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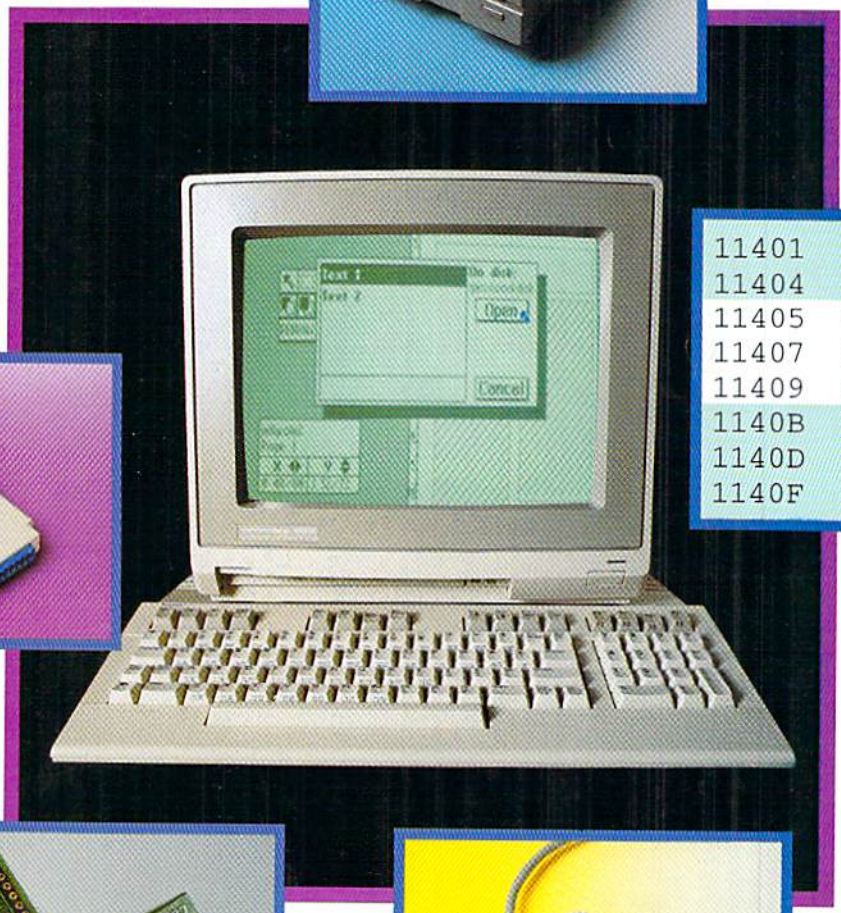
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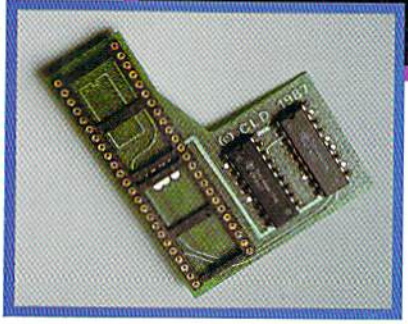


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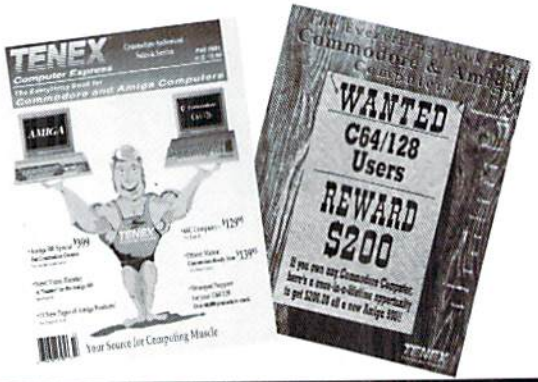
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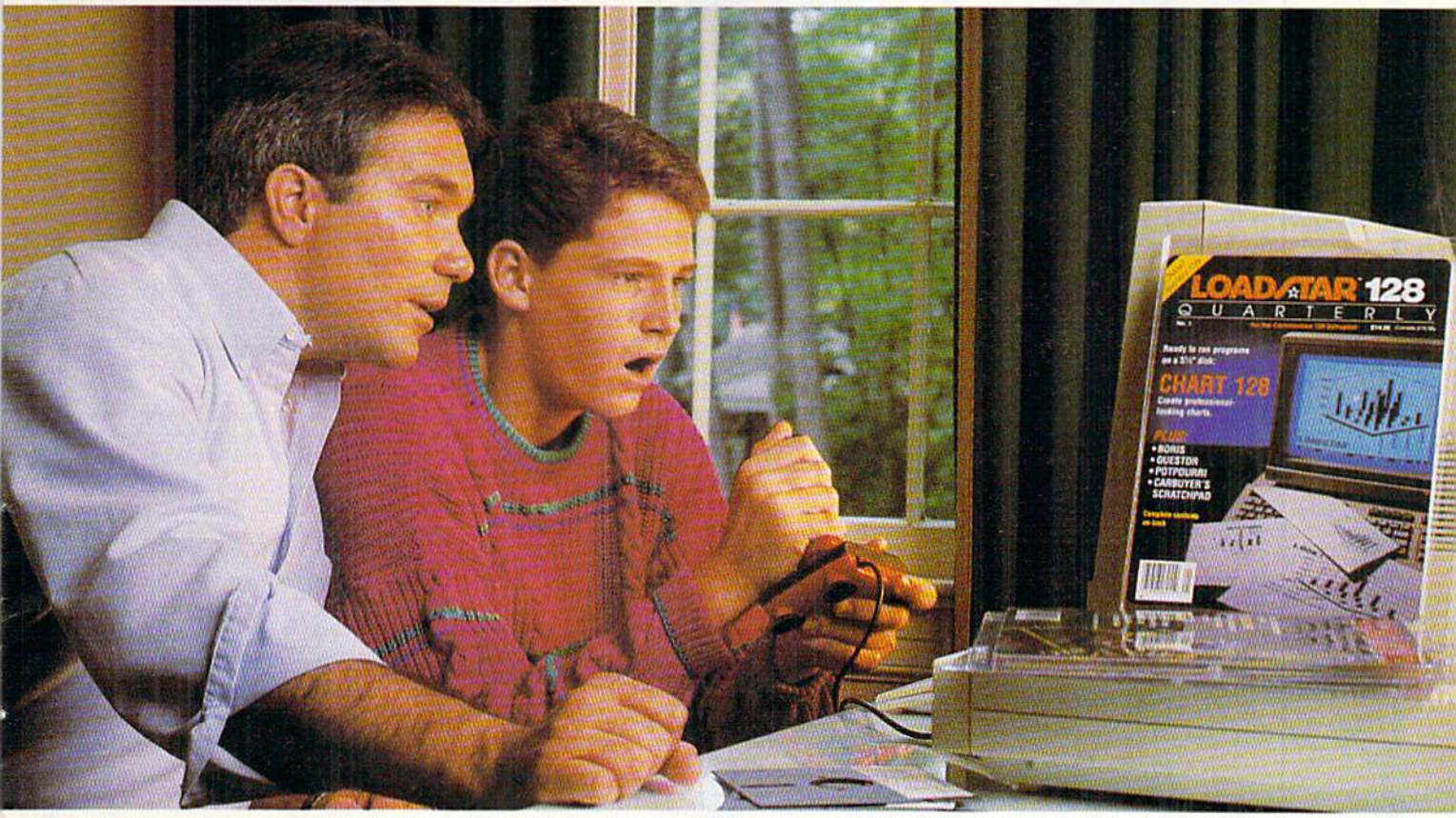
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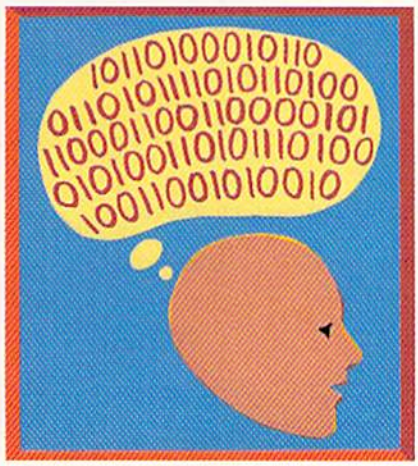
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CONTENTS

VOLUME 8, NUMBER 6 NOVEMBER/DECEMBER 1991



PAGE 18



PAGE 38

COVER PHOTOGRAPHED BY ED JUDICE

FEATURES

18 Cliff Diver or Couch Potato? *by Stéphane Dirschauer*
Are you maximizing your Commodore potential? Beginners and experts alike can learn new ways to use their computer more efficiently and effectively.

20 Get With the Programming *by Stéphane Dirschauer*
Debunking the myths of programming: It's not just for hard-core compu-nerds. Really!

23 ABCs of REUs *by Malcolm O'Brien*
The most exciting products being developed for the Commodore today are these little pieces of hardware. Find out which one is right for you.

26 Basic Questions on RAM Expansion *by Malcolm O'Brien*
If you still think that RAM is a barnyard animal, this article will help with answers to questions like "What is it?" and "How much is enough?"

***28 Ultimate Sprite Editor** *by Mark Jordan*
This program doesn't just *edit* sprites, it it also creates, animates, folds, rotates, expands, flips, copies, pastes and inverts...all at machine language speed!

***34 Volleybound** *by Tony Brantner*
Volleyball with an edge.

36 128 Speedshop *by Ellen Rule*
From Jiffy-DOS to the VDC, these chip upgrades can make your 128 a real hot rod.

***38 Port Authority** *by Richard Penn*
Use either joystick port for your C-64 games with this handy machine language utility.

***41 Dominoes** *by Kirk Ward*
Strategy and luck are rewarded in this C-128 version of the classic game.

DEPARTMENTS

4 RUNning Ruminations *by Dennis Brisson*
Don't let the learning curve daunt you. Computing is worth the effort.

6 Magic *compiled by Tim Walsh*
Once again *RUN* readers wave their magic wands and reach into their hats.

8 News and New Products *by Janice Greaves*
Read all about it: The Carmen Sandiego Show, new games by Data East and UBI Soft, plus catalogs of free computer materials.

10 Mail RUN
RAM gets a special plug and readers respond with tips on creating C-64 forms.

12 Software Gallery *Reviews of:*
- Bad Blood
- Street Rod
- Clue Master Detective
- MicroLeague Baseball II Enhanced
- Spot
- Word Writer 6

***50 128 Mode** *by Mark Jordan*
If you glimpsed a man for only a few seconds, could you remember what he looked like? Composite Man is an addictive game that will hone your powers of observation.

54 geoWatch *by Gerry Descoteaux*
The most frequently asked questions about GEOS are finally answered!

55 Gold Mine *compiled by Louis F. Sander*
Get the hottest gaming tips from pros like you.

57 Commodore Clinic *by Ellen Rule*
Buffers aren't just for aspirin tablets. Learn how they can improve your print speed.

61 RUN's Checksum Program
Run it right, the *first* time.

64 NEW! User's Group Update

64 Coming Attractions; List of Advertisers

64 RUN Amok

*** If you're too busy decking the halls to type in this issue's programs, order them "already wrapped" on the November/December ReRUN disk. Just call 800-343-0728.**

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RUNning Ruminations

Straightening the Learning Curve

One of the pleasures of editing a computer magazine is helping readers to overcome computing hurdles. Most of the users I talk to pose typical first-time user questions, from software advice to typing instructions. Some problems are easy to solve ("Yes, you must turn on your monitor to get an image on the screen"). Others are more difficult ("Sorry, but I don't know offhand the pin configuration for that interface").

Most of my contact with readers has been positive. I've established solid relationships with some readers. I hear from others infrequently. Some call back with more problems and questions. Many extend their appreciation. Most I never hear from again.

No one ever arrived on this earth with an innate knowledge of computing.

It's this majority I worry about. I question whether I've really helped and wonder if these new owners—who were so anxious to take advantage of computing—became intimidated or frustrated and chucked their systems into the closet.

Learning to use your computer can be fraught with anxious moments. I recall when, for the longest time, each new piece of software or hardware I encountered presented a new challenge, often accompanied by a rise in blood pressure. Things got better, but the learning curve was formidable.

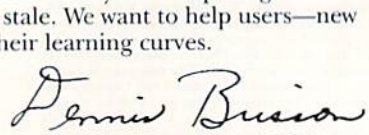
Part of the problem may be that, by its nature, computing is interactive and, thus, complex. Add to that the fact that sources for new products and information are quickly drying up in this market, and you have a situation that's not conducive to an influx of new computerists. And what about current owners? What's the inducement for them to remain in the market? Even Commodore itself encourages its users to abandon this market by promoting upgrade offers!

If manufacturers are to attract new users into the market, they must demonstrate a commitment to support these new users and design hardware and software that are easy to use. For their part, consumers have to be realistic and develop a clear understanding of what computers are all about and how much work is involved.

New users should remember that no one ever arrived on this earth with an innate knowledge of computing. We all had to learn. We either had the perseverance to teach ourselves or the good fortune to be assisted. Commodore users should take solace in the fact that their computers are relatively user-friendly; you soon reach a point where computing makes your life easier, more productive and more entertaining. It takes work, sure, but the effort is certainly worth it.

Cover Story

Once you've made the commitment, you need to know if you're getting the most out of your computer. This is where *RUN* can help. In "Cliff Diver or Couch Potato?" on page 18, we'll show you how you can generate new interest and excitement in your computing experience and keep it from going stale. We want to help users—new and experienced—straighten out their learning curves.



Dennis Brisson
Editor-in-Chief

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Video RAM 64K Daughterboard	50

BOOKS

1571 Internals+	$17
500 C128 Questions & Answers	15
K Jax Revealed Trilogy	32
Lou Sanders Tricks & Tips	16
Lou Sanders Gold Mine	24
Twin Cities 128 Compendium #1	15

GENERAL BUSINESS

CMS Accounting 64 or 128	129
CMS Inventory Module 128	60
Datamanager 64	19
Leroy's Label Maker	27
Microlawyer	49
Paperclip 3	39
Paperclip Publisher	14
Pocket Filer 2	29
Pocket Planner 2	25
Pocket Superpak 2 (Digital)	67
Pocket Writer 3	46
Swiftcalc 128 w/sideways	39
Swiftcalc 64 w/Sideways	19
Technical Analysis System 64	32
Word Writer 3/128	35
Word Writer 6/64	**39**
Write Stuff 128 w/spellchecker	29
Write Stuff 64 w/spellchecker	25
Write Stuff Busnss/Legl Templates	10

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Linkword:Spanish	29
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Mickey's Runaway Zoo	17
Numbers Show (The)	10
Sky Travel	39
Where in Europe Carmen Sandiego	29
Where in Time Carmen Sandiego	29
Where in USA is Carmen Sandiego	29
Where in World Carmen Sandiego	29
World Geopgraphy	29

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This excellent alignment program is a must-have for every Commodore owner. Easy to use, it helps you to align your drive so that it runs just as if it were new! The simple instructional manual and on-screen help prompt you through the alignment procedure and help you adjust the speed and head stop of your drives. It even includes instructions on how to load the alignment program when nothing else will load!

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MAGIC

Put a beep into your prompts, add a stopwatch to your Commodore, and append files in either 64 or 128 mode.

By TIM WALSH

$5D5 CURSOR BEEP 64

Cursor Beep 64 is an interrupt-driven and relocatable routine that "beeps" in synch with the cursor's flashing. Add it to your programs to signal user input. Use SYS 65418 or RUN-STOP/RESTORE to turn it off.

```
Ø REM BEEPER - ROBERTO MORASSI      :REM*37
1Ø FORX=ØTO52:READY:POKE68Ø+X,Y:A=A+Y:NEXT
                                    :REM*11
2Ø IFA<>55Ø9THENPRINT"DATA ERROR !":END
                                    :REM*2Ø
3Ø SYS 68Ø                          :REM*146
4Ø DATA 12Ø,165,2Ø,24,1Ø5,38,141,2Ø,3,165,
   21,1Ø5,Ø,141,21,3,169,4,141      :REM*229
5Ø DATA 19,212,169,24Ø,141,2Ø,212,169,5Ø,1
   41,15,212,169,13,141,24,212      :REM*236
6Ø DATA 88,96,165,2Ø7,24Ø,3,169,17,44,169,
   16,141,18,212,76,49,234          :REM*186
```

—ROBERTO MORASSI, PISTOLA, ITALY

$5D6 SCREEN BANNER 64

Wouldn't it be nice to have screen titles that aren't affected when you clear the screen? Screen Banner 64 makes it possible. It places a centered title of up to 40 characters across the top of the screen. Press RUN-STOP/RESTORE to clear it.

```
Ø REM SCREEN BANNER 64 - KELLY KIPFERL
                                    :REM*42
1Ø WD$="":FOR T=53Ø32 TO 532Ø2:READ D:CK=C
   K+D:POKE T,D:NEXT                :REM*233
2Ø IF CK <> 24Ø13 THEN PRINT"ERROR IN DATA
   ...":END                         :REM*185
3Ø PRINTCHR$(147)"ENTER A MESSAGE UP TO 4Ø
    CHARACTERS IN LENGTH":INPUT WD$
                                    :REM*144
4Ø LN=LEN(WD$)                      :REM*124
5Ø IF LN>Ø AND LN<41 THEN 7Ø         :REM*24
6Ø PRINT"INVALID MESSAGE!":GOTO 3Ø:REM*136
7Ø POKE 53244,224                   :REM*121
8Ø SYS 53Ø32                        :REM*216
9Ø END                              :REM*218
1ØØ DATA 16Ø,1,177,45,41,128,2Ø1,128,24Ø,1
    ,96,2ØØ,177,45,2Ø1,41,144,1,96:REM*163
11Ø DATA 141,211,2Ø7,2ØØ,177,45,141,77,2Ø7
    ,2ØØ,177,45,141,78,2Ø7,162,Ø    :REM*99
12Ø DATA 189,1Ø3,136,157,212,2Ø7,232,236,2
    11,2Ø7,2Ø8,244,173,211,2Ø7,74 :REM*186
13Ø DATA 141,255,2Ø7,169,2Ø,56,237,255,2Ø7
    ,141,255,2Ø7,173,2Ø,3,2Ø1,119 :REM*145
14Ø DATA 2Ø8,75,173,21,3,2Ø1,2Ø7,2Ø8,68,96
    ,173,252,2Ø7,16Ø,Ø,2Ø4,255,2Ø7 :REM*27
15Ø DATA 24Ø,7,153,Ø,4,2ØØ,76,124,2Ø7,162,
    Ø,189,212,2Ø7,2Ø1,65,144,3,56 :REM*151
16Ø DATA 233,64,153,Ø,4,232,2ØØ,236,211,2Ø
    7,2Ø8,236,192,4Ø,24Ø,1Ø,173   :REM*225
17Ø DATA 252,2Ø7,153,Ø,4,2ØØ,76,158,2Ø7,16
    5,214,2Ø1,Ø,2Ø8,5,169,17,32     :REM*46
18Ø DATA 21Ø,255,1Ø8,253,2Ø7,173,2Ø,3,141,
    253,2Ø7,173,21,3,141,254,2Ø7    :REM*82
19Ø DATA 12Ø,169,119,141,2Ø,3,169,2Ø7,141,
    21,3,88,96                      :REM*2Ø6
```

—KELLY KIPFERL, HORSEHEADS, NY

$5D7 SEQ FILE COPY 64/128

Seq File Copy 64/128 is an easy way to copy sequential files without resorting to a file-copy utility.

When you're ready to copy a sequential file, just run the program, enter the name of the file and the device numbers for the source and destination disks, then sit back and let the program do its thing. If you're using one drive, the filename of the copy will be prefixed with the word COPY. Seq File Copy works on the C-64 and the 128, and is compatible with the 1541, 1571 and 1581 disk drives.

```
Ø REM COPY SEQUENTIAL FILES 64/128 - MATTH
  EW PRICE                          :REM*47
1Ø INPUT"FILENAME:";F$              :REM*1Ø1
2Ø IF F$="" THEN 1Ø                 :REM*147
3Ø INPUT"SOURCE DRIVE:";SD          :REM*238
4Ø INPUT"TARGET DRIVE:";TD          :REM*2Ø2
5Ø FA$=F$:IF SD=TD THEN FA$="COPY"+F$
                                    :REM*141
6Ø OPEN2,SD,2,F$+",S,R"             :REM*14Ø
7Ø OPEN1,TD,3,FA$+",S,W"            :REM*128
8Ø GET#2,A$                         :REM*158
9Ø IF ST<> 64 THEN 11Ø              :REM*117
1ØØ IF ST=64 THEN 12Ø                :REM*75
11Ø PRINT#1,A$;:GOTO 8Ø             :REM*178
12Ø CLOSE2:CLOSE1:END               :REM*113
```

—MATTHEW PRICE, WILMINGTON, NC

$5D8 APPENDER 64

Appending multiple programs on the C-64 is a cinch with this relocatable machine language program. Type in, save and run Appender 64, then load the primary program that needs programs appended to it. Type SYS 680 to activate Appender 64, and load the second program. It will automatically be appended to the first. It is essential that the second program have line numbers higher than the first. Disable Appender 64 by entering SYS 65418.

```
Ø REM APPENDER 64 - ROBERTO MORASSI:REM*62
1Ø FOR T=ØTO33:READ D:POKE68Ø+T,D:CK=CK+D:
   NEXT                             :REM*19Ø
2Ø IF CK<>3365 THEN PRINT"ERROR IN DATA...
   ":END                            :REM*2Ø7
3Ø DATA 165,2Ø,24,1Ø5,16,141,48,3,165,21,1
```

```
   Ø5,Ø,141,49,3,96,72,56,165,45  :REM*195
4Ø DATA 233,2,133,195,165,46,233,Ø,133,196
   ,1Ø4,76,165,244                :REM*59
```

—Roberto Morassi, Pistola, Italy

$5D9 Appender 128

Appending programs on the C-128 is much easier than on the C-64. In fact, a one-line command will do it. Just load in the first Basic program, then enter the following one-liner:

```
BLOAD "filename",B0,P(PEEK(4624)+256*PEEK(4625)-2)
```

Note that "filename" in the statement is the name of the file you wish to append to the file that you just loaded. Finally, enter DELETE 2-1 to hook the lines up correctly. As with the above C-64 program, be sure the line numbers of the second program are higher than the first.

—Bob Renaud, Washington, MA

$5DA Happy Birthday 64/128

In the May 1988 issue of *RUN*, Magic Trick $491 by Joseph Charnetski played Happy Birthday. Here's an enhanced version that adds words to the song

After running the program, you'll be prompted to enter the name of the birthday boy or girl. Press RETURN and the birthday song will play non-stop. It's a great way to get your Commodore involved at your children's next birthday party.

```
Ø REM HAPPY BIRTHDAY 64/128 - PETE BAKER
                                  :REM*1Ø2
1Ø DIM WD$(25):PRINTCHR$(147)"{4 CRSR DNs}
   "                              :REM*27
2Ø INPUT "NAME";NM$               :REM*243
3Ø GOSUB17Ø                       :REM*112
4Ø INPUT"(S)LOW (M)ED (F)AST";T$   :REM*76
5Ø T=145Ø-(T$="S")*2ØØ+(T$="F")*2ØØ:REM*76
6Ø N$="##)#4Ø##)#<4##UE4Ø)JJE4<4"  :REM*11
7Ø D$="**&&&$**&&&$**&&&&$**&&&#" :REM*23Ø
8Ø S=54272:FORJ=STOS+23:POKEJ,Ø:NEXT
                                  :REM*14
9Ø POKES+5,13:POKES+12,9:POKES+24,15
                                  :REM*39
1ØØ PRINT "{SHFT CLR}{5 CRSR DNs}" :REM*44
11Ø FORJ=1TO25:PRINT WD$(J);:N=ASC(MID$(N$
   ,J,1))+15                      :REM*2Ø
12Ø D=ASC(MID$(D$,J,1))-34:POKES+1,N
                                  :REM*224
13Ø POKES+8,N/2:POKES+4,17:POKES+11,33
                                  :REM*35
14Ø FORZ=1TOT/D:NEXT:POKES+4,16   :REM*149
15Ø POKES+11,32:NEXT:POKES+24,Ø    :REM*Ø
16Ø GOTO6Ø:END                    :REM*136
17Ø WD$(1)="HAP":WD$(2)="PY ":WD$(3)="BIRT
   H":WD$(4)="DAY ":WD$(5)="TO "  :REM*74
18Ø WD$(6)="YOU, "+CHR$(13)+CHR$(13)
                                  :REM*18Ø
19Ø WD$(7)="HAP":WD$(8)="PY ":WD$(9)="BIRT
   H":WD$(1Ø)="DAY "              :REM*2Ø3
2ØØ WD$(11)="TO ":WD$(12)="YOU, "+CHR$(13)
   +CHR$(13)                      :REM*1Ø8
21Ø WD$(13)="HAP":WD$(14)="PY ":WD$(15)="B
   IRTH":WD$(16)="DAY "           :REM*14
22Ø WD$(17)="DEAR ":WD$(18)=NM$:WD$(19)=""
   +CHR$(13)+CHR$(13)             :REM*146
23Ø WD$(2Ø)="HAP":WD$(21)="PY ":WD$(22)="B
   IRTH":WD$(23)="DAY "           :REM*113
24Ø WD$(24)="TO ":WD$(25)="YOU!"  :REM*1Ø1
25Ø RETURN                        :REM*137
```

—Paul Baker, Browns Valley, CA

$5DB Stopwatch 64/128

With Stopwatch 64/128, you can start and stop timing with the press of any key. When you run the program, press any key to start the timer, which uses the computer's CIA chip for accuracy to 1/100 of a second. It displays seconds, minutes and hours. Then press any key to stop the timer.

```
Ø REM STOPWATCH 64 - JAMES BARNETT :REM*53
1Ø E$="":PRINTCHR$(147)           :REM*192
2Ø PRINT"PRESS A KEY TO START TIMER":GOTO
   13Ø                            :REM*2Ø7
3Ø H=Ø:M=Ø:A=TI/6Ø                :REM*2Ø3
4Ø LT=(INT(((TI/6Ø)-A)*1ØØ))/1ØØ   :REM*24
5Ø S=LT:IF S<=59 GOTO 9Ø           :REM*49
6Ø M=M+1:A=TI/6Ø                  :REM*12Ø
7Ø IF M<59 GOTO 9Ø                :REM*177
8Ø H=H+1:M=Ø                       :REM*57
9Ø PRINT"{8 CRSR DNs}"H;M;S        :REM*66
1ØØ PRINT"PRESS A KEY TO STOP":GET E$:IF E
    $=""GOTO 12Ø                  :REM*218
11Ø PRINTCHR$(17):GOTO2Ø           :REM*85
12Ø PRINTCHR$(19):GOTO4Ø          :REM*143
13Ø Q$=""                         :REM*1Ø3
14Ø GET Q$:IF Q$=""THEN 14Ø       :REM*144
15Ø PRINT CHR$(147):GOTO3Ø          :REM*7
```

—James Barnett, Osprey, FL

$5DC Drive Status 64

Drive Status 64 gives C-64 users a utility that 128 owners have in the command PRINT DS$. Run Drive Status 64 to create the machine language file ERROR MSG on disk. When you're typing programs on your C-64, load the file beforehand with "ERROR MSG",8,1. Then, whenever a disk error occurs, you can check the drive status by entering SYS 679.

```
Ø REM DISK DRIVE STATUS 64 - JAME T. JONES
                                  :REM*1Ø7
1Ø FOR T=679 TO 712:READ D:POKE T,D:CK=CK+
   D:NEXT                           :REM*1
2Ø IF CK <> 5238 THEN PRINT"ERROR IN DATA.
   .":END                         :REM*215
3Ø DATA 32,2Ø4,255,165,186,32,18Ø,255,169,
   111,133,185,32,15Ø,255,169,13,32
                                  :REM*216
4Ø DATA 21Ø,255,32,165,255,2Ø1,13,2Ø8,246,
   32,21Ø,255,76,171,255,96         :REM*82
5Ø SA=679:EA=713:H1=INT(SA/256):L1=SA-256*
   H1:H2=INT(EA/256):L2=EA-256*H2   :REM*58
6Ø SYS 57812"ERROR MSG",8:POKE 193,L1:POKE
    194,H1:POKE 174,L2:POKE 175,H2:REM*124
7Ø SYS 62954:CLOSE15:OPEN15,8,15,"I0":CLOS
   E15                            :REM*1Ø3
8Ø PRINTCHR$(147)"DRIVE STATUS IS ACTIVE."
   :PRINT"SYS 679 FOR DRIVE STATUS"
                                  :REM*181
```

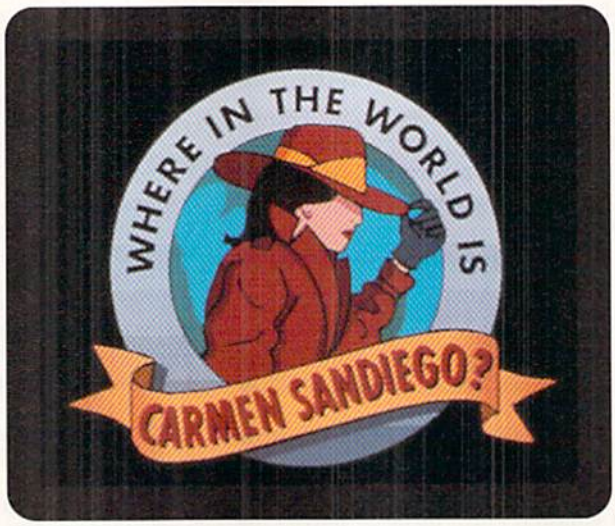
—James Jones, Klondike, TX ■

For a couple of corrections to the September/October Magic, see *RUN Amok on page 64.*

News and New Products

Big news this issue, with a variety of software, a new EPROM chip, and even a free tree offer for us paper wasters.

By JANICE GREAVES



Look out Alex Trebek! Crime queen Carmen now stars in her own game show.

Now Showing: Carmen Sandiego

BOSTON, MA—Master criminal Carmen Sandiego is on the loose again! And this time she's hitting the airwaves. **Where in the World Is Carmen Sandiego** is now a daily half-hour game show for 8- to 13-year-olds. The program is based on the best-selling computer game, and is being aired on PBS.

The show is produced by the makers of Wonder Works and Degrassi High, both highly acclaimed programs. In the new game show, contestant-detectives decipher a variety of clues to determine where Carmen and her band of thieves are hiding out. Clues to the whereabouts of the dastardly deed-doers come in via animation, live characters and zany props from various places, plus "reports" from a wide range of celebrities, such as Kool Moe Dee, Branford Marsalis, Penn and Teller and Walter Cronkite.

Winning contestants receive geographic prizes, such as a trip to any location in the continental United States. The information in Carmen will be supplied through research by the staff of National Geographic's *World* magazine.

The State of the CBM Union

NEW YORK, NY—Interesting news came from Commodore Business Machines in June. According to the *Wall Street Journal*, the European market accounted for a whopping 85 percent of CBM's recent sales. What's more, while sales on the Amiga side rose only 20 percent, sales of the C-64 rose more than 30 percent. Unfortunately (for 8-bit users), Commodore's MS-DOS computer line topped the list with 35 percent reported growth for the quarter.

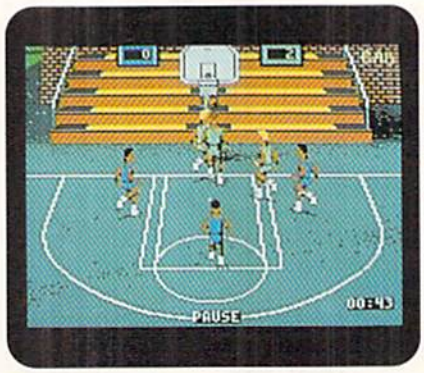
A Developer's Guide

DAYTON, MD—T & C Publishers has a book for enterprising programmers and developers called ***How to Develop, Publish and Market Your Own Computer Software***. According to T & C, the book was published "for all the programmers and hackers who dream of marketing a 'really great piece of software.'" The steps and strategies of software development and marketing described by author Thomas Taylor are gleaned from his own entrepreneurial experiences. In the book, he covers topics such as writing and publishing the user's guide, manufacturing the product, technical support and small business management.

How to Develop, Publish and Market Your Own Computer Software sells for $19.95 and runs 176 illustrated pages. For more information, contact T & C Publishers, PO Box 1, Dayton, MD 21036.

All-Star Basketball

SAN JOSE, CA—Data East has just released **The Dream Team 3 on 3 Challenge** for the C-64. The new game features all-pro basketball players Patrick Ewing, Dominique Wilkins and Joe Dumars in a fast-paced game.



