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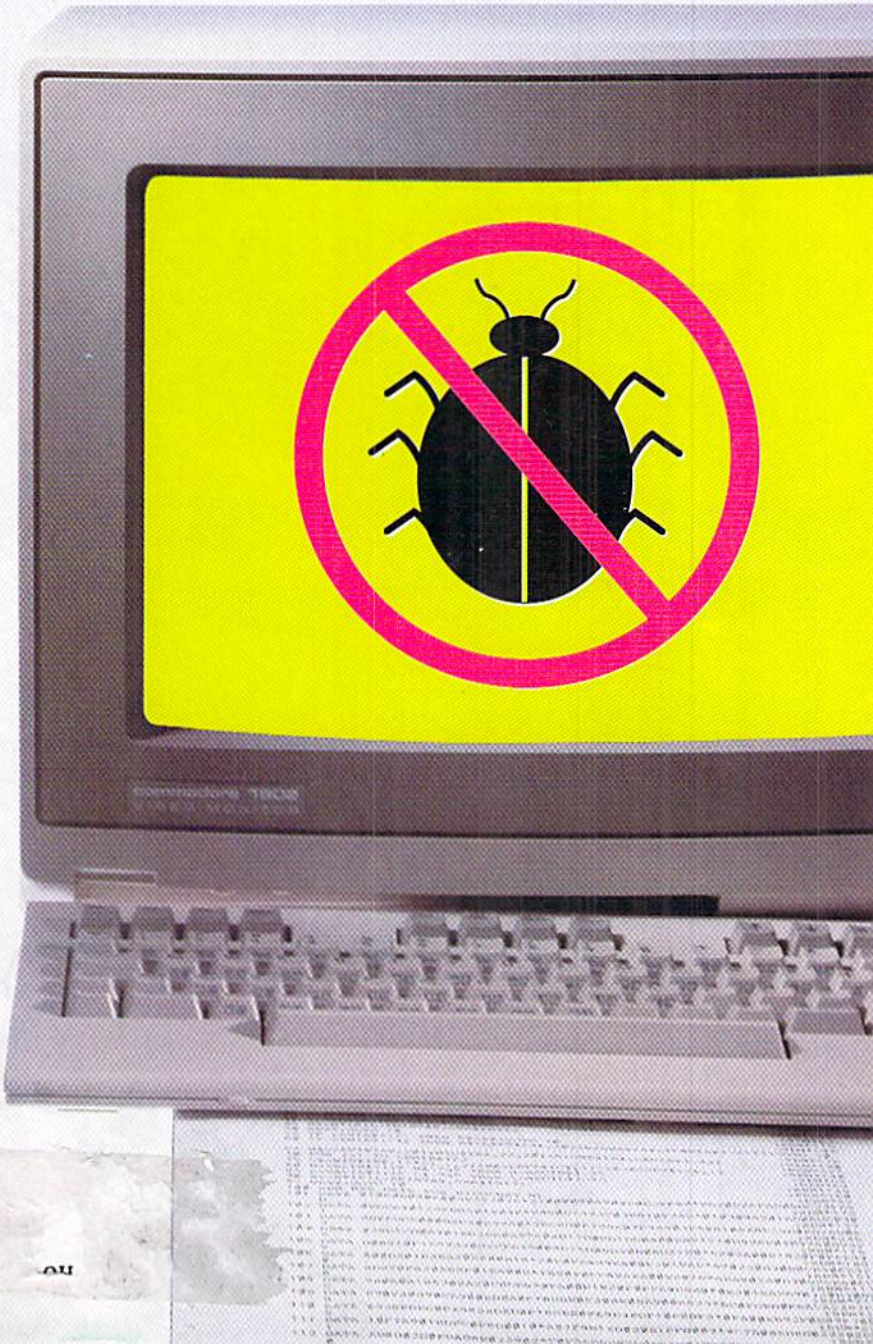
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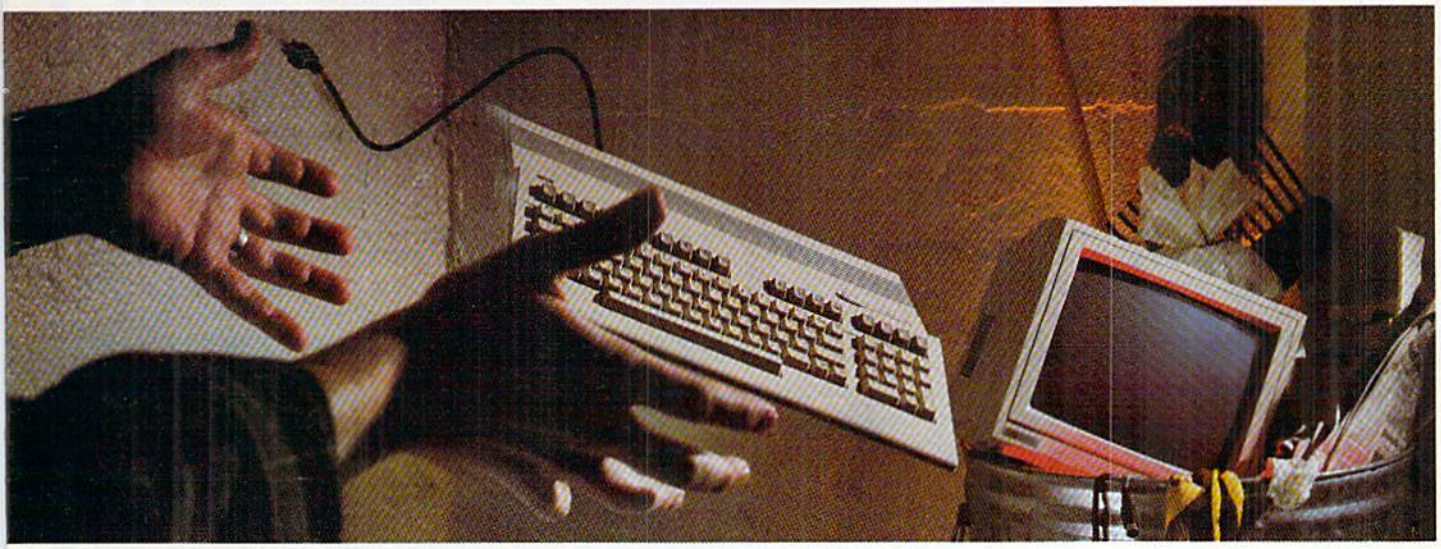
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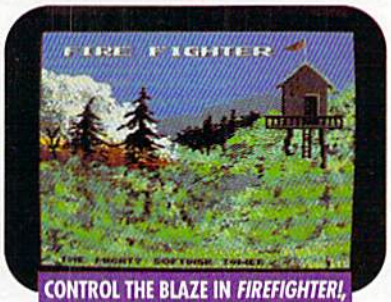
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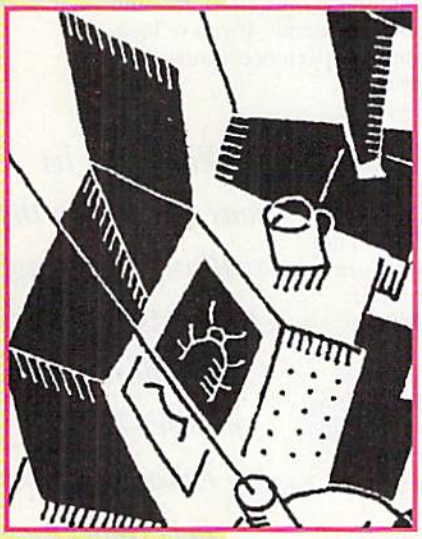
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Police, Pizza . . . Programs and Peripherals

Most of us prominently display emergency telephone numbers in our homes—police, fire and ambulance numbers, as well as the numbers of the pizza delivery service and cable TV repair. If you're looking for Commodore hardware or software or experience a computing emergency, you should refer to the following numbers and keep them handy for reference:

1. **Your favorite mail order company**. Many mail order companies are still busy serving the Commodore market. I keep a list containing over a dozen such companies near my computer. They serve as sources of information about hardware and software for this market. Check the ads in *RUN*. You may uncover a product you've been looking for . . . at a bargain price.

2. **Commodore's customer-support number**. This number (800-448-9987) is useful for finding local sources for products, as well as a place to get your Commodore fixed. You might discover the products you need at a retail or computer store near you.

3. **A user's group number**. Besides being excellent sources of information about computers, user's groups are, at this stage, probably good avenues for buying used equipment from members planning to upgrade. Contact the group nearest you.

4. ***RUN*'s customer-support line**. This number (800-343-0728) is the one to dial for information about *RUN* products.

5. **Online numbers**. Post the number of your favorite BBS or your favorite electronic network, such as QuantumLink. Through the wonderful world of telecommunications, you can chat with other users, download software and access valuable information about Commodore computing.

When you let your fingers do the walking, locating products for your Commodore system needn't be an exhausting experience.

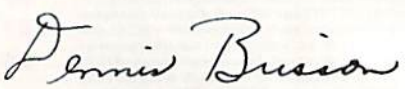


Maybe you know other sources not mentioned here, or perhaps you've tried some other strategies to obtain products. Why not tell us about your experiences and share them with *RUN* readers?

We know that Commodore users may sometimes have difficulty finding hardware and software. Besides those mentioned above, what sources for Commodore products still exist? (Glad you asked!)

To help answer that question, we have introduced a new column: **Curtain Call**. Each issue, at the end of the show (that is, on the last page) a solid-gold software or hardware "star" will be brought to center stage spotlight to face the crowd and take a bow (in other words, it'll get a special editor's review). It may be a star-search hopeful (a new product) or an old pro to "the biz" (a product that's been around for some time), but it will be an available product you should know about. Even though it will be on the last page of each issue, it's probably the first page you should turn to for available hardware and software for your Commodore computer.

Products will appear based on their entertainment and/or productivity value. So, if you're one of the many active Commodore users in the market for new products, don't miss Curtain Call each issue.



Dennis Brisson
Editor-in-Chief

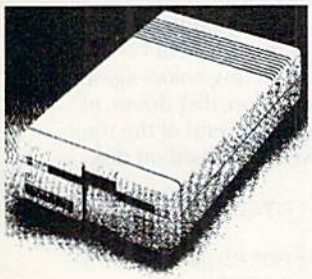
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MAGIC

These exciting routines put more color into your programs, make two-key combinations easier to press and add a word-wrap feature to the C-64 and C-128.

By TIM WALSH

$5E4 WHICH FILE WAS LAST?

Whenever you need to know the name of the last file loaded from disk, the answer is just a SYS command away. Entering either of the following commands in Program or Direct mode will print the last filename to the screen:

```
C-64: SYS 62913
C-128: SYS 62753
```

—HAROLD BENTLEY, HILLSBORO, MO

$5E5 RESTORE LINE 64

C-128 users have long relied on Basic 7.0's Restore command, which lets data be read into memory beginning at a specified line number. This is essential for programs, such as multiple-choice tests, that must branch to specific Data statements based on user input.

Restore Line 64 brings the convenience of the Restore command to Basic 2.0 on the C-64. When activated, it uses the following syntax:

```
SYS 49152, (line #)
```

Line # can be either a numeral or a variable that holds a numeral. As with the Basic 7.0 version of the routine, Restore Line 64 works only within Program mode.

```
Ø REM RESTORE LINE 64 - MICHAEL MYERS
                                        :REM*243
1Ø FOR T=49152 TO 49219:READ D:POKE T,D:CK
   =CK+D:NEXT                           :REM*83
2Ø IF CK <> 1Ø486 THEN PRINT"ERROR IN DATA
   ...":END                             :REM*3Ø
3Ø PRINTCHR$(147)"RESTORE LINE 64 ACTIVE!"
                                        :REM*132
4Ø PRINT"ENTER SYS 49152, LINE #"  :REM*6Ø
5Ø DATA 32,253,174,32,138,173,32,247,183,1
   32,253,133,254,165,43,133,251    :REM*72
6Ø DATA 165,44,133,252,16Ø,2,177,251,197,2
   53,2Ø8,19,2ØØ,177,251,197,254  :REM*178
7Ø DATA 2Ø8,12,56,165,251,233,1,164,252,13
   3,65,132,66,96,16Ø,Ø,177,251    :REM*136
8Ø DATA 72,2ØØ,177,251,24Ø,8,133,252,1Ø4,1
   33,251,184,8Ø,211,1Ø4,96         :REM*113
```

—MICHAEL MYERS, BEARDSTOWN, IL

$5E6 DISK ACCESS FLASHER 64

During disk saves and loads, C-64 programs usually don't change the screen display. Disk Access Flasher 64 will liven up your programs by cycling shifted characters through various colors whenever disk activity takes place.

The routine activates the C-64's extended background-color mode. You can change the default cycling colors with the following commands:

```
POKE 842,C1:POKE 855,C2
```

C1 and C2 are color values from 0–15. Using similar syntax, POKE 886,C3 and POKE 905,C4 (where the values of C3 and C4 are also from 0–15) would change the cycling colors again.

Disk Access Flasher works with all Commodore disk drives, including the 1581. A clearly marked demo at the end of the routine lets you see it in action, saving and verifying itself on disk.

```
Ø REM DISK ACCESS FLASHER - RICHARD PENN
                                        :REM*62
1Ø A=65535:B=56334:POKE1,55:POKEB,Ø:POKE95
   ,Ø:POKE96,16Ø:POKE9Ø,255:POKE91,255
                                        :REM*53
2Ø POKE88,255:POKE89,255:SYS41919:POKEA,PE
   EK(A):POKEB,1:POKEB-1Ø,149:POKEB-9,66
                                        :REM*228
3Ø FORU=82ØTO911:READQ:POKEU,Q:CK=CK+Q:NEX
   T:FORT=251TO254:POKET,Ø:NEXT:POKE2,Ø
                                        :REM*53
4Ø IF CK<>12Ø73THENPRINT"ERROR IN DATA..."
   :END                                 :REM*227
5Ø POKE6Ø947,76:POKE6Ø948,52:POKE6Ø949,3:P
   OKE6Ø893,76:POKE6Ø894,94:POKE6Ø895,3
                                        :REM*129
6Ø DATA134,2,166,251,232,134,251,224,254,2
   Ø8,15,165,252,73,1,133,252,2Ø1  :REM*159
7Ø DATA1,24Ø,13,169,2,141,34,2Ø8,166,2,12Ø
   ,169,Ø,76,22,238,169,3           :REM*182
8Ø DATA141,34,2Ø8,76,78,3,133,253,134,2,16
   6,254,232,134,254,224,254,2Ø8    :REM*142
9Ø DATA15,165,252,73,1,133,252,2Ø1,1,24Ø,1
   9,169,2,141,34,2Ø8,165,253       :REM*58
1ØØ DATA166,2,36,148,48,3,76,225,237,76,23
    Ø,237,169,3,141,34,2Ø8,76,122,3:REM*99
11Ø REM DEMO LINES BELOW             :REM*1Ø6
12Ø POKE 1,53:POKE53265,11:POKE5328Ø,Ø:POK
    E53281,Ø:POKE53282,2:POKE53283,2
                                        :REM*218
13Ø PRINTCHR$(147)CHR$(5)CHR$(18)"DISK ACC
    ESS FLASHER{13 SPACEs}"          :REM*232
14Ø PRINTCHR$(19)CHR$(154)TAB(32)"{SHFT L}
    {SHFT O}{SHFT A}{SHFT D}{SHFT I}{SHFT
    N}{SHFT G}"CHR$(18)" ":POKE53265,91
                                        :REM*11Ø
15Ø SAVE"@Ø:TEST",8:VERIFY"TEST",8 :REM*33
```

—RICHARD PENN, MONTREAL, QUEBEC

$5E7 ESCAPE/BACK-ARROW SCREEN COLORS 128

Looking for another addition to your collection of C-128 routines? Here's a new escape-key routine. When run, it defines ESCAPE/BACK-ARROW to cycle through the C-128's 80-column screen colors. As with any escape-key sequence, release the ESCAPE key before pressing the BACK-ARROW key.

```
Ø REM ESC/BACKARROW COLORS 128 - CHUCK SAR
  ACENO                                :REM*54
1Ø FOR T=4298 TO 4338:READ D:POKE T,D:NEXT
                                       :REM*69
2Ø DATA 169,213,141,56,3,169,16,141,57,3,9
   6,2Ø1,95,24Ø,3,76,193,2Ø1,162       :REM*88
3Ø DATA 26,142,Ø,214,172,1,214,192,255,24Ø
   ,5,2ØØ,14Ø,1,214,96,16Ø,24Ø,14Ø:REM*119
4Ø DATA 1,214,96                       :REM*97
5Ø SYS 4298:END                        :REM*174
```

—Chuck Saraceno, Milford, NH

$5E8 Color SYS 64

Here's a similar routine for the C-64. Color SYS 64 replaces the two pokes needed to change the screen and border colors with a single SYS command. When the routine is in memory, you can change the colors with just a SYS 49220,S,B command (where S is the screen color and B is the border color). Color SYS can be used in either Direct mode or your own programs.

```
Ø REM SYS COLOR 64 - MICHAEL MYERS :REM*73
1Ø AD=4922Ø:FOR T=AD TO AD+18:READ D:CK=CK
   +D:POKE T,D:NEXT                    :REM*4
2Ø IF CK<>2525 THENPRINT"ERROR IN DATA..."
   :END                                :REM*183
3Ø PRINTCHR$(147)"TO USE, ENTER SYS ";AD;"
   ,SCREEN,BORDER"                     :REM*156
4Ø DATA 32,253,174,32,158,183,142,33,2Ø8,3
   2,253,174,32,158,183,142,32,2Ø8,96
                                       :REM*1Ø2
```

—Michael Myers, Beardstown, IL

$5E9 Handy Key 64

Children and others first learning to use the C-64 can benefit from Handy Key 64. When run, this short machine language routine makes the computer "remember" that the CONTROL, COMMODORE or SHIFT key has been pressed, and it displays the key's name in the upper-right corner of the screen until another key is pressed. The second keypress activates the two-key function just as if the keys were pressed simultaneously. Pressing the SHIFT and INSERT-DELETE keys in sequence clears the screen. Handy Key's design makes it a great teaching routine for youngsters.

```
Ø REM HANDY KEY 64 - EUGENE WOODS  :REM*16
1Ø FOR T=82Ø TO 1Ø18:READ D:CK=CK+D:POKE T
   ,D:NEXT                             :REM*3
2Ø IF CK <> 24ØØ5 THEN PRINT"ERROR IN DATA
   ...":END                            :REM*2Ø6
3Ø PRINT"HANDY KEY ACTIVE!":SYS 82Ø
                                       :REM*188
4Ø DATA 173,144,2,2Ø5,2Ø8,3,24Ø,22,2Ø5,2Ø6
   ,3,24Ø,9,141,2Ø6,3,173,143,2        :REM*46
5Ø DATA 141,2Ø5,3,173,2Ø7,3,174,2Ø8,3,2Ø8,
   6,173,2Ø5,3,174,2Ø6,3,12Ø,141       :REM*98
6Ø DATA 143,2,142,144,2,88,96,173,141,2,24
   Ø,67,2Ø5,142,2,24Ø,62,2Ø5,2Ø9       :REM*71
7Ø DATA 3,24Ø,71,162,2Ø,2Ø1,4,24Ø,12,162,1
   3,2Ø1,2,24Ø,6,162,6,2Ø1,1,2Ø8       :REM*177
8Ø DATA 39,72,173,2Ø9,3,2Ø8,11,16Ø,7,185,3
   2,4,153,23Ø,3,136,2Ø8,247,1Ø4       :REM*1ØØ
9Ø DATA 141,2Ø9,3,16Ø,7,189,21Ø,3,153,32,4
   ,173,134,2,153,32,216,2Ø2,136       :REM*235
1ØØ DATA 2Ø8,24Ø,173,2Ø9,3,24Ø,28,141,141,
    2,165,2Ø3,2Ø1,64,24Ø,19,169,Ø      :REM*111
11Ø DATA 141,2Ø9,3,141,142,2,16Ø,7,185,23Ø
    ,3,153,32,4,136,2Ø8,247,1Ø8        :REM*5Ø
12Ø DATA 2Ø5,3,72,235,97,3,Ø,16Ø,147,136,1
    37,134,148,16Ø,16Ø,131,143,141     :REM*1ØØ
13Ø DATA 141,16Ø,16Ø,131,143,142,148,146,1
    43,14Ø,Ø,Ø,255,Ø,255,Ø,255,Ø       :REM*132
14Ø DATA 255,Ø,255,Ø,255,Ø,255,Ø,255,Ø,255
    ,Ø,255                             :REM*53
```

—Eugene Woods, Sweet Home, OR

$5EA Word Wrap Plus 64/128

If you need a word-wrap utility that works on both the C-64 and the C-128 in either 40- or 80-Column mode, look no further. When run, Word Wrap Plus determines which computer it's operating on and configures itself accordingly. Then it prints to the screen the text that's within quotes in lines 10 and 20 and defined as A$. After every six or seven lines, you'll be prompted to press RETURN to continue. The routine's design makes it handy for telecommunications, short text readers and anywhere else that word-wrap is needed. Naturally, you can change the text defined in A$ to your own personalized message.

```
Ø REM WORD WRAP PLUS 64/128 - RICHARD WINT
  ERS                                  :REM*1Ø7
1Ø A$="PLACE YOUR TEXT HERE. YOU'LL NOTICE
    THAT WORDS WON'T BE BROKEN WHEN"
                                       :REM*66
2Ø A$=A$+" PRINTED TO THE SCREEN WITH WORD
   WRAP PLUS FOR THE 64 & 128. "       :REM*177
3Ø FL=Ø:WD$=""                         :REM*21
4Ø L=LEN(A$):X=1                       :REM*225
5Ø L$=MID$(A$,X,1):WD$=WD$+L$:X=X+1:REM*2Ø
6Ø IF L$=" " OR X>L THEN GOTO 8Ø       :REM*116
7Ø GOTO 5Ø                             :REM*2ØØ
8Ø IF FL=Ø{2 SPACEs}THEN GOSUB 13Ø:REM FIR
   ST TIME                             :REM*1
9Ø IF FL<>Ø THEN GOSUB 21Ø:REM SUBSEQUENT
   PRINTING                            :REM*2Ø5
1ØØ FL=1:WD$=""                        :REM*67
11Ø IF X<=L THEN GOTO 5Ø               :REM*2Ø
12Ø GOTO 4Ø                            :REM*248
13Ø POKE981,15                         :REM*1Ø6
14Ø POKE6528Ø,Ø                        :REM*229
15Ø SY=128:SC=4Ø:CC=236:CL=235         :REM*141
16Ø IF PEEK (6528Ø) <> Ø THEN SY=64:REM*96
17Ø IF PEEK (215) = 128 THEN SC=8Ø:REM*24Ø
18Ø IF SY=64 THEN CC=211:CL=214        :REM*134
19Ø PRINT CHR$(147);                   :REM*111
2ØØ GOTO 21Ø                           :REM*11
21Ø PRINT CHR$((POS(.)+LEN(WD$)>SC)*-13);
                                       :REM*252
22Ø PRINT WD$;                         :REM*162
23Ø IF PEEK(CL)<4 THEN RETURN          :REM*195
24Ø IF PEEK(CC)<SC-7 THEN RETURN       :REM*157
25Ø PRINT:PRINTTAB(1Ø)"PRESS <RETURN> TO C
    ONTINUE";                          :REM*12Ø
26Ø GET KY$:IF KY$="" THEN GOTO 26Ø
                                       :REM*253
27Ø IF KY$<>CHR$(13) THEN GOTO 26Ø:REM*1Ø2
28Ø PRINT CHR$(147);                   :REM*2Ø1
29Ø RETURN                             :REM*177
```

—Richard Winters, APO, NY ■

MAIL RUN

Is GEOS worth the time and effort? Is Word Writer VI really better than Word Writer V? Readers offer their opinions and ask for ours.

RUN FOR THE MONEY?

I am tired of hearing you tell readers how the 8-bit market is shrinking. How much is Commodore paying you to say these things? Commodore is pushing the Amiga simply because they can make more of a profit selling it as opposed to a C-64.

The 64 outlasted the 128 and the 128D for a reason. It is more than adequate for some users who are intimidated by larger machines. I am not making the big transition, because the Amiga is already outdated! Besides, I could buy an SX-386 IBM clone with an 85-megabyte hard drive, a VGA color monitor and a 2400-baud modem for far less money than a comparable Amiga. Also, the Commodore 64 is the only computer that has affordable software.

I wish *RUN* would get back to the business of encouraging and supporting its readers and not the interests of Commodore, which is rich enough as it is. After all, isn't that what has kept this magazine going and paid your salaries?

—RICHARD ZEMBA
CLEVELAND, OH

We do not believe that C-64 and 128 users should abandon their computers. That's why we're here! On the contrary, we advocate using 8-bits in innovative ways (yes, even in conjunction with Amigas and MS-DOS machines).

RUN *exists to serve the interests of its readers first and foremost. We've watched this market shrink over the years, no doubt about it, but we stubbornly continue to cover only the 8-bit Commodores. After eight years, we're still committed to publishing excellent programs, articles, columns and market information. This is the best encouragement and support we can offer.*

—EDITORS

I received the November/December issue of *RUN*. Congratulations and many thanks for the great articles. This is what we newcomers are looking for. "Cliff Diver," "The ABCs of REUs," "Ultimate Sprite Editor," and so on, were a real help and decision maker for me. I was not aware of the Quick Brown Box's ability to retain files in case of power failure, and autobooting The Write Stuff, which I use constantly, is great.

Now I am trying to hook up a second C-64 for TWS use only, because the first is permanently hooked up to my Xetec Lt. Kernal hard drive and that interferes with some of the other program functions. I am also trying to hook up two C-64 computers to one monitor and one printer with an A/B switch box. I sure hope it works.

—CSABA CSASZAR
LAKE RONKONKOMA, NY

GEOS CONCERNS

I'm no programmer, but neither am I a stranger to the C-64. Since buying the computer in 1984, I have used it for word processing and, more recently, desktop publishing. My word processor outputs to a 24-pin printer capable of more than 40 different fonts. I also use the machine for database chores, and a few years ago used it to track the customers of a small business. I have even wired it to a VCR for character-generating duties. The Commodore is practical, economical and fun.

I've noticed, in this magazine and others, a lot of ink devoted to GEOS. What I want to know is how to get GEOS to work! I bought it three years ago. The manual is the most horrendously tangled pile of contradicting information I have ever read. Myriads of terms are used that are never explained, and I must constantly flip to different sections in order to follow the tedious sub-branching style.

I never succeeded in booting my original copy of GEOS. And, after trying unsuccessfully many times to reach Berkeley Softworks (now GeoWorks) by telephone, I returned the program. The replacement I received did finally boot after a lot of experimentation, but it only booted up once. I have not been able to use it since then.

I have taken some 300 hours of Macintosh-based graphics and desktop publishing college courses and a few similar courses for the IBM, so I'm no neophyte. It is ironic that the smaller a computer is, the more the programs available for it require the user to know programming.

I realize that GeoWorks prefers users to communicate through Q-Link, but frankly, I'll buy a modem and go that route when I'm feeling up to the frustration and challenge. I'm fairly disillusioned with the product at present.

—MIKE NIXON
PHOENIX, AZ

Early on, Commodore users developed a love-hate relationship with GEOS. Fans heralded it as an innovative and powerful application, while critics found it frustrating, poorly documented and difficult to use. The truth, perhaps, lies somewhere in the middle.

Your experience, however, seems out of the ordinary. Since you originally purchased GEOS, Berkeley Softworks has grown, putting together a more comprehensive customer service department with a technical support line dedicated solely to Commodore and Apple 8-bit GEOS (415-644-0926). If you're willing to try again, they could help you solve the problem. Representatives are available weekdays from 9AM to 3PM Pacific time.

—EDITORS

I have been a C-64 user for two years, and I have a few questions:

First, what is GEOS? You have a column devoted to it. Software companies have pages of public domain and shareware programs devoted to it. The only thing I know is that GeoWorks sells it.

What does GEOS do? Judging from how popular it is, I think I should have this program, but I'm hesitant to spend the money on a program when I have no idea what it is used for.

—JAMES COLLINGS
WAYNESBORO, VA

Your questions are good ones, and you're wise to ask before spending the money. Right now, without GEOS, you load and run programs, view directories, and perform all your computing tasks by typing Basic commands. You're using a text-based operating system. GEOS is a graphics-based operating system, which means that you perform computer functions, such as loading, saving and so on, by manipulating symbols on the screen with a

pointer that you direct with a mouse. (Macintosh people have long referred to this as a "point-and-click" interface.)

There is a wide variety of software available to use with GEOS, including databases, word processors, desktop publishers and games.

For a more detailed description of GEOS and answers to the most-asked questions about it, see the November/December geoWatch column in RUN.

—EDITORS

GOLDEN OLDIES REQUEST LINE

Since I retired several years ago, I have been learning to use computers. I really enjoy typing and saving the various programs and Magic tricks that you publish. Since going bimonthly, however, your magazine has lost something. The last issue had only one program for the C-64. It was fun, but now it is another two months of waiting.

I know you are fighting the advertiser's game and have to program your publication around their needs and your own budget demands. It would be interesting, however, to know the demographics of your subscribers. I would wager they're mostly neophytes like myself. Since you have acquired the old *Commodore Magazine*, would it be possible to have a bimonthly "oldies-but-goodies" section from it and your old *RUN* issues?

—BEN PROFT
GARY, IN

I would like to suggest something that is probably contrary to your editorial policy. In the June 1985 issue of *RUN*, you had an article by Joseph Shaughnessy entitled "Bad Blocks?", which included his program S & F Disk Checker. I find it very useful in salvaging disks that repeatedly give me splat files when I try to save data. Validating the disk and then running Mr. Shaughnessy's program enables me to get the maximum use of the faulty disk.

Accordingly, I suggest that you reprint the article for the benefit of readers who are too new to Commodore computing to have read the original article.

—ROBERT NEDRESKI
ERIE, PA

Thank you for your suggestions to republish past articles. As a general rule, however, we don't republish past articles and programs. We prefer to publish fresh material,which appeals to charter subscribers as well as new readers.

Many back issues of RUN *are still available, and can be ordered by calling 800-343-0728. (Back issues to* Commodore Magazine *are not available.)*

—EDITORS

1581 AVAILABILITY

I read your article "Cliff Diver or Couch Potato?" in the November/December 1991 issue. It mentions the 1581 drive and I may want to purchase one in the next year. Do you know of any place that sells them?

