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RUN

THE COMMODORE 64 / 128 USER'S GUIDE

August 1989
An IDGC/I
Publication

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See Page 18.

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1. NO PURCHASE NECESSARY. Fill out and mail official entry found in package or you can enter by hand printing your name, address and zip code on a 3" x 5" piece of paper and mailing it to CAPCOM Santa's Sleigh Giveaway, 3303 Scott Blvd., Santa Clara, CA 95054. Enter as often as you wish. Each entry must be mailed separately by JANUARY 15, 1990. No mechanical reproductions of entry will be accepted and all mail-in entries must be received at the above address by JANUARY 31, 1990. No responsibility is assumed for lost, late, misdirected, or damaged entries.

2. Prize winners will be determined by means of a random drawing to be conducted by an independent judging organization whose decision shall be final. All prizes listed will be awarded, but there can be only one prize winner per household, group or organization. Odds of winning depend on the number of entries received. Approximate grand prize retail value is as follows: Suzuki Katana \$4,495.00. Winners will be notified by mail by FEBRUARY 15, 1990 and may be required to execute affidavits and advertising release. Taxes on prize winnings are solely the responsibility of the winners.

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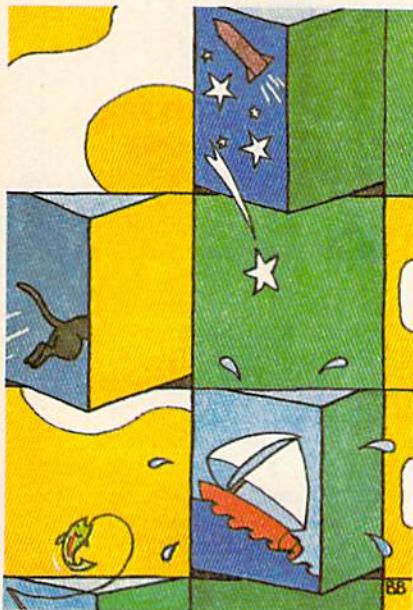
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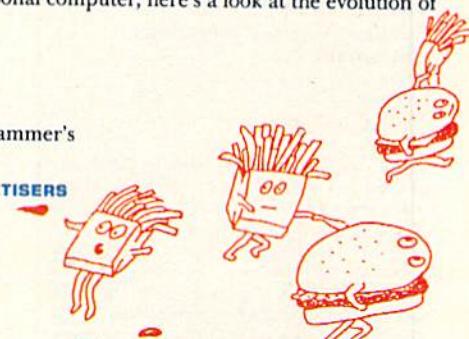
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WIDE WORLD PHOTOS

* If you dread typing in programs, the listings for these articles are available on the July-August 1989 ReRUN disk for \$16.47. To order, see page 37.



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RUNNING RUMINATIONS

"Have you ever heard of anyone getting attached to an IBM clone?"

I'm always amused and intrigued by the variety of uses computerists have devised for their Commodores. The applications are as numerous as chips in the computer market.

This month's profile of Commodore applications runs the gamut from helping to walk the dog at night to controlling the manufacture of printed circuit boards.

The typical *RUN* reader, who uses his Commodore for word processing, games, maintaining lists, or perhaps some Basic programming, will want to find out how his applications compare to those profiled in this issue.

Not many of us use the computer to the extent that "Slim" Johnson does. His C-128 waters the lawn around his Florida home and even turns his Christmas lights on and off.

But most of us can probably identify with Ohio lawyer Patrick West, an applications user who finds his computer as handy as a shirt pocket. He uses his computer for word processing and for maintaining records in his law practice.

Another interesting profile is that of Milo Dailey, editor of a martial arts publication, which used 64s to maintain its subscriber list before switching over to IBMs. Milo admits to having grown accustomed to the 64 over the years. He asks, "Many people are attached to their Commodores, but have you ever heard of anyone getting attached to an IBM clone?"

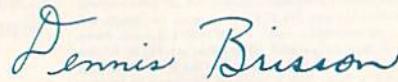
We doubt it, Milo. Creativity and determination are the hallmarks of the Commodore user community. The C-64 is the underdog, the one who enters the ring with no chance in the world to survive against the big boys. Like the famous cinematic pugilist, Rocky Balboa, the C-64 overcame insurmountable odds to dethrone the champ and capture the hearts of thousands of adoring fans.

Most of us became interested in Commodore computing because that machine was the best bargain. Let's face it. If money were no object, we might have purchased an IBM. Why, then, do we stick with Commodores?

Perhaps the answer lies in this month's Mail *RUN* letters, which provide some revealing insight into the character and needs of users. These are your comments on our Commodore service article that was featured in the May issue. Perhaps no other article since we explored the copy controversy question in January 1987 has elicited as much response.

Your comments prove that Commodore computing is more than an entertaining diversion. For some users, it is an integral part of their lives. For others, it is their livelihood. For most, it is a valuable activity to be defended when it faces threat or neglect.

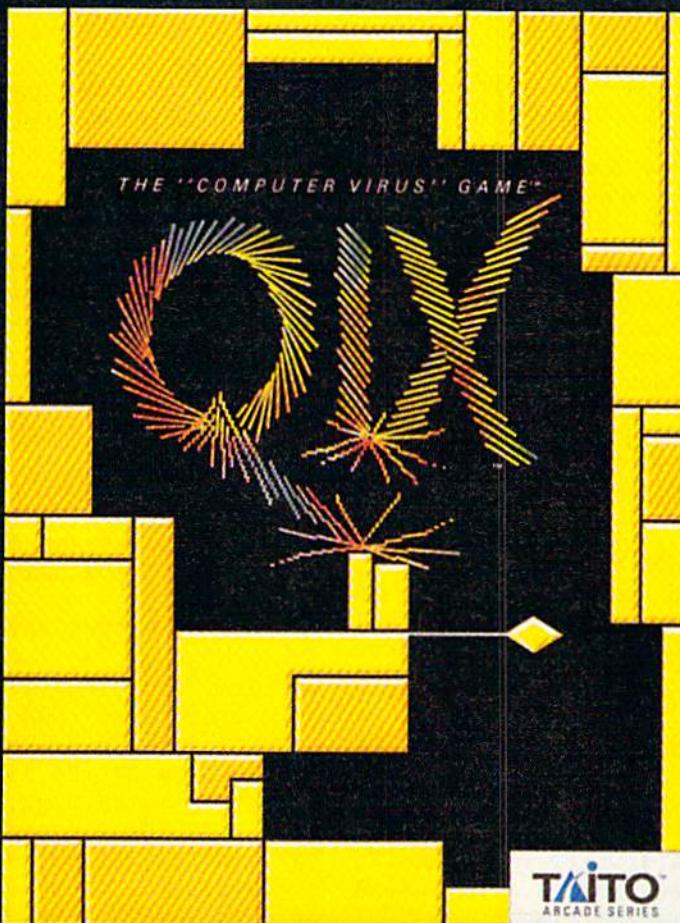
These letters are testimony to the fact that you can love the product and yet be less than ecstatic about the company behind the product. The 64/128 offers the power and flexibility at a price users can afford. This, simply, is the reason for its success.



Dennis Brisson
Editor-in-Chief

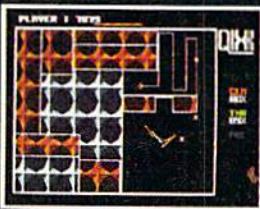
WADUH!

CAN YOU KICK THE QIX® ADDICTION?

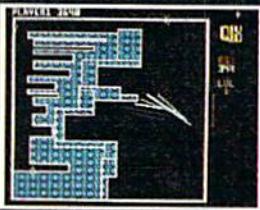


When QIX fever strikes, there is no cure! Like the mind-blowing arcade original, QIX is a computer virus that

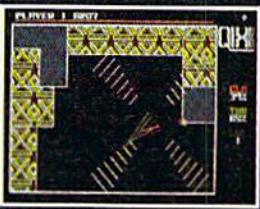
lives deep inside your computer, attacking without warning. Construct a trap in any one of the billions of configurations possible to immobilize QIX. But watch out for SPARX™ and SPRITZ™ and other deadly energy forms! In this electrical world of high-tech infections, mental dexterity and superior strategy are basic to survival. The practice mode turns beginners into addicts. No one is immune! Get your QIX before QIX gets you!



Actual Atari screen.



Actual C/64 screen.



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Circle 179 on Reader Service card.

MAGIC

Load fonts into RUN Paint in four easy steps; add a new cursor to your C-128; position text on the C-64 screen.

Compiled by TIM WALSH

\$540 FONTS FOR RUN PAINT 64/128

A few RUN readers wrote or phoned our editorial offices asking how to load fonts into RUN Paint (March 1989). It's easy; just follow these four steps:

1. Save one or more Commodore font files to a work disk.
2. Rename each font file to be used with RUN Paint with the prefix "RPF". (For example, "ROUND FONT" is renamed "RPF.ROUND FONT".)
3. Run RUN Paint, then place the work disk with the renamed fonts into the drive, select the Font option from the Load menu and place the pointer on the filename of the desired font. Press the left mouse button (or joystick fire-button) to load it into RUN Paint.
4. Select the Text menu. Each font loaded into RUN Paint will be displayed. Select a font by placing the pointer on the font name and pressing the mouse or joystick button.

—TIM WALSH, MAGIC COLUMNIST

\$541 GOING DOWN, ANYONE?

Letter Dropper, a 64- and 128-mode trick, makes the contents of A\$ drop down from the top of the screen and stop on the fourth line from the top to form a statement. The letters may drop down to any line desired by changing the value of DD.

```
0 REM 64/128 LETTER DROPPER - ERIK PEDERSEN :REM*134
10 PRINT CHR$(147): A$="RUN'S MAGIC TRICK S." :REM*57
20 DD=4:L=LEN(A$):RM=(40-L)/2-1 :REM*124
30 FOR J=1 TO L:AS=ASC(MID$(A$,J,1)):AS=AS *AS*2:M1$=MID$(A$,J,1):PRINT"(HOME)" :REM*89
40 IF M1$<>"2 SPACES" THEN FOR K=1 TO DD-2:PRINT TAB(RM+J)M1$(CRSR UP) :REM*28
50 PRINT TAB(RM+J) "":NEXT:PRINT TAB(RM + J)M1$ :NEXT:PRINT :REM*174
```

—ERIK PEDERSEN, APO, NY

\$542 GOING RIGHT, ANYONE?

If you prefer that the characters move out from the left of the screen to form a statement, then Left Letters Zoom is for you. As in the above trick, the statement resides in A\$.

```
0 REM LEFT LETTERS ZOOM - ERIK PEDERSEN :REM*174
10 PRINTCHR$(147): A$="RUN MAGIC TRICKS" :REM*151
20 L=LEN(A$):RM=(40-L)/2-1 :REM*119
30 FOR X=L TO 1 STEP -1:AS=ASC(MID$(A$,X,1
```

```
)):AS=AS*AS*3:M1$="2 SPACES"+MID$(A$, X,1) :REM*69
40 IF M1$<>"2 SPACES" THEN FOR K=1 TO X:P RINT TAB(RM+K-1)M1$(CRSR UP):NEXT:NEXT:PRINT :REM*60
```

—ERIK PEDERSEN, APO, NY

\$543 64 FAST DIRECTORY

Not only does 64 Fast Directory quickly display the C-64's disk directory, but it quietly resides in memory until needed. After you run the program, entering SYS 49152 in Direct or Program mode will display the disk directory.

```
0 REM C-64 EASY DIRECTORY - JEFF PANICI :REM*96
10 PRINT"(SHFT CLR)":CK=.:PRINT"CHECKING:":S=49152 :REM*197
20 FORX=STOS+88:READD:POKEX,D:CK=CK+D:PRINT T"(HOME){CRSR DN}"TAB(10);CK:NEXT :REM*107
30 IF CK<>12836 THEN PRINT"ERROR!!!" :END :REM*113
40 PRINT"(SHFT CLR){CTRL 9}SYS 49152 TO SEE DIRECTORY." :END :REM*149
50 DATA 32,68,229,169,36,133,251,169,5,162 ,8,160,0,32,186,255,169,1,162 :REM*119
60 DATA 251,160,0,32,189,255,32,192,255,16 2,5,32,198,255,32,207,255,32 :REM*88
70 DATA 207,255,32,207,255,32,207,255,32,2 07,255,72,32,207,255,168,104 :REM*235
80 DATA 170,165,144,208,22,152,32,205,189, 169,32,32,210,255,32,207,255 :REM*252
90 DATA 208,248,169,13,32,210,255,184,80,2 14,32,204,255,169,5,76,195,255 :REM*226
```

—JEFF PANICI, SANDWICH, IL

\$544 ECHO CLONE

While working on a Magic trick submission, I discovered a routine, familiar to users of telecommunication software, that produces an "echo" effect, printing two characters to the screen for each keypress. While this routine has little practical use, it can be incorporated into both 64- and 128-mode programs for telecommunication terminal package emulation. Pressing the left arrow key (←) exits the mode.

```
0 REM 64/128 ECHO MODE EMULATOR - TIM WALS :REM*148
10 H :REM*148
10 PRINTCHR$(147)"ECHO MODE EMULATION. PRE SS {LEFT ARROW} TO END":S=3:OPENS,S ►
```

RAMBO III

NOT MILITARY. NOT MERCENARY. AND YOU'RE DEFINITELY NO TOURIST...

SOVIET COMMANDER:
"WHO ARE YOU?"

RAMBO: "I'M YOUR WORST NIGHTMARE."

Remember that line? Now YOU can deliver it to the enemy—in person. Thirty miles over the Afghanistan border, Soviet forces are torturing your friend and mentor, Colonel Trautman. You're the only man alive with enough guts,

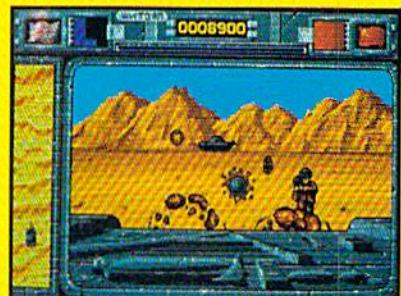
Amiga game screens.



It takes more than muscle to de-activate electronic gates, cross treacherous mine fields, and find the keys to Trautman's cell.



Ever fly one of these things? With the enemy breathing down your back, that Hind chopper's the best way out of this hell hole.



It's just you and your hijacked tank against anti-tank missiles and choppers. Sight in and rearrange that balance of power!

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M A G I C

```

20 GET TS:IF TS="" THEN 20 :REM*234
30 IF TS="(LEFT ARROW)"THEN 50 :REM*93
40 PRINT TS:;PRINT#S,T$:;GOTO20 :REM*23
50 END :REM*178

```

—TIM WALSH, MAGIC COLUMNIST

\$545 A WHOLE NEW C-128 CURSOR

Here's an eye-catching routine for the C-128. Underscore/Overscore Cursor 128 creates a cursor on the C-128's 80-column screen consisting of flashing top and bottom lines. Disable this cursor with the run-stop/restore combination.

```

0 REM C-128 underscore/overscore cursor - :REM*177
ELIAS TABELLO :REM*177
10 M=4864:FOR X=M TO M+17:READ A$:POKE X, :REM*248
DEC(A$):NEXT:SYS 4864 :REM*248
20 DATA A9,1,A2,B,20,CC,CD,A9,1B,20,D2,FF, :REM*44
A9,55,20,D2,FF,60 :REM*44

```

—ELIAS TABELLO, ISLINGTON, ONTARIO, CANADA

\$546 DISK STAMP 64

Disk Stamp 64 lets you safely write an "invisible" copyright or identification message up to 79 characters long to your 1541-formatted, single-sided disk. Type in Disk Stamp 64 and run it, using an unimportant disk, then press the F1 key to write a new or edited message to disk. Once there's a Disk Stamp message on the disk, this program will display the invisible message. Press F5 to read another disk and press F7 to quit.

```

0 REM DISK STAMP 64 - ROBERT COOK :REM*165
10 PRINT"DISK STAMP 64" :REM*226
20 PRINT"INSERT DISK AND PRESS SPACE" :REM*199
30 GETG$:IFG$<>" "THEN30 :REM*22
40 OPEN15,8,15:OPEN2,8,2,"#":PRINT#15,"U1" :REM*55
;2,0;18,0:PRINT#15,"B-P";2,177 :REM*55
50 FORI=1TO79:GET#2,G$:G$=G$+CHR$(0):Z$=Z$ :REM*110
+CHR$(0) :REM*110
60 IF(ASC(G$)AND127)>31THENIN$=IN$+LEFT$(G :REM*214
$,1):NEXT :REM*214
70 PRINT"F1-WRITE TEXT TO DISK" :REM*117
80 PRINT"F5-EXIT FOR NEW DISK" :REM*136
90 PRINT"F7-QUIT PROGRAM" :REM*41
100 CR=LEN(IN$)+1:PRINT"3 CCSR DNs}{CTRL :REM*174
1"IN$" {CCSR LF}"; :REM*174
110 CP=1024+PEEK(214)*40+(PEEK(211)-40)-(P :REM*121
EEK(211)>39):POKE212,0 :REM*121
120 CC=PEEK(CP):SL=LEN(IN$) :REM*174
130 POKECP,CC+128:FORI=1TO64:GETG$:IFG$="" :REM*76
THENNEXT :REM*76
140 POKECP,CC:ON-(G$="{FUNCT 1}")-(G$="{FU :REM*129
NCT 5}")*2-(G$="{FUNCT 7})*3GOTO200,2 :REM*129
30,230 :REM*129
150 IFG$="{CCSR RT}"ANDCR<=SLTHENCR=CR+1:P :REM*226
RINTG$; :REM*226
160 IFG$="{CCSR LF}"ANDCR>1THENCR=CR-1:PRI :REM*43
NTG$; :REM*43
170 IFG$=CHR$(20)ANDSL>0ANDCR>SLTHENIN$=L :REM*130

```

```

180 IFG$<" "ORG$>"{LEFT ARROW}"ORCR>79THEN :REM*7
110 :REM*7
190 IN$=LEFT$(IN$,CR-1)+G$+MID$(IN$,CR+1): :REM*27
CR=CR+1:PRINTG$;:GOTO110 :REM*27
200 IN$=IN$+Z$:PRINT#15,"B-P";2,177 :REM*130
210 FORL=1TO79:PRINT#2,MID$(IN$,L,1);:NEXT :REM*6
220 PRINT#15,"U2";2,0;18,0 :REM*192
230 CLOSE2:CLOSE15:IFG$<"{FUNCT 7}"THENRUN :REM*163

```

—ROBERT B. COOK, WATERTOWN, MA

\$547 HI-SPEED C-64 CURSOR POSITIONING

Positioning text on the C-64's screen has never been easier or faster if you use my Hi-Speed C-64 Cursor Positioning routine in your programs. This machine language utility can be entered in a minute or so, but be careful not to change any of the line numbers or the contents of the lines, most especially line 10, which contains the word REM, a space, then 25 Xs.