Dream Team features fast action with Dumars, Ewing and Wilkins.

In The Dream Team, you can play with or against these three superstars, or select from 26 different players to create your own Dream Team. You control the shots, from hook shots to slam dunks. The game's interface is designed to let you concentrate on scoring points and defending the hoop, not on cumbersome technical operations.

The game is available for $39.95 from Data East, 1850 Little Orchard St., San Jose, CA 95125.

EA Hint Line

SAN MATEO, CA—Tired of getting stir-fried in Vulcania's lava pits? Electronic Arts now has a 900 hint line that can save you (900-288-HINT). The line is available around the clock, seven days a week.

Unfortunately, the hint line only offers hints for a limited list of software, but plans are being made for expanding the service. Titles currently supported by the hint line include: The Immortal, James Pond, Might and Magic, Lakers vs. Celtics, John Madden Football, Sword of Sodan, Populous, Centurion, Faery Tale Adventure and King's Bounty.

The service costs 95¢ for the first minute and 75¢ for each minute thereafter. You must have touch-tone service to access the hintline.

A Catalog of Free Stuff

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Completely updated, the *Guide* also presents the titles and sources of more than 2000 shareware programs for Commodore, Apple, Amiga, IBM and Macintosh computers. Also included is a glossary of more than 1000 computer terms.

For information about getting a copy of the *Guide*, contact The Educators Progress Service, 214 Center St., Randolph, WI 53956. *The Guide to Free Computer Materials* is $36.95, and offers a 15-day money-back guarantee.

Add-Ons for Educators

PORT EDWARDS, WI—Educators who use the Accelerated Reader by Advantage Learning Systems have something to cheer about: Five new disks are now available. The disks offer tests on 214 new titles for various skill levels, such as *Third Grade Is Terrible*, *Watership Down* and *Fahrenheit 451*. Each of the five disks targets a specific audience. These tests do not duplicate tests published on previous disks.

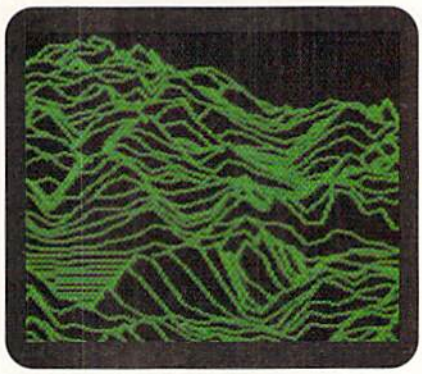
To use the Accelerated Reader, a student selects a book from the book list, reads it, then tests her/himself on comprehension of the book at a computer. The Accelerated Reader program scores the test and accumulates results for each child and for the class as a whole. It requires little supervision by the teacher, and its flexibility makes it effective with all readers.

For a free catalog, write to the Accelerated Reader, Box 95, Port Edwards, WI 54469. Or call toll-free, 800-338-4204.

Computerized Topography

CARROLLTON, TX—**Digital Landscape** by Digiscape software is a new C-64 program that lets you view the topography of the continental United States in three dimensions. (Parts of Canada are also included.)

The software uses data from a topographic map or from one of the elevation disks (included) to produce wireframe renderings of the Earth's surface. The renderings can be rotated 360 degrees in one-degree increments and tilted up to 89 degrees. The scale can be varied, and the renderings exaggerated or smoothed to bring out or suppress details. Renderings can be saved, and text and graphics can be added with a drawing program.



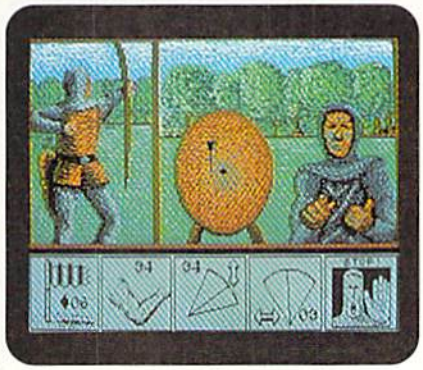
Digital Landscape offers a new perspective on the world around us.

Digital Landscape elevation disks contain over 400,000 elevations taken at regular intervals of 1/20 of one degree across the U.S.A. The Digital Landscape package, which includes the program disk, five elevation disk sets (three disks to a set) and manual, sells for $79. For more information, contact Digiscape Software, PO Box 113058, Carrollton, TX 75011.

Prove You Are the Iron Lord!

SAN MATEO, CA—Terror, Repression, Injustice. That's what **Iron Lord** promises! In UBI Soft's newest C-64 release, you play the forgotten son of a dethroned king. Your quest: to reclaim the throne from your evil uncle.

You must prove your birthright and build a following that respects you, so that when the time comes, they will go to war for you. Only strategy and strength in such fields as archery, arm wrestling and swordplay will win you the respect that you need.



Skill and bravery will prove your birthright in Iron Lord by UBI Soft.

In the adventure, you must travel through various towns, finding answers to your questions and confronting monsters in an underground maze. Prove you are the Iron Lord, Crusader of Justice!

This one-player, joystick-controlled adventure arcade game is copy-protected. For more information, call UBI Soft at 415-332-8757.

Affordable EPROM

CAMBRIDGE, MA—Some of you might remember GEOS programmer Randy Winchester. He's now affiliated with a company named Antigrav Toolkit, which has just released the **KeyDOS ROM**. It's a 32K EPROM (erasable programmable read only memory) chip that contains 20 new function key definitions and utilities that simplify disk operations on multiple drive systems. It's compatible with most C-128 hardware and software, including JiffyDOS, The Quick Brown Box, CS-DOS and even other function ROMs.

You can load C-64 programs in C-128 Fast mode with one keypress and select multiple files from a directory list for typing, printing, copying, renaming and scratching. It also lets you create 1581 partitions and subdirectories and edit disk sectors. GEOS reboots quickly and you can renumber or reset disk drives.

This ROM chip boasts many other fine features, including a Find/Replace utility, dual 80-column screens, a screen editor and dump, plus a screen clock with calendar and alarm. The package is $32.95 and comes with a utility disk and demonstration programs. For complete details and ordering information, contact Antigrav Toolkit, PO Box 1074, Cambridge, MA 02142.

Free Trees

NEBRASKA CITY, NE—We computer users are notorious for using paper heedlessly. To help fight back, The National Arbor Day Foundation is giving ten free Colorado blue spruce trees to each person who joins the Foundation. Membership is only $10 and the trees will be delivered in time for spring planting in March, April or May. In southern and western states, other conifers hardy in those areas will be provided. The trees are guaranteed to grow, or will be replaced free of charge.

To become a member and receive your free trees, send $10 to Ten Blue Spruces, National Arbor Day Foundation, 100 Arbor Avenue, Nebraska City, NE 68410. ■

MAIL RUN

RAM gets a special plug and readers respond with tips on creating C-64 forms.

COMMODORE COMPATIBILITY

A few years ago I read in *RUN* about the Spartan by Mimic Systems, which was capable of emulating Apple software on the Commodore 64.

We have both a C-64 and a C-128 at home, but the schools here are equipped with Apple machines. My children keep asking me to trade our beautiful Commodores for Apple IIs or Macintosh machines to enable them to use the computers both at home and at school. I am rather reluctant to give in. Could you advise me, is the Spartan still available? If it's not, are there any other products that will link Commodores to Apples?

—P. NAGESHWAR
EDMONTON, ALBERTA

I have a question: Is Commodore's CDTV compatible with the 64C?

—JOB CACKA
CANBY, OR

Unfortunately, the answer to both questions is no. The Spartan system (reviewed in RUN, *December 1986) is no longer available. CDTV is actually an Amiga 500 with a CD-ROM drive that runs compact-disk-based software and has a remote-controlled interface. There is no software or hardware that makes the Commodore 64/128 compatible with the Amiga, Apple or any other computer. (No matter what the rumor mill says!) Of course, if you add an Apple at home, you don't need to scrap your Commodores!*

You can *share text and relative files among C-64/128s and other platforms. For a complete discussion of this, see "Share and Share Alike" by Tim Walsh in our last issue (September/October 1991).*

—EDITORS

PPI/GEOS

I am writing in response to the March/April 1991 ProTips column. John Tomasetti suggested installing a switch on the power lead for the PPI printer interface. Another solution would be to download CNFPPI.BIN (Configure PPI) from Q-Link. With it, you no longer need to remember the commands to configure the PPI interface for use with GEOS. It is an Autoexec GEOS program that will automatically set up the PPI if you place it on your boot disk. A quick way to find Configure PPI would be to issue a BRO DEY:PPI at the CBMART"LIB 13 !" prompt.

—BILL ROBERSON
LADSON, SC

CREATING FORMS

To answer Elroy Grandy's letter in the July/August Mail RUN column on his search for a form-making program, the best program I can find is Fun Graphics Machine by Ron Hackley. I use it to make forms, posters and graphics. You can change fonts and load graphics from Printshop, Printmaster Plus and others. You can also enlarge or reduce graphics and text, link screens and much more.

—BERT SIMMONS
CHULA VISTA, CA

I use Paperclip Publisher to create forms. It prints various fonts and type sizes, darkened areas and thin or thick horizontal and vertical lines. In addition, Paperclip Publisher converts many of the popular graphics and word processing formats and converts fonts from GEOS.

—ROBERT REEVES
WHITTIER, CA

RUN INDEX

Do you publish an annual article directory indexed by subject?

—PAUL LITTELL
GRANT'S PASS, OR

Paul, each year we index the articles and reviews by subject, and print the list the following January (except 1988 and 1990, when it was published in February). The 1991 index will be published in the January/February 1992 issue.

—EDITORS

REVOLUTIONARY RAM?

Your excellent answer to Dr. Polakowski (July/August 1991 Mail RUN) covered most of the bases, but unfortunately missed the most important device. Creative Micro Designs' RAMLink controls any REU and runs almost any program many times faster.

It has a backup memory battery kept charged by the power supply, it responds to standard 64/128 DOS commands, and it doesn't need special driver software. RAMLink works with GEOS and all other paint, graphics, database, word processor and accounting programs.

It's hard to believe, but RAMLink is to 64/128 hardware what GEOS is to 64/128 software. It revolutionizes and invigorates the 8-bit hardware capabilities. For years we have been whining about the declining development efforts directed towards our 64/128 machines. CMD has answered the call with devices and DOS chips so advanced that many users can't grasp their full significance. They have no competition and have a serious chance of single-handedly turning around the 8-bit market.

—J.S. GRANDUCCI II

You're absolutely right. Unfortunately, at the time our answer to Dr. Polakowski went to press, we hadn't seen RAMLink. Now it's selling so well that there was a three-month backlog before they even started shipping.

We appreciate the significance of CMD's RAMLink and RAMDrive. They will be reviewed in the January/February issue, and are discussed in "The ABCs of REUs" in this issue (p. 23). It's the initiative of developers like CMD that ensure a future for our market.

—EDITORS ■

RUN's ever-increasing list of Commodore user's groups is now found in the User's Group Update box on page 64.

Software Hut

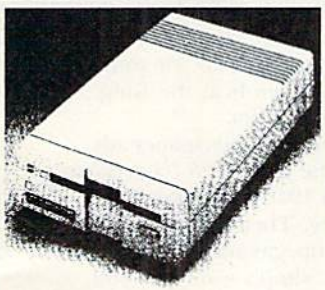
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If you own a Commodore 16, 64, or 128; or a Pet, Plus 4 or Vic 20, write the serial number on the cover of the original owner's manual (no photocopies) and call Software Hut. You can save $300 on an Amiga 500P (off the MSRP of $799). And $200 on an Amiga 500DS (off the MSRP of $599).

The powerful Amiga 500DS hooks up to your TV. It has incredible graphics-with more than 4,000 colors, built-in sound, word processing, and three exciting games. (TV adapter is extra).

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SOFTWARE GALLERY

There's something for everyone in the Gallery this time, including Street Rod, Word Writer 6, Clue Master Detective and MicroLeague Baseball II Enhanced.

By WALT LATOCHA

BAD BLOOD.....A–

Great Graphics and Sound in A "Grave New World" Adventure

Ultima fans should take care before purchasing Bad Blood. Although it's produced by Origin, this game is significantly different from the company's famous role-playing series.

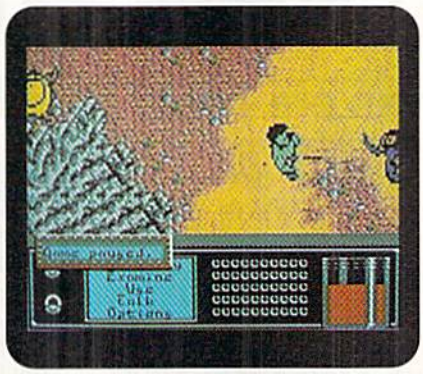
This game takes place on a barren Earth, several years after a nuclear holocaust. Two separate societies have sprung up: the pure-blood humans and the mutants. The former group has enslaved many of the genetically altered beings and is using their labor to rebuild civilization. Now word has spread among the free mutants that Lord Dominix, a powerful pure-blood leader, is organizing an assault to wipe them out. Your mission is to prevent this slaughter.

You begin by selecting to be one of three free warriors. At one extreme is Varigg, a strong, green-skinned giant, and at the other is Dekker, the weak human offspring of mutant parents. The third possibility is Jakka, a woman who looks human but has hidden powers. Your choice will determine the strategy to use as your character infiltrates the world of the pure-bloods.

In addition to its setting, Bad Blood differs from the Ultima programs both in its size—it comes on both sides of only one disk—and in having an individual hero rather than a band of them. Also, the new game's combat relies heavily on arcade skills, and, although Origin included interaction with nonplayer characters, there's practically no development of the hero you select.

What you do get with Bad Blood are rich graphics and sounds, possibly the best that Origin has produced for the C-64. The control system, which is largely menu-driven and manipulated through both the keyboard and a joystick, is also commendable.

Best of all is the post-apocalyptic universe that the software creates. Features such as a host of bizarre beasts and the mutants' colorful slang vocabulary will draw you into the game's atmosphere.



Varigg battles some bizarre beasts in Origin's post-nuclear adventure.

As the program amply illustrates, some people will accept only "purity" and, as a result, will automatically reject Bad Blood because it's not a traditional role-playing game. But players willing to try something different should be intrigued by this vision of a future we all hope will never come.

(Origin Systems, Inc., 110 Wild Basin Road, Suite 330, Austin, TX 78746. C-64/ $49.95. Included in the package is Times of Lore, another game by Bad Blood's author.)

STREET ROD.....A

Cruise Down Memory Lane In This Hot-Rod Simulation

Sure, Street Rod delivers the racing thrills you expect, but it does many other things as well. For one thing, it offers a nostalgia trip for players who are over 45, and, for the younger player, an intriguing lesson about a unique period in America's history.

This original simulation begins at the start of summer vacation, 1963. You have just three months before classes resume to buy an old jalopy, soup it up, win some money and maybe even beat the King, the current ace hot-rodder.

First you have to check newspaper ads and pick one of the game's 25 "cherry" autos, including a 1940 Chevy Roadster and a '61 Corvette. Then it's off to the garage for a tune-up, gas and some body work. The repair shop's wall tells you how many days are left in the vacation and provides important information about your car, including the amount of wear left in its vital parts.

You return to the newspaper often to scan the classifieds for some of the 35-plus parts the program includes. Among them are complete engines, carburetors, manifolds, and four transmission types, ranging from automatic to the four-speed racing variety.

The heart of the game takes place at Bob's Drive-In, where you can challenge cruising drivers to drag or road races, betting for fun, cash or the pink slips of the cars that you and your opponent drive. During races, you must change gears, avoid dropping a transmission and watch out for ticket-happy cops.

The program contains all sorts of other enticing elements. You can, for instance, paint and decorate your car to get more involved in the game and to affect the races you run. There's also an option to sell unneeded parts for money to upgrade your auto, and a Hall of Fame screen for players who vanquish the King.

All of this is accompanied by a much-appreciated save-game feature and an excellent menu-driven control system that accepts input from both a joystick and the keyboard. The sound is very good; the graphics are gorgeous. The instruction manual is outstanding, with clear, detailed descriptions of the gameplay and beautiful photos of classic autos that recreate the spirit of the era.

One of the game's few problems is the package artwork, which gives the false impression that this is a simple, unso- ►

SOFTWARE REPORT CARD

Outstanding	A
Good	B
Average	C
Below Average	D
Crummy	F

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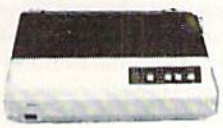
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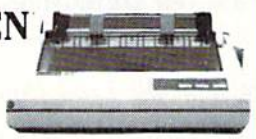
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phisticated program. But those who are even remotely interested in the teen scene of nearly three decades past will love Street Rod.

Would that all C-64 programs were crafted with such loving care and painstaking attention to detail!

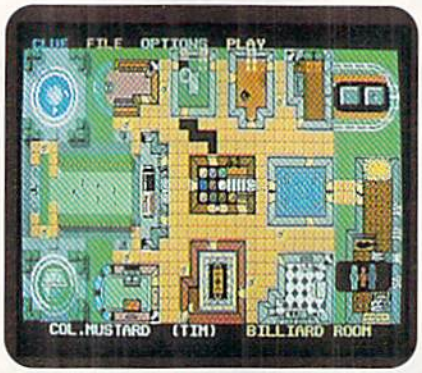
(California Dreams; distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/$24.95)

CLUE MASTER DETECTIVE....A–

Colonel Mustard, in the Library, with the Lead Pipe

With successful products such as Monopoly and Risk, Virgin has become famous for turning board games into computer software. Now this company has produced its most successful conversion by bringing Clue to the C-64.

Sporting the title Clue Master Detective, this software lets three to ten human and computer competitors play at one time, and requires one joystick. The game's object is to solve the murder of Mr. Boddy, the owner of the mansion that you and your opponents are visiting. The winner is the first player to figure out who committed the crime, which weapon was used and in which room the foul deed took place.



Clue Master Detective is Virgin's most successful board game yet!

A turn begins with the computer throwing dice to determine how many squares you can move. Your destination is usually one of the manor's 12 rooms, where you'll see cards showing a character, a weapon and a room. You can eliminate these from suspicion, because if they appear on the cards, they're not connected with the crime.

Landing on certain squares lets you "snoop" by peeking at one of the cards an opponent has received. And there are options to save games, review notes kept in the computer's memory and print information that was previously disclosed.

The program has two problems. First, you must hide some of the information that appears on the screen during your turn, and this can be awkward. Also, becoming comfortable with the play mechanics takes quite a bit of time and experimentation.

On the other hand, both the graphics and the sound are excellent. Also, in contrast to many similar games, the computer players—which can be set at three skill levels—are worthy foes. And the menu-driven control system is exceptionally user-friendly.

Best of all is the game's strategic challenge. It lies not only in discovering the who, what and where of the murder, but in finding ways to beat your fellow players to necessary data and even to trick them in certain situations.

All in all, Clue Master Detective is an excellent program. It's a most satisfying way to play Sherlock Holmes on your very own C-64.

(Virgin Games, Inc., 18061 Fitch Ave., Irvine, CA 92714. C-64/$29.99)

MICROLEAGUE BASEBALL II ENHANCED .....B+

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WORD WRITER 6 AS A PROGRAM.....A AS AN UPGRADE.....B–

Excellent Product, Good Price, Now Has a Built-In Database

Word Writer 6 is essentially an upscale version of Word Writer 5, with the major addition of an electronic card file for mail merges. This was apparent in the first release of its documentation—merely an 18-page supplement with the WW5 manual. (The complete WW6 manual is now being shipped.) If you're looking for a new word processor, this one is an excellent choice. However, there isn't much to warrant spending the extra money if you already have Word Writer 5.

Word Writer 6 retains both the strengths and weaknesses of its immediate predecessor. The strengths are many, including a large dictionary with word count, a thesaurus, an outline mode and an 80-column preview screen. Blocks of text can be moved, copied or deleted. There's a search and replace command, as well as programmable macros to save keystrokes when issuing complex commands.

The documentation is clear and easy to read. You can call up a help screen from within the program, and a keyboard overlay, updated to reflect the Word Writer 6 commands, is provided.

Word Writer 6 has drivers for most dot matrix printers on the market. Documents can be printed in either text or graphics mode with excellent results.



The new card file lets you store lots of information and print only what you need.

The program comes with ten built-in fonts in 27 sizes, plus 150 graphics. Text and graphics print modes can be mixed within a document.

Past deficiencies are also present. Printing in the graphics mode is slow. The spell-checker and thesaurus, when used with a 1571 or 1541 drive, are lethargic. The screen output in the 80-column preview mode provides only a rough approximation of the final product: Carriage returns and page breaks are accurately represented, but fonts and graphics are not. In fairness to Timeworks, most of these problems are due more to the C-64's limitations than to the program.

Word Writer 6 can directly read documents produced with its predecessors. Also, text from other word processors, including geoWrite, can be imported, as can graphics and pictures from GEOS and Doodle!. Imported text and graphics must be converted using an external program before loading the word processor.

New in Word Writer 6 is the electronic card file. A mini-database, the card file stores information in individual

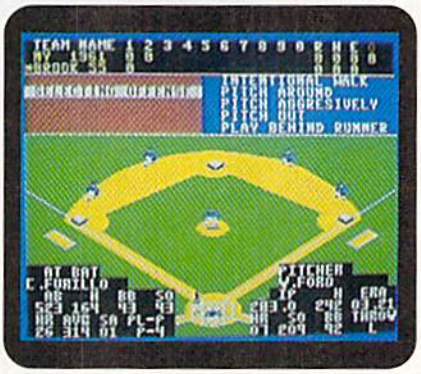
longs in the "Big Leagues." And, while this brand-new version of a C-64 sports classic is weak in a few places, it has more than enough "stuff" to win over fans of America's favorite pastime.

Licensed by the Major League Baseball Players Association, the game contains 26 classic teams from the past, such as the 1988 Oakland and 1959 Los Angeles clubs. While you're learning, you can watch as both teams are coached by your C-64, then you can direct one set of players while a human opponent or the computer coaches the other.

On defense, you choose from a dozen pitching options, including sliders and intentional walks. Guarding the line and playing in at the corners are two of the 14 changes you can make to fielder positions. The program also offers 15 options to the team at bat.

Each player inputs his or her offensive and defensive selections via the keyboard. Then the results are illustrated by a simple animated display of a single play.

The program is packed with features, including bullpen warm-ups, three stadiums, a designated-hitter option and unlimited substitutions. The graphics can be toggled on and off, and the quick-play mode will finish a contest in just a few minutes. In addition, you can create a new team and build it up through trades for talented athletes.



MLB2E is a good fix for post-World Series withdrawal symptoms.

Of special note are the software's statistical capabilities. At any time you can display players' real-life records, which combine with your coaching skill to determine who wins the game. And, with a program-created stats disk, a detailed summary is available of the teams' and players' performance in your own computerized league.

Note that the orders you issue to your team are your only control over the game outcome. This program is pure mental challenge, based on a stripped-down version of real-world pro baseball. To succeed, you must have or develop a solid knowledge of diamond strategy and tactics.

A few basic improvements to the program would be welcome. For example, it's not compatible with Fast Load cartridges, and the resulting three-minute loading time is too long. Also, additional on-screen instructions would make the fine control system even easier to use. Finally, although you can print out all sorts of data from the statistics disk, being able to do the same for players' records during a game would be very helpful.

But the intended audience of MicroLeague Baseball II Enhanced will consider these shortcomings only minor annoyances. The many features of the game, together with the add-on disks, should provide sports fanatics with pleasure for years to come.

(MicroLeague Sports Association, 2201 Drummond Plaza, Newark, DE 19711. C64/ $39.95. The following enhancements are also available: Create a Team program, $24.95; 1987–1989 season disks, $19.95 each.)

SPOT ..... B–

A Good Round of Play, But It Might Make You Thirsty

You may have noticed the growing number of Coke and Pepsi cans placed in

Continued on p. 58.

records, called cards, which can be indexed, edited, viewed, deleted and printed. You can store up to 255 cards in a file, with 3–23 fields per card. Each field can be up to 60 characters long, and you can store many files on a disk.

The card file replaces the address list from earlier versions of Word Writer for storing names and addresses for form letters. You can sort by single or multiple fields, and select specific groups of cards, as well as specific fields within cards, for use before printing.

Although not every field in a card must be printed when doing a mail merge, the fields have to be printed in order. Imagine a card with three fields: name, address and city. While you can design a document that uses only fields one and three, field one must be printed before field three. Fields cannot be repeated within a document.

While this is not a major limitation, it does require some forethought on the user's part when designing the cards for a file. Letters that include a name twice, say in an address block and later in the salutation, must use cards with two name fields.

Lists created with earlier versions of Word Writer or Data Manager can be imported into the card file. You must print letters generated with the card file in the text mode, and they can be no longer than four pages.

The tab function is improved. Now, six tab settings can be user-defined and used in both the text and graphics modes. The font/style bar is more informative, too, now showing when text is justified.

A GOTO Page command gives rapid cursor movement. This control replaces the calculator in earlier versions and lets you jump the cursor to a specific page within a document.

Timeworks provides 60 days of free technical support for registered users. The 60-day period begins with your first letter, fax or phone call to the company. The support number has a 708 area code, a long distance call for most users, but an 800 number is available to those who pay $30 for a year of unlimited technical support. If you intend to contact Timeworks by mail, note that they've moved. Their new address appears below.

Two accessory packs are available to accompany Word Writer 6. One contains 16 additional fonts, the other 130 graphics. The fonts will work with Word Writer versions 4 through 6, but the graphics are specific to the new edition.

Word Writer 6's three 5¼-inch disks can be exchanged, free of charge, for the same program on 3½-inch disks. This is a wise move for Commodore users who own a 1581 drive. I found that spell-checking a 900-word document took about one-third the time using a 1581.

Word Writer 6 is an excellent product, competitively priced, for first-time word processor buyers. The upgrade would be a good purchase for owners of earlier versions of Word Writer as well, unless you own Word Writer 5.

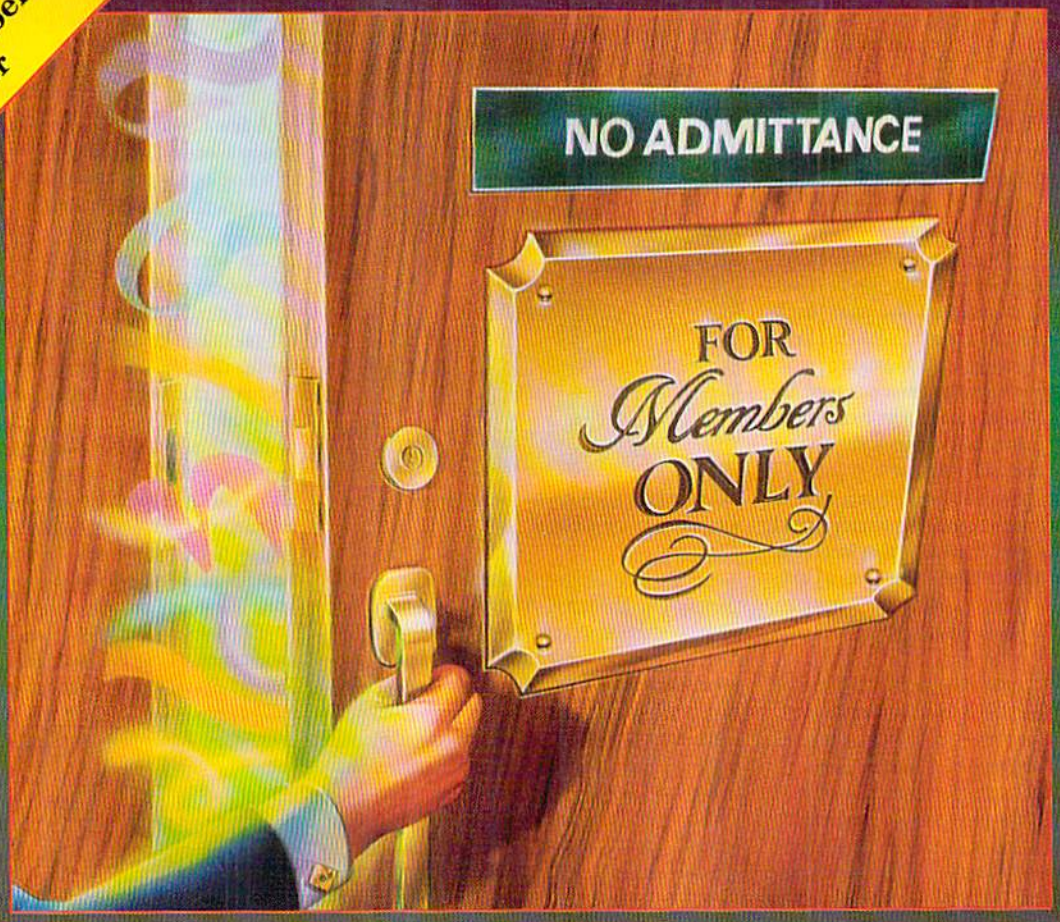
If you have Word Writer 5, remember that the only major change is the electronic card file, so the cost of upgrading is only justified if you do a lot of form letters and mail merges.

(Timeworks, Inc., 625 Academy, Northbrook, IL 60062. C-64/$49.95. Upgrades, $19.95; accessory packs, $9.95 each)

—MICHAEL CAVANAUGH
LEVITTOWN, PA

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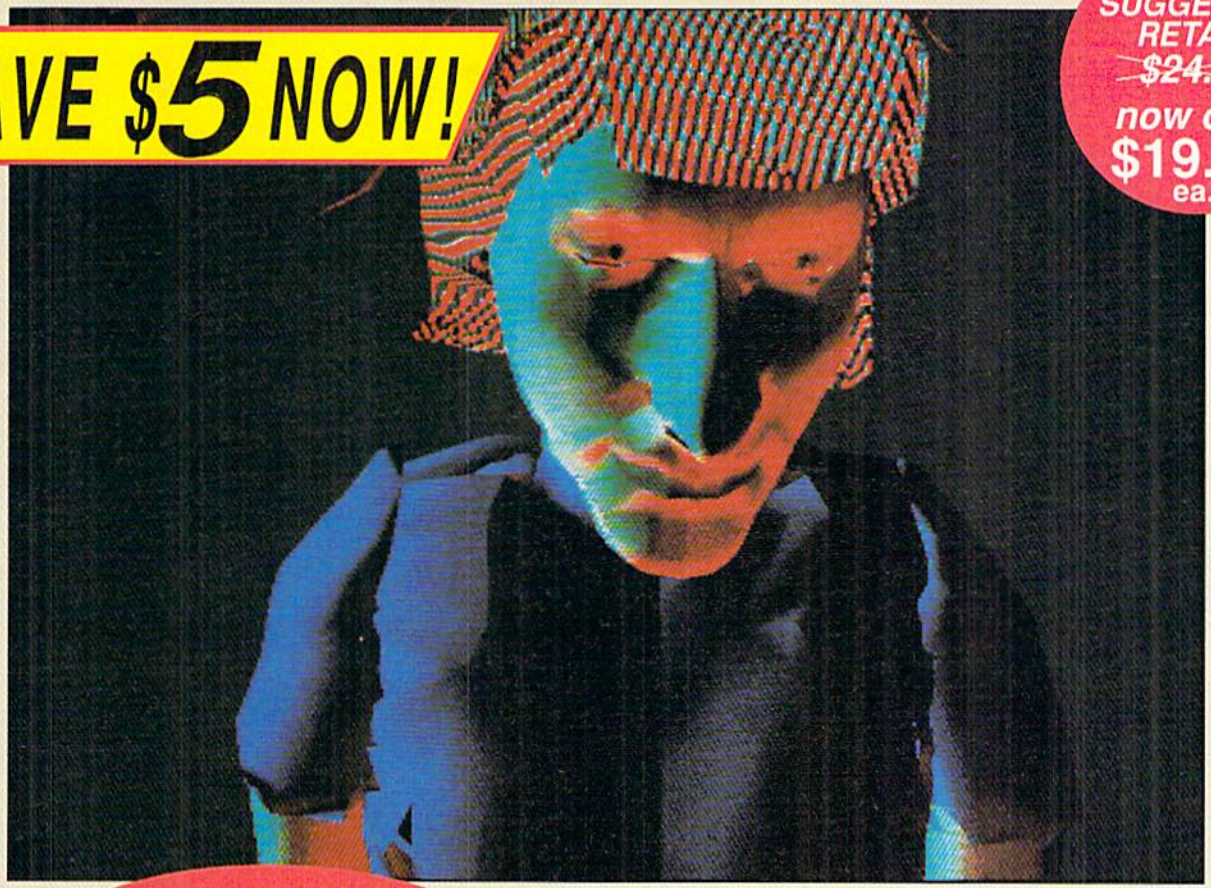
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Cliff Diver
Or
Couch Potato?

