT"{CRSR RT}{SHFT N}":RETU
    RN
359 PRINT"{HOME}"TAB(20)"{SHFT N}":FORI=1TO18:PRINTTAB(
    20)"{COMD G}":NEXTI:PRINTTAB(20)"{SHFT M}":RETURN
361 PRINT"{HOME}"TAB(255)TAB(201)"{3 COMD Ts}{SHFT LB.}
    {CRSR DN}{4 CRSR LFs}{2 COMD @s}{SHFT N}":RETURN
363 PRINT"{HOME}"TAB(255)TAB(203)"{CRSR DN}{SHFT N}{CRS
    R DN}{CRSR LF}{COMD T}{CRSR UP}{COMD @}{SHFT L}{2 C
    OMD @s}{CRSR UP}{4 CRSR LFs}{SHFT N}{SHFT O}{3 COMD
     Ts}{SHFT LB.}{CRSR DN}{2 CRSR LFs}{SHFT N}":RETURN
365 PRINT"{HOME}"TAB(255)TAB(208)"{CRSR DN}{SHFT N}{CRS
    R DN}{CRSR LF}{COMD T}{CRSR UP}{COMD @}{SHFT L}{SHF
    T @}{COMD @}{CRSR UP}{4 CRSR LFs}{SHFT N}{SHFT O}{S
    HFT P}{SHFT M}{CRSR DN}{SHFT M}{CRSR DN}{CRSR LF}{C
    OMD T}":RETURN
```

→

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SOFTWARE FOR C-64

Business

Multiplan (Spreadsheet)	$	63.00
Calc Result (Easy)	$	45.00
Calc Result (Advanced)	$	95.00
Superbase 64	$	95.00
Mirage Concepts (Data Base)	$	89.00
Mirage Concepts (Word Processor) (40/80 clm & 30K Dictionary)	$	89.00
Mirage Concepts (Report Generator)	$	49.00
Home Accountant (Continental)	$	49.00
Tax Advantage (Continental)	$	39.00
Southern Solutions Accounting G/L, A/R, A/P, P/R, I/M ..... each	$	69.95

Utilities

Disk Utility Program (Fast Copy, File Copy, Disassembler & more)	$	49.00
Smart + 64 Terminal	$	49.00
TOOL 64	$	39.95
Simon's Basic	$	39.95
80 Column Expander (Cartridge)	$	60.00

ACCESSORIES

Solo Flight (Simulator)	$	34.95
Hellcat Avenger	$	34.95
CBM 1541 (new version)	$	269.00
MSD Super Disk (Single)	$	355.00
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1600 Modem	$	63.00
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Printer Utility Program (Cardco)	$	19.95
64 Relay Cartridge	$	45.00
Numeric Key Pad	$	49.00
Alien Voice Box (Talks & Sings)	$	119.00
When I'm 64 (Voice Box Sings)	$	35.00
Voice Box Dictionary	$	35.00
Texas Instruments LCD Programmer	$	55.95
Verbatim Diskettes:		
Single Sided/Single Density	$	26.00
Single Sided/Double Density	$	30.00
Double Sided/Double Density	$	42.00
Vic 20:		
3-Slot Expander	$	39.00
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16K Memory	$	79.95
CBM 4023 Ribbons	$	9.95
CBM 8023 Ribbons	$	9.95
Flip N' File 10, 15, 25, 50		Call
Power Strips w/surge stopper		Call
Computer Care Kit	$	19.95
Disk Cleaning Kit	$	12.95

INTERFACES

Superbox (Transparent IEEE, 3-Slot, Reset)	$	139.95
Interpod (Intelligent IEEE & RS-232)	$	139.95
The Connection (By Tymac) (Commodore Graphics + 2K Buffer)	$	95.00
Cardco + G Parallel Interface	$	89.00
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IEEE to Centroonics	$	149.95
Pet-to-IEEE Cable	$	39.00
IEEE-to-IEEE Cable	$	49.00
4 Prong A/V Cable	$	15.00
Centronics Cable (male to male)	$	34.95
RS232 Cable (male to male)	$	31.95
Networking for C-64 & CBM Equipment		Call

MONITORS

CBM 1702 Color Monitor	$	269.00
Panasonic TR-120 (Green)	$	142.00
Panasonic TR-120 (Amber)	$	156.00
Panasonic DT-1300 Color	$	425.00
Monitor Stand (Tilt & Swivel)	$	29.95
RGB Monitor Cable:		
ET-100C (Apple)	$	33.80
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LETTER QUALITY PRINTERS

CBM 6400 Printer	$	1425.00
Abati (20 CPS)	$	475.00
Cardco LQ/1 Printer	$	495.00
NEC Spinwriter		Call

DOT MATRIX PRINTERS

CBM 4023 (100 CPS)	$	499.00
CBM 8023 (160 CPS)	$	799.00
Panasonic KX-P1090 (100 CPS)	$	285.00
Panasonic KX-P1091 (120 CPS)	$	325.00
Panasonic KX-P1092 (180 CPS)		CALL
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Executive 64 Portable	$	995.00
B128-80 (128K 80 column)	$	695.00
SuperPet (5 languages)	$	1495.00
CBM 8032	$	995.00
CBM 8096	$	1495.00
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CBM 8050 Dual Disk 1 meg	$	1295.00
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Listing continued.

```
367 PRINT"{HOME}"TAB(6Ø)"{SHFT O}"TAB(255)TAB(255)TAB(2
    Ø5)"{SHFT L}":RETURN
369 PRINT"{HOME}"TAB(177)"{SHFT O}"TAB(377)TAB(234)"{SH
    FT L}":RETURN
371 PRINT"{HOME}"TAB(255)TAB(59)"{SHFT O}"TAB(219)"{SHF
    T L}":RETURN:REM *** HERE ***
373 PRINT"{HOME}"TAB(255)TAB(54)"{SHFT O}"TAB(229)"{SHF
    T L}":RETURN
375 RETURN
377 PRINT"{HOME}"TAB(255)TAB(212)"{COMD *}{3 COMD Ts}{S
    HFT P}{SHFT M}{CRSR DN}{SHFT M}{6 CRSR LFs}{SHFT M}
    {2 COMD @s}{SHFT @}{COMD @}{CRSR DN}{COMD T}{CRSR U
    P}{CRSR LF}{SHFT M}":RETURN
379 PRINT"{HOME}"TAB(255)TAB(213)"{4 CRSR RTs}{COMD *}{
    3 COMD Ts}{CRSR DN}{3 CRSR LFs}{SHFT M}{2 COMD @s}"
    :RETURN
381 PRINT"{HOME}"TAB(246)"{SHFT P}"TAB(255)TAB(251)"{SH
    FT @}": RETURN:REM***** OK DOWN ****
383 PRINT"{HOME}"TAB(164)"{SHFT P}"TAB(255)TAB(2Ø4)"{SH
    FT @}":RETURN
385 PRINT"{HOME}"TAB(255)TAB(52)"{SHFT P}"TAB(216)"{SHF
    T @}":RETURN
387 PRINT"{HOME}"TAB(255)TAB(42)"{SHFT P}"TAB(217)"{SHF
    T @}":RETURN
389 PRINT"{HOME}{CRSR RT}{2 CRSR DNs}"TAB(255)TAB(2Ø1)"
    {COMD T}{SHFT LB.}{CRSR DN}{2 CRSR LFs}{SHFT N}":RE
    TURN:REM **** NEXT OK ****
391 PRINT"{HOME}{2 CRSR RTs}{2 CRSR DNs}"TAB(255)TAB(2Ø
    2)"{SHFT N}{SHFT O}{3 COMD Ts}{CRSR DN}{6 CRSR LFs}
    {SHFT N} {COMD G}{2 SPACEs}{CRSR DN}{5 CRSR LFs}{2
    COMD @s}{SHFT L}{COMD @}{SHFT N}{CRSR UP}{SHFT N}{C
    RSR UP}{SHFT LB.}{3 CRSR DNs}":RETURN
393 PRINT"{HOME}"TAB(255)TAB(2Ø5)"{4 CRSR DNs}{SHFT N}{
    CRSR DN}{CRSR LF}{COMD T}{CRSR UP}{2 COMD @s}{SHFT
    L}{4 COMD @s}{SHFT @}{2 COMD @s}{CRSR DN}{COMD T}{C
    RSR LF}{CRSR UP}{SHFT M}{CRSR UP}{11 CRSR LFs}";
394 PRINT"{SHFT N} {COMD G}{4 SPACEs}{COMD M} {SHFT M}{
    CRSR UP}{9 CRSR LFs}{SHFT N}{SHFT O}{4 COMD Ys}{SHF
    T P}{SHFT M}"
395 RETURN
397 PRINT"{HOME}"TAB(255)TAB(174)"{3 CRSR DNs}{COMD *}{
    CRSR DN}{SHFT M}{CRSR DN}{SHFT M}{2 CRSR UPs}{2 CRS
    R LFs}{3 COMD Ts}{SHFT P}{SHFT M}{CRSR DN}{4 CRSR L
    Fs}{2 SPACEs}{COMD M} {SHFT M}{CRSR DN}{4 CRSR LFs}
    {COMD @}{SHFT @}{2 COMD @s}":RETURN
399 PRINT"{HOME}"TAB(255)TAB(179)"{3 CRSR DNs}{COMD *}{
    CRSR DN}{SHFT M}{CRSR UP}{CRSR LF}{COMD T}":RETURN
4Ø1 PRINT"{HOME}{CRSR RT}"TAB(255)TAB(2Ø1)"{5 CRSR DNs}
    {3 COMD Ts}{SHFT LB.}{CRSR DN}{4 CRSR LFs}{2 SPACEs
    }{SHFT N}{CRSR DN}{3 CRSR LFs}{COMD @}{SHFT N}":RET
    URN
4Ø3 PRINT"{HOME}"TAB(255);
4Ø4 PRINTTAB(2Ø4)"{5 CRSR DNs}{SHFT N}{SHFT O}{1Ø COMD
    Ys}{SHFT P}{SHFT M}{CRSR DN}{15 CRSR LFs}{SHFT N} {
    COMD G}{1Ø SPACEs}{COMD M} {SHFT M}
4Ø5 PRINT"{2 CRSR RTs}{SHFT N}{CRSR DN}{CRSR LF}{COMD T
    }{CRSR UP}{2 COMD Ps}{SHFT L}{1Ø COMD Ps}{SHFT @}{2
     COMD Ps}{CRSR DN}{COMD T}{CRSR LF}{CRSR UP}{SHFT M
    }":RETURN
4Ø7 PRINT"{HOME}"TAB(255)TAB(177)"{6 CRSR DNs}{COMD *}{
    3 COMD Ts}{CRSR DN}{3 CRSR LFs}{SHFT M}{CRSR DN}{SH
    FT M}{COMD @}":RETURN
4Ø9 PRINT"{HOME}"TAB(255)TAB(255)TAB(241)"{CRSR DN}{SHF
    T LB.}":RETURN
411 POKE53265,PEEK(53265)OR16
412 PRINT"{HOME}"TAB(255)TAB(241)"{7 CRSR DNs}{SHFT N}{
    SHFT O}{16 COMD Ys}{SHFT P}{SHFT M}":FORJ=1TO7:GOSU
    B665
413 GOSUB667:NEXTJ:PRINT"{HOME}"TAB(255)TAB(2Ø1)"{5 CRS
    R DNs}{COMD T}{SHFT O}{16 COMD Ys}{SHFT P}{COMD T}"
    :GOSUB665
415 PRINT"{CRSR UP}{2 SPACEs}{CRSR UP}{CRSR LF}{SHFT M}
    {18 SPACEs}{SHFT N}{CRSR DN}{CRSR LF} ":GOSUB665
417 PRINT"{6 CRSR DNs}":FORJ=1TO15:GOSUB667:GOSUB665:NE
    XTJ
419 PRINT" {CRSR DN}{SHFT N}{CRSR UP}{SHFT L}{16 COMD P
    s}{SHFT @}{CRSR DN}{SHFT M}{4 CRSR DNs}":RETURN
421 PRINT"{HOME}"TAB(255)TAB(255)TAB(22Ø)"{2 CRSR DNs}{
    COMD *}{HOME}":RETURN
423 REM**** START DOORS *****
425 PRINT"{HOME}"TAB(255)TAB(125);:GOTO431
427 PRINT"{HOME}"TAB(255)TAB(13Ø);:GOTO431
429 PRINT"{HOME}"TAB(255)TAB(136);:GOTO431
431 PRINT"{COMD @}{CRSR DN}{2 CRSR LFs}{COMD M} {COMD G
    }{CRSR DN}{3 CRSR LFs}{COMD M}'{COMD G}{CRSR DN}{3
    CRSR LFs}{SHFT @}{COMD @}{SHFT L}":RETURN
433 PRINT"{HOME}"TAB(255)TAB(12Ø)"{CRSR RT}{COMD @}{CRS
    R DN}{COMD G}{CRSR DN}{2 CRSR LFs} {COMD G}{CRSR DN
    }{2 CRSR LFs} {COMD G}{CRSR DN}{2 CRSR LFs}'{COMD G
    }{CRSR DN}{2 CRSR LFs} {COMD G}{CRSR DN}{2 CRSR LFs
    }{COMD @}{SHFT L}":RETURN
435 PRINT"{HOME}"TAB(255)TAB(13Ø)"{2 COMD @s}{CRSR DN}{
    3 CRSR LFs}{COMD M}{2 SPACEs}{COMD G}{CRSR DN}{4 CR
    SR LFs}{COMD M}{2 SPACEs}{COMD G}{CRSR DN}{4 CRSR L
    Fs}{COMD M}{2 SPACEs}{COMD G}{CRSR DN}{4 CRSR LFs}{
    COMD M} '{COMD G}{CRSR DN}{4 CRSR LFs}{COMD M}{2 SP
    ACEs}{COMD G}";
437 PRINT"{CRSR DN}{4 CRSR LFs}{SHFT @}{2 COMD @s}{SHFT
     L}":RETURN
```

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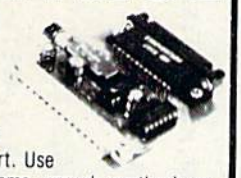
Circle 248 on Reader Service card.

C-64 / VIC-20 **RS-232**

INTERFACE

$ 39 95

MFJ-1238



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C-64/VIC-20

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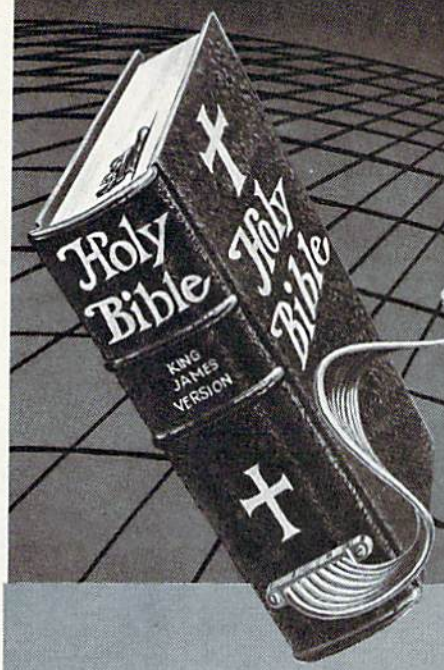

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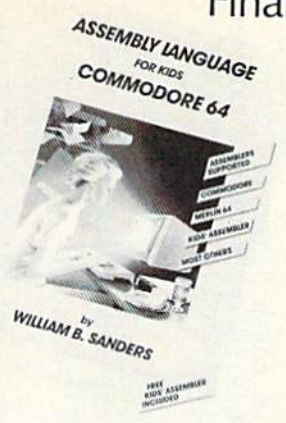
```
439 PRINT"{HOME}"TAB(255)TAB(18Ø)"{COMD M}{CRSR DN}{CRS
    R LF}{COMD M}{CRSR DN}{CRSR LF}{COMD M}{CRSR DN}{CR
    SR LF}{COMD M}{CRSR DN}{CRSR LF}{COMD M}{CRSR DN}{C
    RSR LF}{SHFT @}":RETURN
441 PRINT"{HOME}"TAB(255)TAB(168)"{SHFT O}{2 COMD Ts}{S
    HFT P}{CRSR DN}{CRSR LF}{COMD M}{CRSR DN}{CRSR LF}{
    COMD M}{CRSR DN}{CRSR LF}{COMD M}{CRSR DN}{2 CRSR L
    Fs}{SHFT N}{COMD M}{CRSR DN}{CRSR LF}{COMD M}{CRSR
    DN}{CRSR LF}{COMD M}{CRSR DN}{CRSR LF}{COMD M}{CRSR
     DN}{CRSR LF}{SHFT @}{4 CRSR LFs}{SHFT L}{2 COMD @s
    }{3 CRSR LFs}{CRSR UP}";
443 PRINT"{CRSR LF}{COMD L}{COMD G}{CRSR UP}{CRSR LF}{C
    OMD G}{CRSR UP}{CRSR LF}{COMD G}{CRSR UP}{CRSR LF}{
    COMD G}{CRSR UP}{CRSR LF}{COMD G}{CRSR UP}{2 CRSR L
    Fs}{COMD N}{COMD H}{CRSR UP}{CRSR LF}{COMD G}":RETU
    RN
445 PRINT"{HOME}{CRSR RT}"TAB(255)TAB(161);:GOTO449
447 PRINT"{HOME}"TAB(255)TAB(166);
449 PRINT"{CTRL 9} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF
    }.{CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}{CTRL Ø}{SHF
    T LB.}":RETURN
451 PRINT"{HOME}"TAB(255)TAB(175);:GOTO455
453 PRINT"{HOME}"TAB(255)TAB(18Ø);
455 PRINT"{CTRL 9} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF
    }.{CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}{CTRL Ø}{COM
    D *}":RETURN
457 PRINT"{HOME}"TAB(255)TAB(163)"{CTRL 9} {CRSR DN}{CR
    SR LF} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}.{CRSR
    DN}{CRSR LF} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}
    {CRSR DN}{CRSR LF}{CTRL Ø}{SHFT LB.}":RETURN
459 PRINT"{HOME}"TAB(255)TAB(178)"{CTRL 9} {CRSR DN}{CR
    SR LF} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}.{CRSR
    DN}{CRSR LF} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}
    {CRSR DN}{CRSR LF}{CTRL Ø}{COMD *}":RETURN
461 PRINT"{HOME}"TAB(255)TAB(87);:GOTO467
463 PRINT"{HOME}"TAB(255)TAB(83);:GOTO467
465 PRINT"{HOME}"TAB(255)TAB(91);
467 PRINT"{COMD J}{CRSR DN}{2 CRSR LFs}{CTRL 9}{COMD K}
    {CTRL Ø}{COMD K}{CRSR DN}{2 CRSR LFs}{COMD L}{CRSR
    DN}{CRSR LF}{COMD L}{COMD K}":RETURN
469 PRINT"{HOME}"TAB(255)TAB(95);:GOTO467
471 PRINT"{HOME}"TAB(255)TAB(99);:GOTO467
473 PRINT"{HOME}"TAB(243);:GOTO479
475 PRINT"{HOME}"TAB(249);:GOTO479
477 PRINT"{HOME}{CRSR RT}"TAB(255);
479 PRINT"{SHFT O}{SHFT P}{CRSR DN}{2 CRSR LFs}{SHFT M}
    {COMD M}{CRSR DN}{2 CRSR LFs}{2 COMD Ms}{CRSR DN}{2
     CRSR LFs}{2 COMD Ms}{SHFT P}{CRSR DN}{2 CRSR LFs}{
    SHFT O}{SHFT P}{CRSR DN}{3 CRSR LFs}{SHFT O} {SHFT
    N}{CRSR DN}{3 CRSR LFs}{COMD G}{COMD M}{CRSR DN}{2
    CRSR LFs}{COMD G}{COMD M}{CRSR DN}{2 CRSR LFs}{COMD
     G}{COMD M}{SHFT P}{CRSR DN}{3 CRSR LFs}{SHFT L}{SH
    FT @}{SHFT P}":RETURN
481 PRINT"{HOME}"TAB(169)"{SHFT O}{COMD T}{SHFT P}{3 CR
    SR LFs}{CRSR DN}{COMD G} {COMD M}{CRSR DN}{3 CRSR L
    Fs}{COMD G} {COMD M}{CRSR DN}{3 CRSR LFs}{SHFT M} {
    COMD M}{CRSR DN}{2 CRSR LFs}{COMD G}{COMD M}{CRSR D
    N}{2 CRSR LFs}{COMD G}{COMD M}{SHFT P}{CRSR DN}{3 C
    RSR LFs}{COMD G}";
482 PRINT"{SHFT @}{SHFT P}{CRSR DN}{3 CRSR LFs}{2 COMD
    Gs}{COMD M}{CRSR DN}{3 CRSR LFs}{SHFT O} {SHFT N}{C
    RSR DN}{4 CRSR LFs}{SHFT O} {COMD M}"
483 PRINTTAB(9)"{COMD G} {COMD M}{CRSR DN}{3 CRSR LFs}{
    COMD G} {COMD M}{CRSR DN}{3 CRSR LFs}{COMD G} {COMD
     M}{SHFT P}{CRSR DN}{4 CRSR LFs}{COMD G} {COMD M}{S
    HFT P}{CRSR DN}{4 CRSR LFs}{SHFT L}{COMD @}{2 SHFT
    @s}":RETURN
485 PRINT"{HOME}{2 CRSR RTs}{SHFT M}{7 SPACEs}{COMD M}"
    :FORI=1TO14:PRINT"{3 CRSR RTs}{COMD G}{6 SPACEs}{CO
    MD M}":NEXTI
487 PRINT"{3 CRSR RTs}{COMD G}{6 SPACEs}{COMD M}{SHFT O
    }{3 COMD Ts}{SHFT P}":FORI=1TO3:PRINT"{3 CRSR RTs}{
    COMD G}{6 SPACEs}{COMD M}{COMD G}{3 SPACEs}{COMD M}
    ":NEXTI
489 PRINT"{3 CRSR RTs}{COMD G}{6 SPACEs}{SHFT O}{5 COMD
     Ts}{SHFT P}"
491 J=INT(RND(B)*1ØØ+1):IFJ<11THENPRINT"{HOME}{4 CRSR R
    Ts}{5 CRSR DNs}FRODO{CRSR DN}{5 CRSR LFs}LIVES{3 CR
    SR DNs}{4 CRSR LFs}J.S."
493 RETURN
499 POKE36879,59:K=1:PRINT"{SHFT CLR}":FORI=ØTO2Ø:PRINT
    "":FORJ=ØTO2Ø
5ØØ IFK=1THENK=Ø:PRINT"{CTRL 7}";:GOTO5Ø3
5Ø1 K=1:PRINT"{CTRL 5}";
5Ø3 PRINT"{CTRL 9} ";:NEXTJ,I:PRINT"{HOME}":RETURN
5Ø4 GOSUB499:PRINT"{HOME}DRAWING "N$
5Ø5 FORI=ØTO2Ø:FORJ=ØTO2Ø:POKE11Ø4+I+J*4Ø,M%(I,J):NEXTJ
    ,I
5Ø7 PRINT"{HOME}{CTRL 1}":GOSUB627:GOTO513
5Ø9 POKE53281,Ø:RETURN
511 REM DUMMY CSR
513 IFP<ØORP>2ØORQ<ØORQ>2ØTHENJ=Ø:I=Ø:GOTO517
515 J=Q:I=P*4Ø:F=PEEK(11Ø4+I+J)
517 J=Q:I=P*4Ø:F=PEEK(11Ø4+I+J):POKE11Ø4+I+J,42:I1=Ø:N=
    Ø
519 I1=Ø:N=Ø
521 GETA$:IFA$=""THEN521
523 IFA$="{CRSR UP}"ANDI>ØTHEN:I1=-4Ø:GOSUB577:GOTO519
525 IFA$="{CRSR DN}"ANDI<78ØTHENI1=4Ø:GOSUB577:GOTO519
527 IFA$="{CRSR LF}"ANDJ>ØTHENN=-1:GOSUB577:GOTO519
```

→

Program in the FAST LANE

Finally!



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Listing continued.