After typing in the program, run it, list it, then delete every line except line 10. Line 10 can then be added to your own C-64 programs as the first line in the program. To position the text, use this syntax:

SYS 2054, Row #, Column #:PRINT "YOUR MESSAGE"

```

10 REM XXXXXXXXXXXXXXXXXXXXXXXXX :REM*145
20 FOR X= 2054 TO 2069:READ Y:POKE X,Y:CK= :REM*13
CK+Y:NEXT :REM*13
30 IF CK <> 2302 THEN PRINT "ERROR IN DATA :REM*134
...":END :REM*134
40 DATA 32,253,174,32,158,183,134,214,32,2 :REM*42
41,183,134,211,76,16,229 :REM*42
50 REM RUN, THEN LIST AND DELETE LINES 20 :REM*100
THROUGH 50 THEN SAVE LINE 10 :REM*100

```

—HENRY E. SHOTWELL, BERWICK, PA

\$548 DISPLAYING C-64 STRINGS

The PRINT A\$ command prints variable A\$'s contents to the screen for your examination. Unfortunately, it won't properly print color commands, cursor movements and other non-printing characters.

The solution is to enter POKE 212,1 before printing the string. For example, if A\$="20 CCSR RTs", then enter these commands to print A\$:

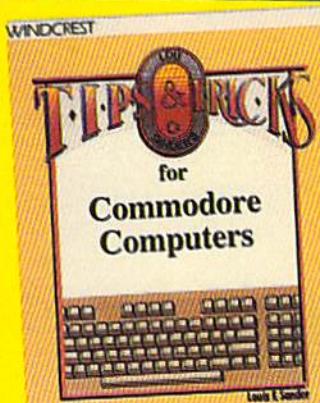
POKE 212,1:PRINT A\$

—RICHARD PENN, MONTREAL, QUEBEC, CANADA ■

Magic is a forum for RUN's imaginative and inventive readers to share their programming tips, brief software or hardware modifications, shortcuts or items of general interest. If you have an idea to make computing easier, faster, more exciting and enjoyable, send it to: *Magic*, RUN Magazine, 80 Elm St., Peterborough, NH 03458.

RUN pays \$10 to \$40 for each trick published in the column. If you'd like a copy of the latest edition of RUN's *Magic Trick Writer's Guide*, send your request with a self-addressed, stamped, business-size envelope; you'll receive a copy in two or three weeks.

7 GREAT WAYS TO USE YOUR COMMODORE



LOU SANDER'S TIPS & TRICKS FOR COMMODORE COMPUTERS

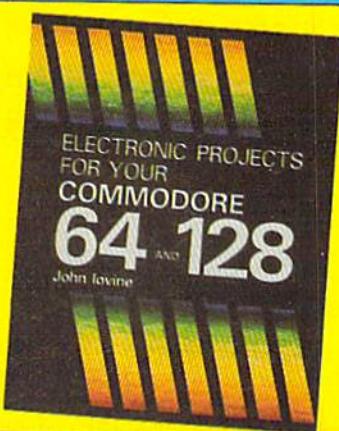
by L. Sander
Well-known computer columnist Lou Sander shares 600 time-saving tips for maximum performance. 352 pp./125 illus.

No. 3192H, \$31.95

ELECTRONIC PROJECTS FOR YOUR COMMODORE 64 AND 128

by J. Iovine
11 affordable projects to expand the value of your Commodore including a speech synthesizer and lie detector. 176 pp./97 illus.

No. 3083H, \$24.95



REPAIR TIPS

COMMODORE CARE MANUAL: Diagnosing and Maintaining Your 64 or 128 System

by C. Morrison and T.S. Stover
Details preventive maintenance, problem diagnostics, and simple repairs. Save valuable time and expense. 227 pp./101 illus.

No. 3141P, \$16.95



TROUBLESHOOTING AND REPAIRING YOUR COMMODORE 64

by A. Margolis
"With the complete set of schematics and many well placed illustrations, this is an excellent book"
—Online Today.
Step-by step repairs. 368 pp./250 illus.

No. 1889P, \$16.95

TROUBLESHOOTING AND REPAIRING YOUR COMMODORE 128

by A. Margolis
A troubleshooting flowchart, chip location guide, master schematic, servicing manual and more prepare you to solve most computer problems. 448 pp./327 illus.

No. 3099P, \$18.95

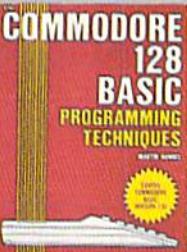
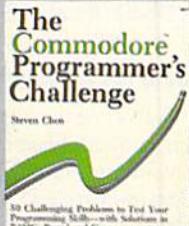


PROGRAMMING GUIDES

THE COMMODORE PROGRAMMER'S CHALLENGE

by S. Chen

50 Challenging Programs to Test Your Programming Skills—With Solutions in BASIC, Pascal, and C. Expand your programming expertise. 240 pp./163 illus. No. 2817P, \$14.95



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by M. Hardee

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RM69

NEWS AND NEW PRODUCTS

New prez at Commodore; printers galore; banish glare; games and more.

Compiled by HAROLD R. BJORNSEN

DON'T STARE AT THE GLARE

NORTHBROOK, IL—**Glare Eliminator**, an anti-glare, anti-reflective aerosol spray coating, is available from Opto-Technics (310 Melvin Drive, Unit 20, Northbrook, IL 60062) for \$29.95. The optical coating eliminates glare and reflections from monitor screens with one application and lasts the lifetime of the monitor.

Check Reader Service number 400.

NEW HAND AT THE HELM

WEST CHESTER, PA—Commodore has named **Harold D. Copperman** as president and chief operating officer of Commodore's U.S. operations. He replaces Max Toy, who resigned to pursue other interests.

Copperman, 42, was formerly vice president and general manager of eastern operations for Apple Computer. Prior to that, he served with IBM for 20 years.

Irving Gould, chairman of Commodore, said, "...the hiring of an individual with Harry Copperman's experience and track record is a key element in our plan for building a strong U.S. operation."

Copperman said he plans "...to take advantage of Commodore's broad range of products to further penetrate the education market and to expand our use of value-added resellers. We will also continue to build and enhance our dealer distribution network."

A SPEEDY PRINTER

TORRANCE, CA—Epson America (23530 Hawthorne Blvd., Torrance, CA 90505) has released the **LX-800** 9-pin, 80-column serial dot matrix printer for the C-64 and C-128. It has bidirectional printing in Text mode and unidirectional printing in Graphics mode. Print speeds range from 180 and 150 characters per second in Draft mode to 30 and 25 cps in Near-Letter-Quality mode. Resident fonts include roman and sans serif. Bit image resolution is



60 to 240 horizontal by 72 vertical dots per inch. The printer ribbon is good for up to 3,000,000 characters. \$299.

Check Reader Service number 402.

A SMALL LASER PRINTER

WEST CALDWELL, NJ—The **PC Laser 6000/EX**, a six-page-per-minute model, has an input paper tray that adjusts to accept letter-, legal- and international-size formats. It also can output on envelopes, transparencies and label stock. For high-volume printing, the laser's paper capacity can be expanded to 400 sheets by installing an auxiliary paper tray. The machine measures 8.1-by-16.1-by-16.5 inches and weighs 37 pounds. Available for \$1895 from Ricoh Corp., 5 Dedrick Place, West Caldwell, NJ 07006.

Check Reader Service number 403.

MORE GAMES FOR THE C-64

HUNT VALLEY, MD—**Destroyer Escort**, a war game for the C-64, gives you control of one of the most versatile ships in naval history. You'll plan a route through and around enemy forces, and protect your convoy from the enemy. The package includes six routes to navigate, three levels of difficulty, four types of defensive weapons and seven different battle screens. \$34.95.

In **Dr. Doom's Revenge**, a C-64 comic adventure, the evil genius has stolen a

U.S. nuclear missile and threatens to detonate it over New York City if his demands aren't met. As Spider-Man and Captain America, you must invade Dr. Doom's fortress to save New York City from Armageddon. Available for \$39.95.

Check Reader Service number 405.

ARM YOUR MONITOR

JAFFREY, NH—Curtis Manufacturing Company (30 Fitzgerald Drive, Jaffrey, NH 03452) introduces three **Curtis Monitor Arms**. Features common to all three models—the Standard (\$69.95), the Executive (\$139.95) and the Professional (\$239.95)—include 360-degree arm and monitor platform rotation, plus three mounting options: the arms may be secured to a desk with a single- or double-swivel clamp, permanently bolted or screwed to a desk or wall. The Executive and Professional models have a monitor platform that tilts to 25 degrees and a keyboard rack that slides away when not in use. In addition, the Professional keyboard rack contains a tilt-option designed for easy keyboard adjustment.

Check Reader Service number 409.

A PRINTER FOR SMALL BUSINESSES

MOUNT LAUREL, NJ—Okidata (532 Fellowship Rd., Mount Laurel, NJ

08054) announces a new nine-pin printer called the **Microline 172** for small businesses and the home office. The \$289 machine has a 180 character-per-second Draft-mode speed, 144 cps high-speed draft, 120 cps Utility mode and a 30 cps near-letter-quality speed. It weighs 9.9 pounds and has a print-head life of 200 million characters.

Check Reader Service number 410.

NEWS FROM SCIENCE DIGEST

THE LAWN RANGER—Having a tough time getting your teenager to mow the lawn? Then get the Lawn Ranger, a robotic lawnmower. After you've guided the robot Lawn Ranger around the perimeter of the yard with a joystick, creating a border of cut grass, it senses and moves over uncut grass inside the boundary, steering around trees, shrubs and other objects in its path.

SHORT CIRCUIT—Computer scientist Roger Lund has found a microscopic fiber that may be a common cause of electronic bugs. He inspected failing memory chips with a scanning electron microscope, revealing stray pieces of gold-silicon fibers used to weld components. Some of the fibers were big enough to stretch between on/off leads, thus shorting the circuits.

A C-64 IN A WRISTBAND?—Computer chips containing wires so small that 6,000,000 of them could fit in a human hair could result in cabinet-size supercomputers shrunk to the size of laptop models that are 1000 times faster.

SPOTLIGHT ON GAMES

WESTLAKE VILLAGE, CA—Spotlight Software (4165 East Thousand Oaks Blvd., Westlake Village, CA 91362) has announced four new packages for the C-64. Each retails for \$29.95.

In **DeathBringer**, a fantasy role-playing game for the C-64, you'll assume the part of a barbarian hero who must reclaim five magical gems to stop an evil wizard from casting his spell of doom.

When the moon eclipses the sun in the adventure game, **Total Eclipse**, an ancient Egyptian curse will be triggered, causing the moon to explode and a cascade of meteors to plummet towards the Earth. As an archaeological explorer, you'll travel through a giant pyramid to locate and destroy a secret shrine holding the power of the curse.

Faster than soccer, more aggressive than hockey, **Speedball**, an arcade-ac-

tion game, has you drop into an arena of solid steel, where you must try to guide a rapid-fire solid metal ball toward a goal while avoiding lethal blows from the enemy.

In **Dark Side**, an adventure game, you become the mercenary of the future, a one-man army who must save the world from imminent destruction. Armed with lasers, shields and a jet power pack, you'll follow orders to locate and destroy a world-threatening weapons system in a heavily guarded military zone before time runs out.

Check Reader Service number 406.

DON'T LET THE CANDLE DIE!

SAN MATEO, CA—In **The Magic Candle**, a medieval fantasy role-playing game for the C-64, you must save the land of Deruvia from the wrath of the arch-demon, Dreax, who's been imprisoned within the candle's flame for ages. In your mission, you'll encounter many monsters and use special skills, such as sword swinging and casting magic spells. You'll also explore 54 dungeon levels, six towns, six villages and two castles, and speak with the natives of Deruvia in your quest for the lost knowledge needed to stop the candle from burning out. Begin your search for \$39.95. Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404.

Check Reader Service number 407.

SEE-THROUGH KEYBOARD COVER

FORT WALTON BEACH, FL—**Keyskin Plastic Keyboard Covers** are designed to protect your computer keyboard against dust, spills and anything else that could cause damage. The covers are so thin that you can type with them in place. They're available for the Commodore 64, PC-10 and Amiga computers for \$25.95. CompuCover, 2104 Lewis Turner Blvd., Fort Walton Beach, FL 32548.

Check Reader Service number 401.

MIND-BLOWING ROLLING

REDWOOD CITY, CA—Epyx (PO Box 8020, Redwood City, CA 94063) introduces **Mind-Roll**, a C-64 arcade game where players bump, bash, roll and crash through a multi-dimensional puzzle that's set on ten different planes. Each plane is more difficult than the last, and gamers can set them up in any order for play or practice. Using a joystick, players walk a plank, hunt for

hidden amulets, fill a fickle screen with tiled squares or score big by rolling over puzzle squares in a predetermined sequence. The seventh plane features "time boosters" to give gamers extra time to negotiate obstacle courses, roar down a racetrack or blaze through a maze. Available for \$29.95.

Check Reader Service number 412.

WOMEN INVOLVED IN EQUIPMENT DECISIONS

NEW YORK—A *Working Woman* magazine survey of 100 women managers reveals that approximately three-quarters of them worked in businesses that purchased new high-technology office equipment during the past year. Seventy-five percent of the women polled said they played an active role in the purchasing process.

About half of the companies employing the respondents bought personal computers last year. In these companies, 62 percent of the respondents initiated the idea to purchase, 70 percent evaluated various brands and models, and 57 percent made the final purchase decision.

Of the 79 percent who had direct contact with equipment salesmen, 40 percent felt they were being talked down to because they were women.

Forty percent of the women polled said they were interested in science and technology when they were growing up. Half of the respondents had some courses in school and 60 percent received on-the-job training. Seventy-five percent said they did things on their own to help them deal with new equipment, such as reading manuals, taking courses and consulting with others.

One-third of the respondents felt portrayals of women in ads for equipment were generally positive, while 26 percent thought they were negative.

TREASURES FOR THE TAKING

SUNNYVALE, CA—Enter the ancient tomb of the Pharaohs, with over 200 rooms, each filled with treasures. They are yours for the taking if you can make good use of the limited supply of ladders and if you can avoid the deadly grasp of the tomb guard or the mummy in **Pharaoh's Revenge**. A game for the C-64 from Publishing International, 333 West El Camino Real, Suite 222, Sunnyvale, CA 94087. Available for \$29.95.

Check Reader Service number 408. ■

MAIL RUN

Readers respond to Commodore's attitude toward customer service and support.

RUNNING RESPONSES

The suggestion in the RUNning Ruminations editorial about Commodore support and service that Commodore set up Loren Lovhaug in business as a service agency for the C-128 sounds excellent and would certainly have my support.

—WARREN COLEMAN, MD
MONROE, LA

I bought a C-128 and was pleased with it. Unfortunately, most computer stores I stopped in for software and hardware gave me the impression that they didn't want to handle a "toy." I've no place to buy anything for my computer except through ads in *RUN*. And, as for service, nobody wants to talk Commodore.

—JACK W. FISHER
ESTERO, FL

AN UNKINDER, UNGENTLER COMMODORE?

I think you are being too fair to Commodore in stating that their service record is poor because users buy from discount stores instead of supporting those who both sell and service Commodore computers. I buy all my appliances from discount stores, which always include a list of service people in the area. If General Electric can do it, why can't Commodore?

—DOROTHY A. WILSON
NEWBURYPORT, MA

SUPPORTING THE DEALER

If one is to expect service and support from the local Commodore dealers, it's only fair to support the dealer. If it's difficult to justify the expenditure of a few additional dollars for the product, then think of it as a service contract. The return far outweighs the cost.

Also, if dealers are supported by computer users, they will have a larger voice concerning product support and service policies. To complain about a prob-

lem of our own making is like closing the barn door after the animals have escaped.

—TREVOR J. SKIDMORE
MILTON, ONTARIO, CANADA

Commodore should give its dealers 100 percent support so that they will feel confident in handling the manufacturer's equipment and in supporting the customers who buy their machines. I will support a dealer where I can buy equipment and in return get support and good software.

—FRANK W. FIFE
RAPID CITY, SD

GIVE 'EM HELL, LARRY

I'd like to be counted among the disgusted about Commodore service and support. Before 90 days passed, my power supply failed. I took it to an authorized agent and was told that they would fix it "within 90 days" and that there would be a "handling charge" of \$20. This indicates to me the value of Commodore's "warranty." I bet the power supply retails for not much more than the handling charge. It's interesting to note the glowing promises in Commodore's ads and then experience the "to hell with you" attitude after the sale.