Are you really making the most of your Commodore system? Use this checklist to find out where you stand . . . or sit.

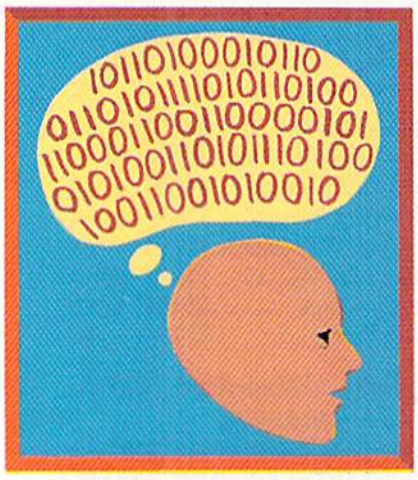
By STÉPHANE DIRSCHAUER

It's sad to say, but many Commodore users are computing couch potatoes. They run stock systems with just a handful of programs and seldom venture into new territory. Many new users, especially, fail to take the next few steps toward realizing their computing potential, and often because they simply don't know the possibilities or understand the benefits.

How do *you* measure up? Are you poised to take the plunge, or are you putting down roots in the furniture? To find out, answer the following questions. Whenever you answer "no," read on to see what you're missing and how you can get it.

1. Do you know how to program?

There was a time when computer users needed to write programs simply because the only software available was the home-brewed variety. But even today there are many inducements to program: It isn't as difficult as it appears; it will give you a greater understanding of your computer; and it is (believe it or not) very rewarding personally.



I know it's tough to believe, but learning to program isn't the abstruse task it seems. The C-64 and 128 each sport an excellent Basic programming language (Basic, after all, stands for *Beginner's* All-Purpose Symbolic Instruction Code). If Basic isn't your thing, alternatives wait in the wings, including Pascal, Comal, Forth, and Pilot.

As you learn to program, you will come to understand more and more of how a computer really works. Even just a smidgen of Basic can reduce the mystery. You'll find it easier to interpret your software's responses and to sympathize with your computer's problems.

Finally, consider the satisfaction that creating your own programs will afford. Many of today's best novelists began writing because of the pleasure they derived from other authors' books. In the same manner, let yourself be inspired to program by the programs that you use every day. When you have your own finished product—something real to show for your efforts—you'll know what I mean. Even if you don't win the Nobel Prize, you'll enjoy creating your own programs, however simple they are. (See "Get With the Programming" on page 20 for more on this subject.)

So, if you haven't written a line of code in your life, dig out that Basic manual and have a go at it. You may stumble upon your true calling—or at least discover a new hobby.

2. Do you own a RAM expansion unit?

In this era of gigabytes galore, the C-64's measly 64K is almost embarrassing (though it helps to think of it as 65,536 bytes, or 524,288 bits). Thankfully, this initial storehouse can be expanded using one of Commodore's RAM expansion units (REUs). The 1764 boosts your C-64 to 320K. The 1700 and 1750 boost the C-128 to 256K and 640K, respectively. Similar products from Creative Micro Designs, called RAMLink and RAMDrive, bolster the RAM up to 2 megabytes!

Think of the REU as an extra-speedy disk drive—so quick, in fact, that data appears in the blink of an eye. A program written to use the REU can switch between chunks of code at great speed, making the program effectively larger than 64K. (Many programs do this with ordinary disk drives, but at noticeably reduced speed.)

Strictly speaking, though, your programs will still be only 64K long. The C-64's microprocessor, the 6510, has an address bus that's only 16 bits long. And since it can use only as many RAM locations as 16 binary digits (bits) can specify, the "maximum" program length

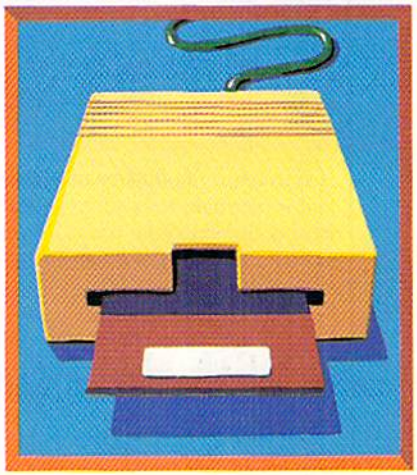
ILLUSTRATED BY CAROLINE WHITE

is only 64 kilobytes long. The same goes for the C-128. Its microprocessor handles only 64K and must juggle between different "banks" to access the full 128K of RAM.

Unfortunately, few programs use the REU directly. Its biggest backer is GEOS, and for good reason: When equipped with an REU, GEOS becomes lightning fast.

For more information about REUs, see "The ABCs of REUs" on page 23.

3. Do you have a 1581 disk drive?



Once you have more memory, the next logical step is increasing your disk capacity; the 1541's 170 kilobytes are rather scant.

Commodore's slick 1581 is a big improvement. Its 3½-inch floppies (also used with Amiga, Macintosh and IBM computers) can hold 800 kilobytes—almost five times more than the 1541's 5¼-inch disks. The 1581 DOS also has a feature called *partitioning,* which lets you divide your disk into several distinct areas with separate directories. With so much space on the disk, one directory for the lot might be too cumbersome.

There are drawbacks, the biggest of which is compatibility. Many commercial programs assume that the disk they're using is structured *à la* 1541, and lose themselves in the new layout. Even worse, most of the devilish copy-protection schemes won't let you transfer a program to the new 1581 format in the first place.

Given these limitations, the 1581 is an excellent data drive. But don't sell off your 1541 yet—it's best to use the two drives together. For example, the 1541 can load up your word processor, while the 1581 keeps the text files. You'll probably find that owning two drives is as much an advantage as the 1581's greater capacity.

By the way, don't be surprised if you quickly fill up the new 3½-inch disks. Most likely, your productivity will rise to take advantage of the extra space, and you'll find that the thirst for disk space is unquenchable.

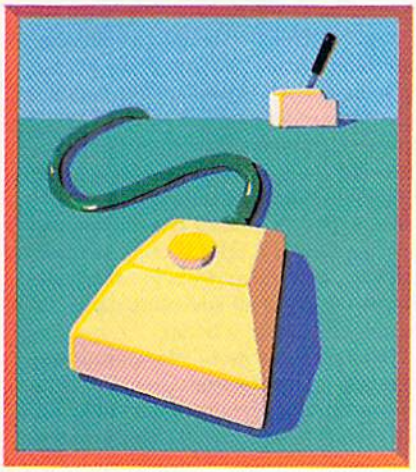
4. Do you take advantage of freely distributable software?

Who says you can't get something for nothing? There's a ton of software available at little or no cost—it's called *freely distributable* software.

There are two classes of freely distributable software: public domain and shareware. Public domain (PD) programs can be exchanged at no cost because the author has relinquished the copyright to the public domain. With shareware, once you've tried out the program, you must pay the author a fee of $1 to $25 (occasionally more) to honorably continue using it.

Although you won't encounter freely distributable software at your computer retailer, it's still easy to find. User's groups and disk copying services make a wide range of PD disks available at a minimal charge to cover the copying. What's more, bulletin board systems and networks such as CompuServe offer extensive menus of freely distributable fare.

PD and shareware programs, although rarely as elaborate as their commercial counterparts, often fill a niche that's too small to profit from commercially. If you've been looking everywhere for an esoteric application or a great game, this is the place to find it.



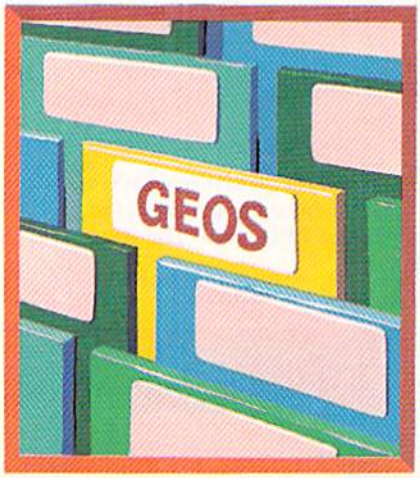
5. Do you use a mouse?

Ever tried to draw a graphics screen using a joystick? It's like playing one of those plastic pocket games where you try to roll a ball into a hole—it's nearly impossible. While a joystick is fine for games, it isn't accurate enough for many programs.

A 1351 mouse, on the other hand, is a proportional input device. Unlike the joystick, which distinguishes only a few directions, a mouse distinguishes speed as well as 360 degrees of continuous direction. Dart your mouse around the mouse pad and your on-screen pointer will mirror its movements.

As with many equipment add-ons, the main impediment to the mouse's success is the lack of supporting software. Many new productivity programs accommodate it, and it's ideal with GEOS. Still, lots of software ignores it. Thankfully, Commodore's 1351 mouse also has a joystick mode, in which it mimics a joystick to work with a wider variety of programs.

Whether or not a mouse is a worthwhile addition depends on what applications you use. For graphics, it certainly out-performs the joystick.



6. Do you use GEOS?

Chances are some promotion has put a copy of GEOS in your hands. But do you use it?

GEOS isn't merely a set of entwined programs with a similar interface. It's a whole new operating system that sports a graphics interface and makes operating your Commodore a smoother task. But to use GEOS, your system must be ready for it; for example, running it on a C-64 with a single 1541 drive can be painfully slow. To make the most of GEOS, you really should have at least a 1581 or an REU.

With an expanded computer system, GEOS works like a dream. No longer is support for printers and other hardware program-dependent—it's all handled by GEOS.

There's also a quality line of GEOS software, including geoPaint and geoWrite. An operating system is only as good as its supporting software, and in this respect GEOS is top-drawer.

7. Do you telecommunicate?

A modem (modulator-demodulator) may be an excellent investment for you, because it can admit a flood of information into your home. Modems convert data (such as text characters) into electrical signals that can travel over Ma Bell's lines. Add a terminal program, and you'll be able to connect to other computer users, bulletin board systems (BBSs) and databases.

Large cities have hundreds of BBSs, where you can read

Get With the Programming!

IF YOU COULD ARRANGE the world's population into two groups—programmers and nonprogrammers—and step back to view the results, you'd see vast continents covered with nonprogrammers, and, in a blotch just larger than Silicon Valley, a small group of people clutching programming manuals.

It's not amazing that programmers make up only a fragment of the populace. The surprising fact is that programmers are a minority even among computer users.

It's surprising not only because programming is relatively easy to learn, but also because the benefits are great. It's far simpler to do than it looks, and it can even be fun.

The Fundamental Myth: Programming Is Difficult

There's only one reason why programming is so intimidating: It's cloaked in a veil of myth. Here are just a few of the erroneous beliefs that have been circulating since computing began:

• *Only a computer expert can learn to program.* Quite the opposite. You don't need to be an "expert" to learn, but learning may just make you an expert. Many people start programming with little prior computer experience. The world's first programmer was Lady Ada Lovelace, who, in the 19th century, worked on a mechanical calculating machine invented by Charles Babbage. She obviously was not a computer expert!

• *Learning can take months or years.* For the skill to create professional-quality programs, certainly; learning any worthwhile skill takes time. You can, however, learn enough Basic in a short time to reap some benefit from programming. Basic 2.0, the C-64's dialect of the language, has a vocabulary of just 76 words—and 80 percent of the time you'll need only 40 of those. Once you've mastered their use, you'll essentially know Basic. Of course, these words—called reserved system words or *keywords*—have special usages and formats, but those aren't hard to remember either.

• *Learning will require extra books and software.* Not at all. If you have a working C-64 or C-128 with the manuals, you have everything you need to begin: the Basic language and a tutorial (included in your system guide). Later, perhaps, you may wish to expand your knowledge by reading up on specific techniques or mastering new languages, but at first you won't need anything you don't already have.

• *Programming is different from other kinds of computing.* Absolutely wrong. Basic and other languages are, after all, just programs themselves. The only differences are in the application. Basic is simply a program that can be used to create other programs.

Pros: 4/Cons: 0

Ten years ago, the motivation to program was obvious: Software was scarce, and if you wanted a program you often had to make it yourself. In today's computer marketplaces, commercial software provides for all kinds of computer needs. Still, though you may not *need* to write your own programs, there are many reasons you might *want* to:

• *To create your own specialized applications.* You've probably thought of an idea for a great program. And, homemade programs can be customized to fit your equipment and your specific needs—a benefit not available to you with commercial software.

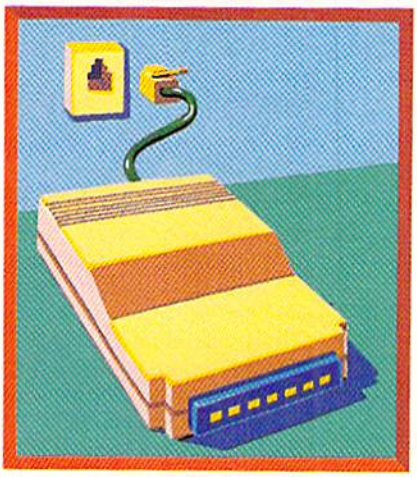
• *To fix, enhance, and generally tinker around with other people's programs.* Everyone's used a program with an interface that is so illogical that it must have been designed by a sadist. Or you've played a game with screen colors that could only have been picked by someone with a wardrobe of clashing plaids. If the program is in Basic, changing it can be simple. (However, commercial programs are usually written in machine language, and are deliberately made resistant to alteration.)

You might also make enhancements, such as adding a print routine to your database. And it's possible to examine a program, such as an adventure game, to find out how to use it better.

• *To exercise your mind.* Many programmers make a mental exercise out of writing a program. They're never satisfied with merely having it work; they'll spend

and leave messages, upload (send) and download (receive) programs and read text files. The diversity of BBSs is astounding. In Toronto, for instance, there are BBSs dedicated to the sciences, writing, even Esperanto.

8. Do you belong to a large online network?



If your local BBSs seem a bit limited, large continent- or world-wide systems, such as QuantumLink and GEnie, may be the answer. Unlike most BBSs, thousands of people can use these networks simultaneously. And, as befits their size, they offer huge collections of freely distributable software.

The only catch is the cost. In addition to the regular toll phone charges, these systems usually charge per minute plus a monthly fee. If you're not careful, you can run up an enormous bill while seeking an answer to a question or prospecting for program gold.

If you find these costs prohibitive, but you still want something more than a simple BBS, investigate a network of smaller systems. An increasing number of BBSs are linking up to form larger networks on which users can share messages and files.

Most of these networks, such as Usenet, Fidonet and NorthAmeriNet, carry Commodore-specific message conferences and sometimes file exchanges. There may be a slight charge—after all, your local system operator ("sysop") has to pay the BBS's phone bills somehow—but this type of network should prove easier on your pocketbook than a commercial network.

hours making their creation faster and shorter with clever coding. Most programmers aren't that dedicated, but, if you enjoy "mental chewing gum," programming will provide hours of fun as well as a useful finished product.

• *To better understand how software works.* You might consider this the most important reason to program. If you'd like to get more use out of your software, knowing a bit of programming can help. Put a programmer and nonprogrammer side-by-side, each using a new application, and the programmer will almost always catch on in less time.

Programming expertise helps you make smart assumptions about software features by helping you interpret what's happening behind the screens, so to speak. Even a tiny bit of Basic or other language can noticeably effect how smoothly you manuever through your software.

Getting Started

You have several options. Most computer users who learn Basic do so on their own, but you shouldn't have trouble finding a course or an experienced programmer who can show you the ropes.

I do, however, strongly recommend the self-teaching method for a couple of reasons. First of all, you'll never run out of reference material. If you need information and help, there are books and magazines to read and megabytes of programs to analyze and modify. Second, computers are beautiful teachers, because they let you work at your own pace and make your own discoveries. It would be a shame to waste that.

The first thing you should do is follow the examples in your user's manual that cover the basics of Basic. Review them even if you've tried before, to have the fundamentals fresh in your memory. Once you've mastered those minimal commands, your study will largely consist of using them to try new things—such as graphics and sound—then learning new commands whenever the need arises.

Assign yourself exercises: Look at program listings that are one or two screens long and see if you can modify them to meet your specific needs.

Tips for the Novice

In the course of learning several computer languages, I've come across various ways to speed up the process:

1. *Experiment with reckless abandon* (just don't use valuable files). Nothing you can do as a programmer will harm your computer. Try things out even if you're not sure they'll work.
2. *Do a lot of "spaghetti programming."* Sit down at your computer without any preparation and see what you come up with. This isn't the way to write complex programs, but it's fun and chances are you'll create bits of code you can use in larger projects later.
3. *Analyze other people's programs.* They say that you can't write well if you read little. In a similar way, analyzing other programs is a prerequisite for good programming. The listings in *RUN* are an excellent starting point. When you've typed them in, see what changes you can make and what effects the changes have. Looking at large listings is a good way to see how programmers fit different elements into a working whole.
4. *Write small programs at first.* Giant listings can be a nightmare to maintain and debug, particularly if you don't have much experience. Starting with the small stuff helps build up confidence and expertise.

When you feel ready to create a major program, give thought to exactly how it will work and how you'll write its features before starting. Mark Jordan's 128 Mode in the July/August 1991 *RUN* offers good advice about planning out your programs. Even if you have a C-64, you will benefit from his advice when you decide to take on a project.

One excellent project to help you master a language is an adventure game, because it requires input, output, and complex variables.

Finally: Persevere! The first part of learning is always the toughest.

Who knows? Maybe in time we'll expand that little blotch of programmers to cover *all* of California...maybe even part of Oregon too. □

—SD

9. Do you keep up with new developments in computing?

Any "power user" eagerly absorbs Commodore news and information, wherever they can find it. And, of course, *RUN* is the largest source of C-64/128 reviews, articles and type-in programs around.

An occasional expedition into general-interest computer magazines, such as *Byte*, can also be informative about the broad world of personal computing. You rarely will see Commodore coverage in those magazines, but you will be able to keep current with the rest of the computer world.

Books can also be helpful in finding out about specific aspects of computing, such as MIDI software, fractal programming and compiler design. In fact, there are books available about virtually any computer subject imaginable.

10. Is your cartridge port busy?

A C-64 without a utility cartridge is like a car without an automatic transmission. No matter how well you like your current setup, there's something addictive about having features available automatically.

Utility cartridges have come a long way since Fast Load. The serious contenders in today's cartridge market do much more than speed up disk access and add a disk-command wedge. When shopping for a cartridge, look for these features: a machine language monitor, a screen "capture" utility, a reset button, a memory "snapshot" option for backing up protected programs, a provision for adding lives to games and compatibility with commercial programs.

Be forewarned, however: After a while the luxury of a cartridge will no longer be a luxury for you—it will be a necessity.

These options, of course, only skim the surface of the electronic pile, and it's easy to think of others: Join a user's group; get a hard disk drive; learn how to make use of a light pen. Above all, take the necessary time to learn all you can about the equipment you already have, so that any purchases you make will be wise ones. ■

Stéphane Dirschauer is a C-64/128 superuser and programmer who often writes for RUN. *He lives near Toronto, a place well known for its many Commodore cliff divers.*

And for C-128s...

THE C-128 HAS FEATURES that virtually dwarf the C-64. Are you a giant of 128 computing? Answer these questions to find out:

1. Do you make the most of 128 mode? Take a mental inventory of your software. How much of it will run in your computer's full-featured native mode?

If you answer "not much"—or (perish the thought) "none"—you're negelecting some outstanding features, such as extra memory, better graphics, and an expanded keyboard. Admittedly, there isn't as much software for 128 mode as there is for 64 mode, but many commercial developers—including *RUN*—have produced some outstanding productivity, entertainment and education software.

Word processors in particular are suited to the C-128. The screen display in 80-Column mode more closely resembles a printer's output, and the extra memory can accommodate larger documents. For example, the usefulness of Electronic Arts' PaperClip III more than quadruples in 128 mode.

While you're at it, don't forget CP/M mode either. There's a whole world of software available for this venerable operating system, and lots of it is in the public domain.

2. Do you have an 80-column monitor? Once you've established a rich library of 128-specific software, it's foolish to run it all in 40 columns. You can use special cables to get 80-column display on monitors such as the 1702, but the text is hard on the eye. To avoid excessive squinting, consider investing in a monitor designed for 80-column RGB, such as the 1902 or 1084, both of which provide crisp color displays.

There's also a cheaper alternative: monochrome monitors. They generate just as crisp a display for a fraction of the price. Besides, many 80-column applications, such as word processors, terminal programs or spreadsheets, don't make heavy use of color anyway.

3. How much video RAM do you have? The chip that controls the C-128's 80-column output, the VDC, has its own cache of memory to keep track of the screen display—16 kilobytes on most models. While that 16K is fine for text displays and monochrome high-resolution screens, it rules out stunning multicolored displays such as those of Basic 8.0. An experienced Commodore technician can boost the VDC RAM to 64K—enough for all the graphics goodies available. C-128D owners needn't worry about the upgrade. Their machines are already equipped with the extra video RAM.

For more on these upgrades, see "128 Graphics Wizardry" by Lou Wallace (July/August '91 *RUN*) and "C-128 Speedshop" by Ellen Rule on page 36 of this issue. □

—SD

Rugged Individualists Wanted!

DO YOU MAKE THE MOST of your C-64 or C-128 in an unusual way? Do you have the oddest application or arrangement for a computer this side of the Milky Way? Do you have so many attachments on your system that the lights dim every time you power-up? Does your Commodore feed the dog—or the kids?

If so, send me the details! Include a 100-word description of what makes your application or system extraordinary and why you think you deserve a mention in *RUN* (okay, I'll take 101 words, but that's my final offer).

Some of the most interesting and unusual descriptions will be featured in an upcoming article on Commodore "Superusers."

Address your correspondence to:
Superusers
RUN Magazine
80 Elm Street, Peterborough, NH 03458
Attention: Stéphane Dirschauer

The ABCs of REUs

Discover how RAM expansion can add speed and productivity to your computing.

By MALCOLM O'BRIEN

There has never been a better time to be a C-64 or C-128 user, despite the popularity of PCs, Macs and Amigas. Today's Commodore enthusiasts have access to the most sophisticated hardware and software yet developed for 8-bit computers. In fact, many such developments were previously thought beyond the computers' capabilities.

Some of the most significant products have been extra RAM. While the possibility of RAM expansion has been with us for a number of years, today's users have a variety of options, and many *RUN* readers have written to ask about them. This article addresses their questions without going into a deep technical explanation of each device. When you've finished reading, you'll have a good understanding of the various options from a user's standpoint. First, though, if you aren't sure what RAM expansion is or whether you need it, see "Basic Questions on RAM Expansion" (page 26).

There are several important considerations to keep in mind when choosing expansion RAM: capacity, volatility, compatibility, power requirements, applications, and your own personal usage patterns. I'll touch on these points and more in describing each of the available RAM expansion devices.

The Quick Brown Box

The Quick Brown Box (QBB) is the grandfather of 8-bit RAM expansion. Brown Boxes began marketing this handy device before Commodore began making their RAM expansion units (REUs). The original QBB contained 8K of RAM, but today's QBBs range from 64K to 256K.

Physically, the QBB is exactly the same size as a standard expansion-port cartridge. It's possible to use the QBB in conjunction with a Commodore REU, but doing so requires a cartridge-port expander, which plugs into the computer



QBB is the grandfather of RAM expansion. Non-volatile memory sets it apart.

and contains two, three or four slots that accept cartridges. Some expanders provide a switch for each slot, so you can select which cartridges are active, thereby accommodating several QBBs on one computer.

One of the QBB's best features is its nonvolatile RAM, which retains its data even when you turn off your computer. The RAM inside the QBB has very low power requirements, and the built-in battery will last for years. This makes the QBB an excellent choice if you're using several machines. Simply load your favorite programs into the Box and take them from machine to machine. Nonvolatile memory and shirt-pocket portability make the Quick Brown Box very convenient.

But there's more. The software included with the QBB lets you add new files to the Box, delete old files, and copy the entire Box contents to or from a disk file. You can also designate one of the programs to autoboot—to run immediately when the computer is turned on. This is an ideal arrangement for the BBS operator. If a power failure knocks out your BBS, you can be sure that when power is restored your BBS program will reboot without any need for operator intervention. Many users will autoboot with the Box's menuing system. Powering up this way puts a list of files on the screen, and you can select a program to run with just a few keystrokes.

This autoboot feature is also handy if you're a "one application" user. For example, if all you do is word processing, you can just turn on the computer and have your word processor running. There are several excellent applications available from Brown Boxes that will function in this way. The Write Stuff is a powerful word processor that will run from the Box and save text files to the Box, too. In fact, the C-64 version will save your text as you type—if the power fails, you won't lose a keystroke! Other applications include UltraTerm (telecommunications for the C-128) and Q-Disk, which allows using the QBB as a RAMdisk under C-128 CP/M.

It's also possible to boot GEOS from the QBB, thanks to some programs written by Joe Buckley (a.k.a. Red Storm). There are versions of QBB BOOT for both the C-64 and C-128, as well as a variation that runs autoexecs (AUTO QBB). All of this supporting software (and more) is available from Brown Boxes.

Commodore's 1700-Series REUs

The Commodore REU series consists of three models: the 1700 (128K) and the 1750 (512K) for the C-128, and the 1764 (256K) for the C-64. These cartridges are larger than a Quick Brown Box. Each is approximately 5½ inches wide by 4¾ inches deep, so your available desk space may be a factor. All three models are powered by the computer and use standard RAM. Consequently, their power requirements are significant. The power supply included with the C-128 is up to the task, but the one supplied with the C-64 is not. For this reason, the 1764 comes with a replacement power supply. ►

PHOTOGRAPHED BY ED JUDICE

Since Commodore's REUs are powered by the computer and contain no batteries, the storage they provide is volatile. Therefore, you must copy your files to disk before shutting down if you want to retain them. Forgetting to do so will have the same result as turning off the computer before you've saved your work! The method of copying the files differs, depending on the application or operating environment in use. The GEOS deskTop, the CP/M PIP command and the JiffyDOS file copier will all function transparently—exactly as if the extra RAM were a disk.



The 1750 REU makes GEOS and other applications run lightning fast.

The great advantage of the REU is lightning speed when loading and saving large blocks of data. This is due to its nonmechanical nature and a hardware trick known as direct memory access (DMA), which swaps blocks of data to and from the computer's memory without involving the microprocessor. However, sequential I/O (reading and writing data a byte at a time) is comparatively slow, because of the way RAMDOS has been implemented (see below for an explanation of RAMDOS).

In recent years, it has become common to have dealers and service centers install more RAM chips in the 1700 series REUs. I think GEOS has been a contributing factor to this trend. With 128K in your REU, you can't make a GEOS RAMdisk (although GEOS will use the memory to good advantage). With 256K, you can make a 1541-size RAMdisk, and with 512K, a 1571-size RAMdisk. Of course, many users wanted the larger RAMdisk, and so the REU expansion trend began. Today, many users have expanded their REUs to as much as 2MB!

Schematics and instructions for fattening up the REUs are widely available online. You should be aware, however, that expanding an REU isn't a trivial undertaking. If you're not comfortable using a soldering iron, have the work done by someone who is.

You should resist the temptation to add more than 2MB of RAM. Any beyond 2MB will almost certainly exceed the capabilities of the RAM expansion controller chip inside the REU. At present, to my knowledge, only three programs will support a 2MB REU: RAMDOS II; Jim Collette's Configure 2.1 (available on Q-Link and CompuServe); and Creative Micro Designs' GEOS deskTop replacement, gateWay (reviewed in the September/October '91 *RUN*).

Commodore's RAMDOS is a group of programs supplied with (and specifically for) their RAM expanders. Freely distributable and widely available on BBSs and online services, it provides lightning-fast loads and saves in the native modes of the C-64 and C-128, and accepts standard disk commands via the command channel or a DOS wedge. RAMDOS has two particular shortcomings: First, as mentioned above, sequential I/O is comparatively slow. Second, it requires 256 bytes of computer memory, which may be overwritten by some programs. Still, a few commercial products, such as JiffyDOS and Dialogue 128, will recognize and use RAMDOS.

For the most part, RAMDOS will copy files to an REU as to a real disk. It has a few minor bugs, but nothing of catastrophic proportions. Sometimes the block counts are low, but this doesn't mean that data is missing. In fact, RAMDOS uses a more efficient storage scheme than a physical disk. Another anomaly is occasional failure of the rename and scratch commands (not always a bad thing!). Generally, you can use RAMDOS with confidence. Be sure you have one of the later versions, though. I'm using version 4.3, which is available on many BBSs and online services. Note that RAMDOS can see a limit of 512K of RAM; if you have more than that, you need RAMDOS II.

Commodore's REUs are no longer being made, but they are still available and have set the standard for adding extra RAM.

GeoRAM

As the availability of REUs dwindled and the demand increased, Berkeley Softworks (now GeoWorks) saw an opportunity for a new product: GeoRAM, which provides 512K of low-power volatile RAM. GeoRAM works with either Commodore 8-bit computer and, unlike the 1764 REU, doesn't require a new power supply for use with the C-64. The device measures approximately 3½ inches wide by 6 inches deep. GeoRAM doesn't use DMA and therefore is not quite as fast as an REU. However, most of the time you won't notice the difference; it's still much faster than a floppy disk drive.

The main disadvantage of GeoRAM is that it works only with GEOS. In addition, GeoWorks says that it is not expandable. Rumor has it, however, that GeoRAM has been expanded successfully and the instructions for doing so will be released in time. It should also be possible to develop a GRAMDOS for use in the C-64 and 128 native modes.



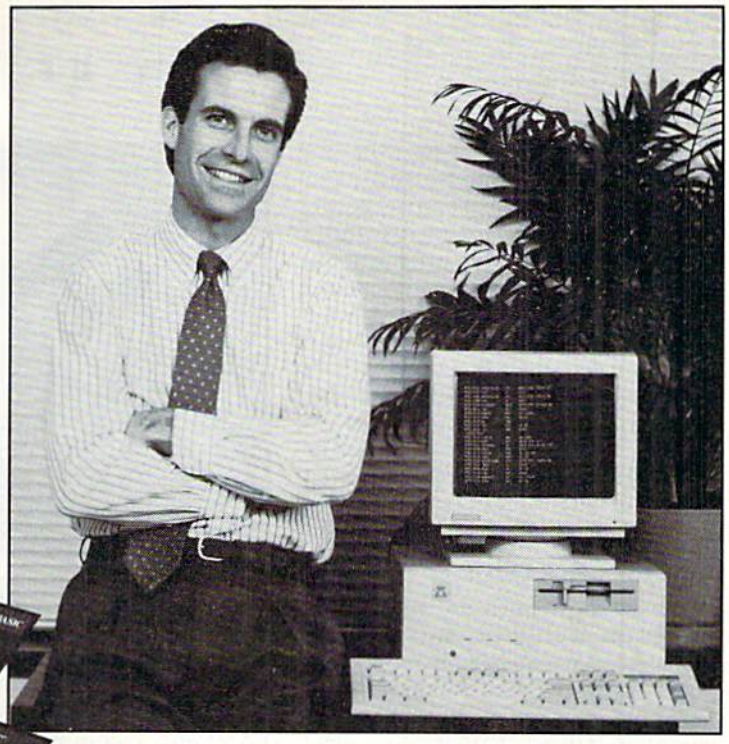
GEORAM comes with a GEOS upgrade, and you won't need a new power supply.

You may ask, "Why can't I use regular RAMDOS and expand my GeoRAM in the same way I would a Commodore REU?" The answer is simply that the two devices are as different as night and day, even though they perform approximately the same function. Consequently, GeoRAM's two shortcomings need to be approached from a completely different standpoint. It's interesting to note here that the GeoRAM disk driver included with CMD's gateWay will recognize up to 2MB; there must be a good reason for that.

The GeoRAM device comes with a GEOS upgrade (version 2.0r) that is designed specifically for use with GeoRAM, to take full advantage of the unit's 512K. The upgrade works on GEOS versions 1.2, 1.3 and 2.0. The upgrade includes a system disk, a backup system disk and a 92-page manual. When I installed the upgrade, I forgot to put my 1571 in 1541 mode. I was pleased (and surprised!) to find that the upgrade installation worked perfectly in spite of my oversight.

Remember, this is only an upgrade. The only application-specific program provided is PaintDrivers. All of the system files, input drivers and printer ►

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drivers are included, along with new Configure and Preferences files, and a few desk accessories. The deskTop is identical to the standard 2.0 deskTop.