—KARL CZAPLA
RANDOLPH, VT

Those drives are hard to come by, and you may be put on a lengthy waiting list. As advertised in RUN, *Software Hut (800-848-0079) offers refurbished 1581 drives.*

—EDITORS

WORD WRITER VI

I appreciated Mr. Cavanaugh's comprehensive WW6 review in the November/December issue of *RUN*. The cardfile, although limited in scope, is a welcome and long overdue improvement for mass mailing. Although a bit awkward, it can be used for personalized mass mail, as Mr. Cavanaugh pointed out, by creating multiple salutation fields to provide additional personalizing in the body of the form letter.

In my view, the tab function "improvement" is a step backward. While it is true that previous tab settings were restricted to Text mode only, previous WW versions allowed an infinite number of tab settings, each set (or cleared) with one combined keystroke. Now, WW6 is restricted to 6 preselected tab settings that must be accessed through the Printer Codes window. Further, the "T" that appears when a tab is set may or may not have any relationship to its actual position on the page. True enough, the column marker will change, but what you see is not necessarily what you get.

Of course, the solution to this dilemma is easy for me. I will continue to use WW4/WW5 for tabulated, columned documents, and will still have the handy calculator to total numbers and values.

—CHARLES DARBY
ROSWELL, MN

MORE 1581 SUPPORT

Super Snapshot makes life much easier for 1581 owners—so much easier you'll wonder how you ever did without it. This cartridge makes single-file copies of many protected and unprotected programs. You can then have a fast-loading version of the program on the same disk as your data. This works with Superscript 64, Superbase v3.0, The Write Stuff (BB Writer, all versions), and Cadpak 64, among others.

For example, the original version of Superscript, which loads several files, takes about two minutes to load. The single-file version of a 3 1/2-inch disk takes one minute and five seconds. With Super Snapshot or JiffyDOS, the same program loads in under eight seconds!

Next, BB Writer v2.0 should be added to your list of programs that will run from the 1581 drive.

Some Timeworks programs work with the 1581. Not mentioned in the Timeworks documentation, Swiftax and Sylvia Porter's Financial Planner will also run from the 1581 (both program and data).

One helpful note: the financial planning program has you back up the entire disk just to back up your data. By using a relative file copier, however, you can quickly back up your data alone.

—JOOST VAS DIAS
HUBERT, NC

What's that you say? You don't have a relative file copier? See page 37!

—EDITORS

STAR NX-1000C PRINTERS

A correction to Commodore Clinic (January/February 1992): Cameron Goble *can* get 80-dpi print density with the printer plugged directly into his C-64 (his current configuration). He should simply flip DIP switches 1 and 5 off (down), and select the Epson FX-80 printer driver from the GEOS deskTop. Note: He must turn the printer off before changing the DIP switch settings.

—RICK DE BRUIN
KIMBERLY, WI

In the January/February 1992 issue of *RUN*, you had a reader with a problem with the NX-1000C. The problem can be solved with the Star NL-10(com) printer driver. It is a little slower than other drivers, but circles come out round, and you get full-page geoWrite output.

—GERALD CRITES
KENNETT, MO ■

Have a comment, compliment, quip or quibble? Send it to Mail RUN at 80 Elm St., Peterborough, NH 03458.

SOFTWARE GALLERY

Elvira comes to the C-64, along with the best AD&D adventure yet, an arcade game construction set and more.

By JOHN RYAN

ELVIRA, MISTRESS OF THE DARK.....A

Excellent controls, graphics and sound make Elvira a hit.

For years now, C-64 owners have listened to Amiga users brag on and on about their graphics. Now, Elvira, Mistress of the Dark has finally arrived for the C-64. And, as promised, the graphics come close to those in the original Amiga version. In addition, while the C-64 cannot compete with the Amiga's stereo sound, the music and sound effects for this game are about the best I've heard from the Commodore.

I don't say these things lightly, having reviewed the Amiga version several months ago for *AmigaWorld* magazine. I liked it then and, without reservation, I can say that I like it now.

Elvira is a graphics adventure packed onto three double-sided disks. It's big, it's bold (Elvira's provocative picture on the box deserves a review in itself), and it easily defines a new standard in Commodore gaming.

The premise of this game is simple: Elvira's evil grandmother, Emelda, will soon rise from the dead unless you help Elvira find six keys scattered throughout her castle. These keys open a chest that contains the secret to keeping Emelda's spirit in check. *Finding* the keys is not the problem, however; *surviving* long enough to find them is. Throughout the dark halls and catacombs of Elvira's castle lurk werewolves, evil guards and a host of other toothy creatures, all of whom delight in murder and mayhem.

You view the game from a first-person "you-are-there" perspective and control it entirely by joystick. This point-and-click control is integral, whether you're moving about the castle or fighting the monsters that dwell there.

The game window takes up two-thirds of the screen, with the lower third reserved for messages and inventory control. Menu bars along the right side control how you interact with the adventure, allowing you to lock, unlock, use, eat, fight by turning tail and running. If you do, however, you won't have much success. You see, most of the important areas of the castle are guarded, so, sooner or later, you'll have to fight. As you and your adversary trade blows, blood spurts across the screen with each successful strike. The computer simplifies the fight a bit, telling you the best time to strike or parry.



Elvira's frequent battles and eerie graphics made my short hairs bristle.

mix, open and examine items.

Elvira is an interactive graphics adventure, a sort of "what-you-see-is-what-you-get" game. Items on the screen can be picked up, moved, closed, pushed or otherwise manipulated. When you take something, such as a weapon, it disappears from the three-dimensional screen and appears in your inventory. Navigation, accomplished by clicking on an arrowed compass, is extremely simple.

What really makes this game is its atmosphere, created by the great high-resolution graphics and exceptional sound effects. Elvira leads you through a gloomy English castle, drawn in somber tones of brown, gray and, occasionally, blood red. And what kind of creepy hostess would Elvira be without offering up gobs of blood and ooze? This game is certainly not for the squeamish—it'll have the hairs on your neck standing on end.

Combat occurs often, but, unlike other graphics adventures, you can avoid a fight by turning tail and running. If you do, however, you won't have much success. You see, most of the important areas of the castle are guarded, so, sooner or later, you'll have to fight. As you and your adversary trade blows, blood spurts across the screen with each successful strike. The computer simplifies the fight a bit, telling you the best time to strike or parry.

During your travels you'll gather better weapons and the experience needed to battle the nasty monsters that appear later in the game. Occasionally, Elvira herself pops up and offers mindless tidbits of advice (or insults, as the occasion warrants).

I suppose I could gripe about the incessant disk access, but I'll temper the criticism by saying that the gorgeous graphics are worth the slow play. Most C-64 owners don't have a fast hard drive to rely on, so you'll have to content yourself with swapping disks as the game proceeds. The software includes turbo-loading routines, so, disk-swapping aside, the loading times from screen to screen are tolerable.

With hundreds of locations to visit and scores of devious puzzles, this game will take you many hours to complete. By including elements of magic, character development and hand-to-hand combat, Elvira manages to intertwine the essential elements of a good "B" horror flick with fantasy role-playing. All that's missing is the bag of popcorn.

($44.95/C-64. Bethesda Softworks, 15235 Shady Grove Road, Suite 100, Rockville, MD 20850)

SOFTWARE REPORT CARD

Outstanding	A
Good	B
Average	C
Below Average	D
Crummy	F

TIE BREAK.....C

Warning: This one is for joystick masters only.

Ever since the original Pong game faded into history, there have been a myriad of tennis simulations, each bandying about well-worn expressions: *realistic, exciting*, and the obligatory *thrilling*. Now, touting itself as the ultimate tennis simulation, Tie Break attempts to bring the

thrill of championship tennis right into your home.

So, does Tie Break do for tennis simulations what Leaderboard did for golf simulations? Hardly.

In this one- or two-player game, you can compete in a regular or championship tournament, or practice your game (and practicing is a must). The action occurs on one of four different court types—grass, clay, artificial turf or PVC. Each affects the ball's speed and bounce differently. Unless you're a joystick master, however, the differences are negligible. You can also choose from several racquets with string tensions ranging from 20 to 30 kilograms. This noticeably affects the hardness or softness of a shot.

The court and players are seen from a bird's-eye view, and, to the game's credit, this aspect works out pretty well. Only the server's half of the court is shown at any one time, with the screen scrolling smoothly as the volley proceeds.

As a sports simulation, Tie Break is amusing at best, tedious at worst. The players are controlled by joystick, and this is perhaps the most aggravating part of the game. Simply put, you'll need a lot of practice to put the ball over the net even once, let alone return three or four volleys.

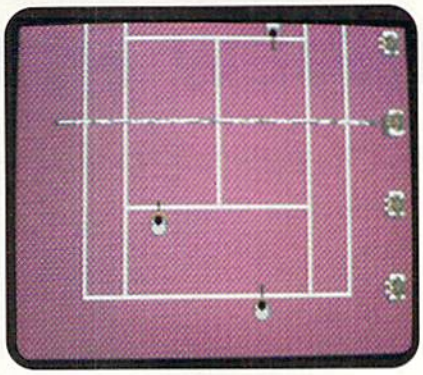
Serves, forehand shots and backhand shots are accomplished by maneuvering the joystick in a certain way, as are stop balls, drop shots, top spins and lobs. You'll have to memorize and practice a lot of joystick movements to become proficient enough to measure any success at this game.

Add the variable of the joystick button, which increases the range of a shot, while trying to remember joystick positions, and you can get frustrated in a hurry—especially if you're playing doubles.

The graphics are rather perfunctory: Each court is presented as an array of rectangular boxes with a net stretching across the middle.

Again, I find myself reviewing software whose ad-copy on the back of the box is rather misleading. Tie Break advertises the game's "amazing" realistic speech and TV-style commentary, but this does not exist in the C-64 version. Nor could I find evidence of its "comic" animation or player editors. If these options exist solely in the 16-bit versions, the box should say so.

While it's evident that the authors strove to make this tennis simulation as realistic as possible, it seems they lost something in the construction. The fun



To be a Tie Break master, you'll have to practice, practice, practice!

of tennis is playing the game, not practicing arduously as real players do.

($29.95/C-64. Digitek Software, 1916 Twisting Lane, Wesley Chapel, FL 33543)

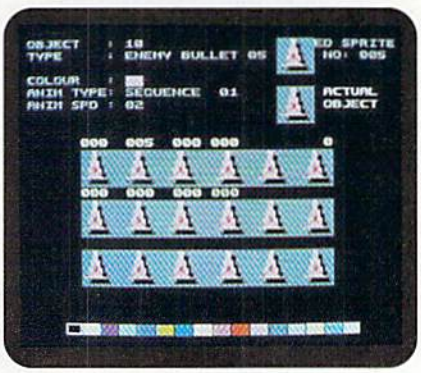
Shoot 'em Up Construction Kit .....B+

Build your own arcade game without learning to program.

Most computer users are not programmers, although many would like to be—especially when they come up with a great idea for a game. If you want to design an arcade game of your own, but don't want to learn a programming language, then Shoot 'em Up Construction Kit is precisely what you need.

As the title implies, this is a full-featured game-construction system that lets you easily put together arcade games of almost any style. You have up to 127 sprites, 58 objects, text, sound and construction tools to help you. The program is completely menu-driven and includes three ready-made games. They play as if they were programmed from scratch. You can study and edit them to see exactly how the construction process works.

Putting a game together is simple, and the documentation leads you through the process easily. A game is comprised of several parts, beginning with sprites



Create your own arcade game with Shoot 'em Up Construction Kit.

(single, four-color drawings). Two or more sprites combine to form an object. Objects can create the appearance of animation, and sound effects can be attached to each object.

Objects and sprites must be placed on a map of your world, where the game play will take place. It is here that you slowly build your game's universe with objects, characters, text, sounds and player limits. This map can be as simple as a single screen or as sophisticated as a large scrolling background.

An extensive editing menu presents options for working on sprites, objects, characters, sound effects and other key aspects of the arcade game. If you've ever used a sprite or character editor such as Ultra Font, then you'll feel right at home with Shoot 'em Up's editors. With your joystick in hand, you cycle through the options, directly editing graphics objects and positioning them on the map. The designers tried to make editing as easy as possible by including many time-saving features, such as copy, flip and rotate.

It's amazing how much control you have over your creation. You can specify how fast on-screen objects move, the points awarded for destroying them, joystick fire rates and bullet speed. You can also specify attack waves, and even edit the level of each map.

I learned to use this program by modifying the games that are provided with it. Within an hour I was completely comfortable building my own game from scratch. Once a game is constructed, you can save everything to disk, then swap the game with your friends, who can boot up your creation and share the fun.

Don't get me wrong: Constructing a game from scratch takes lots of work. But with Shoot 'em Up Construction Kit, you concentrate on the creativity of game-building rather than the bits and bytes that make it all go. It's surprisingly easy to use, it's fun, and it's capable of creating literally thousands of arcade games. You're limited only by your imagination.

($14.95/C-64. Avantage Software, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128)

Chip's Challenge .....B+

To have some real fun, exercise your brain, not just your joystick.

First impressions can be deceiving. Case in point: When I received Chip's

Continued on p. 62.

News and New Products

SPECIAL REPORTS: The latest tax preparation software for the C-64 and C-128, plus a review of the World of Commodore Show.

By JANICE GREAVES

On-Line Classified Ads

PLATTSBURGH, NY—**Online Electronic Classifieds,** a new electronic bulletin board, offers newspaper-style classified advertisements at reasonable prices.

The service works much like the classified section of the newspaper. Ads can be placed in any of the 90 available categories—for instance, "For Sale: Camera Equipment" or "Wanted: Used Computer Hardware." Unlike a newspaper, however, ads on OEC cost only $5 for 300 characters, and they remain posted for 30 days. You can delete your ad before the 30 days if you wish.

There is no cost to view the ads (except for the long-distance telephone charges), and several features of the system make searching for ads easy. For example, you can search for keywords, such as Nikon 35mm F2 camera, and OEC will show you all of the ads offering that camera.

This BBS supports all computer platforms. For more information about OEC, write to PO Box 988, Plattsburgh, NY 12901. To boot up to OEC directly, dial 518-562-9452.

Ease Your IRS Anxiety

PETERBOROUGH, NH—Each year around the first of March, I begin to get nervous—income tax anxiety. I keep accurate financial records, but I'm always afraid that a month or so down the road I'll get a letter showing me how I miscalculated on my 1040, and that, instead of the nice refund I've already spent seven ways, I owe the IRS $2000.

This year, I'm giving my calculator a rest and booting up some Commodore tax software instead. Tax preparation programs have been around for years, but never have they been so sophisticated and so easy to use. Their logical instructions, simple menus and automatic calculations make tax preparation virtually painless (sounds sort of like what your dentist says, huh).

While all of these packages received strong reviews from *RUN* in the past (March 1989 and February 1990), each has unique appeal. The table on page 14 outlines the features of the five major tax preparation packages for the C-64 and 128. Below is a brief description of each.

Timeworks has mastered the art of Commodore productivity with **Swiftax.** With its pull-down menus, help screens, fast-load routines and a detailed tax guide, this program is good even for the novice taxpayer. And the selection of forms and schedules provided with this package makes Swiftax appropriate for most individual or family filers. (Call Timeworks at 800-323-7744.)

If you have more than one home busi- ►

Industry Update: The World of Commodore Show

MISSISSAUGA, ONT—As in previous years, the 1991 World of Commodore show was held the first week of December. Amidst snow, rain and a vivid lightning and thunder storm, the Toronto suburb of Mississauga, Ontario, played host to the gathering of Commodore fans.

While the event has basically evolved into an Amiga extravaganza over the past four years, there's never any shortage of die-hard C-64 and C-128 owners in attendance. Most come to the show not only to see what's new for their computers, but also to pick up software and hardware bargains from the distributors. Items such as discountinued C-64 and C-128 software can be purchased at a fraction of its original price. Hardware bargains also abound, including printers, mouse pads, and monitors that are not platform-specific, which makes for easy holiday shopping.

Eight-bit software titles could also be found at the Free Spirit and Commodore booths. But, for all intents and purposes, Creative Micro Designs (CMD) had the show to themselves for C-64 and 128 coverage.

With a number of computers set up and all of their products on display, 8-bit activity in the CMD booth did not disappoint. Charles Christianson and Doug Cotton, CMD lumnaries familiar to east coast user's group members, demonstrated CMD's products.

While their SID Symphony Stereo Cartridge provided the background music, a dazzling display of images using a RAMLink and RAMDrive showed that the venerable C-128 could almost match a stock Amiga at retrieving and displaying images. Show specials, their hard drives and gateWay demonstrations helped to keep a large crowd hovering around the CMD booth.

Another impressive item promoted by CMD at the show was their new Perfect Print LQ for GEOS. This package lets owners of newer technology printers, such as the Seikosha SP-2400, take advantage of the printer's high-resolution graphics. The result is printed fonts and graphics that rival laser printed output.

Unlike years past, not a single C-64 or C-128 user that I talked to at the show lamented the fact that it's not a Commodore 8-bit event. Rather, they all seem to quietly accept the level of Commodore 8-bit coverage and enjoy seeing Amiga technology and demonstrations and witnessing first-hand the developments in the CDTV market. If the World of Commodore show is any indication, the level of interest, large installed base and occassional appearance of new products means that there's plenty of life left in this market.

—Tim Walsh
Technical Manager

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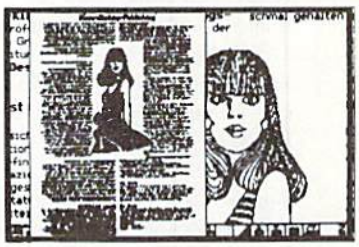
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IN NEVADA

ness, **Tax Master** from Master Software is a great help, because it can create separate schedules for each business, as required by the IRS. In addition, Tax Master can store data from many returns on a single disk. Tax Master doesn't instruct you in basic tax preparation, so it isn't for the neophyte tax preparer. But a well-structured menu system will lead you through the schedules, having you prepare them in the appropriate order. (Call Master Software at 410-922-2962.)

Taxpayers who want to avoid a pile of schedules and forms will appreciate the simplicity of **Taxaid** from Taxaid Software. All of the most-used schedules are included, and printouts are in IRS approved format (except for form 1040). (Call Taxaid Software, Inc., at 715-747-5862.)

With sophisticated features such as REU support and depreciation calculation, plus an extensive list of forms and schedules, **TaxPerfect 64** and **TaxPerfect 128,** from Financial Services Marketing, are the most professional tax packages available for the Commodore 64 and 128 computers. The manual contains full explanations of the various forms and schedules. (Call Financial Services Marketing at 800-525-5611; in Dallas, TX, call 214-386-6320.)

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A (itemized deductions)	•	•	•	•	•
B (interest and dividend income)	•	•	•	•	•
C (profit/loss from business or profession)	•	•	•	•	•
D (capital gains/losses)	•	•	•	•	•
E (supplemental income)	•	•	•	•	•
EIC (earned income credit)					•
F (farm income and expenses)	•	•			•
R (credit for the elderly and disabled)	•				•
SE (Social Security self-employment tax)	•		•	•	•
2106 (employee business expense)	•				•
2119 (sale/exchange of principal residence)					•
2210 (underpayment of estimated tax)					•
2441 (credit for child and dependent care)	•		•	•	•
3800 (general business credit)					•
3903 (moving expenses)	•			•	•
4136 (credit for federal tax on fuels)					•
4255 (recapture of investment credit)					•
4562 (depreciation and amortization)	•	•			•
4684 (casualties and thefts)					•
4952 (investment interest expense deduction)					•
6251 (alternate minimum tax)	•			•	•
8396 (mortgage interest credit)					•
8615 (tax for children under 14)	•			•	•
8815 (series EE bond interest exclusion)				•	•
Prints on 1040	•			•	•
Prints on other IRS forms	•			•	•
IRS-approved plain-paper printouts	•		•	•	•
128 mode support			•		•
REU support				•	•
Keyboard overlays available				•	•

LOGO RESOURCE

PORTLAND, ME—Before the Teenage Mutant Ninja Turtles were even hatched, students in classrooms across America were fascinated with another, more peaceable amphibian: the on-screen turtle guide to the Logo learning system.

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For over ten years the Logo system has been used in schools with a variety of computer systems, including the venerable C-64 and 128 computers. In that time, educators have researched the effectiveness of the Logo system, comparing it to other problem-solving methods and creating a substantial body of statistics and case studies.

Terrapin, Inc., the publishers of Logo, have recently released a free 28-page booklet that explains what Logo is and how it is most effectively used, and outlines research results and cites specific sources of the information with an extensive bibliography.

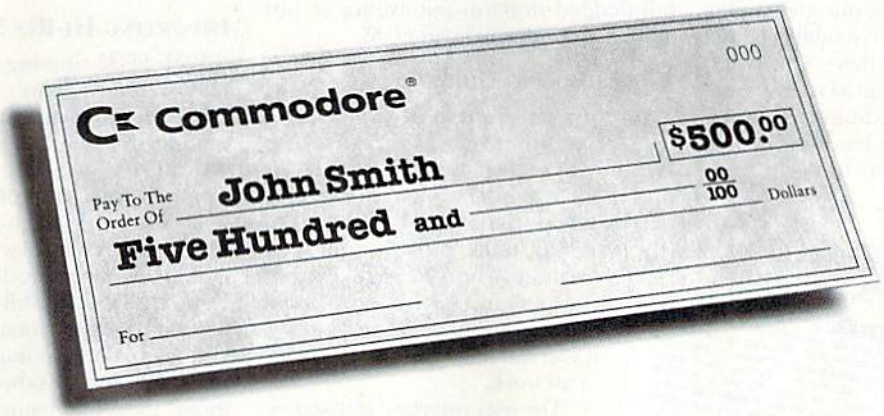
To receive a free copy of the booklet, write to Terrapin Software, Inc., 400 Riverside St., Portland, ME 04103. You can also call Terrapin at 207-878-8200.

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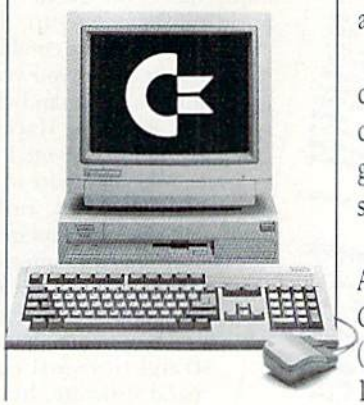
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Fun Graphics Machine

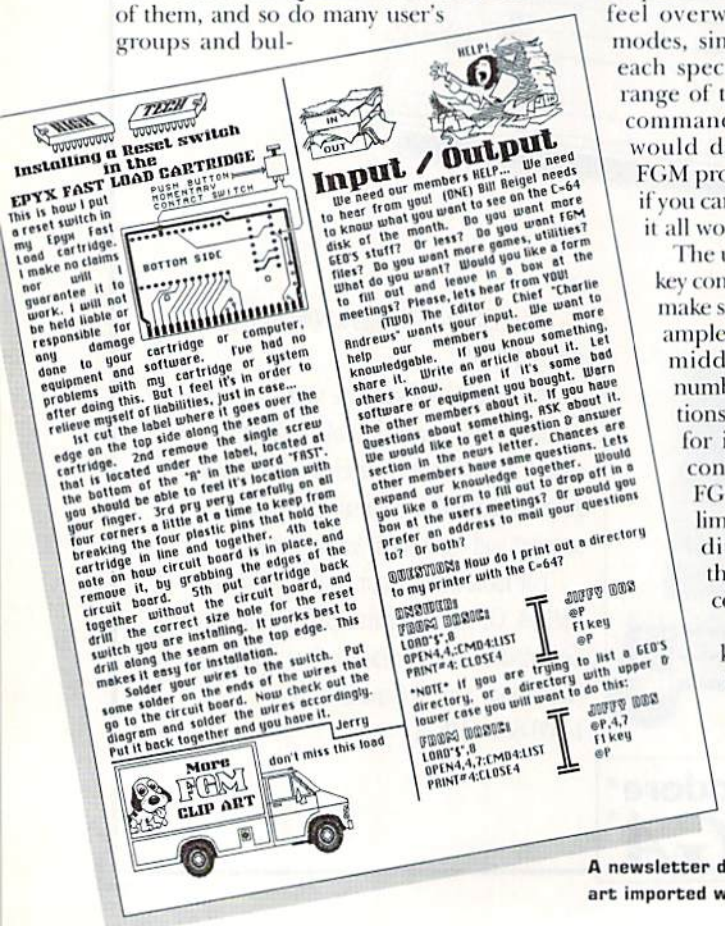
If you're serious about graphics, you need this versatile program.

By STEVE VANDER ARK

You've seen the incredible graphics created with C-64 and 128 computers. Perhaps you've even booted up Doodle! or RUN Paint, fired with enthusiasm to create a great picture of your own. But chances are you were disappointed. Let's face it, creating a masterpiece from scratch isn't easy.

But that's okay, because one great thing about your Commodore is its ability to import artwork done by others. Character fonts, Print Shop and Print Master graphics, and high- and medium-resolution screens abound. Q-Link has libraries full of them, and so do many user's groups and bulletin board systems. All you need is a program to let you use them.

That's exactly what Fun Graphics Machine (FGM) does. With it, you can take all those bits and pieces, modify and combine them in more ways than you ever thought possible, then print them out in a variety of layouts, incorporated into your own work. If you work with graphics, whether full-fledged desktop publishing or just fooling around, you need FGM.



A newsletter design incorporating clip art imported with Fun Graphics Machine.

The Learning Curve

In your first encounter with Fun Graphics Machine, you're likely to feel overwhelmed. The various modes, similar to each other but each specializing in a particular range of tasks, present a maze of commands and keystrokes that would daunt even Mr. Spock. FGM promises amazing results—if you can figure out how to make it all work.

The user interface is based on key combinations, most of which make sense (CONTROL/M, for example, moves the cursor to the middle of the screen). The number of keystroke combinations might make you yearn for intuitive point-and-click control. But Ron Hackley, FGM's author, devoted the limited memory space to additional features, rather than a slick (and memory-consuming) user interface.

To compensate, Ron kept things as user-friendly as possible, with a straightforward command structure. In that spirit, he went to great lengths to create a comprehensive manual. This 140-page, lay-flat tome contains a detailed index that will guide you to an extensive description of each function, complete with screen shots and examples. Separate charts of keyboard commands are included, and keyboard overlays are available. The only thing missing is a tutorial, which would have been nice, considering the program's complexity.

Importing Hi-Res Screens

With FGM running and a list of commands handy, you're ready to work. From the main menu you can activate routines that import graphic elements, provide tools to work on them, and control the appearance of the final print.

FGM runs in high-resolution mode, which creates a display of 320 horizontal by 200 vertical pixels. That's the same resolution as Doodle!, Print Shop, Print Master and The Newsroom, so graphics and full screens can be imported from those programs, or any others that use Hi-Res mode, including many games.

Multicolor screens, such as those from KoalaPaint, use color differently, and with a different resolution than hi-res screens. Fun Graphics Machine imports these as black-and-white images and offers the option of stripping away the unwanted gray patterns that often clutter such conversions. Most multicolor screens will convert into completely acceptable hi-res images.

Playing with Graphics

After you've grabbed a few graphics, it's time to shift into high gear. The imported elements can be combined on any of three separate screens. These screens, in turn, can be "linked" into groups of two or three, either horizontally or vertically. All of the usual manipulations—reverse, invert and flip—are available. Sections of the screen can be grabbed and manipulated, transferred between the screens, saved as separate clip-art files, and enlarged or reduced, ►

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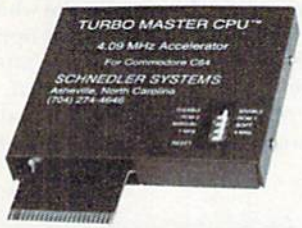
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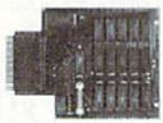
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with or without smoothing, all of which is standard stuff for a graphics program.

Fun Graphics Machine then goes a few steps further. For example, you can adjust the size of the cursor until it covers only the area of the bitmap you want, then run the smoothing routine on that area alone. Other commands let you slant and bend sections of the screen, one pixel at a time, or stretch a selected area. You have complete control over the image, pixel by pixel. If these area manipulations leave a few rough edges, there's a pixel-edit mode as well, for that last fine-tuning.

In fact, Fun Graphics Machine provides just about every kind of image adjustment you could envision, covering areas as small as a single pixel or as large as several linked screens. The result is unprecedented control over the image you produce.

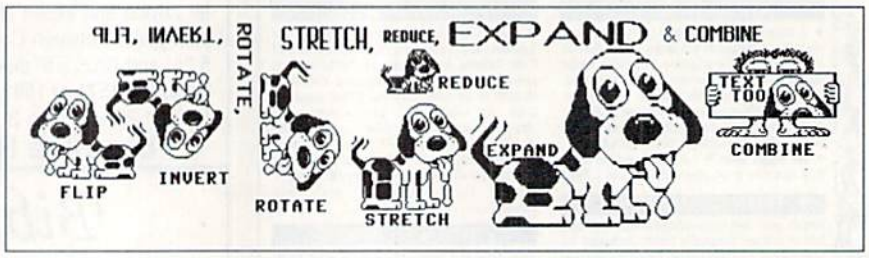
Fiddling with Text

These features are also available for text—it can be manipulated just like any other bitmapped image. In addition, there are special effects just for text, such as autostretching, which expands the text (characters and spaces) horizontally one pixel at a time, and automatic row-spacing, which adds small amounts of space between lines of text.

FGM's text editor is a limited word processor, complete with word-wrap, placing text on one screen or over multiple linked screens. Several character sets are included, and you can import others or create your own with the built-in character editor. Like the graphics functions, the text commands provide virtually complete control over your finished image.

Printing Power

The printing section of the program is just as complete as the others. The printer routines can be customized and adjusted as much or as little as you wish. Adjusting density varies the size of the printout, from a wide image that sprawls over half the page to condensed images that won't fill a page when printed three across.



FGM offers traditional features, plus complete pixel-by pixel control over your image.

You can create entire pages of text and graphics by printing sets of linked screens. A page might consist of two screens linked horizontally across the top, plus two sets of three vertically linked screens for two columns below. The entire 140-page manual was created in this way. In a sense, creating full pages with FGM is like using The Newsroom, where you create individual panels and arrange them into a whole.

However, to create a multipage document, you must design and print each page separately. FGM doesn't offer the text importing and multipage capabilities of a full-fledged desktop publisher, but then, that's not what it was designed to do. Rather FGM attempts to give you complete control over a graphics image and the resulting printout—and on that score it really delivers. FGM will cheerfully produce disk jackets, newsletters, business forms, postcards, labels, and just about any other printer job you can think of.