—JOHN H. LARRY
ST. ALBANS, VT

I'D RATHER SWITCH THAN FIGHT

None of the stories in "At Your Service?" surprised me. I've fought in Commodore's defense for many years, but I'm coming to the end of my rope. I think I'll stop fighting and join the IBM PC-compatible crowd, and it won't be a Commodore product—I'm looking at products that are backed by service and support.

—DARRYL G. LOWEN
LAS CRUCES, NM

I think that Loren Lovhaug and *RUN* were far too kind in describing the quality of Commodore products. I went

through two C-128s and two 1571 disk drives before my system worked properly. Just the aggravation of getting a C-128 repaired is enough to make a grown man cry. Several of my friends have switched to IBM-PCs or clones. I intend to do the same soon.

Also, I believe interest in Commodore's products may be eroding faster than you think. In this area, book stores no longer sell Commodore books and manuals, and Commodore-specific magazines are no longer being sold in some stores that used to carry them.

—CHARLES G. NELSON
BALTIMORE, MD

FINDING RELIABLE SERVICE

To avoid the problems users experience with authorized Commodore service centers, they should change centers until they find a satisfactory one. While this may not be practical for some people, I'm sure many users could benefit from it.

The following advice should also be helpful. Ask if they do repairs on the premises; know what you're talking about when you talk Commodore computers; try to meet and speak with the actual servicer; and remember, greased wheels move faster.

—KEITH SILLS
REGO PARK, NY

Readers: For a current list of authorized service centers in your area, contact Commodore's customer support number, 215-436-4200, in West Chester, PA.

—EDITORS

A CALL TO READERS

This page is your stage, so stand up and say a few words. Extend praise, air grievances or offer hands-on advice and information.

Send your letters to Mail RUN, 80 Elm St., Peterborough, NH 03458. Each letter must include the writer's name and complete address. RUN reserves the right to edit letters for style, clarity and space. ■

IT'S HERE!

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RUN's READER CHOICE CONTEST

YOU COULD WIN ALL OF THE SOFTWARE LISTED ON THIS PAGE

WELCOME TO RUN'S SECOND ANNUAL READER CHOICE CONTEST. This is an opportunity for you—the reader—to vote for your favorite entertainment software developed over this past year. You must choose from among almost 200 entries.

The rules for this contest are simple. You select your five favorite games from the ballot listed below. Tear out the entire ballot and send it in. That's all there is to it! Be sure to include your name and address to be eligible for our drawing. We will select one lucky *RUN* reader as the winner of a fabulous grand prize—all of the game software listed on the ballot!

To enter, simply choose your five top games from the list below and send in your selections before August 10, 1989. There will be ten prize winners in all. The winners, as well as the results of the voting, will be published in the December 1989 issue of *RUN*.

RULES: ► Only one ballot per person and only five selections per ballot. ► Anyone of any age may enter, but prizes won by a minor must be claimed by parent or legal guardian. ► Drawing will be held September 8, 1989. ► First prize: All the software listed on the ballot, subject to availability. ► Second prize: A library of *ReRUN* disks. ► Third prize: A collection of *RUN* productivity software. ► Fourth through tenth prizes: Subscriptions to *RUN*, *ReRUN* or *RUN*'s special disks. ► *RUN* employees and their families are not eligible.

Software titles are listed below according to the distributor, not necessarily the manufacturer.

ACCESS SOFTWARE

- 5-1 Heavy Metal
- ACCOLADE**
 - 6-1 Jack Nicklaus' Greatest 18 Holes
 - 2 Grand Prix Circuit
 - 3 TKO
 - 4 Rack 'Em
 - 5 Serve & Volley
 - 6 Steel Thunder
 - 7 Fast Break
 - 7-1 Jet Boys
 - 2 Bubble Ghost
 - 3 Card Sharks
 - 4 Power at Sea
 - 5 The Train: Escape to Normandy
 - 6 Plasmatrix

BLUE LION SOFTWARE

- 8-1 Ticket to Hollywood
- 2 Ticket to Washington, D.C.

BRODERBUND

- 9-1 Star Wars
- 2 Arcade Game Construction Kit
- 3 Carmen Sandiego—Europe
- 4 Ultima V
- 5 Times of Lore
- 6 Tangled Tales

BUENA VISTA SOFTWARE

- 10-1 Who Framed Roger Rabbit?

CALIFORNIA DREAMS

- 11-1 Vegas Craps
- 2 Vegas Gambler
- 3 Club Backgammon
- 4 TrianGO
- 5 Mancala

CINEMAWARE

- 12-1 The Three Stooges
- 2 Rocket Ranger
- 3 Sinbad: Throne of the Falcon

COSMI

- 13-1 Triple Crown Challenge
- 2 The President is Missing
- 3 Chernobyl
- 4 NavCom 6
- 5 Grand Slam Baseball
- 6 Navy Seal
- 7 Chomp!

DATAEAST

- 14-1 Ikari Warriors
- 2 Victory Road
- 3 Platoon
- 4 Speed Buggy
- 5 Q*bert
- 6 TNK III
- 7 Kid Niki
- 8 RoboCop
- 9 Karnov

DIGITEK

- 15-1 Vampire's Empire
- 2 Western Games
- 3 Miniature Golf

DISCOVERY SOFTWARE

- 16-1 Zoom!

ELECTRONIC ARTS

- 17-1 Lancelot
- 2 Time and Magik
- 3 Firezone
- 4 Annals of Rome
- 5 Borodino 1812
- 6 BattleDroidz
- 7 Global Commander
- 8 The Rubicon Alliance
- 9 The Hunt for Red October
- 0 Cosmic Relief
- x Tobruk
- y Alternate Reality: The City
- 18-1 Double Dragon
- 2 Rockford
- 3 Roadwars
- 4 Battles of the Civil War: Vol. I
- 5 Battles of the Civil War: Vol. II
- 6 Rommel Battles for North Africa
- 7 MacArthur's War
- 8 Pool of Radiance
- 19-1 First Over Germany
- 2 Typhoon of Steel
- 3 Battles of Napoleon
- 4 Questron II
- 5 Overrun
- 6 Hillsfar
- 7 Demon's Winter
- 20-1 Powerplay Hockey: USA vs. USSR
- 2 Jordan vs. Bird: One on One
- 3 Deathlord
- 4 Caveman Ugh-Lympics
- 5 Modem Wars
- 6 Mars Saga
- 7 Bard's Tale III
- 8 Project Firestart
- 9 Patton vs. Rommel
- 0 Wasteland

EPYX

- 21-1 Mind-Roll
- 2 Technocop
- 3 The Legend of Blacksilver
- 4 Street Sports Football
- 5 Dive Bomber
- 6 L.A. Crackdown
- 7 Battleship
- 8 Space Station Oblivion
- 9 The Games—Winter Edition
- 22-1 The Games—Summer Edition
- 2 Tower Toppler
- 3 Metrocross
- 4 Sports-a-Roni
- 5 Final Assault
- 6 Street Sports Soccer
- 7 4x4 Off-Road Racing
- 8 Impossible Mission II
- 9 Sporting News Baseball

FIRST ROW SOFTWARE

- 23-1 Star Empire
- 2 The Honeymooners

GAMETEK

- 24-1 Double Dare
- 2 Hollywood Squares

HI-TECH EXPRESSIONS

- 25-1 Matterhorn Screamer
- 2 Chase on Tom Sawyer's Island
- 3 Win, Lose or Draw

INTRACORP

- 26-1 Ultimate Casino Gambling
- 2 Murder on the Atlantic

KONAMI

- 27-1 Boot Camp
- 2 Rush 'N Attack
- 3 Contra

MASTERTRONIC

- 28-1 Monopoly
- 2 Scrabble
- 3 Risk
- 4 John Elway's Quarterback
- 5 Barbarian
- 6 Skate Crazy
- 7 Raw Recruit
- 8 CA Pro Golf

MEDIAGENIC

- 29-1 F-18 Hornet
- 2 Zak McKracken
- 3 Neuronomancer
- 4 Faery Tale Adventure
- 5 MainFrame
- 6 Black Jack Academy
- 7 Corruption
- 8 Enlightenment
- 9 Jinxster
- 30-1 BattleTech
- 2 F-14 Tomcat
- 3 Chop & Drop
- 4 Take Down
- 5 USS Ocean Ranger
- 6 Rampage
- 7 Predator
- 8 Star Rank Boxing II
- 9 Last Ninja 2

MICROPROSE

- 31-1 Keith Van Eron's Pro Soccer
- 2 Pure-Stat Football
- 3 Red Storm Rising
- 4 Master Ninja

MINDSCAPE

- 32-1 Aussie Joker Poker
- 2 Out Run
- 3 Alien Syndrome
- 4 Space Harrier

THUNDER BLADE

- 6 International Team Sports
- 7 720°
- 8 Willow
- 9 Uninvited
- 0 Winter Challenge
- x Captain Blood

Road Runner

- 2 Indiana Jones
- 3 Clubhouse Sports
- 4 Harrier Combat Simulator
- 5 Blockbuster
- 6 MISL Soccer
- 7 Combat Course
- 8 Road Raider
- 9 Action Fighter

SCORPION

- 34-1 Alien Destruction Set
- 2 The Mandroid Files
- 3 Purple Heart

SHAREDATA

- 35-1 Classic Concentration
- 2 Card Sharks

SIR-TECH SOFTWARE

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SOFTWARE GALLERY

Mix arcade action with a little mystery, add sports to a few unique programs, and you've got this month's reviews!

Compiled by BETH S. JALA

HOMETOWN, U.S.A. A+

*Let Creativity Abound
In Your Own Hometown*

I love software that does something different. I never imagined that I'd review a Commodore program that brings to life the charm and beauty of Norman Rockwell's small-town America. The final product from Hometown, U.S.A. is a group of customized buildings, sized to HO scale to fit in well with model trains and cars.

Basically, this is a graphics editor program applied to a specific application. If you had the artistic ability and patience, you could create similar items with almost any good graphics editor. Most of us, however, are not blessed with those gifts and therefore welcome all the help we can get.

Hometown U.S.A. can work with either one or two disk drives. You can use a joystick, but I found it just as easy to operate from the keyboard. A good variety of printers are supported, and I had no trouble using my Okidata 180, either in Commodore Emulation mode, or as an Epson-compatible with a Xetec Super Graphix interface.

You start with a selection of more than a dozen basic building designs, including several types of stores, a church, gas station, railroad station and houses. A few additional files provide signs and other small touches.

The very first thing I noticed about Hometown, U.S.A. is that it loads quickly, even from a 1541 drive. The screen directions, especially when supplemented by the two books that are included with the program, are concise and easy to understand. Before you know it, you're actually designing your first model.

The display is monochrome; no color is used throughout. Since the printout is intended to be black and white, you're not lured into seeing something on-screen that your printer can't produce.

The program's editor lets you load two separate screens into memory at



Here's an example of Hometown, U.S.A.'s store fronts, with signs "pasted in."

the same time, which makes it quite easy to cut and paste items from one screen to another. You can also add text, use the Fill command to change the appearance of the model's surface, or select a graphics editor to perform pixel-

level drawing. The Erase, Wipe and Undo commands let you correct mistakes or change your mind.

When done, you save your enhanced building designs to disk to work on them later or to exchange them with your friends who also have the program. You'll probably want to print them in order to actually construct the model.

Printing is the only area where I found something unexpected. The printouts take only about half of a sheet of paper. Normally, I would expect the printing to be completed by sending a form feed command to the printer, but Hometown, U.S.A. doesn't do that. I thought at first that it might be an oversight, but I've since decided that it was probably done to conserve paper. Either way, it's a minor point.

The small buildings can probably be constructed directly from the computer printout if you use heavyweight paper. For longer-lasting models, the authors suggest that you carefully glue the printout to thin cardboard before beginning construction. You can then color or paint the models.

It's been a long time since I've seen software that offered something fun and unique, while meeting all my basic ►

REPORT CARD

A Superb!

An exceptional program that outshines all others.

B Good.

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

C Average.

Lives up to its billing. No major hassles or disappointments here.

D Poor.

This program has some problems. There are better on the market.

E Failure.

Many problems; should be deep-sixed!

SOFTWARE GALLERY

criteria for a good program. Home-town, U.S.A. is well designed, easy to use and delivers its promises. I think you'll enjoy it. I give it my highest recommendation. (*Publishing International, 333 West El Camino Real, Suite 222, Sunnyvale, CA 94087. C-64/\$39.95.*)

—JIM GRUBBS
SPRINGFIELD, IL

OPERATION WOLF A-

Strike Hard and Strike Fast For Non-Stop Jungle Action

Taito's ads proudly proclaim that the coin-operated edition of Operation Wolf is "The World's #1 Arcade Game!" After playing the new C-64 version, many fast-action enthusiasts may agree that it deserves the same title in the home computer market.

The program challenges you with six missions. They range from destroying communications equipment in an enemy base camp to rescuing hostages at an airport.

In each scenario, you begin with a limited number of bullets and grenades. Power-up symbols randomly appear, and shooting them replenishes your supplies, renews your strength and furnishes dynamite and high-speed automatic fire.

Battling you every inch of the way are all sorts of nasties who must be eliminated before each level is completed. Most numerous are the ground troops who pop into view and blast away with small arms. Far more dangerous, however, are the helicopters, gunboats and armored cars that target you with more powerful weapons. There's only one way to deal with all these foes: Center them in your on-screen cross hairs and shoot them before they get you. Otherwise, the wounds they inflict will drain away your vitality and end the game.

The coin-operated Operation Wolf has a replica of a machine pistol as its control. In the C-64 version, either a joystick or a 1351 mouse takes its place. The joystick does everything except toss grenades, which are launched by pressing the space bar. Although this arrangement provides just enough control to let most players survive temporarily, the greater precision that a mouse offers makes it much more effective.

Operation Wolf has terrific graphics and sound, and even better animation. In fact, the on-screen gyrations of certain enemy soldiers are so fascinating that they often divert your attention from more dangerous foes.

These excellent sensory elements are major contributors to the game's atmosphere of feverish frenzy. Serious play inevitably results in sweaty palms and a quickened pulse. Although having to select the proper weapon for each situation does provide some strategic richness, this is basically a thrill-a-minute game, which might even be too intense and difficult for some novice players.

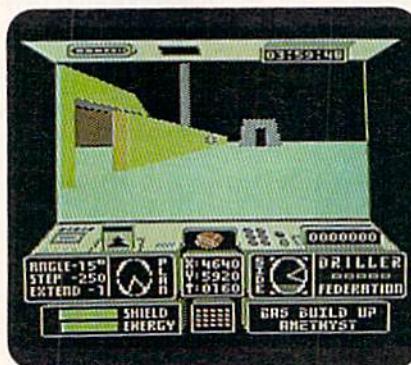
However, it's just this kind of desperate struggle that long-time arcade warriors lust after. As a result, many battle-tested veterans of electronic campaigns will put Operation Wolf high on their lists of must-buy games. (*Taito Software, Inc., 267 West Esplanade, North Vancouver, British Columbia, Canada V7M 1A5. C-64/\$29.95.*)

—WALT LATOCHA
OAK PARK, IL

SPACE STATION OBLIVION B+

Space is the Place For a Gaseous Adventure

Space Station Oblivion can best be categorized as a three-dimensional graphic adventure. You are in Amethyst, one of 18 square sectors that, when joined together, form the poly-



Can you save the planet Mitral from a devastating explosion and certain destruction in Space Station Oblivion?

hedral planet of Mitral. Each of the other sections is also named for a precious gem or mineral: Diamond, Ruby, Emerald, and so on.

Your mission is to locate a specific drilling point within each sector and release the dangerous gas build-up below the surface. Unfortunately, you have only four Mitral hours to do so. And although Mitral is uninhabited, several dangerous security devices remain active. Some can be avoided but others must be deactivated.

Exploring is accomplished through an excavation probe equipped with a dual-action laser system. In addition, if you can find the reconnaissance jet, you'll be able to fly over Mitral and get an overview of your surroundings. Both the probe and the jet are powered by energy from Rubicon crystals.

The most impressive thing about Space Station Oblivion is the realistic way the perspective of your surroundings changes as you move around the planet. Walls, buildings and other solid structures appear exactly as you would expect them to from any viewing angle. However, because of the fraction of a second it takes the C-64 to calculate and re-draw views, the animation does not scroll smoothly. Nevertheless, the ability to roam freely over Mitral's surface makes this 3-D adventure world seem very realistic, especially when compared to graphic adventures that restrict you to a limited number of pre-drawn views that are stored on disk and called up at different times in the game.

Another feature that helps make up for the blocky animation is the large variety of movement and viewing options. For example, the angle of your turns can be adjusted from five to 90 degrees, or a 180-degree turn can be made with a single keystroke. Similarly, the distance you move with each push of your joystick can be set from one to 250 steps.