Because you'll need to use the applications from your old version, answer "yes" when asked if you want to key the new system disk to those applications. (Unfortunately, the RBOOT file included in the GeoRAM package has not been updated for GeoRAM. Using it results in a cold boot and an empty RAMdisk. The updated version of RBOOT has been posted on Q-Link and CompuServe.)

The Latest RAM Technology: RAMLink & RAMDrive

These two products are grouped together for several reasons. Both are available from Creative Micro Designs, both run under CMD's proprietary DOS (and are therefore compatible with almost everything), both have autoboot capabilities and both are offered in multiple-megabyte configurations. And most important, both RAMDrive and RAMLink excel in three key areas: capacity, flexibility and compatibility.



RAMLink is the "everything" box: extra RAM, an interface and an expansion port.

A feature unique to these devices is user-definable partitions, and, because these partitions can emulate the 1541, 1571 or 1581, you can use software that expects to find a particular drive-type. Another option is "native mode" partitions with variable size up to 16MB. Managing a device of this capacity is made easier through subdirectories, which let you group files. This effectively limits the headaches you will most certainly incur if you try to manage a 16MB directory.

You should make good use of the subdirectory capability. Of course, both RAMDrive and RAMLink are supplied with their requisite software and with complete documentation that explains the device's use and provides valuable tips for determining which options are appropriate for your purposes.

It's important to understand the dif-

Basic Questions on RAM Expansion

Q. What is RAM expansion used for?

A. RAM expansion is most commonly used as a simulated disk drive, or RAMdisk. Because of the absence of moving parts in a RAMdisk, access times are greatly reduced. RAMdisks are generally considered to be 35 times faster than a fast floppy disk drive, such as the 1571 or 1581. In reality, they may be faster or slower than this, depending on the application; but they're always much faster than a mechanical disk drive.

The increased speed lets you do your work in less time. The amount of time saved, of course, is directly proportional to the amount of disk access required. A prime example is GEOS, which is very disk-intensive. The time you can save by using RAM expansion with GEOS is astounding.

Q. Do I really need RAM expansion?

A. The answer to this question really depends on your personal usage patterns. If you use your computer only occasionally and don't mind waiting for your disk drive, your need is minimal. The two most important factors in assessing your need are the number of hours you spend computing and the sophistication of your software. For example, I consider RAM expansion essential for all GEOS users. Financial considerations may be important, too. If you're using your computer to make money, you'll find RAM expansion well worth the investment.

Q. How much RAM is enough?

A. This is almost like asking how much software is enough—better to have too much than too little! The real answer depends on what you want to do. If you often work with large volumes of data or switch between a variety of programs, you'll appreciate the convenience of having everything in RAM. A good example would be geoPublishers who need to have many text files, photo albums, and several applications at hand. If they also need to output PostScript files, their need greatly increases.

Q. Which software will benefit from the addition of RAM?

A. There are three ways in which extra RAM can be used: as part of the operating environment, in conjunction with Commodore's own RAMDOS, or in a proprietary manner specific to an application.

In the operating environment category we have GEOS and, on the C-128, CP/M. Virtually anything that runs under these systems can use RAM expansion. Creative Micro Designs' RL-DOS (for RAMLink) or RD-DOS (for RAMDrive) can also be thought of as operating environments. Exhibiting a high degree of compatibility, the CMD devices will work with a wide range of programs.

A number of programs use the Commodore RAM expanders in their own way. Some well-known examples are The Write Stuff, the Pocket series, PaperClip III, Dialogue 128, Big Blue Reader, and Chris Smeets' CS-DOS. There are probably many more, considering that the Commodore RAM cartridges have been with us for several years now. Most of the commercial applications written (or updated) in the intervening time can probably use extra RAM, and I know some public domain programs will. Perhaps someone will amass a list of such software it would be nice to have. □

—MO

ferences between RAMDrive and RAMLink. RAMDrive is available in fixed configurations of 512K, 1MB and 2MB and isn't intended to be user-expandable. Since it's supplied with batteries (in addition to a 9-volt power supply), the storage is nonvolatile. When AC power isn't present, data will be maintained for about two weeks. RD-DOS is supplied on disk, and this is loaded into RAMDrive and maintained there. You'll need to repeat this load only if the batteries run down or a new version of RD-DOS is released by CMD.

Physically, the RAMDisk cartridge is about the length of GeoRAM but a bit narrower. Three switches on the case offer Reset, Swap 8/Swap 9 and Enable/Disable. Five LEDs indicate Activity, Error, Data Valid (battery status indicator), Device 8 and Device 9. If you have a RAMDrive in a cartridge-port expander along with an REU or GeoRAM, RAMDrive will sense the other device and use it. RAMDrive can also be plugged into the cartridge slot of RAMLink, and such a configuration appears as a single device to the computer. In other words, if you have a 2MB RAMDrive plugged into a 2MB RAMLink, you effectively have one 4MB RAMdisk. Note that such an arrangement will stand almost 8 inches above your desktop.

RAMLink is the "everything" box. In addition to its RAM functions, it serves as a parallel interface to the CMD hard drive and has a pass-through cartridge port. RAMLink's power requirements are significant; in fact, this device needs to be plugged into the wall. Don't plug it into the power strip you use for your other computer equipment; when you turn everything else off, you still want RAMLink to receive power to maintain your RAMdisk. An extra measure of protection is provided by the optional lead-acid battery pack. It measures 5 by 3 by 1 inches and will maintain your data for an average of 12 hours when RAMLink is unplugged.

RAMLink is close to the size of an REU, but about ½ inch longer and wider and 2½ inches tall. Its five switches control Reset, Swap 8/Swap 9, Enable/Disable, Normal and Direct. In the direct mode, an REU in the RAMLink cartridge port will be found and used normally by REU-supporting software. Since such software can use only 512K, if you've expanded your REU the additional RAM will be available to RL-DOS. There you can partition it and use the subdirectories—a potentially valuable feature for those who already have an REU. Five LEDs on RAMLink indicate Error, Access, Activity, Device 8 and Device 9. On the back of the device are the battery jack, the 4-pin DIN plug for the power supply, and the 14-pin DIN plug used as the hard drive's parallel connection.



RAMDrive offers up to 2MB of nonvolatile RAM, and great features like Swap 8/9.

RAMLink is available with no RAM installed, but most users will want to have the optional RAM card, which accepts a type of memory module called a SIMM. The RAM card can use SIMMs of two capacities, but they can't be combined—you must use one or the other. With 4M-by-1 SIMMs, a fully-populated RAM card will offer 4MB. RAMLink's maximum capacity of 16MB is achieved with 4M-by-4 SIMMs. You needn't add all the SIMMs at once; they can be placed on the card one at a time, because RAMLink's RL-DOS (supplied on ROM inside the device) always knows how much RAM is available and acts accordingly. Adding the SIMMs is a fairly simple job, but the hardware novice will prefer to enlist the services of a technician or simply purchase a populated card from Creative Micro Designs.

I've tried to cover your RAM expansion options thoroughly in this article. However, if you still have questions, I will try to answer them. Contact me by EMail to 76703,4243 on CompuServe. ■

Malcolm O'Brien, former editor of The Transactor, *has been writing articles and reviews of Commodore products since 1984.*

Sources and Prices

Brown Boxes, Inc.
26 Concord Road
Bedford, MA 01730
617-275-0090
The Quick Brown Box (from $79)

Creative Micro Designs
15 Benton Drive
PO Box 646
East Longmeadow, MA 01028
413-525-0023
RAMLink (from $179.95)
RAMDrive (from $199.95)

Software Support International
2700 N.E. Andresen Road, Suite A10
Vancouver, WA 98661
800-356-1179
1750 Clone ($199.95)
C-64 Power Supply ($39.95)

Tenex Computer Express
PO Box 6578
South Bend, IN 46660-6578
800-PROMPT-1
1700 ($99.95)
1764 ($119.95)
1750 Clone ($199.95)
C-64 Power Supply ($44.95)
Three-Slot Cartridge Expander ($19.95)
GeoRAM ($134.95)

The Ultimate Sprite Editor

Use this multi-featured program to make and edit sprites, create 25-frame animations and more.

By MARK JORDAN

Recently, *RUN*'s editors asked me if I would update the sprite editor, named Sprite Artist, that I wrote for the magazine several years ago. It had been a while since I'd used the program myself, so I loaded it up and thought, "Nice program . . . *for 1985*." Forget the update, it was time to write a brand new editor. Ultimate Sprite Editor is the result. Lest you think the title a bit presumptuous, take a look at what it lets you do:

- Create and edit eight super sprites.
- Make animations up to 25 frames long, with adjustable speed and sequence.
- Type directly from the keyboard into your sprite design.
- "Fold" sprites to get symmetrical designs.
- View all eight sprites at once, and arrange them in different ways for multiple-sprite creations.
- Draw up, down, right and left by setting the cursor appropriately.
- Rotate sprites 90 degrees.
- Copy and paste sprite shapes and undo changes.
- Load sprite files via a simple, error-proof cursor/return method.
- Create Data statements that attach to whatever program you have in memory.
- Plus expand, flip, invert, multicolor, move, and do everything other editors do . . . all at machine language speed.

Actually, I would have loved to put in even more features, but there's a limit to what a poor reader will type, and this program already approaches that limit. It's approximately 4K long and resides in a safe region of memory ($C000–$CFFF) that's also 4K long—another reason I had to quit when I did.

Getting Things Going

As mentioned, Ultimate Sprite Editor is a machine language program, but it comes to you in the form of a Basic loader that creates the machine language code and saves it to disk. To get the program going, type in Listing 1 using *RUN*'s Checksum on page 61 to catch typing errors. Run the program once, being sure to have a disk in the drive. This will create the machine language program USE 64.ML.

Next, type the boot program in Listing 2, and save it on the same disk as the machine language. Whenever you want to use Ultimate Sprite Editor, simply load and run the boot program. Any program you have in the Basic portion of memory will remain unharmed when you load and run Ultimate Sprite Editor. Therefore, you can develop your sprites concurrently with Basic programs.

You can jump in and out of the editor with ease. In fact, if you ever saw the need, you could include Ultimate Sprite Editor itself within a Basic program and use the command SYS 49152 to jump into it while the program is running.

Using Ultimate Sprite Editor should be quite intuitive for those who have worked with previous sprite editors. A large grid, 24 columns by 21 rows, is on the right side of the screen, and the eight sprites show up on the left. Use the cursor keys to move about the grid.

When you first enter the program, sprite 1 will be the active sprite, that you can edit. The function keys let you jump from sprite to sprite (F1 activates sprite 1; F2, sprite 2; and so forth).

Drawing is done using the number keys, 1 to 4, in this way: 1 sets a given point to the background color (in other words, it erases), 2 draws with the existing sprite color, 3 draws with multicolor 1, and 4 draws with multicolor 2. If you're editing in single-color mode (the default), keys 3 and 4 function the same as key 2. The space bar also draws like key 2. One important note that you might overlook in the explanation of features below: To change sprite color or either of the multicolors, simply press SHIFT while pressing the 2, 3, or 4 key.

Features & Functions

Ultimate Sprite Editor's features are accessed by pressing keys. Most alphabetic keys, as well as several nonalphabetic keys, have a function. Here is a key-by-key listing of all the features:

A – *Animate*. This powerful feature requires a little explanation. First you must understand that you will animate only one sprite at a time—the one that's active when you first press A and enter the Animation mode. That sprite may take on any of the eight sprite shapes viewable on the screen, and in any order. It may also take on the same shape several times. The only limit is 25 shape changes before the animation repeats.

Number keys 1–8 correspond to sprites 1–8. Therefore, to set the animation sequence all you must do is press the keys in the order you want the sprite shapes to occur.

To illustrate, if you're editing sprite 1 and want to have it go through the entire eight sprite shapes that you've developed, just press 1, 2, 3, 4, 5, 6, 7, 8. Press RETURN to start the animation. If you'd like to cycle forward then backward through the sequence, just enter 1, 2, 3, 4, 5, 6, 7, 8, 7, 6, 5, 4, 3, 2. (You can leave off the last 1, because the animation cycle will repeat beginning with 1.)

Once the animation begins, you can use the less-than (<) and greater-than (>) keys—or comma (,) and period (.)—to speed it up or slow it down. The current speed is indicated by a number that increases as the animation slows. While a speed-change key is being pressed, the actual speed doesn't change but the displayed speed does.

Performing animations is great fun in itself, but you'll probably want to use your creations inside a program at some

RUN it right: **C-64**

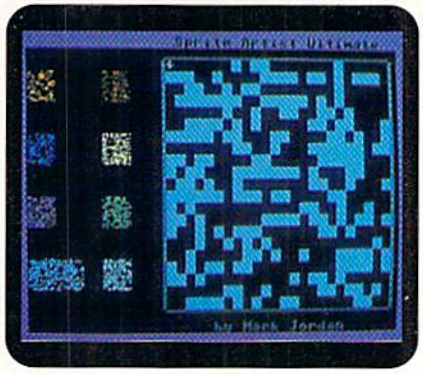
point. It's outside the scope of this article to describe all the details of using sprites within a Basic program, but the concept of animation can be simply stated: Change the sprite pointer located at 2040–2047 to point to the sprite shapes in memory in the same sequence as with Ultimate Sprite Editor.

B – *Background color.* This key cycles the background color of your screen.

C – *Sprite color.* This key (or its alternative, SHIFT/2) cycles the active sprite color. You'll discover that it cycles through only 14 colors. This is because the program doesn't let the sprite color be the same as either of the two multicolors. If you want a color it skips over, just change the multicolor first (see below).

D (shifted) – *Data statements.* This option attaches Data statements to whatever program is in memory, starting with line 60000. It refuses to let you attach data twice—you must exit Ultimate Sprite Editor first and then reenter to do that. This is to keep you from inadvertently attaching several sets of Data to a single program (one popular sprite editor had this flaw).

E – *Type mode.* This novel function lets you manipulate sprite shapes directly from the keyboard. Because sprites are only 24-by-21 pixels, they can contain a maximum of six characters. However, by creative use of this command you can squeeze more in. Just type a row of characters (three), exit Type mode with the BACK-ARROW key, use the scroll keys (see below) to move the characters up or down six or seven pixels, then reenter and type some more.



Create and edit sprites and make animations with Ultimate Sprite Editor.

F – *Fold sprite.* This feature treats whatever is on the left half of your grid as "wet ink." Press F and you'll fold this wet side onto the right. It's very handy for designing symmetrical shapes—just draw half and fold.

G – *Group sprites.* The sprites default into a two-column, four-sprite-deep arrangement. Press G once and they group tightly together vertically; press it again and they group tightly horizontally; press one more time and they cycle back to the default.

H – *Horizontal flip.* Say no more.

I – *Invert.* Turns all the "off" pixels on, and vice versa.

J – *Jump.* Activates the next sprite (an alternative to the function keys).

K – *Walk left.* After you press a color key (or the space bar), it's usual for the cursor to move to the right, as in a word processor. But sometimes you'll want to draw the other way. K does that by moving the cursor left.

L – *Walk right.* Just the opposite of K. See also O and comma (,) for walking up and down. (L and K advance to the next row when you hit the end of the frame. However, O and comma don't advance to the next column.)

L (shifted) – *Load.* Lets you load previously-saved sprite files without any typing—just cursor to the filename and press RETURN. Up to 48 files can be viewed. The sprite data is loaded into memory beginning at location 15808. If your needs call for data in a different section of memory, you'll need to adjust accordingly.

M – *Move sprite.* Permits moving the active sprite anywhere on the screen using the cursor keys. Press R (in Move mode) to reset the position.

O – *Walk up.* See K and L above.

P – *Rotate twice.* Rotates a sprite 180 degrees. This differs from a horizontal flip because the sprite pivots on its center, rather than reversing itself.

Q – *Quit.* Drops you back into Basic. You can reenter Ultimate Sprite Editor at any time, with all sprite shapes intact, using a SYS 49152.

R – *Rotate.* Rotates a sprite 90 degrees. Because sprites are wider (24 pixels) than they are long (21), you'll lose the right three columns.

S – *Save.* Just follow the simple on-screen instructions to create a binary file on disk. You may then use this file in your own programs with the following statement:

```
IF A=0 THEN A=1:LOAD "{filename}",8,1
```

The IF A=0 THEN A=1 is required because of a quirk in the C-64. This quirk further mandates that this line be at the very top of your program.

T – *Toggle single-/multicolor mode.*

U – *Walk up.* Does the same thing as O.

V – *Vertical flip.* ►

Creating a Help Screen

So you think you'll need on-board assistance from time to time using Ultimate Sprite Editor? No problem! Pressing the UP-ARROW (↑) key loads a help screen off the disk—that is, as long as *you've* placed one there.

"How do I do that?" you ask? It's as easy as typing in the six-line Basic program in Listing 3, then creating the screen you want (including reminders) in direct mode, and then typing RUN. Here are the steps:

1. Type in Listing 3 and leave it in memory.
2. Clear the screen.
3. Draw your help screen using keyboard characters and graphics, as well as reverse printing (CONTROL/9). Leave the second line of the screen blank.
4. Carefully cursor up to the blank line, type RUN on it and press RETURN. The screen will save to disk.

That's it. The word RUN that you typed will be erased and you'll have a self-designed help screen at your beck and call.

—MJ

W – *Walk right.* Same as L.

X – *Expand X.* Expands the horizontal element of the sprite.

Y – *Expand Y.* Expands the vertical element of the sprite.

Z – *Border color.* Cycles the border color of the screen.

+ – *Scroll a sprite up one set of pixels.*

– – *Scroll a sprite down one set of pixels.*

@ – *Scroll a sprite to the left one set of pixels.*

***** – *Scroll a sprite to the right one set of pixels.*

↑ – *Load the help screen.* See the sidebar, Creating a Help Screen, to learn how to use this key.

COMMODORE/C – *Copy a sprite into the buffer.*

COMMODORE/P – *Paste the buffer contents into the active sprite.*

COMMODORE/U – *Undo changes made after entering a sprite.*

1 – *Set the color to transparent (background).* Advances the cursor one pixel in the direction previously set.

2 – *Set the color to the sprite color.* Advances the cursor. Press with the SHIFT key to cycle the sprite color (as in C, above).

3 – *Set the color to multicolor1.* Advances the cursor. Press with SHIFT to cycle multicolor1.

4 – *Set the color to multicolor2.* Advances the cursor. Press with SHIFT to cycle multicolor2.

F1–F8 – *Activate sprites 1–8, respectively.*

_ – *Escape from different modes on-screen.*

That's it. Note that most of the keys make some sort of intuitive sense. Many are mnemonic: A for Animation, for example. Some are grouped logically: The K, L, comma, and O are in a diamond arrangement, and the scrolling keys (+ – @ *) are located together. Others just seem to make sense, like function keys 1–8 for sprites 1–8.

Reading about features is fine, but nothing beats using them. Of course, designing sprites is only half the fun; incorporating them into your own programs is the other half. You'll need to review your user's guide if you aren't sure how to do that. R

Mark Jordan teaches high school English in Indiana. He's RUN's *128 Mode columnist and frequently contributes other articles.*

Listing 1. Ultimate Sprite Editor program. (Also available on the November/December ReRUN disk. To order, call 800-343-0728.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) USE 64.
  ML                      :REM*77
5 OPEN 8,8,8,"USE 64.ML,P,W"
                          :REM*127
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 UNIVERSAL
  SPRITE EDITOR 64        :REM*73
1Ø1 DATA ØØC4C7BC4C3CC44C2B*C
  54C43C54CF2C54C69C5*4C3AC84
  C23C64C37C64C           :REM*157
1Ø2 DATA 69CA4C39CA4C76C84CB8*C
  94CBFC74C35C84C7EC9*4CF3C54
  C7BC84C7CC84C           :REM*164
1Ø3 DATA D8C84C54C94C7EC94C83*C
  94CB8C94C83CA4C9ØCA*4C25CA4
  CBDC94CE3C94C           :REM*212
1Ø4 DATA ØBCA4C17CA4C9DCA4CAB*C
  A4CC4CA4C41C64CD8C8*4C2FC84
  C43C54CF9C54C           :REM*152
1Ø5 DATA 1EC64C66CB2Ø9CCØEA2Ø*5
  3C2ADF1CFC951FØØ92Ø*71C22ØC
  ACØ4C7ECØA9ØØ           :REM*2Ø5
1Ø6 DATA 8D15DØA9934CD2FFA9ØB*8
  D2ØDØA9ØØ8D21DØ8DF3*CF8DD8C
  FA21F9DEØCFCA           :REM*157
1Ø7 DATA DØFA2ØØ4CBA98Ø8D8AØ2*A
  9Ø38DF5CFA9Ø18DDFCF*2Ø9BCC6
  ØA9ØØFØØ2A9Ø1           :REM*191
1Ø8 DATA 8DFECFAEF4CFA9CØ85BE*A
  93D85BFEØØØFØØF18A5*BE694Ø8
  5BE9ØØ2E6BFCA           :REM*146
1Ø9 DATA 4CDECØ2ØE9C3ADFECFFØ*Ø
  16ØA9ØØ8DFCCF8DF6CF*8DF9CFA
  ØØØ8CF8CFA2Ø8           :REM*139
11Ø DATA B1FB181ØØ32Ø44C12EF6*C
  FC8CADØF18CF7CFACFC*CFADF6C
  F91BEACF7CFEE           :REM*174
111 DATA F8CFEEFCCFADF8CFC9Ø3*D
  ØD42ØØ7CDEEF9CFADF9*CFC915D
  ØC2608EDACFAD           :REM*121
112 DATA F3CFFØ24A2ØØB1FD29ØF*E
  8DDCDCEDØFAEØØ3FØ14*EØØ2FØØ
  8982Ø91DØØ84C           :REM*248
113 DATA 7ØC1982Ø91DØØ3189ØØ1*3
  8AEDACF6Ø2ØCECØA9ØØ*8DFCCF8
  DF9CFAEF4CFBD           :REM*77
114 DATA C5CE85FFA2Ø8ACFCCFB1*B
  EØA8DE4CF9Ø3B8CFCCF*ADFFCFF
  ØØA38A917EDF9           :REM*86
115 DATA CFA84CAAC1ACF9CFADE2*C
  FFØ16C9Ø1DØØ2C8C888*CØFFDØØ
  5AØ174CC5C1CØ           :REM*1Ø
116 DATA 18DØØ2AØØØA9AØ91FBA5*F
  F91FDACFCCFEEF9CFAD*F9CFC91
  8FØØ9ADE4CFCA           :REM*255
117 DATA DØAF4CEBC1A9ØØ8DF9CF*2
  ØØ7CDEEFCCFADFCCFC9*3FDØ93A
  DF3CFFØØ32ØØ3           :REM*29
118 DATA C2ACFØCF4CBFC22ØE9C3*A
  9ØØ8DF9CFAØØØA9ØØ8D*D9CFAAB
  1FBC8E8C9AØDØ           :REM*111
119 DATA Ø78AØDD9CF8DD9CFEØØ2*D
  ØEDAED9CFBDCDCE8891*FD8891F
  DA9AØAED9CFDØ           :REM*37
12Ø DATA Ø2A92Ø91FBC891FBC8CØ*1
  79ØC82ØØ7CDEEF9CFAD*F9CFC91
  59ØB96Ø2ØE4FF           :REM*253
121 DATA FØFB8DF1CFAØFFC8B957*C
  ECDF1CFFØØ7CØ47BØE9*4C5DC28
  CF2CF6ØADF2CF           :REM*224
122 DATA C9Ø4BØØ34CA6C2C9Ø9BØ*Ø
  34C4DC3C916BØØ34C96*C34C21C
  4B1B2298ØØ92Ø           :REM*242
123 DATA 91B2AEF3CFFØØ4C891B2*8
  86ØB1B2298ØØ92BDØEC*ACFØCF2
  Ø8CC2ADF1CFC9           :REM*25Ø
124 DATA 11FØ1BC991FØ3AC91DFØ*5
  5C99DFØ6B2Ø9EC218A5*B369D48
  5B5A5B285B46Ø           :REM*241
125 DATA A5B3C9Ø79Ø1ØA5B2C97F*9
  ØØAA95FA2Ø485B286B3*DØDB18A
  5B2692885B29Ø           :REM*14Ø
126 DATA Ø2E6B3DØCEA5B3C9Ø4DØ*Ø
  CA5B2C96ØBØØ6A97FA2*Ø7DØDB3
  8A5B2E92885B2           :REM*99
127 DATA BØØ2C6B3DØAFEEFØCFAD*F
  3CFFØØ3EEFØCFACFØCF*CØ18DØE
  CAØØØ8CFØCF4C           :REM*169
128 DATA CEC2CEFØCFADF3CFFØØ3*C
  EFØCFACFØCFCØFDBØØ3*4CØEC3A
  Ø17ADF3CFFØØ1           :REM*76
129 DATA 888CFØCF4CF1C2AEF2CF*A
  CFØCFCACACACAEØØ4DØ*Ø2A2Ø1A
  92ØEØØØFØ17AD           :REM*147
13Ø DATA F3CFDØØ2A2Ø1BDCDCE91*B
  4AEF3CFFØØ4C891B488*A9AØ91B
  2AEF3CFFØØ4C8           :REM*162
131 DATA 91B288AEF5CFFØØBCABD*5
  7CE8D77Ø2A9Ø185C66Ø*ADF1CFC
  95EFØ23C993FØ           :REM*251
132 DATA 57C913FØ6EC9ØDFØØEAD*F
  2CF38E9ØE8DF4CFAA4C*48CA6ØA
  CFØCF2Ø8CC24C           :REM*153
133 DATA 22C3AØØ28CD8CFA9ØØ8D*1
  5DØA9932ØD2FFA95E8D*DBCEA94
  88DDCCE2Ø8FC7           :REM*194
134 DATA 2ØE4FFFØFBA9ØØ8DD8CF*4
  CB4C7A95F85FB85FDA9*Ø485FCA
  9D885FE6Ø2ØE9           :REM*31
135 DATA C3A214AØ17A92Ø91FBA9*Ø
  E91FD881ØF5CA3ØØ62Ø*Ø7CD4CF
  DC3ACFØCF2Ø8C           :REM*15
136 DATA C2AØØØ8CFØCF4CDAC2AD*F
```

ULTIMATE SPRITE EDITOR