Additional Features

One entire section of the program is devoted to making demos—recordings of your keypresses and the resulting graphics effects. Another section prints to a disk to form stand-alone files. Using the clip-art module, you can create compressed clip-art files from imported images. Jerry Freadman, an FGM expert, has compiled several disks chock full of some of the best PD clip-art available. There are no size restraints for FGM-format clip-art, and Jerry has taken advantage of this by including full-screen images converted from such diverse sources as MacPaint and IBM-compatible GIF files.

One drawback inherent in this type of program is the need to work on a page in chunks. As a result, the page can become very busy very fast. However, this problem is easily addressed by planning the layout with the whole page in mind, leaving a few areas open as white space, and letting some graphics spread over more than one screen.

The bottom line is that Fun Graphics Machine is a remarkable, capable pro-

Driving Your Machine: Peripheral Support

FUN GRAPHICS MACHINE supports three active floppy drives, plus RAMDrive, RAMLink, the CMD hard drives and a fine selection of printers. REU support is not available yet, but it's in the works.

FGM is not copy-protected, so you can easily copy it onto a 3½-inch disk for the 1581 drive.

Online support for users of Fun Graphics Machine is available on QuantumLink in the Graphics section of the Commodore Information Network's Computing Support Groups. New utilities and other files can be downloaded, and a message section provides a direct link to the programmer.

Printer Support

The printer routines provided with Fun Graphics Machine can be customized extensively, so even if you don't see your printer on the following list, you might find that with a little experimentation you'll be ready to go. The manual provides plenty of technical help to guide you through the process.

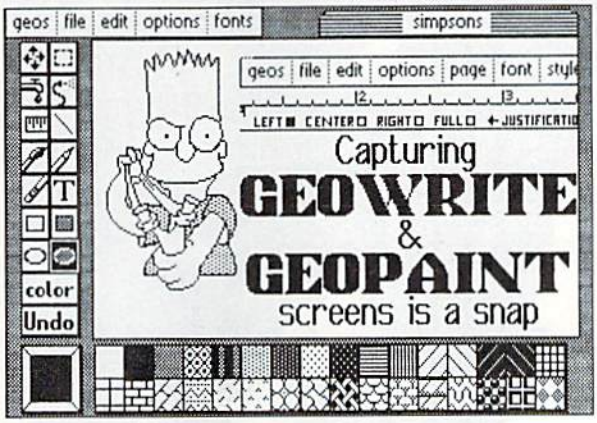
FGM provides drivers for these printers:

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NX-10C, 1000, 1000C
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gram. It can be used for casual image-handling, even for just playing around on the screen, but its sophisticated features will more than satisfy the serious user. With the power to import a wide variety of graphics elements, it effectively unifies the melange of formats and modes in the Commodore world. The interface, while not quite intuitive, calls for key combinations that are generally easy to press. You can usually undo anything you do on the screen, and, with three screens and six graphics buffers at your disposal, you can accomplish quite a bit.

Obviously, Ron Hackley is as much a user as an ace programmer, and it shows in his attention to compatibility, his careful noting of possible pitfalls, and his continued enthusiasm and support for the program. He is obviously delighted with what Fun Graphics Machine can do, and it won't take you long to agree! ■

Steve Vander Ark is a GEOS columnist for Compute's Gazette, *as well as a contributor to* RUN. *He also wrote this issue's GeoWatch column.*



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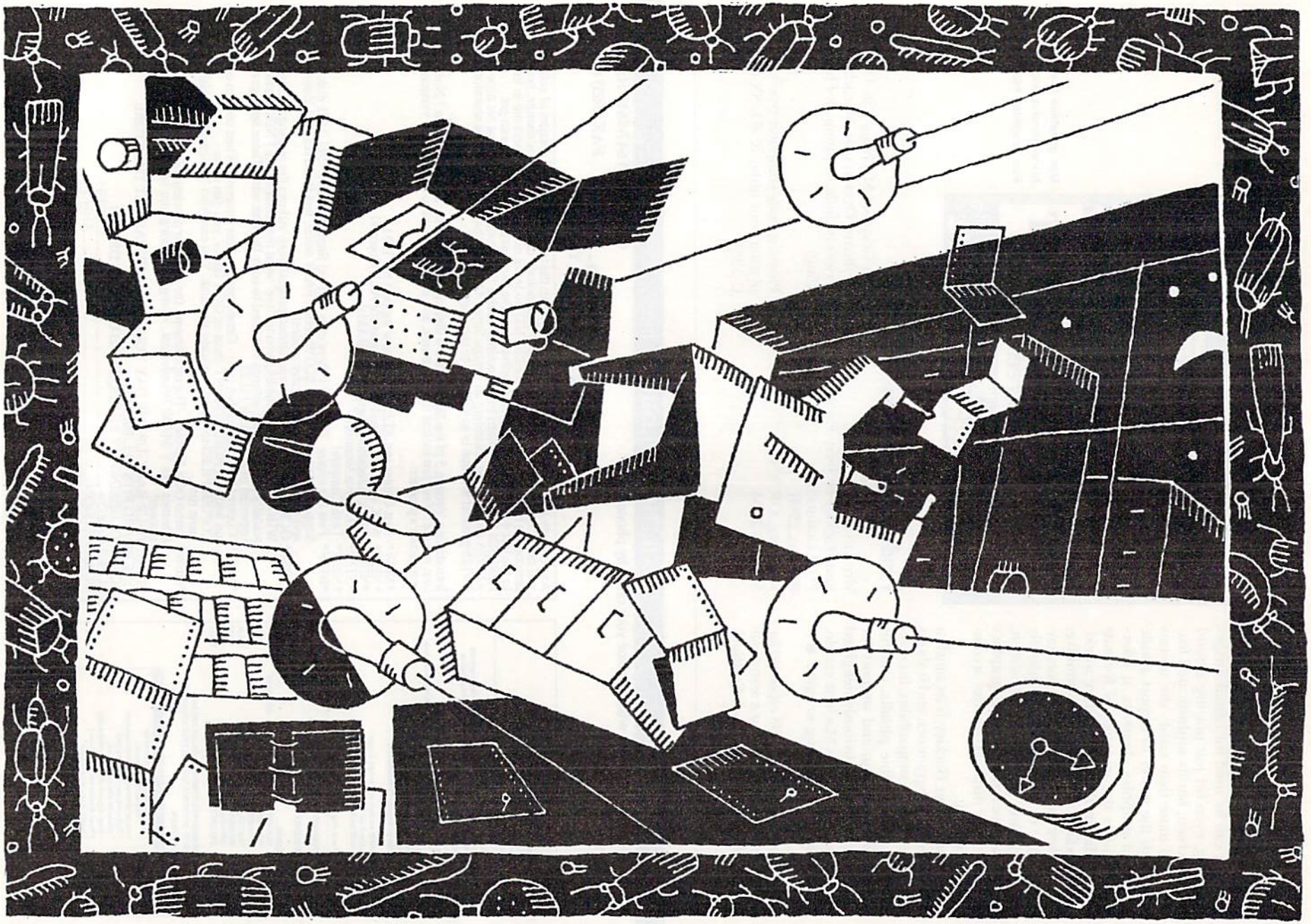
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The 3 A.M. Debugger's Guide

When late-night bugs invade your program, track them down with these techniques.

It's three o'clock in the morning, and you're so tired you've just tried to format your fingers. But that's a minor matter. The new database program you're writing was coming along beautifully, until you fleshed it out with a joystick-controlled interface. Now nothing works. You've been fruitlessly trying to root out the bugs, and, what's worse, you need a working version for tomorrow. What's the next step?

Think of this article as a guide for just that eventuality—when you want to rout your program's bugs quickly and decisively. Which, of course, is all the time.

The first thing to do is retreat, temporarily. Get away from the computer and take a break. Though entomologists might disagree, many bugs—especially the nocturnal kind—are simply the result of fatigue and flagging concentration. Even the shortest pause may help. Often you'll rush back to the keyboard a minute later, having found the solution at the bottom of a glass of strawberry Quik.

The Game's Afoot

If temporarily avoiding the difficulty doesn't work, it's time to track it down. You may have no clue to the bug's nature, but that's all right for now.

In a short, one-screen-long program, the problem area may be obvious. But in a larger program, it could be anywhere. Consider a quiz program that picks a random number, displays it in hexadecimal (base 16) form, asks the user to give the decimal equivalent, and checks the answer. Even in a simple procedure like this there are several potential hiding places: There could be a coding error in the input routine, the routine that checks the answer or in the routine that converts the number into hex.

There are a few common steps to follow:

1. Print everything.

It's a shame you can't see what Basic is up to when it's running a program, because bugs often result from changes in a variable's value. Usually, the only way to keep track of what's happening is with strategically placed Print statements, which show your variables' contents each step of the way. (I've provided an alternative in my Bloodhound program; see p. 22.)

In the hex quiz mentioned above, you'd probably insert Print commands to display the random number in decimal form, plus all the variables the hex conversion routine uses. In the input routine, you might show the length of the input changing when a character is entered, as well as any other special values.

2. "Force" values.

Let's suppose the Print statements reveal a fault in the hexadecimal conversion. Test the conversion by inserting a line that contains a number that's easily converted mentally, such as 255 ($FF) or 0 ($00). Is the conversion correct?

In some cases, "forcing" only one value won't be sufficient. For instance, the routine might convert values above 160 ($A0) properly, but fail whenever the first digit is numeric. An Input statement is more thorough, letting you try out as many values as necessary.

3. Make sure a borrowed routine isn't the site of the problem.

What if the conversion routine is all right? The next suspect would be the input coding—or is that safe ►

By STÉPHANE DIRSCHAUER

ILLUSTRATED BY ROBIN JAREAUX

A Programmer's Best Friend

BECAUSE COMMODORE BASIC is easy to alter and test, it's well suited to debugging. It does, however, have one major fault: lack of feedback. When a program is running, it's impossible to know what's happening internally; the only way you can guess is by interpreting what you see on the screen.

Basic 7.0 (like some enhancements of Basic 2.0) offers the TRON and TROFF commands, which display the number of the line that's currently executing. I've never found them very helpful for debugging, however.

Your Basic Bloodhound

I've written a debugging aid called Basic Bloodhound that can help. It's a short C-64 machine language program that runs in the background, maintaining a constant display of the current line number and the value of any variable you choose.

Listing 1 (on the facing page) is a Basic loader that creates Basic Bloodhound, the machine language file you'll actually use when debugging. Type it in using *RUN*'s Checksum program on page 60, then save it. Running Basic Bloodhound once will create and save the machine language file called BB. To use Basic Bloodhound, load and run BB.

Before you set the Basic Bloodhound on the trail of a bug, it needs to know two things: how fast it should run and which variable it should display (this must be a nonarray variable). Activating BB already slows a program some, because Basic 2.0 has more to do each time it executes a command. Even so, the line numbers may scroll by too quickly. Therefore, when activating BB you can set the speed as you like with:

```
SYS 50222,SPEED
```

where speed is a number from 0 to 255, 0 being the fastest.

BB monitors the first variable that the program uses, so you must put the variable you want to trace ahead of any others. However, that doesn't mean you have to rearrange your program; just insert a line mentioning the variable among the first few lines. For instance, to have BB display the contents of the string UR$, you could add a line 0 reading:

```
0 UR$=""
```

The command SYS 50222, SPEED turns the tracer on and off. You can also activate and deactivate it within your own program. This is handy when it slows down a section of the program you've already tested. Or, change the speed by deactivating it, then entering SYS 50222 with a new speed value.

Beware of the Dog

I have one word of caution: Don't use the Basic Bloodhound program if things crash royally when you're debugging. There may be a conflict with the memory locations that the tracer uses (50222–50550, or $C42E–$C576). ■

from suspicion because you lifted it from another program where it worked flawlessly? Well, no: that's no guarantee. Remember, in Commodore Basic a subroutine shares all its variables with the rest of the program. Perhaps, for example, the input routine uses the variable R to keep track of the reply's length and this is same variable the main program uses to store the random number.

Machine language is a much stickier problem, because it's difficult to examine for conflicts with the main program. Therefore, even if you've written and tested the routine yourself, that doesn't guarantee that it will be trouble-free. Machine language routines get very contrary when anything invades the memory territory they occupy or use.

4. Insert breakpoints into the program.

Back to the hex quiz. Suppose the input routine checks out clean. It looks as if the bug is burrowed somewhere later in the listing, but a number of different variables could be responsible, and printing them all would create a confusing jumble of figures. A better solution might be to insert breakpoints into the program, in the form of Stop commands, before and after the quiz checks the user's answer.

This approach will give you the chance to inspect variables in Direct mode before continuing the program with the CONT command. (Breakpoints are also handy when certain conditions have been reached. For example, you could check if a variable contains an "impossible" value, and, if so, have the program stop.)

Caught Red-Handed

Now that you've probably located the bug's neighborhood, the fix may be apparent and just a matter of changing a line or two. On the other hand, the problem may fit as neatly into the coding as a bit into a byte. In that case, a few more procedures can help:

5. Make sure you're working on the latest version of the program, containing all your previous fixes.

Believe it or not, running an obsolete version is easy to do—maybe you just forgot to save the listing after fixing another bug a few days before.

Another possible problem is "phantom" lines: pieces of code that escaped deletion or wandered out of proper place (maybe the line number was flubbed). A quick look at each line to see if it makes sense in the context should reveal most of these.

One snare I used to get caught in resulted from crashes of machine language routines I was developing along with a Basic program. When the routines went awry, they would secretly muck up some important system pointers. Everything seemed fine, but in reality they had altered Basic lines and vectors. When a new Basic version was saved, it was flawed. So, for safety's sake, I always reset the computer after any crash that could have had adverse effects on memory—that is, all machine language and any code that contains a lot of Poke commands.

6. Make sure there aren't any coding malapropisms or misunderstandings.

If you're programming in a language you're not experienced with, this is the time to check the documentation. Often the bug may be a simple mistake, such as putting command arguments in the wrong order or neglecting to consider the effects of program execution. For example, a Basic neophyte might write FOR C=1 TO 200:NEXT C to pause a display, not realizing that this sets the C variable, which is used to keep track of the cost, to 200.

Similarly, if you're not well acquainted with the C-64/128, you may run into problems in areas such as graphics and disk storage. For instance, someone inexperienced with Commodore graphics might think the color "bleeding" that occurs in hi-res mode is a coding problem, not a quirk in the VIC-II chip.

7. Try out the tricky stuff separately.

As I've pointed out, a Basic subroutine is intertwined with the rest of the program, and that makes debugging difficult, because each line of code can affect the others. For this reason, it may be helpful to try out a tricky piece of code separately, before including it in the program. Often, when I'm unsure how a particular approach will work, I write a tiny program to see if I'm on the right track. If so, the code may just plunk into the real program; otherwise, it's a simple matter of typing NEW and trying again.

8. Add a line here, subtract one there.

Don't remove any lines: You might forget that they were deleted or reenter them with a slight change. Instead, put a REM statement at the beginning of the line. This procedure is hit-and-miss, but the misses will be worthwhile if you make a few hits. Even if it doesn't solve the problem, it may produce some information that will help you zero in on the bug.

Debugging in Languages Other Than Basic

These tips work with, and are intended for, any computer language. There are, however, a few other things to keep in mind when you're not using Basic:

• The most irritating aspect of machine language programming is its spectacular crashes. If you goof with delicate coding, the computer might lock up. Even worse, it's hard to stop and investigate variables as they change.

For this reason, every machine language programmer should get a good utility cartridge with a machine language monitor (MLM). I use Super Snapshot V5, which includes a wonderful monitor that has saved me hours of debugging. There are several cartridges available that can make machine language a bit friendlier.

• When using a compiler to write in C, Pascal, or some other language, it's tempting to make lots of changes before trying the program again, because compiling, linking and running the program can take a while. However, this approach really slows things down by making it difficult to see what corrections have had what effect.

It also helps to know how your compiler varies from the language's standard, and if it has other oddities.

In any language, debugging is drudgery. Sometimes it may seem that you're not programming—you're just coming up with more bugs to debug. But one thing is sure: Nothing beats the moment your program finally runs...*perfectly.* ■

Stéphane Dirschauer is a frequent contributor to RUN. *He debugs his programs in Toronto.*

Listing 1. Basic Bloodhound program. (Also available on the March/April ReRUN disk. To order, call 800-343-0728.)

```
0 REM LISTING 1 CREATES (AND SH
  OULD NOT BE CALLED) BB:REM*68
5 OPEN 8,8,8,"BB,P,W"  :REM*116
6 CT=0:PRINT"{SHFT CLR}":REM*56
10 READ A$:IF A$="-1" THEN CLOS
   E8:PRINT:PRINT"ALL DONE!":EN
   D                   :REM*129
12 PRINT"{HOME}READING LINE "+S
   TR$(CT):CT=CT+1     :REM*141
15 IF LEN(A$)<62 THEN 55
                       :REM*254
20 B$=MID$(A$,1,20)+MID$(A$,22,
   20)+MID$(A$,43,20)  :REM*242
25 FOR I=1 TO 30       :REM*181
30 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                       :REM*209
35 H=ASC(H$)-48+7*(H$>"9")
                       :REM*98
40 L=ASC(L$)-48+7*(L$>"9")
                       :REM*197
45 BY=H*16+L:PRINT#8,CHR$(BY);
                       :REM*67
50 NEXT:GOTO 10        :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
   O 70                :REM*184
60 IF LEN(A$)<42 THEN B$=LEFT$(
   A$,20)+RIGHT$(A$,(LEN(A$)-21
   )):GOTO 70          :REM*176
65 B$=LEFT$(A$,20)+MID$(A$,22,2
   0)+RIGHT$(A$,LEN(A$)-42)
                       :REM*140
70 FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                       :REM*140
80 H=ASC(H$)-48+7*(H$>"9")
                       :REM*17
85 L=ASC(L$)-48+7*(L$>"9")
                       :REM*232
90 BY=H*16+L:PRINT#8,CHR$(BY);
                       :REM*148
95 NEXT:GOTO 10        :REM*160
100 REM MACHINE LANGUAGE FOR BA
    SIC BLOODHOUND     :REM*226
101 DATA 2EC4209BB78E72C5AD63*C
    4F910AE6AC4AC6BC48E*08038C0
    903CE63C460AE      :REM*47
102 DATA 0803AC09038E6AC48C6B*C
    4A264A0C48E08038C09*03EE63C
    46000207C4F0       :REM*97
103 DATA 034CAAAA20A9C4220DAC4*A
    D72C5F00DA200A0FF88*D0FDE8E
    C72C5D0F54C69      :REM*51
104 DATA C4A6D4A4C78EA7C48CA8*C
    4A539CDA5C4D00AA53A*CDA6C4D
    003A9FF60A900      :REM*174
105 DATA 6000000000A5398DA5C4*A
    53A8DA6C4A9FF85D4A9*0085C73
    820F0FF8ED8C4      :REM*50
106 DATA 8CD9C4A200A000182F0*F
    F2005FC5A639A53A20CD*BD6000
    0A200A00B1820      :REM*245
107 DATA F0FFA000B12D8D5EC52C*5
    EC5303AC8B12D8D5EC5*2C5EC53
    014C8A62DE8E8      :REM*9
108 DATA 8AA42E20A2BB20DDBD20*1
    EAB4C49C5C8C8B12D85*22C8B12
    D8523A002B12D      :REM*91
109 DATA C91C900A2A91C2024AB4C*4
    9C5C8B12D8D5EC52C5E*C53003 4
    C49C5C8B12D8D      :REM*112
110 DATA 5EC5C8B12DA8AD5EC520*9
    1B34C04C5AED8C4ACD9*C4182 F
    0FFADA7C485D4      :REM*11
111 DATA ADA8C485C760 0A227A9*2
    020D2FFCAD0FAA200A0*00182 F
    0FF6000534431      :REM*156
112 DATA -1            :REM*225
```

■

Ricochet

If high-speed fun is your goal, take aim on this great C-64 action game.

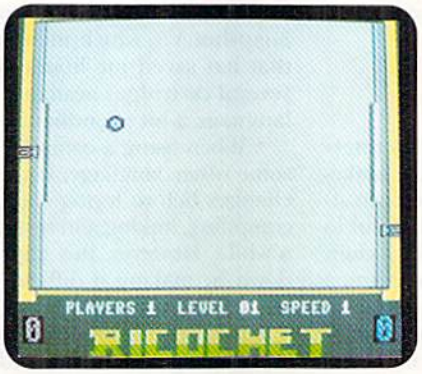
By TONY BRANTNER

Got an itchy trigger finger? Long for that slapshot action of air-hockey? Then warm up your Commodore, because Ricochet is here!

This game looks and plays like air-hockey: smooth, responsive puck action on a rectangular table with a goal at each end. But Ricochet has a twist: Instead of hitting the puck back and forth with a blocker, you and your opponent shoot at it with phasers.

You have to be quick to control the puck. Getting it into the opposite goal scores a point; nine points win the game.

Type in Ricochet from Listing 1, using *RUN*'s Checksum program on page 60, and save it to disk. When you run the program, choose the number of human players and a puck speed, from 1, the slowest, to 3. When playing the computer, you also select a skill level, from 1 to 5. Make each choice by moving the joystick in port 1 up or down to change the number, then pressing the fire-button.



Ricochet is air-hockey with a twist.

The red phaser is controlled by joystick port 1, the blue by joystick port 2 or the computer. To freeze the action, press the COMMODORE key. Press it again to resume. The RUN-STOP key aborts the game and returns you to the main menu.

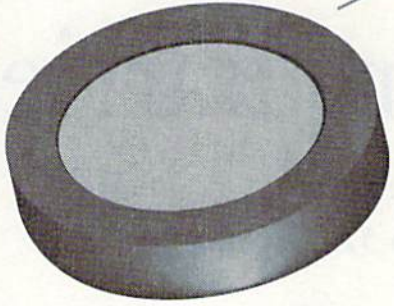
With a colorful screen, lively sound effects, and great action, you'll love this game. R

Tony Brantner is a prolific game programmer for RUN. *His goal is to provide lots of fun for our readers, and he hits it often.*

Listing 1. Ricochet program. (Also available on the March/April ReRUN disk. To order, call 800-343-0728.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) RICOCHE
  T.ML                    :REM*2Ø2
5 OPEN 8,8,8,"RICOCHET.ML,P,W"
                          :REM*138
6 CT=Ø:PRINT"{SHFT CLR}":REM*56
1Ø READ A$:IF A$="-1" THEN CLOS
  E8:PRINT:PRINT"ALL DONE!":EN
  D                       :REM*129
12 PRINT"{HOME}READING LINE "+S
  TR$(CT):CT=CT+1         :REM*141
15 IF LEN(A$)<62 THEN 55
                          :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
  2Ø)+MID$(A$,43,2Ø)      :REM*242
25 FOR I=1 TO 3Ø          :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                          :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55               :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55               :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                          :REM*67
5Ø NEXT:GOTO 1Ø           :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
  O 7Ø                    :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
  A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
  ):GOTO 7Ø               :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
  Ø)+RIGHT$(A$,LEN(A$)-42)
                          :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                          :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55               :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55               :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                          :REM*148
95 NEXT:GOTO 1Ø           :REM*16Ø
1ØØ REM HEX DATA FOR RICOCHET M
  L                       :REM*92
1Ø1 DATA Ø1Ø8ØB08ØA0Ø9E323Ø36*3
  1ØØØØØA9Ø82ØD2FFA9*8E2ØD2F
  FAD8EDC29FE8D           :REM*172
1Ø2 DATA ØEDCA5Ø129FB85Ø1A04F*B
  98ØD1993CØ3881ØF7A5*Ø1Ø948
  5Ø1ADØEDCØ9Ø1           :REM*197
1Ø3 DATA 8DØEDCAØØØB9E5ØE998Ø*3
  EC8DØF798AØ7F998Ø3F*881ØFA8
  D1BDØ8D26DØA9           :REM*246
1Ø4 DATA Ø78D1CDØA9Ø18D25DØA9*6
  Ø8D17DØ8D1DDØAØ6B9*21ØD99F
  8Ø7B928ØD9927           :REM*116
1Ø5 DATA DØ881ØF1A9932ØD2FFA9*Ø
  Ø8D15D8D2ØDØ8D21DØ*A2Ø3AØØ
  8182ØFØFFA94F           :REM*188
1Ø6 DATA AØØD2Ø1EABA2Ø8AØØB18*2
  ØFØFFA996AØØE2Ø1EAB*A9Ø22ØB
  3ØB8CE5ØFA92Ø           :REM*151
1Ø7 DATA 8DE7ØFA2ØA88FØ1EAØØB*1
  82ØFØFFA9AAAØØE2Ø1E*ABA9Ø52
  ØB3ØB8CE6ØFC8           :REM*111
1Ø8 DATA 98ØAØA1869Ø2A2ØC8DE8*Ø
  FAØØB182ØFØFFA9BBAØ*ØE2Ø1EA
  BA9Ø32ØB3ØB8C           :REM*218
1Ø9 DATA E9ØF2Ø99ØCA9ØØ8DEAØF*8
  DEBØF2Ø8EØBA9ØØA899*ECØFC8D
  ØFAA5A2297F18           :REM*19
11Ø DATA 693E8DECØFA9828DEDØF*8
  DEEØFA9E38DF1ØF8DF2*ØFAØØ6B
  92FØD99F3ØF88           :REM*223
111 DATA 1ØF7A9Ø18DFCØF8DØØ1Ø*A
  97F8D15DØ2ØE1FFDØØ3*4C7BØ8A
  D8DØ229Ø2FØ11           :REM*24
112 DATA AD8DØ2DØFBAD8DØ229Ø2*F
  ØF9AD8DØ2DØFBADØ1DC*8DØ11ØA
  DØØDCAEE5ØFDØ           :REM*12
113 DATA Ø32Ø62ØB8DØ21ØA2ØØ2Ø*1
  4ØA2Ø39ØAA2Ø12Ø14ØA*2Ø39ØA2
  ØDDØA2Ø12ØB2Ø           :REM*129
114 DATA 75ØCAØ4688DØFDADØ51Ø*F
  ØA9A9678D15DØ2Ø5DØC*A9FØ8DØ
  6D4A9118DØ4D4           :REM*21Ø
115 DATA A9Ø185Ø4A5Ø485Ø5A5Ø5*Ø
```

RUN it right: **C-64; joystick(s)**