```
529 IFA$="{CRSR RT}"ANDJ<2ØTHENN=1:GOSUB577:GOTO519
531 IFA$="*"THENPOKE11Ø4+I+J,F:P=I/4Ø:Q=J:PRINT"{CTRL 2
    }":GOTO5Ø9
533 IFA$="1"THENF=247:GOTO575
535 IFA$="2"THENF=244:GOTO575
537 IFA$="5"THENF=215:GOTO575
539 IFA$="3"THENF=239:GOTO575
541 IFA$="4"THENF=234:GOTO575
543 IFA$=" "THENF=16Ø:GOTO575
545 IFA$="6"THENF=241:GOTO575
547 IFA$="Ø"THENF=137:GOTO575
549 IFA$="7"THENF=243:GOTO575
551 IFA$="8"THENF=242:GOTO575
553 IFA$="Q"THENF=2Ø4:GOTO575
555 IFA$="W"THENF=2Ø7:GOTO575
557 IFA$="X"THENF=214:GOTO575
559 IFA$="E"THENF=2Ø8:GOTO575
561 IFA$="R"THENF=25Ø:GOTO575
563 IFA$="9"THENF=235:GOTO575
565 IFA$="N"THEN649
567 IFA$="{FUNCT 1}"THENG=G+1:GOSUB625:GOTO521
569 IFA$="S"THENGOSUB585:GOTO5Ø4
571 IFA$="L"THENGOSUB591:GOTO5Ø7
573 GOTO521
575 M%(J,I/4Ø)=F:POKE11Ø4+I+J,F:GOTO519
577 POKE11Ø4+I+J,F:I=I+I1:J=J+N:F=PEEK(11Ø4+I+J):POKE11
    Ø4+I+J,42:RETURN
579 PRINT"{HOME}{CTRL 1}ARE YOU SURE?{29 SPACEs}"
581 GETA$:IFA$=""THEN581
583 RETURN
585 GOSUB579:IFA$<>"Y"THENRETURN
587 K=Ø:OPEN1,1,1,N$:PRINT#1,N$:FORI=ØTO2Ø:FORJ=ØTO2Ø:P
    RINT#1,M%(I,J):K=K+1
589 PRINT"{HOME}"TAB(22)K:NEXTJ,I:CLOSE1:RETURN
591 GOSUB579:IFA$<>"Y"THENRETURN
593 PRINT"{HOME}";:K=Ø:OPEN1,1,Ø,"":INPUT#1,N$:PRINT"{S
    HFT CLR}DRAWING "N$:FORJ=ØTO2Ø:PRINT""
595 FORI=ØTO2Ø:IFK=1THENK=Ø:PRINT"{CTRL 7}";:GOTO599
597 K=1:PRINT"{CTRL 5}";
599 PRINT"{CTRL 9} ";:NEXTI,J:PRINT"{HOME}":K=Ø:FORI=ØT
    O2Ø:FORJ=ØTO2Ø:INPUT#1,A
6Ø1 B=A-INT(A/1ØØØ)*1ØØØ
6Ø2 IFB=137ORB=247ORB=244ORB=234ORB=215ORB=214ORB=241OR
    B=243THEN623
6Ø3 IFB=242ORB=235ORB=2Ø4ORB=2Ø7ORB=2Ø8ORB=25ØORB=16ØTH
    EN623
6Ø5 IFB=213ORB=24ØTHENB=2Ø7:GOTO623
6Ø7 IFB=2ØØORB=217ORB=231ORB=234ORB=246THENB=234:GOTO62
    3
6Ø9 IFB=2Ø1ORB=238THENB=2Ø8:GOTO623
611 IFB=2Ø2ORB=237THENB=2Ø4:GOTO623
613 IFB=2Ø3ORB=253THENB=25Ø:GOTO623
615 IFB=196ORB=197ORB=227ORB=247ORB=248THENB=247:GOTO62
    3
617 IFB=198ORB=21ØORB=226ORB=228ORB=239ORB=249THENB=239
    :GOTO623
618 IFB=176ORB=143ORB=2Ø9THENB=215:GOTO623
619 IFB=199ORB=212ORB=225ORB=229ORB=244ORB=245THENB=244
    :GOTO623
62Ø IFB=152THENB=214:GOTO623
621 IFB>128THENB=B-128
623 M%(I,J)=B:POKE11Ø4+I+J*4Ø,B:NEXTJ,I:CLOSE1:RETURN
625 IFG>8THENG=1
627 ONGGOTO639,629,631,635,633,637,641,643
629 PRINT"{HOME}WALL 1={COMD U},2={COMD J},3={COMD O},4
    ={COMD J}{2 SPACEs}":RETURN
631 PRINT"{HOME}DOOR 6={COMD E},7={COMD W},8={COMD R},9
    ={COMD Q}{2 SPACEs}":RETURN
633 PRINT"{HOME}PIT 5={SHFT W},STAIR Ø=I,X={SHFT V} ":R
    ETURN
635 PRINT"{HOME}CORNER Q={SHFT L},W={SHFT O},E={SHFT P}
    ,R={SHFT @}":RETURN
637 PRINT"{HOME}S=SAVE, L=LOAD{8 SPACEs}":RETURN
639 PRINT"{HOME}{CTRL 1}PUSH {CTRL 9}F1{CTRL Ø} FOR COD
    ES{4 SPACEs}":RETURN
641 PRINT"{HOME}3D{LEFT ARROW}MAP & MAP{LEFT ARROW}3D =
     *{3 SPACEs}":RETURN
643 PRINT"{HOME}N=ERASE MAP AND BOARD ":RETURN
645 FORI=1TO15:R=INT(RND(G)*DC+1):PRINT"{HOME}{2 CRSR R
    Ts}DIE ROLL{5 SPACEs}":PRINT"{HOME}{2 CRSR RTs}DIE
    ROLL"R
647 FORJ=1TO5Ø:NEXTJ,I:RETURN
649 GOSUB579:IFA$<>"Y"THENGOSUB627:GOTO567
651 PRINT"{SHFT CLR}NEW MAP NAME":INPUTN$:FORI=ØTO2Ø:FO
    RJ=ØTO2Ø:M%(I,J)=16Ø:NEXTJ,I
652 GOSUB499:GOTO5Ø7
653 GOSUB627:GOTO567
655 I=E%(3,1):IFI=247ORI=241ORI=32ORI=2Ø7ORI=2Ø8THEN663
657 I=E%(3,2):IFI=239ORI=242ORI=25ØORI=2Ø4THEN663
659 I=E%(3,2):IFI=214THEN663
661 Q=Q+Z:P=P+Y:GOTO9
663 PRINT"{HOME}{3 CRSR RTs}AGAINST{CRSR RT}WALL":FORI=
    1TO9ØØ:NEXTI:PRINT"{HOME}{3 CRSR RTs}{7 SPACEs}{CRS
    R RT}{4 SPACEs}":GOTO161
665 FORI=1TO3Ø:NEXTI:RETURN
667 PRINT"{2 SPACEs}{COMD G}{16 SPACEs}{COMD M}":RETURN
671 PRINTTAB(15)K:RETURN
```

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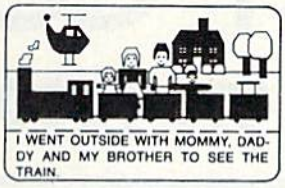

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DIRECT CONNECTION

Hooking the VIC-1600 Modem to the Telephone

The flip of a toggle switch is all that's needed to put your computer on the phone if you build this simple modem-telephone connection.

BY HARVEY G. HURWITZ

Access to the various electronic bulletin boards and commercial information exchange services such as CompuServe and The Source is now well within the scope of all VIC-20 and C-64 users.

A low-cost device, the VIC-1600 modem, which simply plugs into the user port on the rear deck of these computers, acts as an electronic coupling device. It translates the incoming signals into a form acceptable by the computer (demodulation) and converts the computer's output signals into a form acceptable by the telephone line (modulation). Thus, the term modem is derived from the words modulator and demodulator.

With the VIC-1600 in place, information exchange takes place at a prodigious rate. In addition to the VIC-1600, you'll need a Terminal Emulator program. Software of this type, though somewhat limited in scope, is provided with the modem. It lets you access and communicate with bulletin board services, but only through a screen display—you can't upload or download. You are, therefore, limited to what you can absorb by direct reading as the data scrolls up and off the screen.

There are a number of other terminal programs available that contain "streaming buffers," or similar memory devices. These permit you to store all information both sent and received until you have completed your contact. At that point, you can print out the entire contents of the memory as hard copy. Whichever terminal system you end up with, it will have one thing in common with all others—the VIC-1600.

Clumsy Connections

While the VIC-1600 has proved itself to be an effective communications device, it does have one very significant shortcoming. The method of connecting it to the telephone line is cumbersome and can, in fact, cause damage to the cables, the telephone or the modem itself.

To use this device, you first dial the host computer's telephone number. (The host computer is simply the computer system that's operating the information service or bulletin board with which you wish to communicate.)

When the host computer answers (indicated by a continuous high-pitched tone in the earpiece of the handset), you must pull out the modular plug of the cable connecting the handset to the body of the telephone itself. You must then plug a similar cable into both the now-vacant socket on the telephone body and a matching socket on the rear of the modem.

What you'll have done, in effect, is substitute the VIC-1600 modem for the telephone handset. If you haven't spent too much time fumbling with these reconnections, and if you've avoided breaking any of the fragile plugs or jacks, the host computer will still be waiting for you to log in.

Since the plugs and cables of this modular arrangement are designed to facilitate rapid replacement of entire components, they are hardly of lasting quality. These fragile pieces of plastic, with their tiny contacts with thin wires in vinyl jacket cable, can't compare with the cables and plugs normally used in the communications industry, where ¼-inch-diameter plugs and rugged sockets with big, wide contacts are the norm. Even these have been known to fail with constant flexing and wear, and the modular equipment appears toylike in comparison.

Another drawback to the modular

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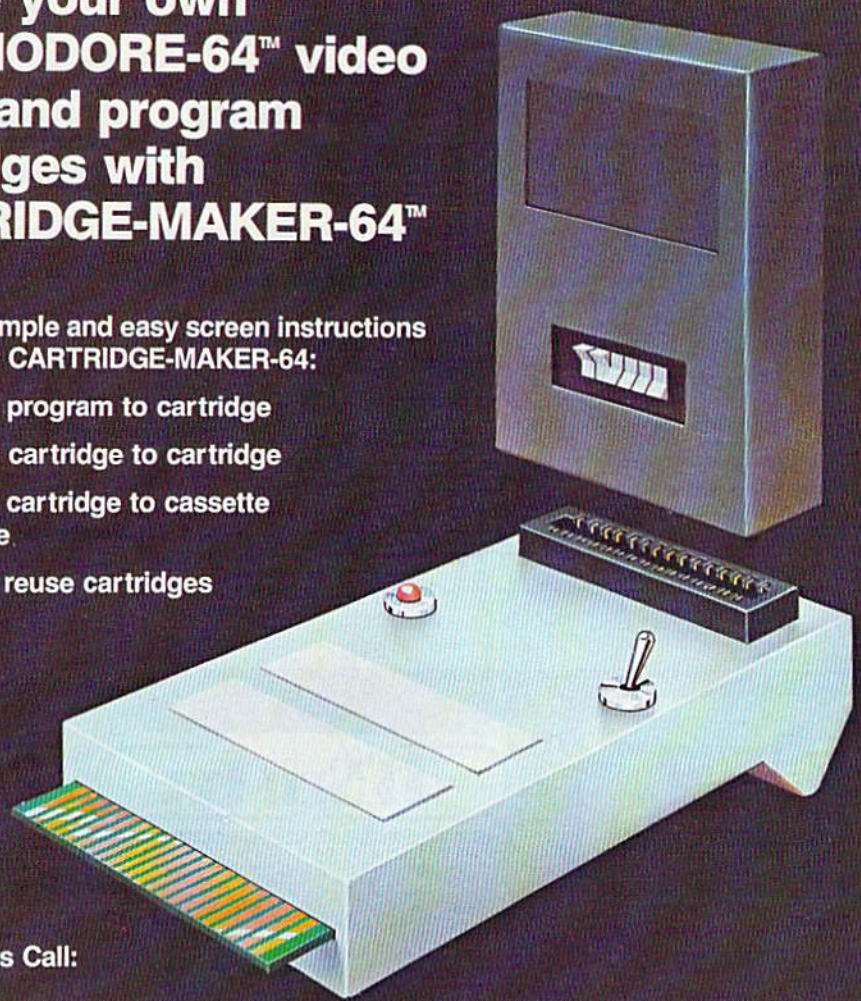

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connections is that they may contribute to a drop in signal quality and strength. The sensitivity of the VIC-1600 is already somewhat lower than some other, similar devices, and any further loss in signal strength can seriously affect the intelligibility of the reception.

The Direct Connect Solution

From a technical standpoint, there's no reason why the modem cannot be connected directly with the telephone lines. Such hardline connection will eliminate the potential problems of plug or wire failure, and signal loss will also be reduced to a minimum.

Since the modem cannot be in the circuit while you're dialing, and should not be on-line when not actually in use, the problem resolves itself into one of judicious switching. This is, after all, what you're doing when you plug and unplug the various cables.

You can accomplish the switching by installing a small switchbox and a multiple modular jack. The switchbox should be located on the operating desk near the computer, and the jack should be installed at the point in the room where the telephone is connected.

The parts required are modest in cost, and you can obtain them at any electronic supply store or at Radio Shack. You'll need the following.

- One mini-box, 1 inch deep by 2 inches long by 1½ inches wide.
- One double-pole, double-throw toggle switch with an on-off plate.

Required parts are modest in cost, and available at any electronic supply store.

- One modular-type handset cable (small modular plug).
- One modular-type telephone cable (large modular plug).
- One single-to-double modular jack adapter.

Construction Instructions

Assembly of the switchbox is fairly simple and requires only minimal ability to handle small tools and a soldering iron. In order to facilitate construction, I'll describe the process step by step.

1. Remove the mini-box cover plate and set it aside. Drill a ½-inch-diameter hole in the center of the top surface of the box. If you're using the plastic type of mini-box, you can do this with almost any sharp instrument.

2. Mount the switch in the hole so that the switch throw is in line with the longer dimension of the box. Secure the switch in place using the nuts provided. Be sure that the on-off plate is mounted on the outside of the box and is properly aligned with the slot in the switch body.

3. Select the handset cable, which is the cable with the smaller-sized modular plugs attached. Cut this cable in half, or to a suitable length—it must reach from the box to the socket on the modem.

4. Using a pair of diagonal cutters or small pliers, cut a small rectangular slot along the rear edge of the box. This cut should be made on one of the narrow sides of the box and should measure about one-quarter of an inch wide. It will serve as a channel for the cables

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after the rear cover plate is replaced.

5. Carefully cut away about one inch of the insulating jacket on the cut end of the handset cable. Be sure you do not cut through the insulation on the *individual* wires inside the cable.

6. Separate the four wires, now exposed, by carefully pulling them apart. Remove approximately one-quarter of an inch of the insulation from the tips of these wires. You should end up with four individual leads with insulation colored red, black, green and white.

7. Using a small soldering iron (30 watts or less), tin the exposed copper leads. Heat the exposed wire until the solder melts on the wire itself. Use only a Rosin-core electronic solder, and use it sparingly.

8. Examine the switch carefully. There will be six solder lugs extending from the back—two located at each end and two in the center. It's the center two that you'll use at this time. Place the tinned red lead in one of the lugs and the black lead in the other. Solder them in place. (When soldering these leads, remember to heat the lug and the wire until the solder melts. Use the solder sparingly and don't let the wire move while the joint is cooling. A properly soldered connection will be bright and shiny.)

9. There will be two leads hanging free at this point (white and green). Ignore them for the moment. You'll connect these later.

Enter the world of telecommunications by simply flipping a switch on your new system.

10. Cut the remaining telephone cable to size—it must extend from the switchbox to the double modular jack. Remove one inch of the jacket and separate the wires as you did with the other cable. Strip back one-quarter of an inch of the insulation and tin the wire ends.

11. Again, examine the switch. There is a keyed face plate on the front that indicates the on and off positions. Place the toggle in the on position.

12. The two lugs directly behind the tip of the switch-toggle arm and at the on end of the switch are the lugs that will be used for the following connections. If you have an ohmmeter, you can check for continuity between these lugs and the center lugs on the switch before proceeding.

13. Connect the remaining red lead coming from the telephone cable to the end lug on the same side of the switch as the red lead that you soldered in step 8. Solder this lead in place.

14. Connect the black lead to the matching lug on the same end of the switch and on the same side as the black lead that you connected in step 8.

15. The switch should now have a red wire connected to the center lug and a red wire connected to one of the end lugs. It should also have a black wire connected to a center lug and a black wire connected to the end lug adjacent to the red wire. (See Fig. 1.)

16. Connect the two green wires to-

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gether by twisting and soldering. *Do not connect these leads to any of the switch lugs.* Tape the connection with plastic insulating tape. In the same way, join the white leads together, solder and tape the connection. Place these wires beside the switch so that the cover plate will not press on or pinch them when installed.

17. Install the cover plate using the four screws provided. Make sure that none of the switch lugs touch the plate. You can bend them down and out of the way if necessary. Place the cables in the notch that you cut into the edge and tighten the plate down. Make the notch deeper if it appears that the cables are being pinched.

18. Remove the telephone from its modular jack and plug the double modular jack in its place. Reconnect the phone on one side of the double jack. Plug the telephone cable from the switchbox into the other. Make sure that the switch is now in the off position.

19. Insert the handset line into the modular jack on the rear of the VIC-1600. *Turn off your computer before installing the modem in the user port.*

This completes the assembly procedure. With this switchbox installed, you will now be able to dial up the desired host computer or service by using the telephone in the normal fashion.

Turn on your computer, check the switchbox to be sure that it is off and load whatever terminal program you are using. When loading is complete, dial the number of the host computer or system that you will be using. When you hear the answering tone, flip on the switch, hang up the phone and log in. The VIC-1600 will do the rest.

The modem will maintain the contact and will receive signals directly from the telephone line. All communication will be controlled from the keyboard of your computer and will be visibly indicated on the screen.

Upon completion of the entire transaction, you'll sign out of the system in the manner prescribed by the system's protocol. You disconnect by flipping the switch on the box to off. This releases the line and returns the phone to the condition where calls are normally made or received.

By simply flipping a switch on your new direct connect system, you are now into the world of telecommunications. R

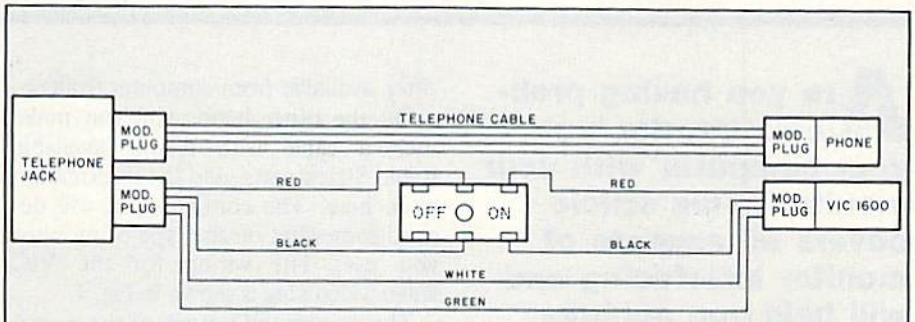

Fig. 1. Schematic for VIC-1600 direct connection unit.

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MONITOR MADNESS

Are you having problems interfacing your computer with your monitor? This article covers all aspects of monitor interfacing and will help you achieve video vividness.

BY LARRY FILBY

High quality monochrome video monitors often appear on the surplus market or at electronic flea markets at very attractive prices. However, as many have found, there are often difficulties encountered when trying to use these monitors with Commodore equipment.

The VIC has proven to be a special problem with surplus and even commercially available green-screen monitors, such as NEC and Zenith. The VIC has insufficient video output to drive many of these monitors. The resulting video picture turns out to be weak and difficult, if not impossible, to read, even with subdued room lighting.

The older C-64s and the VIC also have problems interfacing with the new Commodore 1702 monitor because of differences in plugs and circuitry.

A Cable Assembly

Before you can use the VIC with a non-Commodore video monitor, you must have a suitable cable assembly. Octopus cable assemblies, with a 5-pin DIN connector on one end and three or four RCA phono plugs on the other, are often available from computer dealers.

On the other hand, you can make such a cable with readily available Radio Shack parts and the information given here. The configuration will depend somewhat on the type of monitor you use. The wiring for the VIC audio/video plug is shown in Fig. 1.

The majority, if not all, of the monochrome monitors will not have sound capability, so you'll only be concerned with video output. Pin 4 is called video low and pin 5 is called video high. The video signal here is called composite video, meaning that it has both light-level and color information.

The only difference between the two pins is the signal-level output, but neither was sufficient with the stock VIC to drive the two commercial monitors I tried. Pin 4 level was adequate after adjusting video level.

A Simple Adjustment

The solution to the VIC video-level problem is a simple internal adjustment. If you're not familiar with electronics, I suggest you get help from someone. While there are no lethal voltages inside the VIC, a tool dropped onto the VIC's motherboard, with power on, could have drastic consequences.

I suggest, too, that you wait until your unit is out of warranty before making changes of any kind, since once you open your unit, the warranty expires.

First, unplug all cables from the VIC. Take out the three Phillips screws that are on the bottom front and lay the top half with the keyboard assembly out of the way. The bottom half will contain the main computer board. At the rear of the board, you'll see a metal-shielded assembly with a perforated snap-on cover. Carefully pry this cover off, moving around its edge a little at a time.

Removing this cover reveals the 40-pin 6560 video chip. To the rear of that chip, you'll find one or two miniature adjustment potentiometers with a single or cross slot, which you must adjust with a small screwdriver or tuning tool. Commodore has made changes to the circuitry in different production runs, so you may have either one or two adjustments, depending on when your unit was produced.

Before making any changes to the adjustment, I suggest you pencil in a diagram of the adjustment position. (You could do this on top of the 6560 chip.) This will be helpful if you should want to return the adjustment to its original position at some later date, for use with the TV RF demodulator cable assembly. (A little more about this later.)

Presuming that you now have a suitable video cable, plug everything in and prepare to adjust the video level with the unit turned on, but still disassembled. (Again, if you don't feel confident to do the work yourself, get some help.) With the unit plugged in and turned on, make the adjustment.

If you have a VIC with a one-adjustment potentiometer, that is the one to turn. If you have the two-adjustment version, turn the one on the left, as viewed from the front of the main board, counterclockwise, and watch the results on your screen.

The adjustment potentiometer will likely have some sealant, similar to fingernail polish. This should break away easily. In the two units I tried, both ended up with the adjustment all the way counterclockwise.

You may try combination settings of this adjustment, along with the brightness and contrast controls on the mon-

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itor, to get the best display with your particular system. Once you're satisfied with the display, turn off the power, replace the snap-on cover and reassemble the two case halves.

Using Commodore's 1702

A major problem encountered when using the VIC or C-64 with the new Commodore 1702 color monitor has to do with the cable connections.

The eight-pin DIN supplied with current 1702s will not fit the VIC, meaning that you must buy or build another cable. Also, if you have an older, five-pin C-64, you won't be able to use the cable supplied with the 1702 monitor.

Fig. 2 shows the outputs for the five- and eight-pin DIN connectors used on older and newer C-64s. Notice that although the VIC and older C-64s use the same five-pin connector, the two machines possess different pin assignments.

If you have the older, five-pin C-64, not only will you have to come up with another cable, but the pin-4 composite video connection was only meant to be used with the front connections of the 1702. The rear connections of the 1702 are meant for separate chrominance and luminance inputs, not available with the five-pin connector. (For those of you who would like to make a cable that would connect to the rear of your monitor, see Nick Zavalishin's article, elsewhere in this month's *RUN*.)

If you have the newer, eight-pin connector, a cable is furnished with the 1702, so you won't have any problems. If you have the older 1701 monitor, no cable, I am told, was furnished, so you'll have to make your own. (Again, see Nick Zavalishin's article.)

Five-pin DIN connectors are available at Radio Shack stores (catalog # 243-003). Eight-pin DINs are not available at Radio Shack, but should be available through most electronics distributors. The two figures provided with this article should enable you to connect any combination of VIC-20 or C-64 and monitor; and the information on adjusting video output level from the VIC will allow you to make up for any shortcomings in that area.

A Final Note

I mentioned earlier that you should make a note of the position of the video gain control in case you decide to use the unit with a TV and the RF demodulator cord at some later date. An easy way to reset the level for that configuration is to cable it up and simply back down the video gain adjustment until you get a satisfactory picture. I found that a setting slightly different from the original gives a better display.

So there you have it. I hope the information presented here will help with some of the problems you'll encounter when using various combinations of models and monitors. R

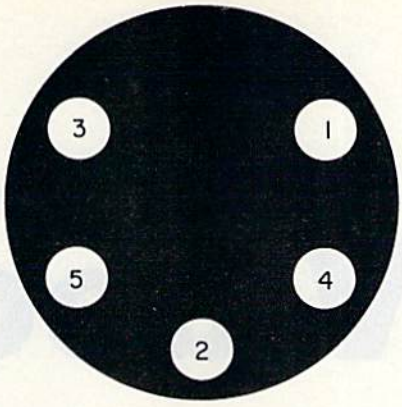

Fig. 1. The wiring for the VIC audio/video plug.

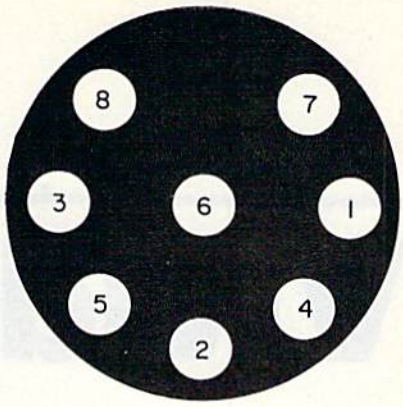

Fig. 2. The outputs for the five- and eight-pin DIN connectors used on both series of C-64s.

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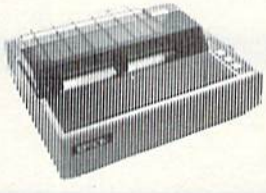

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Vivid Video

BY NICK ZAVALISHIN

A three-jack cable is exactly what you need to fill the gap between your Commodore computer and a sharper display on your Commodore monitor. This article tells you, step by step, how to make one.

Photo 1. Preparing one end of the connector cable.

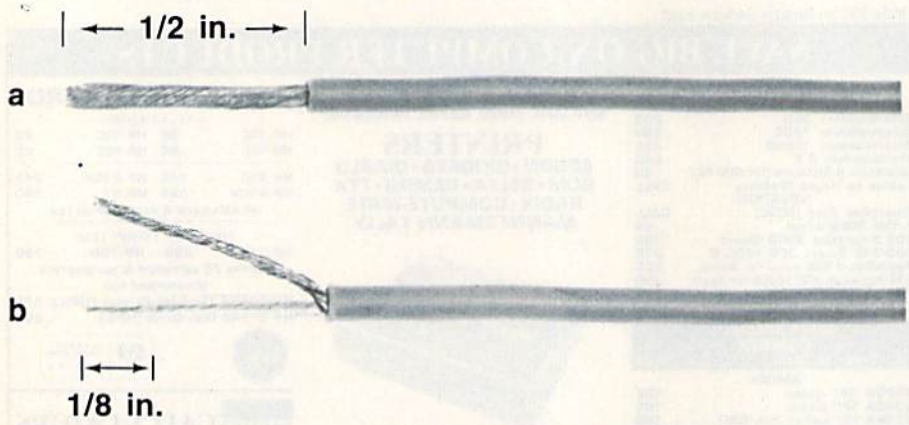
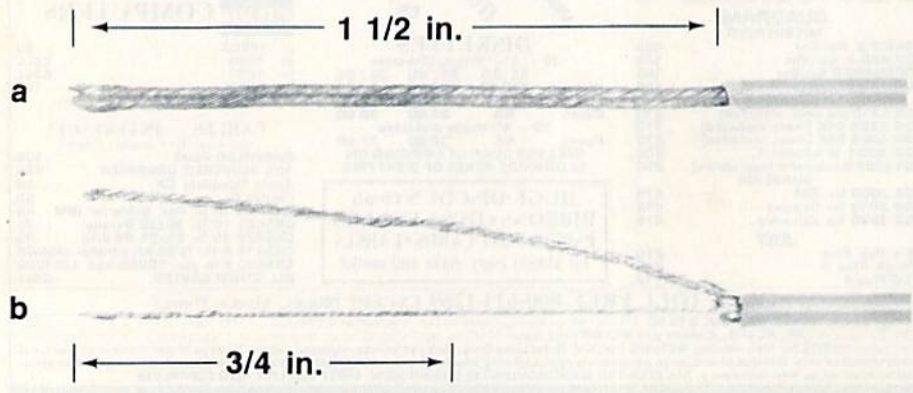


Photo 2. Preparing the other end of the cable.



Address all author correspondence to Nick Zavalishin, PO Box 5084, Milford, CT 06460.

After you see some disappointing displays on a color TV with your Commodore 64, which is highly touted for its hires graphics, you go out and buy the Commodore 1701 monitor. Good!

You connect the monitor, with the provided cable, to the front jacks on the 1701. The display is vastly improved, yet there's that nagging part of the 1701 instruction manual telling you about a three-jack cable. The manual informs you that this cable connects to the rear of your monitor. A thorough search of the shipping container and packing material does not turn up a three-jack cable.

Furthermore, you begin to recall rumors that this method of interfacing your C-64 to the monitor will make a big difference in your display's sharpness and color quality. These rumors are right on target. When you connected your 1701 monitor, you were impressed with the improvement over using your color TV. With a three-jack cable, you can double that initial improvement.

After going to several of the discount and department stores that sell the 1701, you realize that the department managers or clerks have no idea what you are talking about. To your disappointment, their technical knowledge is equal to or less than yours.

The next logical step is a "computer" store. You find that these stores no longer carry the Commodore computers or their related peripherals, and the salesmen can only answer questions related to their product lines.

You Can Make One

Now for the good news. If you have a soldering iron and can get to a Radio

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Shack store, you can make a first class three-jack connector yourself, for less than $7. The following is a list of the parts needed, with the Radio Shack product numbers. You will need one of each.

- Five-pin DIN audio/video plug #274-003
- Color-coded phono plugs (package of 8) #274-321
- Miniature single conductor with spiral wrap shield #278-752

Find a well-lit, clear area to work in. First, cut the cable into three equal 4-foot lengths, then strip and prepare one end of each cable, shown in Photo 1a. Make sure you strip exactly ½ of an inch of the outer insulation and twist the shield wire strands, as in Photo 1b. Next, strip about ⅛ of an inch of the inner insulation and twist the center wire.

Now prepare the other end of each cable, as shown in Photo 2a. On this end, strip 1½ inches of the outer insulation and twist the shield wire strands as in Photo 2b. Next, strip ¾ of an inch of the inner insulation and twist the center wire. While it is not absolutely necessary, flowing a small amount of solder on the wire tips usually makes the final assembly easier.

Solderdarity

Disassemble the five-pin DIN plug and slide the three ends, as prepared in Photo 1, through the plastic insulator shell, as shown in Photo 3. When soldering, be sure that you touch both parts to be soldered with your iron, and don't apply the heat any longer than necessary to flow the solder.

In the next step, first crimp, then

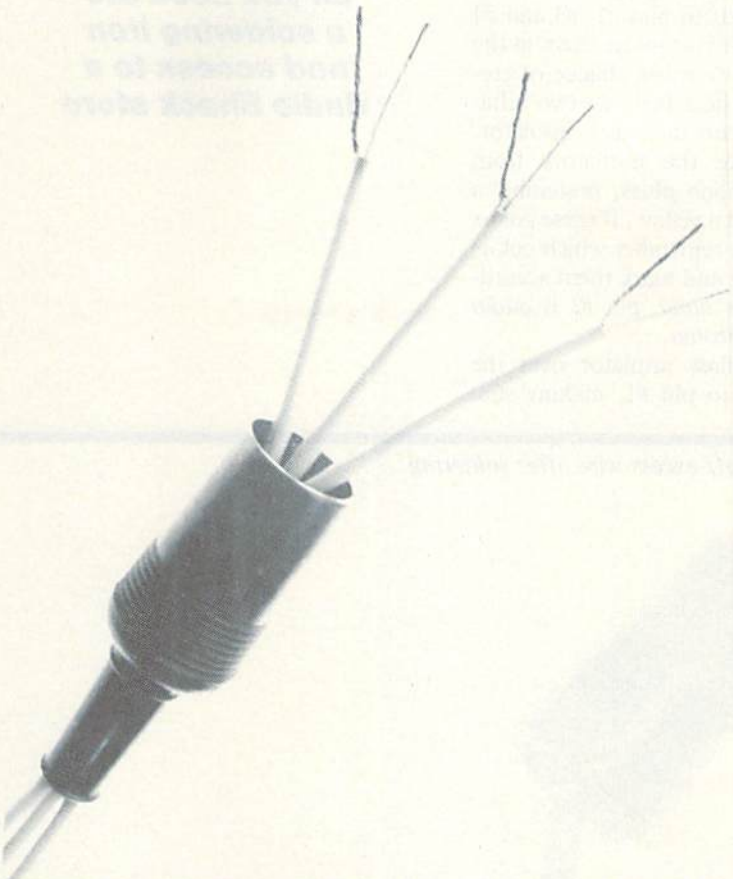
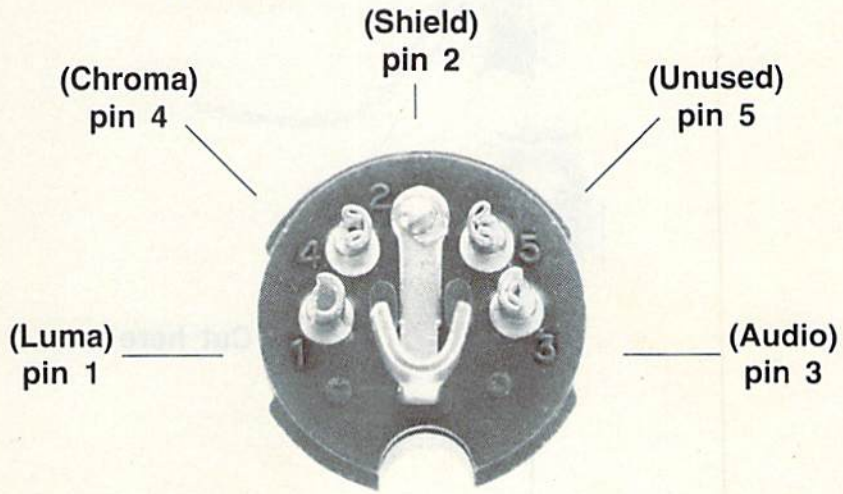


Photo 3. Inserting the cable through the plastic insulator shell.

Photo 4. Soldering the leads.



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solder, all three copper shields to pin #2 of the five-pin DIN plug. Solder the three center leads to pins #1, #3 and #4 (see Photo 4). If you solder them in the order given, there is less chance of creating sufficient heat between two adjacent pins to distort the plastic insulator.

Next, remove the insulators from three of the phono plugs, preferably a white, a red and a yellow. If these colors are unavailable, remember which colors go to which pin and mark them accordingly! Pin #1 is *luma*, pin #3 is *audio* and pin #4 is *chroma*.

Slide the yellow insulator over the cable soldered to pin #1, making sure that the large opening is facing the unsoldered end of the cable. Likewise, slip the white insulator over the cable soldered to pin #3 and the red insulator over the cable soldered to pin #4.

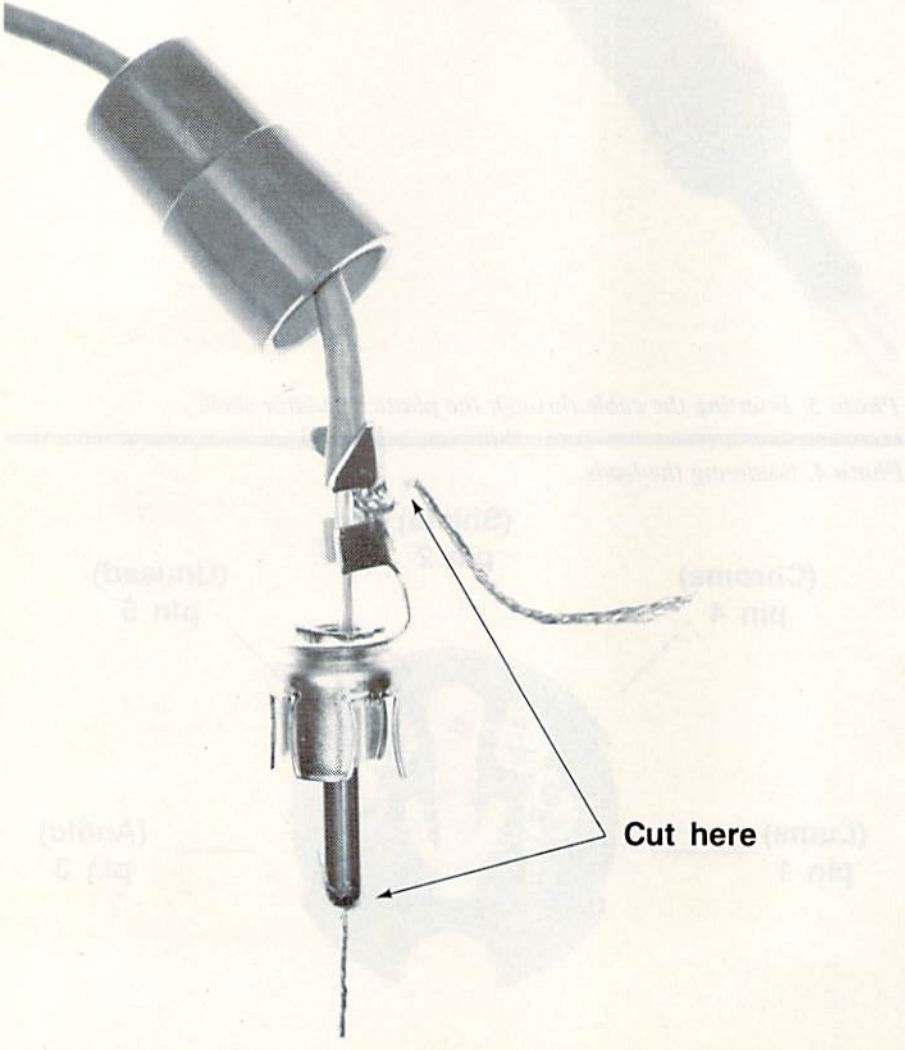
For an improved display, all you need are a soldering iron and access to a Radio Shack store

Now solder the copper shield of each cable to the winged tab on the audio plug, and cut off the excess wire. The center wire, which you've pushed through the center of the plug, is soldered at the tip (see Photo 5). Gently crimp the wing tabs around each cable and cut any excess wire beyond the soldered tips.

At this point, check your solder joints at both ends of each cable, and make sure that there aren't any solder bridges between the pins on the DIN plug. Reassemble the DIN plug and the audio plug insulators. If you have an ohmmeter, check the continuity of pins #1, #2, #3 and #4. Also check for any shorts. You should have infinite resistance between all of the pins. Now you are ready to connect the 1701.

Follow the diagram in your monitor manual and connect the white plug to the audio jack, the yellow plug to the luma jack and the red plug to the chroma jack. Don't forget to set the switch on the back of your monitor to the rear position. Then, turn on your system and enjoy the best display of color and graphics you've ever seen on your Commodore system.

Photo 5. Cut off excess wire after soldering.



Feature Films, Too

By the way, if you have or will acquire a video tape recorder, you can use your 1701 as a top quality TV monitor. By connecting your front panel video and audio jacks to the video-out and audio-out jacks usually found on the rear of most VTRs, you'll experience a picture that few TV sets can match. There are very sound technical reasons why this is so, one of which is that the 1701 has a far greater bandwidth than a TV set. This frequency bandwidth directly affects the sharpness and color of the image.

The connecting cables (you need two) are also standard Radio Shack items. They are called shielded phono connectors and are available in 3-foot lengths (product #42-2366), 6-foot lengths (product #42-2367) and 12-foot lengths (product #42-2368). R

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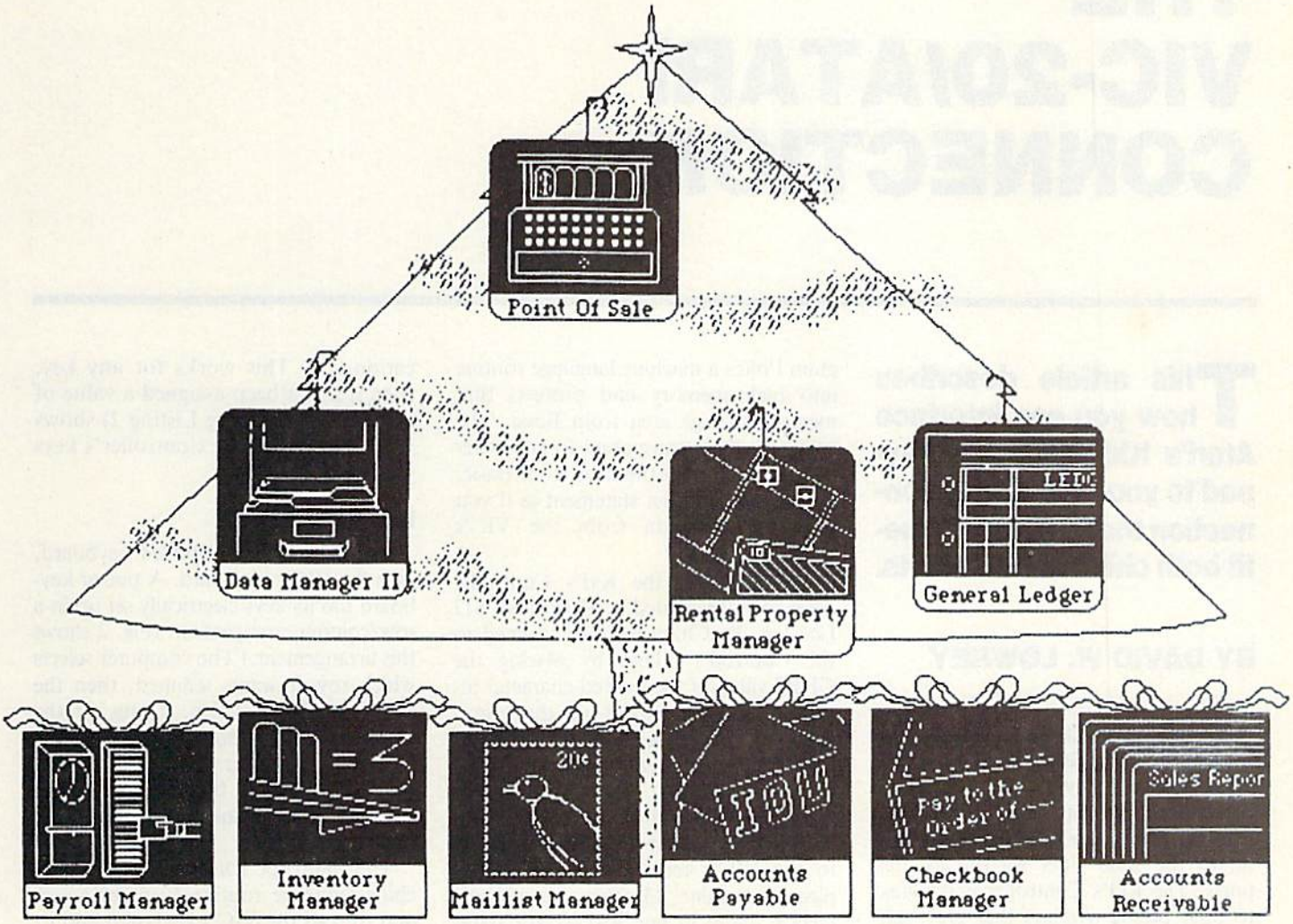

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THE VIC-20/ATARI CONNECTION

This article describes how you can interface Atari's Kid Controller keypad to your VIC-20—a connection that's sure to benefit both children and adults.

BY DAVID W. LOWREY

The Kid's Controller, Atari's new peripheral for its 2600-series game machine, is a large keypad consisting of 12 nickel-sized buttons, layed out like a telephone touch pad. The keypad hooks up to the 2600 VCS via the joystick ports. The Kid's Controller is designed to hold plastic overlays that are packaged with games that use the Controller. It retails for approximately $16 at most stores that sell 2600 games.

The joystick port on the 2600 is the same as the one on the VIC-20, so I tried interfacing it to the VIC. After several days of trial and (mostly) error, I developed a program that allows the Kid's Controller to act as a separate keyboard.

Each key on the Controller can be set to any character on the VIC's keyboard, so you may use it as a numeric keypad, create separate keys for each of the cursor directions or use it with games that require keyboard control. Children may thus interact with a computer, without using joysticks or paddles.

Program Operation

The program (see Listing 1) fits into any of the VIC's possible memory configurations. When run, this loader program Pokes a machine language routine into high memory and protects that memory storage area from Basic. The routine is then transparent to any other program. To read the keys from Basic, use an Input or Get statement as if you were reading data from the VIC's keyboard.

The keys on the Kid's Controller have been designated as S1 through S12 (see Fig. 1). Characters are assigned to the Controller's keys by placing the CHR$ value of the desired character into the Data statement of the corresponding Controller key. (The CHR$ values are in appendix J of the VIC owner's manual.)

Therefore, if you wanted the key with the zero printed on it (S11) to be equal to the VIC's return key, you would place the value 13 (the return key's CHR$ value) in line 490's Data statement. You would do this to each of the Controller's keys to which you wanted a value assigned. Any keys not used should be assigned a value of zero. You can change key assignments once the loader program has been run by entering the following statement, either in Direct mode or in a program.