```
    2CF38E915AAA9ØØ1869*Ø3CADØF
    B8DDØCFA9CØ8D      :REM*23Ø
137 DATA D1CF6CDØCF6ØADF4CF8D*E
    7CFA9328DEACFA2ØØ8E*EECFA9B
    7AØCD2Ø1DCD2Ø      :REM*133
138 DATA E4FFFØFBC95FFØ36C9ØD*F
    Ø38C939BØEFC9319ØEB*38E9318
    DF4CF2Ø72CAA2      :REM*8
139 DATA 322Ø5DCB2Ø72CAAEEECF*A
    DF4CF9DE8CEEEEECFAD*E7CF8DF
    4CFEØ19FØØ94C      :REM*236
14Ø DATA 53C42ØDFCC4C19CDADEE*C
    FFØAAA9D5AØCD2Ø1DCD*A5CBC94
    ØDØFAA2ØØ8EEF      :REM*113
141 DATA CFEEEFCFAEEFCFCA18BD*E
    8CE69F7AEE7CF9DF8Ø7*A5CBC93
    9FØ28C9Ø1FØ19      :REM*142
142 DATA C92FFØ28C92CFØ2AAEEA*C
    F2Ø5DCBAEEFCFECEECF*FØC84CA
    FC42ØDFCC2ØE4      :REM*77
143 DATA FFDØFB4C47C42ØE4FFDØ*F
    B4C92C4CEEACF4CØ1C5*EEEACFA
    DEACF2Ø75CCA2      :REM*212
144 DATA ØØAØØ2BDEBCF2Ø1AC5E8*8
    81ØF6A2194CD7C41869*BØC9BØD
    ØØ6CØØØDØØ2A9     :REM*127
145 DATA AØ99Ø1Ø46ØEE21DØAD21*D
    Ø29ØF8D21DØ6ØEE2ØDØ*AD2ØDØ2
    9ØF8D2ØDØ6ØAE      :REM*59
146 DATA F4CFFEC5CEBDC5CE29ØF*A
    CF3CFFØØACDCFCEFØEE*CDDØCEF
    ØE98DCECE9DC5      :REM*46
147 DATA CE9D27DØ4C6CCAA941AØ*C
    E2Ø1DCD2ØCECØA9ØØ8D*D2CFAED
    2CFEØØ6FØF4A5      :REM*232
148 DATA BE187D51CE85BEA9ØØ85*B
    ØA9D885B12ØE4FFFØFB*A24ØC95
    FFØ241ØØ2A2ØØ     :REM*199
149 DATA 8EE4CF293FØDE4CFAA18*A
    5BØ69Ø885BØ9ØØ2E6B1*CADØF22
    ØC1C5EED2CF4C      :REM*14Ø
15Ø DATA 78C54C19CDA97F8DØDDC*A
    93385Ø1AØØØA2ØØB1BØ*8CF8CF4
    88AA86891BEE8      :REM*239
151 DATA E8E8EEF8CFACF8CFCØØ8*D
    ØE8A93785Ø1A9818DØD*DC4C6CC
    A6Ø2Ø83C94C37      :REM*61
152 DATA C6A2Ø2FECDCEBDCDCE29*Ø
    F9DCDCECDCECEFØFØAØ*Ø3EØØ2F
    ØØ2AØØ2D9CDCE      :REM*218
153 DATA FØE39D23DØ4C6CCAA2Ø3*4
    CFBC5ADØ6DØAØØØC961*FØØ8AØ2
    ØC931FØØ2AØ1Ø      :REM*167
154 DATA 4CDØCCEEFFCF2Ø6CCACE*F
    FCF6ØA9932ØD2FFA929*AØCE2Ø1
    DCDA9ØØ8DDDCF      :REM*75
155 DATA 8D15DØ2ØF1C62ØCCFFA9*Ø
    2A2Ø8AØØØ2ØBAFFA9Ø5*A2D3AØC
    E2ØBDFF2ØCØFF      :REM*24
156 DATA 2ØECC62ØDDC69Ø55ADE7*C
    FC922DØF4EEDDCFAØØØ*8CF7CF2
    ØDDC69Ø41ADE7      :REM*4Ø
157 DATA CFDØØ6CEDDCF4C73C6C9*2
    2FØ1DAEDDCFEØØ1FØ13*C98Ø9ØØ
    5297F4CADC629      :REM*157
158 DATA 3FACF7CFEEF7CF91FB4C*8
    7C6AEDDCFEØØ1FØØB18*A5FB691
    485FB9ØØ2E6FC      :REM*51
159 DATA 4C73C6A2Ø12ØC6FFA9Ø2*2
    ØC3FF2ØCCFF4CFAC62Ø*CFFF8DE
    7CF18A59Ø294Ø      :REM*48
16Ø DATA DØØ1386ØA2Ø24CC6FFA9*2
    A85FBA9Ø485FC62Ø2Ø*F1*C62Ø5CC
    72ØE4FFFØFBC9      :REM*225
161 DATA 5FDØØ34CB4C72Ø5CC7A2*Ø
    ØC911DØØ2A228C991DØ*Ø2A2D8C
    91DDØØ2A214C9      :REM*166
162 DATA 9DDØØ2A2ECC9ØDFØ438A*1
    ØØ2C6FC1865FB85FB9Ø*Ø2E6FCA
    5FCC9Ø5BØØ6A5      :REM*96
163 DATA FBC92A9ØB3AØØØB1FBC9*2
    ØDØØAC8B1FBC92ØDØØ3*4CFAC64
    CFDC6AØØØ8DF7      :REM*2Ø6
164 DATA CFB1FB498Ø91FBC8CØ1Ø*D
    ØF5ADF7CF6ØAØØØB1FB*C92ØFØ1
    7C92DFØØBC94Ø      :REM*43
165 DATA 9Ø05Ø98Ø4C87C7Ø94Ø99*D
    BCEC8CØ1ØDØE3CØØØFØ*218CDDC
    FA9Ø2A2Ø8AØØ1      :REM*2Ø6
166 DATA 2ØBAFFADDDCFA2DBAØCE*2
    ØBDFFA9ØØ2ØD5FFADD8*CFFØØ16
    ØA9FF8D15DØ2Ø      :REM*39
167 DATA DFCA4CØ4CBADF4CFØA8D*E
    6CFA9AØAØCD2Ø1DCDA9*FF8DE7C
    F2ØE4FFFØFB8D      :REM*226
168 DATA F7CFAEE6CFA5CBC94ØFØ*1
    AADF7CF2ØØ7C8ADE7CF*C9Ø7FØØ
    44A8DE7CFAEE7      :REM*2Ø8
169 DATA CF2Ø5DCB4CDAC7ADF7CF*C
    95FDØC94CØ4CBC911FØ*14C991F
    Ø14C91DFØ14C9      :REM*79
17Ø DATA 9DFØ14C952FØØ16Ø4CCE*C
    CFEØ1DØ6ØDEØ1DØ6ØFE*ØØDØ6ØD
    EØØDØ6ØA9Ø18D      :REM*237
171 DATA F5CF6ØA9ØØ4C31C82ØCE*C
    ØA9ØØ8DF7CFAEF4CFBD*C5CE85F
    FAØØØA217B1FB      :REM*199
172 DATA 1Ø1Ø8CE4CF8AA8A9AØ91*F
    BA5FF91FDACE4CFC8CA*CØØCDØE
    62ØØ7CDEEF7CF      :REM*88
173 DATA ADF7CFC915DØD56ØA9Ø4*4
    C31C86Ø2ØCECØA9ØØ8D*F8CF8DF
    9CF2ØE9C3A9ØØ      :REM*88
174 DATA 8DE6CF8DE5CF8DE4CFAC*F
    8CFA215B1FB181ØØ138*2ØCEC82
    ØØ7CDCADØF1AC      :REM*242
175 DATA F9CFADE4CF91BEC8ADE5*C
    F91BEC8ADE6CF91BEC8*8CF9CFE
    EF8CFADF8CFC9      :REM*153
176 DATA 15DØBC4C6CCA6EE4CF6E*E
    5CF6EE6CF6ØA91FAØCE*2Ø1DCDA
    2ØDA92Ø9DØ7Ø4      :REM*15
177 DATA CADØFAA9ØØ8DF7CF2ØE4*F
    FFØFBC9ØDFØ35C92AFØ*F3C93FF
    ØEFC914FØ1AC9      :REM*12
178 DATA 5FFØ4AAEF7CF9DDBCE2Ø*D
    2FFEEF7CFADF7CFC9ØD*FØ124CE
    EC8CEF7CF3Ø7C7     :REM*34
179 DATA A94DAØCE2Ø1DCD4CEEC8*A
    9Ø8AAA82ØBAFF18ADF7*CF69Ø3A
    2D8AØCE2ØBDFF      :REM*28
18Ø DATA A9CØ85FBAAA93D85FCA8*C
    8C8A9FB2ØD8FF4CØ4CB*ACFØCF2
    Ø8CC22ØF5CCAD      :REM*49
181 DATA F3CF49Ø18DF3CFAD1CDØ*4
    DE1CF8D1CDØ2Ø6CCAAD*FØCF29F
    E8DFØCFA84CBF      :REM*36
182 DATA C26ØA9Ø24C31C82ØEDCA*A
    9ØØ8DF8CFA93C8DF9CF*A2Ø3ACF
    8CFB1FDACF9CF      :REM*45
183 DATA 91BEEEF8CFEEF9CFCADØ*E
    D38ADF9CFE9Ø68DF9CF*ADF8CFC
    93F9ØDB4C6CCA      :REM*Ø
184 DATA A9Ø34C31C82ØEDCAAØØØ*C
    8C8C88CF8CFCØ3F9ØØ5*9838E93
    FA8B1FDACF8CF      :REM*93
185 DATA 88888891BEC8CØ3FDØE2*4
    C6CCA2ØEDCAAØØ38888*88B1FDC
    8C8C88CF8CFCØ      :REM*73
186 DATA 3F9ØØ7489838E93FA868*9
    1BEACF8CFC8CØ42DØEØ*4C6CCAA
    9Ø18DE2CF2Ø6C      :REM*155
187 DATA CACEE2CF6ØA9Ø28DE2CF*2
    Ø6CCAA9ØØ8DE2CF6ØEE*2ØDØAD2
    ØDØ29ØF8D2ØDØ      :REM*158
188 DATA A2279DØØD8CA1ØFA6ØEE*F
    4CFAEF4CFEØØ8DØØ5A2*ØØ8EF4C
    FBDC5CE8DCECE      :REM*113
189 DATA 2ØF5CCAD1CDØ2DE1CFFØ*Ø
    2A9Ø18DF3CF2ØDFCA2Ø*72CAA21
    42Ø5DCB2Ø72CA      :REM*223
19Ø DATA 2ØF8C34C75C12ØCECØAØ*Ø
    ØA9FF51BE91BEC8CØ4Ø*DØF56Ø2
    ØF5CCAD1DDØ4D      :REM*238
191 DATA E1CF8D1DDØ6Ø2ØF5CCAD*1
    7DØ4DE1CF8D17DØ6Ø2Ø*CECØA94
    Ø85FDA96485FE      :REM*76
192 DATA 4CF8CA2ØCECØA94Ø85FD*A
    96485FEAØØØB1FD91BE*C8CØ4ØD
    ØF74C6CCA2ØCE      :REM*9
193 DATA CØA98Ø85FDA96485FE4C*B
    6CA2ØCECØAØ3FA9ØØ91*BE881ØF
    B6Ø2ØCECØA98Ø      :REM*116
194 DATA 85FDA96485FE4CF8CA2Ø*C
    ECØA9ØØ85FDA96485FE*AØØØB1B
    E91FDC8CØ4ØDØ      :REM*8Ø
195 DATA F76ØA9932ØD2FF2Ø19CD*A
    2ØØBD91CDFØØ69DD4Ø7*E8DØF5A
    Ø18A96F993604      :REM*33
196 DATA A97799A6Ø788DØF3AØØØ*A
    9Ø485FCA95E85FBA976*91FB18A
    5FB691985FB9Ø      :REM*1ØØ
197 DATA Ø2E6FCA97591FB18A5FB*6
    9ØE85FB9ØØ2E6FCC8CØ*15DØDD2
    Ø13C44C75C1A2      :REM*117
198 DATA Ø1AØØØ88DØFDCADØFA6Ø*C
    EDFCFFØØ7A9EEAØCD4C*6ACCA96
    Ø8DE4CFA9EA8D      :REM*88
199 DATA E5CFA9CØ85FBA93D85FC*A
    9ØØ85FDA9Ø885FEAØFF*A94Ø8DE
    8CFC8B1FDDØFB      :REM*117
2ØØ DATA C8981865FD85FD9ØØ2E6*F
    EAØØØB1FDDØEAC8B1FD*DØE5AØØ
    ØA6FE18A5FD69      :REM*166
2Ø1 DATA 2791FD9Ø01E88AC891FD*C
    8ADE4CF91FDC8ADE5CF*91FDC81
    8ADE4CF69ØA8D      :REM*191
2Ø2 DATA E4CF9ØØ3EEE5CFA98391*F
    DC8A92Ø91FDA9Ø88DE9*CF8CE3C
    FAØØØB1FB2Ø75      :REM*146
2Ø3 DATA CCACE3CF18C8ADEDCF69*3
    Ø91FDC8ADECCF693Ø91*FDC8ADE
    BCF693Ø91FDA9      :REM*18Ø
2Ø4 DATA 2CAEE9CFEØØ1DØØ2A92Ø*C
    891FDE6FBDØØ2E6FCCE*E9CFDØC
    1CEE8CFFØ13C8      :REM*161
2Ø5 DATA A9ØØ91FDC8981865FD85*F
    D9ØØ2E6FE4CAECBC8A9*ØØ91FDC
    891FDC891FDC8      :REM*23
2Ø6 DATA 981865FD85FD9ØØ2E6FE*A
    5FD852D852F8531A5FE*852E853
    Ø8532A917AØCE      :REM*152
2Ø7 DATA 2Ø1DCD2ØE4FFFØFB4C19*C
    DA2FFE8388DF7CFE964*BØF78EE
    DCFADF7CFA2FF      :REM*153
2Ø8 DATA E8388DF7CFE9ØABØF78E*E
    CCFADF7CF8DEBCF6ØA9*FF8D15D
    Ø2ØDFCCA2Ø7BD      :REM*1Ø4
2Ø9 DATA C5CE9D27DØ8DCECECA1Ø*F
    4A2Ø2BDCDCE8D25DØE8*BDCDCE8
    D26DØA9ØØ8D1Ø      :REM*2Ø6
21Ø DATA DØ8D1DDØ8D17DØ8D1CDØ*A
    ØØØA2ØØB995CE9DØØDØ*C8E8E01
    ØDØF46ØA9F78D      :REM*133
211 DATA F7CFA2ØØADF7CF9DF8Ø7*E
    EF7CFE8EØØ8DØF26ØAE*F4CFE8A
    9Ø118CAFØØ42A      :REM*189
212 DATA 4CFCCC8DE1CF6Ø18A5FB*6
    92885FB9ØØ4E6FCE6FE*A5FB85F
    D6ØA966AØCD8D      :REM*213
213 DATA D3CF8CD4CFA93BAØCD2Ø*1
    EABA9132ØD2FFADD3CF*ACD4CF2
    Ø1EAB4C28CA13      :REM*165
214 DATA 122Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2
```

```
    Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
    Ø2Ø2Ø2Ø2Ø2Ø2Ø       :REM*166
215 DATA 2Ø2Ø2Ø2Ø5F3D45584954*2
    ØØØØE972Ø2Ø2Ø2Ø2Ø2Ø*2Ø2Ø2Ø2
    Ø2Ø2Ø2Ø2Ø2Ø2Ø       :REM*2Ø2
216 DATA D35Ø5249544520C15254*4
    9535420D54C54494D41*5445202
    ØØØØ219204DØ1       :REM*114
217 DATA 12ØB204AØF12Ø4Ø1ØEØØ*2
    ØC35253523D4D4F5645*2Ø2Ø2Ø2
    ØD23D52455345        :REM*54
218 DATA 542ØØØ2Ø312D383D5345*5
    155454E43452Ø2Ø2Ø2Ø*D245545
    5524E3DD44553        :REM*28
219 DATA 542ØØØ2Ø3C3E3DD35Ø45*4
    5442Ø2ØD2455455524E*3D52455
    345542ØØØD94F        :REM*58
22Ø DATA 552Ø414C524541445920*4
    449442ØC4C1D4C12E2Ø*C544495
    42ØC2C1D3C9C3        :REM*142
221 DATA 2Ø544F2Ø5245444FØØ2Ø*C
    44F4E4521200ØC6494C*452Ø925
    35Ø2DØØ2ØC355        :REM*34
222 DATA 52534F522FD245545552*4
    E2Ø544F2ØCCCFC1C42Ø*ØØ2ØD45
    95Ø452ØCD4F44        :REM*194
223 DATA 452ØØØ9D2Ø9DØØØØ1Ø2*1
    E1F2Ø11911D9D313233*342Ø5E5
    F9313ØD858986        :REM*97
224 DATA 8A878B888C4142434445*4
    64748494A4B4C4D4E4F*5Ø51525
    3545556575859        :REM*54
225 DATA 5A2B2D4Ø2ABCAFB8CCD3*2
    C222324C419C85AC819*9E5A9E1
    9745A74194A5A        :REM*76
226 DATA 4A19C831C819B331B319*9
    E319E1989318919C831*C849C86
    1C819B331B349        :REM*99
227 DATA B361B3Ø2Ø3Ø4Ø5Ø6Ø7Ø8*Ø
    9ØE02Ø3Ø4Ø1Ø1243A53*5Ø2A535
    Ø2DØØØØØØØØØ        :REM*45
228 DATA ØØØØØØØØØØØØØØØØ1
                         :REM*2Ø6
229 DATA -1              :REM*87
```

Listing 2. U. S. E. Boot program. (Also available on the November/December ReRUN disk.)

```
1Ø IF A=Ø THEN A=1:LOAD "USE 64.ML",8,1
2Ø SYS 49152
```

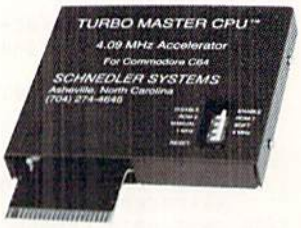
Listing 3. Help-Maker program. (Also available on the November/December ReRUN disk.)

```
1Ø  PRINT"[CLR/HOME] [CURSOR-DOWN] [3 SPACES]"
2Ø  OPEN 2,8,2,"^H,W"
3Ø  POKE 251,Ø:POKE 252,4:POKE 78Ø,251
4Ø  POKE 781,232:POKE 782,7
5Ø  SYS 65496
6Ø  CLOSE2
```

■

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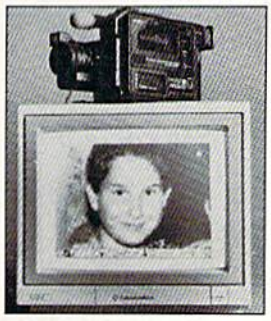
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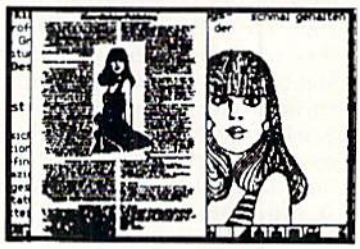
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Volleybound

Serve up some fast action with this C-64 volleyball game.

By TONY BRANTNER

How about a game of two-on-two volleyball? What's that you say? It looks like rain? You have a trick knee? Your dog ate your sneakers? Sorry, none of these excuses wash with Volleybound, because all you need is a joystick. Your C-64 supplies the rest.

As in real volleyball, the object of Volleybound is to keep the ball in the air on your side of the net and make it hit the floor on your opponent's side of the net. You can play against the computer or a friend. With a joystick plugged into port 2, select the number of players. Pull back on the joystick to increase the number, push forward to decrease the number, and press the fire button to make your selection. When playing against the computer, you must also select a difficulty level from one to three.

The yellow team is controlled by the joystick in port 2, the green team by the computer or a joystick in port 1. The two players on a team move in unison.

As the game starts, one team is randomly chosen to serve first. When your team is serving, move the players so one player is under the ball and press the fire button. During a volley, hit the ball by moving one of your players underneath. If the ball is too high, press the fire button and your players will jump and intercept it.

You win a point when you have the serve and your opponent lets the ball hit the floor. You win the serve when your opponent serves and lets the ball hit the floor.

The rules of Volleybound differ slightly from those of real volleyball. Here, a team can hit the ball any number of times before sending it over the net. Also, the ball can't go out of bounds; it bounces off the walls and ceiling instead.

The first player to score 15 points wins. Press the fire button on joystick 2 to play again.

To freeze play, press the COMMODORE key. To continue, press it again. The RUN-STOP key exits to Basic.

When you type in Volleybound from Listing 1, use *RUN*'s Checksum program on page 61 to catch any typing mistakes. Run the program once to create the file Volley.ML. Load and run Volley.ML when you're ready to play. The next time it's raining—or you can't find your shoes—serve up Volleybound! R

Tony Brantner is a professional carpenter. When he's not pounding nails, he's pounding out state-of-the-art games on his C-64.

Listing 1. Volleybound program. (Available on the November/December ReRUN disk. To order, call 800-343-0728.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) VOLLEY.
  ML                        :REM*97
5 OPEN 8,8,8,"VOLLEY.ML,P,W"
                            :REM*115
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 VOLLEYBALL
    64                      :REM*136
1Ø1 DATA Ø1Ø8ØBØ8ØA ØØ9E323Ø36*3
    1ØØØØØØA ØØØB961ØE99*ØØ3FC8D
    ØF78C17DØ8C1D           :REM*236
1Ø2 DATA DØ8C1BDØA91E8D1CDØA9*Ø
    88D25DØA9Ø18D26DØA9*ØØ8D15D
    Ø8D2ØDØ8D21DØ           :REM*196
1Ø3 DATA 8D61ØF8D62ØFA9FEAØØD*2
    Ø1EABA2Ø4AØØB182ØFØ*FFA9B6A
    ØØD2Ø1EABA9Ø2            :REM*1Ø7
1Ø4 DATA 2ØC6ØB84Ø498DØ16A2Ø6*A
    ØØB182ØFØFFA9CAAØØD*2Ø1EABA
    9Ø32ØC6ØB84Ø5           :REM*199
1Ø5 DATA A9FEAØØD2Ø1EABAØØ4A9*Ø
    799ØØD89928D8995ØD8*A9ØD992
    3D8994BD89973           :REM*78
1Ø6 DATA D8881ØE72ØC4ØC2Ø69ØC*A
    21ØAØ13182ØFØFFA98F*AØØD2Ø1
    EABAØØ3B935ØD           :REM*254
1Ø7 DATA 9969ØFA9ØØ996EØFA9DC*9
    964ØFA9FD99F9Ø7B939*ØD9928D
    Ø881ØE2A9FC8D           :REM*9Ø
1Ø8 DATA F8Ø7A9Ø18D27DØA5A229*Ø
    185Ø6A5Ø4DØ1CA2Ø3AØ*1Ø182ØF
    ØFFA9DBAØØD2Ø           :REM*57
1Ø9 DATA 1EAB18A5Ø569312ØD2FF*A
    9ØD2ØD2FFAØØØ989972*ØFC8DØF
    A8D6DØFA6Ø6BD           :REM*252
11Ø DATA 3FØD8D68ØFA9D48D63ØF*2
    ØØ9ØDA91F8D15DØ2ØE1*FFDØØ1Ø
    ØAD8DØ229Ø2FØ           :REM*172
111 DATA 11AD8DØ2DØFBAD8DØ229*Ø
```

RUN it right: **C-64; one or two joysticks**





Bump! Set! Spike! Two-on-two volleyball has never been this fast.

```
    2F0F9AD8D02D0FBEE7C*0FAD7C0
    FC9099029A200          :REM*32
112 DATA 8E7C0FAD00DC20F109AD*0
    1DCA604D014EE7B0FAD*7B0FC90
    3900DA5058D7B          :REM*204
113 DATA 0F20680AA20120F1092*3
    90B20AC0A20FD0A2090*0B20090
    DA00988D0FDAD          :REM*174
114 DATA 630FC9ED9094AD720F0D*7
    30FD08CA91E202D0DA2*00AD6D0
    FD008AD680FC9          :REM*252
115 DATA ACB001E8E406F0058606*4
    CFE08FE610F2069C20*3D0CAD6
    10FC90FB00AAD          :REM*180
116 DATA 620FC90FB0034CFE08EE*8
    602A20CA008182F0FF*A9E5A00
    D201EABA90A20          :REM*114
117 DATA 2D0DAD00DC2910D0E220*4
    00C20160C4C300885020*BC720FD
    004291 0D02618         :REM*92
118 DATA BD720F6901297F9D720F*C
    940B00938A9DCFD720F*4C190A2
    93F18699D9D64          :REM*155
119 DATA 0F9D660F4C5F0AA5024A*4
    A2903A8F034C003B030*18BD690
    F7941 0DDD3D0D         :REM*100
120 DATA 9024DD3F0DB01F9D690F*6
    93C9D6B0FA9009D6E0F*69009D7
    00FBD690F4A4A          :REM*83
121 DATA 4A2903A8B94F0D2CA9FD*9
    DF9079DFB0760A204AD*6D0FD00
    9AD680FC9FBB0          :REM*174
122 DATA 02A20238BD680FED680F*8
    502BD6D0FED6D0F9020*A502C90
    6901AD015AD63          :REM*251
123 DATA 0FC9CD900EC9D7B00AAD*7
    40FC914B003A90F60A9*1B60A91
    7601 8AD770F6D         :REM*115
124 DATA 750F8D770F9044AD790F*F
    02 0AC630F88C0529 00F*8C630FA
    C750F88C0039 0         :REM*241
125 DATA 078C750F6020 1E0CA900*8
    D790F60AC630FC8C0EE*9009A90
    08D740F8D750F          :REM*211
126 DATA 608C630FAC750FC8C02A*B
    0038C750F6018AD760F*6D740F8
    D760F901DAC78          :REM*66
127 DATA 0F18AD680F7945 0DAAAD*6
    D0F7947 0DD00BE01A90*0B8E680
    F8D6D0F60E040          :REM*103
128 DATA 90F5201E0CAD780F4901*2
    9018D780F60A20438BD*630FED6
    30FC905B04638          :REM*79
129 DATA BD680FED680FA8BD6D0F*E
    D6D0FD022A901C01 0B0*1C8D780
    F980A0A090 38D         :REM*213
130 DATA 740FA9018D790FA5A209*5
    0297F8D750F4C210C38*AD680FF
    D680FA8AD6D0F          :REM*110
131 DATA FD6D0FD004C01090D0CA*D
    0AC60AD680FC9A3902E*C9B5B02
    AAD630FC9AD90          :REM*213
132 DATA 23D011A9018D790FA5A2*0
    908291F8D740F4C240C*A000AD6
    80FC9ACB001C8          :REM*182
133 DATA 8C780F2024 0C6085 03A0*0
    08C7A0FC88C8602A920*20D2FFA
    99D20D2FFA905          :REM*224
134 DATA 20 2D0D18AD7A0F69312 0*D
    2FFA99D20D2FFA9052 0*2D0DAD0
    0DC291FC90FF0          :REM*81
135 DATA 142903A818AD7A0F7941*0
    DC503B0C78D7A0F4CD1*0B204000
    CAC7A0FAD00DC          :REM*73
136 DATA 2910F0F960A9142CA90F*2
    CA90B4820 59 0C688D01*D4A9028
    D05D4A2108E04          :REM*155
137 DATA D4E88E04D460A91E2CA9*1
    44820590C688D01D4A9*F08D06D
    4A9118D04D4A9          :REM*84
138 DATA 0F202D0DA017A900990 0*D
    48810FAA90F8D18D460*AD610F2
    0BA0C48A000A9          :REM*192
139 DATA 042094 0C68AAA003A904*2
    094 0CAD620F20BA0C48*A023A90
    42094 0C68AAA0         :REM*252
140 DATA 26A904843B853C8602 8A*0
    A1865020AAAA900 85FB*A4FBB94
    90DA8BD530D91          :REM*240
141 DATA 3BE8E6FBA5FBC9069 0EC*6
    0A2 00C90A9003E90AE8*60AD0CA
    90C889978D899          :REM*197
142 DATA 54D99930DA990CDBD0F1*A
    9A0853BA904853CA214*A961A00
    0913BA027A9E1          :REM*2
143 DATA 913B18A53B6928853BA5*3
    C690 0853CCAD0E4A9A0*9978049
    9C00 7881 0F560        :REM*114
144 DATA A900850 2A2048A0AA8BD*6
    30F9901D0BD680F9900*D0BD6D0
    F4A2602CA10E8          :REM*69
145 DATA A5028D10D0601865A2C5*A
    2D0FC605CC198FD07 0D*070D22B
    F5EFB0001FF00          :REM*229
146 DATA 01FF00FF0001282950 51*F
    DFEFFFDA0FBA0E1E2E2*FB61E16
    1E2E2E2A0A0E2          :REM*226
147 DATA E2E2E2A0E2A0E2E261A0*E
    2A02 0E2A0E2E2A0E2E2*A0E2A0F
    BE2E2E2A020A0          :REM*14
148 DATA 20E2A0FBA0FBE2E2ECA0*E
    2A0E2E205BCBE119D9D*BCBE119
    D9DBCBE119D9D          :REM*97
149 DATA BCBE119D9DBCBE119D9D*B
    CBE119D9DBCBE119D9D*BCBE009
    A484F57204D41          :REM*141
150 DATA 4E592050 4C4159455253*3
    F2000994C4556454C20*4F462005
    04C41593F2000          :REM*178
151 DATA 98124C4556454C2020000*4
    7414D45204F5645522E*2E2E505
    2455353204255          :REM*25
152 DATA 54544F4E0088E93202 0*2
    0202020201C12AAB4B5*BBA192A
    112A192A112B5          :REM*96
153 DATA C692BE12BC2092201 2BB*C
    092A112AC92A1A1A112*B4DF92A
    112BBBB0D2020          :REM*225
154 DATA 2020202020DFA912B5BE*A
    1BCA1BCB5C492BBA212*2092201
    2BE92A2A112BC          :REM*150
155 DATA 92A112BCBCB492DFA112*B
    EBE0D0000 7E0000FF00*00FF000
    0FF0000 7E0000         :REM*186
156 DATA 0000000000000000000*0
    0000000000000000000*0000000
    000000000000           :REM*16
157 DATA 0000000000000000000*0
    0000000000006600 0*0000000
    050550554AA15          :REM*116
158 DATA A0550A5055055455151 5*1
    4541596540596500AA*0000AA0
    000140000AA00          :REM*238
159 DATA 02AA800582501500 5414*0
    0140500500F00F03F00*FC00000
    0000000005055          :REM*70
160 DATA 0554AA15A0550A5055 05*5
    4551515145415965405*9650000A
    A0000AA000014          :REM*232
161 DATA 0002AA0015AA801542 50*0
    5405405C054030C05003*C3C0000
    3F0000000000           :REM*239
162 DATA 00005055055 4AA15A055*0
    A505550554551515145 4*1596540
    5965000AA0000          :REM*206
163 DATA AA00001400000AA8002AA*5
    40581541501501503 0*05030C00
    3C3C00FC00026          :REM*26
164 DATA 0000000000000000000*0
    0000000000000000000*0000000
    000000000              :REM*26
165 DATA -1                :REM*23
```

■

C-128 Speedshop

Rev up your Commodore's engine with these chip upgrades for the C-128.

By ELLEN RULE

The Commodore C-128 is one of the most powerful 8-bit computers ever built, with its 128 mode, fully-emulating 64 mode and built-in CP/M capabilities. However, like a finely built car, even the 128 can stand a tweak here and there to boost its performance—to "rev up its engine" so to speak.

While plug-in cartridges, hardware add-ons and disk-based utilities abound, there is also a select group of rarely-mentioned chip-based enhancements that can be installed "under the hood." These add-ins are ready at the touch of a key without filling a port or loading from disk. They are installed inside the computer (or sometimes inside the disk drive), or occupy the spare socket built into the C-128 for just such a purpose.

128 Superchip

If accessing utilities through the 128's function keys is attractive to you, check out the 128 Superchip from Utilities Unlimited. This chip, which plugs into the spare socket of your C-128, comes in three versions, each of which includes 100 copy parameters.

Version A provides a file copier, a nibbler, a track and sector editor, a screen dump, and a 300/1200-baud terminal program (1650-, 1670- and Hayes-compatible). Version B contains Super 81 Utilities and a complete utility package for the 1581 disk drive. The disk copier will copy whole disks from 1541 or 1571 format to that of the 1581. Options include a disk editor, a drive monitor, a RAM writer, and CP/M and MS-DOS utility functions. Version C combines versions A and B.

JiffyDOS

If you're growing old waiting for your disk drive to load and save, you'll be interested in the JiffyDOS speed enhancement system from Creative Micro Designs. This enhanced disk operating system (DOS) is a chip-for-chip replacement for the Kernal ROM in your computer (64, SX-64, 128 or 128D) and DOS ROM in your 1541, 1571 or 1581 drive. JiffyDOS boosts the speed of disk accesses and other operations up to 15 times beyond standard DOS, and the C-128 version affects both 64 and 128 modes.

Built-in DOS Wedge commands enable you to perform everyday disk housekeeping chores such as formatting, and saving, scratching, or renaming files with just a few keystrokes. Other convenient features include listing directories to screen or printer without affecting memory, function key definitions that work with the directory listing, a screen dump, a built-in file copier, and more.

A 30-day money-back guarantee provides time for testing. Creative Micro Designs ensures compatibility with virtually all software, even CP/M and copy-protected commercial software (including GEOS), and all C-64/128 hardware and peripherals (Quick Brown Box, Commodore RAM expanders, MIDI interfaces, 128 "spare-socket" ROMS, speech synthesizers, digitizers, and so forth). The company promises easy, do-it-yourself installation. Also available is JiffyMON, a JiffyDOS-compatible machine language monitor. (For more details, see the JiffyDOS review in the February '90 issue of *RUN*.)

128 ROM Chip Upgrade

A 128 Upgrade ROM chip set for the C-128 and 1571 drive significantly improves the system's overall performance through better handling of several functions, especially RAM expansion and RAM DOS operations. It also corrects problems with negative relative coordinates in the graphics commands and fixes the infamous "caps-lock Q" bug. The ROM chip upgrade is available from authorized Commodore repair centers.

(Owners of the U.S. version of the C-128D don't have to worry about the ROM upgrade, since the 128D uses a different ROM chip altogether. Also note that revision 05 of the 1571 ROM chip, released in 1987, addresses the Save@ bug and provides an extensive list of corrections to DOS.)

128 Video RAM Upgrade

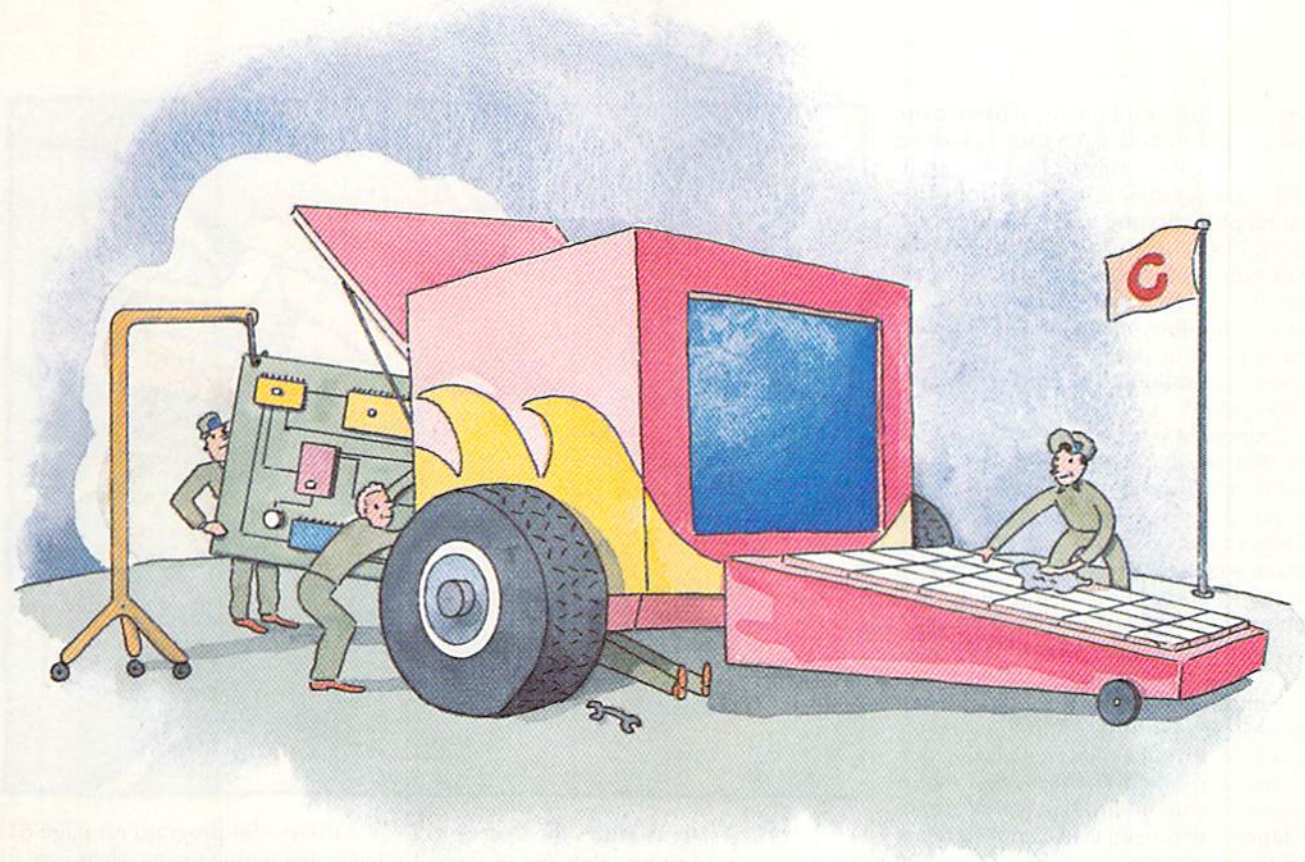
The Video Display Controller (VDC) RAM upgrade for the C-128 increases display memory from 16K to 64K, allowing true 80-column, multicolor graphics. Certain RAMdisk utility programs are designed to access this memory also. (See "Graphics Wizardry" in the July/August '91 issue of *RUN* for an article devoted to this upgrade.) The chips are installed in place of the standard C-128's 80-column, 16K video RAM.