Space Station Oblivion has the complexity to keep most explorers busy through several sessions and enough puzzles and variety to keep things interesting. If you feel that you could use some guidance in locating some of the hidden drilling spots or in gaining access to some sectors, you'll find several pages of tips in Epyx's *Masters Collection Advanced Hint Book*. (*Epyx, 600 Galveston Drive, Redwood City, CA 94063. C-64/\$39.95.*)

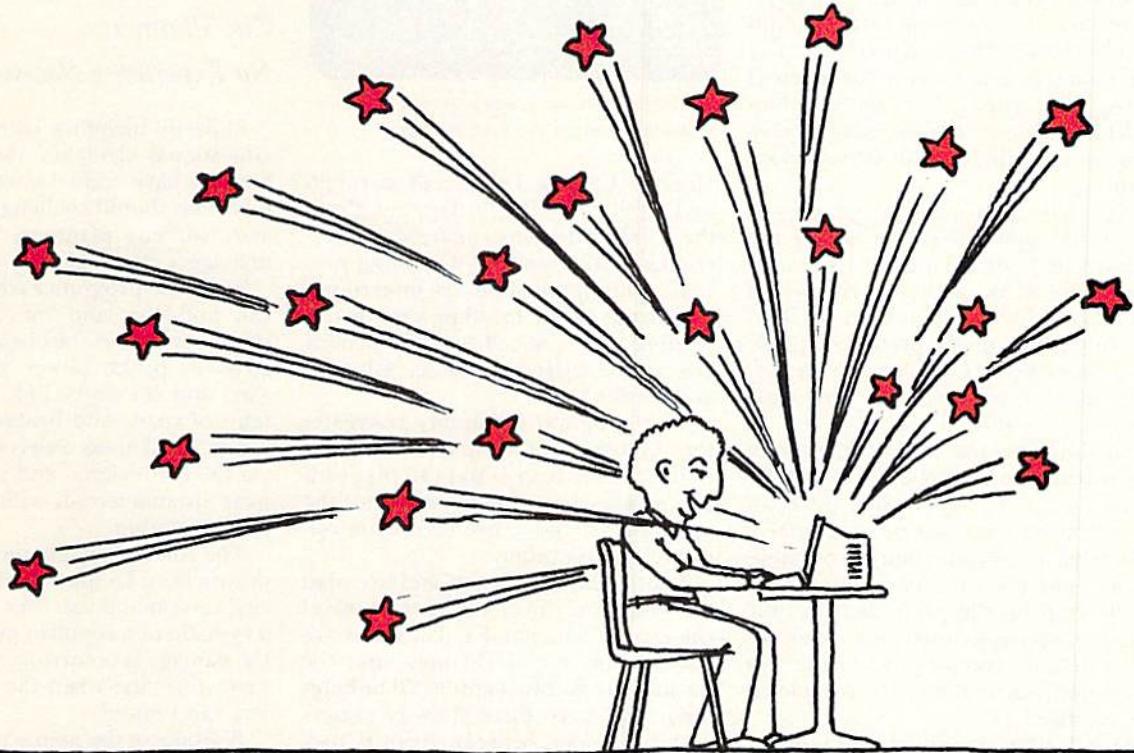
—BOB GUERRA
SOUTH BOSTON, MA

STORYWRITER 128 B

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SOFTWARE GALLERY

the story's conflict and climax.

These are things that most untrained writers never even think about, let alone plan in advance. Yet, even if you have only a vague idea of what your story will be about when you sit down at your computer, you'll be amazed at how easy it is to create a complete outline with just a little coaching from StoryWriter.

StoryWriter's screen features seven windows, one for each category and another for prompts and text entry. You can switch among them at the touch of a key. The cursor keys let you hop quickly about to review what you've written and add, edit or delete before printing.

Now when you boot up your word processor, you'll find the words are primed and ready to flow. I found it useful to work with a printout of StoryWriter's outline next to my keyboard. Others might prefer to simply load StoryWriter's outline file directly into their word processor and build their story around it.

So simple to use that it comes with no instructions, StoryWriter does have a few limitations. One is that the completed outlines are only two levels deep, a fact that limits your ability to organize large amounts of information. Also, word-wrap on the printouts is a little buggy. Outlines printed on a Panasonic KX-P1090 occasionally had one or two truncated words that were completed on another line.

StoryWriter also annoys by refusing to save a revised outline unless given a different name. This is a minor defect, except that after the screen flashes "Disk Error," your outline is cleared from the screen. Don't worry, it's still in memory and can be displayed again by cycling through the categories.

However, these are minor problems with what is clearly an innovative and valuable little program. (Country Road Software, 70284 C.R. 143, Ligonier, IN 46767. C-128/\$12.)

—JOHN PREMACK
LEXINGTON, MA

POWERPLAY HOCKEY: USA vs. USSR B

*Drop Pass, Fakes to the Right,
Skates Down the Middle,
Slap Shot, and He Scores!*

A famous comedian once remarked that he went to the fights and a hockey game broke out. Well, Powerplay



In Powerplay Hockey, you control the center, who always wears the darker jersey.

Hockey: USA vs. USSR isn't as rough and tumble as NHL hockey, but it isn't the Ice Capades either. Excessive body-checking, icing and cross-checking provokes your opponent into a brief round of fisticuffs, while brawling gets the offending player tossed into the penalty box. As the instructions state, "Glasnost and ice don't mix."

This program admirably re-creates the 1980 Winter Olympic matchup between the two teams. You can play with two gamers, go one on one against the computer, or pit a five-man team opposite the computer.

In both the one-on-one and five-man versions, you direct the movement of the center. The game's skill levels are Junior, Minor and Olympic, and the periods can be two, eight or 20 minutes long. You have three lines of skaters and can toggle between them if they start to fatigue. At the end of each period, a stat screen displays the goals and attempts of each player. Depending on the winner at the conclusion of the game, you're transported to either Washington, D.C. or the Kremlin.

Playing the game is very much akin to watching live-action hockey. Players who overskate lose control, slip on the ice, fall on their faces or overshoot their target. Keep in mind that it's not easy to "stop on a dime."

Also, since the action is always around the puck, try to keep one eye on it and the other on your center, because it's possible for him to skate off the screen and miss everything.

Needless to say, this game takes some time to master. The instructions give some tips on how to pass, skate and score, but practice, trial and error are still the best ways to learn. Depending on your joystick, your hand may tire, and the stick will begin to slip. I discovered that wearing a leather (fingerless) driving glove eased the problem.

A nifty item is included with this pack-

age: a poster of a helmeted "Gorby," suitable for framing. (Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/\$24.95.)

—BOB SODARO
FAIRFIELD, CT

SIMCITY B—

*Help Wanted:
City Planner;
No Experience Necessary*

Expertly blending entertaining and educational elements, the creators of SimCity have crafted a series of design tools that should challenge and delight armchair city planners, builders and managers of all ages.

From the program's edit screen, you can bulldoze land for development; construct homes, businesses, factories, airports, parks, power plants, waterways and sea ports; link zones by systems of roads and bridges; and bring power to all areas. Selections are made via the arrow keys, and structures appear instantaneously with a click of the joystick button.

The edit screen also includes tools of destruction. To spice up the life of your city, you can unleash fires, earthquakes, a tornado or a reptilian monster. While the damage is occurring, you can try to save your city; when the crisis is over, you can rebuild.

Features of the map screen include a city overview and various physical and demographic maps. Editing existing terrain, having the computer randomly create new locales, and saving and loading your own creations are also possible.

In the graph screen, you can call up a series of line graphs that help you track the progress or decline of your city over a period of time.

The program rewards those who build cautiously and economically, with the proper ratio of homes to businesses and factories. At first, very little money is available. In time, when taxes start coming in, more costly items, such as airports, can be constructed. As the city grows, pollution and traffic congestion become problems. Only the planner who created a balanced environment can succeed in maintaining a healthy, growing metropolis.

The eight scenarios included on the SimCity disk will give you ideas for your own creations. Also, since each of these cities is designed with a fatal flaw or is facing a disaster, you'll be called upon to save the area. Putting out fires in ►

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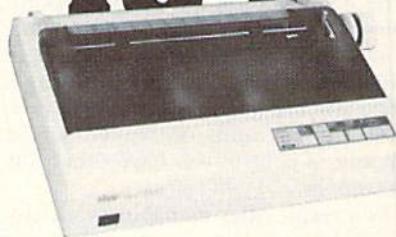
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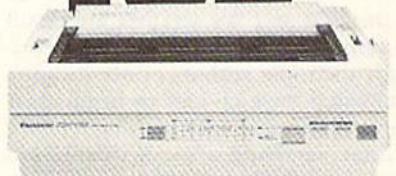
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R3H

SOFTWARE GALLERY

war-torn Hamburg, clearing out tornado damage in 21st century Boston, or rebuilding Tokyo after Godzilla's visit will challenge even the most expert players.

Additional help comes in the form of a 43-page manual, which contains an easy-to-follow tutorial, detailed descriptions of each screen, menu and scenario, a brief history of cities and city planning and a short bibliography.

SimCity is not without its defects, however. The disk catalog sometimes doesn't list your saved cities, both main maps are incorrectly labelled on the game screen, and building costs are unrealistically computed in terms of thousands of dollars.

Most importantly, the 8-bit, C-64 translation is missing a number of features contained on the 16-bit versions. These include the ability to fight crime, to contain nuclear meltdowns, and to construct more types of buildings. Their absence limits the number of variables present and, consequently, the amount of control you have over your metropolis.

As a result, after managing your city for a while, you may find yourself just sitting back and watching. (Maxis Software; distributed by Broderbund Software, Inc., 17 Paul Drive, San Rafael, CA 94903. C-64/\$29.95.)

—LEN POGGIALI
SYRACUSE, NY

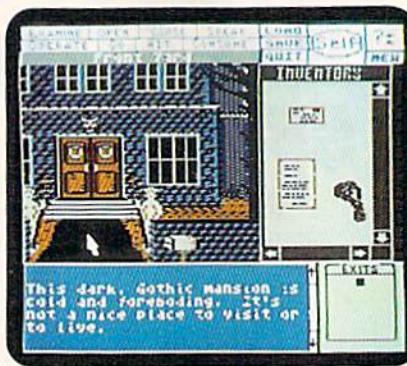
UNINVITED C+

*Do Not Attempt To
Adjust Your Monitor Screen...*

Daylight and fair weather are death to a mystery/horror game. Not surprisingly then, the authors of Mindscape's Uninvited have chosen to begin their narrative on a stormy night.

After surviving a car accident, you arrive at a dark, brooding mansion in search of your missing brother. There is no one to greet you at the front door, but upon entering, something tells you that you're not alone. Perhaps you have a sixth sense; more likely, you've seen too many cheap horror films or played a game similar to this one.

Before you're through with Uninvited, you must visit dozens of locations, examine and pick up many useful items, solve increasingly difficult puzzles, and cope with innumerable disk loads. Easing your task somewhat is a point-and-click interface accessed either by a Commodore-compatible mouse or joystick.



It was a dark and stormy night in Uninvited.

The game screen consists of a number of windows. In the Command window, items can be examined, doors opened, characters spoken to, and so on, by clicking on the command, moving the cursor to the graphic representation in one of the other windows, and clicking again. Many commands can be activated more easily, simply by going to the Graphic, Exit or Inventory window and double-clicking on the object or location itself.

Pointing to the arrows surrounding the Inventory window and holding down the selection button lets you scroll through all of your possessions. Acquiring new objects is accomplished by dragging them from the graphics screen or Object window to the Inventory window.

Up to ten games can be saved on a single disk side, and these can be loaded at most points in the adventure. Getting killed is particularly annoying, so avoid it if possible. The program takes its time announcing your demise, playing a brief dirge and displaying the figure of death or some other ghoulish image.

Another drawback is your character's inability to travel quickly from location to location. Taking your time is fine when first exploring each room. But later on, when you may want to make a quick getaway, a fast transport feature would be most welcome.

Originally released in the mid-1980s for the Macintosh, Uninvited is showing its age. The graphics, although colorful and generally clear, are nowhere near state-of-the-art for the C-64. Even more problematic is the story. Not only is the subject matter old hat, but the treatment is uninspired. The prose style consists of the usual "frozen with horror" clichés, and, despite the occasional appearance of an unworldly creature, there is little to suggest that this deserted house is possessed of anything more than an incredible number of kitchen cabinets.

With a fine user interface and some intriguing puzzles, Uninvited offers a reasonably worthwhile play value for devotees of the graphic adventure genre. (Mindscape, Inc., 3444 Dundee Rd., Northbrook, IL 60062. C-64/\$34.95.)

—LEN POGGIALI
SYRACUSE, NY

BATTLES OF NAPOLEON A

A war strategy game/construction set, this program lets you re-create the battles of the greatest general in France's history. You can play one of the four scenarios provided on the two disks or customize them to your own liking. In addition, you can design your own scenarios or have the computer generate new ones.

In Battles of Napoleon, the computer can take both sides, or you can have one or two human opponents play against the computer. Each turn is divided into 25 phases and represents 30 minutes of battle time. After moving leaders and setting objectives (as in all SSI games, there are dozens of options to choose from), you position your units and pick their targets; the computer determines the outcome of the battles. Units advance, retreat, rout...back and forth until the end.

Battles of Napoleon's construction set has such flexible features that you should be able to re-create almost any historical conflict situation, from stone age to sci-fi. Determining the structure of the forces, creating the armies, designing the map, setting the squares and modifying the tables are the major steps involved in the construction set. If that seems like a bit much, the computer can take over at any step.

Overall, Battles of Napoleon gives you a very detailed, very good game. And you can be the game designer without having to know programming. It's a must-have for every strategy war gamer. (Strategic Simulations, Inc., 1046 N. Rengstorff Ave., Mountain View, CA 94043. C-64/\$49.95.)

—GUY WRIGHT

MIND ROLL B+

At first glance, Mind Roll seems to be one of those software programs that are interesting in concept and design, but somewhat lacking in execution. However, the more you play it, the more engrossed you become, and any flaws are soon forgotten.

You must roll a marble through a

SOFTWARE GALLERY

series of ten mazes of varying degrees of difficulty; not as simple as it sounds! There are no maps of the various mazes. Your only recourse in finding your way around is to explore, explore and explore some more.

Each maze has a goal, or exit point. Upon reaching the goal, you accumulate points and advance to that level's master sequence. For example, in level seven, you must pick up items that are scattered about, find keys to open doors and energizers to score points and boosters to increase the time remaining (all mazes are timed).

One of the good points of this game is that you need not master any one level to move on to the next. Each maze is considered a "level" in name only. They can be played in any order, and repeated as often as desired.

Mind Roll is vaguely reminiscent of Electronic Arts' Marble Madness. While both games start from similar points (spheres rolling through mazes), they go in completely different directions. Fans of EA's product will find hours of

enjoyment with this Epyx version. (Epyx, 600 Galveston Drive, Redwood City, CA 94063. C-64/\$29.95.)

—BOB SODARO

JORDAN VS. BIRD: ONE ON ONE C+

Jordan vs. Bird gives basketball fans the chance to lace on the high-flying sneakers of the Chicago Bulls' guard and the oversized sneakers of the Boston Celtics' great in a half-court game. This latest version of One on One (the original matched Bird against now-retired Philadelphia 76er, Julius Erving) also features a slam-dunk contest and a three-point shootout. Ironically, both Bird and Jordan were injured and couldn't participate in these contests at the most recent NBA all-star game.

Despite these additions, however, Jordan vs. Bird lacks much of the charm of the original One on One. Gone, for instance, is the shattering backboard and the amusing robot who cleaned up

the broken glass while chastising the players for their recklessness. Absent are the slow motion instant replays to let you know when your ball-handling dazzled the computer. I even miss the way the referee pointed an accusatory finger when I fouled a player. Finally, there are no time-outs and no fatigue indicators to let you know when your player is getting tired.

Fortunately, the graphics and sound effects have been improved on the new One on One. The players are roughly twice as big and more detailed than in the original, and the court has been expanded and now scrolls horizontally as players move to the left or right of the screen. Joystick control is slightly more complicated.

However, I think that too many of the game's best features have been sacrificed in the upgrade. If you can still find a copy of the old One on One, grab it. It's a classic that's yet to be beat. (Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/\$29.95.)

—BOB GUERRA ■

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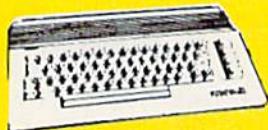
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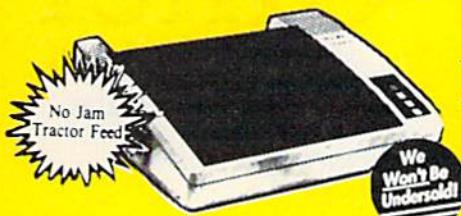
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Sculptor, Lawyer, Editor-in-Chief

RUN's roving reporter has discovered a variety of inventive uses for Commodores, from walking dogs to printing T-shirts.



By LONNIE BROWN

Members of the Commodore community fall into three categories: owners, users and Users. Owners have a computer but seldom turn it on. Regular users, which includes most of us, turn it on but mainly for word processing and playing games. Real Users, on the other hand, squeeze every available byte from memory and press their computer to the limits of its abilities.

Recently, *RUN* asked me to contact some of these Users and find out how they get so much from a Commodore. The answer became clear when I talked to them: They love their machines and know them well. They read Commodore magazines and learn what software and hardware is available; then, once they know what the computer can do, they explore what they can do with it.

Case in point: Clayton "Slim" Johnson is a retired aerospace worker who lives in the small central Florida community of Davenport, south of Walt Disney World. His spare bedroom holds a drafting table, for designing houses, and a C-128. "The old C-64 died one day," Johnson related. "Turned out it was the power supply, although I didn't know it at the time. I bought the 128 the same day the 64 gave out."

Johnson doesn't do anything particularly *unusual* with his computer; it's *how many* things he does with it that's amazing. For starters, he uses an A-B switch box on the computer to select between two printers. One stays loaded with checks for paying bills; the other does a variety of regular printing.

Next to one of the printers sits an X-10 Powerhouse—a device, programmed with the computer, that turns remote switching modules in

wall plugs on and off. "You only use the computer to program the main box here. The X-10 also has a battery backup that keeps it going if the power fails, so the house lights don't come on at noon."

When the appropriate appliances are plugged into the modules, the X-10 makes coffee in the morning, starts the lawn sprinklers, turns on the television in the bedroom and turns it off after Johnson falls asleep. "It also turns my Christmas lights on and off," he said.