```
POKE(PEEK(788)+256*PEEK(789)+1+sn),cn
    sn = controller key number (1-12)
    cn = CHR$ value of desired character
```

If you wanted to make the key with the number sign (S12) on it equal to the letter A (CHR$ value = 41), you would enter:

```
POKE(PEEK(788)+256*PEEK(789)+1+12),41
```

With the Kid's Controller, you can Peek at location 251 to see if any of the Controller's keys are being pressed. If a key is being pressed, its number (1–12) will be in location 251. If no key is being pressed, then a value of 255 will be in location 251. This works for any key, even if it has been assigned a value of zero. Program 2 (see Listing 2) shows you how to read the Controller's keys via location 251.

How It Works

The Controller is a polled keyboard, as is the VIC's keyboard. A polled keyboard has its keys electrically set up in a row/column arrangement. (Fig. 2 shows this arrangement.) The computer selects which row it wants scanned, then the keyboard shows which, if any, of the keys have been pressed. With the Kid's Controller, the four joystick lines select which row to scan, then the two paddle lines and the fire line reveal which keys have been pressed.

The interrupt handler calls the machine language routine 60 times a second to read the VIC's keyboard and to update the system clock (TI and TI$). When the Kid's Controller's routine gains control, it scans the Controller's keys a row at a time until it finds a pressed key, or until all of the keys have been scanned.

If it finds that a key has been pressed, then the program makes sure that this isn't the same key that was pressed on the last scan of the controller. If a different key has been pressed, then the value that was assigned to that key, if non-zero, is placed in the system's keyboard buffer. The number (1–12) of the pressed key is stored in location 251. If a

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Listing 1. Basic loader program to interface Atari's Kid's Controller with the VIC-20.

```
1Ø REM
2Ø REM{3 SPACEs}KCIRQ
3Ø REM
4Ø REM AN INTERFACE
5Ø REM TO THE ATARI
6Ø REM KID'S CONTROLLER
7Ø REM
8Ø REM PROGRAMMED
9Ø REM
1ØØ REM BY D. LOWREY
11Ø REM
12Ø REM
13Ø REM
14Ø REM
2ØØ PRINT"{SHFT CLR}{3 CRSR DNs}{2 SPACEs}LOADING INTER
    FACE"
21Ø TM%=PEEK(51)+256*PEEK(52)-16Ø:NH%=TM%/256:NL%=TM%-N
    H%*256
22Ø POKE51,NL%:POKE55,NL%:POKE52,NH%:POKE56,NH%:CLR
23Ø TM%=PEEK(51)+256*PEEK(52)
24Ø FORI=ØTO159
25Ø READN%
26Ø IFN%=-1THENN%=PEEK(51)
27Ø IFN%=-2THENN%=PEEK(52)
28Ø POKETM%+I,N%
29Ø NEXT
3ØØ SYSTM%+143
31Ø PRINT"{3 CRSR DNs}{2 SPACEs}TO RE-ACTIVATE THE{4 SP
    ACEs}CONTROLLER, ENTER:{4 SPACEs}SYS";TM%+143
32Ø END
33Ø DATA24Ø,12
34Ø REM
35Ø REM PLACE VALES
36Ø REM FOR CNTRLR.
37Ø REM KEYS HERE...
38Ø REM
39Ø DATA 55:REM S1=7
4ØØ DATA 56:REM S2=8
41Ø DATA 57:REM S3=9
42Ø DATA 52:REM S4=4
43Ø DATA 53:REM S5=5
44Ø DATA 54:REM S6=6
45Ø DATA 49:REM S7=1
46Ø DATA 5Ø:REM S8=2
47Ø DATA 51:REM S9=3
48Ø DATA 46:REM S1Ø=,
49Ø DATA 48:REM S11=Ø
5ØØ DATA 13:REM S12=CR
51Ø REM ML CODE
52Ø DATA16Ø,1,169,195,45,17,145,141,17,145,169,127,141,
    32,145,141,34,145
53Ø DATA173,19,145,41,195,133,254,162,3,169,2,133,2Ø3,6
    ,2Ø3,165
54Ø DATA2Ø3,5,254,141,19,145,152,16Ø,Ø,136,2Ø8,253,168,
    169,128,2Ø5
55Ø DATA9,144,144,32,2ØØ,2Ø5,8,144,144,26,2ØØ,173,17,14
    5,41,32
56Ø DATA24Ø,18,2ØØ,2Ø2,48,51,2Ø8,213,165,254,141,19,145
    ,169,128,141
57Ø DATA34,145,2Ø8,21Ø,196,251,24Ø,2Ø,132,251,2ØØ,173,2
    Ø,3,133,245
58Ø DATA173,21,3,133,246,177,245,24Ø,3,32,2Ø1,235,169,2
    47,141,32
59Ø DATA145,169,255,141,34,145,76,191,234,169,255,133,2
    51,2Ø8,237,12Ø
6ØØ DATA169,-1,141,2Ø,3,169,-2,141,21,3,169,255,133,251
    ,88,96
```

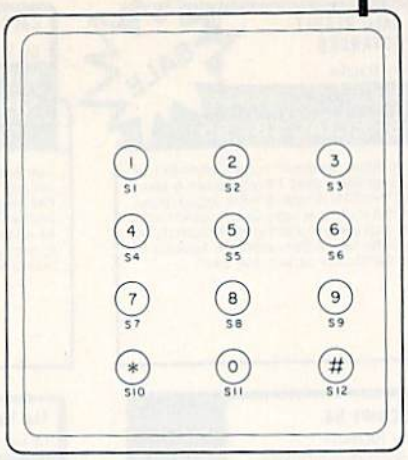

Fig. 1. The keys on the Kid's Controller.

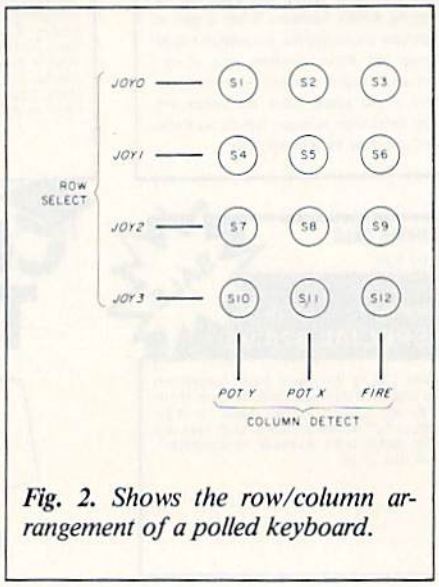

Fig. 2. Shows the row/column arrangement of a polled keyboard.

different key has not been pressed, then 255 is stored in location 251.

Entering the Program

You should type in Listing 1 exactly as printed, then save it before running. Since the machine language routine hooks itself into the VIC's interrupt system, any typing errors in the routine will probably hang your VIC.

When the program is run, it will print out a SYS command. This SYS command should be entered if you are ever forced to use the run/stop and restore keys to recover from a hang or an error. It will restore the machine language routine into the interrupt system. R

Address all author correspondence to David Lowrey, Starbound Computing, PO Box 2234, Columbia, MD 21045.

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Listing 2. Program showing how to read the Controller's keys via location 251.