Many Commodore repair centers can perform this upgrade, and several of *RUN*'s display advertisers sell it for the do-it-yourselfer. If that's you, the procedure is detailed in the *Twin Cities 128 Compendium Book #1*, available from Twin Cities 128 and many of *RUN*'s advertisers. (Note: The C-128D comes with 64K of video RAM already in place, making this upgrade unnecessary.)

EZ-Loader ROM

The EZ-Loader ROM is a product for the C-64 and C-128/128D (64 mode) that replaces the 64 Kernal ROM and simplifies DOS commands. EZ-Loader designates the disk drive, rather than the cassette drive, as the default device and with simple commands brings up a menu from which programs may be loaded by a single keystroke or key combination.

Special features let you temporarily change device numbers, recover from a New command, and install and remove the Commodore DOS Wedge program.



EZ-Loader is available through The Memory Location.

Installation instructions are included, but in some computers the original ROM must be desoldered and a socket installed. This should be done by a qualified technician to avoid damage to the motherboard.

REMEMBER . . .

The circuitry inside your computer is extremely delicate and vulnerable to damage from static discharges. If you're uncertain about how to install any of these products, have a qualified technician do it for you. The few extra dollars you'll spend may save you headaches and more extensive repair bills down the line.

Be aware, too, that the installation of most chip upgrades will probably void any existing warranty on your equipment.

Installing chips under the hood of a C-128 may be more difficult than plugging in a cartidge or loading from a floppy disk, but the one-time inconvenience and expense can be worth it. Replacement chips will put software tools at your fingertips, reduce disk access time and in general maximize DOS operation. Enhanced functions, increased speed, greater graphics capabilities—what'll it be for you? ■

Ellen Rule is a regular contributor to RUN *through articles and her column, Commodore Clinic.*

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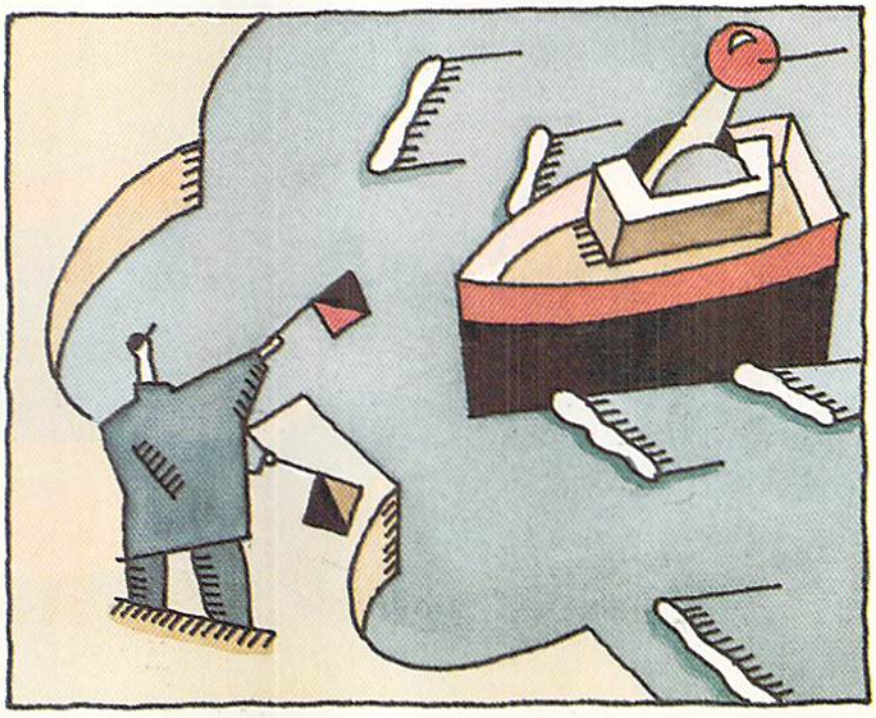
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ILLUSTRATED BY GARISON WEILAND

Port Authority

Use either joystick port for C-64 game play with this handy machine language utility.

By RICHARD PENN



How many times have you booted up your favorite game, only to find that your joystick is plugged into the wrong port? Playing games is fun on the C-64, but switching joystick ports isn't. Not only is moving the joystick annoying, it's also hazardous. Unless you turn your computer off before unplugging the joystick, a static charge from your fingertips could hit the connectors and blow a chip!

Uniport 64 is a machine language utility that solves this problem with most public domain and type-in games. To use it, just put your joystick in port 2, run Uniport and then run your game program, whether it's written for port 1 or port 2. Unfortunately, many commercial games check for foreign code in memory as part of piracy protection, so Uniport won't work with them.

Uniport also sets up a handy reset key to save wear on the computer's on/off switch. When you're finished playing one game, simply tap CONTROL/RESTORE to reset the system and load a new game. Uniport will remain active until you turn off the computer.

Programs that normally use joystick port 1 run slightly faster with Uniport. This is because port 1 activity is treated by the operating system as keypresses, which take more time to decode than port 2 activity. Uniport corrects this problem by processing all input through port 2.

Uniport directly modifies the operating system and resides safely out of the way under ROM. Only 13 bytes of RAM are used (53235–53247), so Uniport will rarely be overwritten by your game. Occasionally a game will deactivate Uniport during initialization, and the keyboard will freeze. A simple tap on the RESTORE key will reactivate the utility.

Type in Uniport from Listing 1, using *RUN*'s Checksum program on page 61 to detect any typing errors, then save it to disk. Once you've tried Uniport's convenient features, you'll use it with all of your favorite *RUN* games. R

Richard Penn is a freelance Basic and machine language programmer. He's contributed both programs and Magic tricks to RUN *in the past.*

Listing 1. Uniport 64 program. (Also available on the November/December ReRUN disk. To order, call 800-343-0728.)

```
Ø REM UNIVERSAL JOYSTICK PORT 6
   4 - RICHARD PENN       :REM*22
1Ø A=88:B=255:C=56334:D=65535:P
   OKE1,55:POKEC,PEEK(C)AND(B-1
   )                      :REM*84
2Ø POKEA+7,Ø:POKEA+8,16Ø:POKEA+
   2,B:POKEA+3,B:POKEA,B:POKEA+
   1,B:SYS41919           :REM*227
3Ø POKED,PEEK(D):POKEC,PEEK(C)O
   R1:POKEC-9,56:SYS65412
                          :REM*32
4Ø FORT=54272TO54296:POKET,Ø:NE
   XT                     :REM*71
5Ø POKE63164,96:REM REMOVE STOP
    KEY SCAN FROM UDTIM :REM*41
6Ø FORU=6ØØØ1TO6ØØ31:READQ:POKE
   U,Q:CK=CK+Q:NEXT       :REM*44
7Ø IFCK<>3845THENPRINT"ERROR IN ►
```

RUN it right: **C-64; joystick**

ILLUSTRATED BY ROBIN JAREAUX

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```
    DATA LINES 8Ø-9Ø":END
                          :REM*114
8Ø DATA169,Ø,141,3,22Ø,172,1,22
   Ø,132,145,32,137,234,141,3,2
   2Ø,173,Ø               :REM*139
9Ø DATA22Ø,141,1,22Ø,173,13,22Ø
   ,1Ø4,168,1Ø4,17Ø,1Ø4,64
                          :REM*1Ø9
1ØØ CK=Ø:FORU=597Ø4TO59713:READ
   Q:POKEU,Q:CK=CK+Q:NEXT:REM
    CTRL WEDGE            :REM*117
11Ø IFCK<>1136THENPRINT"ERROR I
   N DATA LINE 12Ø":END
                          :REM*168
12Ø DATA173,141,2,2Ø1,4,2Ø8,23,
   76,75,233              :REM*113
13Ø CK=Ø:FORU=53235TO53247:READ
   Q:POKEU,Q:CK=CK+Q:NEXT:REM
   NMI RESET RAM WEDGE :REM*62
14Ø IFCK<>1327THENPRINT"ERROR I
   N DATA LINE 15Ø":END:REM*24
15Ø DATA72,8,169,239,133,Ø,169,
   53,133,1,76,83,191 :REM*243
16Ø CK=Ø:FORU=48979TO49ØØØ:READ
   Q:POKEU,Q:CK=CK+Q:NEXT:REM
   NMI RESET ROM WEDGE :REM*53
17Ø IFCK<>2835THENPRINT"ERROR I
   N DATA LINES 18Ø-19Ø":END
                          :REM*1ØØ
18Ø DATA169,Ø,141,3,22Ø,173,1,2
   2Ø,2Ø1,251,2Ø8,5,4Ø,1Ø4,76,
   226,252,4Ø             :REM*64
19Ø DATA1Ø4,76,71,254  :REM*18Ø
2ØØ CK=Ø:FORU=58568TO58577:READ
   Q:POKEU,Q:CK=CK+Q:NEXT
                          :REM*154
21Ø IFCK<>13Ø6THENPRINT"ERROR I
   N DATA LINE 22Ø":END:REM*5Ø
22Ø DATA173,1,22Ø,2Ø1,127,2Ø8,2
   ,133,145,96            :REM*163
23Ø POKE65118,32:POKE65119,2ØØ:
   POKE6512Ø,228:REM NMI ROM S
   TOP CHECK PATCH        :REM*62
24Ø POKE792,243:POKE793,2Ø7:REM
    SET NMI VECTOR TO 53225 TO
    ENABLE RESET ROUTINE
                          :REM*188
25Ø POKE6482Ø,243:POKE64821,2Ø7
   :REM RETAIN NMI VECTORS AFT
   ER RESTORE             :REM*147
26Ø CK=Ø:FORU=64871TO649Ø7:READ
   Q:POKEU,Q:CK=CK+Q:NEXT:REM
   RAM TEST WEDGE         :REM*2Ø8
27Ø IFCK<>64Ø7THENPRINT"ERROR I
   N DATA LINES 28Ø-29Ø":END
                          :REM*197
28Ø DATA169,1,133,251,169,8,133
   ,252,169,Ø,16Ø,Ø,145,251,23
   Ø,251,2Ø8,25Ø,23Ø   :REM*228
29Ø DATA252,166,252,224,16Ø,2Ø8
   ,242,169,Ø,133,251,133,252,
   76,183,228,234,234 :REM*185
3ØØ CK=Ø:FORU=58551TO58567:READ
   Q:POKEU,Q:CK=CK+Q:NEXT:REM
    CLEAR SID WEDGE       :REM*98
31Ø IFCK<>2588THENPRINT"ERROR I
   N DATA LINE 32Ø":END
                          :REM*2Ø7
32Ø DATA162,25,169,Ø,157,255,21
   1,2Ø2,2Ø8,25Ø,162,Ø,16Ø,16Ø
   ,76,138,253            :REM*15
33Ø POKE64858,26:REM BEGIN CLEA
   RING PAGE 3 MEMORY AT LOC 7
   94                     :REM*232
34Ø POKE64982,53:REM RETAIN RAM
    OPERATING SYSTEM AFTER RES
   TORE                   :REM*1Ø5
35Ø PRINTCHR$(147)"UNIVERSAL JO
   YSTICK PORT BY RICHARD PENN
   "                      :REM*127
36Ø PRINT:PRINT"THIS PROGRAM EL
   IMINATES SWAPPING" :REM*164
37Ø PRINT"JOYSTICK PORTS. PLUG
   YOUR JOYSTICK INTO":REM*152
38Ø PRINT"PORT #2, THEN LOAD AN
   D RUN GAMES"           :REM*189
39Ø PRINT"NORMALLY. A JOYSTICK
   PLUGGED INTO"          :REM*92
4ØØ PRINT"PORT #2 WILL WORK NO
   MATTER WHICH":PRINT"PORT A
   GAME NORMALLY USES."
                          :REM*127
41Ø PRINT:PRINT"<CTRL-RESTORE>
   PERFORMS A SYSTEM RESET":PO
   KE1,53                 :REM*255
```

■

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Dominoes

Double up on fun with this C-128 version of a popular classic.

By KIRK WARD

Remember dominoes? If you were anything like me, it enthralled you as a kid, with rows and columns of spotted tiles growing out every-which-way. Each game had new rules—the only thing you were sure of was that the first kid to run out of dominoes was the winner. What a surprise to find that your parents used those same tiles you arranged on the rug to play a sophisticated game of strategy.

In this 128 version, strategy and luck are rewarded with high scores. Each of the rectangular dominoes is divided into two squares, with 0–6 dots on each square. Dominoes 128 uses a set of 28 dominoes, with one tile for each possible combination, including doubles, from 0/0 to 6/6.

The Rules

The object of the game is to earn points by judiciously connecting dominoes to those that have already been played. You can only play a domino at the end of one of the four lines that grow from the four sides of the starting domino. Adjacent squares on connecting dominoes must contain the same number of dots.

Here is the high-scoring kicker: When a domino you play makes the dots in the four end squares total a multiple of five, you win that amount. And since doubles are placed crosswise, both of their squares count, which means that you can score up to 35 points in a single play.

The Setup

The white part of the Dominoes 128 screen is the playing area. At the bottom of the screen are colored areas showing your options, the score and the number of dominoes left in the computer's hand and in the "woodpile."

Each player starts the game with seven dominoes; the remaining 14 comprise the woodpile. Your dominoes are displayed at the bottom of the playing field.

The match begins automatically with the highest double held by either player. Turns alternate thereafter.

Your Turn

When it's your turn, select Play, Draw or Pass by pressing the SPACE BAR to highlight the option you want, then press the RETURN key. When you Play, use the SPACE BAR and the RETURN key to select a domino and a location.

If you can't play, or if you want to build up your hand in the hopes of scoring big, select Draw. You may select Pass only when the woodpile is empty and you can't make a play.

The match continues until one player has no dominoes or both players pass. Then the spots on each player's remaining dominoes are totaled. Whoever has the lowest total receives the difference between the two, rounded down to the nearest multiple of five—so be careul when drawing for that high-scoring play! The dominoes are then shuffled and a new match begins. The first player to reach 200 points wins the game.

Type in Dominoes 128 from Listing 1, using *RUN*'s Checksum program on page 61 to catch your typing errors. With a little luck and a lot of skill, you'll beat the computer in no time. R

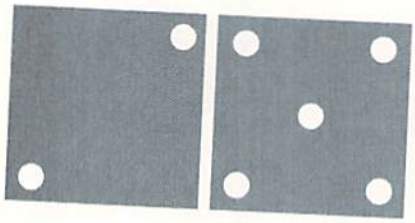
Kirk Ward is an electronics technician with the U.S. military in Korea, where he works on a helicopter simulator.

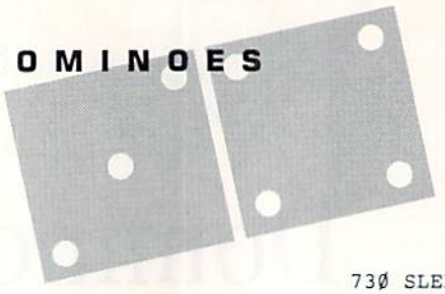
Listing 1. Dominoes 128 program. (Available on the November/December ReRUN disk. To order, call 800-343-0728.)

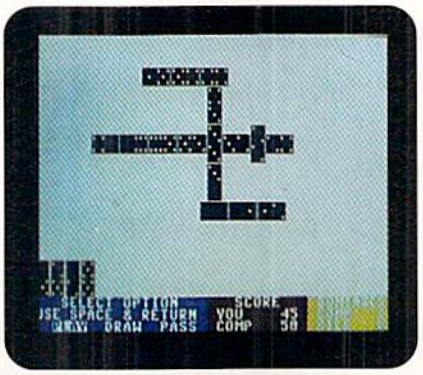
```
5 TRAP 5000              :REM*133
10 PRINT"{SHFT CLR}":POKE248,12
   8:FAST:COLOR0,2:COLOR1,1:COL
   OR4,6                 :REM*81
20 DIM D(29),DC(21),DP(21):X=RN
   D(-TI):SN=9000:GOSUB1700
                         :REM*23
30 GRAPHIC2,1,22:BOX1,5,5,16,16
   ,,1:BOX1,22,7,29,14:DRAW1,22
   ,7TO29,14             :REM*133
40 DRAW1,29,7TO22,14:SSHAPESP$,
   20,5,43,25:SPRSAVSP$,2:SSHAP
   EBL$,32,5,43,28       :REM*213
50 SSHAPE DT$,2,2,3,3:BOX1,54,5
   ,56,10,,1:DRAW1,52,11TO55,14
   TO59,11TO52,11        :REM*209
60 PAINT1,55,12:SSHAPESP$,50,5,
   73,25:SPRSAVSP$,1     :REM*37
70 Z=0:GOSUB1240:GSHAPEDT$,10,1
   0:Z=1:GOSUB1240       :REM*136
80 GOSUB1250:Z=3:GOSUB1240:GOSU
   B1260:Z=5:GOSUB1240:GOSUB127
   0                     :REM*52
90 GOSUB1250:Z=2:GOSUB1240:GOSU
   B1260:Z=4:GOSUB1240 :REM*224
100 GSHAPE DT$,6,10:GSHAPE DT$,
    14,10:Z=6:GOSUB1240:GOSUB12
    70                   :REM*200
110 FORX=6TO14STEP4:GSHAPE DT$,
    X,6:GSHAPE DT$,X,14:NEXT:Z=
    7:GOSUB1240          :REM*59
120 SCNCLR:SLOW          :REM*99
130 PRINT"{CTRL 9}{CTRL 7}{19 S
    PACEs}{CTRL 3}{3 SPACEs}SCO
    RE{3 SPACEs}{CTRL 8} DOMINO
    ES "                 :REM*210
140 PRINT"{CTRL 9}{CTRL 7}{19 S
    PACEs}{CTRL 3} YOU{7 SPACEs
    }{CTRL 8} COMP{3 SPACEs}7 "
                         :REM*245
150 PRINT"{CTRL 9}{CTRL 7}{19 S
    PACEs}{CTRL 3} COMP{6 SPACE
    s}{CTRL 8} PILE{2 SPACEs}14
     ":GOSUB1380:GOSUB1400
                         :REM*185
160 X=1:FORU=1TO7:GOSUB1470:GOS
    UB1490:X=X+14:NEXT:GOSUB136
    0                    :REM*92
170 GOSUB1590:PRINT"{CRSR DN}{C
    TRL 9}{CTRL 7} HIGH DOUBLE
    PLAYS":SLEEP1        :REM*120 ►
```

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

DOMINOES

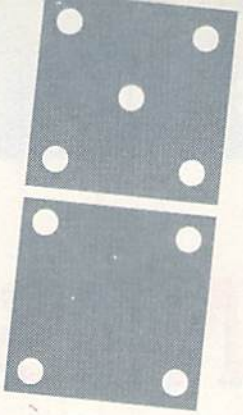




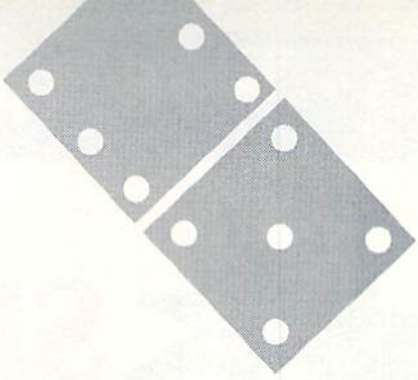


Strategy and luck pay off in this C-128 version of the classic game Dominoes.

```
18Ø FORX=1TO7:U=X:GOSUB147Ø:W=Y
    :V=Z:GOSUB148Ø       :REM*195
19Ø IFW=VANDF1<WTHENF1=W:F2=X
                         :REM*122
2ØØ IFY=ZANDF3<YTHENF3=Y:F4=X
                         :REM*134
21Ø NEXT                 :REM*85
22Ø IFF1=ØANDF3=ØTHEND(14)=DC(7
    ):F3=6:F4=7          :REM*3Ø
23Ø IFF3>F1THEN29Ø       :REM*241
24Ø X=F1:GOSUB132Ø:GSHAPEBL$,85
    ,152:IFF2=7THEN26Ø   :REM*169
25Ø X=F2*14-13:U=7:GOSUB147Ø:GO
    SUB149Ø              :REM*58
26Ø DP(F2)=DP(DP):DP=DP-1:PT=1
                         :REM*122
27Ø IFF1=5THENSP=1Ø:GOSUB137Ø:G
    OSUB138Ø             :REM*1
28Ø X=F1:GOTO31Ø         :REM*82
29Ø X=F3:GOSUB132Ø:DC(F4)=DC(DC
    ):DC=DC-1:PT=2:GOSUB145Ø
                         :REM*213
3ØØ IFF3=5THENSP=1Ø:GOSUB137Ø:G
    OSUB14ØØ             :REM*153
31Ø EP=1:FORU=1TO4:EP(U)=X:NEXT
    :SP(2)=2*X           :REM*1Ø8
32Ø IFTP>199ORTC>199THEN1Ø6Ø
                         :REM*94
33Ø IFDP=ØORDC=ØORPS=2THEN112Ø
                         :REM*73
34Ø IFPT=1THENPT=2:GOTO72Ø
                         :REM*64
35Ø PT=1:GOSUB159Ø:PRINT"{CTRL
    9}{CTRL 7}{3 SPACEs}SELECT
    OPTION{3 SPACEs}":GOSUB156Ø
                         :REM*187
36Ø PRINT"{CTRL 9}{2 SPACEs}PLA
    Y{2 SPACEs}DRAW{2 SPACEs}PA
    SS ":MC=1:C=2:GOSUB13ØØ
                         :REM*138
37Ø GETA$:IFA$=""THEN37Ø:REM*2Ø
38Ø IFA$=CHR$(13)THENONMCGOTO43
    Ø,67Ø,7ØØ            :REM*137
39Ø IFA$<>CHR$(32)THEN37Ø
                         :REM*2Ø8
4ØØ GOSUB159Ø:GOSUB131Ø:MC=MC+1
    :C=C+6               :REM*228
41Ø IFMC>3THENMC=1:C=2   :REM*212
42Ø GOSUB13ØØ:GOTO37Ø    :REM*81
43Ø GOSUB159Ø:PRINT"{CTRL 9}{CT
    RL 7}{3 SPACEs}SELECT DOMIN
    O{3 SPACEs}":GOSUB156Ø:GOSU
    B157Ø:X=26:CX=1      :REM*16Ø
44Ø MOVSPR1,X,19Ø:SPRITE1,1,3
                         :REM*219
45Ø GETA$:IFA$=""THEN45Ø:REM*86
46Ø IFA$=CHR$(13)THENSPRITE1,Ø:
    GOTO51Ø              :REM*2Ø7
47Ø IFA$="X"THENSPRITE1,Ø:GOTO3
    5Ø                   :REM*58
48Ø IFA$<>CHR$(32)THEN45Ø
                         :REM*29
49Ø CX=CX+1:IFCX>DPTHENCX=1:X=2
    6:GOTO44Ø            :REM*146
5ØØ X=X+14:GOTO44Ø       :REM*66
51Ø X=1:GOSUB159Ø:PRINT"{CTRL 9
    }{CTRL 7}{4 SPACEs}SELECT P
    LACE{3 SPACEs}":GOSUB156Ø:G
    OSUB157Ø             :REM*253
52Ø MOVSPR2,EX(X)+25,EY(X)+5Ø:S
    PRITE2,1,3           :REM*126
53Ø GETA$:IFA$=""THEN53Ø
                         :REM*152
54Ø IFA$=CHR$(13)THENSPRITE2,Ø:
    GOTO59Ø              :REM*197
55Ø IFA$="X"THENSPRITE2,Ø:GOTO4
    3Ø                   :REM*99
56Ø IFA$<>CHR$(32)THEN53Ø
                         :REM*163
57Ø X=X+1:IFX>EPTHENX=1:REM*243
58Ø GOTO52Ø              :REM*137
59Ø U=CX:GOSUB147Ø:IFY<>EP(X)AN
    DZ<>EP(X)THENGOSUB142Ø:C=Ø:
    GOTO51Ø              :REM*133
6ØØ GOSUB15ØØ:ONED(X)GOSUB175Ø,
    188Ø,2Ø3Ø,218Ø:PS=Ø:REM*169
61Ø X=CX*14-13:V=DP*14-13:GSHAP
    EBL$,V,152:GOSUB161Ø
                         :REM*185
62Ø IFDP=CXTHEN64Ø       :REM*159
63Ø U=DP:GOSUB147Ø:GOSUB149Ø
                         :REM*17
64Ø DP(CX)=DP(DP):DP=DP-1
                         :REM*135
65Ø IFSP/5<>INT(SP/5)THENSP=Ø:G
    OTO32Ø               :REM*2Ø9
66Ø GOSUB137Ø:GOSUB138Ø:GOTO32Ø
                         :REM*5Ø
67Ø IFN=ØTHENGOSUB142Ø:GOTO35Ø
                         :REM*216
68Ø GOSUB128Ø:DP=DP+1:DP(DP)=D(
    Z):GOSUB129Ø:GOSUB143Ø
                         :REM*236
69Ø X=DP*14-13:U=DP:GOSUB147Ø:G
    OSUB149Ø:GOTO35Ø     :REM*193
7ØØ IFN>ØTHENGOSUB142Ø:GOTO35Ø
                         :REM*5Ø
71Ø PS=PS+1:GOTO32Ø      :REM*18
72Ø GOSUB158Ø:GOSUB159Ø:PRINT"{
    CTRL 9}{CTRL 7} COMP TAKING
     TURN{2 SPACEs}"     :REM*238
73Ø SLEEP1:GOSUB161Ø:T1=SP:SP=Ø
    :GOSUB136Ø:TY=Ø:TZ=Ø:REM*8Ø
74Ø FORX=1TODC:U=X:GOSUB148Ø:GO
    SUB152Ø              :REM*234
75Ø FORU=1TOEP:T2=T1-SP(U)
                         :REM*229
76Ø IFY<>EP(U)ANDZ<>EP(U)THEN87
    Ø                    :REM*44
77Ø IFY=EP(U)THENF1=X:U1=U:T2=T
    2+Z                  :REM*2Ø5
78Ø IFDB=1THENT2=T2+Y:GOTO8ØØ
                         :REM*229
79Ø IFZ=EP(U)THENF2=X:U2=U:T2=T
    2+Y                  :REM*228
8ØØ IFF1<>XTHEN83Ø       :REM*Ø
81Ø IFT2/5=INT(T2/5)THENV=T2:EL
    SE83Ø                :REM*255
82Ø IFTY<VTHENTY=V:F3=X:U3=U
                         :REM*42
83Ø IFF2<>XTHEN87Ø       :REM*75
84Ø IFT2/5=INT(T2/5)THENW=T2:EL
    SE86Ø                :REM*111
85Ø IFTZ<WTHENTZ=W:F4=X:U4=U
                         :REM*129
86Ø IFTY>=TZTHENTZ=Ø:ELSETY=Ø
                         :REM*1Ø8
87Ø W=Ø:V=Ø:NEXTU,X:T2=Ø
                         :REM*117
88Ø IFTY>ØTHENU=F3:X=U3:SP=TY:G
    OTO1Ø2Ø              :REM*4
89Ø IFTZ>ØTHENU=F4:X=U4:SP=TZ:G
    OTO1Ø2Ø              :REM*2Ø1
9ØØ IFF1>ØTHENU=F1:X=U1:GOTO1Ø2
    Ø                    :REM*132
91Ø IFF2>ØTHENU=F2:X=U2:GOTO1Ø2
    Ø                    :REM*19Ø
92Ø IFN=ØTHENGOSUB159Ø:PRINT"{C
    RSR DN}{CTRL 9}{CTRL 7}{7 S
    PACEs}PASS{8 SPACEs}":GOSUB
    16ØØ:SLEEP1:PS=PS+1:GOTO32Ø
                         :REM*2
93Ø GOSUB159Ø:PRINT"{CRSR DN}{C
    TRL 9}{CTRL 7}{7 SPACEs}DRA
    W{7 SPACEs}":GOSUB16ØØ:SLEE
    P1                   :REM*133
94Ø GOSUB128Ø:DC=DC+1:DC(DC)=D(
    Z):GOSUB129Ø:GOSUB143Ø
                         :REM*172
95Ø U=DC:GOSUB148Ø:U1=Ø:FORU=1T
    OEP                  :REM*181
96Ø IFY=EP(U)ORZ=EP(U)THENU1=U
                         :REM*98
97Ø NEXT:IFU1=ØTHENGOSUB145Ø:GO
    TO92Ø                :REM*236
98Ø X=U1:U=DC:IFY=ZTHENT2=T1-SP
    (X)+2*Y:GOTO1Ø1Ø     :REM*1ØØ
99Ø IFY=EP(X)THENT2=T1+Z-SP(X):
    GOTO1Ø1Ø             :REM*64
1ØØØ T2=T1+Y-SP(X)       :REM*148
1Ø1Ø IFT2/5=INT(T2/5)THENSP=T2
                         :REM*99
1Ø2Ø GOSUB159Ø:PRINT"{CRSR DN}{
    CTRL 9}{CTRL 7}{7 SPACEs}P
    LAY{8 SPACEs}":GOSUB16ØØ:S
    LEEP1                :REM*215
1Ø3Ø GOSUB148Ø:PS=Ø:GOSUB15ØØ:O
    NED(X)GOSUB175Ø,188Ø,2Ø3Ø,
    218Ø                 :REM*123
1Ø4Ø DC(U)=DC(DC):DC=DC-1:GOSUB
    145Ø:IFSP=ØTHEN32Ø:REM*125
1Ø5Ø GOSUB137Ø:GOSUB14ØØ:GOTO32
    Ø                    :REM*112
```



DOMINOES