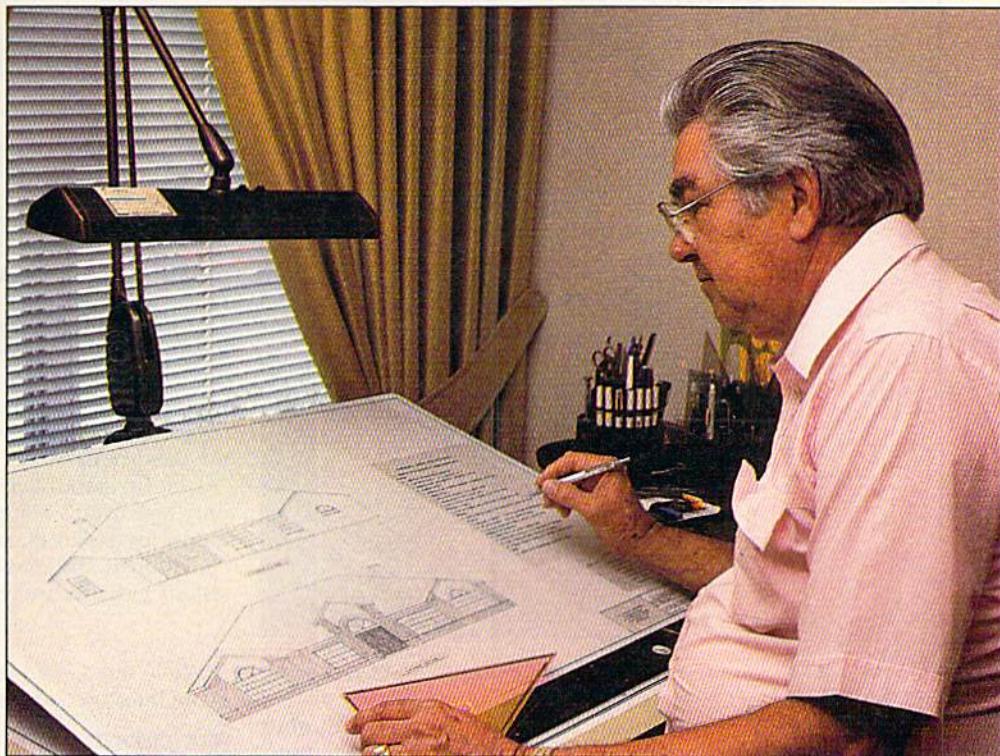
And it walks his dog, Skeeter! A nightlight by Skeeter's bed comes on about 10:15 PM. If the pooch has already hit the hay, it reminds him to take a trip outside for the evening. "I've got everything but my wife programmed with the computer," joked Johnson, "and I'm working on that."

Johnson's word processor comes in handy for creating text to accompany his house plans. He also wrote a simple program that accepts user input to calculate square footage and estimate construction costs.

Like many of us, Johnson turns out banners and cards with his computer. Unlike most of us, he also makes home-video title screens with it, using the Video Title Shop program from Datasoft.

A peripheral that has added greatly to Johnson's enjoyment of his C-128 is The Quick Brown Box, a programmable memory cartridge that fits into the game port of the machine. He stores often-used programs there, to make them available at a few keystrokes. The cartridge provides 64K of memory, with battery backup so the programs in it aren't lost when the computer is turned off. "It's really a helper," he said. "I use the one from my old C-64, but I want to get the C-128 version for this machine."

Clayton "Slim" Johnson, of Davenport, Florida, who uses his C-128 for a variety of household tasks, says "People don't realize how versatile these machines are."



Slim Johnson uses his computer for things he never imagined. Sometimes he thinks about getting a bigger and faster machine, "but there's nothing I want to do that I can't do with the C-128. People don't realize how versatile these machines are."

MASHED TURNIP

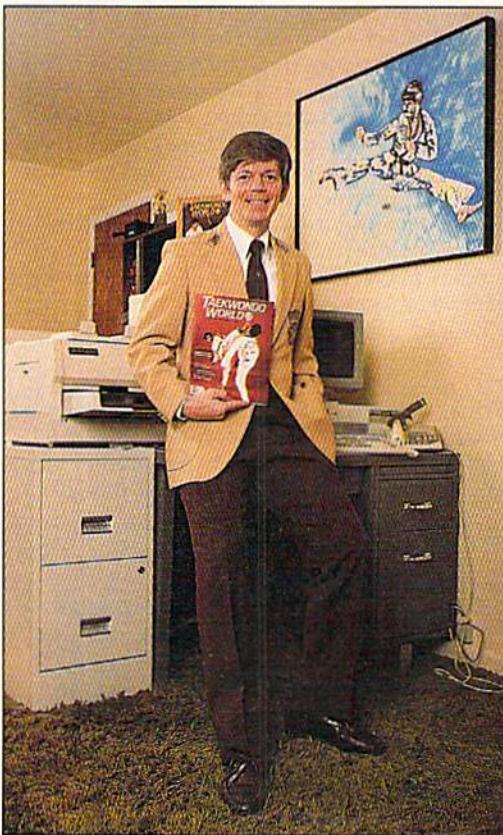
Milo Dailey, editor-in-chief of *Taekwondo World*, used to keep mailing lists for hundreds of subscribers on a C-64. "I was accused of squeezing blood out of a turnip," he related. "That machine was doing things no one thought it could do."

His magazine, a martial arts and fitness publication out of Rapid City, South Dakota, now numbers its subscribers in the tens of thousands and finally outgrew the C-64. However, Dailey quickly pointed out that "the faithful Commodore hasn't been retired yet. My brother-in-law's daughter is using it for school papers."

Dailey looks on the C-64 as an old friend. "I get nostalgic talking about that machine," he said. "The Commodore taught us about computers. Many people are attached to their Commodores, but have you ever heard of anyone getting attached to an IBM clone? If there were an upgrade path from the 64 to an up-to-date professional system, we probably would be using it today instead of the IBM-AT clones."

THE ARTFUL USER

The day I called, Dale Beach was using his Commodore to print cartoons on transfer paper, so they could be ironed onto T-shirts for a school fund-raising project. He's an artist who has discovered he can use a commercial video digitizer

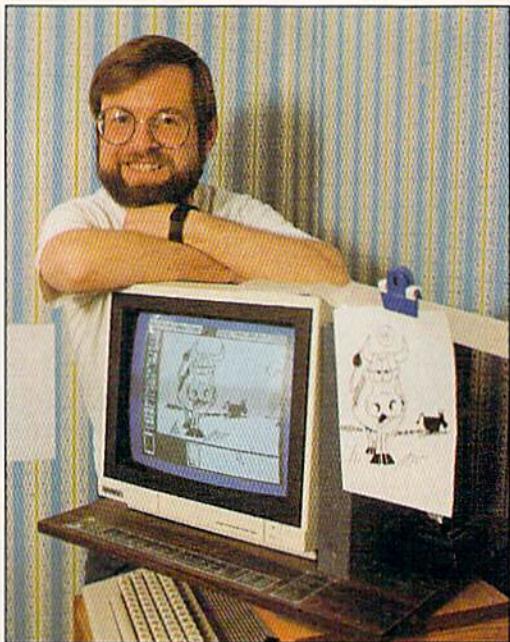


Milo Dailey, editor-in-chief of *Taekwondo World*: "Many people are attached to their Commodores, but have you ever heard of anyone getting attached to an IBM clone?"

to turn his drawings into printer images.

Although Beach has used Commodore computers since the VIC-20 days, he didn't fully ►

Dale Beach of Elwell, Missouri, credits GEOS with letting him realize the potential of his Commodore for artwork.



appreciate their potential until he started using GEOS for artwork. Now, he publishes a disk of original cartoon art for GEOS users. Another project the Commodore/GEOS combination made possible was a professional-looking, 14-page magazine Beach uses to introduce himself and his artwork to prospective clients.

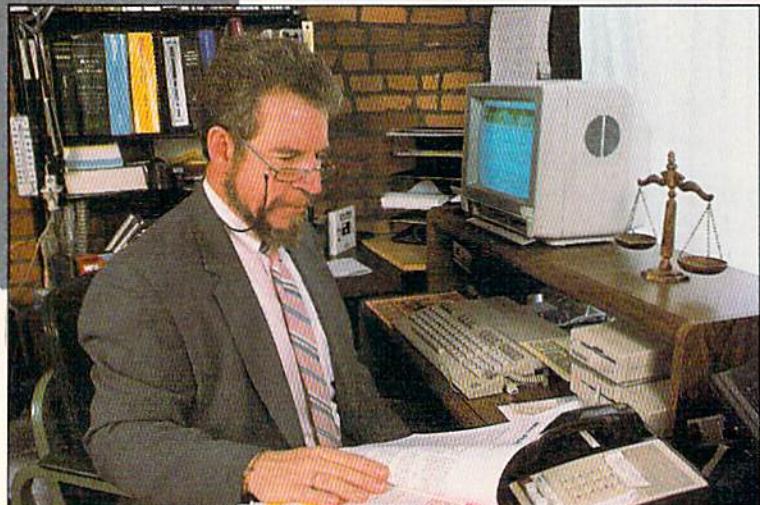
"After I got a page done with geoPublish, I'd transmit it on QuantumLink to a company called LaserDirect to be laser printed. The service was very reasonable, and it never took more than four days—usually two or three—before I had the finished product in my hands."

He used a copy machine to reduce his cartoons to magazine size, then pasted them on the camera-ready pages. Finally, it was off to the printer. Beach said, "I saved a lot of money by not having my booklet typeset in the normal manner."

IT'S LEGAL

While Dale Beach uses his Commodore for a specific application, Ohio attorney Patrick A. T. West takes a shotgun approach to computer use. The C-128 in his law office is his electronic part-

"I have no secretary," says Ohio attorney Patrick West. "With a C-128 and peripherals, I don't need one."



ner, with Paperback Writer 128 serving as a word processor and SwiftCalc 128 as a spreadsheet. Partner 128 generally increases the computer's productivity.

"If I had to do without all extras but one, I would keep Partner 128," stated West. This plug-in cartridge can get you out of a program you're running and pop up an on-screen menu at the press of a button. Then you can perform various tasks, from typing a quick note to printing out mailing labels to checking a calendar, and return to the program.

"I have no secretary," explained West, who has been using Commodore computers in his practice for over eight years. "With a C-128 and peripherals, I don't need one. I write all my own letters, address all my own envelopes and lick my own stamps."

Indeed, stamp-licking seems to be about the only task West's computer doesn't do. It documents his expenses, tracks his billing, prints out court forms and even helps figure property divisions in bankruptcy and divorce cases.

MUSIC TO THEIR EARS

While one C-128 runs a law office in Columbus, Ohio, two others have generated text and



Raymond C. Bryan, shown here with his sculpture, entitled *Aluminum Henge*, put the C-128's graphics and music capabilities to use in a unique art exhibit.

music for a metal-sculpture and computer-art exhibit in Minneapolis, Minnesota. Raymond C. Bryan picked Commodores for his show, not only because of their low price, but, he explained, because "they have good graphics and their mu-

Computers Making Computers

Using C-64-controlled drilling machines to make printed circuit boards.

By JEFF DYER

MANY PEOPLE THINK OF THE C-64 as just a game machine or a home computer, but that's not the case at Dyer Photographic, a printed circuit board manufacturer in Anderson, Indiana. There the C-64 is at the heart of the automated fabrication process.

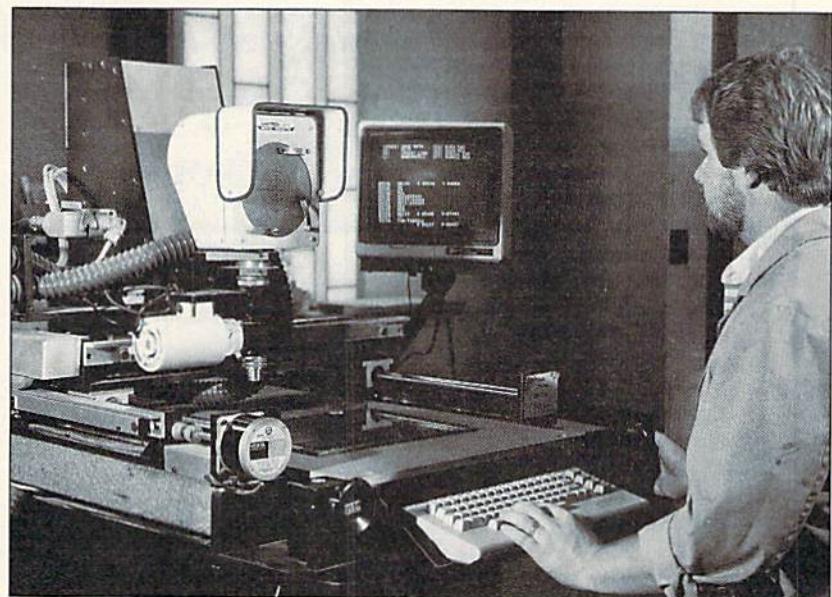
Printed circuit boards, of course, are present in virtually all electronic devices produced in the past 25 years. Computers are prime examples, but they also figure in automobiles, microwave ovens, wrist watches and myriad other devices. Manufacturing the boards is a big business, and automated equipment designed for large-volume production is readily available. However, this type of equipment is inappropriate for prototype and small-volume manufacturers such as Dyer. That's where the C-64 comes in.

A part of the board-manufacturing process that's very well suited to automation is drilling the holes for mounting the electronic components. A board may need from only a few to several thousand holes, and the accuracy and speed of drilling has considerable impact on quality and price.

At Dyer, about 250,000 holes are drilled every day using two Commodore-controlled machines designed and manufactured by Cirtec Systems of Berrien Springs, Michigan. These driller/router machines also rout the board edges.

Before the holes can be drilled, their locations must be entered into the computer, either by hand or automatically. By hand, a Dyer employee places a photo tool (film positive) under a piece of glass, slides it into a ten-power microscope and maneuvers the scope head over the pads where the components will go. When the cross-hairs in the scope intersect at a desired hole location, the employee presses a foot pedal to enter the X and Y coordinates into the C-64. This process is repeated until all the hole locations have been digitized.

In the automatic method, a customer



The C-64 controls the positioning of the hole locations for the drilling process at Dyer Photographic.

supplies the hole locations already digitized by a computer-aided-design (CAD) program. This data can be entered directly into our machines from punched tape or transferred from an IBM-compatible computer either in IBM format or, via modem, in ASCII format. About a third of our customers provide hole locations in one of these ways.

The C-64 program that controls the drilling and routing process is well written and easy to use. All options are menu-selected, and a step-and-repeat feature enables us to enter data for a repeated pattern of holes only once, after which we just offset the location to duplicate the pattern.

The version of the program for each board we manufacture is saved to original and backup disks. Then a file card is made up showing the board's part number, the

disks where its program is stored and other necessary information. Repeat orders are then easy to process.

The Cirtec machines won't drill as many holes per hour as the big machines generally used in the industry, but they cost less and are easy to maintain. The entire machine is made of off-the-shelf and plug-in parts, and we keep spare C-64s on hand in case of computer trouble. Downtime is measured in minutes, not days. In fact, in the four years we've been using the Cirtecs, they've accumulated less than one day of electronic downtime between them. All things considered, they are perfect for our prototype and small-volume operation. ■

Jeff Dyer is President and CEO of Dyer Photographic, Inc., and a part-time instructor in electrical engineering technology.

sic capabilities weren't available on any other computer in the price range."

Viewers were impressed, but musicians were more impressed. "They were amazed at what computers could do with music," said Bryan, "particularly the smaller-memory machines I was using."

Your C-64 or C-128 has lots of potential, too, especially with the programs and peripherals available. Explore all the possibilities—from educational to occupational to recreational—and

don't let the big-boy computers kick sand from Silicon Beach in your Commodore's face.

Editor's note: Can you top this sampling? If you use a C-64 or C-128 in an interesting and unusual way, please write and tell us about it. ■

Lonnie Brown, computer columnist for The Ledger (Lakeland, FL) and frequent contributor to RUN, won the 1988 Software Publisher's Association award for best reporting of computer news.

Label Base

Put some zip into your addressing chores with this remarkable mailing-label generator.

1

By BOB KODADEK

Label Base is an integrated database program for maintaining names, addresses and telephone numbers, with built-in printing routines that let you instantly print both mailing labels, in any quantity, and a personalized telephone directory. Because the program is menu-driven and its files are memory-based, it's fast and easy to move around in, and, since the record format is predefined, you can start inputting your data immediately.

What really sets Label Base apart from many other Basic programs of this type is its use of "pure" sequential files, which means that file data can be exchanged readily between Label Base and some popular programs, such as Superbase. You can even create or edit your files with a word processor that uses sequential files, such as RUN Script.

Best of all, Label Base will run on both a C-64 and a C-128 in either 40- or 80-Column mode with no modifications. In 80 columns, the program automatically takes advantage of the "wider" screen and runs in Fast mode.

CUSTOMIZING THE PROGRAM

Begin by typing in Listing 1 in either 64 or 128 mode, using *RUN*'s Checksum program. Save it to disk before running.

Label Base is self-modifying, so the program can be used for both the C-64 and C-128. By default, it operates in Uppercase mode, but you can use lowercase by merely changing PS=0 in line 40 to read PS=7. This affects both screen and printer output. I believe that labels printed in uppercase have a better appearance and are easier to read; also, it's easier and faster to enter data in this mode. However, since this is a matter of personal preference, I feel it's important to have lowercase available.

- COMMODORE BUSINESS MACHINES
1200 WILSON DRIVE
WEST CHESTER, PA 19380
- BOSTON RED SOX
4 YAWKEY WAY
BOSTON, MA 02115
- TACO BELL PHEASANT LANE MALL
DANIEL WEBSTER HWY
NASHUA, NH 03060
- MAIL RUN
80 ELM STREET
PETERBOROUGH, NH 03458

Label Base is configured to print "one-across" mailing labels of the standard size, which measure $15/16$ of an inch wide by $3\frac{1}{2}$ inches long. If you're using a wider label, you'll need to adjust the amount of vertical space between labels by increasing variable LL in line 40 of the program.