```
10 REM
20 REM THIS PROGRAM
30 REM SHOWS HOW TO
40 REM READ THE KEYS
50 REM OF THE KID'S
60 REM CONTROLLER BY
70 REM LOOKING AT
80 REM LOC. 251.
90 REM
100 REM PROGRAMMED
110 REM
120 REM BY D. LOWREY
130 REM
140 REM
150 REM
160 REM
200 REM VERIFY THAT
210 REM THE CONTROLLER
220 REM ROUTINE HAS
230 REM BEEN LOADED
240 REM
250 IF PEEK(789)=234 THENPRINTCHR$(147)"THE LOADER MUST
    BE RUN FIRST!"
300 REM
310 REM ASSIGN A VALUE
320 REM OF ZERO TO ALL
330 REM OF THE KEYS
340 REM
350 FOR SN=1 TO 12 :REM KEY NUMBERS
360 POKE(PEEK(788)+256*PEEK(789)+1+SN),0
370 NEXT
400 REM
410 REM PRINT THE
420 REM NUMBER OF THE
430 REM SWITCH BEING
440 REM HELD DOWN
450 REM
460 SN=PEEK(251) :REM KEY NUMBER OF KEY BEING HELD DOWN
470 SN$=STR$(SN)
480 IFSN=255 THEN SN$="NONE" :REM NO KEY HELD DOWN IF S
    N=255
490 PRINTCHR$(147)SN$
500 REM
510 REM QUIT IF KEY
520 REM NUMBER 12 IS
530 REM PRESSED
540 REM
550 IFSN<>12 THEN GOTO 460
560 END
```


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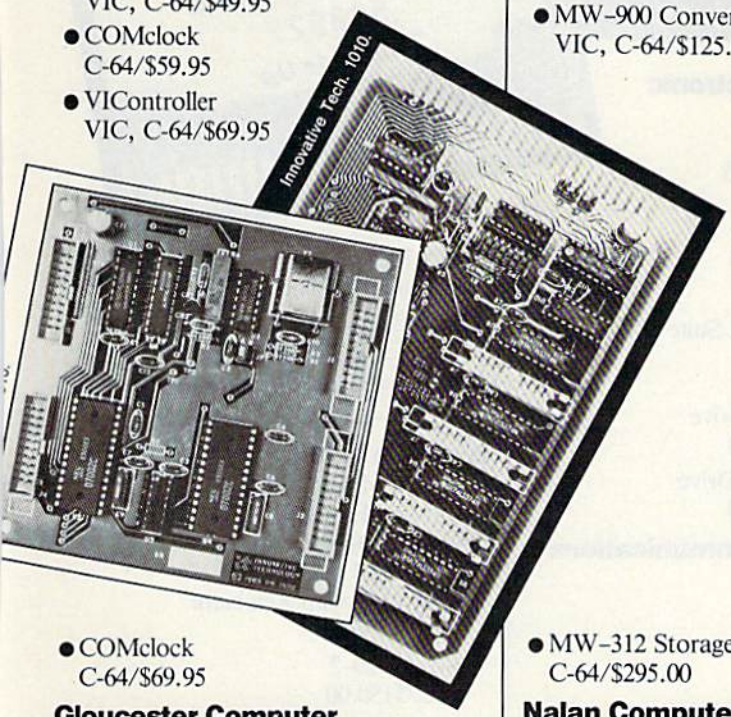

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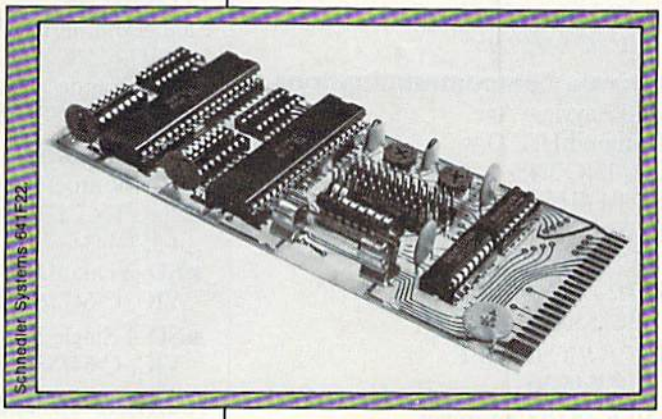

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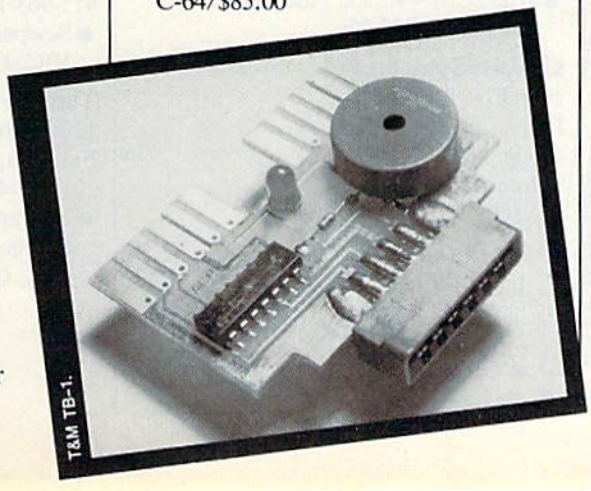

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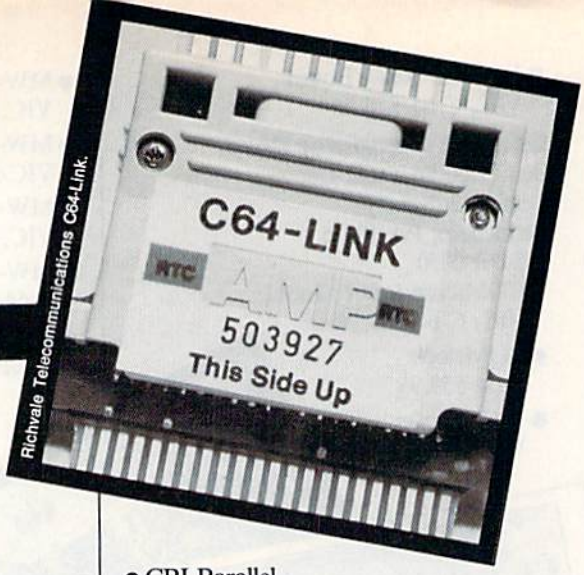

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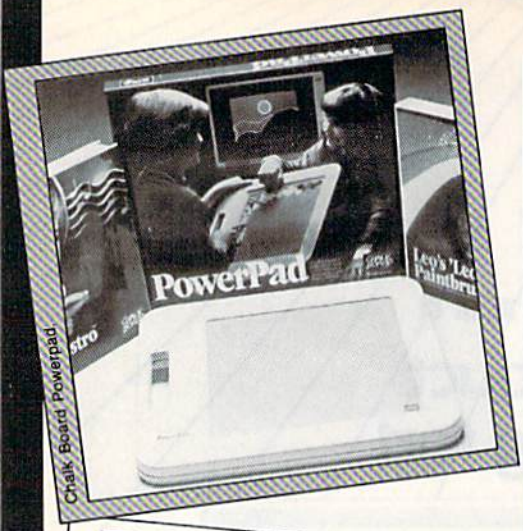

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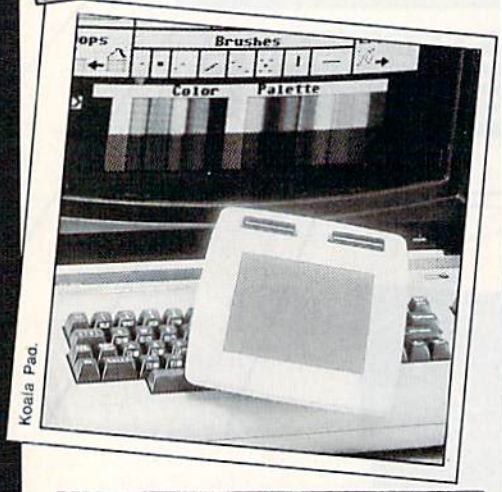

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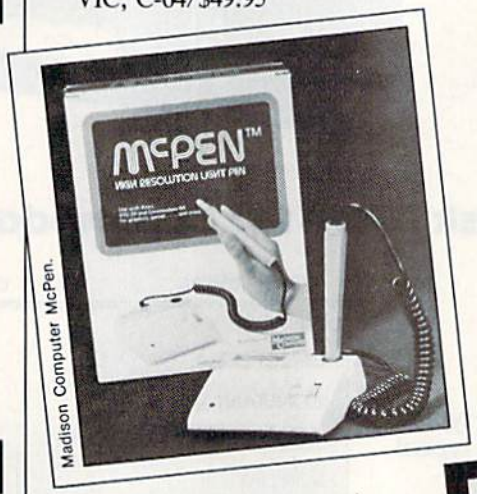

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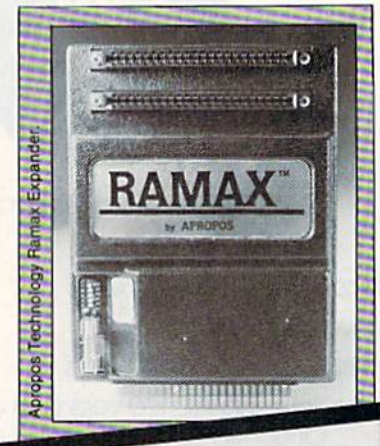

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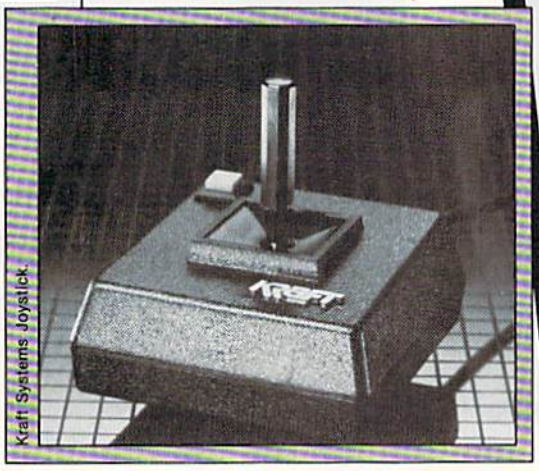
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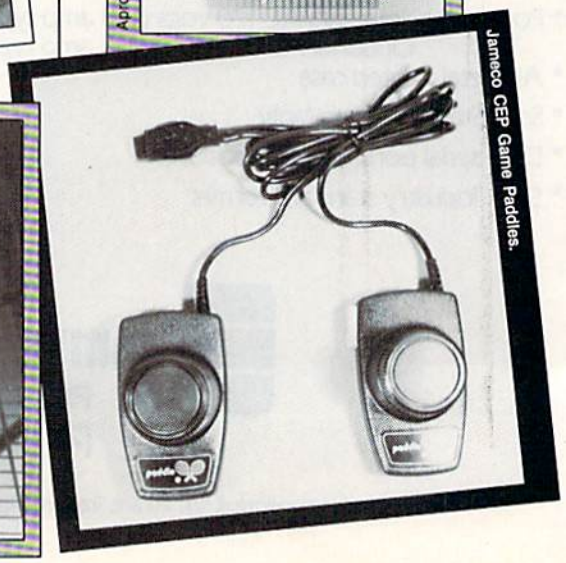
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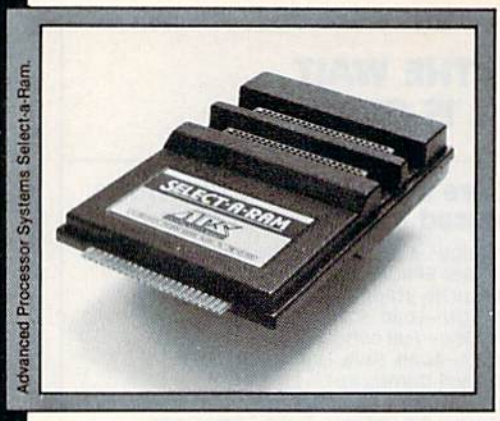

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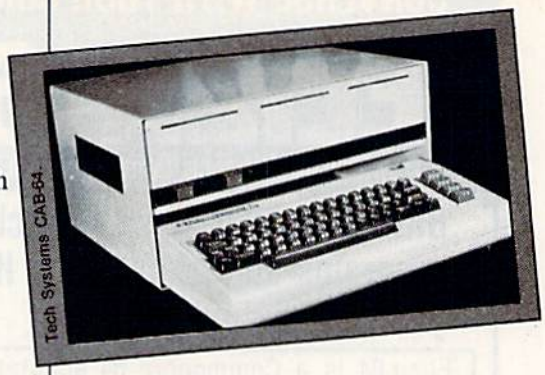
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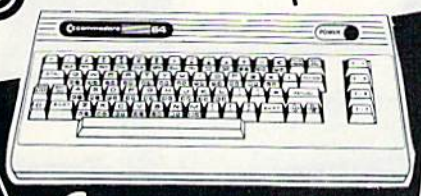

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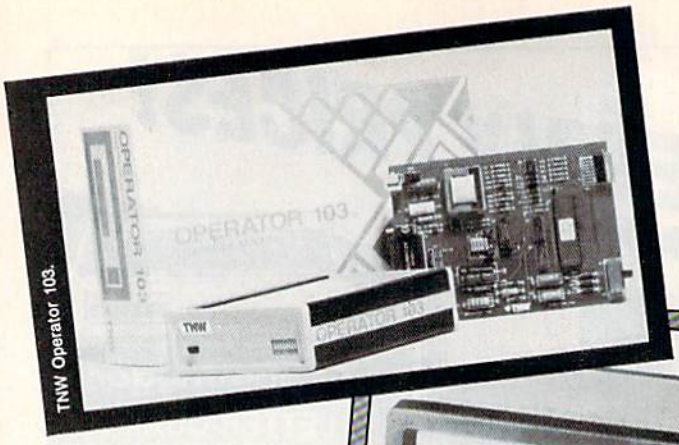

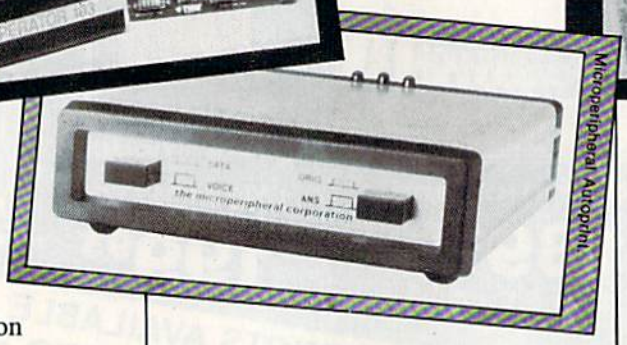

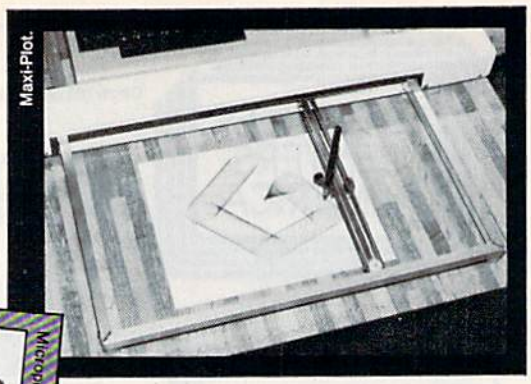

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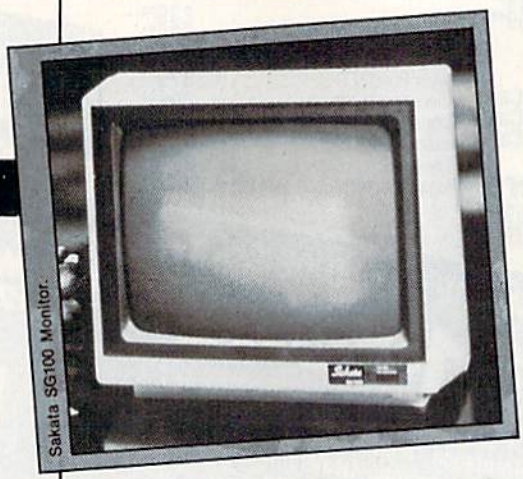

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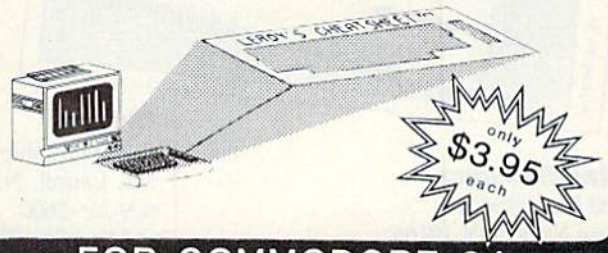

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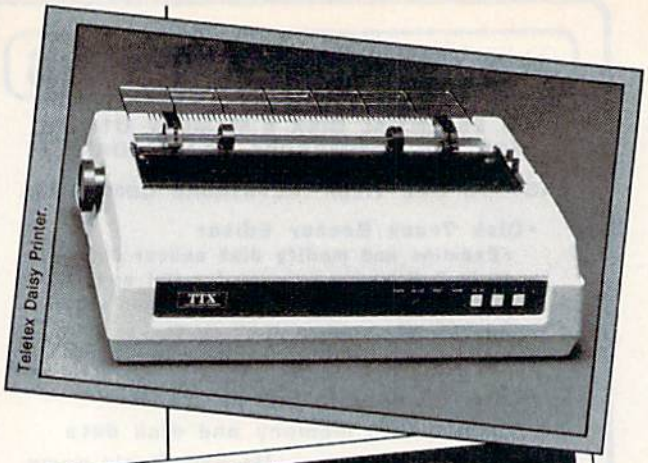

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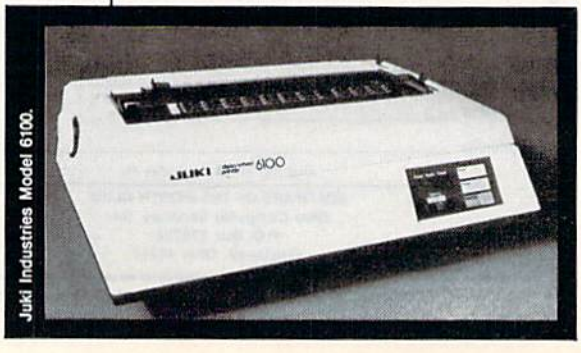

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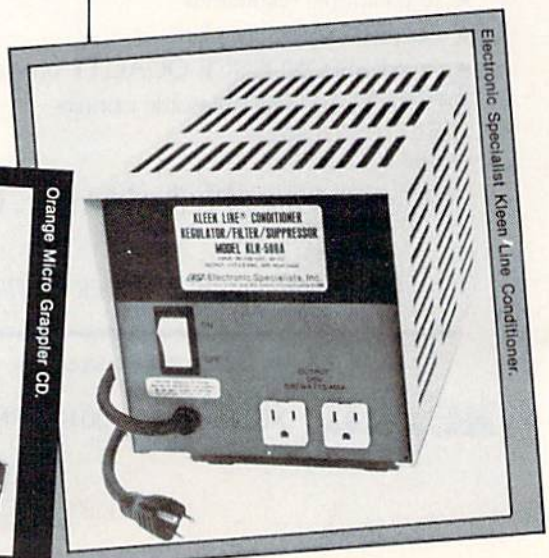

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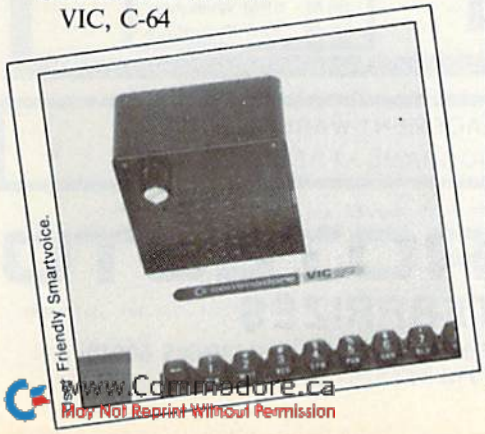

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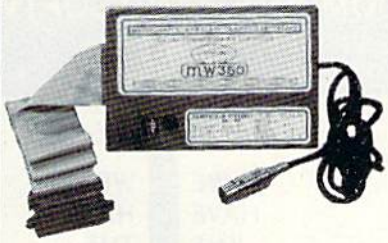

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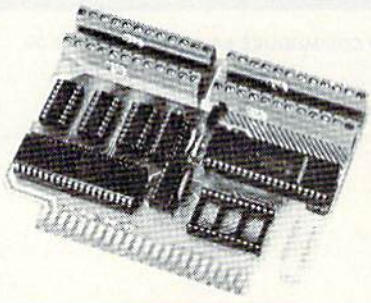

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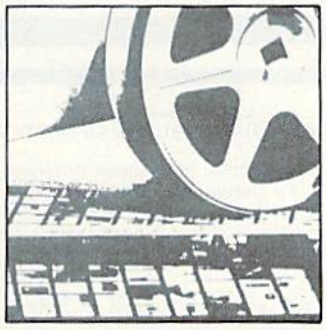

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For Com-64 or VIC-20 computers. Just plug it in and your can program words and sentences, adjust volume and pitch, make talking adventure games, sound action games and customized talkies!! FOR ONLY $19.95 you can add TEXT TO SPEECH, just type a word and hear your computer talk—ADD SOUND TO "ZORK", SCOTT ADAMS AND AARDVARK ADVENTURE GAMES!! (Disk or tape)

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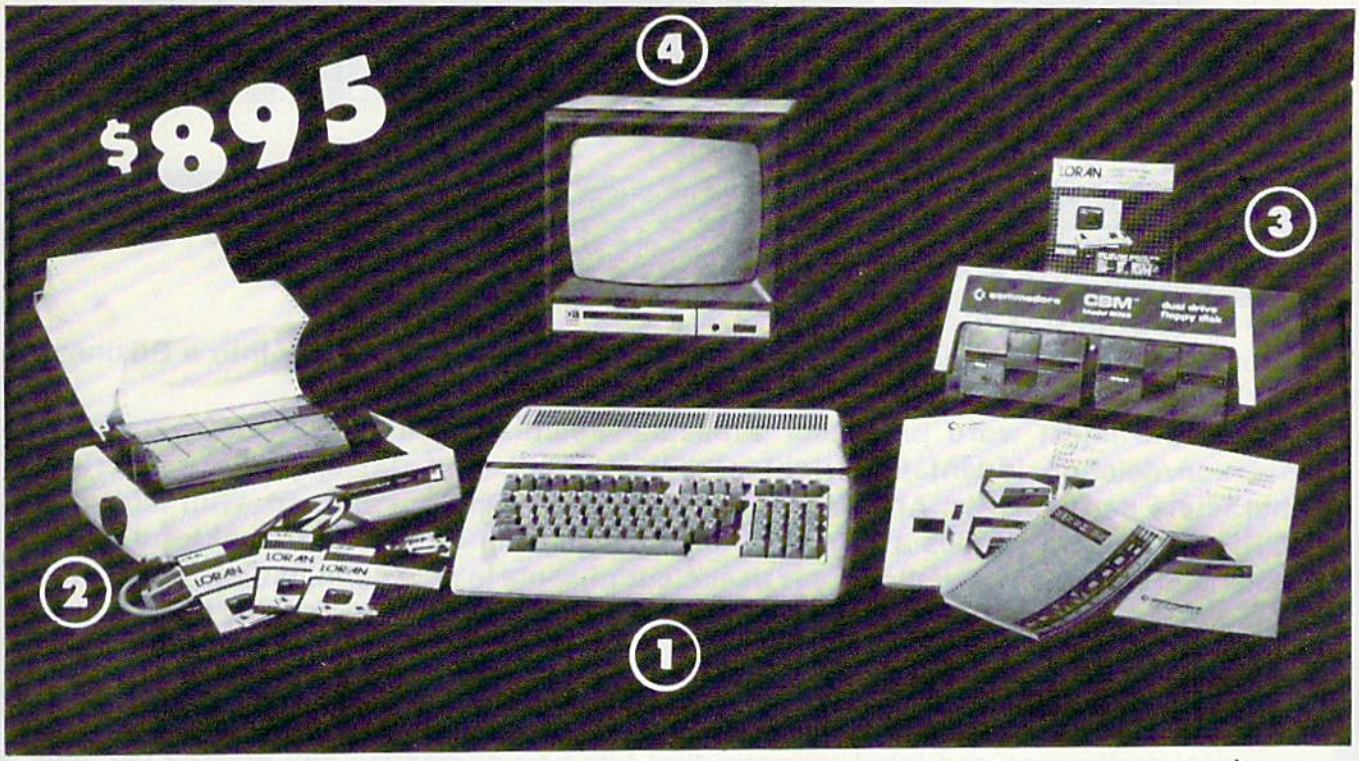

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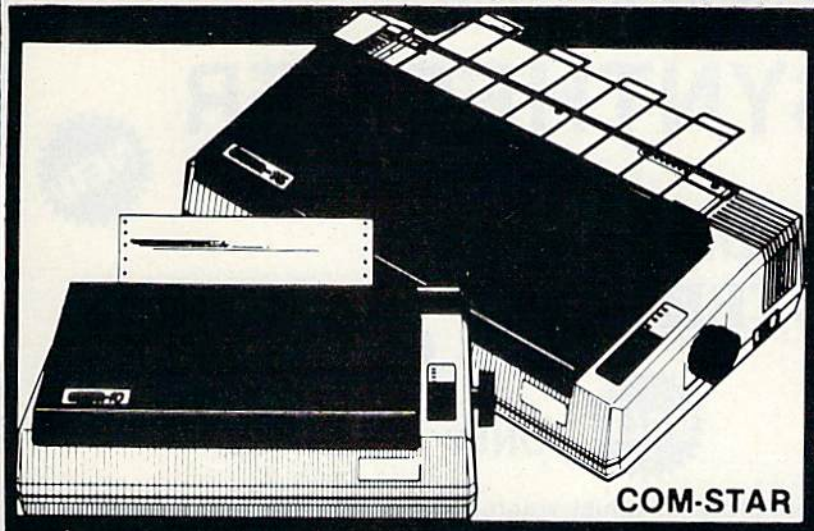

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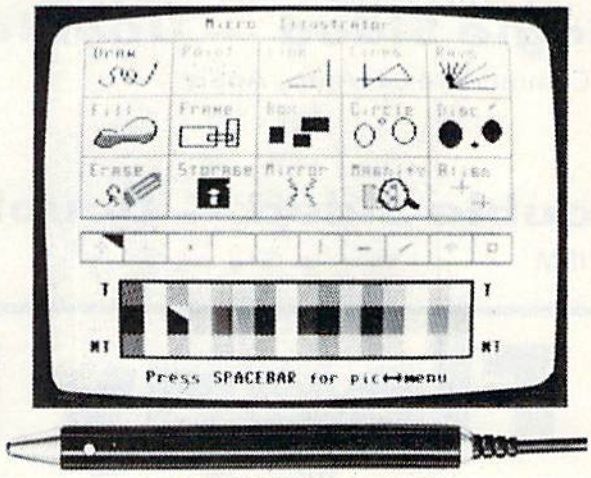

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Facts: (Holds 50 to 75 Disks)

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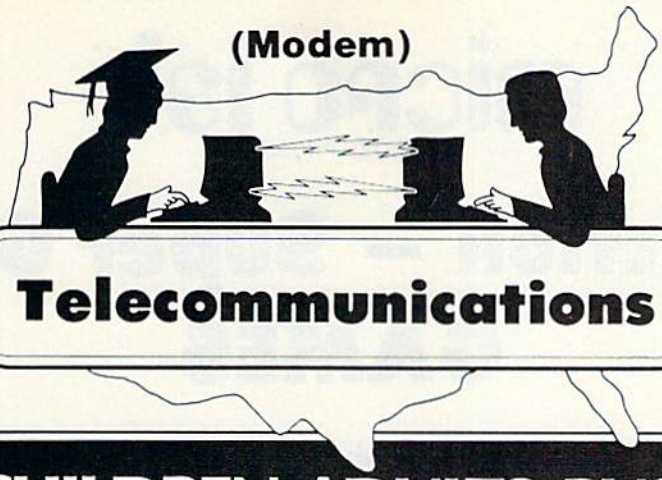

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Miner 2049er II — Now the Sequel to the original can be yours on the Commodore 64. This one is even harder. Avoid ricocheting ore lumps, warp transporters, radioactive stalactites, among other things. You control gigantic girder cranes, high speed

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SALE

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Boulder Dash — Dig frantically through 16 magical caves in your search for the diamonds and hidden escape tunnel. Avoid falling boulders, enchanted walls. Even an amoeba. Fantastic action makes this a must for everyone. List $39.95. **Sale $27.95.** (Disk.)

Dino Eggs — You must climb, jump and run over the cliffs where the dino eggs are buried. Avoid snakes, spiders and other menaces

as you try and rescue the eggs. Watch out for momma or she'll squash you flat. Fantastic action. List $39.95. **Sale $27.95.** (Disk.)

Death In The Caribbean — Fantastic High resolution adventure with over 100 beautiful screens. Find the treasure using your map but watch out for cliffs, ants, crocodiles, plus many more. Fantastic graphics. Highly recommended. List $39.95. **Sale $27.95** (Disk.)

The Heist — Leap recklessly from moving platforms, evade man-eating robots, dodge falling boxes and monstrous stompers. These are just a few of

the dangers you face as you search through 96 different rooms fiendishly boobytrapping to keep you from stealing the microfilm. Fantastic graphics and sound! List $39.95. **Sale $27.95.** (Disk.)

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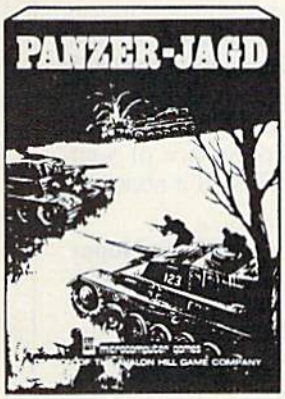
T.A.C. (Tactical Armor Command.) Fantastic computer adaptation of the famous board game. The player or players control up to 8 units simultaneously including tanks, infantry and anti-tank guns. (Fantastic graphics.) (Disk.) List $44.95. **Sale $34.95**.

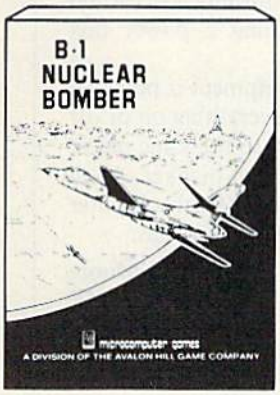
Commodore 64



Panzer Jagd. Fantastic tank simulation puts you in the German seat forced to secure the area of the Russian front. If you succeed your remaining units are saved for the big battle. See if you can rewrite history or make the same mistakes. (Great playability.) (Disk.) List $29.95. **Sale $21.95**.

Legionnaire. You as Caesar Augustus command up to 10 legions against an army of barbarian infantry, all aspects including cavalry, shock effects, fatigue, morale and slope effects as the battlefield scrolls before you in full color and animation. (Tape.) List $39.95. **Sale $24.95**. (Disk.) List $44.95. **Sale $27.95**.

Commodore 64



B-1 Nuclear Bomber. Pilot a B-1 bomber through stiff Russian defenses on the way to the target city. The computer controls Soviet MIG fighters and surface to air missiles. You must rely on your electronic counter measures and self defense missiles to succeed. Fantastic strategy game. (Tape.) List $19.95. **Sale $13.95**. (Disk.) List $24.95. **Sale $18.95**.

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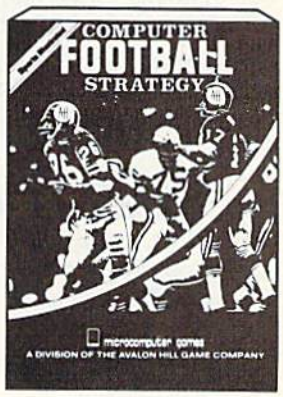

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Magic (from p. 12)

$123 Joystick sorrow, VIC version—On the VIC, if a Datassette key is depressed, it can disrupt operation of the joystick. So always press the Datassette's stop key if you're working with a joystick.

Bosco Tsang
Windsor, Ontario
Canada

$124 VIC joystick reader—This one-liner will read the VIC joystick port.

```
10 POKE 37154,127 : X=(NOT PEEK (37151)) AND 60-((PEEK
   (37152) AND 128)=0) : PRINT X : GOTO 10
```

Pushing the joystick in the following directions will return the indicated values of X:

North	4	Northeast	5
South	8	Northwest	20
West	16	Southeast	9
East	1	Southwest	24

When the joystick is centered, X=0. Pressing the fire button will return a value of 32 plus the value for the joystick direction. To have the computer wait for the user to press the fire button, use the following.

```
20 PRINT "PRESS THE BUTTON TO CONTINUE"
30 WAIT 37137,32 : WAIT 37137,32,32
40 Continue the program here.
```

Tony Giordano
Brooklyn, NY

$125 VIC paddles—Use the paddles, it's easy! Just Peek (36872) for paddle X and Peek (36873) for paddle Y. That's all it takes to read them—very easy, compared to the joystick.

Unknown Magician
Unknown Address

$126 VIC paddle program—Plug a paddle into the VIC's control port, turn up the sound, run this program and twiddle the paddles.