```
                                :REM*81
137Ø GOSUB158Ø:GOSUB159Ø:PRINT"
     {CTRL 7}{CRSR DN}{CTRL 9}{
     2 SPACEs}{CTRL Ø} PLAY SCO
     RES"SP:SLEEP2:RETURN
                                :REM*236
138Ø TP=TP+SP:C=29-LEN(STR$(TP)
     ):GOSUB159Ø          :REM*119
139Ø SP=Ø:PRINT"{CRSR DN}{CTRL
     9}{CTRL 3}"TAB(C)TP:RETURN
                                :REM*151
14ØØ TC=TC+SP:C=29-LEN(STR$(TC)
     ):GOSUB159Ø          :REM*35
141Ø SP=Ø:PRINT"{2 CRSR DNs}{CT
     RL 9}{CTRL 3}"TAB(C)TC:RET
     URN                  :REM*1
142Ø GOSUB158Ø:GOSUB159Ø:PRINT"
     {CTRL 9}{CRSR DN}{CTRL 7}
     {CTRL Ø} INCORRECT PLAY ":
     SN=2ØØØ:GOSUB16ØØ:SLEEP2:R
     ETURN                :REM*21Ø
143Ø GOSUB159Ø:IFN>9THENC=36:EL
     SEC=37               :REM*221
144Ø PRINT"{2 CRSR DNs}{CTRL 8}
     {CTRL 9}"TAB(C)N:RETURN
                          :REM*152
145Ø GOSUB159Ø:IFDC>9THENC=36:E
     LSEC=37              :REM*154
146Ø PRINT"{CRSR DN}{CTRL 8}{CT
     RL 9}"TAB(C)DC:RETURN
                          :REM*246
147Ø Y=INT(DP(U)/1Ø):Z=DP(U)-Y*
     1Ø:RETURN            :REM*48
148Ø Y=INT(DC(U)/1Ø):Z=DC(U)-Y*
     1Ø:RETURN            :REM*253
149Ø GSHAPEDM$(Y),X,152:GSHAPED
     M$(Z),X,164:RETURN:REM*197
15ØØ IFEP=1THENEP=2:GOTO152Ø
                          :REM*1Ø8
151Ø IFEP=2ANDX=2THENEP=4
                          :REM*146
152Ø IFY=ZTHENDB=1:ELSEDB=Ø
                           :REM*41
153Ø RETURN               :REM*142
154Ø IFDB(X)=1THENDB(X)=Ø
                          :REM*192
155Ø RETURN               :REM*154
156Ø PRINT"{CTRL 9}USE SPACE &
     RETURN ":RETURN      :REM*73
157Ø PRINT"{CTRL 9}{3 SPACEs}HI
     T X TO EXIT{3 SPACEs}":RET
     URN                  :REM*92
158Ø GOSUB159Ø:FORB=1TO3:PRINT"
     {CTRL 9}{CTRL 7}{19 SPACEs
     }":NEXT:RETURN       :REM*111
159Ø POKE235,21:PRINT:RETURN
                          :REM*151
16ØØ SOUND1,SN,1Ø:SN=9ØØØ:RETUR
     N                    :REM*238
161Ø IFEP=4THEN163Ø       :REM*161
162Ø SP=SP(1)+SP(2):RETURN
                          :REM*113
163Ø IFEY(4)>91THENSJ=1:REM*155
164Ø IFEY(3)<6ØANDSJ=1THENSJ=2
                          :REM*71
165Ø IFSJ=2THENSP=SP(1)+SP(2)+S
     P(3)+SP(4):RETURN    :REM*228
166Ø IFSJ=1OREY(3)<6ØTHEN168Ø
                          :REM*21Ø
167Ø SP=SP(1)+SP(2):RETURN
                          :REM*191
168Ø IFSJ=ØTHENSP=SP(1)+SP(2)+S
     P(3):RETURN          :REM*21
169Ø SP=SP(1)+SP(2)+SP(4):RETUR
     N                    :REM*248
17ØØ N=28:DP=7:DC=7:PS=Ø
                          :REM*218
171Ø FORX=1TO28:READD(X):NEXT:F
     ORX=1TO3:READM$(X):NEXT
                          :REM*69
172Ø FORX=1TO7:GOSUB128Ø:DP(X)=
     D(Z):GOSUB129Ø:GOSUB128Ø:D
     C(X)=D(Z)            :REM*215
173Ø GOSUB129Ø:NEXTX      :REM*212
174Ø FORX=1TO4:READEX(X),EY(X),
     ED(X):NEXT:RETURN    :REM*16
175Ø IFDB=1THENEP(X)=Y:SP(X)=2*
     Y:GOTO183Ø           :REM*15
176Ø GOSUB154Ø:IFY=EP(X)THENEP(
     X)=Z:SP(X)=Z:GOTO18ØØ
                          :REM*38
177Ø EP(X)=Y:SP(X)=Y:GOSUB133Ø:
     GSHAPEDM$(Y),EX(X),EY(X)
                          :REM*195
178Ø GSHAPEDM$(Z),EX(X)+12,EY(X
     ):IFDB=1THENSP(X)=SP(X)+Y
                          :REM*165
179Ø GOTO181Ø             :REM*79
18ØØ GOSUB133Ø:GSHAPEDM$(Z),EX(
     X),EY(X):GSHAPEDM$(Y),EX(X
     )+12,EY(X)           :REM*13
181Ø IFEX(X)-25<27THENEX(X)=EX(
     X)-13:ED(X)=4:DB(X)=1:RETU
     RN                   :REM*219
182Ø EX(X)=EX(X)-25:RETURN
                          :REM*233
183Ø IFDB(X)=1THENDB(X)=Ø:GOTO1
     77Ø                  :REM*112
184Ø GSHAPEDM$(Y),EX(X)+12,EY(X
     )-6:GSHAPEDM$(Y),EX(X)+12,
     EY(X)+6              :REM*222
185Ø IFEX(X)-13<27THENEX(X)=EX(
     X)+12:EY(X)=EY(X)+19:ED(X)
     =4:RETURN            :REM*141
186Ø EX(X)=EX(X)-13:RETURN
                          :REM*234
187Ø EX(X)=EX(X)-6:EY(X)=EY(X)-
     13:RETURN            :REM*189
188Ø IFDB=1THENEP(X)=Y:SP(X)=2*
     Y:GOTO197Ø           :REM*57
189Ø GOSUB154Ø:IFY=EP(X)THENEP(
     X)=Z:SP(X)=Z:GOTO193Ø
                          :REM*215
19ØØ EP(X)=Y:SP(X)=Y:GOSUB133Ø:
     GSHAPEDM$(Z),EX(X),EY(X)
                          :REM*33
191Ø GSHAPEDM$(Y),EX(X)+12,EY(X
     ):IFDB=1THENSP(X)=SP(X)+Y
                          :REM*54
192Ø GOTO194Ø             :REM*22Ø
193Ø GOSUB133Ø:GSHAPEDM$(Y),EX(
     X),EY(X):GSHAPEDM$(Z),EX(X
     )+12,EY(X)           :REM*163
194Ø IFX=1THENA=1Ø2:ELSEA=27Ø
                          :REM*176
195Ø IFEX(X)+25>ATHENEX(X)=EX(X
     )+25:EY(X)=EY(X)-12:ED(X)=
     3:DB(X)=1:RETURN     :REM*114
196Ø EX(X)=EX(X)+25:RETURN
                          :REM*11Ø
197Ø IFDB(X)=1THENDB(X)=Ø:GOTO1
     9ØØ                  :REM*17
198Ø GSHAPEDM$(Y),EX(X),EY(X)-6
     :GSHAPEDM$(Y),EX(X),EY(X)+
     6                    :REM*16Ø
```

Continued on p. 59.

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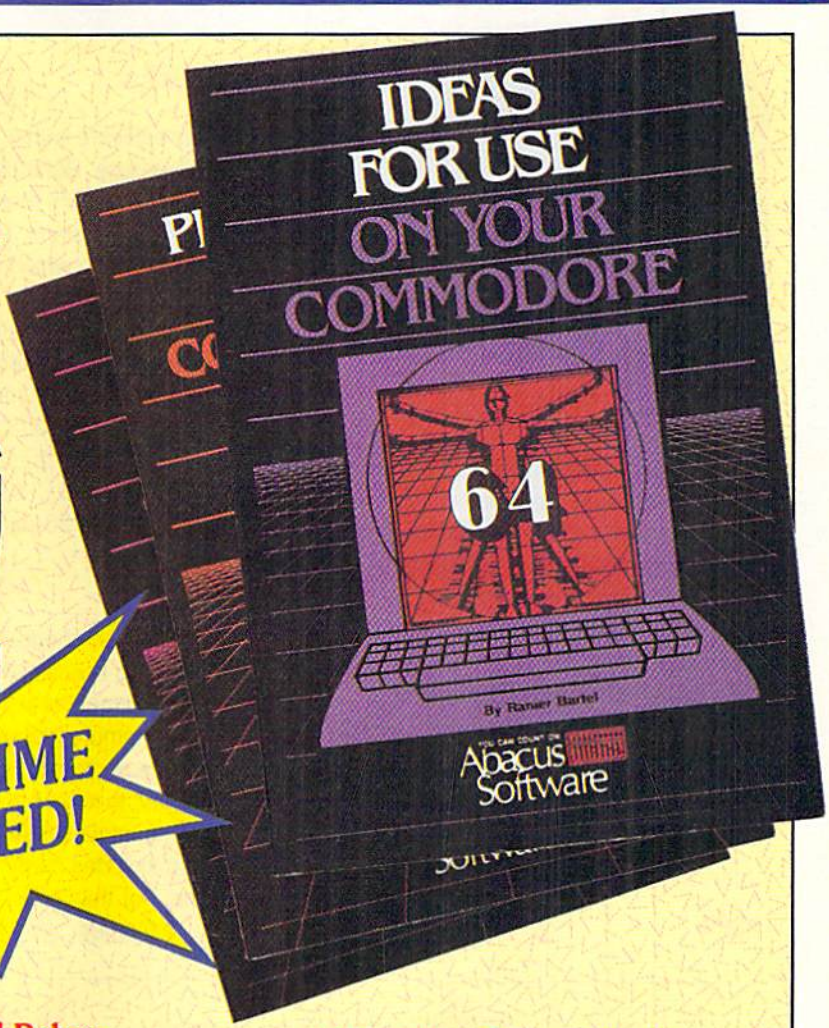
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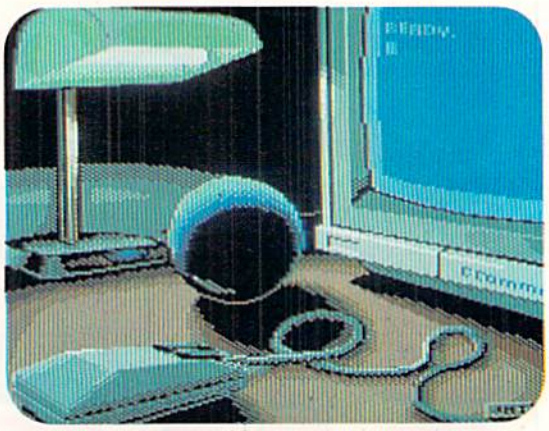
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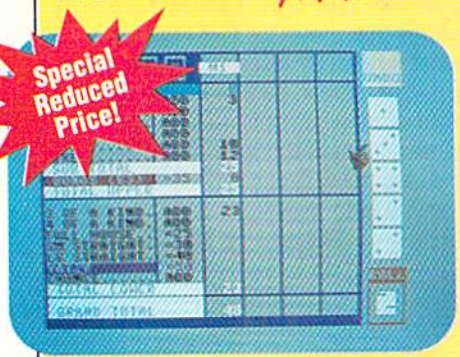
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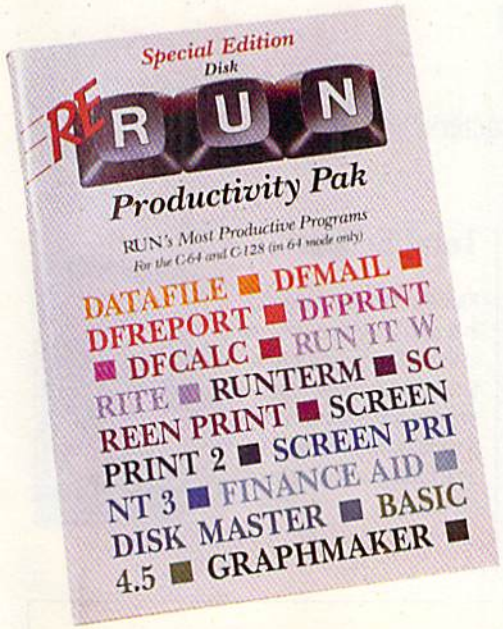
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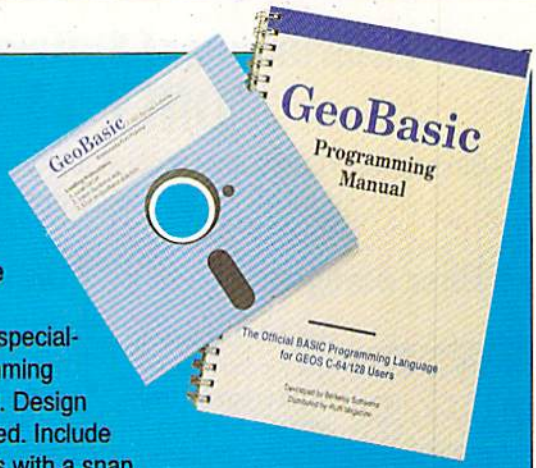
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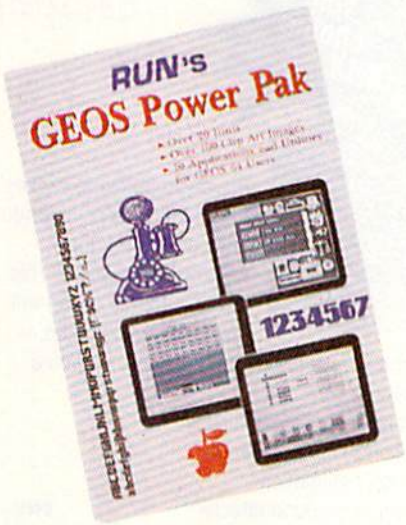
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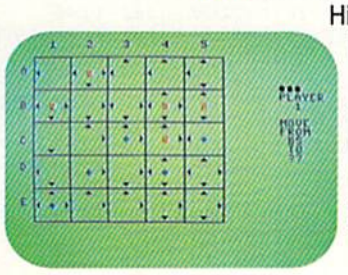
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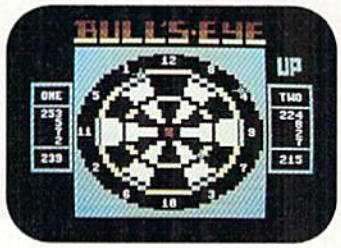
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128 Mode

Let's face it, remembering details for a composite drawing is tough. How well can you do?

By MARK JORDAN

HAVE YOU EVER wondered how good you'd be at helping the police construct a composite drawing? You know, the kind police artists base on a victim's memory of individual parts of a criminal's face. Would you have enough visual memory to cry, "Yes, that's the nose. I'm *sure* of it!"

I wouldn't. Composite-Man, the program in Listing 1, has proven that to me many times, but it's fun trying anyway. In fact, Composite-Man might be described as a game—one that all members of the family, from the smallest tyke to the oldest coot, will enjoy. It also could be labeled a self-help program, because it certainly will improve your observation skills.

No matter what you call it, the program won't mean a thing until you type it in. Naturally, you'll want to use *RUN*'s Checksum program on page 61 to get the code right, and you'll want to save it before running it the first time. Get that done and you're ready to find out how observant you are.

A Nose Is a Nose...

The program begins with a slight delay (about eight seconds) while it converts Data statements into facial features: eyes, noses, ears, and so forth. That done, it displays a face. Look carefully—you have only four seconds to take it in! Then the reconstruction process begins.

First come the eyes—six sets of them. (Hmm, were his eyes narrow and slitty or big and bright?) Next comes the hair... or hat. (Now isn't that strange; I can't even remember if I saw hair or a hat.) And knowing which hat he wore isn't enough, you must also recall its color.

The job gets harder. You must choose mustaches or eyeglasses, noses and ears, and finally the shape of the fellow's face. Eight choices are required to make your C-128 do a composite drawing of the face you saw so briefly.

Facing the Facts

Once you've finished selecting features, sit back and watch the computer draw the composite and original faces side-by-side. At this point you'll see your mistakes, but the program won't let you off that easy. It will also create a bar graph that charts your success in three categories: accuracy, speed, and a combination of the two.

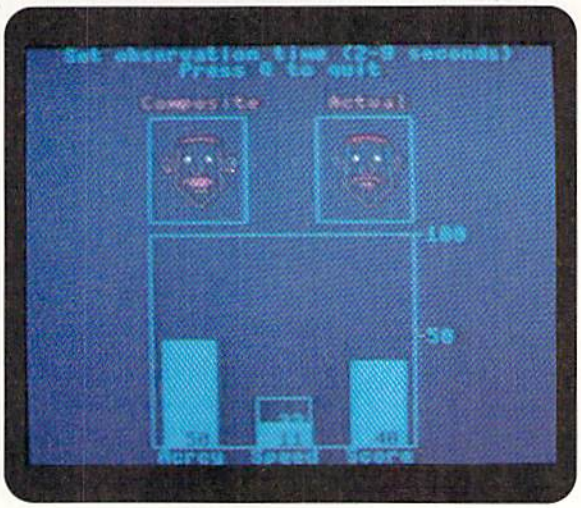
The accuracy score is based on the number of correct selections you made; get all eight features right and you'll score 100 percent here. The speed score is based on both how long you took to make your selections and how long you viewed the original face. After each round, you can change the view time to anywhere from two to nine seconds. (The default is four.) Your final score is a combination of 70 percent accuracy and 30 percent speed. Not only will the bar graph report the results of your latest round, it will also draw hollow bars representing your best scores.

I think Composite-Man is fun, and so does my entire family. It has (sadly) revealed that some people are more observant than others. I think kids have an advantage: Their brains aren't cluttered with a lifetime of faces. But I'm getting better. Try Composite-Man and see what you think. I hope you never need to recreate a mugger's face, but, if you do, you'll be able to shout with conviction, "Yes! That's the ear. I'm *sure* of it." R

Mark Jordan is one of RUN's *favorite sleuths, regularly uncovering neat ideas for the C-128.*

Listing 1. Composite-Man program. (Also available on the November/December ReRUN disk. To order, call 800-343-0728.)

```
10 FAST:COLOR4,1:GRAPHIC1,1                :REM*175
20 SSHAPE ER$,0,0,23,20:REM*183
30 FORSP=1TO6:READ PA$(SP),C(SP
   )                                       :REM*46
40 FORT=1TO6:A$(SP,T)=ER$:I=0
                                           :REM*178
50 DO:READD:IFD<0 THENEXIT
                                           :REM*81
60 I=I+1:MID$(A$(SP,T),I,1)=CHR
   $(D)                                    :REM*106
70 LOOP                                    :REM*51
80 IFD=-2THEN READ X,Y:ELSE X=A
   (SP,T-1,0):Y=A(SP,T-1,1)
                                           :REM*9
90 A(SP,T,0)=X:A(SP,T,1)=Y
                                           :REM*46
100 NEXT:NEXT                              :REM*226
110 SEC=4:LC$=CHR$(14)                     :REM*236
120 GOSUB200                               :REM*187
130 GOSUB250                               :REM*208
140 GOSUB630                               :REM*220
150 GOSUB860                               :REM*247
160 IFSE$<>"Q"THEN120                      :REM*250
170 GRAPHIC0,1:PRINT"{2 HOMEs}
                                           :REM*19
180 CHAR,8,4,"{SHFT W}E'LL BE W
    ATCHING YOU..."                        :REM*96
190 DO:LOOP                                :REM*229
200 FAST:GRAPHIC2,1,10 :REM*134
210 PRINTLC$:POKE247,128:WINDOW
    0,10,39,24                             :REM*234
220 GOSUB1120                              :REM*18
230 SLOW                                   :REM*50
240 RETURN                                 :REM*127
250 COLOR1,16:CHAR,5,7,LC$+"{SH
    FT O}BSERVE THIS FACE CLOSE
    LY..."                                 :REM*5
260 V=53248:POKEV+21,127
                                           :REM*165
270 SLEEP SEC                              :REM*123
280 POKEV+21,0:SCNCLR                      :REM*116
290 TI$="000000"                           :REM*31
300 FORT=1TO6                              :REM*174
310 PRINT"{SHFT CLR}{COMD 8}{SH
    FT W}HAT KIND OF "PA$(T)" D
    ID THE MAN HAVE?{CRSR DN}"
                                           :REM*50
320 CHAR,14,0,CHR$(14)+" {SHFT
    P}RESS 1-6 ",1                         :REM*244
330 C=9:IFT<3 THEN C=2    :REM*9
340 II=6                                   :REM*24
350 FORI=1TO6                              :REM*202
360 CHAR,23,0,RIGHT$(STR$(II),1
    ),1                                    :REM*137
370 CHAR,I*5+1,3,STR$(I)
                                           :REM*146
380 XX=32:IFT=6THENXX=20:IFI>3T
    HENXX=-70:II=3                         :REM*193
390 SPRSAV A$(T,I),I:MOVSPRI,I*
    40+XX,100:SPRITEI,1,C
                                           :REM*90
400 NEXT                                   :REM*16
```



How much can you remember? Composite-Man is an addictive game that will hone your powers of observation.

```
41Ø K=T:GOSUB46Ø          :REM*44
42Ø IFT=2THENGOSUB5ØØ     :REM*249
43Ø NEXT                  :REM*5Ø
44Ø GOSUB53Ø              :REM*12
45Ø RETURN                :REM*82
46Ø GETKEYK$:E=VAL(K$)    :REM*127
47Ø IFE<1 OR E>IITHEN46Ø  :REM*98
48Ø PP(K)=E:POKE2Ø8,Ø     :REM*242
49Ø RETURN                :REM*122
5ØØ PRINT"{SHFT CLR}{SHFT W}HAT
    COLOR WAS IT? {CTRL 9}{CTR
    L 2} 1 {CTRL 3} 2 {CTRL 5}
    3 {CTRL 8} 4 {COMD 2} 5 {CO
    MD 8} 6 {COMD 8}"     :REM*112
51Ø K=Ø:GOSUB46Ø          :REM*2Ø
52Ø RETURN                :REM*148
53Ø POKEV+21,Ø            :REM*97
54Ø CHAR,23,Ø,"6",1       :REM*112
55Ø PRINT"{SHFT CLR}{SHFT W}HAT
    SHAPE WAS HIS FACE?"
                          :REM*197
56Ø COLOR1,9              :REM*229
57Ø FORT=1TO6             :REM*191
58Ø CIRCLE1,T*4Ø+2Ø,4Ø,16,17,5Ø
    ,31Ø,,T*1Ø+15         :REM*187
59Ø NEXT                  :REM*21Ø
6ØØ II=6:K=7:GOSUB46Ø     :REM*69
61Ø TM=VAL(TI$)           :REM*197
62Ø RETURN                :REM*248
63Ø GRAPHIC1,1:C=2        :REM*46
64Ø FORT=1TO6             :REM*241
65Ø X=A(T,PP(T),Ø)+95:Y=A(T,PP(
    T),1)+54              :REM*35
66Ø YY=A(T,R(T),1)+54     :REM*3Ø
67Ø IFT<3THENBEGIN        :REM*133
68Ø C=2:CC=2:IFT=2THENC=C(PP(Ø)
    ):CC=CY               :REM*49
69Ø SPRSAV A$(T,PP(T)),T:SPRSAV
     A$(T,R(T)),T+2       :REM*63
7ØØ MOVSPRT,X+24,Y+5Ø:MOVSPRT+2
    ,X+124,Y+5Ø           :REM*9
71Ø SPRITET,1,C:SPRITET+2,1,CC
                          :REM*145
72Ø GOTO77Ø               :REM*41
73Ø BEND                  :REM*14
74Ø COLOR1,9              :REM*144
75Ø GSHAPEA$(T,PP(T)),X,Y,2
                          :REM*144
76Ø GSHAPEA$(T,R(T)),X+1ØØ,YY,2
                          :REM*21
77Ø NEXT                  :REM*135
78Ø GSHAPEA$(6,PP(6)+3),X+48,Y,
    2                     :REM*196
79Ø GSHAPEA$(6,R(6)+3),X+148,Y,
    2                     :REM*236
8ØØ CIRCLE1,1Ø7,61,16,17,5Ø,31Ø
    ,,PP(7)*1Ø+15         :REM*44
81Ø CIRCLE1,2Ø7,61,16,17,5Ø,31Ø
    ,,R(7)*1Ø+15          :REM*185
82Ø CHAR,9,3,LC$+"{SHFT C}OMPOS
    ITE{5 SPACEs}{SHFT A}CTUAL"
                          :REM*31
83Ø COLOR1,6:BOX1,77,35,135,85:
    BOX1,177,35,233,85    :REM*35
84Ø POKE2Ø8,Ø             :REM*168
85Ø RETURN                :REM*227
86Ø GRAPHIC1              :REM*152
87Ø CHAR,29,11,"-1ØØ":CHAR,29,1
    7,"-5Ø"               :REM*7
88Ø BOX1,77,91,233,191    :REM*181
89Ø CHAR,1Ø,24,LC$+"{SHFT A}CRC
    Y{2 SPACEs}{SHFT S}PEED{2 S
    PACEs}{SHFT S}CORE"   :REM*35
9ØØ AC=Ø:FORT=ØTO7:IFR(T)=PP(T)
    THENAC=AC+1           :REM*129
91Ø NEXT                  :REM*2Ø
92Ø B(1)=AC/8:B(2)=6/TM:B(3)=B(
    1)*.7+B(2)/1Ø+2/SE/5:REM*19
93Ø X=84                  :REM*2Ø8
94Ø FORT=1TO3:GOSUB97Ø:NEXT
                          :REM*189
95Ø GOSUB1Ø7Ø             :REM*6
96Ø RETURN                :REM*74
97Ø AA=INT(B(T)*1ØØ):BB=INT(TP(
    T)*1ØØ)               :REM*131
98Ø XX=X+31:YY=191-AA:ZZ=191-BB
                          :REM*18Ø
99Ø S$=" ":IFAA>99THENS$="":IFA
    A>1ØØTHENYY=87        :REM*66
1ØØØ IFBB>99THENZZ=91     :REM*19
1Ø1Ø IFB(T)>TP(T)THENTP(T)=B(T)
     :ELSE BOX,X,191,XX,ZZ:CHAR
     ,X/8+1,ZZ/8+1,STR$(BB)
                          :REM*137
1Ø2Ø BOX,X,191,XX,YY,,1   :REM*61
1Ø3Ø AA$=MID$(S$+STR$(AA),2)
                          :REM*146
1Ø4Ø CHAR,X/8+1,23,AA$,1:REM*76
1Ø5Ø X=X+56               :REM*216
1Ø6Ø RETURN               :REM*182
1Ø7Ø CHAR,3,Ø,LC$+"{SHFT S}ET O
    BSERVATION TIME (2-9 SECON
    DS)"                  :REM*239
1Ø8Ø CHAR,12,1,LC$+"{SHFT P}RES
    S {SHFT Q} TO QUIT"
                          :REM*247
1Ø9Ø GETKEY SE$:SE=VAL(SE$)
                          :REM*229
11ØØ IFSE<2THENSE=4       :REM*169
111Ø RETURN               :REM*224
112Ø FORSP=1TO6           :REM*137
113Ø RR=6:IFSP=6THENRR=3
                          :REM*136
114Ø R=INT(RND(1)*RR)+1:R(SP)=R
                          :REM*182
115Ø C=9:IFSP=1THENC=2    :REM*9
116Ø IFSP=2THEN R(Ø)=INT(RND(1)
    *6)+1:C=C(R(Ø)):CY=C
                          :REM*148
117Ø SPRSAV A$(SP,R),SP:REM*182
118Ø SPRITE SP,Ø,C        :REM*36
119Ø MOVSPR SP,A(SP,R,Ø)+3ØØ,A(
    SP,R,1)+9Ø            :REM*244
12ØØ NEXT                 :REM*55
121Ø SPRSAV A$(6,R+3),7:MOVSPR
    7,RSPPOS(6,Ø)+48,RSPPOS(6,
    1):SPRITE7,,9         :REM*78
122Ø R(7)=INT(RND(1)*6)+1
                          :REM*74
123Ø COLOR1,9:CIRCLE1,287,48,16
    ,17,5Ø,31Ø,,R(7)*1Ø+15
                          :REM*245
124Ø RETURN               :REM*99
125Ø DATA "EYES",2,3,192,6Ø,62,
    131,232,12,128        :REM*121
126Ø DATA 2ØØ,7,,112,-2,,
                          :REM*17
127Ø DATA 31,195,248,13,129,176
    ,7,,224,-1            :REM*87
128Ø DATA 15,129,24Ø,3Ø,195,12Ø
    ,15,129,24Ø,-1        :REM*115
129Ø DATA 7,,224,31,129,248,7,1
    29,224,-1             :REM*225
13ØØ DATA 64,,2,32,129,4,31,,24
    8,6,,96,-1            :REM*138
131Ø DATA 6,,96,14,,112,-1
                          :REM*217
132Ø DATA "HAT/HAIR",3,213,85,8
    5,213,85,85,17Ø,17Ø
                          :REM*153
133Ø DATA 171,213,85,85,176,,3,
    192                   :REM*239
134Ø DATA ,1,128,,1,-2,,-1Ø
                          :REM*244
135Ø DATA 15,255,24Ø,127,255,25
    4,255,193             :REM*245
136Ø DATA 255,224,,3,128,,1,128 ►
```

RUN it right: C-128

128 MODE