After you've gotten the program working, type in a few sample records, then test for the proper spacing by printing them on a plain sheet of paper and placing the printout next to a strip of your labels for comparison. If the records are too close together, increase LL in line 40 and try again until you achieve the proper positioning of the text. After making this, or any other, change to the program, be sure to save the new version to disk.

USING LABEL BASE

When you run Label Base, it first determines which machine you're using and the number of screen columns available, then appropriately introduces itself as Label Base 64 or Label Base 128 and displays the main menu. If it finds itself in the 80-Column RGB1 mode of a C-128, it automatically switches the 8502 processor to 2 MHz and blanks out the composite video screen.

The main menu is shown in Figure 1. To select one of the functions, press the designated function key. At any point in the program, you may return to this main menu by pressing the return key.

The Load, Save, Directory and Alphabetize functions are self-explanatory. Of course, Load and Save actually mean read and write, since Label Base files are sequential.

Note that when it's writing files, the program adds the prefix .LB to each filename. This limits the maximum number of characters in a name to 13, but enables Label Base to distinguish its files from others on the same disk and display only those files when you ask for a directory. When you're reading or writing a file, don't enter the prefix, since the program does it for you. By entering no filename, you can abort a read or write operation without affecting the current file in memory. The error channel is read and reported after each disk operation. To erase the current file in memory and start a new one, press F1 and enter NEW as the filename.

The Enter Data function lets you add new records to a file directly from the main menu. The blank record, or template, is displayed, complete with field names and designated field lengths, so all you have to do is enter the required data into each field and press the return key. The custom input routine automatically limits the amount of data entered.

To correct an error in the current field, use the delete key. To leave a field blank, just press return and move on. After entering the last field, press the space bar to do another record, or press the return key for the main menu. If necessary, records may be further edited from the Select Records menu described below. ►

RUN it right: C-64 or C-128, in 40- or 80-Column mode; printer

RUN WORKS

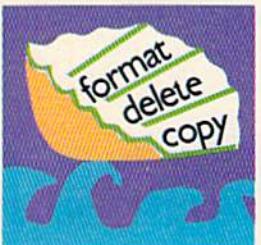
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L A B E L B A S E

While the machine language input routine will accept most characters and punctuation except the quotation mark, it's important not to use commas or colons in your data. If you do, Basic's Input# command will ignore any data after the comma or colon when the file is later read back into memory. While the Get# command will read every byte of data, I found it far too slow for reading large sequential files.

Both the Select Records and Print Menu functions provide submenus to work from.

THE SELECT RECORDS MENU

Whenever you choose Select Records, the current record is displayed on the screen, along with a menu of "quick-key" commands. Control/P instantly prints the current record on as many labels as you indicate; it can be aborted by pressing 0 and return. To find out what the one-letter, quick-key commands do, press ? to go to the Help screen, shown in Figure 2.

The first four one-letter commands instantly locate the First, Next, Previous or Last record in the current file. Key Field Match finds a record by last name, even if you don't remember the correct spelling of the entire name. In most instances, only the first one or two characters will do.

To do a Key Field search, press the K key, and, when prompted for the key field, enter the first portion of the last name and press return. The first record beginning with those characters will appear. Then use the Next Record command to quickly locate the record you want. For this to be effective, the file must be in alphabetical order, so, if nec-

Figure 1. Main menu.

F1 — LOAD FILE
F3 — SAVE FILE
F5 — SELECT RECORDS
F7 — DIRECTORY
F2 — ENTER DATA
F4 — ALPHABETIZE
F6 — PRINT MENU

when using a C-64, you must represent an empty field with an asterisk on the screen, though it'll be stored as a space character. For this reason, I recommend Edit only for making minor changes to a record. Otherwise, use the Replace command to re-enter the entire contents of the record.

THE PRINT MENU

The Print menu lets you print the current record, all the records in your file or a phone directory of all the records. You'll be prompted for the number of labels you wish to print from each record, the default being 1. If, at this point, you decide not to print a label, enter 0 for the quantity and press return.

All the printing routines check for the presence of a printer with device number 4. If this printer isn't found, the command to print will simply be ignored.

The listings in the phone directory printout are formatted like those in a real phone directory and include no city, state or Zip code. The paging feature in this print routine is based on the normal page length of 66 lines.

The number of files you can input using Label Base is unlimited. However, the maximum number of records per file is 250 for the C-64 and 350 for the C-128. This should be more than enough for the average home computer user.

Even if you're used to another program for printing your labels, try Label Base. It can print a small quantity of labels so fast that you can be finished before a larger database, such as Superbase 128, is done loading. □

Bob Kodadek has been a frequent contributor to RUN over the years.

Figure 2. Select Records Help commands.

F — FIRST RECORD
N — NEXT RECORD
P — PREVIOUS RECORD
L — LAST RECORD
K — KEY FIELD MATCH
A — ADD RECORD
D — DELETE RECORD
R — REPLACE RECORD
E — EDIT CURRENT RECORD

essary, return to the main menu and sort the file by pressing the F4 key.

The remaining commands on the Select Records menu let you add new records or delete, replace and edit the current record. When you're editing a record, each field is presented individually. Edit uses Basic's own Input# routine to take data directly from the screen, so all the cursor control keys are functional. However, the Input routine doesn't limit the length of input, so be careful not to enter strings longer than Label Base will allow.

Unlike the C-128's Input# command, the C-64's won't accept an empty string (containing only spaces) from the screen or logical device #1. As a result,

Running Instructions: Type in the program; save it before running.

Listing 1. Label Base program. (Available on ReRUN disk. See page 37.)

```
10 REM LABEL BASE 64/128 :REM*206
20 REM BY BOB KODADEK :REM*162
30 : :REM*88
40 PS=0:LL=3:Q=250:C=40:MO=64:M
L=828:YR=782:PRINT CHR$(142)
:REM*152
50 IF PEEK(40960)=0 THEN MO=128
:ML=4864:POKE828,183:IF PEEK
(215) THEN C=80 :REM*51
60 SP$=CHR$(32):MS=CHR$(44):IF
MO=128 THEN YR=8:Q=350
:REM*240
70 IF C=80 THEN POKE53265,PEEK(
53265) AND 239:POKE 53296,1:
REM FAST MODE :REM*150
80 B$=CHR$(13)+CHR$(18):O$=CHR$(
146):FOR I=0 TO 6:READ FD$(I),L$(I):NEXT
:REM*71
90 FOR I=3 TO C:L$=L$+CHR$(163)
:NEXT:FOR I=0 TO 39:E$=E$+SP$:
NEXT :REM*65
100 FOR I=0 TO 89:READ BY:POKE
ML+I,BY:CK=CK+BY:NEXT:IF PS
THEN PRINT CHR$(14)
:REM*139
110 IF CK<>14598 THEN PRINT"DAT
A ERROR":END :REM*208
120 DIM R$(Q,7),K(Q):FOR I=1 TO
Q:K(I)=I:NEXT :REM*57
130 : :REM*188
140 REM - MENU 1 - :REM*186
150 CLOSE1:CLOSE5:CLOSE15:GOSUB
300:PRINT :REM*134
160 PRINT B$ SPC(5)"F1" O$" - L
OAD FILE" :REM*17
170 PRINT B$ SPC(5)"F3" O$" - S
AVE FILE" :REM*200
180 PRINT B$ SPC(5)"F5" O$" - S
ELECT RECORDS" :REM*30
190 PRINT B$ SPC(5)"F7" O$" - D
IRECTORY " :REM*194
200 PRINT B$ SPC(5)"F2" O$" - E
NTER DATA" :REM*73
210 PRINT B$ SPC(5)"F4" O$" - A
LPHABETIZE" :REM*152
220 PRINT B$ SPC(5)"F6" O$" - P
RINT MENU" :REM*161
230 GOSUB310:KP=ASC(A$)-132:IF
KP<1 OR KP>7 THEN 230
:REM*106
240 ON KP GOSUB430,560,650,1330
,980,880,1590 :REM*0
250 GOTO150 :REM*71
260 : :REM*63
270 X=20:Y=0:GOSUB280:PRINT E$:
RETURN :REM*208►
```