```
1 X=PEEK(36872) : POKE 36876,X : POKE 36878,X : POKE
  36879,X : PRINT "{SHIFT CLR}" X : GOTO 1
```

John Hartenstein
Philadelphia, PA

$127 Paddle Wait statements—In other tricks, we've shown how the Wait statement can be used to stop program execution until a certain key is pressed. To wait for the paddle buttons, use the following.

```
WAIT 56321,4,4        (C-64, Port 1, X)
WAIT 56321,8,8        (C-64, Port 1, Y)
WAIT 56320,4,4        (C-64, Port 2, X)
WAIT 56320,8,8        (C-64, Port 2, Y)
WAIT 37137,144,16     (VIC, X)
WAIT 37152,128,128    (VIC, Y)
```

Grant A. Dibert, III
Ft. Thomas, KY

$128 Power supply tip—The Commodore power supply is very sensitive to overheating, and needs a good flow of air around and through it to keep it cool.

Although the unit is shipped with a long cord, and the literature says to keep it a far distance from the cassette drive, computer and monitor, *never* put the power supply on the floor, especially a carpeted one. The unit will sink into the pile of a rug or carpet, blocking the cooling vents on the bottom. Even hardwood floors are dusty, and a dust-clogged power supply is a candidate for failure. Do yourself a favor and put the power supply up on a table where you can see it, and periodically dust it and check for clogged vents.

Joseph A. Levine
Lynchburg, VA

$129 Magical power switch—Tired of plugging and unplugging your power supply every time you use it? Just get an in-the-cord switch of the type used for table lamps, and wire it into your power supply. Most of the switches are made by Leviton, and are available in hardware and lighting stores. They're very easy to install, and they make life a *lot* easier.

Steven D. Jackson
Caldwell, ID

$12A A constant source of power—If you experience the frustration of having your power cord fall out right after you've typed in 500 lines of code, try this tip. Glue your power cord into the power connector with clear silicone rubber. It won't change the appearance of your machine, and the rubber can be easily removed if necessary in the future.

Tom Hoppe
Spokane, WA

$12B Power box—Every computer owner should use a multiple-outlet power box, of the type that has a single switch controlling all the sockets. In spite of what you may read in the manuals about turning on certain pieces of equipment before others, using a power box almost never causes any trouble.

Consider the advantages: All your equipment is powered from a single wall socket; you can turn everything on or off with one switch; every power cord is run to the same place; often these boxes include a protective circuit breaker. All in all, the power outlet box is one of the most useful computer accessories you can have. Ask for one for Christmas.

Ed Moore
Portland, ME

$12C Improved TV video on the C-64—If you're using a color TV rather than a monitor, you can improve your picture by making up a special plug for the monitor's audio/video connector. (That's *not* the one you plug your TV into.) Referring to Appendix I in your user's guide, connect a 150-ohm resistor between the luminance and video-out pins, and the results might amaze you.

Be careful, because the DIN plug's pins aren't numbered

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as you might expect. The picture in the book shows the solder-lug end of the male connector, and the pins you want are the two on the right.

L.F.S.

$12D Pen pals—Being overseas has its good and bad points. The good is access to both British and American software for my C-64, and the bad is not having access to many Commodore stores.

Regardless, I've devised a way to keep in touch with my home in the States. I hook my C-64 to my video cassette recorder, then type a video letter to my friend in New Jersey, demonstrating the latest game from the British press or whatever strikes my fancy.

When he's been thoroughly amazed by British ingenuity, my friend rerecords the tape with American TV programs and mails it back. Then I can see what is happening in the States, watch 60 Minutes or a movie from HBO.

Bill Murray
Alconbury, England

$12E Connector hint—There are two points of caution when making up cables with DIN connectors.

First, the standard DIN pin numbers are not what you might imagine. Depending on the number of pins in the connector, for example, pin 1 may or may not be next to pin 2. The situation is so confusing that even published diagrams are sometimes incorrect. (The ones in Commodore publications are all right. Look closely at them to see what we're talking about.)

The second confusing point is that published pinouts often don't say which end of which sex connector they are illustrating, so it's again unclear which pin is which. The Commodore manuals illustrate the solder terminal end of the male connector.

Tiny pin numbers are always molded into the insulator, so if your eyes are good and if you're careful, you shouldn't have any trouble.

L.F.S.

$12F Expansion port connectors—Anyone skilled enough to make his own cables can easily make his own expansion port connectors. Radio Shack sells blank printed-circuit boards and all the equipment you need to etch your own, including the artwork for the male connector pins. It's easy and a lot of fun to make your own connectors in this way.

Clay Collins
Honolulu, HI

$130 More expansion port connectors—I have built circuits for the expansion port using Vector 3662DP plugboards. These are blank boards with 0.1-inch spacing and 22 gold-plated contacts on each side. The cost is about $10. However, the numbers and letters used by Commodore on the expansion port are the reverse of industry standards (pin 1 standard is pin 22 on the expansion port, etc.), and this must be noted when wiring the connector.

Thomas Maggio
Rome, NY

$131 Safety tip—My cat jumped onto the computer table, knocking the braid from the Datassette connector inside one of the rear ports, where it did a lot of electrical damage. To prevent such accidents in the future, I made covers for all the ports by folding pieces of duct tape nearly in half, lengthwise. I used the remaining sticky part to fasten the covers to the rear of my computer, where they can be lifted up when access is required. My covers keep paperclips, cable braid, dust and other unwelcome items outside the computer, where they belong.

Lorraine Richards-May
Leesburg, IN

Editor's note: Those Datassette braids are much more trouble than they're worth. Since they are only used with Commodore PETs, many VIC and C-64 owners just cut them off and discard them.

$132 SX-64 printer-interface hint—Some C-64 add-on devices, notably Cardco printer interfaces, pick up their power by plugging into the cassette port on the rear of the computer. Because the SX-64 portable computer doesn't have a cassette port, it's not possible to use a standard Cardco cable with it. We solved this problem by cutting off the connector that goes from the interface to the cassette port. We then obtained a 9-pin subminiature D connector and soldered the former cassette port wire onto pin 7. Now we can plug the connector into one of the game ports, and the interface picks up its power from there. Our printer (Epson MX-80) runs fine, and the other game port is free so we can still use a joystick with programs like Commodore's Magic Desk.

Kris & Steve Coon
Honeoye, NY

$133 One-line flasher—This program makes any TV set or color monitor flash like a strobe light. The strobe time can be changed by changing the number in the timing loop, and the program can flash in any desired color by changing the number of the color in the second Poke. The following program is for the VIC.

```
1 A=36879:POKEA,8:FORT=1TO99:NEXT:POKEA,25:GOTO 1
```

This line is for the C-64:

```
1 A=53280:B=A+1:POKEA,0:POKEB,0:FORT=1TO99:NEXT:
  POKEA,1:POKEB,1:GOTO 1
```

Luis Enrique Grijalva Raudales
Tijuana, Mexico

$134 Keyboard tip—With all the keys on the Commodore keyboard, it's easy for your fingers to miss the home keys for touch typing. If you put drops of glue on the F and J keys, you'll be able to feel them when your hands are positioned correctly. Choose a type of glue that will make a substantial bump, but one that can be scraped off later, if needed.

James Bartlett
Summerville, GA

$135 Printer trick—Because I am working with the monitor and machine language, I wrote this triple-

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loop program to make a one-page hex and decimal conversion chart. If you start the chart at the very top of a page, it just fills the sheet. The program works perfectly with my Commodore 4022 tractor printer and should work the same with others.

```
1 OPEN4,4:CMD4:FORI=0TO63:FORJ=ITO255STEP64:D$=STR$
  (J):PRINTJSPC(5-LEN(D$))
2 H=J/16:FORK=1TO2:H%=H:H$=CHR$(48+H%-(H%>9)*7)
  :PRINTH$;:H=16*(H-H%)
3 NEXT:PRINTSPC(12);:NEXT:PRINT:NEXT:PRINT#4:CLOSE4
```

G. Sturdivant
Address Unknown

$136 Cassette tape index—When saving the first program on a new cassette, consider reserving space for a tape index, which you can record at the start of the tape after it is full. Ten numbers on the tape counter should be enough to hold a very large index, especially if it's a simple one. My indexes are disguised as Basic programs, with the line numbers corresponding to tape-counter settings, and with the program names typed in as Basic text. The following example will save, load and list perfectly, but of course it can't be run.

```
0 INDEX
10 PROGRAM #1
20 PROGRAM #2
45 PROGRAM #3
55 Etc., etc.
90 END OF LAST PROGRAM
```

Ken Wills
Pittsburgh, PA

$137 Saving data—For those who've never saved anything but programs on their Datassette, here's a little program that illustrates the saving of data.

```
10 PRINT"{SHIFT CLR} INPUT DATA";:POKE631,34:POKE198,1:
   INPUTD$:PRINTD$
20 OPEN1,1,1,"DATA":PRINT#1,CHR$(34)+D$:CLOSE1
30 PRINT"{SHIFT CLR} REWIND TAPE, THEN PRESS A KEY."
40 GET A$:IF A$=""THEN 40
50 OPEN1,1,0,"DATA":INPUT#1,D$:PRINTD$
```

The Pokes in line 10 put a quotation mark as the first character in D$, allowing it to contain commas, colons and so on. When the quotation mark is read back, it places the computer in Quote mode, so all the characters will be printed as they were typed.

Kenneth E. Stringham, Jr.
Attleboro, MA

$138 C-64 Save disable—You can disable the C-64's Save command with POKE 818,32. To enable it again, enter POKE 818,237.

Damien Nelson
Melbourne, Australia

$139 Using abbreviations—When keyword abbreviations are used in long program lines, the lines can list longer than the usual 80 columns. (Prove it by entering 10?:?:?:, etc., running the question marks to a point just short of the 80th column. Then list the line—it should take up almost six screen lines.)

The long lines cannot be edited, which is annoying when they have to be changed in some way. To avoid retyping in this circumstance, make a dummy line, numbering it so it will never be executed. After its line number, make the first character a quotation mark. The rest of this line should be your regular program line, including all its abbreviations.

When you need to edit your regular long line, just list the dummy, edit the line number, delete the leading quotation mark, edit the rest of the line, then hit the return key. Your dummy remains if you need it again, but your newly edited line replaces the one you couldn't edit before, with a saving of many keystrokes. You can delete the dummy when your program achieves its final form.

Lion L. Kuntz
San Francisco, CA

$13A Easier debugging—When debugging, you often need to return repeatedly to certain sections of the program. To get there much faster, you can insert lines like the following at the beginning of your program.

```
0 GOTO20
1 LIST 100-200
2 LIST 450-550
3 OPEN 3,4:CMD3:LIST 400-430
4 etc.
20 REM END OF DEBUG
```

The line numbers to list are only examples; you'll want to use whatever line numbers are most appropriate for the program being debugged. To use the routine, just type in RUN 1 to list lines 100–200, RUN 2 to list lines 450–550, RUN 3 to list to the printer and so on. Since executing the List command terminates program execution, you don't have to put End or Stop commands in each line. An alternate routine is this:

```
0 GET A$:IF A=""THEN0
1 IFA$="A"THEN LIST 100-200
2 IFA$="B"THEN LIST 450-550
3 IFA$="C"THEN OPEN3,4:CMD3:LIST 400-430
20 REM END OF DEBUG
```

Here, you just run the program, then press a key for the listing you want. Typing an unused letter will execute the program normally. I've used both forms of this trick with great success.

Mike Rogalski
Monrovia, CA

$13B Variable names—If you run this:

```
10 TOP=65
20 BOTTOM=90
30 PRINT BOTTOM-TOP
```

you will get a Syntax error, because TO, a Basic keyword, is embedded in each of the variable names. You can trick the computer by placing a graphics character inside the keyword. Try this:

```
10 T{shift J}OP=65
20 BOTT{shift J}OM=90
30 PRINT BOTT{shift J}OM-T{shift J}OP
```

The program will run perfectly, giving an answer of 25. When you list the program, you won't see the shifted characters at all, but they're in there just the same.

Nick Proakis, Jr.
Aliquippa, PA

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(from p. 72)

```
72Ø PRINT"{COMD 5}{11 SPACEs}{CRSR DN}PLAY AGAIN{2 SPAC
    Es}{CTRL 9} Y OR N{CTRL Ø}"
73Ø GETA$:ON-(A$="")GOTO73Ø:SYS51253
74Ø IFA$="N"THENPRINT"{SHFT CLR}":POKE53272,(PEEK(53272
    )AND24Ø)OR4:END
75Ø PRINT"{SHFT CLR}"
76Ø GOSUB8ØØ:GOTO2ØØ
77Ø SYS512ØØ:G$="{2 SPACEs}A{2 SPACEs}NEW{2 SPACEs}HIGH
    ":GOSUB153Ø:PRINTDW$"{COMD 7}"
78Ø G$="{9 SPACEs}SCORE!":GOSUB153Ø:PRINTDW$:GOSUB156Ø:
    GOSUB82Ø
79Ø RETURN
8ØØ PRINT"{SHFT CLR}{CRSR DN}{CRSR RT}{COMD 5}STARTING
    SKILL LEVEL 1-5 ";:INPUT"{2 SPACEs}1{3 CRSR LFs}";S
    K:IFSK<1ORSK>5THEN8ØØ
81Ø PRINT"{SHFT CLR}{CRSR DN}";:QX=FRE(Ø)
811 RETURN
82Ø FORI=ØTO24:POKESI+I,Ø:NEXT:POKESI+24,15:POKESI+5,9:
    POKESI+6,24Ø
83Ø POKESI+13,24Ø:POKESI+8,28:RETURN
84Ø DATA25,3Ø,6Ø,18,2Ø9,6Ø,15,21Ø,6Ø,18,2Ø9,6Ø
85Ø DATA15,21Ø,6Ø,18,2Ø9,6Ø,25,3Ø,6Ø
86Ø DATA18,2Ø9,6Ø,15,21Ø,6Ø,18,2Ø9,6Ø
87Ø DATA15,21Ø,6Ø,18,2Ø9,6Ø,25,3Ø,6Ø
88Ø DATA17,195,6Ø,18,2Ø9,6Ø,21,31,6Ø,23,181,6Ø
89Ø DATA25,3Ø,25Ø,Ø,Ø,125,18,2Ø9,25Ø,Ø,Ø,125,12,143,75Ø
9ØØ DATA Ø,Ø,-1
91Ø DATA 12Ø,169,2ØØ,141,21,3,169,18,141,2Ø,3,169,6,141
    ,52
92Ø DATA 3,88,96,2Ø6,52,3,24Ø,3,76,49,234,169,5,141,52
93Ø DATA 3,16Ø,26,169,226,153,151,5,23Ø,2,165,2,41,15,1
    53
94Ø DATA 151,217,136,16,239,76,49,234,12Ø,169,49,141,2Ø
    ,3,169
95Ø DATA 234,141,21,3,88,96,-1
96Ø DATA 169,4Ø,133,254,173,Ø,22Ø,74,176,8,16Ø,Ø,132,25
    4,234
97Ø DATA234,234,234,74,176,8,16Ø,8Ø,132,254,234,234,234
    ,234,74
98Ø DATA 176,8,16Ø,39,132,254,16Ø,27,132,253,74,176,8,1
    6Ø,41
99Ø DATA 132,254,16Ø,59,132,253,96,-1
1ØØØ DATA 12Ø,169,84,141
1Ø1Ø DATA 2Ø,3,169,192,141,21,3,88,96,173,148,192,2Ø8,4
     Ø,174
1Ø2Ø DATA 149,192,232,224,64,2Ø8,2,162,Ø,189,15Ø,192,14
     1,Ø,212
1Ø3Ø DATA 232,189,15Ø,192,141,1,212,232,189,15Ø,192,141
     ,4,212,232
1Ø4Ø DATA 189,15Ø,192,141,148,192,142,149,192,2Ø6,148,1
     92,76,49,234
1Ø5Ø DATA 12Ø,169,49,141,2Ø,3,169,234,141,21,3,88,96,1,
     31
1Ø6Ø DATA 97,8,17,15,143,12,17,15,195,16,17,15,48,11,17
1Ø7Ø DATA 15,143,1Ø,17,15,48,11,17,15,1Ø4,9,17,15,143,1
     Ø
1Ø8Ø DATA 17,15,97,8,17,15,233,7,17,15,97,8,17,15,1Ø4
1Ø9Ø DATA 9,17,15,143,1Ø,17,15,48,11,17,15,1Ø4,9,17,15
11ØØ DATA 143,1Ø,17,15,-1
111Ø REM ** ALPHABET **
112Ø DIMA$(57)
113Ø A$(1)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRSR
     LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CTRL Ø}{COM
     D Y}{CTRL 9} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{COMD Y}
     {COMD Y}{3 CRSR UPs}"
114Ø A$(2)="{CRSR RT}{CTRL 9}{2 SPACEs}{COMD *}{CRSR DN
     }{3 CRSR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CTR
     L Ø}{COMD Y}{CTRL 9} {CTRL Ø}{CRSR DN}{3 CRSR LFs}
     {3 COMD Ys}{3 CRSR UPs}"
115Ø A$(3)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRSR
     LFs} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}{CTRL Ø
     }{3 COMD Ys}{3 CRSR UPs}"
116Ø A$(4)="{CRSR RT}{CTRL 9}{2 SPACEs}{COMD *}{CRSR DN
     }{3 CRSR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CRS
     R RT} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 COMD Ys}{3 C
     RSR UPs}"
117Ø A$(5)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRSR
     LFs} {CRSR DN}{CRSR LF} {CTRL Ø}{COMD Y}{CTRL 9}{
     CRSR DN}{2 CRSR LFs}{CTRL Ø}{3 COMD Ys}{3 CRSR UPs
     }"
118Ø A$(6)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRSR
     LFs} {CRSR DN}{CRSR LF} {CTRL Ø}{COMD Y}{CTRL 9}{
     CRSR DN}{2 CRSR LFs}{CTRL Ø}{COMD Y}{2 CRSR RTs}{3
     CRSR UPs}"
119Ø A$(7)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRSR
     LFs} {CRSR DN}{CRSR LF} {CRSR RT} {CRSR DN}{3 CRS
     R LFs}{CTRL Ø}{3 COMD Ys}{3 CRSR UPs}"
12ØØ A$(8)="{CRSR RT}{CTRL 9} {CRSR RT} {CRSR DN}{3 CRS
     R LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CTRL Ø}{CO
     MD Y}{CTRL 9} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{COMD Y
     } {COMD Y}{3 CRSR UPs}"
121Ø A$(9)="{CRSR RT}{CTRL 9} {CRSR DN}{CRSR LF} {CRSR
     DN}{CRSR LF} {CRSR DN}{CRSR LF}{CTRL Ø}{COMD Y}{3
     CRSR UPs}"
122Ø A$(1Ø)="{CRSR RT}{CTRL 9}{2 CRSR RTs} {CRSR DN}{CR
     SR LF} {CRSR DN}{3 CRSR LFs}{COMD U}{CRSR RT} {CRS
     R DN}{3 CRSR LFs}{CTRL Ø}{3 COMD Ys}{3 CRSR UPs}"
```

→

Listing continued.

```
123Ø A$(11)="{CRSR RT}{CTRL 9} {CRSR RT} {CRSR DN}{3 CR
     SR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CTRL Ø}{C
     OMD Y}{COMD J}{CRSR DN}{3 CRSR LFs}{COMD Y} {COMD
     Y}{3 CRSR UPs}"
124Ø A$(12)="{CRSR RT}{CTRL 9} {CRSR DN}{CRSR LF} {CRSR
     DN}{CRSR LF} {CRSR DN}{CRSR LF}{CTRL Ø}{3 COMD Ys
     }{3 CRSR UPs}"
125Ø A$(13)="{CRSR RT}{CTRL 9} {COMD *}{SHFT LB.} {CRSR
     DN}{4 CRSR LFs} {CTRL Ø}{COMD *}{SHFT LB.}{CTRL 9
     } {CRSR DN}{4 CRSR LFs} {2 CRSR RTs} {CRSR RT}{CRS
     R DN}{5 CRSR LFs}{CTRL Ø}{COMD Y}{2 SPACEs}{COMD Y
     }{3 CRSR UPs}"
126Ø A$(14)="{CRSR RT}{CTRL 9} {COMD *} {CRSR DN}{3 CRS
     R LFs} {CTRL Ø}{COMD *}{CTRL 9} {CRSR DN}{3 CRSR L
     Fs} {CRSR RT} {CRSR RT}{CRSR DN}{4 CRSR LFs}{CTRL
     Ø}{COMD Y} {COMD Y}{3 CRSR UPs}"
127Ø A$(15)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRS
     R LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CRSR RT} {
     CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 COMD Ys}{3 CRSR UPs
     }"
128Ø A$(16)="{CRSR RT}{CTRL 9}{2 SPACEs}{COMD *}{CRSR D
     N}{3 CRSR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CT
     RL Ø}{2 COMD Ys}{CRSR DN}{3 CRSR LFs}{COMD Y}{2 CR
     SR RTs}{3 CRSR UPs}"
129Ø A$(17)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRS
     R LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CTRL Ø}{CO
     MD D}{CTRL 9} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 COMD
      Ys}{COMD V}{3 CRSR UPs}"
13ØØ A$(18)="{CRSR RT}{CTRL 9}{2 SPACEs}{COMD *}{CRSR D
     N}{3 CRSR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CT
     RL Ø}{COMD Y}{COMD J}{CRSR DN}{3 CRSR LFs}{COMD Y}
     {COMD Y}{3 CRSR UPs}"
131Ø A$(19)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{3 CRS
     R LFs} {CRSR DN}{CRSR LF}{CTRL Ø}{2 COMD Ys}{CTRL
     9} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 COMD Ys}{3 CRSR
      UPs}"
132Ø A$(2Ø)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{2 CRS
     R LFs} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}{CTRL
     Ø}{COMD Y}{CRSR RT}{3 CRSR UPs}"
133Ø A$(21)="{CRSR RT}{CTRL 9} {CRSR RT} {CRSR DN}{3 CR
     SR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CRSR RT}
     {CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 COMD Ys}{3 CRSR UP
     s}"
134Ø A$(22)="{CRSR RT}{CTRL 9} {CRSR RT} {CRSR DN}{3 CR
     SR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs}{CTRL Ø}{CO
     MD *}{COMD @}{SHFT LB.}{CRSR DN}{3 CRSR LFs} {COMD
     Y} {3 CRSR UPs}"
```

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```
142Ø A$(48)="{CRSR RT}{CTRL 9} {COMD P} {CRSR DN}{3 CRS
     R LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs} {CRSR RT} {
     CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 COMD Ys}{3 CRSR UPs
     }"
143Ø A$(49)="{CRSR RT}{COMD D}{CTRL 9} {CRSR DN}{CRSR L
     F} {CRSR DN}{CRSR LF} {CRSR DN}{CRSR LF}{CTRL Ø}{C
     OMD Y}{3 CRSR UPs}"
144Ø A$(5Ø)="{CRSR RT}{CTRL 9}{COMD P}{COMD O} {CRSR DN
     }{2 CRSR LFs}{SHFT LB.}{CTRL Ø}{SHFT LB.}{CRSR DN}
     {3 CRSR LFs}{CTRL 9}{SHFT LB.}{CTRL Ø}{SHFT LB.}{C
     RSR DN}{2 CRSR LFs}{3 COMD Ys}{3 CRSR UPs}"
145Ø A$(51)="{CRSR RT}{CTRL 9}{COMD P}{COMD O} {CRSR DN
     }{2 CRSR LFs}{CTRL Ø}{COMD D}{CTRL 9} {CRSR DN}{3
     CRSR LFs}{CTRL Ø}{COMD O}{CRSR RT}{CTRL 9} {CTRL Ø
     }{CRSR DN}{3 CRSR LFs}{3 COMD Ys}{3 CRSR UPs}"
146Ø A$(52)="{2 CRSR RTs}{CTRL 9}{SHFT LB.} {CRSR DN}{3
     CRSR LFs}{SHFT LB.}{CTRL Ø}{SHFT LB.}{CTRL 9} {CR
     SR DN}{3 CRSR LFs}{2 COMD Is} {CTRL Ø}{COMD V}{CRS
     R DN}{2 CRSR LFs}{COMD Y}{3 CRSR UPs}"
147Ø A$(53)="{CRSR RT}{CTRL 9} {2 COMD Ps}{CRSR DN}{3 C
     RSR LFs} {CTRL Ø}{2 COMD Is}{CRSR DN}{3 CRSR LFs}{
     COMD P} {CTRL 9} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 C
     OMD Ys}{3 CRSR UPs}"
148Ø A$(54)="{CRSR RT}{CTRL 9} {2 COMD Ps}{CRSR DN}{3 C
     RSR LFs} {CTRL Ø}{2 COMD Is}{CRSR DN}{3 CRSR LFs}{
     CTRL 9} {CRSR RT} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{3
     COMD Ys}{3 CRSR UPs}"
149Ø A$(55)="{CRSR RT}{CTRL 9}{2 COMD Ps} {CRSR DN}{2 C
     RSR LFs}{SHFT LB.}{CTRL Ø}{SHFT LB.}{CRSR DN}{2 CR
     SR LFs}{CTRL 9} {CTRL Ø}{CRSR DN}{CRSR LF}{COMD Y}
     {CRSR RT}{3 CRSR UPs}"
15ØØ A$(56)="{CRSR RT}{CTRL 9} {COMD P} {CRSR DN}{3 CRS
     R LFs} {CTRL Ø}{COMD I}{CTRL 9} {CRSR DN}{3 CRSR L
     Fs} {CRSR RT} {CTRL Ø}{CRSR DN}{3 CRSR LFs}{3 COMD
      Ys}{3 CRSR UPs}"
151Ø A$(57)="{CRSR RT}{CTRL 9} {COMD P} {CRSR DN}{3 CRS
     R LFs} {CTRL Ø}{COMD I}{CTRL 9} {CRSR DN}{CRSR LF}
     {CTRL Ø}{CRSR DN}{CRSR LF}{COMD Y}{3 CRSR UPs}"
152Ø RETURN
153Ø FORI=1TOLEN(G$):G=ASC(MID$(G$,I,1)):IFG>64THENG=G-
     64
154Ø PRINTA$(G);:NEXT:RETURN
156Ø HQ=SID+8:LQ=SID+7:POKENW-7,33:POKENW,33:RESTORE
157Ø READXX:READXY:READDU:IFDU<ØTHEN16ØØ
158Ø POKEHQ,XX:POKELQ,XY:POKESI,XY+3Ø:POKESI+1,XX:FORDL
     =1TODU:NEXT
159Ø GOTO157Ø
16ØØ POKENW,Ø:POKENW-7,Ø:RETURN
```

Listing continued.

```
135Ø A$(23)="{CRSR RT}{CTRL 9} {2 CRSR RTs} {CRSR DN}{4
     CRSR LFs} {SHFT LB.}{COMD *} {CRSR DN}{4 CRSR LFs
     } {CTRL Ø}{SHFT LB.}{COMD *}{CTRL 9} {CRSR RT}{CRS
     R DN}{5 CRSR LFs}{CTRL Ø}{COMD Y}{2 SPACEs}{COMD Y
     }{3 CRSR UPs}"
136Ø A$(24)="{CRSR RT}{CTRL 9} {CRSR RT} {CRSR DN}{3 CR
     SR LFs}{COMD F}{COMD U}{COMD D}{CRSR DN}{3 CRSR LF
     s} {CRSR RT} {CRSR DN}{3 CRSR LFs}{CTRL Ø}{COMD Y}
     {CRSR RT}{COMD Y}{3 CRSR UPs}"
137Ø A$(25)="{CRSR RT}{CTRL 9} {CRSR RT} {CRSR DN}{3 CR
     SR LFs} {CRSR RT} {CRSR DN}{3 CRSR LFs}{CTRL Ø}{CO
     MD Y}{CTRL 9} {CTRL Ø}{COMD Y}{CRSR DN}{2 CRSR LFs
     }{COMD Y} {3 CRSR UPs}"
138Ø A$(26)="{CRSR RT}{CTRL 9}{3 SPACEs}{CRSR DN}{2 CRS
     R LFs}{SHFT LB.}{CTRL Ø}{SHFT LB.}{CTRL 9}{CRSR DN
     }{3 CRSR LFs}{SHFT LB.}{CTRL Ø}{SHFT LB.}{COMD @}{
     CRSR DN}{3 CRSR LFs}{3 COMD Ys}{3 CRSR UPs}"
139Ø A$(32)="{CRSR RT}"
14ØØ A$(33)="{2 CRSR RTs}{CTRL 9} {CRSR DN}{CRSR LF} {C
     RSR DN}{CRSR LF}{CTRL Ø}{COMD I}{CRSR DN}{CRSR LF}
     {COMD Y}{3 CRSR UPs}"
141Ø A$(45)="{CRSR RT}{CRSR DN}{3 COMD Is}{CRSR UP}"
```


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Commodore Clinic

By Jim Strasma

Commodore Clinic is a monthly column designed to help you, the RUN *reader, through any troubles or questions you have as you use your VIC or 64 computer. Send questions to:*

Jim Strasma
Commodore Clinic
1238 Richland Ave.
Lincoln, IL 62656

So this column can help as many people as possible, please try to limit your questions to topics of general interest, and limit each letter to one question. Including a full-sized (#10) self-addressed stamped envelope will ensure a reply even if your letter does not appear in print. I do ask that you not call, though, because my telephone does not know how to type, and only typed questions can help others through this column.