```
    ,,1,-1                  :REM*23
137Ø DATA 62,,126,124,,31,24Ø,
                            :REM*53
138Ø DATA 7,192,,3,192,,3,128,,
    1,128,,1,-1             :REM*3
139Ø DATA 15,239,,125,181,192,2
    47,119                  :REM*84
14ØØ DATA 96,222,247,176,234,17
    Ø,176,7                 :REM*152
141Ø DATA 255,252,3,255,255,-1
                            :REM*54
142Ø DATA ,126,,,255,,,255,,,25
    5,,1,74,128             :REM*198
143Ø DATA 1,255,128,255,255,255
    ,-1                     :REM*2Ø6
144Ø DATA ,126,,3,255,192,15,25
    5,24Ø,15                :REM*46
145Ø DATA 255,24Ø,213,85,86,255
    ,255,255,223,255,247,-1
                            :REM*251
146Ø DATA "MUSTACHE (OR GLASSES
    ) ",4,96,,6,144,8,9,192,28
                            :REM*19
147Ø DATA 3,127,247,254,15,193,
    24Ø,-2,,7               :REM*235
148Ø DATA 7,255,192,28,,112,48,
    ,24,-2,,1Ø              :REM*121
149Ø DATA 2,17Ø,128,5,85,64,6,1
    7Ø                      :REM*38
15ØØ DATA 192,8,,32,8,,32,-1
                            :REM*152
151Ø DATA 255,255,255,48,24,12,
    48,6Ø                   :REM*53
152Ø DATA 12,48,1Ø2,12,48,1Ø2,1
    2,31,195,248,-2,,-1:REM*98
153Ø DATA 31,195,248,32,36,4,32
    ,6Ø                     :REM*13Ø
154Ø DATA 4,32,36,4,31,195,248,
    -1                      :REM*211
155Ø DATA 255,255,255,32,,4,16,
    24,8,8                  :REM*214
156Ø DATA 36,16,4,66,32,3,129,1
    92,-1                   :REM*253
157Ø DATA "MOUTH",8,27,,,127,19
    2,,36,128,,27,128,-2,6,12
                            :REM*176
158Ø DATA 32,,,31,128,-1
                            :REM*229
159Ø DATA ,128,,1,,,14,,,48,-2,
    6,11                    :REM*16Ø
16ØØ DATA 29,192,,255,24Ø,,127,
    224                     :REM*17Ø
161Ø DATA ,34,32,,34,32,,3Ø,224
    ,-1                     :REM*14
162Ø DATA 5,,,31,128,-1 :REM*76
163Ø DATA 29,192,,63,224,,127,2
    24,,24Ø,96              :REM*47
164Ø DATA ,63,192,,31,128,-1
                            :REM*142
165Ø DATA "NOSE",1Ø,2,,,1,,,,12
    8,,48,128,,72,64,,64,64,,6
    3,128,-2,6,2            :REM*1Ø9
166Ø DATA 7,,,15,128,,15,192,,3
    1,192,,22,128,-1    :REM*99
167Ø DATA 5,,,5,,,8,128,,8,128,
    ,9,,,14,-1              :REM*24Ø
168Ø DATA 2,,,1,,,17,,,33,,,33,
    ,,17,,,14,-1            :REM*159
169Ø DATA ,,,14,,,15,,,31,128,,
    63,192,,39,32,,24,192,-1
                            :REM*83
17ØØ DATA 6,,,24,,,32,,,33,64,,
    32,64,,33,128,,3Ø,-1
                            :REM*72
171Ø DATA "EARS",16,,7,,,12,128
    ,,8                     :REM*128
172Ø DATA 96,,9,,,12,128,
                            :REM*146
173Ø DATA 6,32,,3,192,,1,128,-2
    ,-22,                   :REM*62
174Ø DATA ,1,128,,2,64,,2
                            :REM*191
175Ø DATA 32,,1,64,,1,,,,16Ø,,,
    64,-1                   :REM*159
176Ø DATA ,,,,3,128,,2  :REM*49
177Ø DATA 192,,3,96,,1,192,-1
                            :REM*2Ø3
178Ø DATA 14,,,19,,,97,,,9,,,19
    ,,,7Ø,,,6Ø,-1           :REM*155
179Ø DATA 24,,,36,,,68,,,4Ø,,,8
    ,,,8Ø,,,32,-1           :REM*71
18ØØ DATA 28,,,52,,,1Ø8,,,56,-1
                            :REM*67 ■
```

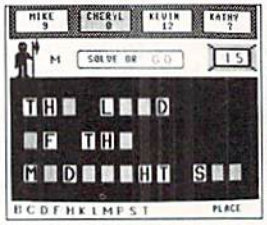

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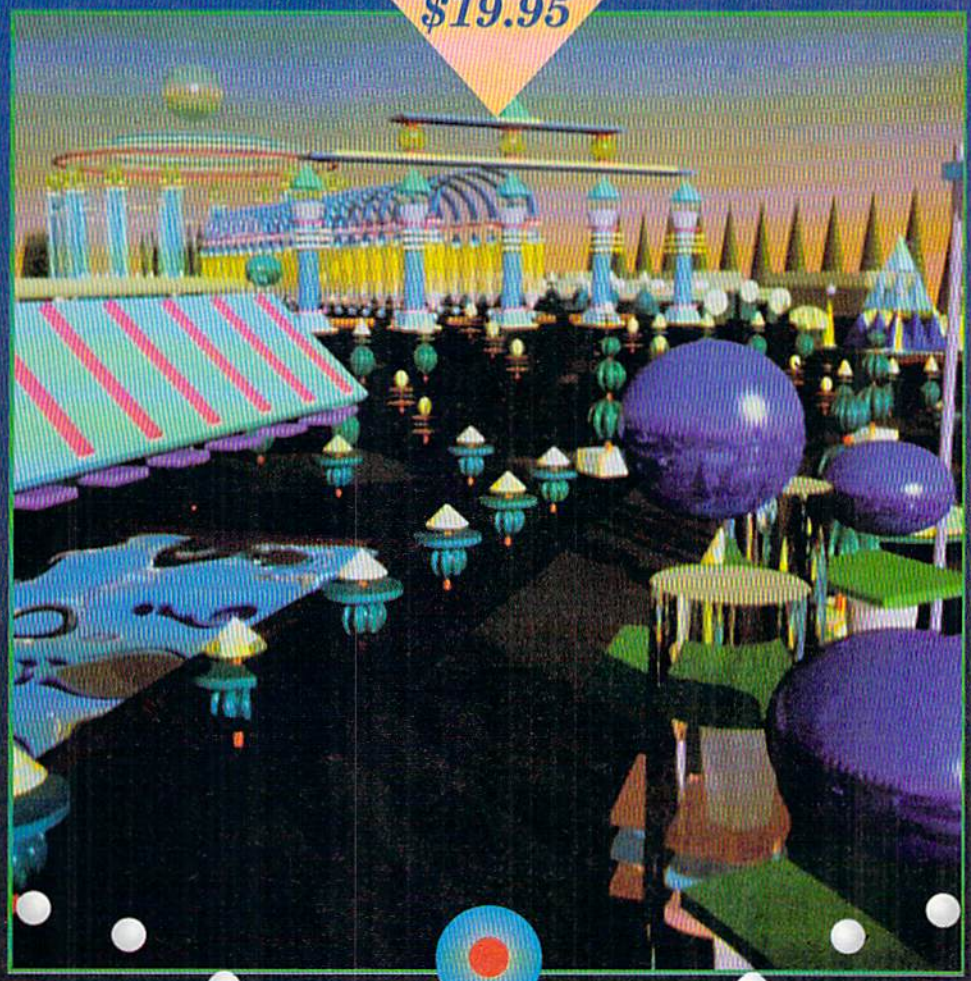


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RNMD1291

GEOWATCH

If you've heard of GEOS, but want some answers before you lay out the cash, read on! This column is for you.

By GERRY DESCOTEAUX

ANYONE WITH A REPUTATION as a GEOS expert knows: The questions never end! At user's group meetings and over the networks, would-be GEOS users need advice. Here are answers to their ten most pressing questions:

1. *What is GEOS?* The word *GEOS* is an acronym for the Graphical Environment Operating System produced by GeoWorks. It's a graphics-oriented system, with an integreted series of applications, that has revolutionized Commodore 8-bit computing.

Coming in versions for the 64 and the 128, GEOS has made it practical for Commodore users to perform tasks once left to high-end machines. From word processing to desktop publishing, GEOS lets you accomplish almost anything with your 8-bit machine.

2. *Is GEOS hard to learn?* No! That's the whole point—GEOS is easy to use because of its consistent design. As soon as you've mastered the convenient pull-down menus and the shortcut commands used consistently throughout the GEOS applications, you can have professional-quality output.

3. *What's the advantage of using GEOS?* The biggest advantage is the ability to share data between applications. For instance, you can take geoWrite text and a clipping from a geoCalc spreadsheet and insert them into a geoPublish document that already contains bit-mapped images from geoPaint.

GeoCalc is a spreadsheet program, geoWrite is a word processor and geoPublish is a desktop publisher. GeoPaint is a graphics program used to create and edit images, or import them from other Commodore graphics programs, such as Doodle! and Newsroom.

4. *What kind of hardware will I need to run GEOS?* GEOS is a flexible program, and works with a variety of hardware setups. You will need at least a C-64, one 1541 disk drive, a monitor and a joystick or mouse. But in all honesty, with this configuration the program will be very slow. GEOS runs best from a RAM expansion unit (REU), which speeds up operations so they happen almost instantly. I'd recommend a large amount of RAM—512K or more—and a 1581 3½-inch disk drive for data storage. (For more information on REUs, see Malcolm O'Brien's article "The ABCs of REUs" on page 23.)

5. *What can I do with GEOS?* Almost any document you might think of, from the small and simple to the large and complex, can be produced with your Commodore and GEOS. I've used it to make greeting cards, geoWatch columns, and even a full-blown magazine.

6. *Will GEOS produce professional-looking documents?* The answer is yes, absolutely! With GEOS and a laser printer you can turn out documents indistinguishable from those created with any other computer. If you don't have a laser printer, put your GEOS documents on disk and send them out to a company that does laser printing. Also, special printer drivers make it possible to create excellent documents even on a 9- or 24-pin dot-matrix printer.

7. *Where can I find answers for my GEOS questions?* Besides right here in the *RUN* geoWatch column, there are several sources of GEOS information. GeoWorks' Customer Service can answer any questions. You can contact them at 2150 Shattuck Ave., Berkeley, CA 94704; 415-644-0926.

If you have a modem and belong to QuantumLink, the Commodore-specific online network, another source of expert information is available to you. In the Software Showcase area, you'll find the GEOS Arena, where you can get answers to questions from the online GEOS representatives ("geoReps"). In addition, there are forums, bulletin boards chock full of information and thousands of fellow GEOS users to help you.

8. *Where can I get GEOS and what does it cost?* There are several places to buy GEOS products. Among them are your local software outlets, the mail-order companies that advertise here in *RUN*, and the online shopping network in The Mall on Q-Link. You can also purchase directly from the manufacturer by writing to the GeoWorks Order Processing Center, 5334 Sterling Center Drive, Westlake Village, CA 91361, or calling 800-772-0001, ext. 1012.

The basic GEOS operating system is priced at less than $50. Additional GEOS applications are even less, and bargains can be found through many mail-order houses. As always, it's best to shop around.

9. *Is there much third-party support for GEOS?* Again a resounding yes! Many hardware manufacturers design their products specifically to work with GEOS. From expansion boards to printers, GEOS is well supported. There are also numerous third-party sources of GEOS-compatible software, including *RUN*, who has put out several disks of productivity applications for GEOS—GEOS Power Paks I and II and the GEOS Companion. Also, in the Software Showcase/GEOS Arena on Q-Link you'll discover thousands of GEOS programs written by fellow Q-Linkers.

10. *What GEOS questions haven't been answered here?* There are many questions still to answer:

Will GeoWorks ever release an 80-column geoPublish? No.

How do I find out if there are new versions of my GEOS programs available? Write to GeoWorks.

Are there better programs available for the C-64/128 than GEOS? No.

Can I use other Basic programs with GEOS? Yes, but only those that return you to Basic when they're through.

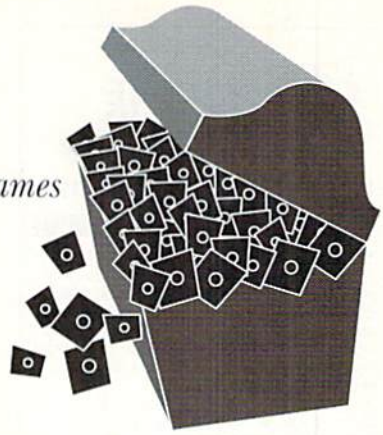
I hope that my answers encourage you to go ahead and try GEOS. You'll be pleasantly surprised how quickly you become a GEOS expert yourself! ■

Gerry Descoteaux is a career counselor in New Hampshire. An avid musician, his most extensive GEOS project has been publishing a monthly statewide music magazine.

GOLD MINE

This time, we have tips from readers about some of the freshest games on the market, including B.A.T., Golden Axe and Ultima VI.

By LOUIS F. SANDER



3D GEOBREAK: If the ball doesn't respond correctly at the beginning of the game, place your paddle a little to the right of the center at the very bottom of the screen. The ball will zip on the screen, make a strange noise, then disappear off the screen. When you press the fire button, the ball will act normally again. To make it easier to hit the ball, keep it in the center of your paddle and follow its path on the screen.

—RYAN HIDALGO
GARNERVILLE, NY

AFTER BURNER: To evade missiles on levels 1 and 2, bank left. On level 3, bank right. On level 4, wait until the tanker is low before you attempt to dock. On levels 5, 8 and 9, bank left while diving or you're finished.

On level 10, bank right to evade most of the missiles, but watch out for the planes that come in rolling—their missiles are tricky. Don't shoot these planes. Instead, start at the right edge and fly around the screen in a picture-frame pattern until you meet back at the right edge. The missile will burn out.

When destroying fortresses, wait until they fire missiles before you fire. Levels beyond 10 are like levels 4–10, so do the same things to evade missiles.

—MATT LOCKNER
LOHRVILLE, IA

AXE OF RAGE: When you begin you will be facing either a blade belly or a knuckle dragger. Face the blade belly so you can leap over him and avoid your first battle. If you start out against a knuckle dragger, get in one good kick and then move a step or two forward and repeat it. Keep it up until you kill him. To kill a blade belly, stand still and kick when he approaches. He'll never hit you.

To kill a mutant chicken, squat down and hack at it with your axe. Sometimes it will be hacked in half. To kill the pithdoff man (the big ogre that laughs at you), wait until he's about two feet away compared to Garth's size, and do a flying neck chop. This, if done right, will hack off his head. My advice with the Lardosaurus is to stay away!

—JOSHUA SMITH
SAVANNAH, GA

B.A.T.: To earn some quick krells, find the character with the technician's pass and steal it. Usually this will be the glokmups. You will be arrested and taken to the police station. Search the cell to find another pass, then sell it. You should get about 3100 krells. Use the other pass to enter the airlock.

—BRUCE STUART
HEALDSBURG, CA

CURSE OF THE AZURE BONDS: When under the city of Hap, you will meet a group of salamanders sporting in pools of lava. If you are nice to them they will give you something.

If you put a hold-person spell on the first dark elf lord, you will paralyze him. When he's immobile, take his armor and shield.

—FORREST S. FREY, III
LEXINGTON, NC

DARK CASTLE: In the dungeon, you will die if you take the wrong key. Keep your eye on the prisoner. If he lifts his head, you have the proper key. If he shakes his head, you have the wrong one.

To grab the shield, stand to the left of it and press F7. When the cloud is almost over you, press F7 again. Lightning will strike the cloud, and you'll find yourself back in the main hallway with the shield.

When asked if you want sound or music, choose sound. Although music is more enjoyable, the sounds are almost necessary at certain times.

—STEVEN RICHARDSON
ANIMAS, NM

DÉJÀ VU: At the beginning of the game, move the jacket on the stall door, and notice the gun behind it. When faced with the prostitute in the street, hit her and take her purse. To cure yourself, take the syringe to the doctor's office and inject yourself with bisodiumitis. When faced with the mugger, hit him four times, then give him a quarter; the gun he had didn't have any bullets anyway. If you hit him five times, the gun gets its bullets, and you sure will know it!

When in the casino, spin the wheel on the wall, which will reveal a secret passage. When you hear a siren, get out of that area fast. When you get the key for your trunk, take the tape off the fat lady's mouth and inject her with the truth drug. The key that opens the car door is the same key that starts the car. Both cabs charge the same fare, so don't waste your time choosing between them.

—MICHAEL REZNICK
HAMILTON SQUARE, NJ

FIRE KING: The best character to use is Emily the Enchantress, because her magic lasts much longer. To build up your character's abilities, enter the sewers and cross the river. To enter the chamber, the name is Muckmire. Gather the artifacts and press F7. Do this as many times as it takes to build your character's abilities to the maximum.

—DARREL BACON
SAN ANTONIO, TX

FUTURE KNIGHT: When a robot shoots you, press the CONTROL key. The bullet will pass right through you! You can keep doing it until you are out of the robot's range.

When getting the securo key or the exit pass, there is an easy way to get back to the exit. After getting the object, press the LEFT-ARROW key (the one at the top left-hand corner of the keyboard). You'll return to the exit immediately.

Use bombs wisely—they restore you to 999 constitution.

—STEVEN RICHARDSON
ANIMAS, NM

RED STORM RISING: If you play a scenario at a difficult level with an older sub, your ER will be much higher. I've gotten ►

as high as 5400. Also, the manual talks about "snap shots" when you are very close to a target. If you're in this situation, the thing to do is fire a torpedo at the target, setting the PAP directly on the target. As soon as you fire, activate the torpedo. This has worked for me several times, and it can work for you, too!

—Robert T. Timmons
North Bergen, NJ

Sport of Kings: If you are playing a long competition, it is handy to press F7 at the beginning of each horse race. This will cause the computer to finish the race off-screen, displaying the tote-board when it is finished—a real time-saver!

—Andrew Wiskow
Aloha, OR

Starflight: If you've read the notices at Starport, you've found out that the sun of that system will flare and destroy the system. To prevent it, you must destroy the crystal planet. To do this, you need several things, including a black egg device, found at 143,115 on the first planet. The planet is guarded by a security drone that asks you a series of numbers. Answer "yes" to all multiples of six. You'll find the black egg on the planet at coordinates 28N by 4E.

You'll also need the crystal orb. Head for the system 132:165. You will be stopped and asked if you will give up some of your fuel as tribute. Agree with your assailants and ask them questions about themselves and the ancients. Keep asking questions until they tell you about Sphexi. Go to Sphexi and look for a strange hexagon shape just south of your landing point. Grab the crystal orb and all of the endurium in the area, then leave immediately. Go straight to the system at 192,152.

Land at the planet at 47N by 45W. Save your game in case of trouble. Go south until you encounter the message. Read it and drop the black egg directly next to it. If the egg is too far from the message, pick it up and drop it again. As soon as you do this, launch and maneuver. You will receive a countdown message from the egg, and the planet will be destroyed. If not, reload your saved game and try again.

When you destroy the planet, you will receive another message, this one from Starport. They will commend you and promise you 500,000 MU.

—Randy Clarke
Colorado Springs, CO

Street Sports Basketball: Choose an Easy game against the Computer at School. Try to choose, in order, Butch, Vic and Kevin. Butch and Kevin hit everything. Vic plays great defense and doesn't miss much. You can't lose with this combination.

—David Mintz
Perkasie, PA

Ultima VI: If you're having trouble, just talk to yourself and type:

```
i↵ {↵ = RETURN}
wan↵
chea↵
```

Now, from the cheaters' menu you can modify your party information in practically every way. You can even learn a spell that isn't in the documentation. It requires nothing to cast, and it erases every character on the screen except you (and Lord British, if he happens to be there).

—Dan Morrow
Ashland, OR ■

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COMMODORE CLINIC

Buffers aren't just for asprin tablets. Learn how they can improve your printing speed. Also: a keypad cure for the C-64!

By ELLEN RULE



Q *I would like to know how to speed up my printer when using Print Shop. I have an Admate DP-100 with a Xetec Super Graphics Jr. interface. When I print a greeting card or a graphics screen, the printer just pokes along, only printing one line at a time and then pausing.*

—DOUG BERGEN

A Printing speed, measured in characters per second (cps), depends on the speed at which the data is sent out by the software, the maximum speed of your printer and the buffer capacity of either the printer or the interface.

Your system can only print as quickly as the software provides data. Many graphics programs send data to the printer only one line at a time, so no amount of upgrading will improve their printing speed. This is not the case in this instance, however, according to the manufacturer of Print Shop, Brøderbund Software. Therefore, you should look at improving either the printer or the buffer capacity.

Each printer has a maximum cps rate: To increase the rate, you simply need a faster printer. To find out if this is something you should consider, try borrowing an interface with a built-in buffer. If this doesn't help, then you should consider the purchase. If the buffer does help, you have two options: either improve your buffer capacity, or live with the slow printing time.

The buffer is an area of memory set aside to accumulate the data sent from the computer and release it, in a steady stream, to the printer, as fast as the printer can accept it. Some printers and interfaces come with a built-in buffer, some don't; check your printer manual to find out if it has one. The Super Graphics Jr. doesn't.

To increase your buffer capacity, you can upgrade your printer or interface, or you can purchase a parallel printer buffer. This piece of hardware is installed between the interface and the printer, and is available from many computer supply houses, including Tenex (1-800-PROMPT-1) and Lyben Computer Systems (1150 Maplelawn, Troy, MI 48084). Prices range from $80 for 32K to $160 for 512K. You should note that, like most printers, these buffer units are not Commodore-specific products. The interface converts the data to a parallel signal, which is standard for the computer industry.

If you don't want to spend the money to get a larger buffer, relax and enjoy the down-time. While waiting for my printer, I sometimes like to take a good stretch, tidy up my work station, or reacquaint myself with my family!

Q *I have encountered a problem saving the C-64 version of the game Elite. I have been saving the game on a disk under the name FRED1, FRED2, etc. This has worked fine up to save FRED292. After that, further saves cause the drive light to flash. On checking the directory, only the saves up to 292 are listed.*

—ALFRED HURTER
OTTAWA, ONTARIO

A Your problem may be that you have exceeded the capacity of your disk. According to Commodore's manuals, the 1541 and 1571 drives only allow 144 entries in the directory; the 1581 allows 296. You should also check the Blocks Free message under your directory listing. The total capacity is 664 blocks for the 1541, 1328 for the 1571, and 3160 for the 1581.

Q *How can I make my 1350 mouse compatible with GEOS 2.0 128? Will a 1350 driver help my mouse work proportionally, so I don't keep going off the edge of my mouse pad?*

—PHILLIP HELLER

A Use the joystick driver for your 1350 mouse. Unfortunately, the 1350 mouse doesn't supply the type of signal that can be interpreted as proportional. The signal provided by the joystick/1350 mouse is time-related, which means your pointer's movement is based on how long the mouse is travelling in a given direction, not on the distance travelled. Try moving the mouse more slowly and you may be able to keep within the confines of your pad. If you don't have one of the larger mouse pads, look for one at a computer supply store.

Q *Is there a keypad program available to use on the C-64?*

Also, do you know of a program available that will calculate an amortization schedule including interest, taxes, principal, etc., for home mortgage loans?

—MILDRED ROSS
KANSAS CITY, KANSAS

A Believe it or not, in the September/October issue of *RUN*, Mark Jordan's 128 Mode column featured a type-in keypad program for the C-64 that is just what you're looking for. It can be typed in either 64 or 128 mode, and runs in 64 mode.

To answer your second question, a program called Loan Analysis appeared in the July 1988 *RUN*. It asks for the amount borrowed, the interest rate and the term of the loan. Output options include the amount of the monthly payments, a recap of the loan data and how much of each payment will go toward principal and how much to interest.

Or, if you prefer, in the December 1990 *RUN* you'll find a program called Prequalify 64/128, which can be used to determine your chances of being accepted for a mortgage based on the guidelines generally used by lending institutions.

To order these or other back issues of *RUN*, call 800-343-0728. If you prefer to get the programs already on disk, order the corresponding ReRUN (available at the same toll-free number). ■

Do you have a problem with or question about your Commodore computer system, software or programming? Send your questions to Commodore Clinic, RUN *Magazine, 80 Elm St., Peterborough, NH 03458. Questions are answered only through this column, and, due to the volume of mail, only those questions likely to appeal to the majority of readers will be published.*

From p. 15.

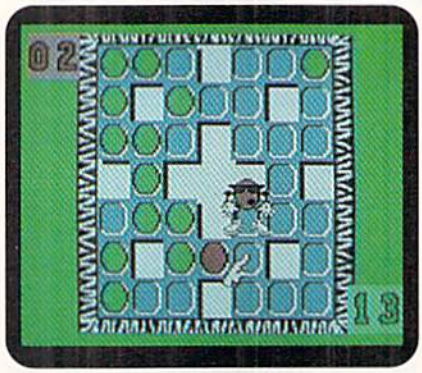
positions of high visibility in recent movies. This trend in marketing strategy, called "product placement," has now made its C-64 debut with Spot, a package from Virgin Games starring 7-Up's nimble little trademark of TV fame.

At least one joystick is needed for this game, which allows you play up to three human or computer opponents. Each competitor is assigned a color, which appears on the tiles they begin with.

A standard game takes place on a grid of 49 squares and consists of two basic moves: You can either create a new tile in an open square next to one of your tiles, or you can move a tile two squares from its current location. In either case, you change to your color the pieces that lie next to the square where the action takes place.

The winner of a game is the player who has the most tiles on the board after the last move is made.

Other features include nine skill levels for the computer and an overall time limit for a game, as well as limits for individual moves. Also, the disk contains 512 preprogrammed grids, and you can add or remove squares from any of them with a construction set feature.



Virgin Games' Spot is one strategy game with a "well-rounded" sense of humor.

The program's graphics are simple, with one exception: When you activate the Spot character, he'll illustrate the game's moves with colorful gyrations such as cartwheels, pole vaults and moonwalks. These animated sequences are well done and appealing.

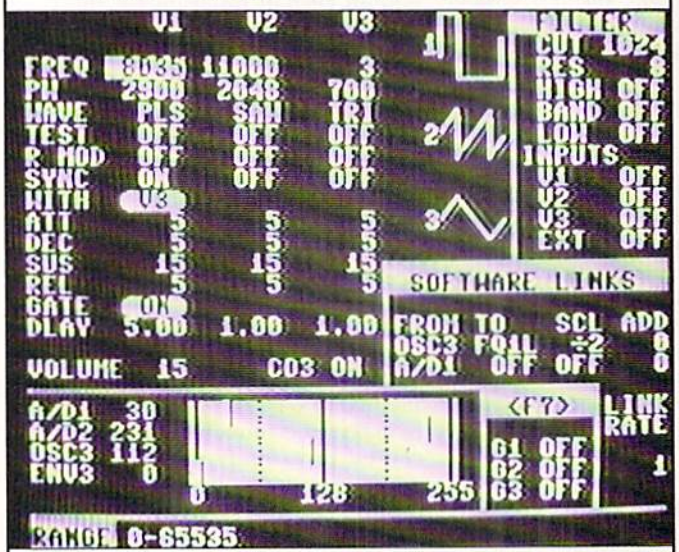
The sound effects, on the other hand, are disappointing—merely a few musical notes heard during only a small portion of the game. Also, you can't directly call up individual preprogrammed grids, and edited playing fields are not saved. As a result, if you wish to begin a session at the program's 100th playing field, you must either cycle through the first 99 grids on the disk or reconstruct the board you want.

In addition, the instructions mention landing on Secret Spot Squares, where you can have free moves or swap pieces with an opponent. However, the documentation doesn't mention that these squares are rare, appearing only once in every 100 games or so.

Despite these problems, Spot can be very enjoyable, even addictive. The game offers an intriguing challenge for players who relish strategy contests that require planning two or more moves in advance.

(Virgin Games, Inc., 18061 Fitch Ave., Irvine, CA 92714. C-64/$19.99) ■

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Continued from p.43.

```
199Ø IFX=1THENA=1Ø2:ELSEA=27Ø
                          :REM*13Ø
2ØØØ IFEX(X)+25>ATHENEY(X)=EY(X
     )-31:ED(X)=3:RETURN
                          :REM*136
2Ø1Ø EX(X)=EX(X)+13:RETURN
                          :REM*87
2Ø2Ø EX(X)=EX(X)+6:EY(X)=EY(X)+
     13:RETURN            :REM*13
2Ø3Ø IFDB=1THENEP(X)=Y:SP(X)=2*
     Y:GOTO212Ø           :REM*1ØØ
2Ø4Ø GOSUB154Ø:IFY=EP(X)THENEP(
     X)=Z:SP(X)=Z:GOTO2Ø8Ø
                          :REM*227
2Ø5Ø EP(X)=Y:SP(X)=Y:GSHAPEDM$(
     Y),EX(X),EY(X):GSHAPEDM$(Z
     ),EX(X),EY(X)+12     :REM*235
2Ø6Ø IFDB=1THENSP(X)=SP(X)+Y
                          :REM*177
2Ø7Ø GOTO2Ø9Ø              :REM*1Ø8
2Ø8Ø GSHAPEDM$(Z),EX(X),EY(X):G
     SHAPEDM$(Y),EX(X),EY(X)+12
                          :REM*2Ø7
2Ø9Ø IFX=4THENA=89:ELSEA=8
                          :REM*112
21ØØ IFEY(X)-25<ATHENEX(X)=EX(X
     )-25:ED(X)=1:DB(X)=1:RETUR
     N                    :REM*1Ø7
211Ø EY(X)=EY(X)-25:RETURN
                          :REM*51
212Ø IFDB(X)=1THENDB(X)=Ø:GOTO2
     17Ø                  :REM*141
213Ø GOSUB133Ø:GSHAPEDM$(Y),EX(
     X)-6,EY(X)+12:GSHAPEDM$(Y)
     ,EX(X)+6,EY(X)+12    :REM*47
214Ø IFX=4THENA=89:ELSEA=8
                          :REM*66
215Ø IFEY(X)-13<ATHENEX(X)=EX(X
     )-31:EY(X)=EY(X)+12:ED(X)=
     1:RETURN             :REM*248
216Ø EY(X)=EY(X)-13:RETURN
                          :REM*58
217Ø GSHAPEDM$(Y),EX(X),EY(X)+6
     :GSHAPEDM$(Y),EX(X),EY(X)+
     18:EY(X)=EY(X)-19:RETURN
                          :REM*86
218Ø IFDB=1THENEP(X)=Y:SP(X)=2*
     Y:GOTO227Ø           :REM*167
219Ø GOSUB154Ø:IFY=EP(X)THENEP(
     X)=Z:SP(X)=Z:GOTO223Ø
                          :REM*136
22ØØ EP(X)=Y:SP(X)=Y:GSHAPEDM$(
     Z),EX(X),EY(X):GSHAPEDM$(Y
     ),EX(X),EY(X)+12     :REM*1Ø9
221Ø IFDB=1THENSP(X)=SP(X)+Y
                          :REM*218
222Ø GOTO224Ø              :REM*228
223Ø GSHAPEDM$(Y),EX(X),EY(X):G
     SHAPEDM$(Z),EX(X),EY(X)+12
                          :REM*37
224Ø IFX=3THENA=51:ELSEA=126
                          :REM*88
225Ø IFEY(X)+25>ATHENEY(X)=EY(X
     )+12:EX(X)=EX(X)+13:ED(X)=
     2:DB(X)=1:RETURN     :REM*255
226Ø EY(X)=EY(X)+25:RETURN
                          :REM*165
227Ø IFDB(X)=1THENDB(X)=Ø:GOTO2
     32Ø                  :REM*1Ø3
228Ø GOSUB133Ø:GSHAPEDM$(Y),EX(
     X)-6,EY(X):GSHAPEDM$(Y),EX
     (X)+6,EY(X)          :REM*35
229Ø IFX=3THENA=51:ELSEA=126
                          :REM*174
23ØØ IFEY(X)+13>ATHENEX(X)=EX(X
     )+19:ED(X)=2:RETURN
                          :REM*114
231Ø EY(X)=EY(X)+13:RETURN
                          :REM*172
232Ø GSHAPEDM$(Y),EX(X),EY(X)-6
     :GSHAPEDM$(Y),EX(X),EY(X)+
     6:EY(X)=EY(X)+19:RETURN
                          :REM*154
233Ø DATA Ø,1,2,3,4,5,6,11,12,1
     3,14,15,16,22,23,24,25,26,
     33,34,35,36,44,45,46,55,56
     ,66                  :REM*118
234Ø DATA PLAY,DRAW,PASS,127,7Ø
     ,1,165,7Ø,2,152,39,3,152,8
     9,4                  :REM*233
5ØØØ SLOW:GRAPHICØ:PRINT"{SHFT
     CLR}";ERR$(ER),EL:END
                          :REM*8Ø
```


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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.

```
1Ø REM RUN'S CHECKSUM 64/128 - BOB KODADEK
2Ø MO=128:SA=3328:IF PEEK(4Ø96Ø)THEN MO=64:SA=49152
3Ø I=Ø:CK=Ø:CH=Ø:LN=19Ø
4Ø FOR K=Ø TO 16
5Ø FOR J=1 TO 1Ø:READ B:IF B>255 THEN GOTO 17Ø
6Ø CH=CH+B:POKE SA+I,B:I=I+1:NEXT
7Ø READ LC
8Ø IF LC<>CH THEN GOTO 17Ø
9Ø CH=Ø:LN=LN+1Ø
1ØØ NEXT K
11Ø POKESA+11Ø,24Ø:POKESA+111,38:POKESA+14Ø,234
12Ø PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
13Ø PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128 THEN 1
    6Ø
14Ø POKESA+13,124:POKESA+15,165:POKESA+25,124:POKESA+2
    6,165
15Ø POKESA+39,2Ø:POKESA+41,21:POKESA+123,2Ø5:POKESA+12
    4,189
16Ø POKESA+4,INT(SA/256):SYS SA:NEW
17Ø PRINT"YOU HAVE A DATA ERROR IN LINE ";LN;"!":END
18Ø REM DO NOT CHANGE THESE DATA STATEMENTS!
19Ø DATA 12Ø,162,24,16Ø,13,173,4,3,2Ø1,24,884
2ØØ DATA 2Ø8,4,162,13,16Ø,67,142,4,3,14Ø,9Ø3
21Ø DATA 5,3,88,96,32,13,67,152,72,169,697
22Ø DATA Ø,141,Ø,255,133,176,133,18Ø,166,22,12Ø6
23Ø DATA 164,23,134,167,132,168,17Ø,189,Ø,2,1149
24Ø DATA 24Ø,58,2Ø1,48,144,7,2Ø1,58,176,3,1136
25Ø DATA 232,2Ø8,24Ø,189,Ø,2,24Ø,42,2Ø1,32,1386
26Ø DATA 2Ø8,4,164,18Ø,24Ø,31,2Ø1,34,2Ø8,6,1276
27Ø DATA 165,18Ø,73,1,133,18Ø,23Ø,176,164,176,1478
28Ø DATA 165,167,24,125,Ø,2,133,167,165,168,1116
29Ø DATA 1Ø5,Ø,133,168,136,2Ø8,239,232,2Ø8,2Ø9,1638
3ØØ DATA 169,42,32,21Ø,255,165,167,69,168,17Ø,1447
31Ø DATA 169,Ø,32,5Ø,142,169,32,32,21Ø,255,1Ø91
32Ø DATA 32,21Ø,255,169,13,32,21Ø,255,1Ø4,168,1448
33Ø DATA 96,1Ø4,17Ø,24,32,24Ø,255,1Ø4,168,96,1289
34Ø DATA 56,32,24Ø,255,138,72,152,72,24,162,12Ø3
35Ø DATA Ø,16Ø,Ø,32,24Ø,255,169,42,2Ø8,198,13Ø4
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Coming Attractions

Productivity Plus—
Who says there aren't any important developments in this market anymore! Next issue, *RUN* spotlights the RAMLink and RAMDrive devices from Creative Micro Designs. These new products may revolutionize your computing experience.

Mah Jongg and Hip Hop—
(No, these aren't the names of Charlie Chan's arch nemesis and his sidekick.) The first is an ancient Chinese game of skill recently popularized as "Shanghai;" the second is an exciting arcade game sure to keep you hopping. Both great games are yours, next time.

New Printers—
RUN's hardware hard guy, Tim Walsh, puts some new printers through their paces.

Plus—
RUN's annual list of articles, software reviews, GEOS coverage, type-ins, hints and tips and more.

ReRUN Preview—
Here's the lineup for the November/December ReRUN disk: **Ultimate Sprite Editor**—A powerful program for creating and editing sprites and creating animations; **Volleybound**—One- or two-player fast-paced volleyball for the C-64; **Port Authority**—A handy joystick utility that allows use of either joystick port with games; **Dominoes**—A C-128 version of an all-time popular classic; **Interlace128**—This gives you an 80-Column Interlace mode for GEOS 128; **Cassette Keeper**—Maximize your cassette use when recording music. **PLUS!**—Other bonus programs.

RUN Amok

Oops—we goofed! Two errors were printed in the May/June 1991 Magic column in item **S5CC**:

1) In line 30, replace the semicolon (;) with a colon (:).

2) In line 100, replace the data number 321 with the number 231.

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Reader Service	Page
Brantford Educational Service	60
Briwall	5
Compsult	60
Creative Micro Design	2
Darkside Software	52
Grapevine Group, Inc., The	56
Indy Software	58
Inkwell Systems	59
Jason Ranheim	59
Lance Haffner Games	40
Loadstar	1
Lyco Computer	13
Montgomery Grant	CIII
NRI Schools/McGraw Hill	25
Rio Computers	33
RUN	
Animation II	17
Catalog	44–49
Mind's Eye Video	53
ReRUN VIP	16
Schnedler Systems	32
Software Hut	11
Software Support Int'l	39
Software Support Int'l	58
SOGWAP Software	52
Strategic Simulations	CIV
Superior Micro Systems	56
Tektonics Plus, Inc	40
Tenex Computer Express	CII

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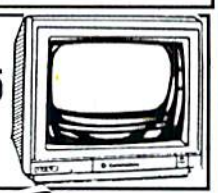
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