```
    AØAØA8DØ1D4A9Ø22Ø6D*ØCC6Ø5D
    ØEFE6Ø4A5Ø4C9        :REM*166
116 DATA ØA9ØE32Ø5DØCAEFAØFFE*E
    AØF2Ø8EØBA9Ø62Ø6DØC*AEFAØFB
    DEAØFA829Ø7DØ        :REM*121
117 DATA E7CØ48BØØ34CFFØ8A2ØA*A
    ØØF182ØFØFFA2C9AØØE*A5Ø44A9
    ØØ4A2D7AØØE8A        :REM*93
118 DATA 2Ø1EABA91E2Ø6DØCE6Ø4*A
    DØ1DC291ØDØD92Ø0Ø6C*4C7BØ81
    8BDØ31Ø7DE7ØF        :REM*25Ø
119 DATA 9DØ31Ø9Ø18BDØ11Ø29Ø3*A
    818BDEDØF791BØDC938*9ØØ7C9C
    EBØØ39DEDØF6Ø        :REM*125
12Ø DATA BCEFØFDØ1EBDØ11Ø291Ø*F
    ØØ16ØBDEDØF9DEFØFBD*32ØD9DF
    6ØF8A9DFDØF48        :REM*197
121 DATA 2Ø46ØC68AA18BDF6ØF7D*1
    CØDA8BDFDØF7D1FØDDØ*ØFCC32Ø
    D9Ø119DFDØF98        :REM*57
122 DATA 9DF6ØF4C88ØACC33ØD9Ø*F
    1FØEFA9Ø09DEFØF6Ø18*ADF3ØF6
    91Ø85Ø2ADFAØF        :REM*69
123 DATA 69ØØ85Ø338A5Ø2FDF6ØF*A
    8A5Ø3FDFDØFDØ37CØ11*BØ3318A
    DECØF69ØA38FD        :REM*158
124 DATA EFØFC9ØBBØ25A8B941ØD*8
    DØB1ØA5A229Ø71936ØD*8DØ71ØA
    9ØØ9DEFØF8EØA        :REM*96
125 DATA 1ØACE9ØFB94CØD8DØ61Ø*4
    C2AØC6Ø18ADØ91Ø6DØ7*1Ø8DØ91
    Ø9Ø18CEØ71ØAC        :REM*18Ø
126 DATA ØB1Ø18ADECØF791CØDC9*3
    59ØØ8C9C7BØØ48DECØF*6ØADØB1
    Ø49Ø129Ø18DØB        :REM*219
127 DATA 1Ø4EØ71Ø4C2DØC18ADØ8*1
    Ø6DØ61Ø8DØ81Ø9Ø2ØCE*Ø61ØACØ
    A1Ø18ADF3ØF79        :REM*68
128 DATA 1CØDAAADFAØF791FØDDØ*Ø
    BEØ319ØØB8EF3ØF8DFA*ØF6ØEØ2
    B9ØF5ADØA1Ø49        :REM*125
129 DATA Ø129Ø18DØA1Ø4EØ61ØAD*E
    CØFC9619ØØ8C99BBØØ4*EEØ51Ø6
    Ø4C2DØCA21F18        :REM*62
13Ø DATA ADECØF69Ø6CDEEØFFØØ6*A
    21DBØØ2A21EADFØØFDØ*1218ADE
    CØF69Ø738EDEE        :REM*71
131 DATA ØFC9Ø5BØØ48A29ØF6Ø8A*6
    ØAEEBØFA98ØAØ3F2Ø9F*ØBAEEAØ
    FA9CØAØ3F85FB        :REM*117
132 DATA 84FCAØØØBD3CØ391FBE8*C
    8C8C8CØ189ØF36Ø8DØC*1ØAØØØ8
    CØD1ØC88C86Ø2        :REM*133
133 DATA A92Ø2ØD2FFA99D2ØD2FF*A
    9Ø52Ø6DØC18ADØD1Ø69*312ØD2F
    FA99D2ØD2FFA9        :REM*227
134 DATA Ø52Ø6DØCADØ1DC291FC9*Ø
    FFØ1529Ø3A818ADØD1Ø*791BØDC
    DØC1ØBØC68DØD        :REM*2Ø8
135 DATA 1Ø4CBFØB2ØØ6ØCACØD1Ø*6
    Ø2Ø5DØCA9ØE8DØ1D4A9*FØ8DØ6D
    4A9118DØ4D4A9        :REM*72
136 DATA ØF2Ø6DØCA91Ø8DØ4D4AD*Ø
    1DC291ØFØF96ØA92A2C*A916482
    Ø5DØC688DØ1D4        :REM*94
137 DATA A9Ø28DØ5D4A21Ø8EØ4D4*E
    88EØ4D46Ø2Ø5DØCA952*8DØ8D4A
    9Ø58DØCD4A28Ø        :REM*124
138 DATA 8EØBD4E88EØBD46ØAØ17*A
    9ØØ99ØØD4881ØFAA9ØF*8D18D46
    Ø1865A2C5A2DØ        :REM*235
139 DATA FC6ØA9ØØ85Ø2A2Ø68AØA*A
    8BDECØF99Ø1DØBDF3ØF*99ØØDØB
    DFAØF4A26Ø2CA        :REM*1Ø9
14Ø DATA 1ØE8A5Ø28D1ØDØ6ØA9ØB*8
    D2ØDØ8D21DØA9AAAØØD*2Ø1EABA
    9138504A9D8AØ        :REM*128
141 DATA ØD2Ø1EABC6Ø4DØF5A9Ø6*A
    ØØE2Ø1EABA2Ø7AØØ318*2ØFØFFA
    976AØØE2Ø1EAB        :REM*129
142 DATA A2Ø7AØ24182ØFØFFA975*A
    ØØE2Ø1EABA217AØØ818*2ØFØFFA
    94FAØØD2Ø1EAB        :REM*191
143 DATA 18ADE5ØF69318D56Ø718*A
    DE9ØF69318D69Ø7ADE5*ØFDØ18A
    215AØ11182ØFØ        :REM*16
144 DATA FFA98CAØØE2Ø1EAB18AD*E
    6ØF69314CD2FF6ØØØ1*FFØØØØF
    FFDFAFBFCFCFE        :REM*11
145 DATA FFØ4ØAØE Ø2Ø6ØAØEBØ18*4
    Ø3237243C7Ø5Ø2818Ø8*Ø4Ø8182
    85Ø7Ø1Ø1Ø1Ø1          :REM*196
146 DATA Ø1ØØØØØØØØØØØ73B9FF*9
    9BC122ØC492B512A192*A1122Ø9
    2B72Ø122Ø92B7        :REM*147
147 DATA A1122Ø92B72Ø122Ø92A2*A
    1122ØC4922ØB7122Ø92*B7ØD1D1
    D1D1D1D1D1D1D        :REM*29
148 DATA 1EAC122Ø92DØ12DFA192*A
    1122Ø92A2BB122Ø92A2*A1122Ø9
    2A2BB122Ø92B7        :REM*137
149 DATA A1122Ø92A2BB2Ø122Ø92*Ø
    Ø932Ø9E122ØBA92C6C6*C6C6C6C
    6C6C6C6C6C6C6        :REM*94
15Ø DATA C6C6C6C6C6C6C6C6C6C6*C
    6C6C6C6C6C6C6C6C6C6*C6C612C
    C2ØØDØØ2Ø122Ø        :REM*161
151 DATA 98B49BC72Ø2Ø2Ø2Ø2Ø2Ø*2
    Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
    Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*79
152 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2C898A79E*2
    ØØDØØ2Ø122ØD92C4C4*C4C4C4C
    4C4C4C4C4C4C4        :REM*1Ø1
153 DATA C4C4C4C4C4C4C4C4C4C4*C
    4C4C4C4C4C4C4C4C4C4*C4C412C
    F2ØØDØD1D9Ø12        :REM*55
154 DATA B52ØB6119D9D9DB52ØB6*9
    1911D1D9B9254C4159*4552532
    ØØ53Ø2Ø2Ø2Ø2Ø        :REM*65
155 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø9B53*5
    Ø4545442ØØ53Ø111D1D*9Ø12B52
    ØB6119D9D9DB5        :REM*124
156 DATA 2ØB6ØDØØ12Ø5A1119DA1*1
    19DA1119DA1119DA111*9DA1119
    DA1ØDØØ9B4C45        :REM*212
157 DATA 56454C2ØØ53ØØØ9C484F*5
    72Ø4D414E592Ø5Ø4C41*5945525
    33F2ØØØ9E4C45        :REM*216
158 DATA 56454C2Ø4F4626Ø5Ø4C41*5
    93F2ØØØ1C5Ø55434B2Ø*535Ø454
    5443F2ØØØ129B        :REM*241
159 DATA 47414D452Ø2Ø4F564552*Ø
    DØØ129B5Ø5245535320*4649524
    5ØDØØØ3FFØF3E        :REM*132
16Ø DATA AAF7EBFEEBEBØ3A7EBFE*E
    B3EAAF7Ø3FFØFØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*212
161 DATA ØØØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØ26         :REM*31
162 DATA FØFFCØDFAABCEBBFEBDA*C
    ØEBEBBFEBDFAABCFØFF*CØØØØØØ
    ØØØØØØØØØØØØ        :REM*55
163 DATA ØØØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*9
164 DATA ØØØØØØ26ØØØØØØØØØØØ*7
    8ØØØØFCØØØØ78ØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*1ØØ
165 DATA ØØØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*11
166 DATA ØØØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØØ*ØØFCØØØ
    3ABØØØE9ACØØE        :REM*112
167 DATA 66CØØE76CØØE66CØØE9A*C
    ØØ3ABØØØØFCØØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*219
168 DATA ØØØØØØØØØØØØØØØØØØØ*Ø
    Ø26ØØØØØØØØØØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ        :REM*57
169 DATA ØØØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØØ*ØØØØØØ
                         :REM*195
17Ø DATA -1              :REM*24
```

RUN it right: **C-64; joystick(s)**

Breaking the Memory Barrier

The pros and cons of pushing your REU to 512K . . . and beyond.

By MALCOLM O'BRIEN

Adding extra RAM to the Commodore 17xx series RAM expansion units (REUs) seems to be the latest trend for C-64/128 users. There are good reasons why this particular method of system expansion is so popular: The devices themselves are still available, the RAM chips are widely available and inexpensive, the plans are practically free for the downloading to anyone with GEOS, and the results are very worthwhile. Let's take a look at these points, one by one.

The Hardware

Commodore no longer manufactures the 17xx REUs, but you can still purchase a 1750 Clone (a 1764 with 512K) from Software Support International or Tenex. Keep in mind, however, that the supply is limited, and someday they'll all be gone, so I'd suggest that you act fast to avoid disappointment. The RAM expansion controller chip (REC) that's inside the REU is proprietary to Commodore, so it's unlikely that anyone else will manufacture REUs when remaining stock is exhausted. More on this later.

The RAM chips can be purchased at almost any electronic supply store. It's important that you get the right type: 256K×1-bit ICs with a speed of 150 nanoseconds or faster. They're commonly designated as type 41256-15. Eight of these provide 256K, so, if you're expanding from 512K to 1MB, you'll need 16. Several other commonly available parts are required as well; you'll find a parts list in the plans.

The Documentation

The plans are the technical information and instructions that have been assembled by Andrew Mileski (Q-Link handle, Recursion) into a public domain file called "beyond 512K.sda," available on Q-Link and CompuServe (in LIB 4 of the CBMAPP forum under the name MEGRAM.SDA), and may well be available via local BBSs or your user's group library.

Load and run this file in C-64 mode and three files will be written to the disk in device 8: the geoWrite documentation, the goePaint schematic, and a special font that's required for the geoWrite file. You'll need to use a conversion program to put all three files back into GEOS format before you can print them. The resulting nine pages include a one-page disclaimer with copyright notice and distribution instructions, a one-page schematic diagram and a seven-page article that gives instructions and a technical explanation of the project.

Mileski's documentation is thorough and well presented. He mentions two issues of the *Transactor* in the article, but, unfortunately, there's no source for back issues of that publication, and copyright considerations preclude reprints. Fortunately, Mileski's article is complete and does not require the referenced articles.

Have It Done for You

Although the installation process is uncomplicated, it does require proficiency in electronic techniques and a few hours of painstaking, precise work. The good news is, there are people who will do it for you.

I'm aware of at least two Q-Link users who are in the business of expanding REUs: Raymond Day in Michigan (RaymondD2) and Melvin Montgomery in Texas (CMDR FIXER). Day offers user's groups a discount, and Montgomery will also expand geoRAMs. If you're too far away or can't do without your REU for a while, perhaps someone local can do the work for you. Any competent technician could add the extra RAM following Mileski's instructions.

The Benefits of More RAM

There's no question that the most popular application of expanded REUs is GEOS. The speed of working from an REU in this disk-intensive environment can't be beat, diskTurbo notwithstanding. With 256K, you can have a RAM-1541; with 512K, a RAM-1571. With a full megabyte and Jim Collette's Configure 2.1, you can have a RAM-1581. With two megabytes and the same software, you can set up two RAM-1581s! One of the drivers included with gateWay (by Creative Micro Designs) will recognize and use REUs of up to two megabytes without the need for drive emulation.

A "real world" example will make the benefits clear. I was using a 512K REU and had loaded it with the deskTop, geoPaint, geoWrite, geoSpell, the dictionary, seven fonts, a 20K geoWrite document and a 17K geoPaint picture. I then began to write a one-page letter. Halfway through the letter a dialogue box appeared, saying that my RAMdisk was nearly full and that I should delete files to continue. I was surprised by this turn of events; after all, I just wanted to print one Write file and one Paint file, and write a one-page letter! That doesn't seem like much work, but it was enough to fill my RAM-1571.

The annoyance of a situation like this is directly proportional to the amount of work you have to do. Deleting one font let me finish my letter, but a larger project would have required tougher choices. Suppose you're working on a school project that will amount to numerous pages of text with a variety of illustrations. You could get back 96K by removing the geoSpell dictionary, but accessing the dictionary from disk is more time-consuming—and spell-checking, important though it may be, is boring even when it's fast.

Imagine the situations faced by GEOS power users! One particular type of user comes to mind: the desktop publisher. The publisher of a newsletter will want all the files I loaded plus geoPublish (99K), a few LW fonts (11–12K each), and maybe geoPubLaser (25K), Text ►

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Grabber (19K), Graphics Grabber (15K) and Photo Manager (10K). Yow! It adds up fast! With just two LW fonts, that user is looking at about 522K! However, with a RAM-1581 (or a real 1581), 268K would still be available for article files, borders, photo albums, text albums, desk accessories and geoPublish data files.

Outside the GEOS Environment

Another great application for an expanded REU is a bulletin board system (BBS). Most BBSs use chained or overlaid program segments, commonly referred to as links or doors. When you're running from floppy drives, noticeable slowdowns occur while the software loads these segments. This translates into more online time and cost for the user, and decreased user throughput. Since an REU loads program segments fast, slowdowns are eliminated and your BBS can run at full speed. You'll also avoid a lot of wear and tear on your disk drives. Any prospective BBS operator should search out a BBS program with strong support for expanded REUs.

Software developers are also good candidates for expanded REUs, particularly as software becomes more capable and sophisticated. One developer of my acquaintance will soon expand past 512K; he's reached the point where his machine language source code files for a single application need more memory than that! (GEOS developers also have to design icons and screens, or maybe custom fonts, in addition to their source code.) My acquaintance has been using RAMDOS in the native environment. When he switches to a 1MB REU, he'll also need to start using Andrew Mileski's RAMDOS II.

Most commercial software won't use the extra RAM without having GEOS, gateWay or RAMDOS as an intermediary. I have heard rumors that PaperClip III uses expanded REUs properly (surprising, if true), but that The Write Stuff will not load its dictionary properly into an expanded REU (unless the extra RAM can be disabled by means of a switch). The Write Stuff author, R. Eric Lee, has been quick to support new developments in the Commodore market in the past, so, if the rumor is true now, it may not be by the time you read this. There already is some software that requires the REU—the Switcher utility included with gateWay, for example. And there is likely to be more of it in the future.

Caveat Expandor!

There's a very important point to keep in mind when considering an expanded REU: the physical limitations of the REC chip. As noted above, the REC makes all this magic happen, and Commodore is the only source for the chip. Treat it like gold! While it's true that Commodore still repairs older equipment, it's likely that at some time they'll stop making REC chips. If your REC gives up the ghost then, you'll have no other source.

At the World of Commodore show in Toronto in 1989, RAM-expansion pioneer Paul Bosacki and I had a conversation about RAM expansion with Commodore hardware guru Dave Haynie. Haynie remarked that, while he was sure the REC would support a megabyte, he would not recommend two megabytes.

Avoiding arcane technical explanations, suffice to say that ICs are designed to drive only so many subsidiary ICs. In the case of the REC, that number is 16 (the 512K in a 1750). However, to ensure the reliability of the REU, the REC can actually handle more than 16. This chip-handling capability is referred to as "fan-out," and it was Haynie's contention that two megabytes is beyond the fan-out capability of the REC and that reliable operation can not be expected in that situation. It's analogous, perhaps, to putting a four-cylinder engine in a logging truck; don't be surprised when you can't haul too many logs and if your engine (the REC) gives out. The fact that 2MB REUs work at all is testimony to the design quality of the initial product.

Now, I know that many users have 2MB in their REU and have experienced no problems at all. However, I have also heard of cases in which the REU works fine for a period of time and then becomes erratic, showing inconsistent amounts of RAM. Bosacki has told me of three such cases; sometimes all the RAM is available, sometimes only 512K and sometimes even less. In conjunction with the strain on the REC, he believes that noise on the bus contributes to such erratic operation, especially on the C-128 (which has a fussier expansion port than the C-64).

The bottom line is, REUs are great to have when you're using software that supports them. By all means, get one and put a megabyte into it if you like. But if you're thinking of two megabytes . . . well, you've been warned. If you want two megabytes (or more) there are better ways of getting it: RamLink and RamDrive, for example.

One of the key benefits in all of this is the increase in hardware hacking. The quest for RAM has sent a lot of people "under the hood" to do some tinkering. Consequently, I expect we'll see other interesting developments in the future. I don't mean other RAM devices; that area is well covered now. But there are a few things done on other platforms that aren't done on the C-64/128...yet. ■

Malcolm O'Brien lives in Toronto and has been writing about Commodore computers since "the early days" (1984). He formerly served as editor of The Transactor.

Sources and Prices

Melvin Montgomery
Q-Link handle: CMDR FIXER
1504 Amherst Drive
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REU upgrades (prices not available at press time)

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Fun Pak 128

Superb examples of sophisticated strategy, high speed arcade action and graphic puzzles. Leave the bounds of Earth in search of new and fertile territory. Create a 3D adventurer who explores dungeons in search of treasures and exotic new weapons. Challenge your sense of spatial relationships and powers of deduction. For the C-128. Includes 28-page booklet. 8 Programs.
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Gamepak

Get set for plenty of action with arcade games such as Ski, Chopper Run, and Bug. Control a hungry spider-eating snake. Trap shoot. Get airborne. Beat the Taxman. Solve the Mystery of Lane Manor. Navigate through enemy territory. Plus word games like Scrambler, Findword and more. On C-64 disk with 38-page booklet.
#RPA1 $14.97

The President Is Missing!

They've taken the most powerful leader in the world. Your assignment is to track down the U.S. President's kidnappers. *The President Is Missing!* is an exciting blend of different game genres — graphics, mystery, adventure, simulation. It features great graphics, well-thought-out game play and promises hours and hours of challenge and excitement.

- Includes a 30-minute audio tape of terrorist demands, information and clues you must use to thwart the terrorists.

#RPD2 $4.95

Entertainment Software from Cinemaware

The Three Stooges

Join Larry, Moe, and Curly in their zany plight to save an old lady and her three beautiful daughters from the grips of an evil banker. You'll love the digitized voices and sound effects, stellar graphics and superb animation, as your joystick manuevers the Stooges through irresistible slapstick fun.
#RPC1 $7.95

Rocket Ranger

Don your rocket pack and take to the skies to bring back all the thrills and action of the classic sci-fi, rock 'em-sock 'em 1940's serials. Includes a secret decoder wheel to help you change history and save mankind.
#RPC2 $7.95

Total Eclipse

Feel like you are travelling in a great Egyptian pyramid in this 3-D graphics adventure. Find puzzles, traps, treasures and more in this arcade action race against time to save mankind from destruction.
#RPC3 $7.95

Dark Side

Become a one-person army dedicated to saving the world from imminent destruction in this hi-tech 3-D adventure. Armed with lasers, shields, and a jet power pack, your challenge is to destroy the Alien weapon before the apocalypse is unleashed.
#RPC4 $7.95

GREAT GAMES AT GREAT PRICES *FROM* ACTIVISION!

Predator

Based on the popular Schwarzeneggar movie, this intense action-adventure game pits you against an alien hunter who kills for sport (not recommended for the weak-at-heart).
#RPE1 $4.95

Ghostbusters II

Proton-packed arcade-style action with devilish strategy challenges and great laughs. Features the digitized images from the hit movie, plus an upbeat soundtrack that includes the Ghostbusters theme and other great songs.
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Last Ninja 2

Help the NYPD dispose of an elite corps of Ninja Warriors who are terrorizing the city. Enjoy the full martial arts action with detailed 3-D graphics and 6 different soundtracks.
#RPE3 $4.95

Please Note: All Activision games require a 1541 or 1571 Disk Drive and a joystick

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Exciting Games from Cosmi

Navy Seal

Have you got what it takes to join this elite commando unit comprising "the toughest men alive"? This exciting arcade action will test your combat skills Features include:
- multiple levels of difficulty
- realistic sound effects
- lifelike animation
- authentic sound effects

#RPD1 $4.95

Chomp!

You're just a lowly goldfish, but what adventures you'll have in your journey to survive! The cast of bad characters you'll encounter in the fish tanks makes for amusing fun, but also a great challenge. This fast-action game features great graphics, realistic animation and exciting sound effects. Simply put, it's a great game! Fun for all ages!
#RPD3 $4.95

Grand Slam Baseball

Grand Slam Baseball is actually two games in one — regular baseball and a homerun derby between Steve Garvey and Jose Canseco, two of the all-time powerhitters in the game.
You control all aspects of game play — hitting, pitching, fielding and base running. You can also make up your own teams and leagues. Features include:
- impressive graphics and animation
- realistic sound effects
- two- or one-player modes

#RPD4 $4.95

MICROPROSE GAMES

A classic in air combat action!

F-15 Strike Eagle

Strap yourself in behind the cockpit of one of the most powerful and technologically advanced fighter planes in the world and engage in combat with Libyan fighters. This all-time block buster in jet simulation presents realistic air combat excitement. No C-64 game library is complete without this exciting title.
#RPF1 $9.95

The Amazing Spider-Man

Everyone's favorite webslinger finds himself in a precarious predicament and needs your help against the evil Mysterio, a master of special effects and illusions. Spidey must survive a disk-full of deviously devised booby-traps to save himself and Mary Jane Parker. The graphics, animation and control system are a credit to our famed wall-climber's super powers. Six levels of action packed arcade game excitement.
#RPF2 ~~$19.95~~ **—NOW $19.95!**

Stunt Track Racer

Test your driving skills with this car-racing simulation that's guaranteed to satisfy both car-racing and computer fans alike. Realistic animation and great graphics put you right in the middle of the action. Experience racing action as you never have before.
#RPF3 $9.97

More Than Just a Great Game ... It's an Adventure!

Airborne Ranger

Test yourself as one of America's elite fighting men. Embark on solo missions behind enemy lines — rescue hostages from a terrorist prison or infiltrate the HQ of an enemy unit. Whether starting an infiltration, search and destroy, rescue or sabotage mission, plan on plenty of heavy-hitting action!
#RPF4 $9.97

Dr. Doom's Revenge

This C-64 game combines on-screen comics with great arcade game action in an entertaining package. Spider-Man and Captain America team up to combat Dr. Doom and his gang of ten treacherous villains. This pair of brave heroes are hard-pressed to navigate their way through Doom's castle and disarm a missile. You'll enjoy controlling the adventures of this comic book duo.
#RPF5 $9.95

Are you a hustler?

3-D Pool

Test your skill with 15 different trick shots, or create your own with the trick-shot editor. And then, if you think you're good enough, enter tournament play against a line-up of formidable opponents.
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Set sail for adventure on the high seas!

Pirates!

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Simply the BEST military simulation released for the C-64 !

Red Storm Rising

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RUN &

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BARG

* Denotes program runs in C-128 mode. **Denotes both C-64 and C-128 modes. All other programs run in C-64 mode only. Each disk comes complete with documentation booklet.

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#RRB1 A point and click interface. Envelope addresser. Questionnaire. 80 Columns on your C-64.

#RRB87 *Appointment book. **Retirement finance planning. *Calculate mortgage payments. *Checker-like board game.

#RRD0 Organize activities on a monthly calendar. *128 Basic Enhancement. C-64 adaption of Breakout. *C-128 variation of Tetris.

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Relative File Copier

Ever wanted to copy those relative files your database creates? Here's a C-64 program that solves the problem.

By HENRY SOPKO

Copying relative files is next to impossible with conventional file copiers. Copy Rel 64, a machine language program that loads and runs like a Basic program, solves that problem. Copy Rel can duplicate up to the maximum 65,535 records in a relative file, it's simple to use, and it's compatible with the 1541, 1571 and 1581 disk drives.

Begin by typing in Listing 1, using *RUN*'s Checksum on page 60. Save it to disk, then run it once to create COPYREL.ML. Next, run COPYREL.ML, insert the disk with the relative file to be copied, and type in the name of the file. If you want to see the directory, hold down the F3 key; press RUN-STOP to halt the directory.

After entering the name of the file to be copied, press RETURN. Copy Rel will scan the file parameters, then prompt you to place the destination disk in the drive. Once this is done, it will create the file on the destination disk, which will take anywhere from just seconds to a few minutes, depending on the file's size and the drive used. Naturally, 1581 disk drives are the fastest.

After the file has been created, you are prompted to reinsert the source disk and press RETURN. Copy Rel will copy each record into the computer's memory (in addresses $2800 to $FFFF), then, when memory is full, it will tell you to reinsert the destination disk.

You will be able to see your record data displayed during the reading and writing operations. Follow each disk-swap prompt as instructed for a perfect copy of your relative file. R

Henry Sopko lives in Hamilton, Ontario. A self-taught programmer, he programs the C-64 and 128 for pleasure.

Listing 1. Copy Rel 64. (Also available on the March/April ReRUN disk. To order call 800-343-0728.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) COPY RE
  L.ML                    :REM*1Ø6
5 OPEN 8,8,8,"COPY REL.ML,P,W"
                          :REM*136
6 CT=Ø:PRINT"{SHFT CLR)":REM*56
1Ø READ A$:IF A$="-1" THEN CLOS
  E8:PRINT:PRINT"ALL DONE!":EN
  D                       :REM*129
12 PRINT"{HOME}READING LINE "+S
  TR$(CT):CT=CT+1         :REM*141
15 IF LEN(A$)<62 THEN 55
                          :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
  2Ø)+MID$(A$,43,2Ø)      :REM*242
25 FOR I=1 TO 3Ø          :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                          :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55               :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55               :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                          :REM*67
5Ø NEXT:GOTO 1Ø           :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
  O 7Ø                    :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
  A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
  )):GOTO 7Ø              :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
  Ø)+RIGHT$(A$,LEN(A$)-42)
                          :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                          :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55               :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55               :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                          :REM*148
95 NEXT:GOTO 1Ø           :REM*16Ø
1ØØ REM HEX DATA FOR COPY REL 6
  4                       :REM*244
1Ø1 DATA Ø1Ø8ØB Ø8ØA ØØ9E323Ø36*3
  1ØØØØØA217AØØ88E18*Ø38C19Ø
  32Ø E7FFA9ØFA2          :REM*1Ø4
1Ø2 DATA Ø8AØØF2ØBAFFA9ØØ85B7*2
  ØCØFFAØØØA2ØF2ØC9FF*B949Ø82
  ØD2FFC8CØØ2DØ           :REM*65
1Ø3 DATA F5A2Ø32ØC9FFA2Ø22ØC9*F
  F4C4BØ8553A2ØFAØAA Ø*2D84B72
  ØA1ØF2ØA6ØE2Ø           :REM*246
1Ø4 DATA C5ØA2Ø2BØF2ØE411EE6F*Ø
  9A5FAC9ØØDØEB2Ø5B1Ø*A91585B
  72Ø A1ØFA2ØØ86          :REM*59
1Ø5 DATA Ø62ØECØA2Ø14112ØE411*A
  9ØØ85B72ØA1ØF2ØECØA*2ØC5ØAE
  E6FØ92Ø5ØØ9CE          :REM*227
1Ø6 DATA 6FØ9A91285B2A9Ø685B3*A
  9ØØ85FBA92885FCAØØØ*84Ø2EE6
  FØ94C21Ø92Ø72           :REM*12
1Ø7 DATA Ø9A2ØØ86Ø22ØD8Ø8AE6F*Ø
  9E4ØDDØE9AE7ØØ9E4ØE*DØE24CC
  CØ82ØCCFFA2Ø7           :REM*76
1Ø8 DATA 86ØCC6ØD4CE8Ø9A2Ø22Ø*C
  6FF2ØE4FF85ØFE6Ø2A4*Ø299ØØ1
  82ØB7FFC94ØDØ           :REM*72
1Ø9 DATA 17A5ØFC9FFFØØ52Ø2DØ9*A
  9FF2Ø2DØ92Ø43Ø92Ø98*134CØFØ
  9A5ØF2Ø2DØ94C           :REM*51
11Ø DATA DDØ8AE6FØ9EØFFFØØ16Ø*E
  E7ØØ96ØA9Ø22ØC3FF6Ø*A6FCEØF
  FDØØ34CD5Ø94C           :REM*1Ø7
111 DATA B1Ø82ØB9ØAAØØØ91FB2Ø*B
  FØAE6FBA6FBEØØØFØØ1*6ØE6FC6
  ØAØØØA92Ø998Ø           :REM*25
112 DATA Ø6C8CØFFDØF86ØAØØØA2*Ø
  F2ØC9FFB96DØ92ØD2FF*C8CØØ5D
  ØF5A2Ø32ØC9FF           :REM*1Ø
113 DATA A2Ø22ØC9FF6Ø5Ø62Ø1ØØ*Ø
  ØAØØØB1B2C93ØBØØ32Ø*CBØ9AØØ
  4B1B2C939BØØ5           :REM*33
114 DATA 69Ø191B26ØAØØ3B1B2C9*3
  9BØØ969Ø191B2AØØ44C*CBØ9AØØ
  2B1B2C939BØØ9           :REM*177
115 DATA 69Ø191B2AØØ34CCBØ9AØ*Ø
  1B1B2C939BØØ969Ø191*B2AØØ24
  CCBØ9AØØØB1B2           :REM*145
116 DATA C939BØØ669Ø191B2AØØ1*A
  93Ø91B2C8CØØ5DØF96Ø*AE6FØ9A
  C7ØØ9CAEØFFDØ           :REM*2Ø6
117 DATA Ø188860884Ø94CF2Ø9AE*6
  FØ9AC7ØØ986Ø884Ø9A6*ØA8E6FØ
  9A6ØB8E7Ø09A2           :REM*48
118 DATA Ø32ØC9FFAØ1484B72ØA1*Ø ►
```