Updates

My claim in the July column that the Save With Replace command *does* work drew fire from a host of readers. The following two letters are typical:

Update: Your answer regarding the Save With Replace disk command missed the mark. I suffered occasional mysterious transmutations of programs, which I finally traced to the Replace command. This was the sequence: With the wedge enabled, I entered "@s 0:program1". The rare and unpleasant result: Program 1 correctly replaced, but some other program converted to program 1.

Mark Dengler
Richmond, CA

A: You didn't use the Save With Replace command. You invented a new Scratch With Replace command. The proper syntax for Save With Replace is as follows:

```
SAVE "@0:name",8
```

Or, if you are using Basic 4,

```
DSAVE "@name"
```

I'm not at all surprised that something unusual happened when you used your syntax, and some others who complained may have done something similar.

Another likely culprit is a misaligned disk. Here is a relevant quote by Tom D'Angelo, from issue 19 of the *Midnite Software Gazette*: "Problems with... @save...can all be traced to improper drive setup (speed and alignment)."

Update: The reason that "old rumors die hard" is because this is a documented bug. I have experienced this problem myself.

Gregory Daggett
Milwaukee, WI

A: After receiving several complaints like yours, I used Save With Replace over a dozen times every day last week on my 64, without any problem whatsoever, just as I have used it without problems for the past several years on nearly all combinations of Commodore equipment.

I then spent this week with three of the foremost experts on Commodore disk drives anywhere, namely Jim Butterfield of Canada, Dick Immers of the U.S., and Mike Todd of England. After receiving another letter such as yours, we discussed the legendary Save With Replace bug. All of us were in full agreement that *there is no evidence that such a bug exists*, despite statements to the contrary in *Compute!*, *Compute's Gazette*, *The Transactor* and even a hint in *RUN*'s Magic column.

Jim Butterfield, *Compute!*'s most respected editor, was quite emphatic on the subject, saying at one point that no one who has ever seriously studied the Save With Replace command has ever found any evidence that it has destroyed a single file. He added that three years ago fellow expert Harry Broomhall offered to buy a case of beer for the first person able to describe any procedure by which it could be shown that the Save With Replace command had destroyed a file. Though there are many thirsty programmers, the case of beer remains unclaimed.

All of the above-named experts have thoroughly studied the internal workings of the @Save command, and they've come to the same conclusion—it works!

That you noticed a disk was mangled after using @Save is not proof that @Save is what caused your distress. According to the above experts, the exact same thing would have happened to you if you had used Save without the @ sign under the same circumstances.

Many things can ruin a disk in a way that may not be noticed for months. Renaming an existing file to another name, saving a new copy under the original name, and then scratching the renamed file, as some readers suggested, works well. However, Save With Replace works in almost precisely the same way—writing the new file completely before the old one is scratched. Why use three commands when one will do as well?

To avoid future troubles, let me repeat three crucial rules for writing to disk:

1. Never use Save With Replace unless there is enough room left on your disk to hold a complete spare copy of the program or file being replaced. If you violate this rule, it is possible on the 1541 to end up with an apparently good save that consists of only part of your file (what fit on disk prior to its filling). The only way you'll be able to tell a problem exists is by noting that a replaced file no longer occupies enough blocks on the disk.

2. Never scratch a file that has not been

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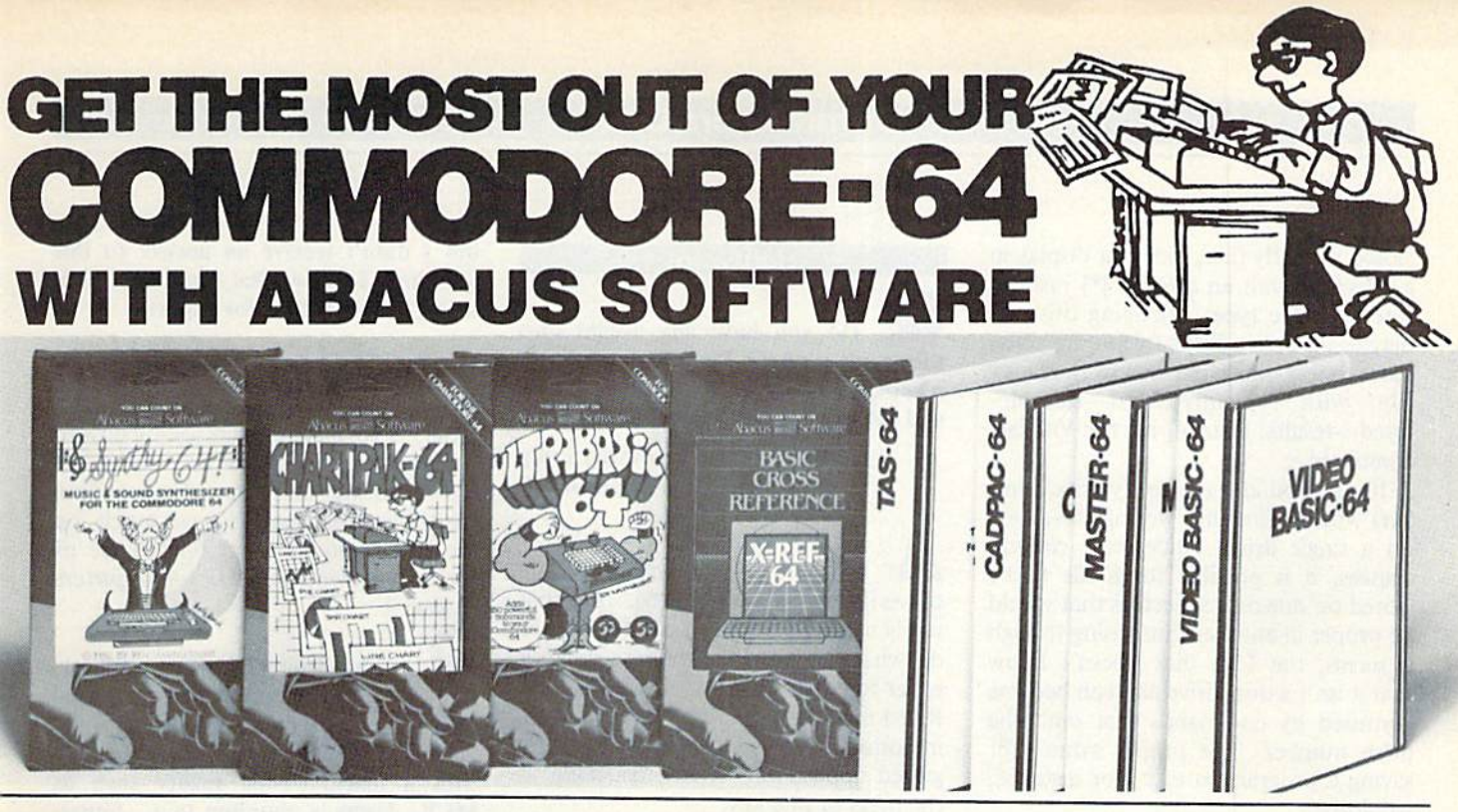

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closed properly (i.e., files that display in a directory with an asterisk [*] just before their file type). Violating this rule may result in the disk's freeing for reuse more sectors than were used by the faulty file, with typically fatal—but delayed—results. Instead, use the Validate command.

3. It is a good idea to specify drive numbers when saving and writing files, even on a single drive. Under rare circumstances, it is possible for a file to be stored on one disk in sectors that would be proper in another. Surprising though it seems, the 1541 disk doesn't know that it isn't a dual drive and can become confused by commands that omit the drive number. The proper syntax for saving a program to disk, for instance, would be:

```
SAVE"0:PROGRAM NAME",8
```

Sorry to take so much space, but those of you who wrote about problems with @Save deserve a full reply, and the rumor about @Save, though it has more lives than a cat, deserves to die.

I also received a lot of mail regarding my suggestion, in the July issue, that the 801 and 1526 printers do not appear to work on the VIC. I based that observation on some boxes I saw labeled "For the Commodore 64 Only." Since then, however, I have received several letters from VIC owners, printed on these printers, as proof it can be done. Other VIC owners wrote in to say they've had problems with them, and one person wrote in with a solution. Here it is:

Update: If you have typed in a program, then listed it to a printer, the 801 will, on some occasions (especially where there are Poke or DIM statements), lock up.

If you first save the program, then do a SYS 64802 and reload the program, it can then be listed to the printer.

Other than listing programs, I've had no problems using the 801 with the VIC. I hope one day there will be a simple solution.

Douglas Johnson
High Point, NC

A: Me, too. Thanks for writing.

Hardware

Q: Do you have any insight into the features of the Plus/4? Would you recommend that a first-time user wait and get one?

Steven Long
Los Angeles, CA

A: The Plus/4 will include a more powerful Basic than the 64, one that rarely needs Peek or Poke statements to do what is wanted. It will also make it easier for users to get at the full 60K of RAM memory in Basic programs. More importantly, it will include an integrated applications ROM, activated at the press of one key.

This ROM will include a simple word processor, data manager, spreadsheet and graph maker, all able to work together. This will make the machine instantly useful to those who buy it. It will also include a more powerful modem port, more colors, and it will be much more compact than the 64.

On the other hand, it will be incompatible with most products developed for the 64. Only a few of the most useful programs, including Easy Calc, will be immediately available, and the new model will also use different cartridges, joysticks, graphics pads, light pens and such. Fortunately, efforts were made to preserve key locations in zero page and the jump table, and the Plus/4 can use existing disks and some printers.

Thus, the Plus/4 may be a very wise purchase for new users, especially those willing to write their own programs or make do with the ones built in. However, it could be very costly for someone who already has a 64 or VIC, with a lot of programs and accessories.

For more information about the Plus/4 (as well as the C-16, a VIC replacement with 16K RAM), see the review articles by Jim Butterfield and Tom Benford in this issue.

Q: I would like to know if the 1541 disk drive can be modified for 50 Hz. I would like to take my 1541 to my country, Argentina. I wrote to Commodore, but I didn't receive an answer to this question. I know that Commodore is selling a 50-Hz drive for export.

Jose Garay
Mississippi State, MS

A: I get lots of letters asking how to convert 64s, VICs and accessories for use in other countries. Commodore printed an excellent 11-page article on the subject in the Sept./Oct. issue of their *Commodore Microcomputers* magazine.

Q: When I plug a Commodore cartridge into the cartridge slot of my 64 *after* the power is on, I lose Basic. I was hoping to read the cartridge source code with a machine-code reader such as MLX. Using a monitor (e.g., Supermon) also proved unsuccessful. I don't see how an expansion motherboard (e.g., Cardco CB-5) will solve this, as you implied in an earlier column. What is energized by the Commodore cartridges to disable Basic, and can this be counteracted?

Henry Metz
Bronx, NY

A: You're lucky that Basic is all you lost when you plugged in that way! Many VIC owners have lost their whole systems by plugging in cartridges with power already on. What's getting you isn't something magic in the cartridges, but rather their very nature. To ensure maximum flexibility, the cartridge port is connected to nearly all the important wires that run the 64. When you plug something in with power on, you disrupt the signals on all these wires. Don't do it!

When the computer is reset, it checks the cartridge port; if certain characters are found in the first few locations of the cartridge memory, the computer turns control over to the cartridge instead of Basic. If you need to study a cartridge, use the CB-5 as I suggested before.

Q: I would like recommendations on an 80-column board, and a 12- to 13-inch green monochrome monitor, with 80-column display. Expenditures

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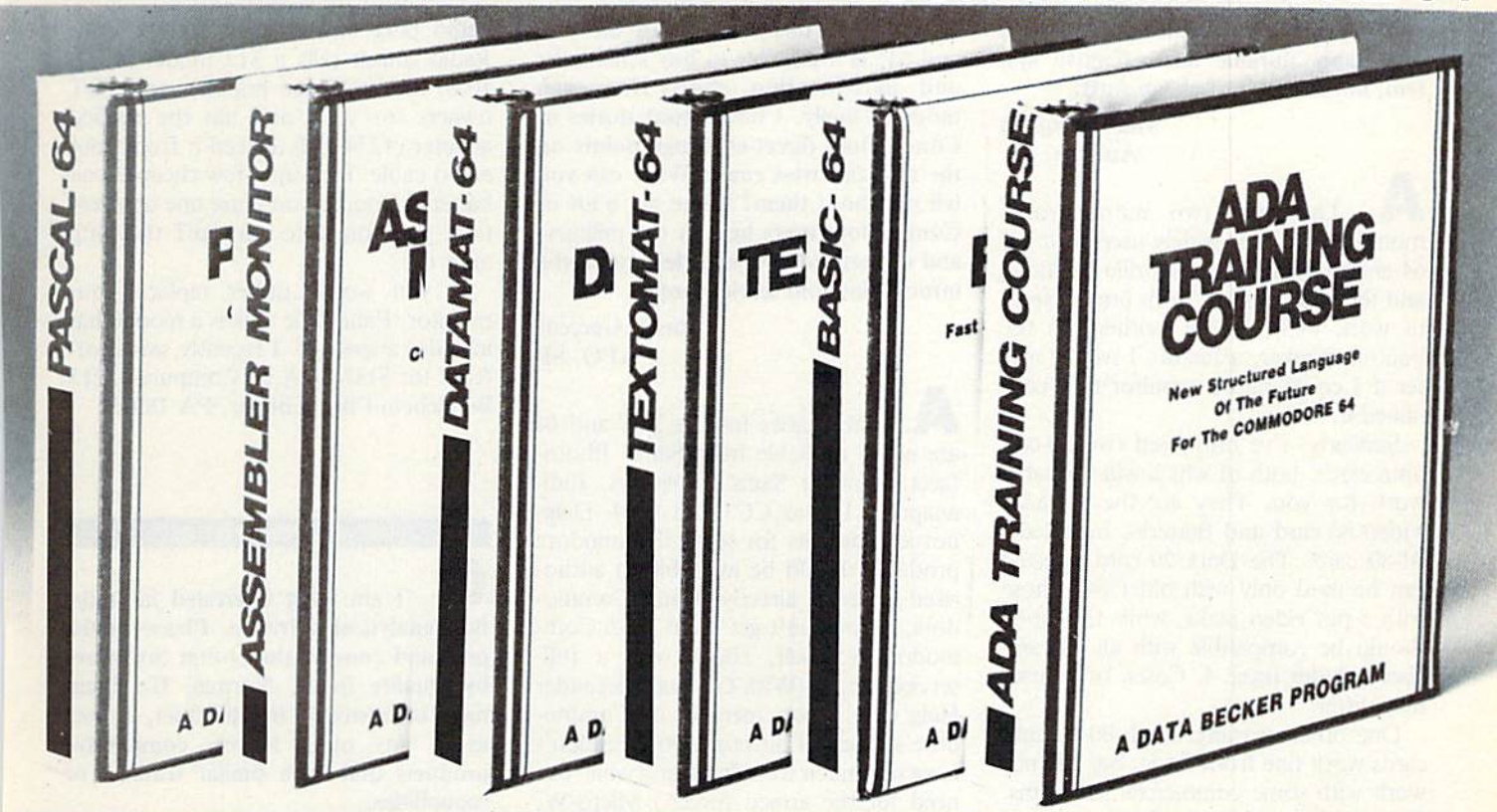

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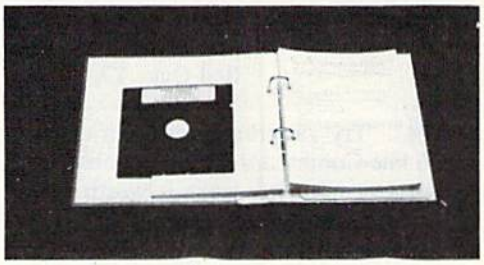

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must be restricted. However, I want a reasonably durable and effective system, not a bunch of cheap stuff.

Miles Vaughan
Auburn, AL

A: The only two monochrome monitors I've seen widely used with the 64 are Leading Edge's Gorilla monitors and those by Zenith. Both brands seem to work well, though neither has the built-in speaker, a feature I would prefer if I could find a monitor that contained it.

Similarly, I've only used two 80-column cards, both of which will probably work for you. They are the Data/20 Video 80 card and Batteries Included's BI-80 card. The Data/20 card I tested can be used only with older 64s, those with 5-pin video jacks, while the BI-80 should be compatible with all 64s and also includes Basic 4. Costs, of course, may differ.

One other warning. Both 80-column cards work fine from Basic, but will not work with some commercial programs. Do not assume that a 40-column program will become an 80-column program just because you have an 80-column card.

Q: I'm having trouble trying to obtain ribbons for the 1515 printer. Can you help me?

J.R. Wirt
Box 400
Red Oak, TX 75154

A: Try ordering them through a full-line Commodore dealer, probably a dozen at once (to make it worth their trouble). If that is not possible, you could also try ordering directly from Commodore. I saw plenty during a recent factory tour. Also, in August I saw over a dozen at Bits-n-Bytes Computing, 214 N. Main St., Jamestown, NY 14701. I've also included your address, in case anyone else with ribbons wants to write you.

Q: I represent Commodore computers in the Army and Air Force Exchange System throughout the Republic of Korea. Where can I get diagnostic disks for the many models of the VIC and 64? Is it possible to buy schematics and part-location charts for each model? Finally, I have heard stories of Commodore direct-exchange points on the east and west coast. What can you tell me about them? There are a lot of Commodore users here in the military, and we seem to have been left out of the information and service loop.

Russel Garecht
APO, SF

A: Schematics for the VIC and 64 are newly available from Sams' Photofacts, Howard Sams Publishers, Indianapolis, IN, as CC3 and CC4. Diagnostic programs for some Commodore products should be available to authorized dealers directly from Commodore; if you can't get them from Commodore yourself, check with a full-service dealer. (With General Alexander Haig now a new member of Commodore's board of directors, you shouldn't have too much trouble getting what you need for the armed forces.) Micro-W, Box 113, Pompton Plains, NJ 07444, also sells Mr. Chester, a diagnostic disk for the C-64.

The direct exchange program is still available through Commodore's West Chester, PA, and Schaumburg, IL, offices. Other exchange offices in California and Texas have reportedly just been closed. To verify current exchange prices and arrangements, you could contact Commodore service at 1200 Wilson Drive, West Chester, PA 19390.

Q: I am using a monitor that has no sound capabilities with my 64. What is the cheapest, easiest way to obtain sound for my system?

J.F. Stadalsky
Campobello, SC

A: Short of replacing your monitor, I've found that the simplest solution is to simply connect the audio plug from your 64's video cable to a high-level input jack on a stereo system's amplifier. I use the jack that normally gets its signal from the tuner.

Another alternative, if you don't have a stereo nearby, is to connect the audio plug into a small battery amp. Radio Shack sells a $12 model (#277-1008) that has been popular with PET owners for years and has the needed adapter (#274-330) to feed it from your audio cable. Pick up a few cheap 9-volt batteries, too, as you'll use one up every time you forget to turn off the amp after use.

If you would rather replace your monitor, Panasonic makes a model that includes a speaker. I recently saw it offered for $137 by A.B. Computers, 215 Bethlehem Pike, Colmar, PA 18915.

Software

Q: I am most interested in statistical/analytical software. Please advise pros and cons of the Q-Stat Software, by Quality Input, Normal, IL. I am most interested in this product, as well as in any other known competitive products that have similar features or capabilities.

William Moser
Muncie, IN

A: What can I say? Quality Input has often promised to send programs to me for review, but has never done so, and though Quality Input is an area firm, I have never seen their wares in stock at the several nearby stores I have checked.

Three other products have been or are being reviewed. The Number Cruncher Statistical System (from Jerry Hintze, 865 E. 400 N., Kaysville, UT 84037) was highly recommended in a recent *Midnite* review. SSP (from Kobetek Systems Ltd., 1113 Commercial St, New Minas, Nova Scotia B4N 3E6, Canada) and Stat Pack (from Handic Software) are currently being reviewed and seem praiseworthy.

Q: I have had my VIC for six months now, and I have not yet heard how to use graphics, nor have I seen any book on it. Can you give any stores or names of books that will help me?

Fred Benardella
Grand Rapids, MN

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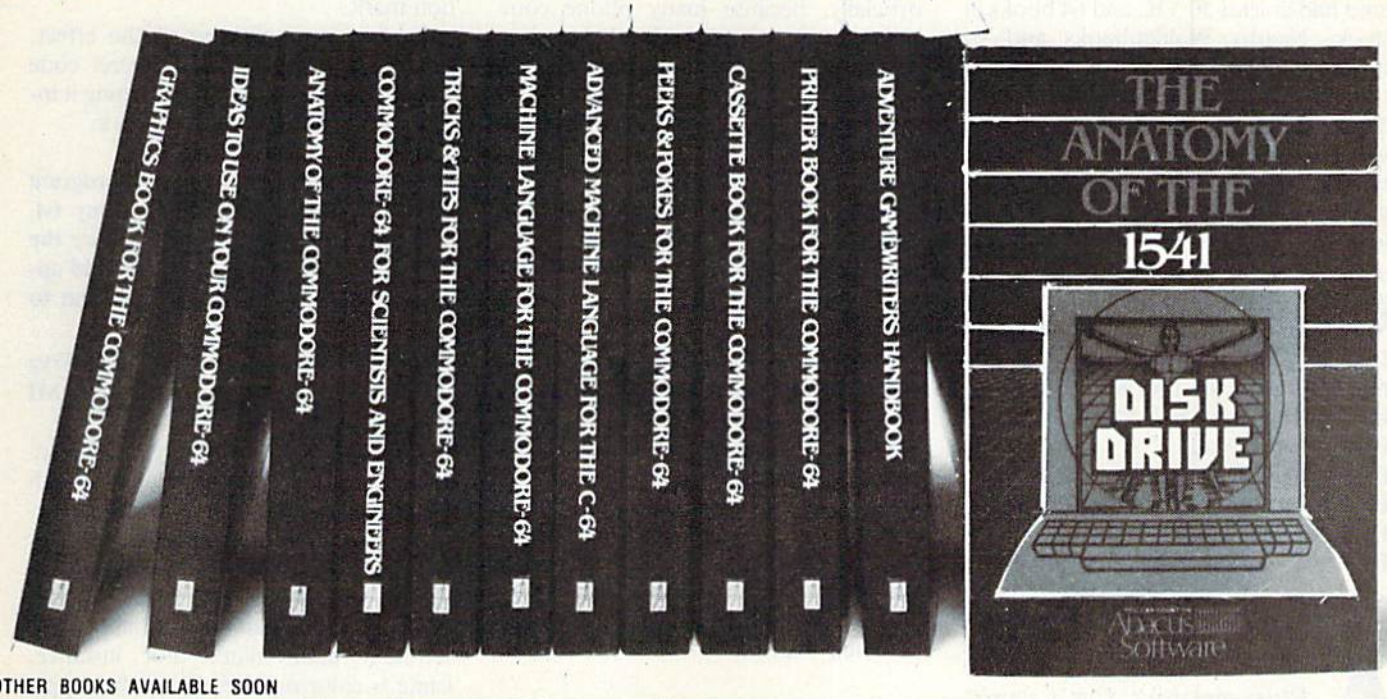

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A: I thought every bookstore in the land had at least 50 VIC and 64 books in stock. Nearby Waldenbooks and B. Dalton's bookstores are littered with them, and I use the term advisedly. One VIC book worth mentioning is *Mastering Your VIC*, from Wiley Press. Any bookstore can special-order it for you if it isn't in stock. (C-64 owners should look into the even better matching volume, *Mastering Your 64*.)

Q: If the following are not what I've suggested below, then what are they, and what are they used for?
Bank—where you wait in line
Boards—as in skate
Bus—where you never have change
Expansion Port—larger place for ships
DIN Pin—the last pin to fall
RCA plug—a free radio ad

Robert Niles, MD
Hollywood, FL

A: What are they? That's simple. They're jargon, specialized terms only intended to be understood by computer specialists, similar to the thousands of words you learned in medical school. And just as peritoneum is more precise than belly, the above terms help computer users speak precisely.

Since it is difficult to avoid using a few technical terms in this column, and more difficult to define them each time they appear, you may want to get the *Encyclopedia of Microcomputer Terminology*, by Linda and John Christie. It is a Prentice-Hall book, and quite understandable.

Q: I own a 64 computer and have recently purchased an automodem. I wish to set up a free community bulletin board system. Are there any specifications or any registries that I would have to fill out? If so, can you tell me how I can contact these authorities?

Chris Armstrong
Waukegan, IL

A: Yes, you are supposed to report the purchase of the modem to your local telephone company. Officially, they will want at least two numbers from it, including its FCC-registration number and its ringer-equivalence number. I say officially, because many phone companies no longer care about the numbers and would rather not be bothered with them. But check anyway to be safe.

Theoretically, the phone company could also use the modem as an excuse to charge you a higher phone rate, although earlier attempts to do so were successfully resisted in Oklahoma. On the other hand, if your phone company offers an incoming-calls-only service, your BB line could be even cheaper than your regular line.

One other warning. You, as system operator (sysop), will be responsible for anything illegal that appears on your bulletin board, so keep it cleared of such things as copyrighted programs or information on how to illegally access the phone system, or your next call could be from the FBI or a software company's lawyer.

Programming

Q: While experimenting with REM [shift L] as a way to prevent listing a program, I discovered that this is the *only* combination that produces an error message when listed. The other letters of the alphabet produce Basic keywords. Have I discovered some secret code, or is there some mundane explanation? And what use is it, apart from shortening REM statements?

John Shimwell
San Francisco, CA

A: You have discovered an undocumented feature (a bug) in Microsoft Basic. Unfortunately, we can't name it after you, as others have also discovered it. What is happening is that the internal tokens, used to save memory space when entering the various Basic keywords, have the same ASCII value as the key combinations you tried. Normally, Basic knows when a particular value is a keyword and when it is a keystroke, but inside a REM statement, it forgets. No harm is done, but unless you want the unusual effects, it's best to either avoid capital letters inside a REM statement or precede them with a quotation mark.