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280 IF MO=64 THEN POKE781,X:POK
E YR,Y:POKE783,0:SYS65520:R
ETURN :REM*232
290 POKE7,X:POKE YR,Y:POKE5,0:S
YS65520:RETURN :REM*172
300 PRINT CHR$(147)" LABEL BASE
" MO"- FILE: "FS$:PRINT SPC
(1) L$:RETURN :REM*252
310 A$="":GET A$:IF A$="" THEN
310 :REM*34
320 RETURN :REM*207
330 F$="":INPUT F$:LE=LEN(F$):R
ETURN :REM*42
340 INPUT#15,EN$,EM$,ET$,ES$:EN
=VAL(EN$):RETURN :REM*168
350 GOSUB270:X=19:Y=0:GOSUB280
:REM*230
360 CLOSE 5:CLOSE 15 :REM*212
370 PRINT B$ "DRIVE STATUS:" O$
+SP$+EN$+M$+EM$+M$+ETS+M$+E
S$ :REM*179
380 PRINT:PRINT"PRESS RETURN"
:REM*182
390 GOSUB310:IFA$<>CHR$(13)THEN
390 :REM*243
400 RETURN :REM*28
410 :REM*213
420 REM - LOAD FILE - :REM*26
430 PRINT:PRINT"LOAD WHICH FILE
";:GOSUB330 :REM*89
440 IF LE<1 THEN RETURN:REM*56
450 IF F$="NEW" THEN NR=0:RN=0:
FS$="":RETURN :REM*197
460 OPEN 15,8,15:OPEN 5,8,5,"LB
.+F$+",S,R" :REM*17
470 GOSUB340:IF EN<>0 THEN 350
:REM*110
480 PRINT:PRINT"READING " F$;:R
N=1 :REM*123
490 FOR I=RN TO Q:FOR N=0 TO 6:
INPUT#5,R$(I,N) :REM*31
500 IF ST=64 THEN 520 :REM*25
510 NEXT N:NEXT I :REM*56
520 NR=I:FOR I=1 TO Q:K(I)=I:NE
XT :REM*51
530 FS$=F$:GOTO350 :REM*39
540 :REM*84
550 REM - SAVE FILE - :REM*196
560 PRINT:PRINT"SAVE TO FILENAM
E"::GOSUB330 :REM*87
570 IF LE<1 THEN RETURN:REM*182
580 OPEN 15,8,15:PRINT#15,"$0:L
B."+F$ :REM*183
590 OPEN 5,8,5,"LB."+F$+",S,W":GOSUB340 :REM*133
600 PRINT:PRINT"WRITING " F$;:I
F EN<>0 THEN350 :REM*230
610 FOR I=1 TO NR:FOR N=0 TO 6:
IF R$(K(I),N)="" THEN R$(K(I),N)=SP$ :REM*255
620 PRINT#5,R$(K(I),N):NEXT N:N
EXT I:GOTO350 :REM*33
630 :REM*178
640 REM - SELECT RECORDS - :REM*149
650 GOSUB1080:GOSUB310 :REM*81
660 IF A$=CHR$(13) THEN RETURN
:REM*180
670 IF A$="F"THEN IF NR THEN RN
=1 :REM*176
680 IF A$="L"THEN RN=NR:REM*195
690 IF A$="R"AND NR THEN GOSUB1
500:GOTO650 :REM*39
700 IF A$="P"AND RN>1 THEN RN=R
N-1 :REM*137
710 IF A$="N"AND RN<NR THEN RN=
RN+1 :REM*185
720 IF A$="K"THEN GOSUB1430
:REM*143
730 IF A$="D"AND NR THEN GOSUB1
260:IFRN>NRTHENRN=RN-1
:REM*170
740 IF A$="A"THEN GOSUB980
:REM*73
750 IF A$="E"AND NR THEN GOSUB1
160 :REM*195
760 IF A$=CHR$(16) THEN GOSUB16
90 :REM*57
770 IF A$="?"THEN GOSUB790
:REM*64
780 CLOSE4:GOTO650 :REM*136
790 GOSUB300:X=5:Y=8:GOSUB280:P
RINT"HELP MENU":PRINT
:REM*71
800 PRINT SPC(8)"F - FIRST RECO
RD":PRINT SPC(8)"N - NEXT R
ECORD" :REM*92
810 PRINT SPC(8)"P - PREVIOUS R
ECORD":PRINT SPC(8)"L - LAS
T RECORD" :REM*247
820 PRINT SPC(8)"K - KEY FIELD
MATCH":PRINT SPC(8)"A - ADD
RECORDS" :REM*160
830 PRINT SPC(8)"D - DELETE REC
ORD":PRINT SPC(8)"R - REPLA
CE RECORD" :REM*165
840 PRINT SPC(8)"E - EDIT CURRE
NT RECORD" :REM*168
850 GOSUB380:RETURN :REM*41
860 :REM*149
870 REM - SORT RECORDS :REM*196
880 Y=NR:PRINT:PRINT"SORTING";
:REM*251
890 Y=INT(Y/2):IFY=0THEN RETURN
:REM*217
900 J=1:K=NR-Y :REM*101
910 I=J :REM*31
920 L=I+Y:PRINT".":IF R$(K(I),
0)<=R$(K(L),0) THEN 940
:REM*52
930 T=K(I):K(I)=K(L):K(L)=T:I=I
-Y:IF I>0 THEN 920 :REM*12
940 J=J+1:IF J>K THEN 890
:REM*238
950 GOTO910 :REM*2
960 :REM*249
970 REM - ENTRY :REM*181
980 T=NR+1:IF T>Q THEN RETURN
:REM*169
990 RN=T:NR=T:FLAG=1:FOR I=0 TO
6:R$(RN,I)=""":NEXT :REM*4
1000 GOSUB1080:FOR I=0 TO 6:X=8
+I:Y=11:GOSUB280:POKE YR,L
%(I) :REM*155
1010 SYS ML:C1=PEEK(YR):IF C1=0
THEN R$(RN,I)=SP$:GOTO103
0 :REM*212
1020 FOR S=1 TO C1:R$(RN,I)=R$(RN,I)+CHR$(PEEK(255+S)):NE
XT S :REM*110
1030 NEXT I:K(RN)=RN:GOSUB270:Y
=6:GOSUB280:PRINT"PRESS SP
ACE BAR FOR ANOTHER"
:REM*144
1040 GOSUB310:IFA$=SP$ THEN 980
:REM*12
1050 FLAG=0:RETURN :REM*102
1060 :REM*90
1070 REM - DISPLAY RECORD -
:REM*119
1080 GOSUB300:X=4:Y=5:GOSUB280:
PRINT"RECORD #RN"OF"NR
:REM*188
1090 X=8:Y=0:GOSUB280:FOR I=0 T
O 6:LD=36-(24-L%(I))
:REM*53
1100 PRINT SPC(8-LEN(FD$(I))) F
D$(I)" < " R$(K(RN),I) TAB(
LD)">:NEXT :REM*20
1110 IF FLAG THEN RETURN
:REM*148
1120 IF FLAG=0 THEN X=18:Y=8:GO
SUB280:PRINT "(PRESS CTRL-
P TO PRINT)" :REM*60
1130 X=20:Y=1:GOSUB280:PRINT"SE
LECT - F, N, P, L, K, A, D
, R, E, ?" :REM*45
1140 RETURN :REM*7
1150 :REM*188
1160 REM - EDIT RECORD(2 SPACES
)- :REM*150
1170 GOSUB300:X=4:Y=5:GOSUB280:
PRINT"RECORD #RN"OF"NR
:REM*22
1180 X=8:Y=0:GOSUB280:FOR I=0 T
O 6 :REM*235
1190 IF R$(K(RN),I)="" OR R$(K(RN),
I)=SP$ THEN R$(K(RN),I)
="*":REM*64
1200 PRINT SPC(8-LEN(FD$(I))) F
D$(I)": " R$(K(RN),I)
:REM*60
1210 PRINT CHR$(145) TAB(10);:O
PEN1,0:INPUT#1,R$(K(RN),I)
:REM*82
1220 IF R$(K(RN),I)="" THEN R$(
K(RN),I)="" :REM*37
1230 PRINT:CLOSE1:NEXT:RETURN
:REM*161
1240 :REM*23
1250 REM - DELETE RECORD -
:REM*194
1260 GOSUB270:Y=5:GOSUB280:PRIN
T"DELETE THIS RECORD? (Y O
R N)" :REM*117
1270 GOSUB310:IF A$<>"Y" THEN R
ETURN :REM*184
1280 FOR N=0 TO 6:R$(K(RN),N)=R
$(NR,N):R$(NR,N)=""":NEXT
:REM*111
1290 FOR I=1 TO NR:IF K(I)=NR TH
EN K(I)=K(NR):K(NR)=0:NR=N
R-1:RETURN :REM*148
1300 NEXT:RETURN :REM*179
1310 :REM*93
1320 REM - READ DIRECTORY
:REM*30

```

L A B E L B A S E

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1330 GOSUB300:PRINT:PRINT
1340 OPEN15,8,15:OPEN1,8,0,"$0:
1350 LB.*":GOSUB340:IFEN<>0THEN
1360 350 :REM*104
1350 N$=CHR$(0):GET#1,A$,A$:
1360 :REM*77
1360 GET#1,A$,A$:IF A$=""THEN 1
1360 400 :REM*96
1370 GET#1,A$,C$:PRINT ASC(A$+N
1370 $)+ASC(C$+N$)*256; :REM*28
1380 GET#1,A$:IF A$=""THEN PRINT
1380 :GOTO1360 :REM*59
1390 PRINTA$;:GOTO1380 :REM*19
1400 GOTO360 :REM*206
1410 : :REM*185
1420 REM - KEY STRING - :REM*160
1430 GOSUB270:Y=6:GOSUB280
1430 :REM*84
1440 PRINT"ENTER KEY - ";INPUTK
1440 $ :REM*152
1450 FOR I=1 TO NR :REM*205
1460 IF K$=LEFT$(R$(K(I),0),LEN
1460 (K$)) THEN RN=I:RETURN
1460 :REM*89
1470 NEXT:RETURN :REM*86
1480 : :REM*4
1490 REM - REPLACE RECORD
1490 :REM*27
1500 GOSUB270:Y=5:GOSUB280:PRIN
1500 T"REPLACE THIS RECORD? (Y
1500 OR N)" :REM*45
1510 GOSUB310:IF A$<>"Y" THEN R
1510 ETURN :REM*73
1520 FOR I=0 TO 6:R$(K(RN),I)="
1520 :"NEXT :REM*85
1530 GOSUB1080:FOR I=0 TO 6:X=8
1530 +I:Y=11:GOSUB280:POKE YR,L
1530 % (I) :REM*119
1540 SYSML:C1=PEEK(YR):IF C1=0
1540 THEN R$(K(RN),I)=SP$:GOTO1
1540 560 :REM*197
1550 FOR S=1 TO C1:R$(K(RN),I)=
1550 R$(K(RN),I)+CHR$(PEEK(255+
1550 S)):NEXT S :REM*152
1560 NEXT I:RETURN :REM*24
1570 : :REM*90
1580 REM - PRINT MENU - :REM*98
1590 GOSUB300:PRINT:PRINT
1590 :REM*156
1600 PRINT B$ SPC(5)"F1" O$" -
1600 PRINT CURRENT RECORD"
1600 :REM*7
1610 PRINT B$ SPC(5)"F3" O$" -
1610 PRINT ALL RECORDS":REM*253
1620 PRINT B$ SPC(5)"F5" O$" -
1620 PRINT PHONE LIST" :REM*49
1630 GOSUB310:IF A$=CHR$(13) TH
1630 EN RETURN :REM*64
1640 KP=ASC(A$)-132:IF KP<1 OR
1640 KP>3(2 SPACES)THEN 1630
1640 :REM*54
1650 ON KP GOSUB1690,1800,1850
1650 :REM*21
1660 CLOSE4:GOTO1590 :REM*151
1670 : :REM*198
1680 REM - PRINT RECORD -
1680 :REM*36
1690 CN=1:OPEN4,4,PS:CLOSE4:SS=
1690 :REM*197 ■

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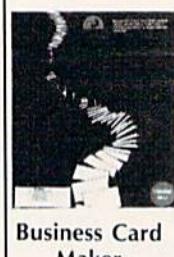
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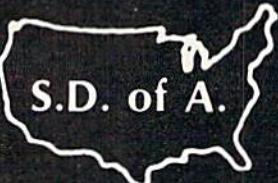
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Journey to the Center Of Your C-128D

*This is the third stop on RUN's continuing tour of
the inside workings of Commodore hardware.*



By ELLEN RULE

Welcome again to *RUN* magazine's Commodore tour bus! This month's excursion will feature yet another of Commodore's computers, the C-128D. There will be some familiar sights for those of you who rode along on the disk drive expedition last April and the C-64/128 tour in December of 1988, but veteran sightseers and newcomers alike will get a scenic view of the 128D's new IC architecture and design.

Most people are leery about opening their computers, and for good reason. Aside from voiding any existing warranty, handling computer components can cause damage from factors such as static electricity. Avoid the risk by hopping aboard our bus; departure time has arrived!

WHAT MEETS THE EYE

The C-128D is a combination of a C-128 computer and a 1571 disk drive, but with some modifications and upgrades. Like the C-128, the 128D provides 128K of user-accessible memory (which can be increased to 640K with Commodore's 1750 RAM expander), 16 colors and 40- or 80-column composite/RGB output.

The 128D operates in the same three modes as the 128: 64 mode (reached by holding down the Commodore key while booting), native 128 mode and CP/M mode (accessed by turning on the computer with the CP/M boot disk in the drive). In other respects, also, the 128D is much like the 128 and the 1571 drive. Since our prior tours explored those units, our focus on this tour will be on the unique features of the 128D.

The first thing you notice about this machine is that its form differs from the C-128. A detachable keyboard allows freedom of movement, so you can even compute from the comfort of your recliner! If you prefer a desk, the feet at the back of the keyboard can be raised

to adjust the keyboard's angle. Despite its new design, the function and layout of the keyboard are identical to those of the C-128.

The broad rectangular case of the 128D houses the computer and disk drive components, including the heretofore separate power supply. With this new design, there's less clutter and tangle of wires on the desktop than with earlier Commodore computers. However, there is a catch: servicing one component puts the whole system in the shop. There's none of the swapping for a "loaner" power supply or disk drive that's possible with a more modular system.

Scouting around the outside of the 128D's housing, we find many familiar ports and sockets. At the rear left is the on/off switch and the power cord connection. Stretching along the back are the familiar user port (for RS-232C interfacing), the RGB connector (for 80-column display), the RF (TV) plug and the TV channel-selection switch. Next come the 8-pin video socket (for 40-column display) and the 6-pin serial port, which allows the coupling of external disk drives and a printer with the computer. At the back right is the expansion port, where cartridges and memory boards such as the 1750 RAM and the Brown Box may be affixed.

Around the corner, on the right side of the case, are the computer and disk drive reset buttons. The drive reset button may be a new feature to you, since it appeared before only on Commodore's SX-64. Pressing this switch has the same effect as turning the disk drive power off and on, with no interruption to the computer power supply. Next in line are the joystick ports (for joystick or mouse) and the 25-pin, D-shaped keyboard connector.

Finally, we come to the cassette port, originally intended for attaching the 1530 Datasette, but now used more frequently for dongles (software protec-

tion devices) and printer interfaces (to access the port's 5 volts dc). Because the 128D's case is metal, many users find it necessary to wrap the bare edges of the cassette port opening with nonconductive material, such as electrical tape, to prevent short-circuiting of the computer's ICs by exposed solder joints on components that are plugged in.

THE MAP OF THE CITY

Lifting the lid of the C-128D, we see the disk drive hardware at the right front and the built-in power supply at the back left. These aren't much different from the corresponding parts of the C-128 and 1571, so we won't linger with them. When these components are removed, the computer's motherboard lies before us, its resistors, capacitors, diodes and over 60 integrated circuits resembling a small metropolis. Communication and movement of data takes place along the copper lines of the address, data and control buses.

This city is dominated by the computer circuitry, which occupies the southwest, northwest and northeast corners of the motherboard (looking down on it as you would at a north-oriented map). The disk drive circuitry, a subcity in the southeast, is isolated by a barrier formed of the disk drive's power and data source components (cable connectors, a square, black ac-to-dc rectifier and a blue, barrel-shaped capacitor).

Running parallel to this partition on the west are the 8721 programmable logic array (PLA) and the 8722 memory management unit (MMU). As you may recall from the tour of the C-128, these ICs police the memory resources of the computer and monitor IC selection for operations in the 64, 128 and CP/M modes—complex tasks, indeed!

To the west of the PLA are the central processing plants of the C-128D. First we reach the Z-80, the secondary processor, which makes CP/M operation ▶

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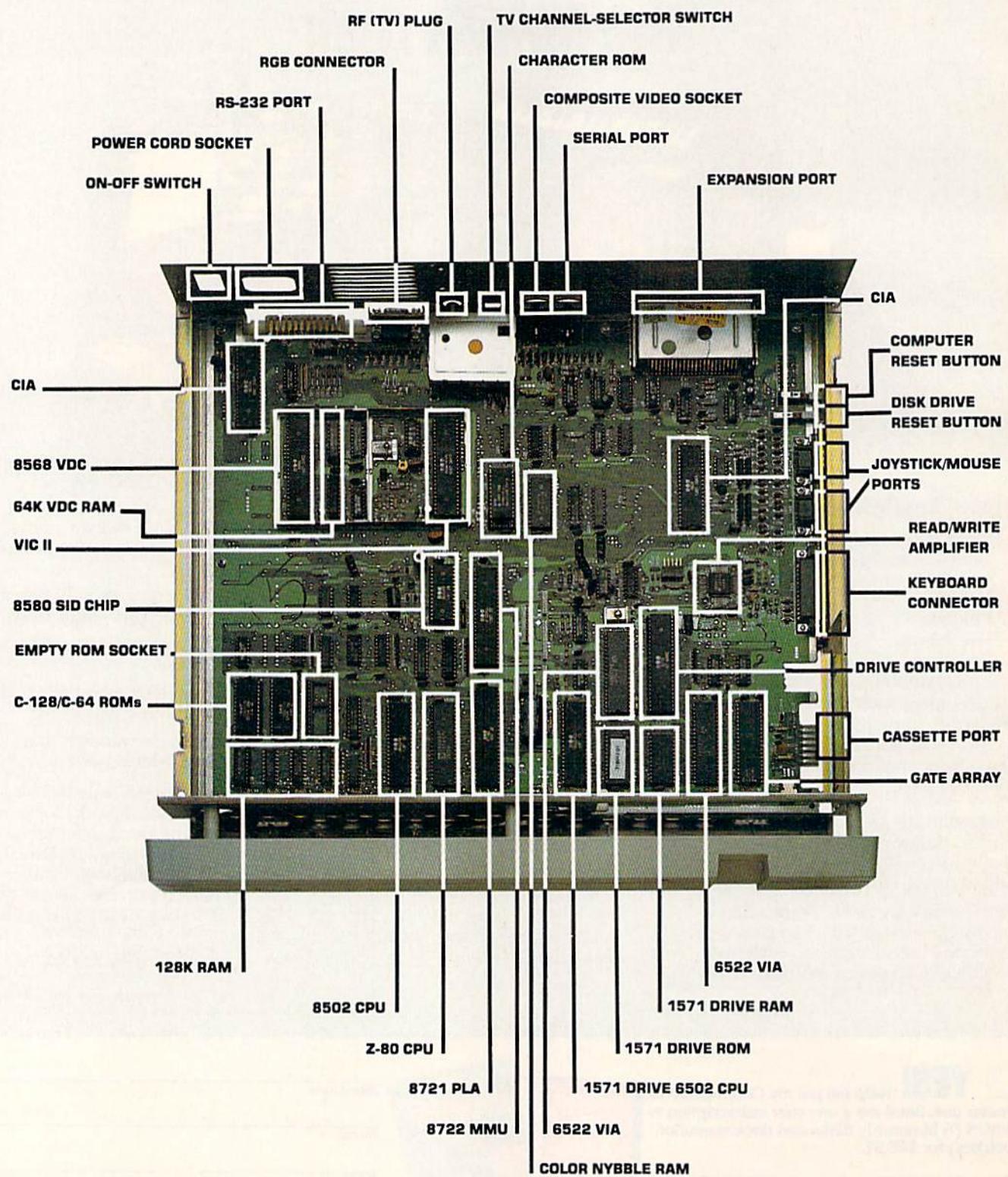


Figure 1. The locations of the principal elements on the C-128D's motherboard.

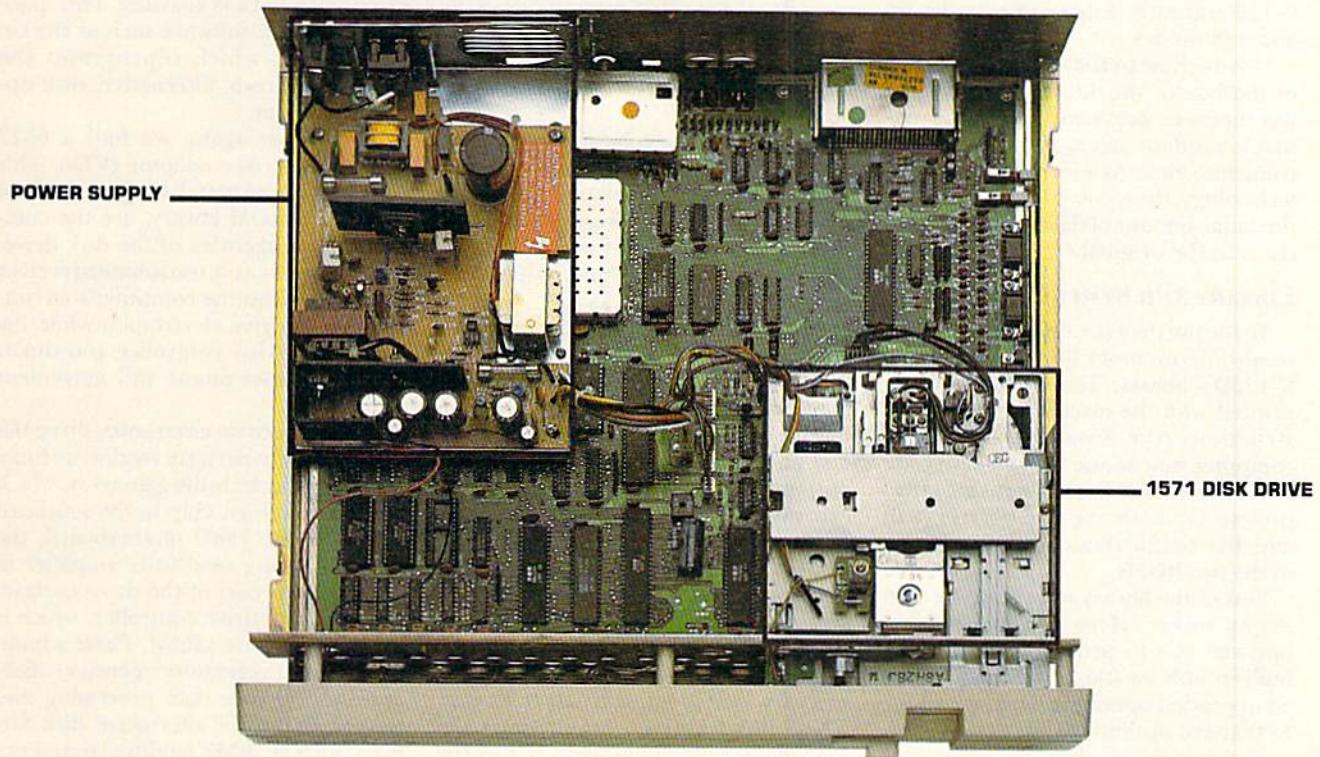


Figure 2. The motherboard with power-supply and disk-drive assemblies in place.

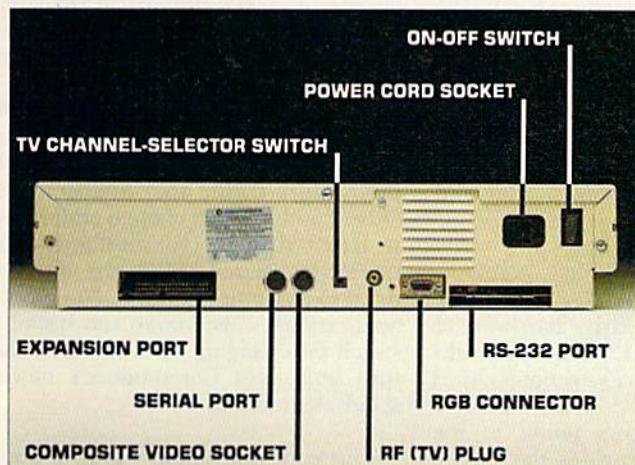


Figure 3. The interface connections on the back of the C-128D.

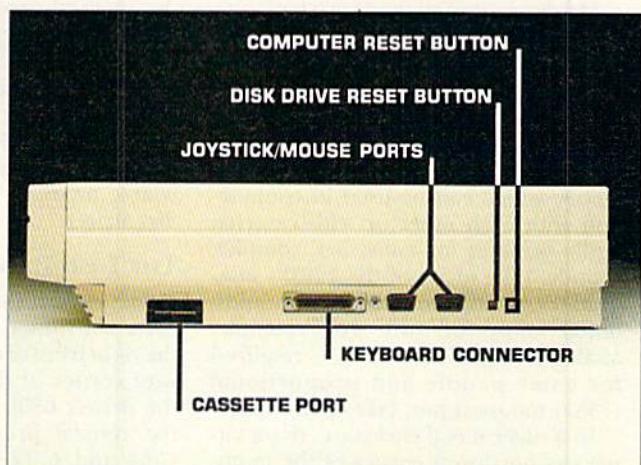


Figure 4. A view of the right-hand side of the C-128D computer.

possible. Still further to the west lies the 8502 central processing unit (CPU), the brain of both the C-128 and C-128D. Compatible with the earlier CPU of the C-64, the 8502 can interpret C-64 and C-128 software instructions in the 64 and 128 modes.

Moving now to the southwest corner of the board, the 128D's four storage warehouses, providing 128K of dynamic random access memory (RAM), come into view. As a result of enhanced technology, these compact ICs can store the same amount of data as the 16 RAM chips in the original C-128!

LIBRARY AND SYMPHONY HALL

To the north of the RAMs are two new read-only-memory (ROM) ICs—the C-128D's library. These chips are imprinted with the machine language instructions (the Kernel) that tell the computer how to use the software code it receives. The Basic language interpreters for both the C-64 (Basic 2.0) and the C-128 (Basic 7.0) also reside in the two ROMs.

East of the library is a vacant lot—an empty socket. Here you can plug in optional ICs to provide, for instance, built-in utilities (the 128 Super IC) or an upgraded operating language (Basic 8) that are instantly available for use.

A third ROM chip, the character ROM, stores information for the screen characters. It lies to the north of the MMU, where it's accessed by the 128D's video components and the CPUs.

Just east of the character ROM lies the color nibble RAM, where screen color is stored.

Moving to the northeast, we pass over a number of the small ICs concerned with moving data around in orderly fashion. Then, west of the MMU, we stop at the 8580 SID chip, the symphony orchestra of the 128D. As with the 6581 SID, the 8580 produces three voices, which can be used in conjunction with each other or with external audio sources to construct complex sounds. Like many of the 128D's integrated circuits, the 8580 has an additional chore or two. For example, analog-to-digital conversion, required for game paddle and proportional (1351) mouse input, takes place here.

In a silver metal enclosure, dominating the northwest corner of the motherboard, is the 128D's video production studio. Housed here are the 40- and 80-column video controllers and their helper ICs.

The 8564 VIC II, located on the east side of the video compound, is the same video IC found in the original C-128.

Like the earlier 6567 VIC, it provides the computer's 40-column color capabilities, including the hi-res bit-mapped graphics and the sprite action that make Commodore computers so much fun to use. VIC II has other responsibilities, as well, such as generating certain 128-mode timing signals and electronically providing support for the 128D's extended keyboard.

Within the same enclosure is a quartz crystal, the Big Ben of the computer. The oscillation of this system clock produces an absolutely regular tick that keeps the operations of one IC in synchronization with the input/output processes of another.

In the western half of the video enclosure is the 8568 video display controller (VDC), an update of the C-128's 8563 VDC. This IC is responsible for 80-column RGB hi-res (640×200 pixels) and interlaced (640×400) video output. Like its predecessor, the 8568 can produce programmable character fonts and an impressive color graphics display. In addition, the internal workings have been redesigned so as to decrease the part count and enhance system integration.

The VDC uses the 64K of special video memory located immediately to its east. These two RAMs store four times the information the video RAM ICs in the C-128 can. This increased memory allows the VDC to control (and scroll) screens larger than will fit on the monitor, work with 16 colors or more in high resolution and support Basic 8's graphics capabilities.

At the far northwest corner and near the motherboard's eastern border lie the two complex interface adaptors. These CIAs are the Port Authority of the 128D; without them the computer would be unable to communicate with the outside world via its many input/output (I/O) ports, including the keyboard, joysticks, modem, printer and disk drives.

THE DISK DRIVE

The bulk of the circuitry for the disk drive lies under the drive hardware at the right front of the 128D. In the southwest corner of this city-within-a-city is the drive's 6502 CPU. This relative of the central processors found in the C-64 and C-128 provides the drive's "intelligence." In brief, it calls memory addresses within the drive's other ICs, reads data stored there and transmits control signals to memory and I/O components over the copper buses.

East of the 6502 lies the 1571 ROM, the drive's library chip, where the disk

operating system (DOS) is stored. The CPU looks here for operating procedures and file-management instructions. Next in the row is the drive's RAM warehouse, where data is temporarily stored during DOS activities. This space is also used by software such as Berkeley's GEOS, which reprograms the drive for its own, alternative, disk operating system.

To the east again, we find a 6522 versatile interface adaptor (VIA). This chip and its partner VIA, just north of the drive's ROM library, are the communication agencies of the disk drive. One VIA acts as a transmitter/receiver station between the computer's circuitry and the drive electronics, while the other is the drive controller, coordinating the stepper motor and movement of the head.

Within the drive electronics, three ICs work closely to perform read/write functions. They include the gate array, which is the 40-pin logic chip in the southeast corner of the 128D motherboard; the spidery-looking read/write amplifier in the northern part of the drive envelope; and the 5710 drive controller, which is north of the drive's RAM. These administrative and regulatory agencies collaborate to enhance data processing and storage; interpret alternative disk formats, such as IBM's modified frequency modulation (MFM); and read and write Commodore's native group-code recording (GCR). The read/write amplifier and the 5710 drive controller are unique to the C-128D.

You might also be interested in the quartz crystal to the west of the 5710. Similar to its counterpart in the computer, this clock produces timing pulses that coordinate activities among the drive's ICs.

Nearby, slightly to the southwest, solder bridges determine the device number of the internal disk drive. Closed, the bridges define the number as 8. Other combinations of open and closed set it to 9, 10 or 11. (For most purposes, there's no reason to set the internal drive to any number but 8. For special applications, a technician can install a switch for changing the number, a feature built into Commodore's newer stand-alone drives.)

This concludes today's tour. I hope you've enjoyed it. Please watch your step when leaving the bus. ■

Ellen Rule is a psychiatric R.N. who finds time not only for extensive user group involvement, but also for a home-based business, Home Computer Resource.

Memory in Motion

*Animation brings Concentration to life
in this matching game.*



By KEN HUEBNER

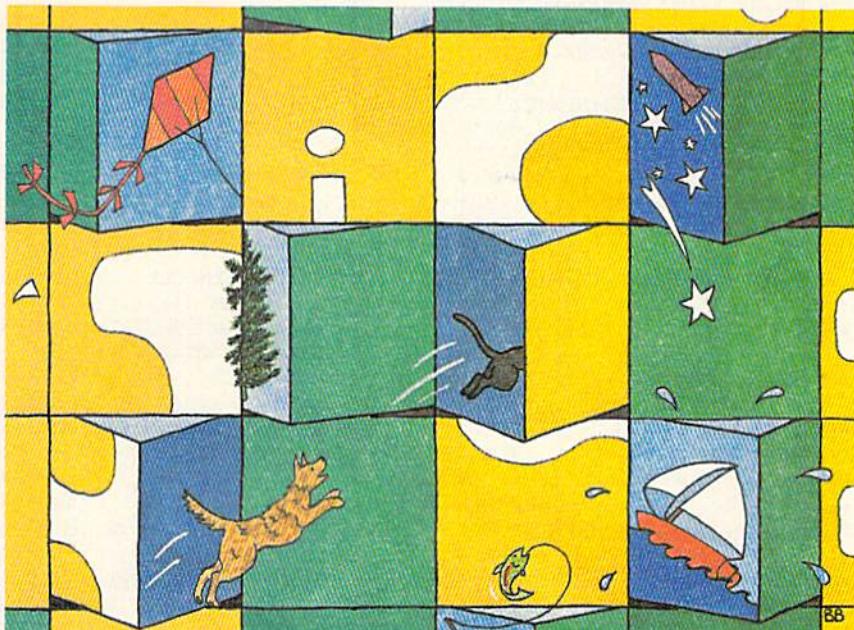
Memory Tiles is a colorful Concentration-type game for players of ages eight to 80. It shuffles 42 rectangular tiles and displays them on the screen with their backs up. On the "other side" of each tile is a miniature computer picture.

To play, you and a friend take turns moving the cursor around the screen with the cursor keys, searching for matched pairs of pictures. Once you have the cursor over a desired tile, press the space bar, and instantly an animated dog, rocket, Christmas tree or other picture will appear. When the show is over, seek out the matching picture among the other tiles, again by moving the cursor and pressing the space bar. In time, you'll remember the positions of previously shown pictures, making it easier to find matches.

If you make a match, a melodic whistle will tell you to try for another; if you miss, a low beep will signal your opponent to take a turn. The scorekeeper at the bottom of the screen always indicates whose turn it is.

The game is over when all 42 tiles have been matched. If you want to play again—or restart a game—just press the ← key.

When you type in Memory Tiles (Listing 1), use *RUN*'s Checksum program



to catch any errors you make and be sure to save it to disk before running it. Here's a tip for typing the multitude of command codes in the Data statements. Pressing the quote key or the space bar lets you access command codes from the Basic text editor, a feature that's especially useful for revising characters in the middle of previously

entered lines. Just cursor up to a bad character, insert a space, press the correct character code, space right, backspace and press return.

Now, where *did* I see that other dog? ☺

Ken Huebner is a software designer who runs his own business, called Softrek.

Running Instructions: Type in Listing 1 and save it to disk before running it.

Listing 1. Memory Tiles program. (Available on ReRUN disk. See page 37.)