RELATIVE FILE COPIER

```
      F2ØECØA2ØC5ØAA4B7A9*ØØ85Ø28
      5ØF85Ø685FBA9        :REM*252
119 DATA 2885FCA92285B2A9Ø685*B
      3EE6FØ9AE6FØ9EØØØFØ*562Ø72Ø
      92Ø5ØØ92ØB9ØA       :REM*176
12Ø DATA AØØØB1FB2ØBFØAC9FFFØ*1
      7E6Ø2A4Ø299ØØ182ØD2*FFE6FBA
      6FBEØØØDØEØE6       :REM*4Ø
121 DATA FC4C36ØAE6FBA6FBEØØØ*D
      ØØ2E6FC2Ø43Ø92Ø9813*A2ØØ86Ø
      2AE6FØ9E4Ø8DØ       :REM*221
122 DATA BØAE7ØØ9E4Ø9DØA9A6Ø*E
      ØØ7FØ164C8CØAEE7ØØ9*4C3ØØAA
      E6FØ9AC7ØØ986       :REM*233
123 DATA ØA84ØB4CAEØAA2Ø32Ø*C9*F
      F2Ø1BØ9A4*C84B72ØA1*ØF2ØEC9
      A4C17Ø8A2Ø32Ø       :REM*84
124 DATA C9FF2Ø1BØ94C81Ø878A2*7
      486Ø16ØA27786Ø1586Ø*A9Ø2A2Ø
      8AØØ22ØBAFFA9       :REM*17
125 DATA Ø4A2DBAØØA2ØBDFF2ØCØ*F
      F6ØØØØØØØØØØØØØØØØ*ØØØØØØØ
      ØØØØØØØØØØA2        :REM*68
126 DATA ØØ86C62Ø1BØ9A5C6C9ØØ*F
      ØFA6ØA9ØØ8D2ØDØ8D21*DØA9932
      ØD2FFA9ØD2ØD2        :REM*136
127 DATA FF2Ø7112A92DAØØB8D1C*Ø
      B8C1DØBAØØØB92DØBFØ*ØC2ØD2F
      FC8DØF5EE1DØB        :REM*171
128 DATA 4C1BØB6Ø1312Ø5D5D6D7*D
      8D9DADBDCDDFFDFØD12*9BB5B6B
      7B8B9BABBBCBD        :REM*37
129 DATA BEBF922Ø2ØD2C5CCC1D4*C
      9D6C52ØC6C9CCC52ØC3*CFDØC9C
      5D2ØD2Ø2Ø2Ø2Ø        :REM*2Ø6
13Ø DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø1C2ØA4A4A4A4A4A4A4*A4A4A4A
      4A4A4A4A4A4A4        :REM*2Ø9
131 DATA A4ØD2Ø2Ø2Ø2Ø2Ø982ØC6*C
      9CCC52ØCEC1CDC52Ø1C*A59F2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*22Ø
132 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø1CA7*Ø
      D2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø12B3B3        :REM*1Ø3
133 DATA B3B3B3B3B392A3A3A3A3*A
      3A3A3A3A3A398ØD2Ø*2ØD2C5C
      3CFD2C42ØCCC5        :REM*221
134 DATA CEC7D4C82Ø1CA59F2Ø2Ø*2
      Ø2Ø2Ø1CA7ØD2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*155
135 DATA 2Ø2Ø12B3B3B3B3B3B3*9
      2ØD2Ø2Ø98D4CFD4C1CC*2ØD2C5C
      3CFD2C4D32Ø1C        :REM*188
136 DATA A59F2Ø2Ø2Ø2Ø2Ø1CA7ØD*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2ØA3A3A3A3        :REM*228
137 DATA A3A3A3ØD982Ø1CBØCØCØ*C
      ØCØCØCØCØCØCØCØCØCØ*CØCØCØC
      ØCØCØCØCØCØCØ        :REM*192
138 DATA CØCØCØCØCØCØCØCØCØCØ*C
      ØCØCØCØAE98ØD2Ø1CDD*922Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*42
139 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2ØDD98ØD        :REM*21
14Ø DATA 2Ø1CADCØCØCØCØCØCØCØ*C
      ØCØCØCØCØCØCØCØCØCØ*CØCØCØC
      ØCØCØCØCØCØCØ        :REM*2Ø7
141 DATA CØCØCØCØCØCØCØCØCØBD*9
      8ØD2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø1CA4A
      4A4A4A4A4A42Ø        :REM*196
142 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2ØA4A4*A
      4A4A4A4A4AØD982ØD2C5*C1C4C9C
      EC72Ø1CA5Ø52Ø        :REM*229
143 DATA 2Ø2Ø2Ø2Ø1CA72Ø98D7D2*C
      9D4C9CEC72Ø1CA5Ø52Ø*2Ø2Ø2Ø2
      Ø1CA7ØD2Ø2Ø2Ø        :REM*9Ø
144 DATA 2Ø2Ø2Ø2Ø2Ø2ØA3A3A3A3*A
      3A3A32Ø2Ø2Ø2Ø2Ø2Ø*2Ø2ØA3A
      3A3A3A3A3A3ØD        :REM*179
145 DATA 99AFAFAFAFAFAFAFAFAF*A
      FAFAFAFAFAFAFAFAF*AFAFAFA
      FAFAFAFAFAF          :REM*246
146 DATA AFAFAFAFAFAFAFAFAFAF*A
      F1E2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*132
147 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*96
148 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*97
149 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*98
15Ø DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*99
151 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*1ØØ
152 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*1Ø1
153 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø        :REM*1Ø2
154 DATA 2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
      Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
      Ø2Ø2Ø2Ø1299B4        :REM*65
155 DATA 92B7B7B7B7B7B7B7B7B7*B
      7B7B7B7B7B7B7B7B7B7*B7B7B7B
      7B7B7B7B7B7B7        :REM*14
156 DATA B7B7B7B7B7B7B7B7B7B7*Ø
      D2Ø129E2ØC6332Ø922Ø*98C4C9D
      2C5C3D4CFD2D9        :REM*194
157 DATA 2Ø2Ø2Ø129E2ØD2C5D3D4*C
      FD2C52Ø922Ø98D2C5D3*C5D4ØØA
      2ØØAØØØ86Ø286       :REM*23Ø
158 DATA C6A6C6EØØØFØFAAD77Ø2*C
      986DØ1CA2Ø32ØC6FF2Ø*FC112ØE
      CØA2ØFAØAA2ØØ       :REM*97
159 DATA 86C6AØ2D84B72ØA1ØF4C*A
      6ØE99DBØA4CFCØEC94Ø*BØØD998
      9Ø4E6Ø2C8A2ØØ       :REM*158
16Ø DATA 86C64CAEØEE94ØC94ØBØ*Ø
      34CE1ØEE94Ø4CE1ØEC9*ØDFØØDC
      914FØ13A6Ø2EØ       :REM*111
161 DATA 1ØFØDD4CDDØEA6Ø28ECF*Ø
      AA2ØØ86C66ØA6Ø2EØØØ*FØCA88A
      92Ø99890499DB        :REM*41
162 DATA ØAC6Ø24CE7ØE2Ø72ØF2Ø*6
      9ØFA9Ø885BA2ØB4FFA9*6F85B92
      Ø96FF2ØA5FFC9        :REM*146
163 DATA 3ØDØØB2ØABFFA9ØØ85FA*2
      Ø72ØF6Ø2ØD2FF2ØA5FF*C9ØDDØF
      62ØABFFA9Ø185        :REM*255
164 DATA FA2Ø1BØ92Ø87ØF6Ø18AØ*Ø
      2A2ØA2ØFØFF6Ø2Ø69ØF*A92ØAØØ
      Ø2ØD2FFC8CØ24        :REM*21
165 DATA DØF8A99E2ØD2FF6Ø18AØ*1
      1A2Ø32ØFØFFA99F2ØD2*FFA92ØA
      ØØØ2ØD2FFC8CØ        :REM*21Ø
166 DATA 1ØDØF86Ø2Ø72ØF2Ø69ØF*A
      4B7B9BDØFC9ØØFØØ72Ø*D2FFC84
      CA9ØFA99F2ØD2        :REM*137
167 DATA FF6Ø9EC94E534552542Ø*D
      34F5552434520C44953*4BØØ9EC
      94E5345525420        :REM*34
168 DATA C4455354494E4154494F*4
      E2ØC449534BØØ9EC54E*5445522
      Ø46494C454E41        :REM*15
169 DATA 4D4520544F2Ø42452Ø43*4
      F5Ø4945442Ø2ØØ9EC3*4F5Ø594
      94E4720495320        :REM*178
17Ø DATA 434F4D5Ø4C4554454421*Ø
      Ø9ED343414E4E494E47*2Ø46494
      C4520Ø5Ø415241       :REM*91
171 DATA 4D4554455253ØØ9ED354*4
      14E4442593A2ØC35245*4154494
      E472Ø52454C41        :REM*149
172 DATA 5449564520464940450ØØ*A
      Ø6384B72ØA1ØFA2D986*B2A2Ø48
      6B3A26DE8E8E8        :REM*188
173 DATA E8AØØ98EB71Ø8CB81Ø2Ø*B
      61ØAE71Ø9CA86Ø5A2ØØ*8E71Ø98
      6ØB2Ø5ØØ9CEB7        :REM*245
174 DATA 1ØCEB71ØA22986B2A2Ø5*8
      6B32Ø72Ø92ØB61ØAE6F*Ø9CA86Ø
      DAE7ØØ986ØE2Ø        :REM*53
175 DATA E4112Ø5ØØ9A2Ø32ØC9FF*6
      ØEE71Ø94CCF1Ø2Ø5ØØ9*2ØE21ØA
      5FAC9ØØFØØ16Ø       :REM*153
176 DATA 2Ø72Ø94CB61ØAD6FØ9C9*F
      FDØE6EE6FØ9EE7ØØ92Ø*72Ø94CB
      C1ØA9Ø885BA2Ø        :REM*42
177 DATA B4FFA96F85B92Ø96FF2Ø*A
      5FFC93ØDØØ82ØABFFA9*ØØ85FA6
      Ø2ØA5FFC9ØDDØ        :REM*69
178 DATA F92ØABFFA9Ø185FA6ØA2*Ø
      22ØC9FF6ØAØ7D84B72Ø*A1ØFA5Ø
      58D8F11A6ØD8E        :REM*179
179 DATA AF11A5ØE8DBØ11A9Ø2A2*Ø
      8AØØ22ØBAFFAØØØB9DB*ØA997C1
      1C8C4Ø2DØF5A2        :REM*216
18Ø DATA ØØBD8C11997C11C8E8EØ*Ø
      4DØF4A5Ø269Ø6A27AAØ*112ØBDF
      F2ØCØFF2ØB211        :REM*6
181 DATA 2Ø9Ø112Ø9Ø112ØB211A9*F
      F2ØD2FF2ØB2112ØB211*2Ø1BØ92
      ØB2116Ø3Ø3AØØ       :REM*196
182 DATA ØØØØØØØØØØØØØØØØØØØ*Ø
      ØØØØØØØØ2C4C2CØØAØ*ØØA2ØF2
      ØC9FFB9AD112Ø        :REM*122
183 DATA D2FFC8CØØ5DØF5A2Ø32Ø*C
      9FFA2Ø22ØC9FF6Ø5Ø62*Ø1ØØØØA
      9Ø885BA2ØB4FF        :REM*98
184 DATA A96F85B92Ø96FF2ØA5FF*C
      931BØØ92ØABFFA2Ø22Ø*C9FF6ØC
      932FØF32ØA5FF        :REM*246
185 DATA C9ØDDØF92ØABFFA2Ø22Ø*C
      9FF6ØA2ØØ8E6FØ98EAF*1186ØA8
      E7ØØ98EBØ118E        :REM*16Ø
186 DATA 71Ø986ØB86ØC6ØA9932Ø*D
      2FFA96B85BBA91285BC*A9Ø685B
      7A9Ø885BAA96Ø        :REM*198
187 DATA 85B92ØD5F3A5BA2ØB4FF*A
      5B92Ø96FFA9ØØ859ØAØ*Ø384FB2
      ØE1FFFØ382ØA5        :REM*131
188 DATA FF85FCA49ØDØ2F2ØA5FF*A
      49ØDØ28A4FB88DØE4A6*FC2ØCDB
      DA92Ø2ØD2FF2Ø        :REM*121
189 DATA A5FFA69ØDØ12AAFØØ62Ø*D
      2FF4C4E12A9ØD2ØD2FF*AØØ2DØC
      12Ø42F66Ø243Ø        :REM*42
19Ø DATA 3A2A3D52A2ØØAØD886FB*8
      4FCA2ØØAØ2Ø86FD84FE*A27F8EØ
      DDCA5Ø129FB85        :REM*234
191 DATA Ø1A2ØØAØØØB1FB91FDC8*C
      ØØØDØF7E6FCE6FEE8EØ*Ø8DØEEA
      5Ø1Ø9Ø485Ø1A2        :REM*211
192 DATA 818EØDDCAØØØB9D21299*A
      826C8CØ58DØF5AØØØB9*3Ø13999
      827C8CØ6EDØF5        :REM*129
193 DATA AD18DØ29FØØ9Ø88D18DØ*6
      ØØØØØØØØ1Ø7ØEØE1EØØ*ØØØØBA1
      EØ6Ø2ØØØØØØØ        :REM*23
194 DATA ØD387Ø7ØFØØØØØØØ83E1*7
      1717ØØØØØØF7E3E3E3*E3ØØØØØ
      Ø1F8FCFC7C7ØØ        :REM*212
```

Continued on p.56.

ROM Is Where The Heart Is

New adventures (and computers) may beckon, but... you can't shut the door on your C-64!

By WARREN D. BUCHANAN

Was it peer pressure or simply the American obsession of keeping up with the Jones's? I don't know. Maybe both of these factors finally induced me to take the plunge.

Not that I entirely regret the move, but it was a difficult decision for me to reach. You see, for some reason known only to an elite few in the field of psychoanalysis, Commodore 64 owners are a fiercely loyal and faithful group, willing to defend against even petty criticism of their computers.

Perhaps it's because most of us have had our machines since the dawning of the home computer age, or maybe it's simply that familiarity breeds allegiance. Whatever it is, we know: There's something almost addictive about the sound of a 1541 grinding away, filling all available 64K of memory with indiscernible binary numbers.

Still, I guess it had to happen. But my conversion to an MS-DOS machine was made only after obtaining a blood oath from my wife that she would *never* sell my trusty C-64 or any of my accessories accumulated over the years in the pursuit of the ultimate technology. *Never.*

The momentous day arrived—a day etched in my memory. The 64 was sadly removed from its place of prominence in the den and replaced by a PC-compatible sporting a 40-meg hard drive. With a heavy heart, I hauled my old C-64 upstairs to the spare room and quietly reassembled the computer, two 1541s, a 1701 monitor and a Star NX-10C printer. With a lump in my throat, and my family looking on like strangers at a wake, I stood in the doorway, contemplating a legend, recalling the glory days.

The remorse from this treason was almost unbearable. Seldom would I again delight to the sound of a Fast Load cartridge being inserted. Maybe never again would I experience the exhilaration as geoPublish flowed from the 1541 into the RAM expander. What memories! My knowledge of Basic and assembly language had been shaped on this machine. My very first feature article had been drafted on it. I had been an Olympic gold medal winner. I had eradicated the blight of totalitarianism from the Western hemisphere. I had won everything from the World Series to the Super Bowl. I...I had been *a star.*

And now my beloved was being supplanted, just as it had once nudged aside my 16K Radio Shack Color Computer. The emotion of the moment was overwhelming; I hadn't wanted a drink this badly since the cassette recorder replaced my old eight-track. I appealed for a moment alone with my C-64 and, delicately, my family turned and withdrew.

I knew they couldn't understand. I realized that they could never know of the bond that develops between a man and his Commodore. How could they? It would be like trying to fathom the universe, or trying to understand why Bruce Willis is a sex symbol. So, alone in that room, I bid adieu to my loyal friend; a companion and confidant who had served me long and true. I was Batman saying farewell to Robin.

As I stood caressing the keyboard, which had for so long been an extension of my very arm, I could almost detect sobbing from somewhere deep within the labyrinth of transistors, chips and circuit boards; it seemed to be appealing to me for clemency. "You *Benedict Arnold,*" I muttered to myself.

Alas, time and technology must march on. Thus, I now sit surrounded by technology that was only a dream back in '83 when I first unpacked my C-64. Lately I find myself reflecting on a simpler time when the only requirement for software was a label stating "C-64 Compatible." Now I spend my time trying to decipher phrases like "Operates Under Windows X.0 and Above," "Requires DOS Y.0," and "Minimum ZMB RAM." I awake in the night, sweating, wondering whether that new $280 software package I bought requires CGA, MCGA, EGA, hi-res EGA, VGA, IBM 8514/a or Hercules. (I was too proud to ask the clerk. In the MS-DOS world, such a show of ignorance would be an inexcusable *faux pas.*)

I've also discovered that if I am to keep my head above water, I must learn a radical new language. Just yesterday, my neighbor was telling me about his 286-based PC with 1MB RAM hooked to a DECnet PCSA network. He then proceeded to inquire as to whether I knew of any way he could relocate part of the networking software to extended memory to allow additional room in the lower 640K for conventional programs.

To his shock and embarrassment, I burst into tears.

Now I just learned that my compatible with the fancy 789XYZ microprocessor has been officially pronounced obsolete, replaced by a new generation of PCs with new and more confusing numerical designations—with astral-sounding operating systems and interminable memory capacities. Why not just give me a paper cut and pour alcohol on it!

And so, late at night when our house is still and Jay Leno has bid America farewell for another day, there can be heard the reassuring sound of a whirring 1541 behind the door at the end of the dark upstairs hall. As the family sleeps, a solitary figure sits, face illuminated in front of a 1701, and savors the moment. One of a "dying breed" basks in the splendor of the past, content in the awareness that, no matter how fancy or advanced the technology gets, nothing, *nothing* can *ever* replace a trusty old, tried-and-true C-64. ■

Warren Buchanan is a sentimental writer and C-64 lover who grudgingly uses an MS-DOS clone by day and who keeps nodding off and snoring at the breakfast table.

Flying High With Flashcards

When you need to learn facts in a hurry, take off with this C-128 notecard program.

By KENNETH HOKE

As an airline pilot, I often study the various systems of the aircraft I fly. I always used 3 × 5 flashcards, with questions on the front and answers on the back, but to make studying more fun (and to save on cards), I wrote Notecards-128.

Anyone who studies material repetitiously will appreciate the Notecards-128 system. Questions and answers on up to 12 subjects can be saved to disk using the Question/Answer Editor (Listing 1). My largest file so far contains 60 questions and answers; I'm sure the C-128's 128K of memory can hold many more.

The subjects are then displayed in the menu of the Notecards-128 program itself (Listing 2). When you choose a subject, the questions begin. With each question you cue the answer, which appears with a menu of options.

Two Programs

The programs are written in Basic. Start by entering both listings using *RUN*'s Checksum program on page 60, saving each to disk.

Listing 1, the Q & A editor, creates a separate sequential file to store each category of questions. Listing 2, the notecard program, includes three lines you must customize. Line 20 contains variable S, which tells the program how many subjects to look for in the Data statements. Make S equal the number of subjects you want the main menu to display (maximum of 12). Lines 830 and 840 are Data statements that contain the subjects as they will appear in the menu. The listing includes sample subjects entered in the proper format. Enter your own subject names (15-character limit for each) in these Data statements. Remember, the number of subjects you enter in 830 and 840 must equal the value of S in line 20.

Many Questions

Once you've saved Listing 1 and the customized version of Listing 2, you're ready to enter the questions and answers. To do so, run Listing 1. A menu will offer three choices: Create (build a new subject file); Add-To (add questions and answers to an existing file); Edit (remove unwanted questions). After making a selection, enter a filename that's exactly like the one in the Data statements in lines 830 and 840 of Listing 2. The program uses the Data statements to both print the main menu and search the disk directory for your question and answer files.

The cursor will appear in the question block, awaiting your input. Because the Basic Input statement is so simple, you must follow two guidelines: Don't use the comma, colon or cursor keys and don't begin a question or answer with a space.

I didn't include a word-wrap feature, so, if a word won't fit at the end of a line, enter spaces until you reach the next line. Don't press the RETURN key to advance the line; press the RETURN key only when you've finished typing, because RETURN enters the question or answer. When your last answer has been entered, type an asterisk (*) in the subsequent empty question block and press RETURN again; this will save your input to disk. You can use both upper- and lowercase letters while typing.

I suggest making a "dummy" file to practice entering questions. After a few attempts, you'll have the hang of it.

When you've entered the questions and answers for each subject, it's time to study. Run Notecards-128 and follow the prompts. With Notecards-128 on your flight line, you'll never have to use old-fashioned flashcards again. R

Kenneth Hoke is a commercial pilot. He's been programming in Basic since 1986.

Listing 1. Question/Answer Editor program. (Also available on the March/April ReRUN disk. To order, call 800-343-0728.)

```
10 REM NOTECARDS 128 QUESTION/A
   NSWER EDITOR LISTING 1 - KEN
   NETH HOKE              :REM*13
20 IFPEEK(215)<>128THEN 40
                          :REM*126
30 SCNCLR:PRINT"{CTRL O} SWITCH
    MONITOR TO 40-COLUMN MODE":
   PRINTCHR$(27)"X":SLOW:REM*63
40 PRINTCHR$(27)+"M"     :REM*88
50 C$(1)="QUESTION":C$(2)="{COM
   D O}ANSWER{COMD O}" :REM*101
60 DIMA$(200):DIMB$(200):COLOR0
   ,2:COLOR4,2:SCNCLR  :REM*199
70 FORY=1TO2:PRINT"{CTRL 7}"SPC
   (16)"{8 COMD Os}"C$(Y)"{8 CO
   MD Os}"              :REM*159
80 FORX=1TO6:PRINTSPC(16)"{COMD
    K}"SPC(22)"{CTRL 9}{COMD K}
   ":NEXTX              :REM*98
90 PRINTSPC(16)"{24 COMD Us}{CR
   SR DN}":NEXTY        :REM*244
100 PRINT"{CTRL 3}{40 COMD Os}"
                          :REM*23
110 FORX=1TO3:PRINT"{COMD J}"SP
    C(38)"{COMD L}":NEXT
                          :REM*154
120 PRINT"{40 COMD Us}":REM*102
130 PRINTCHR$(142):WINDOW1,22,3
    8,22,1               :REM*83
140 PRINT"{CTRL 6}NOTECARDS-128
    {2 SPACEs}QUESTION/ANSWER E
    DITOR":SLEEP2        :REM*238
150 PRINT"{CTRL 1}CREATE, ADD-T
    O OR EDIT A FILE? (C/A/E)"
                          :REM*83
160 GETKEYQ$:IFQ$="C"ORQ$="A"TH
    EN GOTO 180          :REM*25
170 IFQ$<>"E"THEN160     :REM*134
180 SCNCLR:INPUT"{CRSR DN}NAME
    OF FILE";D$          :REM*196
190 IFLEN(D$)>15THENPRINT"{SHFT
     CLR}{CTRL 9}15 CHAR MAX LE
```

RUN it right: **C-128 (in 40-column mode)**



Whether you're studying arithmetic or aerodynamics, Notecards-128 will help.

```
    NGTH - TRY AGAIN":SLEEP3:GO
    TO18Ø                  :REM*2Ø9
2ØØ PRINTCHR$(14)          :REM*35
21Ø IFQ$="E"THEN39Ø        :REM*165
22Ø WINDOWØ,Ø,15,19,1      :REM*169
23Ø PRINT"{CRSR DN}{SHFT D}O NO
    T{SHFT SPACE}USE THE":PRINT
    "{CTRL 9}:{CTRL Ø} OR {CTRL
     9},{CTRL Ø} SYMBOLS"
                           :REM*22
24Ø PRINT"WHEN ENTERING":PRINT"
    INFORMATION."          :REM*181
25Ø PRINT"{3 CRSR DNs}{SHFT D}O
     NOT USE THE{2 SPACEs}CURSO
    R KEYS WHENENTERING INFO."
                           :REM*38
26Ø PRINT"{3 CRSR DNs}{SHFT E}N
    TER AN {CTRL 9}*{CTRL Ø} IN
    "                      :REM*132
27Ø PRINT"QUESTION BLOCK":PRINT
    "WHEN COMPLETE."       :REM*214
28Ø WINDOW1,21,38,23,1 :REM*136
29Ø PRINT"{SHFT CLR}{SHFT T}YPE
     IN QUESTIONS AND ANSWERS."
                           :REM*33
3ØØ PRINT"{CRSR DN}{SHFT H}IT '
    RETURN' TO ENTER EACH {SHFT
     Q} & {SHFT A}."       :REM*85
31Ø N=Ø                    :REM*123
32Ø N=N+1                  :REM*126
33Ø WINDOW17,11,38,16,1:WINDOW1
    7,1,38,6,1             :REM*195
34Ø OPEN1,Ø:INPUT#1,A$(N):CLOSE
    1                      :REM*1Ø5
35Ø IFA$(N)="*"THENN=N-1:GOTO 5
    6Ø                     :REM*55
36Ø WINDOW17,11,38,16  :REM*184
37Ø OPEN1,Ø:INPUT#1,B$(N):CLOSE
    1                      :REM*86
38Ø GOTO32Ø            :REM*194
39Ø WINDOW1,21,38,23,1   :REM*29
4ØØ PRINT"{CRSR DN}{SHFT L}OADI
    NG: "D$                :REM*11
41Ø N=Ø:DOPEN#1,(D$),R :REM*149
42Ø N=N+1              :REM*218
43Ø INPUT#1,A$(N),B$(N):REM*252
44Ø IFST<>64THEN42Ø:ELSEDCLOSE#
    1                      :REM*156
45Ø PRINT"{SHFT T}YPE {CTRL 9}N
    {CTRL Ø} TO VIEW NEXT QUEST
    ION & ANSWER"          :REM*142
46Ø PRINT"{SHFT T}YPE {CTRL 9}D
    {CTRL Ø} TO DELETE QUESTION
     & ANSWER"             :REM*1Ø7
47Ø PRINT"{SHFT T}YPE {CTRL 9}F
    {CTRL Ø} WHEN YOU ARE FINIS
    HED"                   :REM*165
48Ø FORX=1TON              :REM*249
49Ø WINDOW17,11,38,16,1:WINDOW1
    7,1,38,6,1             :REM*32
5ØØ PRINTA$(X)             :REM*2Ø7
51Ø WINDOW17,11,38,16:PRINTB$(X
    )                      :REM*71
52Ø GETKEYR$:IFR$="F"THEN 58Ø
                           :REM*151
53Ø IFR$="D"THENA$(X)="DELETE":
    GOTO55Ø                :REM*57
54Ø IFR$<>"N"THEN52Ø       :REM*87
55Ø NEXTX                  :REM*91
56Ø IFQ$="A"THENAPPEND#1,(D$):G
    OTO59Ø                 :REM*251
57Ø IFQ$="C"THENDOPEN#1,(D$),W:
    GOTO59Ø                :REM*75
58Ø DOPEN#1,"@"+(D$),W :REM*163
59Ø WINDOW1,21,38,23,1:PRINT"WR
    ITING DATA TO DISK" :REM*11
6ØØ FORX=1TON              :REM*96
61Ø IFA$(X)="DELETE"THEN63Ø
                           :REM*214
62Ø PRINT#1,A$(X):PRINT#1,B$(X)
                           :REM*1Ø8
63Ø NEXTX:DCLOSE#1:WINDOWØ,Ø,39
    ,24,1                  :REM*253
64Ø WINDOWØ,Ø,39,24,1:GOTO7Ø
                           :REM*21
```

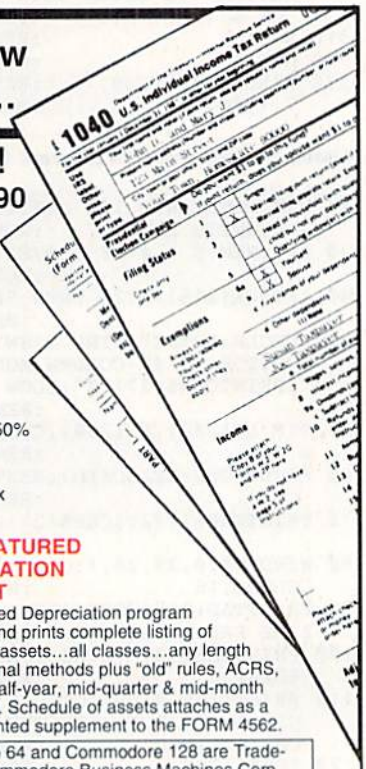
Listing 2. Notecards-128 program. (Also available on the March/April ReRUN disk.)

```
1Ø REM NOTECARDS 128 LISTING 2
   - KENNETH HOKE          :REM*116
2Ø S=8:REM S = # OF SUBJECTS
                           :REM*196
3Ø IFPEEK(215)<>128 THEN 5Ø
                           :REM*86
4Ø SCNCLR:PRINT"{CTRL O}SWITCH
   MONITOR TO 4Ø-COLUMN MODE...
   ":PRINTCHR$(27)"X":SLOW
                           :REM*227
5Ø DIM A$(2ØØ),B$(2ØØ),C$(S):VO
   L 15                    :REM*238
6Ø FORD=1TOS:READC$(D):NEXTD
                           :REM*245
7Ø PRINTCHR$(142);CHR$(27)+"M"
                           :REM*16Ø
8Ø WINDOWØ,Ø,39,24,1:COLORØ,16:
   COLOR4,16               :REM*8Ø
9Ø PRINTTAB(9)"{COMD 4}RUN MAGA
   ZINE PRESENTS:"         :REM*4Ø
1ØØ PRINTTAB(13)"{CTRL 3}NOTECA
    RDS-128"               :REM*235
11Ø PRINT"{CRSR DN}{CTRL 1} CHO
    OSE A SUBJECT WITH THE CURS
    OR KEYS{CRSR DN}"      :REM*149
12Ø FORF=1TO2              :REM*183
13Ø PRINTTAB(9)"{CTRL 9}{COMD 4
    }{26 SPACEs}":NEXT     :REM*43
14Ø PRINTTAB(5)"{CTRL 9}{COMD 5
    }{SHFT LB.}{26 SPACEs}{COMD
     4}{3 SPACEs}"         :REM*188
15Ø PRINTTAB(5)"{SHFT O}{24 COM
    D Ys}{SHFT P}{CTRL 9}{COMD
    5} {COMD 4}{3 SPACEs}"
                           :REM*58
16Ø FORF=1TO1Ø             :REM*59
17Ø PRINTTAB(5)"{COMD 4}{COMD H
    }{COMD V}"SPC(22)"{COMD C}{
    COMD M}{CTRL 9}{COMD 5} {CO
    MD 4}{3 SPACEs}":NEXT
                           :REM*185
18Ø FORF=1TO2              :REM*243
19Ø PRINTTAB(5)"{COMD 4}{COMD H
    }{COMD V}"SPC(22)"{COMD C}{
    COMD M}{CTRL 9}{COMD 5} ":N
    EXT                    :REM*Ø
2ØØ PRINTTAB(5)"{COMD 4}{COMD G
    }{COMD V}{22 SPACEs}{COMD C
    }{COMD N}{COMD 5}{SHFT LB.}
    "                      :REM*71
21Ø PRINTTAB(5)"{COMD 4}{26 COM
    D Ys}"                 :REM*129
22Ø PRINT"{CRSR DN}{CTRL 1}{3 S
    PACEs}PRESS RETURN TO LOAD
    YOUR CHOICE"           :REM*63
23Ø COLOR5,7:Z=1           :REM*54
24Ø CHAR1,11,9:PRINTCHR$(18);C$
    (1)                    :REM*245
25Ø FORD=2TOS              :REM*13
26Ø PRINTTAB(11);C$(D):NEXTD
                           :REM*39
27Ø GETKEYQ$:GOSUB8ØØ:IFQ$="{CR
    SR UP}"ORQ$="{CRSR DN}"THEN
     29Ø                   :REM*52
28Ø IFQ$=CHR$(13)THEN 36Ø:ELSE
    27Ø                    :REM*31
29Ø CHAR1,11,(8+Z):PRINTC$(Z)
                           :REM*78
3ØØ IFQ$="{CRSR UP}"THENZ=Z-1
                           :REM*1Ø4
31Ø IFQ$="{CRSR DN}"THENZ=Z+1
                           :REM*27
32Ø IFZ=ØTHENZ=S           :REM*56
33Ø IFZ=(S+1)THENZ=1       :REM*238
34Ø CHAR1,11,(8+Z):PRINTCHR$(18
    );C$(Z)                :REM*21
35Ø GOTO 27Ø               :REM*179
36Ø L=(4Ø-(LEN(C$(Z))+22))/2
                           :REM*22
37Ø CHAR1,Ø,24:PRINT"{COMD 8}{C
    TRL 9}{37 SPACEs}" :REM*219
38Ø CHAR1,Ø,24:PRINT"{CTRL 9}{C
    TRL 3}"SPC(L)C$(Z)" QUESTIO
    NS ARE LOADING"        :REM*41
39Ø X=Ø                    :REM*2Ø9
4ØØ DOPEN#1,(C$(Z)),R  :REM*254
41Ø X=X+1:INPUT#1,A$(X),B$(X)
                           :REM*1Ø1
42Ø IFST<>64THEN41Ø:ELSEDCLOSE#
    1                      :REM*19Ø
43Ø PRINTCHR$(14):SCNCLR
                           :REM*238
44Ø COLOR4,7:COLORØ,4:COLOR5,12
```

```
                          :REM*217
45Ø PRINT"{2 CRSR DNs}":REM*195
46Ø PRINTTAB(7)"{16 COMD @s}"
                          :REM*12Ø
47Ø PRINTTAB(6)"{COMD M}{CTRL 2
    }{CTRL 9}{16 SPACEs}{COMD 4
    }{CTRL Ø}{COMD G}" :REM*169
48Ø PRINTTAB(6)"{COMD M}{CTRL 2
    }{CTRL 9}{16 SPACEs}{COMD 4
    } {CTRL Ø}{9 COMD @s}"
                          :REM*17
49Ø PRINTTAB(6)"{COMD M}{CTRL 2
    }{CTRL 9} {24 COMD @s} {CTR
    L Ø}{COMD 4}{COMD G}"
                          :REM*253
5ØØ FORF=1TO1Ø            :REM*142
51Ø PRINTTAB(6)"{COMD M}{CTRL 9
    }{CTRL 2} {COMD G}{22 SPACE
    s}{COMD M} {COMD 4} ":NEXT
                          :REM*238
52Ø PRINTTAB(6)"{COMD M}{CTRL 9
    }{CTRL 2} {24 COMD Us} {COM
    D 4} "                :REM*22
53Ø PRINTTAB(6)"{COMD M}{CTRL 9
    }{CTRL 2}{7 SPACEs}{COMD 4}
     {CTRL 2}{1Ø SPACEs}{COMD 4
    } {CTRL 2}{7 SPACEs}{COMD 4
    } "                   :REM*87
54Ø PRINTTAB(7)"{COMD T}{CTRL 9
    }{26 SPACEs}"         :REM*51
55Ø CHAR1,8,5:PRINT"{CTRL 9}{CT
    RL 2}"C$(Z)           :REM*4Ø
56Ø CHAR1,Ø,21:PRINTSPC(5)"{SHF
    T T}HIS CATEGORY HAS"X"QUES
    TIONS."               :REM*27
57Ø FORA=1TOX             :REM*8Ø
58Ø WINDOWØ,24,39,24,1 :REM*251
59Ø PRINT"{CRSR DN}{CTRL 1}{11
    SPACEs}{SHFT P}RESS {CTRL 9
    }{SHFT N}{CTRL Ø} FOR ANSWE
    R.{1Ø SPACEs}"        :REM*133
6ØØ WINDOW9,8,3Ø,15,1:COLOR5,1
                          :REM*185
61Ø PRINT"{SHFT CLR}"A".{2 SPAC
    Es}{CTRL 9} QUESTION ":PRIN
    T:PRINTA$(A)          :REM*245
62Ø GETKEYQ$:IFQ$<>"N"THEN62Ø
                          :REM*21Ø
63Ø SOUND1,3ØØØØ,2Ø,1,Ø,15ØØ,3:
    SOUND2,3ØØØØ,2Ø,1,Ø,15ØØ,Ø
                          :REM*148
64Ø WINDOWØ,24,39,24,1    :REM*62
65Ø PRINT"{2 CRSR DNs}{CTRL 1}{
    SHFT N}EXT-{CTRL 9}{SHFT N}
    {CTRL Ø}{2 SPACEs}{SHFT B}A
    CKUP-{CTRL 9}{SHFT B}{CTRL
    Ø}{2 SPACEs}{SHFT N}EW CATE
    GORY-{CTRL 9}{SHFT C}{CTRL
    Ø}{2 SPACEs}{SHFT Q}UIT-{CT
    RL 9}{SHFT Q}"        :REM*213
66Ø WINDOW 9,8,3Ø,15,1 :REM*1ØØ
67Ø PRINT"{SHFT CLR}"A".{2 SPAC
    Es}{CTRL 9}{2 SPACEs}{SHFT
    A}NSWER{2 SPACEs}":PRINT:PR
    INTB$(A)              :REM*48
68Ø GETKEYQ$:IFQ$="Q"THEN76Ø
                          :REM*229
69Ø GOSUB8ØØ              :REM*251
7ØØ IFQ$="C"THEN7Ø        :REM*93
71Ø IFA=XTHEN77Ø          :REM*217
72Ø IFQ$="N"THENNEXT      :REM*115
73Ø IFQ$<>"B"THEN68Ø      :REM*26
74Ø A=A-1:IFA<1THENA=1    :REM*1Ø6
75Ø GOTO58Ø               :REM*76
76Ø WINDOWØ,Ø,39,24,1:PRINTCHR$
    (27)+"L":END          :REM*4
77Ø PRINT"{SHFT CLR}{SHFT N}O M
    ORE QUESTIONS!!.{2 SPACEs}Q
    UIT OR CHOOSE ANOTHERCATEGO
    RY? ({SHFT Q}/{SHFT C})"
                          :REM*167
78Ø GETKEYQ$:IFQ$="Q"THEN76Ø
                          :REM*Ø
79Ø IFQ$<>"C"THEN78Ø:ELSE7Ø
                          :REM*47
8ØØ SOUND1,1ØØØØ,5,,,,2:RETURN
                          :REM*144
81Ø REM PLACE UP TO 12 SUBJECT
    HEADINGS IN DATA STATEMENTS
    -15 LETTERS MAX       :REM*147
82Ø DATA PLACE CATEGORIES,IN LI
    NES 82Ø               :REM*139
83Ø DATA AND 83Ø OF,LISTING 2!,
    ,RUN LISTING 1,FIRST TO CRE
    ATE,CATEGORIES.       :REM*4Ø
```