As for the usefulness of the effect, you could also use it as a secret code that could only be read after typing it into a REM statement and listing it.

Q: I would like to run a program from the Apple computer on my 64. The only things that won't run are the Plot and Color commands. I would appreciate it if you could tell me what to do instead.

Robert Fryz
Dearborn, MI

A: The easiest way to emulate Apple's Plot and Color commands is with Commodore's Super Expander cartridge, available for either the VIC or 64. Its equivalent commands, Draw and Color, work in a similar way, but have added options and will probably need different data values. For instance, white is color number 15 on the Apple and color number 1 on the 64. Similarly, the plot range on the Apple is 0–39 and 0–47, while the range on the 64 is 0–320 and 0–160 in the Split-Screen mode most similar to Apple's.

Q: I accidentally created a file named ""movies". Note the double quotes at the beginning of the name! Is there a way, short of reformatting the entire disk, to rename or scratch the file? I'd hate to reconstruct the whole thing.

Vito Devenere
Spokane, WA

A: Scratching it would be simple. Simply replace the unwanted quote mark in the name with a question mark when you give the command. The question mark serves as a wild card, making the disk not care what character occupies that position in the name. Thus, your command could read:

```
OPEN 15,8,15,"S0:?MOVIES"
```

Unfortunately, by using the wild card, a similar name, such as "XMOVIES", would also be scratched. If that is a problem, rename the other files first.

Renaming the troublesome file with-

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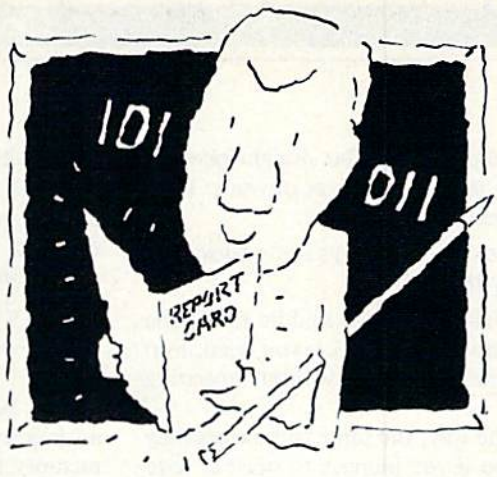

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out scratching it is also straightforward, but the method is not as obvious. Here is the required command:

```
OPEN 15,8,15,"R0:MOVIES=" + CHR$(34)
+ "MOVIES"
```

The CHR$(34) in the middle forces the extra quote mark, which you need, into the command string, without upsetting Basic.

By the way, the same techniques may help you if you manage to open or save a file without any name at all. You'll hear this situation referred to as a comma file, because it will appear in the disk directory with a name consisting of a single comma.

Scratch such files with:

```
OPEN 15,8,15,"S0:?"
```

Q: Several months ago, I sent you an inquiry regarding whether there is a memory location in the 64 to monitor the status of the 1541 disk drive (whether or not it is busy at the moment). Though I enclosed an SASE, I never received a response. What gives?

Kent Bridwell
Long Beach, CA

A: Though I would like to answer every question fully and promptly, I sometimes can't do either. Also, tough questions take longer. What you ask is possible to do—a matter of a couple of Pokes and a Peek. Jim Butterfield published the needed code to do this on the Pet a good while back, but it took several months before I came across it again. Here it is, but don't try it as is because the necessary I/O locations and values will be different on the 64 and VIC.

```
10 REM CLEAR NFRD
20 POKE 59456,PEEK(59456) AND 251
30 REM READ NRPD
40 X=PEEK(59456) AND 64
50 REM RESTORE NFRD
60 POKE 59456,PEEK(59456) OR 4
```

I expect to eventually find the equivalents, but if another reader finds them sooner, perhaps he or she could write in and save us all further trouble.

Q: Is there a SYS or Poke or something that will make the 1541 reset?

Theodore Austin
Washington, DC

A: Assuming the 1541 is sufficiently in control of itself to respond to commands, you can reset it by sending the command "UJ" to its command channel:

```
OPEN 15,8,15
PRINT#15,"UJ"
CLOSE 15
```

If this doesn't work, remove any disk in the drive and turn the 1541 off and on again.

A true hardware reset switch can also be added to the 1541. Students at the recent Lincoln College Commodore Computer Camp did so on a short board (tan) 1541 by connecting the front end of R25 to the back end of R16 through a simple pushbutton. Naturally, you do this at your own risk and will void your warranty if you copy them.

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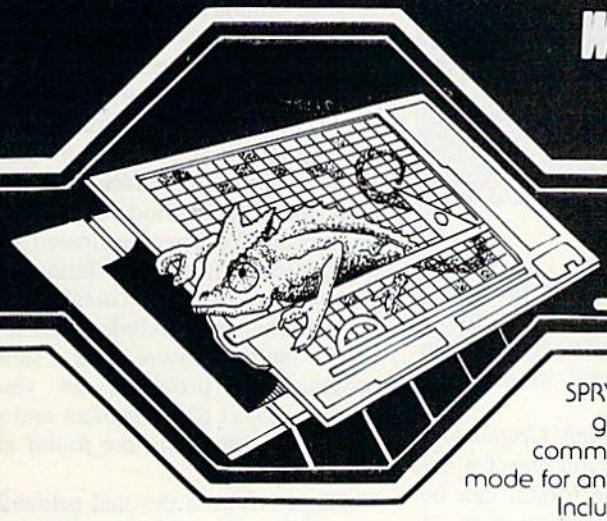

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Commodore 64 Color Graphics: A Beginner's Guide

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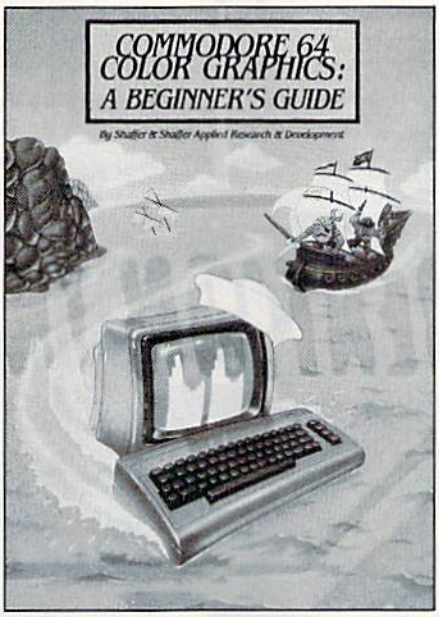
Commodore 64 Color Graphics: A Beginner's Guide is one of those rare books that is well-done throughout. Most of the book is devoted to drawing the high-resolution picture of a sailing ship that appears on the frontispiece. Each chapter presents several graphics subroutines, which the authors call "tools." When you finish the book, you have a complete subroutine toolkit, allowing you to draw pictures of your own.

The book really is for beginners who know almost nothing about programming. It is written in plain English, with a minimum of technical explanations. For readers who want to know the nitty-gritty of how everything works, the authors provide lucid explanations in separate, black-bordered boxes. The authors assure us that we can skip everything in the boxes, if we wish.

The book begins its discussion of high-resolution graphics with directions for controlling color (both background and foreground) in every pixel on the screen. It covers finding and plotting points, drawing lines and shapes and coloring the shapes. The last two chapters show you how to generate and duplicate shapes and build and manipulate sprites. The appendix offers a trouble-shooting guide, a complete listing of the book's tools, some new subroutines, machine language versions of the tools and design charts.

Each graphics subroutine is short. The longest listing is less than half a page. Printed on a letter-quality printer, the code is exceptionally easy to read, and the authors explain each step clearly. Many excellent illustrations support these explanations. The authors offer exercises (with solutions, of course) to give you practice with some of the routines.

Graphics is a complex subject, but this book takes you step-by-step so simply that you may not notice how much



you are learning. The toolkit provides a flexible graphics utility. The authors show you the principles involved in designing high-resolution pictures of your own.

Commodore 64 Color Graphics is worth buying, even if you aren't a beginner. The subroutine toolkit can be applied to any high-resolution work. If you are a beginner and want to play with the Commodore 64's Hi-Res mode, you will not find a more accessible book on the subject.

Annette Hinshaw
Tulsa, OK

The Commodore 64 Starter Book

Christopher Titus, David Larsen and Jonathan Titus
Howard W. Sams & Co., Inc.
4300 West 62nd St.
Indianapolis, IN 46268
Softcover, 382 pp., $17.95

The Commodore 64 Starter Book is a non-technical, easy-to-read guide for beginning users of this popular computer. After an introductory chapter on setup and keyboard use, the bulk of the book is devoted to introducing twenty of the most commonly-used Basic commands.

Beginning in chapter two with the Input and Print commands and the distinction between strings and values, each succeeding chapter introduces two or three new commands, using short sample programs to illustrate how and why the commands are to be used. The authors gently encourage you to modify the sample programs in order to gain a clearer understanding of how each command works. Program listings are set apart from the text by use of indentation, a different type face and rust-colored ink. This method results in superior readability when compared to the dot-matrix print used for listings in the *Commodore 64 User's Guide*.

Each chapter concludes with a quiz on the material covered and a series of programming problems for you to solve. Answers to the quizzes and solutions to the problems are found at the end of the book.

Chapter four is devoted primarily to the And...Or and If...Then commands; it also introduces flow charts, which are used throughout the remainder of the book to further clarify program structure. Clarity in programming might be considered one of the guiding principles of this book. The authors en-

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courage the novice programmer to make programs as readable as possible by using REM statements, avoiding run-together commands and using indentation to distinguish functional blocks within a program.

Chapter seven deals with advanced math functions. Rather than merely giving an inventory of the math operators available in C-64 Basic and illustrating their use in sample programs, this chapter goes beyond the call of duty by giving brief historical accounts of how and why square roots, pi, trig functions and logs were discovered. This approach should make these concepts more digestible for the mathophobes among us.

Chapters on graphics and sound programming are rather limited; more detail could have been included in these areas.

The book concludes with chapters on accessories and maintenance. The accessories chapter includes information on the Datassette recorder, disk drive, graphics printer and joystick. While the space limitations did not permit inclusion of full operating instructions for each of these devices, the information offered here is enough to get the beginner started, and it is easier to understand than the manuals provided by Commodore for these devices. The final chapter consists mostly of common sense advice for preventing damage to the computer; also included is valuable information on shopping for software.

This book's clarity and orderly structure make it an excellent choice for any beginning programmer. By learning the good programming habits that it advocates, you may avoid a lot of frustration further down the road. At $17.95, it is competitively priced with similar books on the market. While I still flinch slightly at such prices for paperbacks, I consider this particular title to be an excellent value.

David B. Doty
San Francisco, CA

Top-Down Assembly Language Programming for Your VIC-20 And Commodore 64

Ken Skier
McGraw-Hill Book Co.
1221 Avenue of the Americas
New York, NY 10020
Softcover, 412 pp., $16.95

If you want to learn how to program in assembly language on your Commodore, then Ken Skier's *Top-Down Assembly Language Programming for Your VIC-20 and Commodore 64* is the book for you. It is clear enough for a beginner, yet it contains enough information to keep an intermediate machine language programmer interested.

The whole book is set up to show you how to write a particular program—a machine language monitor. The program, called Visible Monitor, is a one-pass assembler; it's not as good as

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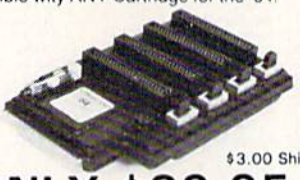

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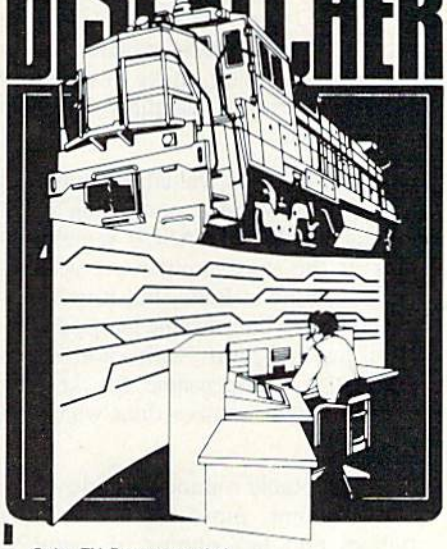

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Supermon 64, but it is still very usable. The best thing about the monitor is that it makes the use of text strings easy. The most valuable thing about the book is its step-by-step explanation of each subroutine in the program.

A major point in favor of this book is that the subroutines can be used as routines in other assembler or Basic programs. For example, the excellent screen utilities would be useful for games and other programs that use the screen often. Another good feature is that most of the routines can be transferred to any 6502-based machine with little (if any) modification.

The utilities include many routines that are necessary to run the other routines in the monitor programs. Most of these subroutines are short, but some are almost programs in their own right. All have one thing in common: excellent documentation. The listings are commented upon extensively. This documentation, and general explanations in the text of the book, make this the best beginner's text on assembly language that I've seen.

One of the most valuable routines in the book is one for converting hexadecimal numbers to ASCII representations of the same numbers. I wrote a similar routine in Basic, but it was slow and clumsy. This machine language version is fast and short. Such a conversion program is indispensable for keeping track of which number does what in a hex dump.

Other notable routines include a simple text editor, move routines, printer routines and hex dumps of memory. The text editor can be used to document your machine language program internally, enter text (if your output has a lot of text) and input string data.

The book does have a few shortcomings. Most of them are minor, but a few are enough to stop many programmers. The programs are, for the most part, listed in Data statements. These are daunting to poor typists and those who don't have a functional ten-key pad. There is also a lack of detailed instructions on how to use the assembler. I have used many such programs, but I found this assembler hard to use. I also had trouble reading the assembler coding of the program. Skier uses a three-pass assembler, which allows labels and comment lines. This is fine for a quick run-through, but for a nitty-gritty debugging session, you need to be able to read the addresses at a glance.

In all, I found *Top-Down Assembly Language Programming* an excellent book. It is packed with essential information on most aspects of machine language programming. It is very well organized and clear enough for the beginner.

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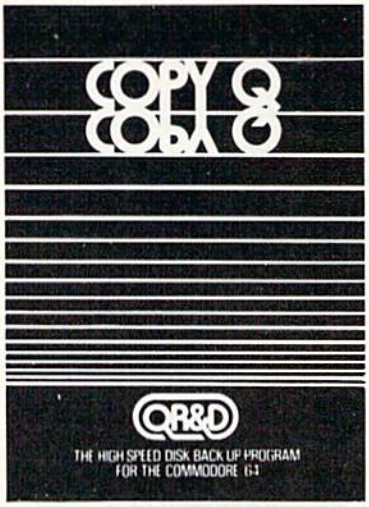

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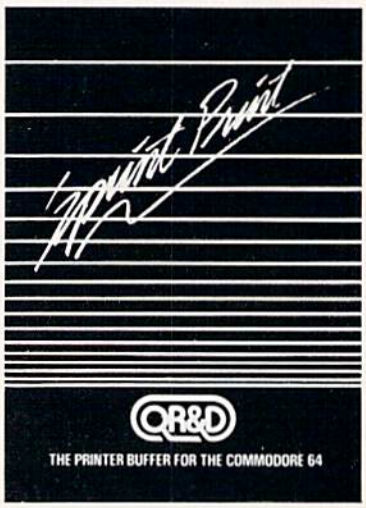

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Observations and Alterations

I believe your magazine to be the finest on the market. Your reviews of software have been vital to me in the selection of both a word processor (Quick Brown Fox) and a spreadsheet (Calc Result Easy), and I have been pleased to find them both excellent products. I even ordered them from a *RUN* advertiser (Universal Software).

Your articles are always interesting and useful, even if I don't do any programming. I am learning the rudiments of Basic simply from constant exposure to your articles.

I'm surprised that it has taken so long and so many magazines to come up with an intelligent method of listing programs. I don't want to memorize all the strange characters on the 64's keyboard—I just want to type in a program. Your method of using brackets for the odd symbols has encouraged me to enter your programs—something I have never attempted with any other publication.

On two occasions, I have typed in programs from *RUN*, only to wonder what to do with them afterwards. For this reason, I thought I might pass along some useful, if not novel, modifications.

I shortened the Database Deluxe program (February 1984) to 32 pages (so it runs quicker) and entered each day of a given month as the reversed title of each page (e.g., page 1 is August 1). This way, I have a handy appointment calendar, with up to ten entries per page. Also, I can scroll forward or backward, change entries and even get a printout.

I use this program every day, turning to it when I first step into the office each morning, to see what I must do. I also use it to keep simple account records for my business, allotting each page (with ten separate transaction records available) to a customer. It's certainly no more efficient than the old paper-and-pencil list I used before, but it is more interesting.

I also find the check-manager program ("Check It Out!") in your July issue to be very useful, and really a better program (and more powerful) than many commercial check-ledger programs. I use it a bit differently, recording *all* my business expenses. I enter them like checks, only without a check number. I also standardized my expense categories, so I can immediately tell from month to month what percentage I am spending where.

In addition to the monthly expense file, I have one called "Total," in which (you guessed it) I enter my total figures from the end of each month *by category*. By this method, I can see in a matter of seconds where I stand year-to-date on my income and spending and where my expenses are highest—an invaluable tool for a small-business man.

Again, thank you for producing an excellent magazine. My purchase of *RUN* is a better investment than my computer—I get a much higher return on a much smaller investment.

Del Suggs
Tallahassee, FL

My purchase of RUN is a better investment than my computer—I get a much higher return on a much smaller investment.

Hams Respond

I have received quite a good deal of mail regarding my article, "Radio-Active Software," in *RUN*'s July issue. Apparently, a lot of hams, prospective hams and SWLs are out there reading *RUN*!

All of the letters have been favorable, and many wanted to know who makes what type of software, which wasn't included in the article's accompanying chart. Also, I have received several letters from software authors and manufacturers who were surprised by the response they received from the article.

Karl Thurber/W8FX
Millbrook, AL

Cookware

The other day, it must have reached 100 degrees in the sun, and my friend left his only Lode Runner disk (by Broderbund Software) on his car's dashboard. The next day, the disk resembled a piece of burnt fried bacon.

However, after we pried the wrinkled jacket apart, the disk didn't look damaged. We inserted it into another jacket, trying not to touch the tracks with our fingers. Unbelievably, the program loaded and ran fine.

I'm not recommending that readers try this, but I've always thought of software disks as very fragile and heat-sensitive.

Jim Stephens
Nashville, TN

The Cost of Pirating

As a supplier of software to the amateur radio market, it has been more and more obvious that a large proportion of our software in use has never been purchased. It seems that there is a prevailing attitude among the perpetrators that there is nothing morally or legally wrong with what they are doing. I would like to challenge them on both issues.

I doubt that many of the people who have covertly acquired software realize the expense that goes into a sophisticated software development of commercial quality. For example, there are many software hackers who can write RTTY programs that work just fine for

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The $5.00 cost will also include up date sheets to new collections that will be released during 1985. The up-date sheets will be sent when available to each person purchasing the Program Manual.

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their transceivers. But to develop a nearly bug-free program (I am not sure a totally bug-free program of any significance has been developed) that will satisfy the commercial market is quite another feat! The costs of documenting, maintaining and supporting software can be phenomenal!

Some people look at the cost of raw parts for a software package and think "what a rip-off!" without ever considering how many thousands need to be sold just to pay the engineering development costs. Keep in mind that the engineer who developed the program is a highly skilled individual who is making his living by writing software that must stand up against the criticism of a demanding market. For the company that supports such individuals on the belief that there will be a return on their investment, it makes little business sense to continue developing products only to have them stolen in the marketplace.

I doubt I can add anything new to the argument, but I really think the user needs to consider the damage he is doing to his hobby when he "gives away" a copy of a program he has purchased. With a continuation of this practice, there will be no furtherance of professional software development in the future. Therefore, the person who gives away a copy of his program is only cheapening his own investment in the future.

C. Mike Lamb, President
Advanced Electronic Applications, Inc.
Lynnwood, WA

VIC-20 Support Needed

I am writing as a noncomputer person making a moderate effort to learn some essentials.

I have a VIC-20 and certainly feel it's the best money value available for my needs. I estimate it will provide perhaps twice as much information as I need regarding computers. I have been quite distressed, however, by the unavailability of support hardware.

Commodore apparently markets their product line primarily through department stores and discount houses. None of these organizations wants to handle products costing less than $100, and, therefore, the purchase of a plug, cable or interface is an exercise in total frustration. The computer stores generally do not carry any compatible hardware due to the Commodore marketing practices. Dealing directly with Commodore is comparable to a disaster. (The purchase of a $50 item entailed a time period from April 10 to July 27 to conclude the purchase and resolve all of the attendant problems).

There must be a better way!

William S. Webster
Ashland, VA

Well, readers, has anyone else experienced similar problems? If you have a solution, let us know.

Editors

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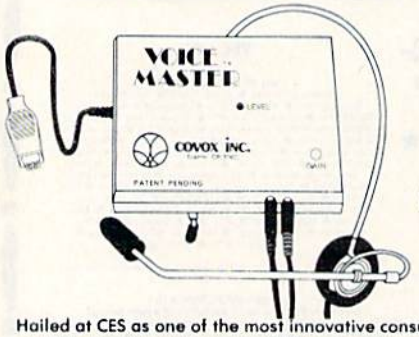

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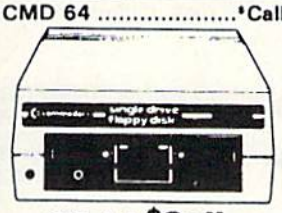

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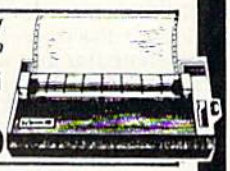

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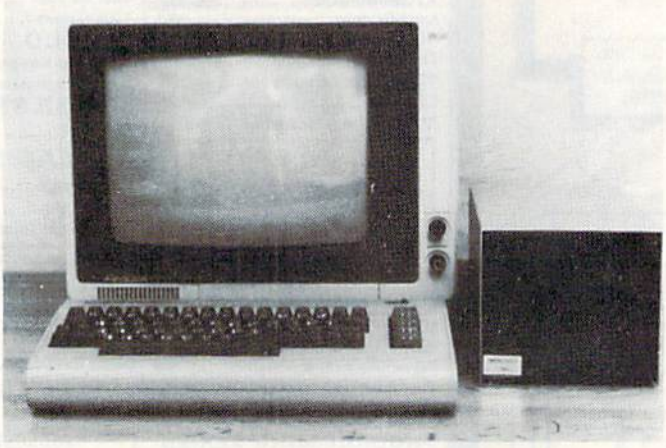
SAVE
OPEN
INPUT#
PRINT#
GET#
CLOSE



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The **QUIKDISK** initialization is accomplished with the command SYS56843. The initialization sets the **QUIKDISK** default device number to eight. Program loading, saving, is done exactly the same as the Commodore disk drive e.g. LOAD "PROGRAM", 8. Special disk commands like NEW and SCRATCH are also identical in format. In addition, a special disk utility is available that makes disk maintenance functions much easier. Tasks like formatting (NEW), eliminating old files (SCRATCH), copying, and other functions are done via an easy to use menu display.

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Clubs

National Convention

The Forth Interest Group is an international user's group with 60 chapters worldwide and more than 4800 members.

The group will host the Sixth Annual Forth National Convention on November 16 and 17, at the Hyatt Hotel in Palo Alto, California. Anyone interested is invited to attend. Doors will be open from 11:30 AM until 6:00 PM, with admission $10 per person in advance and $15 at the door.

For more information about the convention or the Forth Interest Group itself, write PO Box 8231, San Jose, CA 95155, or call 415-962-8603.

Marysville, WA

Anyone interested in software exchange for the C-64 can contact Bunch 'A' Bytes, a Commodore user's group in Marysville, WA. The group publishes a monthly newsletter, with free classified advertisements and a help-tip section.

If interested, contact Bunch 'A' Bytes, c/o Joey Miller, 4916 121st Place NE, Marysville, WA 98270.

Mobile, AL

The Commodore Club of Mobile is a non-commercial, non-profit user's group which supports C-64, VIC-20 and PET owners. The club has public domain software available and membership is $10 a year.

For more information, contact Tom Wyatt, 3868-H Rue Maison, Mobile, AL 36608, 205-343-1178, or call Joan Daugherty, 205-661-6852.

Springfield, IL

The Springfield Pet User Group (SPUG) meets on the third Friday of each month at 7:00 PM, at the Our Savior School (Monroe and Old Jacksonville Road), and publishes a newsletter called the SPUG Gazette.

For more information, contact Bill Eardley (Secretary), Springfield Pet User Group, 3116 Concord, Springfield, IL 62704, 217-753-8500.

Mt. Laurel, NJ

The Rancocas Valley User Group meets on the fourth Tuesday of the month at 7:00 PM, at the Mt. Laurel Hilton.

For information, write Rancocas Valley User Group, PO Box 234, Mt. Laurel, NJ 08054, or call M. Eisenbacher, 609-267-1912.

Knoxville, TN

If you are a C-64 user and live in the Knoxville, TN area, you can join ET 64 User's Group. The club, which consists of more than 80 families, meets on the first Thursday of each month at 7:00 PM, in the MLB Community Center in Knoxville. ET 64 User's Group offers a bimonthly newsletter and instructional programs. Public domain software is exchanged at the meetings.

For more information, contact ET 64 User's Group, PO Box 495, Knoxville, TN 37901.

Central Kentucky

C*Bug (the Commodore Bardstown User Group) was formed in October 1983, and now has 43 members from the central Kentucky area who meet monthly. The group supports all Commodore computer sorts and all types of user applications. A newsletter is published monthly.

For more information, contact C*Bug, the Commodore Bardstown User Group, PO Box 165, Bardstown, KY 40004, 502-348-6380.

Burlington, VT

The Burlington Area Commodore User's Group can be reached through Steve Lippert, 6 Mayfair, South Burlington, VT 05041, 802-658-4160.

Avon Park, FL

Chips is a Commodore user's group which meets in Avon Park, FL. Anyone interested can contact Chips User's Group, c/o Jerry Klimczak, UMR Box 3063, Avon Park, FL 33825.

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New Products RUNdown

Compiled by Shawn Laflamme

Temperamental Wizard

The Scrolls of Abadon is an action game that takes you into the dark world of the Wizard.

If you outrage the Wizard, you will be punished by menacing underworld creatures. If you delight him, you will be rewarded with valuable treasures.

The game has options for one or two players. It is available on disk for the Commodore 64, with a retail price of $34.95. Access Software, Inc., 925 East 900 South, Salt Lake City, UT 84105.

Check Reader Service number 430.

New Soundware

Passport Music Software (625 Miramontes St., Suite 103, Half Moon Bay, CA 94019) has released the Soundware MIDI product line for the C-64.

Included in the Soundware line is the Passport MIDI Interface, giving you access to the Soundware library of software. It has MIDI In, MIDI Out and Drum Sync connections. It retails for $195.

MIDI/4 is a music software program that allows you to create your own recording studio. It operates like a multi-track tape recorder with unlimited overdubs, real-time editing and tempo control. It records all controllers, including key velocity, pitch bend, aftertouch and modulation. It retails for $99.

Other programs in the Soundware library are available on disk, with prices ranging from $39 to $299.

Check Reader Service number 400.

Musical Accessories from Melodian

Melodian, Inc. (115 Broadway, Suite 1202, New York, NY 10006) has released the Melodian keyboard and software system. In addition to playing music, the keyboard and software can also teach and compose music.

The 18-inch, three-octave, 37-key Melodian keyboard is similar in appearance to a portable electric organ. It plugs into the Commodore 64, using the C-64's synthesizer to reproduce 16 instrumental sounds.