■

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RUN Literary Awards

RUN's writing contest turned up some excellent authors. Congratulations all around!

By MARK JORDAN

It was a dark and stormy night. The few rays of sunlight that had managed to break the day's relentless gloom had long since disappeared. A heavy *thud* aroused me from my work, and I reluctantly parted the curtain. A grizzled man retreated into the cold fog and a large satchel sat dripping on my doorstep. The *RUN* Writing Contest entries had finally arrived!

In truth, their arrival was not nearly so dramatic. The mail carrier brought them to me day after day in little packages, until I had over 150 submissions. Each contest category—fiction (both short and long), poetry and nonfiction (again, both short and long)—was well represented. Young and old, male and female, hacker and nonhacker joined in the pursuit of fame and fortune.

Entries were made on disks containing my program for publishing books on disk. (See "Dark and Stormy Night," May/June '91 *RUN.)* The program can read, display and print out files from an assortment of word processors with an interface that any reader will quickly understand.

Kudos

Please pardon the cliché, but there were no losers in this contest. I enjoyed all the entries, and *RUN* has recognized each author's achievement by mail. Some of the writers deserve special mention, even though they weren't selected as winners. Those kudos go to:

- Herbert Buell of Rensselaer, New York, for the most attractive disk sleeve (a jack-o'-lantern).
- Richard Bandelier of Fort Wayne, Indiana, for the most attractive disk label (ghosts).
- Richard Dyszel of Gaithersburg, Maryland, for the most attractive disk cover (folded, with the disk sleeve glued inside).
- Darian Rebb of Reidsville, North Carolina, for the most uniquely painted disks (all the way to the hole!).
- Edward Beer of Buena Park, California, for the most entries (six of them).
- Carole Castleberry of Springhill, Louisiana; Larry Beebe of Alturas, California; Allie Hunter of Grand Falls-Windsor, Newfoundland; and Nancy Black of Mount Vernon, Ohio, for submitting four or more entries.

The submissions showed a creative, thoughtful, industrious family of Commodore authors (some novices, to be sure, others professional in every respect) with a wide range of interests. In the fiction categories, I expected the large number of science fiction and sword-and-sorcery stories, but I didn't expect the many richly textured tales of romance and personal struggle. The range of topics in the nonfiction categories was encouraging. The biggest surprise, however, was the number and quality of entries in the poetry category.

Dos and Don'ts

Judging this contest has helped me understand what confronts first-readers, those people who read the manuscripts that come into publishing houses. If you wish to publish further, here is some advice:

- Do engage the reader, beginning with the first paragraph.
- Don't depend on style to hold the reader. Instead, depend on content. Tell a story.
- Do use correct grammar. To those wanting to write in dialect or slang, James Kilpatrick, author of *The Writer's Art*, offers "a word of sound advice: Lie down until the impulse goes away." (Our Grand Prize Winner, however, uses dialect quite effectively. Well done, Ms. Crain!)
- Do make your entire package attractive: the disk sleeve, the label, and the on-disk explanation of the written piece.
- Do put a plot in your fiction—one that builds some level of suspense to the end. All writing—even nonfiction—needs a discernable beginning, middle and end, with the sensation of crescendo and resolution.
- Don't write something others have already written. There are many ways to look at things—ways that others haven't tried.

As an author myself, I find that writing is one of the most challenging, frustrating, humbling, enlightening and rewarding tasks I have ever attempted. From the entire *RUN* staff, congratulations to each of you! ■

Mark Jordan is RUN's *128 Mode columnist and a frequent contributor to the magazine. He also teaches high school English, helping young and aspiring writers fulfill their destiny. (Well, maybe that's a little dramatic...)* ►

The Envelope Please...

Congratulations to these winners of the RUN *Writing Contest*

Grand Prize

Buccaneer Romance, *by Elizabeth Lane Crain*

Long Fiction

I—The Abaddon Faction, *by D. W. Skrabanek*
II—The Ghost Squad, *by Mary C. Fletcher*
III—The Power of His Medicine, *by Holly Sue Potthoff*

Short Fiction

I—Past Due, *by Douglas J. Lee*
II—Rude Awakening, *by James Pettit*
III—Crazy Hannah/Cry Wolf, *by Ann Klee*

Poetry

I—Poems from Life, *by Don Radler*
II—Parodize Lost, *by Warren Pease*
III—Death of Claude, *by Tom Bolling*
H—Shana's Poetry, *by Shoshana Olesen*

Long Nonfiction

I—Benghazi, by *Carole M. Castleberry*
II—Congress and the President, *by Don Radler*
III—Public Access: Homegrown Television, *by Kevin A. Komonyi*
H—Machine Language Tutorial, *by Reiner Richter*

Short Nonfiction

I—Cameras and Computers, *by Nancy A. Black*
II—Gardening for Beginners, *by Debbie Long*
III—Technoshort, *by Richard Dyszel*
H—21st Century Schizoid Class, *by Larry Hagney*

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Buccaneer Romance

Here's an excerpt from our Grand Prize winner.

By ELIZABETH LANE CRAIN



In rich, round Antillean tones, the pilot announced,

"I set you down at 4:37 sharp. How'll dot be?"

The passenger nearest me, a young black woman with a tiny baby at her breast, replied to the wall speaker,

"Dass fine, mon."

I looked out and saw land rising up: an endless white margin of beach dividing hills massed in green from the sea of utter turquoise. So far, Dragona was a Caribbean picture-postcard. So far, I still felt in control: Everything would be back to normal soon. This was just an interval, a little working vacation, and then I'd go home to Bob and stick Dragona on my refrigerator with a happy-face magnet.

I saw some buildings and then we were down and the doors were open and our baggage was there on the concrete. I stepped outside and was blasted. The air was soft and hot, the breeze buoyant, and my first sensation was that I was about to be picked up and borne away on it.

Nearby, two enormous coconut palms, their trunks crossing in a lazy 'x,' sprang up out of the pavement; they slap-slapped languidly in the muggy movement of the air. I was really here. I felt my face crumpling, and tears springing out, and I couldn't stop them.

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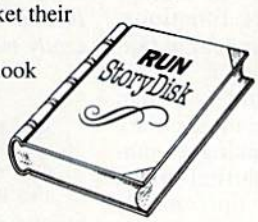
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HARDWARE GALLERY

This C-128 chip upgrade adds enhanced DOS functions plus other features to your escape and function keys.

BY JOHN RYAN

KEYDOS ROM

It's as if the developers found the best PD utilities and installed them on this EPROM chip.

With the C-128 sliding not-so-gracefully into its seventh year, you'd think that all possible ideas to rejuvenate it would have been tapped out by now. Right? Wrong.

Well . . . *maybe*. KeyDos, a 32-kilobyte ROM chip for the C-128 from Antigrav Toolkit, intends to put some more zip into your computer by introducing enhanced DOS functions and a host of other features that are available right from power-up.

Forget about plugging in cartridges (if you're like me, you probably already have at least a shoe box full of them) or booting routines from disk. KeyDos is a small Erasable Programmable Read Only Memory (EPROM) chip that installs directly on the 128's motherboard.

INSTALLATION

If you own a "flat" C-128 rather than a C-128D, then installing KeyDos involves a bit of soldering. If you're a bit squeamish about pulling apart your computer, have your local technician do the job, or install the chip in a 1700, 1764 or 1750 RAM Expansion Unit. Here again, the installation involves a bit of soldering and cutting a circuit jumper.

C-128D owners have the easiest installation: Simply pop off the computer's cover (five screws) and plug the chip into an empty socket.

In either case, be sure to exercise care when installing the KeyDos chip, because static electricity can severely damage the circuitry in your computer. Ground yourself by touching something metal before sticking your hands into your computer's innards, or, better yet, use a grounding strap, if you can find one.

Additionally, you need to exercise care when inserting the chip into the socket, or you might bend the pins. If you have the pins aligned correctly, it should take just a gentle nudge, pressing down on both sides of the chip with equal pressure.

The installation instructions that come with KeyDos are straightforward and easy to understand, and the documentation does a good job of explaining all of KeyDos's capabilities.

KEYDOS FUNCTIONS

Once installed, KeyDos's functions are activated by holding down the ALT key while resetting the computer. The heart of KeyDos is the way it reprograms the computer's function and escape keys. As for the commands that it assigns to these keys, they range from very useful to only slightly so.

At the touch of a function key you can display the directory on any one of your disk drives. You can then cursor up to a particular filename and run, rename or scratch the file, among other things.

Likewise, KeyDos functions manipulate 1581 partitions and subdirectories painlessly. You can also read in sequential files without disturbing memory, and perform a host of other DOS functions that would normally require a lot of typing.

Besides being able to scratch, rename or run programs with a key touch, you can also activate some very useful routines by pressing the ESCAPE key. Particularly interesting are methods to renumber disk drives (without having to reset them), a Basic un-new feature, text find/replace functions, and a very sophisticated machine language monitor and debugger.

Moreover, KeyDos includes a video manager that can easily manipulate the VDC chip. The video manager simplifies changing the resolution of the 80-column screen (either horizontally or vertically). It also lets you set the screen and character colors, as well as design your own cursor, if you are so inclined.

Rounding out some of the more useful KeyDos functions are a fast GEOS rebooting routine for C-128 REU users, full RAM expansion support (RAMdisk), an on-screen clock/ calendar, a screen dump utility, batch-file support, ASCII and Pet ASCII text converter routines, a file copier, and dual 80-column screens with full-screen editing support.

KeyDos uses a configuration file to define the function keys, and a compiler is included to let you define the keys as you wish.

COMPATIBILITY

KeyDos is compatible with JiffyDos and many other function ROMs. If compatibility problems arise, you can get around them by not activating KeyDos on power-up.

KeyDos *does not* enhance disk-drive performance. Neither is it meant to replace the computer's Kernal ROM.

At just over $32, it is a good value for the serious programmer or hacker. If you're only a casual user, however, you probably won't get much mileage out of some of the more powerful KeyDos functions.

It's almost as if the folks at Antigrav Toolkit sought out the best of the public domain utilities available for the C-128 and then installed them on this EPROM chip. This is not necessarily a bad thing, but I have to wonder, nevertheless, whether this product is too little too late. ■

John Ryan is a contributing editor to RUN, having written many articles, reviews and programs for the magazine. An air traffic controller for the U.S. Air Force, he recently moved to Sumter, South Carolina.

KeyDos (for the C-128)
Antigrav Toolkit
PO Box 1074
Cambridge, MA 02142
$32.50

Easy Bank Switching

More memory equals less worry with this bullet-proof bank-switching utility.

By GARY NOAKES

Scared of video bank switching? Many programmers are; after all, one incorrect Poke command can crash the program. But without bank switching, redefined characters will devour the C-64's memory.

Video Bank Setup (VBS) Generator takes the worry out of video banking. It does all the calculations to switch banks and relocate the screen and character set addresses, and then generates the Basic program that pulls the switch.

Type in VBS Generator from Listing 1, using *RUN*'s Checksum program on page 60 to look for typing errors. Then save VBS Generator to disk before running it, because it will erase itself after creating the new program.

A Little Input

When run, the generator asks which video bank you wish to use for your own program, then lists all the possible screen locations within that bank (excluding those under Basic and Kernal ROMs in bank 3). Enter your choice at the prompt. Next, it lists all the possible font addresses within the selected bank. Again, enter your choice. The last screen lets you check the starting and ending addresses, then either create the new program, start over or quit.

The generator rejects illegal or incorrect screen and font addresses. Illegal screen addresses are those that interfere with the Character ROM images in banks 0 and 2; illegal font addresses are those that either duplicate or overwrite the selected screen memory. Incorrect screen addresses are any not evenly divisible by 1024; incorrect font addresses are any not evenly divisible by 2048.

Although legal, font addresses 53248 and 55296 are beneath the I/O ROM, making it impossible to load to them from disk. Therefore, fonts must be poked into these addresses from Data statements. A prompt will remind you of this when the need arises. The generator also creates the code to reset addresses to the defaults as you exit your program.

Here are some things to remember when programming in a new video bank:

- In bank 1, 2 or 3, pressing RUN-STOP/RESTORE makes the cursor seem to disappear. Actually, the cursor and Basic go back to bank 0, leaving the Kernal's screen editor behind. Blindly type POKE 648,4 and press RETURN to redirect the Kernal and redisplay the cursor.
- When selecting bank 1 or 3, be sure that character data is available before switching or the screen will turn to garbage. The Character ROM is available only from banks 0 and 2.
- Any font loaded from disk or poked into memory with Data statements must have the same address as that shown in the line 20 created by the generator. Otherwise, your program might not be able to locate the font.
- Once the screen has been moved, poking characters to it requires the offset that appears in newly-generated line 30. For example, to poke a character to the bottom-right corner of the screen (normally address 2023), use POKE (OFFSET+2023). Pokes to color memory remain the same.
- The sprite pointers follow along when the screen moves. The new start-of-sprites pointer appears in newly-generated line 30.
- Newly-generated lines 10 through 30 are included only for your convenience. Once your program is completed, you can delete them. R

Gary Noakes lives in Landover, Maryland. This is his first program for RUN.

Listing 1. VBS Generator program. (Also available on the March/April ReRUN disk. To order, call 800-343-0728.)

```
10 REM VBS GENERATOR - GARY NOA
   KES                    :REM*244
20 POKE53280,0:POKE53281,0:PRIN
   T"{SHFT CLR}{CTRL H}"
                          :REM*248
30 L$="{COMD 8}{39 SHFT *s}"
                          :REM*118
40 E$="{39 SPACEs}":GOTO550
                          :REM*107
50 REM{2 SPACEs}-- SUBROUTINES
   --                     :REM*66
60 PRINT"{SHFT CLR}{CTRL 4}{39
   COMD @s}"              :REM*164
70 PRINT"{CTRL 9}{3 SPACEs}{CTR
   L 4}VIDEO BANK SETUP (VBS) G
   ENERATOR{4 SPACEs}":RETURN
                          :REM*204
80 N$="":POKE198,0        :REM*155
90 GETG$:PRINT"{COMD 8}{CTRL 9}
   {SHFT Q}{CTRL 0}{CRSR LF}{SH
   FT Q}{CRSR LF}";:IFG$=""THEN
   90                     :REM*246
100 IFG$=CHR$(13)THENPRINT" ":R
   ETURN                  :REM*123
110 IF(G$=CHR$(20)ANDLEN(N$))TH
   ENN$=LEFT$(N$,LEN(N$)-1):GO
   TO140                  :REM*127
120 IF(LEN(N$)=>L)OR(G$<"0"ORG$
   >"9")THEN90            :REM*223
130 N$=N$+G$               :REM*43
140 PRINT"{CTRL 4}"G$;:GOTO90
                          :REM*131
150 POKE214,17:PRINT:PRINTL$:RE
   TURN                   :REM*70
160 IFVB=0ORVB=2THENRETURN
                          :REM*206
170 IFVB=3THEN190         :REM*40
180 PRINTL$:PRINT"{CTRL 4}CHARA
   CTER ROM AVAILABLE AT 36864
   -40959":GOTO200        :REM*3
190 PRINTL$:PRINT" {CTRL 4}CHAR
   ACTER ROM AVAILABLE AT 4096
   -8191"                 :REM*185
200 PRINT"{COMD 3}NO SCREEN/FON
   T DATA AT THESE LOCATIONS!"
```

```
    :GOTO27Ø                :REM*48
21Ø GOSUB15Ø:PRINT"{COMD 3}SCRE
    EN AND FONT ADDRESSES CANNO
    T MATCH!"               :REM*22
22Ø PRINT"SELECT ANY FONT ADDRE
    SS EXCEPT:{COMD 8}"SA:GOTO2
    7Ø                      :REM*17
23Ø GOSUB15Ø:PRINT"{COMD 3}THE
    FONT WILL OVERWRITE SCREEN
    MEMORY!"                :REM*138
24Ø PRINT"SELECT ANY FONT ADDRE
    SS EXCEPT:{COMD 8}"FA:GOTO2
    7Ø                      :REM*2Ø8
25Ø GOSUB15Ø:PRINT"{COMD 3}{2 S
    PACEs}ADDRESS IS LEGAL BUT
    DATA CANNOT BE{2 SPACEs}"
                            :REM*24Ø
26Ø PRINT" LOADED! IT MUST BE P
    OKED IN!{2 SPACEs}{CTRL 4}O
    K? Y/N "                :REM*233
27Ø PRINTL$:RETURN          :REM*95
28Ø POKE214,17:PRINT:FORI=1TO4:
    PRINTE$:NEXT:RETURN:REM*146
29Ø GOSUB6Ø:PRINT"{CTRL 9}{3 SP
    ACEs}* SCREEN ADDRESSES IN
    THIS BANK *{3 SPACEs}"
                            :REM*2Ø5
3ØØ PRINT"{2 CRSR DNs}{COMD 8}E
    NTER THE SCREEN ADDRESS:":P
    RINTL$"{CRSR DN}{CTRL 4}"
                            :REM*194
31Ø FORX=SMTOEMSTEP1Ø24:PRINTX,
    :NEXT                   :REM*221
32Ø PRINT:PRINTL$:GOSUB16Ø
                            :REM*145
33Ø POKE214,22:PRINT:PRINT"{COM
    D 8}SCREEN ADDRESS:{8 SPACE
    s}{7 CRSR LFs}";        :REM*218
34Ø L=5:GOSUB8Ø:IFN$=""THEN33Ø
                            :REM*213
35Ø SA=VAL(N$):ES=SA+999
                            :REM*193
36Ø IFSA<SMORSA/1Ø24<>INT(SA/1Ø
    24)ORSA>EMTHEN33Ø       :REM*34
37Ø IF(SA>4Ø95ANDSA<8192)OR(SA>
    36863ANDSA<4Ø96Ø)THEN33Ø
                            :REM*116
38Ø RETURN                  :REM*8
39Ø GOSUB6Ø:PRINT"{CTRL 9}{4 SP
    ACEs}* FONT ADDRESSES IN TH
    IS BANK *{4 SPACEs}":REM*56
4ØØ PRINT"{2 CRSR DNs}{COMD 8}E
    NTER THE FONT ADDRESS:":PRI
    NTL$"{CRSR DN}{CTRL 4}"
                            :REM*177
41Ø FORX=CATOECSTEP2Ø48:PRINTX,
    :NEXT                   :REM*2Ø3
42Ø PRINT:PRINTL$:GOSUB16Ø
                            :REM*245
43Ø POKE214,22:PRINT:PRINT"{COM
    D 8}FONT ADDRESS:{8 SPACEs}
    {7 CRSR LFs}";          :REM*2Ø7
44Ø L=5:GOSUB8Ø:IFN$=""THEN43Ø
                            :REM*96
45Ø FA=VAL(N$):EF=FA+2Ø47
                            :REM*242
46Ø IFFA<CAORFA/2Ø48<>INT(FA/2Ø
    48)ORFA>ECTHEN43Ø       :REM*113
47Ø IFFA=SATHENGOSUB21Ø:GOTO43Ø
                            :REM*254
48Ø IFFA<SAANDEF>ESTHENGOSUB23Ø
    :GOTO43Ø                :REM*16Ø
49Ø IFFA=53248ORFA=55296THENGOS
    UB25Ø:GOTO51Ø           :REM*17
5ØØ RETURN                  :REM*128
51Ø GETG$:IFG$<>"Y"ANDG$<>"N"TH
    EN51Ø                   :REM*86
52Ø IFG$<>"Y"THENGOSUB28Ø:GOTO4
    3Ø                      :REM*211
53Ø RETURN                  :REM*162
54Ø REM{2 SPACEs}-- MAIN PROGRA
    M --                    :REM*22
55Ø GOSUB6Ø:PRINT"{CTRL 9}{9 SP
    ACEs}* SELECT VIDEO BANK *{
    9 SPACEs}"              :REM*146
56Ø PRINT"{2 CRSR DNs}{COMD 8}E
    NTER THE NUMBER OF THE VIDE
    O BANK:":PRINTL$        :REM*249
57Ø PRINT"{2 SPACEs}{COMD 3}BAN
    K:"SPC(12)"MEMORY RANGE:":P
    RINTL$                  :REM*78
58Ø PRINT"{CRSR DN}{4 SPACEs}{C
    TRL 4}Ø"SPC(18)"Ø - 16383"
                            :REM*65
59Ø PRINT"{4 SPACEs}1"SPC(14)"1
    6384 - 32767"           :REM*144
6ØØ PRINT"{4 SPACEs}2"SPC(14)"3
    2768 - 49151"           :REM*233
61Ø PRINT"{4 SPACEs}3"SPC(14)"4
    9152 - 65535{CRSR DN}":PRIN
    TL$                     :REM*167
62Ø PRINT"{CTRL 4}THE CHARACTER
     ROM IS:"               :REM*114
63Ø PRINTSPC(12)"{COMD 8}AVAILA
    BLE {CTRL 4}IN BANKS Ø AND
    2"                      :REM*95
64Ø PRINTSPC(1Ø)"{COMD 3}UNAVAI
    LABLE {CTRL 4}IN BANKS 1 AN
    D 3":PRINTL$            :REM*241
65Ø POKE214,22:PRINT:PRINT"{COM
    D 8}VIDEO BANK:{8 SPACEs}{7
     CRSR LFs}";            :REM*166
66Ø L=1:GOSUB8Ø:IFN$=""THEN65Ø
                            :REM*81
67Ø B=VAL(N$)+1:IFB<1ORB>4THEN6
    5Ø                      :REM*157
68Ø ONBGOTO69Ø,71Ø,73Ø,75Ø
                            :REM*175
69Ø VB=3:SM=1Ø24:EM=1536Ø:GOSUB
    29Ø                     :REM*8
7ØØ CA=2Ø48:EC=14336:GOSUB39Ø:G
    OTO77Ø                  :REM*43
71Ø VB=2:SM=16384:EM=32767:GOSU
    B29Ø                    :REM*33
72Ø CA=16384:EC=3Ø72Ø:GOSUB39Ø:
    GOTO77Ø                 :REM*148
73Ø VB=1:SM=32768:EM=39936:GOSU
    B29Ø                    :REM*143
74Ø CA=32768:EC=471Ø4:GOSUB39Ø:
    GOTO77Ø                 :REM*54
75Ø VB=Ø:SM=49152:EM=52224:GOSU
    B29Ø                    :REM*19
76Ø CA=49152:EC=6144Ø:GOSUB39Ø
                            :REM*92
77Ø GOSUB6Ø:PRINT"{CTRL 9}{1Ø S
    PACEs}* FINAL APPROVAL *{11
     SPACEs}"               :REM*23Ø
78Ø PRINT"{2 CRSR DNs}{COMD 8}V
    BS WILL USE THESE ADDRESSES
    :":PRINTL$              :REM*234
79Ø PRINT"{6 SPACEs}{CTRL 4}VID
    EO BANK SELECTED: {COMD 3}"
    3-VB                    :REM*45
8ØØ PRINT"{CRSR DN}{4 SPACEs}{C
    TRL 4}SCREEN ADDRESS: START
    : {COMD 3}"SA           :REM*54
81Ø PRINTSPC(22)"{CTRL 4}END: {
    COMD 3}"ES              :REM*138
82Ø PRINT"{CRSR DN}{6 SPACEs}{C
    TRL 4}FONT ADDRESS: START:
    {COMD 3}"FA             :REM*223
83Ø PRINTSPC(22)"{CTRL 4}END: {
    COMD 3}"EF:PRINTL$      :REM*18Ø
84Ø PRINTSPC(12)"{CRSR DN}SELEC
    T OPTION:"              :REM*234
85Ø PRINTSPC(12)"{CRSR DN}[{COM
    D 3}G{COMD 8}]{CTRL 4}ENERA
    TE VBS"                 :REM*149
86Ø PRINTSPC(12)"{COMD 8}[{COMD
     3}S{COMD 8}]{CTRL 4}TART O
    VER"                    :REM*197
87Ø PRINTSPC(12)"{COMD 8}[{COMD
     3}Q{COMD 8}]{CTRL 4}UIT PR
    OGRAM"                  :REM*33
88Ø GETG$:IFG$=""THEN88Ø
                            :REM*137
89Ø IFG$="G"THEN94Ø         :REM*76
9ØØ IFG$="S"THENCLR:GOTO3Ø
                            :REM*41
91Ø IFG$="Q"THENPRINT"{SHFT CLR
    }{COMD 8}":END          :REM*112
92Ø GOTO88Ø                 :REM*252
93Ø REM{2 SPACEs}-- GENERATE VB
    S PROGRAM --            :REM*252
94Ø PRINT"{SHFT CLR}{CTRL 1}{3
    CRSR DNs}NEW{COMD 8}"
                            :REM*34
95Ø PRINT"{2 CRSR DNs}1Ø REM SC
    REEN ADDRESS: START ="SA":
    END ="ES": VIDEO BANK ="3-V
    B                       :REM*112
96Ø PRINT"2Ø REM{3 SPACEs}FONT
    ADDRESS: START ="FA": END =
    "EF                     :REM*139
97Ø PRINT"3Ø REM{4 SPACEs}SCREE
    N POKE OFFSET ="SA-1Ø24": S
    PRITE POINTERS ="SA+1Ø16
                            :REM*173
98Ø PRINT"4Ø P{SHFT O}56578,P{S
    HFT E}(56578)OR3:P{SHFT O}5
    6576,(P{SHFT E}(56576)AND25
    2)"                     :REM*135
99Ø IFVB>ØTHENPRINTSPC(9)"{CRSR
    UP}OR"VB                :REM*194
1ØØØ PRINT"5Ø P{SHFT O}53272,(P
    {SHFT E}(53272)AND15)"
                            :REM*236
1Ø1Ø V=((SA-SM)/1Ø24)*16:IFV>ØT
    HENPRINTSPC(27)"{CRSR UP}O
    R"V                     :REM*99
1Ø2Ø PRINT"6Ø P{SHFT O}648,"SA/
    256":?"CHR$(34)"{SHFT CLR}
    "CHR$(34)":P{SHFT O}53272,
    (P{SHFT E}(53272)AND24Ø)"
                            :REM*17
1Ø3Ø V=INT(((FA-SM)/2Ø48))*2:IF
    V>ØTHENPRINTSPC(5)"{CRSR U
    P}OR"V                  :REM*189
1Ø4Ø PRINT"1ØØØ REM GOTO 1Ø01Ø
     RESETS PRG TO DEFAULT SCR
    EEN & CHAR LOCATIONS"
                            :REM*53
1Ø5Ø PRINT"1Ø01Ø P{SHFT O}56578
    ,P{SHFT E}(56578)OR3:P{SHF
    T O}56576,(P{SHFT E}(56576
    )AND252)OR3"            :REM*17Ø
1Ø6Ø PRINT"1Ø02Ø P{SHFT O}53272
    ,21:P{SHFT O}648,4:P{SHFT
    O}5328Ø,14:P{SHFT O}53281,
    6:P{SHFT O}646,14:END"
                            :REM*179
1Ø7Ø PRINT"{CRSR DN}{CTRL 4}SAV
    E"CHR$(34)"VIDEO BANK SETU
    P"CHR$(34)",8{COMD 8}{HOME
    }"                      :REM*74
1Ø8Ø POKE631,13:POKE632,13:POKE
    633,13:POKE634,13:POKE635,
    13:POKE636,13           :REM*1Ø4
1Ø9Ø POKE637,13:POKE638,13:POKE
    639,13:POKE64Ø,13:POKE198,
    1Ø                      :REM*142 ■
```

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SOLID PRODUCTS . . . SOLID SUPPORT

128 Mode

This little program lets your C-128 show its stuff—on two monitors at a time.

By MARK JORDAN

THE VDC (video display controller) chip is the video brains behind your C-128's 80-column capabilities. When the 128 first came out, this chip was the main reason I rushed to buy one; I was fed up with the C-64's limited 40-column text display. What a step forward in technology it was to view text as it would appear on the printed page (at least somewhat).

Well, recently I discovered a need to step backward in technology, when I was asked to be a judge in *RUN*'s writing contest. As a high school English teacher, I thought this would be an excellent opportunity to show students the writing process from the umpire's perspective. So I hauled my C-128 into the classroom, hooked it up to a VCR that fed into a 27-inch monitor, and booted up one of the contest entries I considered quite good.

One or the Other

It worked great...with one minor glitch: I couldn't use my computer monitor to read the text aloud while the class looked at the big screen, because the big screen hogged the video. I was forced to sit in front of the big screen (which sat atop a 6-foot-tall cart), my back to the class, while a student at the blind computer pressed the next-screen key every time I signaled.

I didn't mind the crick in my neck or the inefficient calls for "next screen," but having my back to the class was really more than I could bear. (It's not that I don't trust my students; it's just that I...don't *trust* them, if you know what I mean.)

In spite of these agonies, the experience of using my Commodore as a presentation device suddenly opened new doors in my brain. In today's world of VCRs and 27-inch monitors, the C-128's easily-exploited composite video output (which you don't get with any other computer without special hardware) is a natural companion. It occurred to me that I might just put my overhead projector to rest forever. Wow, why hadn't I thought of that before?

Of course, there remained that one problem of a blank computer monitor. Anyone, not just a teacher, doing a video presentation with a computer/monitor hookup would want a private screen so they could face their audience. I could envision some sort of video splitter solving the problem, but I rejected that idea because 1) I'm not the hardware type—I hate messing with wires; 2) it would cost money; and 3) you and I both know where the fittings would be everytime I needed them: elsewhere.

Writing the Program

That meant finding a software solution. And guess what—with the C-128's dual video modes, it was easy to do. My plan was to create a machine language routine that would copy the VDC (80-column) display to the VIC (40-column composite) display, and vice versa. That way I could use my computer monitor in VDC mode, and the VCR monitor in VIC mode. I didn't have to buy new cables or mess around with wires.

There were obstacles, to be sure. One was speed: How could a routine that copied more than 2000 bytes of data (both the text and the attributes) between the VDC and VIC be fast enough to avoid bogging down the whole operation? Solution: Don't copy continuously—just when needed.

The second obstacle was that the two modes have different screen widths—80 columns versus 40 columns. Solution: Use the VDC's little-known double-pixel mode to make the 80-column screen look like it has only 40-columns. If that sounds stupid, my endeavor showed one good reason for it, and there are more.

The result of my effort is a little machine language program that I find very useful, and I hope you do, too. You'll type it in as a Basic loader (Listing 1), and the typing won't take much time, because the machine language is only 415 bytes long. Be sure to use the Checksum program on page 60. Save the program, then run it. You'll hear the disk drive kick in after a moment, saving the machine language version that you'll use.

Load that version with BLOAD "VIC/VCD". Then call it by typing SYS 3328. Anytime you hit RUN-STOP/RESTORE, you'll need the SYS again.

Three Keystrokes for Two-Screen Folks

This isn't an interrupt-driven routine; it works by adding commands to the Escape vocabulary. To wit, the following keystroke commands:

ESCAPE/TAB: Copy one screen to another.

ESCAPE/← (back-arrow): Toggle the copy direction (VIC to VDC, or vice versa).

ESCAPE/+ (plus sign): Set 80-column mode to double-width.

The first of these options allows you to copy your present screen, whether VIC or VDC, to the other. For my class presentation, each time I displayed a new screen on my personal monitor I pressed ESCAPE/TAB to copy it to the big screen.

The second option lets you reverse the copy direction, from the VIC to the VDC or vice versa. My chore called for copying from VDC to VIC, but there are many possibilities for going the other way. For instance, copying a screen of text to the other video source is a way of preserving it temporarily.

The third option switches your 80-column display into double-pixel mode.

Oh, by the way, you don't need two monitors hooked up to test this little program. Just flip your display button back and forth. However, be sure to put your computer in Slow mode (type SLOW and press RETURN) if you want to see the composite output.

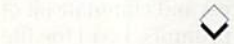
The program resides in memory locations 3072 to 3487, so it's incompatible with any software that uses that area. You'll just have to try it out with your word processor to see if it works. It definitely runs in Direct mode and can be incorporated into any software you write.

Continued on p. 63.

RUN it right: **C-128 (40- and 80-column modes)**

12 Handy Tips For Beginning Programmers

Add these helpful hints to your repertoire of programming skills.



A Many-Colored Thing

To change the background color (64/128, 40 columns) type: POKE 53281,X
To change the background color (128, 80 columns): COLOR6,X
To change the border color (64/128, 40 columns): POKE 53280,X
To change the cursor color (64): POKE 646,X (X=0 TO 15)
To change the cursor color (128, 40 or 80 columns): COLOR5,X (X=1 TO 16)

A Blockbuster

When using the C-64, instead of typing LOAD"$",8 and LIST to check how many blocks are free on a disk, use LOAD "$0:",8 followed by LIST, and you won't have to wait for all the filenames to appear.

Auto Load & Run

If you are a C-128 owner, or if you own a C-64 with JiffyDOS, FastLoad, or another utility cartridge, you can automatically load and run the first Basic program on your disk. Simply insert the disk into your drive and then press the SHIFT and RUN-STOP keys simultaneously. No need to type the Load or Run command. Remember: C-64 owners can take advantage of this only if they have a utility cartridge.

The 40–80 Switch

To switch between 40 and 80 columns from within a program, type SYS 65375 and press the RETURN key. Or press ESCAPE/X.

A Time-and-Space Saver

To save space and speed up your Basic programs, use multiple statements per line, separated by a colon.

Slow Mode-tion

To vary the speed of a program listing in 128 mode, press ESCAPE/A to select Insert mode. Your listings will now scroll very s-l-o-w-l-y until you hit ESCAPE/C, RESET or RUN-STOP/RESTORE, all of which will return you to normal speed.

In the Driver's Seat

When you put your 128D in 64 mode, either by turning it on with the COMMODORE key pressed or by typing GOTO 64, be sure that your drive is in the correct mode also. To do this, press the drive reset button or enter:

```
OPEN 15,8,15, "U0>M0":CLOSE 15
```

Quitting Quote Mode

To move the cursor in Quote mode, press SHIFT/RETURN. This will bring you down to the next line without entering the line you just typed into memory.

To quit the Quote mode on the C-128, just press the ESCAPE key twice.

Print-Statement Flasher

You can flash any Print statement in the C-128's 80-column mode by adding a CHR$(15) or a CONTROL/O between the PRINT and the quotation mark.

For 1902A Owners

For a clearer screen and increased resolution on your 80-column C-128, type:

```
POKE 54784,9:POKE 54785,232
```

Making a New Start

To "cold start" your C-64 or C-128 in 64 mode without turning the computer off, type SYS 64738 whenever the cursor is blinking. On the C-128, in 128 mode, SYS 16384 will work also, in 40- or 80-columns.

If at First . . .

Here are three ways to run a machine language program: First, try typing LOAD "FILENAME",8,1 {RETURN}, and then RUN {RETURN}. If that doesn't work, type SYS 49152 in Direct mode when the screen says READY. This is the starting address of many machine language programs. If all else fails, you can learn the starting address of a machine language program by using RUN Shell or a similar utility. Once you have the program's address, just type SYS and the address. ■

ProTips

Boost your productivity with hints on Fleet System 4, Font Master II and Flexidraw.

By JANICE GREAVES

FLEET SYSTEM: I discovered this tip for the Fleet System 4 word processor by accident. As a convenient way to remember filenames, I put the FS format symbol ESCcm:FILENAME at the top of each file.

Then I discovered that you can get that line to appear on the Recall, Store, Insert command if you move the cursor to the first letter of the filename and hit SHIFT-CLR/HOME for "Recall, Store, Insert" and select the mode and drive number, then hit the UP-ARROW key.

This will avoid mistyping the filename, so the file is always stored correctly.

—JACK FOURNIER
VENICE, FL

OKIMATE 20: I finally discovered what "thermal paper" is! They don't tell you in the manual, but it's just fax paper. The best thing about it is that you don't have to use a ribbon to print with it. The Okimate 10 also works with fax paper.

—ROBERT TRAYLOR
MOORE, OK

PAPERCLIP III: CMD hard drive users will be surprised to learn that files load more quickly using Paperclip's built-in fast loader than they do when relying on CMD's parallel option (available only with RAMLink). To get the quickest document loading and saving times, make sure to turn parallel operation off (@p0). Otherwise, Paperclip won't even run from the hard drive.

—MICHAEL HABERMANN
BALTIMORE, MD

PAPERCLIP III: To get a slow scroll in Paperclip III, press SHIFT and then keep the RETURN key held down until you want to stop.

—MICHAEL HABERMANN

WRITE STUFF 128, WITH A 1571 AND A 1750: In the September/October 1991 ProTips, I saw a tip about autoloading The Write Stuff 128 using a 1581 and a 1750. I've modified that advice so it can apply to a 1571. Here is my revised version of the tip:

If you have a 1571 drive and put the dictionary in your 1750 REU, you can automate the process and eliminate all of the disk insertion prompts. Load the file RAM FC from Basic and list it. Remove the Print command in line 90 and delete line 95. In line 110, if you use the large dictionary, leave it as is; if you use the small dictionary, replace the "*" with "-u." This will only load the small dictionary from the disk. Replace line 150 with GOTO 120. Remove the PRINT in line 155 and replace GETKEYA$ with GOTO 157, also in line 155.

Scratch the old RAM FC, and then save the modified version using the same name (RAM FC).

This will work only if you have your Write Stuff program and the dictionary on the same disk. I strongly recommend that you make a working copy of your Write Stuff disk and use it instead of your original. I've made all the changes on my backup disk and it works very well. The best part is when you insert your Write Stuff disk and turn on your 128. The very next screen you see is the program with everything you use loaded up and ready to go.

—ROY JOHNSON
MEMPHIS, TN

FONT MASTER II: Xetec's Font Master II (for the C-64) is an excellent word processor, especially for camera-ready publishing, since its typewriter-size printing (9-point) is much better than the similar sized printing produced by GEOS or Newsroom. I've worked with FontMaster II for four years and have some useful suggestions.

Precautions must be taken when using FM's Font Creator, to avoid corrupting files. If you have a Fast Load cartridge, remove it before loading the Font Creator. The Font Creator has a glitch in its Save-with-Replace function. Therefore, it is better to save a modified font under a temporary filename, and then use a directory editor to erase the original font and change the name of the edited font.

I have also found it useful to print out samples of different settings of the CS (character spacing) command, because different printers have slightly different results. I printed samples of both regular and compressed type. I also worked up a table of the equivalents of various LI settings to LS settings, as these also differ among printers.

One last warning: As I mentioned, the Save-with-Replace command in FM's word processor has a problem. If your first attempt at saving and replacing a file fails (if, for instance, there isn't a disk in the drive), then repeating the command sometimes erases the file from the disk—as it is supposed to do—but then saves nothing in its place! Therefore, use the Save command a third time, then read the directory to make sure it worked.

—BERNARD SUSSMAN
WASHINGTON, D.C.

FLEXIDRAW: You can transfer images from photographs and pictures without the hardened skills of an artist or the expense of a scanner by using the following technique. If the image can physically fit within your screen area, find the local art supply store and ask for "treated acetate," several fine-tipped permanent markers and a small roll of drafting tape.

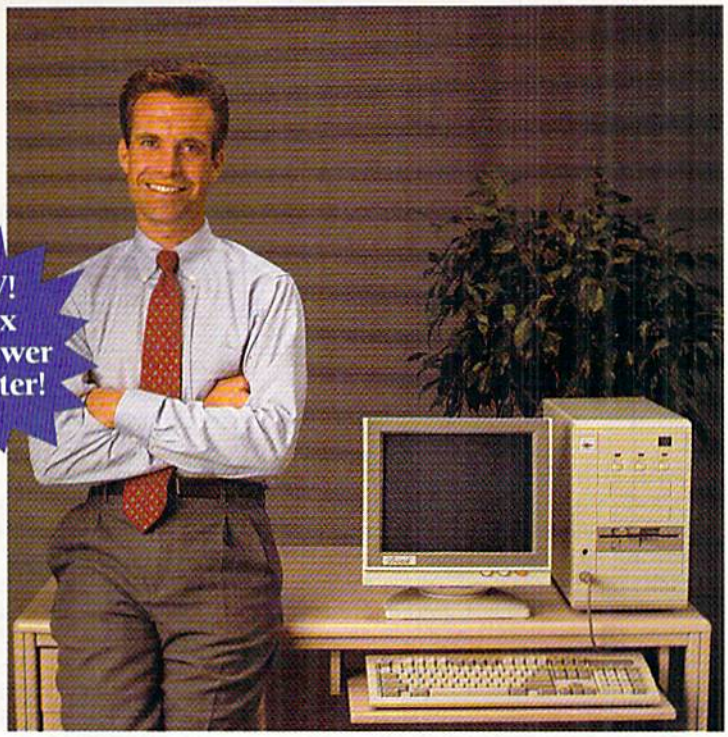
The acetate comes in clear 9 × 12-inch single sheets or large rolls, which can be easily cut. It's coated with an invisible film to allow ink to dry on the surface. Simply trace the desired images onto the acetate with a marker and then use the low-stick drafting tape to tack the acetate tracing to your monitor screen after loading your Flexidraw program.

When the program prompts you to touch the screen with the light pen, make sure that there is acetate over the program's calibration line so that the pen will "read" through the film. Some adjustment of your screen's brightness level may be needed.

Now you can use the light pen to retrace your image. If you draw carefully, you will be able to produce a reasonably accurate screen copy of your image. ■

—PEDRO BELL
CHICAGO, IL

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GEOWATCH

It's amazing how much you can learn by taking on a challenging project. Here are some time-savers (and life-savers) that I've discovered.

By STEVE VANDER ARK

I WAS HIRED RECENTLY to type a doctoral dissertation using GEOS. At first, I wondered if GEOS could meet the exacting specifications of a university psychology department. Along the way, I pushed myself, my Commodore and GEOS farther than I had before, with advanced computing techniques, sophisticated hardware and state-of-the-art software.

Needless to say, it wasn't all smooth sailing, and I learned a lot. The following tips made the project much less stressful, and far more productive.

GEOS BOOT DISKS: Berkeley was kind enough to supply GEOS users with two boot disks (in case one gets eaten by your gerbil, or your two-year-old). But when my system disk mysteriously lost the first two files, rendering it useless, I started to worry. I hadn't done anything overtly stupid, it just happened. If it can happen once, it can happen again, and without GEOS I lose access to all of my files!

That was enough to convince me to buy a copy of Maverick, the archive/copy/utility program. It provides routines to create your own boot disks using your original as the source. Now I have a 1571 double-sided boot disk with just the right combination of applications, fonts and utilities to keep everything where I want it. And I know that if anything goes wrong, I still have the original disk safely tucked away.

GEOS WITH AN REU: When you start using a RAM expansion unit, you quickly develop your own routines for loading it with your applications upon booting up. This usually means placing a work disk in the drive and hitting COMMODORE-K for a disk copy.

While this is certainly a viable method, you will often spend time copying files you really don't need for the task at hand. When writing a letter, for instance, why load the REU with display fonts that you keep handy for geoPublish? Why load geoWrite when you're going to be using geoPaint?

Some users have a separate disk for each application, which does help, but there is an even better way, which is especially helpful if you use a 1571 or a 1581, with their larger storage capacities. Get Batch-Copier by Jim Collette, either from *RUN*'s premium download section of Q-Link, or by buying *RUN*'s GEOS Companion disk (see the catalog in this issue). With this ingenious program you can create "command files" to place on the first page of your disk directory.

These files, when double clicked, will load the files listed in them to the opposite drive. You can make a command file for each particular task that requires setting up RAM. For example, your geoWrite command file will list geoWrite, plus the fonts, text and photo manager you commonly use with it. In addition, Batch-Copier blanks the screen for maximum speed—it's much faster than the copy routines available from the deskTop.

Now just one disk and one quick click of the mouse will set you up every time!

CATALOGING GEOS DISKS: If you've ever tried to use a cataloging utility on GEOS disks, you've already found that GEOS uses a different form of ASCII coding than other Commodore disks. As a result, the filenames won't work with most cataloging programs.

There are several GEOS-environment replacements, however. None of them goes so far as to make an alphabetical database of the results (that's a challenge for some clever GEOS programmer out there . . . make it create its own geoFile document!), but they do give you a listing of the disk contents.

Nick Vrtis of Kentwood, Michigan, has written GetDirectory, which creates a text scrap out of the directory of a GEOS disk. Directory Label from Storm Systems prints out a three-column label-sized directory list that you can affix to the disk jacket or cut out and slip inside with the disk.

John Howard's GeoList 2.0 prints out the directory, complete with notes and author information. Each of these files is available on Q-Link. They're shareware, so you must send the appropriate payment to the author if you decide to use the program.

BOOTING GEOS: If you use GEOS 64, you probably wish you could autoboot GEOS the way the 128 can. If you use GEOS 64 on a 128, you're even more aware of how convenient this feature would be. While a true autoboot is not possible, you *can* have the next best thing with that old faithful Fast Load cartridge. It will allow you to get GEOS up and running with one simple key combination (RUN-STOP/COMMODORE). And if you're using GEOS 64 on the 128, the cartridge will put you in 64 mode upon power-up; there's no holding down the COMMODORE key while you flip the switch, no GO64 commands.

Of course, if you're using an REU, you're out of luck, since your cartridge port is occupied, but the added RAM is well worth a little extra typing.

GATEWAY 64/128: Once you get used to the way this new program handles your GEOS environment, you might not want to go back to the deskTop. Once in a while, however, you might find yourself wishing for the old ways—especially when it comes to maneuvering files around the directory. More often than not, the best you can manage is to swap one file for another. And since there's no border, you have to pick up each file individually, scroll through the directory, place that file, then scroll back to where you came from.

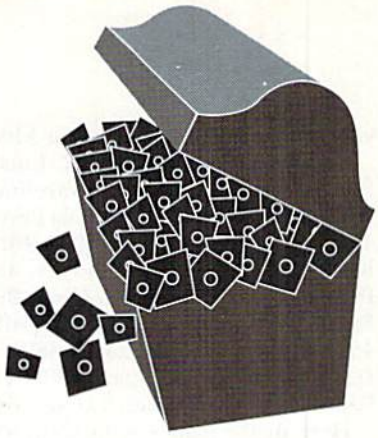
But it really isn't necessary to rearrange the directory very often, since the new file list is entirely in memory at once, and the slider and the scroll arrows make any part of the listing accessible very quickly. The only time that I've run into trouble is when I wanted to rearrange fonts to get the correct six or seven first on my disk. Because they were scattered around the directory, it was very time consuming to put them in order.

The solution to my dilemma was to use the View menu to view only fonts. The resulting list was small enough to make the task a cinch! ■

GOLD MINE

Gain an (unfair!) advantage with these clever game tips from fellow RUN *readers.*

By LOUIS F. SANDER



BARD'S TALE III: Before you teleport to Malefia, you have to carry all the special magic items that the Old Man asked you to recover from each dimension (Valarian's Bow, the Belt of Alliria, and so on). Scattered in Malefia you will find statues of the special characters from each dimension (Lanatir, Ferofist, and so forth). To get some clues and enter Tarjan's dimension, use the item that belongs to each character over their statue.

It's absolutely necessary that you bring a thief with your party, because no one else can kill the mad god. Before you fight with Tarjan, you will fight with his allies. Save spells and harmonic gems until you face Tarjan himself.

—CUAUHTEMOC F. RAMIREZ
TLALNEPANTLA, MEXICO

BLOCKBUSTER: Here's a list of codes for playing at higher levels (first the code, then the level): SYCO, 11; TORK, 21; UBIK, 31; RRAP, 41; YOGI, 51; GIJO, 61; MATT, 71.

If you have a cartridge with a reset button that allows you to enter pokes, here's a poke for unlimited lives: POKE 11856,165. When you have unlimited lives, you can't use the F1 and F7 combination to stop the game.

—MIKE MORROW
WILLOWS, CA

BOULDERDASH: On level 3, go down to the lower-left corner of the first cage, leaving one space between you and the cage. Wait until the firefly is in the upper-left corner of the cage, then run in through all four cages without stopping. If you do it correctly, you'll get all four diamonds and leave the fireflies going in circles.

—LLOYD BEACHY
NAPPANEE, IN

CASTLEVANIA: On level 1, in the room with the vampire bat, there's a platform with two blocks. Hit the last block and you'll get a double shot. In the room after the fish men, hit the small blocks and you'll find a pork chop.

In the first room on level 2, go up the stairs and walk to the wall. Hit the two blocks and wait in the hole for the crown. This will give you extra points. After the first door on this level, go past the Medusa heads, stand on the first platform, and wait a few seconds. A chest will appear behind you. In the room with the spiked crushers, go down the first step and hit it. You'll get another pork chop.

In level 3, on the platform where the second hunchback sits, there's another pork chop. Hit the block and it will appear. There's another one in the room with the Mummy Man; go down the stairs and hit the last block.

—DANIEL FRAWLEY
MEMPHIS, TN

CRAZY CAR: On level 3, start the car right away. Other cars won't pass you, and you'll have a greater chance of getting to level 4. If you can do this on all the levels, and you have good control and a steady hand, you should be able to win the game. Be careful to stay off the edges of the tracks, because they will slow you down.

—HALIS SANTANA
BROOKLYN, NY

DAN DARE: To finish this game, you must open all three doors to the underground fortress. Use weeds to breath through when searching underwater, and don't kick anything there. Throw the fruit for the torch. When aiming the laser with the reflectors, follow the path of the reflectors. If you don't end up back at the laser, you messed up!

Fight lots of Treens—they give you valuable keys. To beat Mekon, move in close, hold down the button, and pull the stick right. When his fortress is gone, run like the wind back to your ship.

—JEFF JONSSON
SURREY, BRITISH COLUMBIA

F-14 TOMCAT: Training exercises are far tougher than any other dogfights. Here's a foolproof method for winning most of them.

As soon as you hear "Fight's on," switch to full throttle and perform a split-S (one of those training maneuvers you thought you'd never use). When you come out of this maneuver, quickly switch to guns and make a hard break to one side. If you can't find your opponent, break the other way. When you find him, he will be close enough for a gunshot. With practice, you'll never miss.

—JASON CROME
GENOA, IL

GOLDEN AXE: In level 1, the enemies need to be knocked down three times. To save time, you can jump and attack them or head-butt them. Do the same thing to the bosses, but be careful. If you don't attack them properly, they can swing your weapon and you'll lose a bar.

You can get more magic very easily. After you get three enemies, they'll run off the screen. Run in their direction and head-butt, and you'll get an extra bag of magic.

When choosing characters, the man is the strongest, but has magic powers between those of the dwarf and the lady. The dwarf is the second strongest, but has the weakest magic. The lady, as you may have guessed, has the least strength but the strongest magic.

—WAYNE SNYDER
HARLEYSVILLE, PA

KANE: To take advantage of this tip, you'll need more than one peace token when you get to screen four. In screen four, immediately run into an obstacle. Press F1 and the screen will go blank. Keep holding the key for as long as you want. When you let go, you'll have a higher score.

—DOUGLAS CHAN
AUGUSTA, ME

MEAN STREETS: If you get a slot screwdriver, you can disarm the magnetic field in Carl Linsky's apartment. This will let ►

you get the fruit cake, valued at $4000.

Some useful NC locations: Linsky's home, 4660; Bridgeview Warehouse, 4675; Big Surf Hotel, 5162; Lola Lovetoy, 4603; her apartment, 4605; Robert Knott's office, 5037; Wanda Peck, 4621; Peter Dull, 4674; Bosworth Clark, 9932; Frank Schimming, 4650; Tom Griffith, 4590; J. Saint Gideon's home, 3891; Cal Davis, 3720; Ron Morgan, 1998; Greg Call, 4753 and 8911; Beach House, 6470.

Here are the names of the eight scientists, their passcards, and their passwords; you'll need these to finish the game: Klaus, green, pawn; Hammond, grey, king; Linsky, blue, bishop; Jones, yellow, queen; Morgan, red, stalemate; Clark, black, rook; Davis, orange, checkmate; Call, purple, knight.

To finish the game, go to MTC (4550). You'll have only 30 seconds to enter all the passcards and passwords. Take too long, and you're dead.

—KEN ORDES, JR.
ARABI, LA

MODEM WARS: It's a good strategy to pick map DYLAN in Custom mode, because plateaus stretch all the way across the screen, with a river in the front. A good formation to have is one unit, then a space, then another unit and another space, and so on, until the line stretches all the way across the screen. Make another such formation directly below the first one, filling in the gaps. To minimize damage, make sure the units are facing forward, and keep them mostly on the plateaus.

If you put the boomers on the highest part of the plateau, they'll be able to hammer your opponent before he can even approach you. These elite gunners can shoot farther and do more damage than any others; they can win or lose a war very fast. If they're not on your side, then drone, missile, or surround your enemy as soon as possible.

If you put a spy in your recycler, he can detect enemy spies who come to sit on it.

—JASON ARTHUR
SALEM, OR

STAR EMPIRE: The warp hole that lets you enter a planet is always on the northwest side of the planet, just a small distance away. If you don't see the hole right away, check your system map. Avoid flying around aimlessly; if you do, you will soon lose your position.

—JONATHAN YOUNG
VANCOUVER, BRITISH COLUMBIA

TANGLED TALES: In Adventure 1, there's a secret door in most of the dungeons. Also, Sneezy can get the diamonds with the pick in the cavern below the slime pool. Drop these in the slime pool in the basement of your master's tower.

—DONALD MORTON
FORT SMITH, AR

TEST DRIVE: I used to have a problem shifting gears; I'd always lose time or crash from not being able to turn during a shift. But now I'm a shifting terror. Here's my secret: When you want to shift, just make sure you're accelerating, then press the fire-button. You'll automatically shift without wasting any time or losing steering ability. To downshift, just put on the brake and press the fire-button again. Oh yes, make sure you've slowed down enough that to not blow your engine!

—KELLY MATHEWS
SAN ANTONIO, TX

UNINVITED: When you're in the downstairs hall and you're confronted by the ghost that looks like Shirley Temple, you must have the bottle of "No Ghost" ready and open. Pour it on the ghost's head, and she's history. When confronted by the dogs in front of the chapel, use the lightning spell to gain entrance. In the chapel, move the cross on top of the altar, and the altar will move off to the side, revealing a passage downward. When you find the battle axe, use it to bash at the sofa in the entrance hall; you'll end up with a skeleton key.

—MICHAEL REZNICK
HAMILTON SQUARE, NJ

WAR OF THE LANCE: When the Dragon Highlords move to conquer a country, don't let the armies of that country fight alone. Try to bring most of your armies from your other countries to help. Don't forget your leaders, or your armies will lose their effectiveness.

—FORREST S. FREY, III
LEXINGTON, NC

WINGS OF FURY: To begin your mission, select rockets and use them to destroy the hardened gunners only. The hardened gunners are usually on the front or back of the islands, and are the only ones that can knock you down from high altitudes.

When you're finished with the hardened gunners, return to your carrier and select bombs. Go to the highest altitude your plane can reach, and drop all the bombs on the island. Keep doing this until all men and gunners are destroyed.

The only thing that can kill you is an enemy airplane. To dogfight, get on the enemy's tail and hold your button down. It's tricky getting on the enemy's tail, but you can do it. Fake him out by quickly changing the direction of your airplane, then turning back. If you're successful, he will be tricked into turning around.

—KEN ORDES, JR.
ARABI, LA

Z: When you've completed the first level and go into warp, hold your joystick diagonally to the right. When you come out of the warp, you'll be flying so fast you'll collide with one of the warp boxes and jump to the next level. You can keep doing this until you've reached the last level.

—STEVE RIDLEY

TOWER TODDLER: To get unlimited lives, press P for pause, then simultaneously press UP-ARROW, LEFT-ARROW and J. Press the fire-button to end the pause.

—GILBERTO TORRES
BROOKLYN, NY

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From p. 38.