The Melodian line of music software includes ConcertMaster, MelodyMaster and RhythmMaster. ConcertMaster creates an environment in which children and adults can experiment and learn about music. MelodyMaster and RhythmMaster use the excitement of a video game to help children and adults learn pitch, rhythm and the ability to read and perform music.

The Melodian keyboard, with ConcertMaster software, is available for $200.

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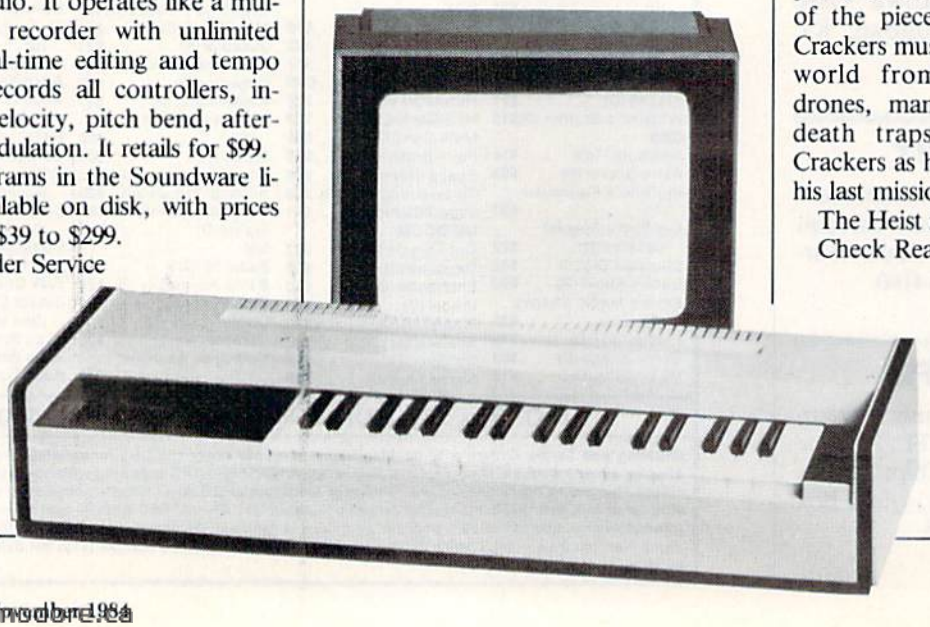

Brinx Jinx

Brinx Jinx is a chase game for the Commodore 64, from Chromazone Software (PO Box 7325, San Jose, CA 95150).

Thieves lurk everywhere. Precious seconds tick away as you maneuver through an intricate maze to the vault. Grab the money and hurry back to the armored truck—but don't become frantic. One mistake means an ambulance escort to defeat.

The game contains up to 36 mazes, seven vault locations and four difficulty levels. It is available on disk for $29.95.

Check Reader Service number 404.

The Heist

MicroLab (2699 Skokie Valley Road, Highland Park, IL 60035) has released The Heist for the Commodore 64.

The Heist features a three-level art gallery with 90 booby-trapped rooms, through which super spy Graham Crackers must maneuver to steal the entire art collection.

Terrorists have hidden doomsday plans, concealed on a microdot, on one of the pieces of art in the gallery—Crackers must find it in time to save the world from destruction. Sweeper drones, man-eating robots, stompers, death traps and dead ends await Crackers as he undertakes what may be his last mission.

The Heist is available on disk for $35.

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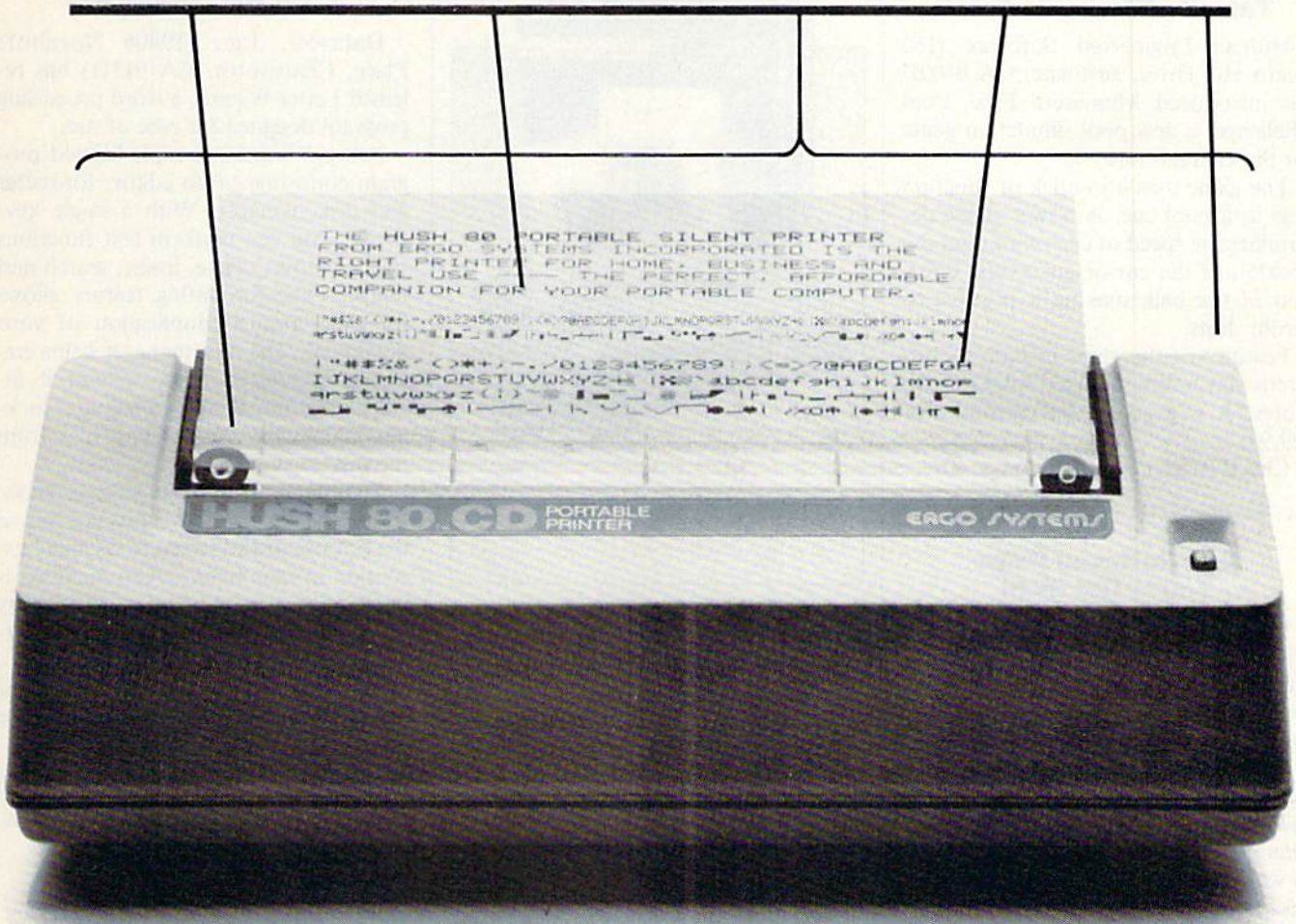

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Take On Minnesota Fats!

Human Engineered Software (150 North Hill Drive, Brisbane, CA 94005) has introduced Minnesota Fats' Pool Challenge, a new pool simulation game for the Commodore 64.

The game uses a joystick or function keys as a pool cue. A power gauge determines the speed of each shot, and the position of the cursor guides the direction of the ball, making it possible to carom shots.

Features of the game include six different play options and a display of high scores. It is available on cartridge for $29.95.

Check Reader Service number 407.

New Software Helps You to Get Rich!

Continental Software (11223 South Hindry Ave., Los Angeles, CA 90045) has released Volumes II, III and IV in its Get Rich! series of personal financial software.

The new Get Rich! programs are titled Real Estate Planning, Insurance Planning and Retirement and Estate Planning. These programs are designed to work in tandem with Get Rich: Strategies, the first volume in the series. While Get Rich: Strategies gives you a profile of your entire financial picture, the supplemental volumes are subject-specific.

Real Estate Planning covers all aspects of investing—from types of properties to methods of buying. Insurance Planning concentrates on how much and what type of life insurance you should buy, answering a multitude of "what if" questions.

Retirement and Estate Planning helps you to plan for later years by informing you about investments such as IRA and Keogh; it then maps out a potential retirement plan based upon your individual needs.

Volumes II, III and IV in the Get Rich! series are available for the Commodore 64, with a retail price of $49.95 each.

Check Reader Service number 414.

Personal Color Printer

Okidata (532 Fellowship Road, Mt. Laurel, NJ 08054) has introduced the Okimate 10, a full-color printer for the Commodore 64.

The Okimate 10 implements thermal transfer printing technology. It will work with virtually any type of paper, from standard writing paper to mailing labels. It also prints on acetate to create instant transparencies for overhead projectors.

The printer has a thumbnail-sized print head with a text speed of 60 characters per second. It uses a special color or black ribbon in a cartridge. The color ribbon mixes primary colors to create over 40 different shades. Capabilities of the unit include full-color instant screen dumps of charts and graphs and letter-quality text processing.

The Okimate 10 comes with a Plug 'n Print package, which includes an operating module, software, color and black ribbons, a connector cable, a handbook and sample paper. It retails for $239.

Check Reader Service number 435.

Word Processing Wiz

Datasoft, Inc. (19808 Nordhoff Place, Chatsworth, CA 91311) has released Letter Wizard, a word processing program designed for ease of use.

Letter Wizard is a triple-faceted program consisting of an editor, formatter and disk manager. With a single keystroke, you can perform text functions such as move, delete, insert, search and replace. The formatting feature allows for exact printed duplication of your document. The disk manager helps create an organized filing system; it includes features such as renaming, locking, unlocking and deleting files from the disk.

The program also features a database/form letter merge and a prompt line at the bottom of the screen to facilitate execution of commands. Also included is Spell Wizard, a 30,000-word dictionary that automatically indicates spelling errors and allows immediate correction.

Letter Wizard is available on disk for the Commodore 64. It retails for $49.95.

Check Reader Service number 408.

Command the Raven

In Stellar 7, you must use the Raven, Earth's most sophisticated combat machine, to battle your way through seven star systems. You must reach the Arcturan star system and destroy its Supreme Overlord, Gir Draxon.

From the command seat in the Raven, you can spot the enemy through your window and keep an eye on your instruments. The Raven is equipped with a Biphasal Thunder Cannon, which fires two nuclear shells. The Gravatic Scope helps you to locate enemies. The Inviso Cloak is used to confuse the enemy, and the Protonic Shields protect the Raven from enemy fire.

Stellar 7 is available on disk for the Commodore 64. Retail price is $29.95. Penguin Software, 830 4th Ave., PO Box 311, Geneva, IL 60134.

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Advanced Spelling Programs

American Educational Computer, Inc. (2450 Embarcadero Way, Palo Alto, CA 94303) has released AEC Spelling, a series of advanced spelling programs.

The new programs address the spelling needs of students in grades two through eight, teaching the spelling of over 4000 words. The programs also allow the student to enter additional words.

A pretest is given to the student, and correctly-spelled words are then eliminated. Words spelled incorrectly are automatically recorded on a words-to-study list. After the student completes a study program on each of the misspelled words, a posttest is given to monitor progress.

The AEC Spelling programs are available on disk for the Commodore 64. Each grade level retails for $39.95.

Check Reader Service number 416.

Capture the Fuzzbomb!

Agent USA is a geography/action game for children ages nine and up.

The game features a spy of superior intelligence who, at the child's direction, maneuvers throughout the country via train in search of the elusive Fuzzbomb (who is rapidly turning everyone into fuzzbodies).

Rescuing the country from the Fuzzbomb—and winning the game—depends upon skill in planning itineraries by learning train schedules, time zone changes, the location of states and the names and locations of their capitals.

Agent USA is available on disk for the Commodore 64. The package includes a mapboard, a poster, stickers, a train schedule and a quick-reference card. Retail price is $39.95. Scholastic, Inc., 730 Broadway, New York, NY 10003.

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Your Ticket to Adventure

CodeWriter Corp. (7847 N. Caldwell Ave., Niles, IL 60648) has released AdventureWriter, a new program that allows you to use written English to design your own adventure games. No knowledge of programming is required.

Treasure hunting, jungle escapes, mazes, villains and heroes can all be created with the program. The AdventureWriter program was written with open windows that allow room for additions or changes in ideas.

When your game is completed, you can transfer it onto your own disk. You can then copyright the game for subsequent resale.

AdventureWriter is available on disk for $60.

Check Reader Service number 417.

A Devilish Battle

Commodore Business Machines (1200 Wilson Drive, West Chester, PA 19380) has released Satan's Hollow, based upon the Bally/Midway arcade game.

You must build a bridge over a fiery river to reach a bonus round and do battle with Satan himself. A multitude of creatures and demons fly in curving patterns, trying to destroy you by bombing the bridge, dropping eggs on you and stealing your extra ammunition.

The demons become almost invisible as the scene grows darker and darker, eventually turning into night. The action is accompanied by a synthesized version of Wagner's "Ride of the Valkyrie."

Satan's Hollow is available on disk for the Commodore 64. Retail price is $34.95.

Check Reader Service number 424.

Wize Up!

Wize Accounting is an integrated accounting package for the Commodore 64, from Orbyte Software (PO Box 948, Waterbury, CT 06720).

Wize Accounting combines Accounts Receivable, Accounts Payable and General Ledger functions on a single program disk. It can hold up to 2200 accounts, and it can accept up to 1500 transaction entries per disk. The program automatically posts receivable and payable transactions to the proper ledger accounts. It can also accept data extended over multiple disks.

The program can generate and print a variety of reports; it also performs automatic check writing. Retail price is $119.95.

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Under the Big Top

Parker Brothers (50 Dunham Road, Beverly, MA 01915) has released Circus Charlie for the Commodore 64.

Charlie is a little clown who demonstrates his circus prowess in a series of lighthearted, yet challenging, stunts under the big top. As the show begins, you must maneuver Charlie, mounted on a lion, through a series of fiery hoops.

In the highwire act, Charlie must make his way across the tightrope, hopping over monkeys that block his path. In the main ring, Charlie must hop from one spinning ball to the next. He then rides upon the back of a fast-moving lion. For his final performance, Charlie flies through the air from trapeze to trapeze.

Circus Charlie features five screens, options for one or two players and circus music. It is available on cartridge for $30.

Check Reader Service number 406.

Balance Your Checkbook

Checkbook Manager allows you to keep a current account of your household budget. The program will balance your checkbook, allow you to keep track of charitable donations, food expenses and other items.

You can recall checks by number, date and category. After recall, the program will give you a totalled account of that particular category. The program can also print hardcopy for later reference.

Checkbook Manager is available on disk for the Commodore 64. Retail price is $19.95. Comm*Data Computer House, Inc., 320 Summit Ave., Milford, MI 98092.

Check Reader Service number 428.

Word Processor with Built-in Telecommunications

Prentice-Hall (PO Box 819, Englewood Cliffs, NJ 07632) has released Skiwriter II, a word processing package with built-in telecommunications.

The cartridge format of Skiwriter II allows you to start using the program immediately. All choices are made from a series of plain-English menus by moving an on-screen pointer—no control codes or commands are used. You can change line spacing, margins, justification and other factors by selecting from a menu. You can also connect to any peripheral (cassette recorder, disk drive, modem or printer).

Skiwriter II also functions as a telecommunications package, allowing you to communicate via electronic mail and connect to information services such as CompuServe, The Source and Dow Jones.

Skiwriter II is available for the Commodore 64, with a retail price of $69.95.

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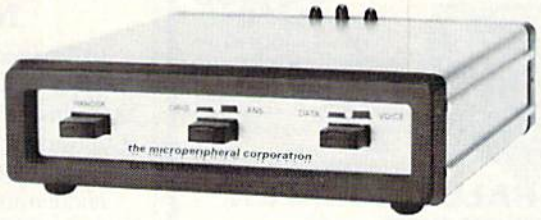

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New Products RUNdown

Twisted Humor

In Twisted, you must use your C-64 as eyes, ears, hands and legs to explore the ruins of the ill-fated Realhigh Tech, a university where the only prerequisite for admission was a sense of humor.

Hidden in the school's murky rooms and corridors are treasures that were left behind by alumni who have since vanished. The school is filled with dozens of secret passages, one-way hallways and warped perspectives. Your computer understands even the craziest commands, and it responds with some helpful (and some not-so-helpful) retorts.

The clues in Twisted are subtle, and the treasures can be valuable or seemingly worthless. Your final score is determined by the number of treasures found, the number of rooms explored and task performance.

Twisted is available on disk for $39.95. Trapeze, Inc., 3727 Buchanan St., San Francisco, CA 94123.

Check Reader Service number 422.

C-64 Expansion Interface

Cardco, Inc. (300 S. Topeka, Wichita, KS 67202) has released the Cardboard/5, a five-slot expansion interface for the Commodore 64.

Features of the Cardboard/5 include a glass/epoxy circuit board, gold-plated contacts, logic lines (switched by solid-state IC switches), a reset button and full LED status indication.

The unit allows you to switch to any cartridge slot or combination of slots. Each slot has four LEDs and two toggle switches for indication and control. There are also two master toggle switches that allow you to manually override any situation and set the lines as desired.

The Cardboard/5 is available for $79.95.

Check Reader Service number 405.

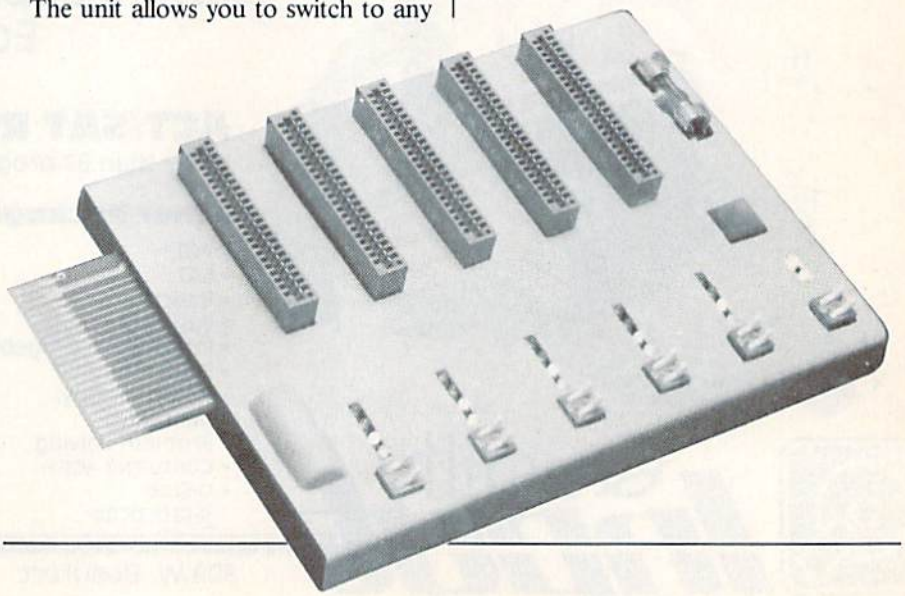
Graphics Terminal Emulator

Graph-Term 64 is a graphics terminal emulator program for the Commodore 64. It prints text and high-resolution plots generated by a mainframe computer. It can be used by scientists, engineers and others who use standard graphics programs that generate plot files in Tektronix format.

While displaying the incoming data, the program also stores it in memory for subsequent transfer to disk, tape or the Commodore 1520 plotter. During a terminal session (or afterward), the information can be reviewed at high speed, slow motion or stop action.

Graph-Term 64 comes with a number of simple Basic programs for saving and loading plot files. It is available on disk for $49.95. Bennett Software Co., 3465 Yellowstone Drive, Ann Arbor, MI 48105.

Check Reader Service number 421.



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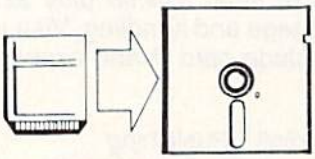

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New Products RUNdown

The Continuing Adventures of Pitfall Harry

Pitfall II: Lost Caverns continues the adventures of Pitfall Harry, the intrepid explorer and treasure-seeker of the original Pitfall.

Having searched the world's jungles, Pitfall Harry has now journeyed to the mysterious mountains of Peru, accompanied by his niece, Rhonda, and the cowardly mountain cat, Quickclaw. Harry's goal is to recover the celebrated Raj Diamond, stolen a century before and secreted inside the Lost Caverns of the Incas.

Unfortunately, Harry was separated from Quickclaw and Rhonda when they entered the labyrinthine caverns. He must rescue his friends as well as locate the diamond.

Pitfall II: Lost Caverns for the Commodore 64 is available on disk for $31.95 and cartridge for $34.95. Activision, Inc., 2350 Bayshore Frontage Road, Mountain View, CA 94043.

Check Reader Service number 403.

Memory Expansion Products from LETCO

Leader Electronic Technology Co. (7310 Wells Road, Plain City, OH 43064) has released the 64KC memory expander for the Commodore 64.

The 64KC expander plugs directly into the expansion port on the C-64. The extra memory can be used to store data, machine language programs and more. Retail price is $139.95.

A new 256K module for the C-64 is also available, retailing for $499. For VIC-20 owners, the 64KV memory expander is available for $109.95.

Check Reader Service number 434.

Explore the New World

Seven Cities of Gold is a new educational software program that allows you to re-create the Spanish exploration of the New World.

The program features accurate geographical and climatological representation of the Americas; it is designed to give you an appreciation of the obstacles encountered by the Conquistadors.

You must petition the king to finance your expeditions, and you will suffer his displeasure if the amount of gold you return is inadequate. You must also allocate resources, such as food, ships and other goods, and decide how to deal with various native populations.

Seven Cities of Gold is available on disk for the Commodore 64. Retail price is $40. Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403.

Check Reader Service number 431.

Learn the Secrets of the Masters

Mychess II is a chess simulation game from Datamost, Inc. (20660 Nordhoff St., Chatsworth, CA 91311).

Mychess II can be played in 2-D, 3-D, color or black and white. It includes nine skill levels (from beginner to master), hints and instant replays. It allows you to rotate the board, take back moves, examine an opponent's possible moves, save to disk and print out games. You can play against the computer or a human opponent.

Mychess II is available on disk for the Commodore 64, with a retail price of $34.95.

Check Reader Service number 411.

The Absolute Approach to Information Management

Compufile is a relative database program for the Commodore 64.

The program has 20 user-defined fields, user-defined reports, multiple levels of search and sort abilities and a user-changeable format. Multiple databases can be stored on a single disk. The system will automatically correct many error conditions, and it can deliver records in sequential file form so they can be accessed by word processors.

Compufile is menu-driven and written in machine language. A directory of all databases contained on a disk is automatically displayed on your screen at the start of the program. Compufile is available on disk for $39.95. ABS-(olute) Software, 1780 Austin Highway, San Antonio, TX 78218.

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New Products RUNdown

Stop The War Machine!

Raid on Bungeling Bay is an arcade-style game that puts you in control of a helicraft with a mission to stop The War Machine.

With tanks, boats, anti-aircraft guns, fighter planes, radar and bombers, The War Machine is a formidable foe. It knows only one thing: survival by force.

Taking off from a carrier in the Dire Straits, you'll be flying over the enemy islands, making raid after raid on the Factories of War. Successful completion of all six levels of the game results in a display of a front-page newspaper story describing the details of your victory, followed by a ticker-tape parade complete with fireworks.

Raid on Bungeling Bay is available on disk for the Commodore 64, with a retail price of $29.95. Broderbund Software, 17 Paul Drive, San Rafael, CA 94903.

Check Reader Service number 432.

States & Traits

States & Traits is a new educational software game that challenges children ages nine and above to sharpen their knowledge of U.S. geography, history and current trivia.

The program gives you two options. In States, you must chart the states into their proper locations on a master map. In Traits, you must plot topographic features into their correct geographic locations and answer questions about a multitude of U.S. landmarks, historical facts and trivia.

States & Traits allows you to test your geographic knowledge of the whole United States or concentrate on one of four regions. It is available on disk for the Commodore 64, with a retail price of $44.95. DesignWare, 185 Berry St., San Francisco, CA 94107.

Check Reader Service number 433.

COMING NEXT MONTH

- **In Pursuit of Trivia** With the success of the board game Trivial Pursuit, many software manufacturers are attempting to ride the trivia wave with software to run on the C-64. Next month, we'll take a look at the trivia craze and the latest trivia offerings. You'll have an opportunity to test your knowledge of little-known facts on a variety of subjects.
- **Spotlight on Productivity** Commodore's newest computer, the Plus/4, features built-in applications software. Beginning with December, and continuing for the next several months, *RUN* will take an in-depth look at each of the built-in software packages—starting with word processing—and how you can use them.
- **Commodore Games** The December issue will also feature reviews of two exciting new releases from Commodore—the arcade classic Satan's Hollow and the challenging Jack Attack.
- **Shopping for Software** Gift-givers will find plenty of ideas in this issue, which will feature a software buyer's guide listing manufacturers of game, educational and home/personal software, as well as utilities. The list will include 200 software manufacturers—most of whom produce C-64 software, but some who support the VIC-20. Companies supporting Commodore's new Plus/4 and C-16 are also listed.
- **Latest Look in Software** Noted Commodore author Jim Strasma will take a look at the software industry and provide some valuable tips on how to purchase software to fit your needs.
- **Penny-Pinching Software** Discover how you can acquire lots of software *without* spending lots of money. You'll be surprised at the amount of Commodore-compatible programs you can get, if you know where to look.
- **The Many-Colored VIC** Here's an easy-to-use editor that's an artist when it comes to designing and modifying your multicolored VIC-20 graphics characters.
- **Screen Dump** Here's a useful utility program that gives you a printout of what's displayed on your screen—all by simply pressing a function key.
- **Nasty Nimbots** In this game, you must outwit and outmaneuver a dozen formidable opponents. It's a cunning game of the mind for the VIC that is both fun and challenging.
- **'Tis the Season** No December issue would be complete without at least one Christmas article to help you get into the spirit of the season. But before you go Christmas caroling, get in tune with your VIC-20 and this Christmas Songbook program.

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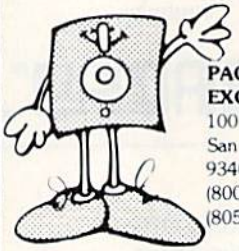

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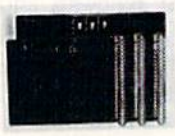

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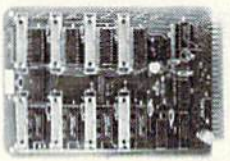

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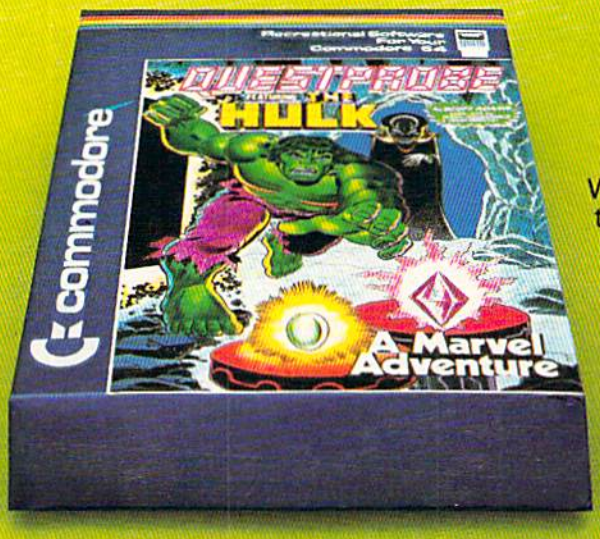

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