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195 DATA ØØØØ8EØ4Ø48888ØØØØØØ*Ø
    ØØØØØØØ3BØØØØØØØØØØ*ØØØØØDØ
    ØØØØØØØØØØØØØ          :REM*7Ø
196 DATA C3ØØØØØØ2Ø6ØEØEØFEØØ*Ø
    ØØØØØØØØØFFØØØØØØØ*ØØØØFFØ
    3Ø7ØE1C387ØEØ          :REM*165
197 DATA CØ1E1E1E1EØEØEØ7Ø1ØØ*Ø
    ØØØØØØ2Ø6ØEBAFØFØFØ*FØ7Ø7Ø3
    8ØD7979797971          :REM*87
198 DATA 71E183E7EFEØEØEØEØEØ*F
    Ø83Ø3Ø1Ø1Ø1Ø1Ø1Ø3DØ*FØEØEØE
    ØEØEØFØ71F1FØ          :REM*111
199 DATA FØFØFØ7Ø3B988Ø1D3838*3
    8B81DEØEØEØEØEØEØE8*7ØEØEØE
    ØEØEØE2E246A5          :REM*2Ø7
2ØØ DATA Ø2C9ØØFØØDAØØØB9Ø118*9
    98ØØ6C8C4Ø2DØF56Ø      :REM*55
2Ø1 DATA -1                :REM*59
```

■

COMMODORE CLINIC

What is a machine language monitor? How can I fix my disk drive? Our specialist answers these questions and more.

By ELLEN RULE



Q *I bought the book* Machine Language for the Commodore 64 and Other Commodore Computers *with the idea of becoming a machine language programmer. All went well until I read that I need a machine language monitor installed in my C-64 to get going. What is a machine language monitor and how do I get one?*

—P.J. MCGINLEY
SMITHVILLE, ONT

A A machine language monitor is a program that allows you to write, run, modify, load and save machine language programs. Its display looks similar to the familiar Basic screen you view every time you turn on your 64. The difference is that an ML monitor displays additional information pertinent to machine language programming, such as status register values, the accumulator, X and Y values and the stack pointer.

With machine language you will be able to take advantage of the 6502 processor's speed, versatility and accuracy. Instead of communicating with the CPU (central processing unit) via commands such as LIST, RUN, SAVE or LOAD, you might use M (to display memory), G (to start running a program), S (to save) and L (to load.)

You can obtain an ML monitor commercially (for example, Commodore's Assembler 64, an old stand-by recently offered by Tenex) or through the public domain. Jim Butterfield's Supermon64 should be available through your user's group or from bulletin board systems such as QuantumLink. (These sources will also help you overcome the learning curve associated with any new language.) Brady Books offers a disk to accompany the book you purchased that includes the Supermon program, or, if you have more time than money, you might want to type in the "junior" monitor generator program found in appendix H of your book. (Please read the directions carefully first!)

Q *For several years I have been using the Write Now! word processing cartridge from Cardco, Inc. I recently tried to purchase another cartridge for my daughter and a spare for myself, only to find that the company went out of business and the program is no longer available. I have other word processing programs, but the files I created with Write Now! will not work in any of these. I know that cartridges are supposed to be immortal, but accidents happen and I would hate to lose the literally hundred of files that I have stored with this program.*

—WILLIAM WATSON, JR.
SEATTLE, WA

A Whether your program fails or you find a different word processing program that you like better, having backup copies of your files is insurance against your future needs.

To make your backup files transportable (that is, so they can be read by other word processors), look in the program's manual for instructions on saving your text as either an ASCII file or a sequential (seq) file. These are virtually universal file types, and can therefore be understood by other word processing programs. To use these files with another kind of computer, you will need a translation program such as the Big Blue Reader from Sogwap Software.

To get another copy of the Write Now! cartridge, try contacting a user's group or check out the computer flea markets and consignment shelves. Somebody might have one they no longer use.

Q *A few months ago my computer broke and I shipped it out to be fixed. After a long wait, I got it back. Then my monitor stopped working; the sound is okay, but there's no picture. Can you help?*

—KENNY ELLIS
OKEECHOBEE, FL

A Before you send your components off to the repair shop again, you could do some basic troubleshooting. First, check your monitor's brightness and contrast controls. Although this is the most common cause of monitor "failure," it's also the most easily overlooked!

If adjusting the dials doesn't help, test each component of your system one at a time. You might start by hooking up a VCR's output to your monitor. If the monitor works this way, then hook up your C-64 to a friend's monitor. If that still doesn't reveal the problem, try using a different monitor cable; it's possible that a loose wire in the cable is to blame.

Q *One of my 1541 disk drives needs mechanical alignment and another one has a burned-out chip. Disk drive repairs are a little expensive in my area; can you recommend any do-it-yourself books that will help me.*

—AZFAR JUNAID
NASHVILLE, TN

A Howard W. Sams & Co. publishes two titles that might be of help: *Commodore 1541 Disk Drive Troubleshooting & Repair Guide* and *Computerfacts for the Commodore 1541/VIC 1541.* (A separate *Computerfacts* volume is also available for the 1541-II drive.) Abacus Software publishes the *1541 Repair and Maintenance Book*. All three books are available from Commodore dealers, book stores and the mail order companies whose ads you will find in *RUN*.

Another do-it-yourself source for drive realignment is a program from Free Spirit called Commodore 1541/1571 Drive Alignment. It is also available through mail order companies.

These are all excellent sources of information, but such projects take skill. Remember that at least half of the repair charge you pay is for a technician's skill, experience and knowledge. The other portion of the repair charge goes for parts and specialized, often expensive equipment (oscilloscopes, multimeters, and so on), which the average do-it-yourselfer would find little use for. Consider, too, that you can easily cause further damage to your computer while poking around; you could end up incurring even more expense.

Shop around for repair prices. Several of the service centers who advertise in *RUN* offer inexpensive shipping charges and flat rates for repairs. ■

Send your questions to Commodore Clinic, RUN *Magazine, 80 Elm St., Peterborough, NH 03458. Questions are answered only through this column.*

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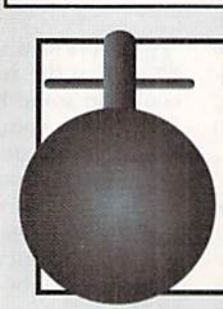
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RUN's Checksum & Program Typing Hints

TYPE IN *RUN*'S CHECKSUM, which serves for both the C-64 and for the C-128 in either 40- or 80-Column mode, and save it to disk before running it. When typing in a program from *RUN*, first load and run *RUN*'s latest version of the Checksum program, which contains a new feature explained below. The screen will display a SYS number (49152 for the C-64; 3328 for the C-128) that deactivates and reactivates the Checksum. Always disable *RUN*'s Checksum before attempting to run another program. Note: You can abbreviate Basic keywords; spaces affect the checksum only when within quotes; and the order of characters affects the checksum.

When you press return after typing in a program line, a one-, two-, or three-digit number from 0 to 255 appears in the home position. If this number matches the checksum value in the program listing, the line as you typed it is correct. If the number that appears doesn't match the checksum value, compare the line with the magazine listing to find your error. Then move the cursor back up to the line and make your corrections. Now, after you press return, the correct checksum value should appear. Continue entering the listing until all the lines have been correctly typed. Then deactivate *RUN*'s Checksum, using the appropriate SYS number, and save the finished program.

We sometimes get letters and phone calls from new readers who have typed in the Checksum program for the first time. They are confused by the "Out of Data Error in Line 30" message that appears when they try to run the Checksum program. Understandably, they compare line 30 of the listing with line 30 as they typed it in, and cannot find anything wrong. The message unintentionally misleads them into thinking the error is in line 30, whereas the typing mistake is actually somewhere in one of the Data statements in lines 190–350.

So, we've added a new feature to the Checksum program that alerts readers to the number of the Data statement line in the Checksum program where an error has actually been made. **Note that this feature works *only* on the Checksum program itself, and not on any other program listing in *RUN*.**

After you've entered and saved the Checksum program to disk, run it. If you've made any errors in any of the Data statements, the program will give you a specific line number. Find the mistake, correct it, press return, save the program and run it again. Repeat this procedure until the Checksum program runs flawlessly.

Control Characters Demystified

All the graphics and control characters in the listings in *RUN* have been translated into understandable key combinations. They are the instructions you see inside the curly braces. For example, {SHIFT L} means you hold down the shift key while you press the L key once. You do *not* type in the curly braces. What appears on the screen will look quite different from what is designated inside the braces. Here are some more examples:

{22 SPACES}—press the space bar 22 times.

{SHIFT CLR}—hold down the shift key and press the clr-home key once.

{2 CRSR DNs}—press the cursor-down key twice.

{CTRL 1}—hold down the control key and press the 1 key.

{COMD T}—hold down the Commodore logo key and press the T key.

{5 LB.s}—press the British pound key (£, *not* #) five times.

Refer to the following paragraphs for any other Error messages you get from running any program listing in *RUN*.

Other Error Messages

Having heard from many users over the years about their difficulties with typing in listings, we've identified a few recurring problems that plague many people but are easy to fix. So read on and see if your problem is one of these.

- You get an "Out of Data in Line xxx" message. This means that a program line was reading from Data statements and reached the end of the data before it was done reading. There are two possible problems.

One might be with the program line that reads the data, usually a For-Next loop. Make sure you have the proper values for the loop, because if, for example, the listing has a loop of 0 to 150, and you've typed 0 to 160, you'll get the Out of Data message. If the loop is correct, then the problem lies in the Data statements themselves. One possibility is that you omitted a whole line of data. That's easy enough to find and correct. It's more likely that you've skipped one or more individual data items or typed in a period instead of a comma, which causes two data values to be read as one number. Check your typing carefully against the listing. Using *RUN*'s Checksum program when you type in listings from the magazine should help in this case.

- You get an "Illegal Quantity Error in Line xxx" message. This means you've read a number from a Data statement and tried to poke it into a memory address. The error occurs because the number is larger than 255 (the largest value a memory address can contain), which means that somewhere in your Data statements you've made an error by typing in a number larger than 255. Again, this is easy to check for and correct. First look in your Data statements for a number larger than 255. You might have added an extra digit, or perhaps you ran two numbers together (23456 instead of 234,56).
- You get a "Syntax Error in Line xxx" message. This could be almost anything. What it tells you is that there is something wrong in the indicated line. Usually you've misspelled a Basic keyword or omitted some required character. List the line and examine it carefully.
- You get an "Error in Data" message. This occurs in programs that add up all the data as read, and, when finished, compares that sum with what it should be if the data were typed in correctly. If it isn't the same, it means an error somewhere in typing the Data statements. Go back and check the data carefully. Correct the mistake(s), save the new version and try again.
- Finally, we urge everyone who intends to type in one of our listings to use *RUN*'s Checksum program, which will help you avoid every mistake we've mentioned above, except that it won't detect the omission of a line. R

Listing. *RUN*'s Checksum program. This program is available on *RUN*'s BBS for users to download.

```
10 REM RUN'S CHECKSUM 64/128 - BOB KODADEK
20 MO=128:SA=3328:IF PEEK(4096)THEN MO=64:SA=49152
30 I=0:CK=0:CH=0:LN=190
40 FOR K=0 TO 16
50 FOR J=1 TO 10:READ B:IF B>255 THEN GOTO 170
60 CH=CH+B:POKE SA+I,B:I=I+1:NEXT
70 READ LC
80 IF LC<>CH THEN GOTO 170
90 CH=0:LN=LN+10
100 NEXT K
110 POKESA+110,240:POKESA+111,38:POKESA+140,234
120 PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
130 PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128 THEN 1
    60
140 POKESA+13,124:POKESA+15,165:POKESA+25,124:POKESA+2
    6,165
150 POKESA+39,20:POKESA+41,21:POKESA+123,205:POKESA+12
    4,189
160 POKESA+4,INT(SA/256):SYS SA:NEW
170 PRINT"YOU HAVE A DATA ERROR IN LINE ";LN;"!":END
180 REM DO NOT CHANGE THESE DATA STATEMENTS!
190 DATA 120,162,24,160,13,173,4,3,201,24,884
200 DATA 208,4,162,13,160,67,142,4,3,140,903
210 DATA 5,3,88,96,32,13,67,152,72,169,697
220 DATA 0,141,0,255,133,176,133,180,166,22,1206
230 DATA 164,23,134,167,132,168,170,189,0,2,1149
240 DATA 240,58,201,48,144,7,201,58,176,3,1136
250 DATA 232,208,240,189,0,2,240,42,201,32,1386
260 DATA 208,4,164,180,240,31,201,34,208,6,1276
270 DATA 165,180,73,1,133,180,230,176,164,176,1478
280 DATA 165,167,24,125,0,2,133,167,165,168,1116
290 DATA 105,0,133,168,136,208,239,232,208,209,1638
300 DATA 169,42,32,210,255,165,167,69,168,170,1447
310 DATA 169,0,32,50,142,169,32,32,210,255,1091
320 DATA 32,210,255,169,13,32,210,255,104,168,1448
330 DATA 96,104,170,24,32,240,255,104,168,96,1289
340 DATA 56,32,240,255,138,72,152,72,24,162,1203
350 DATA 0,160,0,32,240,255,169,42,208,198,1304
```

■

MAY/JUNE 1992

Coming Attractions

Lookin' Good with GEOS—
A review of Creative Micro Design's hottest new product for GEOS: **Perfect Print**. This smooth print-enhancement program promises great-looking printouts of your geoWrite documents.

Also, we'll get the scoop on another GEOS program, **Newtools2** from Quincy Softworks, a geoPaint enhancement that allows you to modify and manipulate graphics in ways previously not possible on your Commodore.

Online Activity—
Telecommunications is a way of life for many *RUN* readers. In this issue, we'll show you how to get the most out of your online time. And on-line novices will discover the ins and outs of using a modem.

Great Entertainment—
Traverse, the latest offering from *RUN*'s "entertainment engineer," Tony Brantner (the guy just keeps outdoing himself!), takes you on a zigzag course that will test your nerves as well as your reflexes.

Big News & Hot Reviews—
Once again we'll bring you reviews of the latest software and hardware products, as well as our report on C-64/128 activity at the winter Consumer Electronics Show.

ReRUN Preview—
Here's the March/April '92 ReRUN lineup: **Basic Bloodhound**—Rid your programs of pesty bugs with this utility. **Relative File Copier**—A special copy program written just for database files. **Ricochet**—Enjoy fast-paced air hockey excitement. **Flash Cards 128**—Turn your C-128 into a private tutor with this personal flashcard program. **Easy Bank Switcher**—Relocate video RAM in an instant. **128 Mode**—Display your program and files on two screens at once when making presentations or teaching a class. **Bunny Hop 64**—Help the Easter Bunny gather eggs and elude hungry wolves. Plus many more exciting bonus programs!

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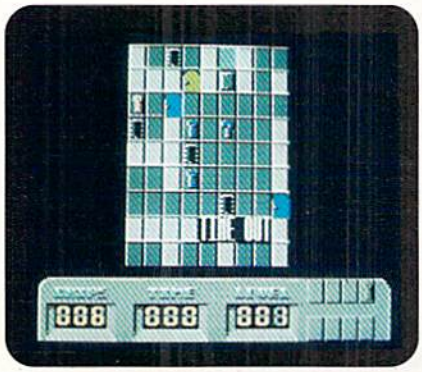
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From p. 11.

Challenge, I groaned, thinking "Oh no, not *another* brain game." Boy, was I in for a surprise. Chip's Challenge is a delightful mix of arcade action and strategy. Not only must you exercise your joystick arm, but your gray matter as well.

Chip's Challenge is a devious journey through 144 challenging mazes and puzzles. The object is to collect as many computer chips as possible, which requires solving the puzzles necessary to access the various areas of the maze on each level. Chips may be guarded by ver-



Beating Chip's Challenge takes joystick prowess, a sharp wit and many, many hours.

min or other obstacles—and therein lies the challenge. Some puzzles are rather obvious and simple to solve. Others are difficult, requiring deduction and sometimes a bit of joystick prowess. To add to the challenge, not only must you collect the required chips, but you must also deal with chip sockets, locked doors, recessed walls, toggle doors, fire, ice and monsters—all of which you have to manipulate in one way or another.

The first eight mazes are learning levels, each introducing you to one of the elements that make up the remaining 136 levels. After level 8, you're on your own.

The game's graphics and sound are particularly good. The mazes have an embossed three-dimensional aspect, and there's a lot of spot animation—leaping flames, undulating magnetic floors, chomping disembodied teeth, and so on.

Be prepared to die often, but don't worry—you won't have to start over again from level 1. Each level has a code, so you can always begin again where you left off by punching in the correct code (keep notes!). In addition, if you get stuck on a particular level and die several times in a row, the game automatically gives you the opportunity to skip to the next level, which is not always more difficult.

Chips Challenge is fun, and it makes you do something that most arcade games do not: *Think.*

($33.95/C-64. Epyx, PO Box 8020, Redwood City, CA 94063)

GATEWAY TO THE SAVAGE FRONTIER ..... B+

A grand-scale AD&D adventure to end them all.

Gateway to the Savage Frontier (GSF) is both the opening and closing of an era. While it's the first in a new series of Advanced Dungeons and Dragons (AD&D) role-playing games from SSI based on earlier games, such as Pool of Radiance, Curse of the Azure Bonds, and Secret of the Silver Blades, it's also the last one they are going to publish for the C-64.

This is not an ordinary dungeon fantasy role-player. In fact, most of the action takes place in the wilderness. Having just completed a quest, you and your companions go for a night of drunken debauchery in a local establishment, where, lo and behold, your booty, weapons and armor are stolen. Now, seriously in need of cash to rearm, your party must come to the aid of the land to halt the imminent invasion of evildoers. As always, you must assemble a worthy fighting force and take a journey in search of magical talismans needed to defeat the invaders.

One thing about this game stands out above all else: It's big—*very* big. The adventure spans four double-sided disks, which are not copy-protected.

As with other FRPs of its ilk, a lot of time and thought must go into developing characters before you begin your quest. Your roster may contain up to six active players and two nonactive ones, selected from six races and five classes. If your character is the correct race, it can be multi- or dual-classed, such as a ranger, paladin, thief, fighter, magic-user or cleric.

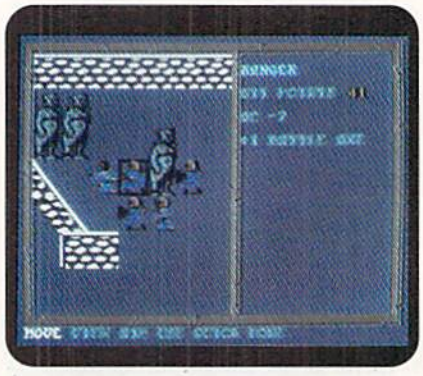
Of course, every detail is accorded to ability scores, alignment and a host of other AD&D factors. (It took me a good 30 minutes to develop my party—a party that, being fundamentally ill-conceived, perished rather quickly once I started the game!)

With your party created, the action begins in the city of Yartar, where supplies, equipment and weapons must be purchased. You also glean the details of your upcoming quest from Yartar's citizenry.

GSF is totally menu-driven. Simple keypresses bring up various menus and submenus that control your interaction with the game. You can view each character, ready equipment, check inventories, trade, drop or share booty, ready spells and interact with the party.

The main screen stands divided, with a small window displaying 3-D representations of the towns, cities or underground portions of the adventure. In the wilderness area, the map switches to an overhead view. A third, rather oblique view appears during combat, and details your party's position, as well of that of your adversaries.

Combat is decided by initiative and



Gateway to the Savage Frontier is SSI's biggest and best AD&D game yet.

concluded in a series of turns. Of course, you have melee weapons, ranged weapons and spells available to you as your roster permits.

If you're new to fantasy role-playing adventures, you'll have to spend a lot of time up front studying the documentation. Fortunately, the instructions are laid out in two nicely indexed booklets; one is a rule book to the game itself, while the other is in journal format and covers the basics of AD&D adventuring. This one also includes a monster manual, spell descriptions and selected paragraphs that you'll be asked to read throughout your adventures.

Unfortunately, some of the graphics (especially inside the towns) are rather bland; the 3-D views, in particular, are not convincing. But what the game lacks in graphics power, it more than makes up for with a solid player interface, great character development and an intriguing story line that will keep you engrossed for many days—even weeks.

It's too bad that for all the time and effort you must invest to keep your characters alive, there will be no further volumes of this game. If, however, you're a fan of fantasy role-playing games—especially AD&D—don't pass this one by. Gateway to the Savage Frontier is bigger and better than any other

SSI release to date. Because of that, it's well worth the price—and well worth your time.

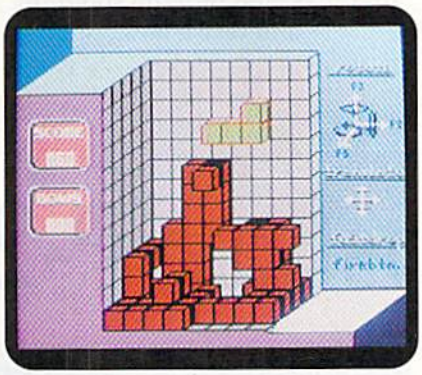
($49.95/C-64. Strategic Simulations, 675 Almonor Ave., Suite 201, Sunnyvale, CA 94086)

MENTAL BLOCKS.....D

Had this been a children's game, it might have rated better.

The only redeeming thing about Mental Blocks is that I didn't have to buy it. (Software reviewers do get some perks.) Sorry if this sounds cruel, but why would anyone release a game that is (1) boring, (2) boring and (3) boring? Mental Blocks rates *three* "borings" because it is a series of *three* "brain games" that require little brain work.

The first, Fits and Pieces, is a 3-D version of Tetris (remember Welltris?) and is the one reason Mental Blocks didn't get an "F." Fits and Pieces presents a series of falling three-dimensional shapes that you fit together to form a solid layer at the bottom of the screen.



Mental blocks features three games of spatial relations.

The graphics are sufficient. But as you move a shape away from you to place it on the board, it doesn't diminish in size, so keeping an eye on the piece's shadow is important. You use the joystick to position the pieces within the playing area and the function keys for flipping and rotating them. This becomes awkward at game's end, when you have less time to make decisions.

After a few games, you'll probably have enough of Fits and Pieces and be ready for a game called Shapes Happen. I get the feeling someone got bored one night and whipped this up (probably after playing Fits and Pieces). Shapes Happen is nothing more than a dreary exercise in trying to guess within 30 seconds what shape should appear next after a series of three geometrical patterns appear at the top of the screen. Points are awarded according to the time left on the ticker after a correct guess. This teaser should provide minutes of fun.

The third and final ordeal, Mental Detector, places a solid cube on the screen, along with four "unfolded" cubes. The object is to figure out within 30 seconds which one of the unfolded cubes matches the solid one. I doubt many of you would care to wait that long.

Had this product been packaged and marketed for teaching youngsters spatial relationships, I would have possibly judged it differently. As it is, Mental Blocks is an ill-conceived package that should have been uploaded to a BBS.

($14.95/C-64. Avantage Software, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128) ■

From p. 50.

In all honesty there was one more minor hitch: The program that the contest entries came on is in 64 mode, therefore I had to create a program that allows me to read the files in 128 mode. But I'll save that little treasure for next time. See you then! R

Mark Jordan teaches high school English in Indiana. He wrote the program used for RUN*'s writing contest and was the contest's primary judge.*

Listing 1. Double-monitor program. (Also available on the March/April ReRUN disk. To order, call 800-343-0728.)

```
10 REM VIC/VDC 128 - MARK JORDA
   N                          :REM*89
20 FORT=0TO415:READA$:POKE3072+
   T,DEC(A$):NEXT             :REM*103
30 SCNCLR:PRINT"{CRSR DN}PLACE
   FORMATTED WORK DISK IN DRIVE
   ,                          :REM*173
40 PRINT"PRESS A KEY..."
                              :REM*138
50 GETKEY A$                  :REM*28
60 BSAVE"VIC/VDC",B0,P3072 TO P
   3490                       :REM*119
70 SYS3328                    :REM*192
80 SCNCLR                     :REM*57
90 DATA A9,B0,8D,F0,0C,A9,FF,8D
   ,F1,0C,A9,00,8D,FF,0C,85
                              :REM*56
100 DATA FD,85,FB,A9,04,85,FE,A
    9,D8,85,FC,EA,AD,F2,0C,F0
                              :REM*16
110 DATA 06,20,7E,0C,4C,2B,0C,2
    0,A4,0C,EA,EE,FF,0C,AD,FF
                              :REM*41
120 DATA 0C,C9,19,F0,12,A5,FD,1
    8,69,28,85,FD,85,FB,90,04
                              :REM*191
130 DATA E6,FE,E6,FC,4C,1C,0C,6
    0,EA,AD,F0,0C,18,69,50,8D
                              :REM*93
140 DATA F0,0C,90,03,EE,F1,0C,A
    2,12,AD,F1,0C,20,CC,CD,E8
                              :REM*138
150 DATA AD,F0,0C,20,CC,CD,60,A
    D,F1,0C,18,69,08,8D,F1,0C
                              :REM*17
160 DATA 20,57,0C,AD,F1,0C,38,E
    9,08,8D,F1,0C,60,EA,20,49
                              :REM*19
170 DATA 0C,A0,00,20,D8,CD,91,F
    D,C8,C0,28,D0,F6,A0,00,20
                              :REM*168
180 DATA 67,0C,20,D8,CD,29,0F,A
    A,BD,E0,0C,91,FB,C8,C0,28
                              :REM*232
190 DATA D0,F0,60,EA,20,49,0C,A
    0,00,B1,FD,20,CA,CD,C8,C0
                              :REM*20
200 DATA 28,D0,F6,20,67,0C,A0,0
    0,B1,FB,29,0F,AA,BD,D0,0C
                              :REM*10
210 DATA 20,CA,CD,C8,C0,28,D0,F
    0,60,EA,EA,EA,EA,EA,EA,EA
                              :REM*236
220 DATA 00,0F,08,06,0A,04,02,0
    D,0C,0B,09,01,0E,05,03,07
                              :REM*153
230 DATA 00,0C,06,0E,05,0D,0B,0
    3,02,0A,08,04,09,07,0F,01
                              :REM*178
240 DATA 80,07,00,00,00,0F,00,0
    0,00,00,00,00,00,00,00,19
                              :REM*87
250 DATA 78,A9,0D,8D,38,03,A9,0
    D,8D,39,03,58,60,C9,09,F0
                              :REM*2
260 DATA 0B,C9,5F,F0,0A,C9,2B,F
    0,16,4C,C1,C9,4C,00,0C,AD
                              :REM*89
270 DATA F2,0C,F0,05,A9,FF,8D,F
    2,0C,EE,F2,0C,4C,00,0C,AD
                              :REM*79
280 DATA F6,0C,D0,08,EE,F6,0C,A
    0,0C,4C,43,0D,A9,00,8D,F6
                              :REM*154
290 DATA 0C,A0,1C,B9,80,0D,85,E
    E,88,8C,F5,0C,A9,06,8D,F7
                              :REM*185
300 DATA 0C,AC,F5,0C,B9,80,0D,8
    8,BE,80,0D,88,8C,F5,0C,20
                              :REM*25
310 DATA CC,CD,CE,F7,0C,D0,EA,A
    9,13,8D,4A,03,8D,4B,03,A9
                              :REM*62
320 DATA 93,8D,4C,03,A9,02,85,D
    0,60,EA,EA,EA,EA,EA,EA,EA
                              :REM*216
330 DATA 1B,28,16,89,19,57,02,3
    5,01,28,00,3F,27,EA,EA,EA
                              :REM*7
340 DATA 1B,00,16,78,19,47,02,6
    6,01,50,00,7E,4F,EA,EA,EA
                              :REM*163
```

■

CURTAIN CALL

***RUN*'s new column where worthy products step into the spotlight and take a bow.**

The Seikosha SP-2400

Don't write off 9-pin printers yet. The Siekosha SP-2400 may not break new ground, but its many features and fine performance make it worth your consideration, even in this day of 24-pin marvels.

The SP-2400 is fully Commodore-compatible when used with a parallel printer interface such as the Xetec Super Graphix or the Omnitronix Hot Shot Plus (both are still available through mail order houses).

With two emulation modes (Epson and IBM), eight programmable graphic densities, six print modes, including three near-letter-quality, and five control-panel-selectable fonts, the SP-2400 can turn out some pretty fancy printing. And Commodore programmers will be pleased to know that it's print features are accessed just like those of any other Epson-compatible machine.

The print, in either graphics or character mode, is dark and crisp enough for even the most discerning user. In fact, if you're upgrading from a time-worn MPS-803 or 1526, you'll find the SP-2400's print quality outstanding. At 15 × 4.4 × 11 inches and 7 pounds, the unit is compact and lightweight, too. All these features, plus the ability to print up to 300 characters per second and a suggested retail price below $300, make the SP-2400 downright impressive.

There are a few inconveniences. As with some earlier Seikosha printers, selecting a font via the SP-2400's control panel requires holding down the shift and NLQ buttons while the print head slides across the bed , stopping at each selection. This procedure is less intuitive and slower than the push-button NLQ access on newer machines.

Cost cuts in the paper-handling department have created another problem: The bail-release lever doubles as an automatic-paper-feed lever, however, it rarely works as promised. As a result, despite careful loading onto the push-type tractor sprockets, continuous paper tends to crumple and jam during insertion. However, manually loading the first sheet, by turning the platen knob, is a snap, and the tractor feed excels at moving paper, including mailing labels, through the printer.



Don't write off 9-pin printers yet. Seikosha's SP-2400 has the features and speed that make it a winner.

The SP-2400 sports no gadgetry for loading envelopes. You must park the continuous paper and then insert each envelope manually. However, readily accessible head-gap adjustment levers make printing the envelopes easy.

For a manufacturer to sell a 9-pin printer these days, it must pack it with options and give it lightning speed. That description fits the Seikosha SP-2400. Outdated paper-handling aside, the small footprint, Epson code compatibility and exceptional print quality are strong points in its favor. If you want to save money by buying a 9- instead of 24-pin printer, compare the SP-2400 with other low-end machines in its price range. It looks like a winner. ■

Courier font on the Seikosha SP-2400
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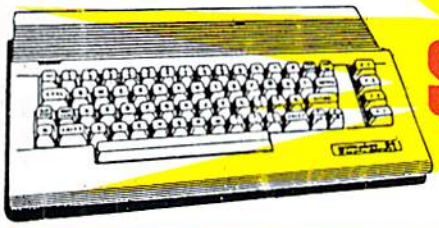
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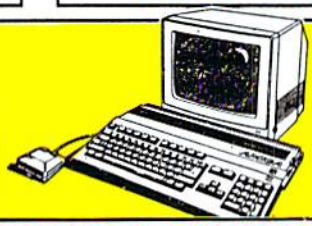
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