```
10 REM MEMORY TILES      :REM*56      70 DIM TT(CT/2) :REM ANIM      130 POKE54296,15      :REM*232
20 REM FILE: "MEMORY"    :REM*78      80 DIM TD$(CT*4):REM IMAGE    140 FORX=1TO MC:READ TM$(X):NEXT
30 :                      :REM*88      90 MC=14:DIM TM$(MC)      :REM*17      150 DATA "(CTRL 9){COMD 6}M{3 S
40 W=7:H=6:{5 SPACES}:REM WID,H      :REM*29      100 :                      :REM*158      PACEs}","{(CTRL 9)E T ","{(CT
50 ITE                      :REM*29      110 REM INIT.GAME      :REM*186      RL 9)M I "      :REM*143
50 CT=W*H{7 SPACES}:REM TOTAL      :REM*23      120 POKE53280,3:POKE53281,11      160 DATA "(CTRL 9)O L ","{(CTRL
60 DIM TS(W,H){2 SPACES}:REM ST      :REM*36      130 :                      :REM*67      9)R E ","{(CTRL 9)Y S {CRSR
AT                      :REM*36      140 :                      :REM*234      DN}"      :REM*12 ►
```

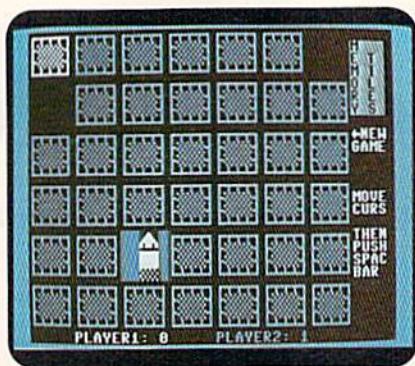
RUN it right: C-64

MEMORY

```

170 DATA "(CTRL 2)(LEFT ARROW)NEW", "GAME(3 CCSR DNs)"
    :REM*210
180 DATA "(CTRL 2)MOVE", "CURS(C
    RSR DN)", "THEN", "PUSH", "SPA
    C", "BAR" :REM*55
190 : :REM*248
200 FORY=0 TO CT/2-1 :REM*205
210 READ V:TT(Y+1)=V :REM*74
220 FORX=0 TO 7 :REM*104
230 READ A$ :REM*89
240 TDS$(Y*8+X+1)=A$ :REM*199
250 NEXTX:NEXTY :REM*153
260 : :REM*63
270 REM START GAME :REM*36
280 PRINT"(SHFT CLR){CTRL 2}":F
    ORY=1TO10:PRINT:NEXT:REM*72
290 PRINT TAB(13)"MIXING TILES!
    " :REM*244
300 FORY=0 TO H-1:FORX=0 TO W-1
    :REM*181
310 TS(X,Y)=0:NEXTX:NEXTY(7 SPA
    CES):REM CLR.TAB :REM*33
320 FOR V=1 TO CT/2:FOR Z=1TO2
    :REM*201
330 D=INT(RND(0)*CT) :REM*9
340 D=D+1:IF D>=CT THEN D=0
    :REM*113
350 Y=INT(D/W):X=D-(Y*W)
    :REM*246
360 IF TS(X,Y)<>0 THEN 340
    :REM*41
370 TS(X,Y)=V:NEXTZ:NEXTV(7 SPA
    CES):REM SET TAB :REM*124
380 : :REM*183
390 REM DISPLAY GAME :REM*39
400 PRINT "(SHFT CLR)":SC$="{CT
    RL 4}" :REM*160
410 FOR PY=0TOH-1:FORPX=0TOW-1
    :REM*242
420 GOSUB 1340 :REM*232
430 NEXTPX:NEXTPY :REM*146
440 PRINT "(HOME)" :REM*85
450 FORX=1TOMC:PRINT TAB(35)TM$
    (X):NEXT :REM*34
460 : :REM*4
470 REM PLAY GAME :REM*254
480 P=1:S1=0:S2=0:CN=CT:REM*102
490 : :REM*38
500 GOSUB 1230(3 SPACES):REM PL
    AYER :REM*116
510 GOSUB 1010(3 SPACES):REM SE
    LECT :REM*206
520 IF K$="(LEFT ARROW)" THEN 2
    70 :REM*74
530 GOSUB 840(3 SPACES):REM SHO
    W :REM*138
540 X2=PX:Y2=PY:T2=TV :REM*171
550 TS(X2,Y2)=T2 :REM*16
560 GOSUB 1010(3 SPACES):REM SE
    LECT :REM*25
570 TS(X2,Y2)=T2 :REM*127
580 SF=4:GOSUB 1450 :REM*60
590 GOSUB 840(3 SPACES):REM SHO
    W :REM*198
600 IFTV=T2 THEN 660 :REM*56
610 FORD=1TO350:NEXT :REM*168
620 SC$="(CTRL 4)":GOSUB 1310(2
    SPACES):REM NORM :REM*178

```



The tiles you turn jump into action in this memory-testing game.

```

1010 REM SELECT SQUARE :REM*91
1020 IF PEEK(56321)<255THEN1020
    :REM*195
1030 D=0:GETK$:IF K$<>""THEN1020
    :REM*189
1040 YC=INT(D/W):XC=D-(YC*W)
    :REM*121
1050 IF TS(XC,YC)>0 THEN 1080
    :REM*149
1060 D=D+1:GOTO 1040 :REM*182
1070 : :REM*108
1080 PX=XC:PY=YC :REM*242
1090 SC$="(CTRL 2)":GOSUB 1340(4
    SPACES):REM SHOW PNT
    :REM*100
1100 GET K$ :REM*234
1110 IF K$=" " ORK$=" (LEFT ARROW
    )" THEN RETURN :REM*19
1120 Z=D :REM*236
1130 IFK$=" (CSR UP)" THEN D=D-
    W:IF D<0 THEN D=CT+D-1
    :REM*147
1140 IFK$=" (CSR DN)" THEN D=D+W
    :IF D>=CT THEN D=D-CT+1
    :REM*206
1150 IFK$=" (CSR LF)" THEN D=D-1
    :IF D<0 THEN D=CT-1:REM*211
1160 IFK$=" (CSR RT)" THEN D=D+1
    :IF D>=CT THEN D=0 :REM*254
1170 IF D=Z THEN 1100 :REM*1
1180 YC=INT(D/W):XC=D-(YC*W)
    :REM*245
1190 IF TS(XC,YC)<1 THEN 1120
    :REM*51
1200 SC$="(CTRL 4)":GOSUB 1340(4
    SPACES):REM MOVE PNT
    :REM*38
1210 GOTO 1080 :REM*13
1220 : :REM*250
1230 REM PRINT PLAYER :REM*171
1240 PRINTCHR$(19):FORY=1TO23:P
    RINT"":NEXT :REM*123
1250 IFP=1THENPRINT TAB(5)"(CTR
    L 2)PLAYER1:";S1; :REM*31
1260 IFP=2THENPRINT TAB(5)"(CTR
    L 4)PLAYER1:";S1; :REM*161
1270 IFP=2THENPRINT TAB(20)"(CT
    RL 2)PLAYER2:";S2; :REM*147
1280 IFP=1THENPRINT TAB(20)"(CT
    RL 4)PLAYER2:";S2; :REM*105
1290 RETURN :REM*157
1300 : :REM*75
1310 REM SHOW 2 SQUARES:REM*179
1320 GOSUB 1350 :REM*124
1330 PX=X2:PY=Y2 :REM*196
1340 REM SHOW SQUARE :REM*100
1350 CX=PX*5:CY=PY*4 :REM*242
1360 REM PLOT SQUARE :REM*145
1370 PRINT SC$;" (HOME)":IF CY=
    0 THEN 1390 :REM*2
1380 FOR Y=1TOCY:PRINT:NEXTY
    :REM*254
1390 PRINTTAB(CX)TD$(X) :REM*18
1400 PRINTTAB(CX)TD$(X+1)
    :REM*225
1410 PRINTTAB(CX)TD$(X+2):REM*12
1420 PRINTTAB(CX)TD$(X+3):REM*54
1430 PRINTTAB(CX)TD$(X+4):REM*127
1440 PRINTTAB(CX)TD$(X+5):REM*54
1450 PRINTTAB(CX)TD$(X+6):REM*127
1460 PRINTTAB(CX)TD$(X+7):REM*54
1470 PRINTTAB(CX)TD$(X+8):REM*127
1480 PRINTTAB(CX)TD$(X+9):REM*54
1490 PRINTTAB(CX)TD$(X+10):REM*127
1500 PRINTTAB(CX)TD$(X+11):REM*54
1510 PRINTTAB(CX)TD$(X+12):REM*127
1520 PRINTTAB(CX)TD$(X+13):REM*54
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1600 PRINTTAB(CX)TD$(X+21):REM*54
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4510 PRINTTAB(CX)TD$(X+312):REM*127
4520 PRINTTAB(CX)TD$(X+313):REM*54
4530 PRINTTAB(CX)TD$(X+314):REM*127
4540 PRINTTAB(CX)TD$(X+315):REM*54
4550 PRINTTAB(CX)TD$(X+316):REM*127
4560 PRINTTAB(CX)TD$(X+317):REM*54
4570 PRINTTAB(CX)TD$(X+318):REM*127
4580 PRINTTAB(CX)TD$(X+319):REM*54
4590 PRINTTAB(CX)TD$(X+320):REM*127
4600 PRINTTAB(CX)TD$(X+321):REM*54
4610 PRINTTAB(CX)TD$(X+322):REM*127
4620 PRINTTAB(CX)TD$(X+323):REM*54
4630 PRINTTAB(CX)TD$(X+324):REM*127
4640 PRINTTAB(CX)TD$(X+325):REM*54
4650 PRINTTAB(CX)TD$(X+326):REM*127
4660 PRINTTAB(CX)TD$(X+327):REM*54
4670 PRINTTAB(CX)TD$(X+328):REM*127
4680 PRINTTAB(CX)TD$(X+329):REM*54
4690 PRINTTAB(CX)TD$(X+330):REM*127
4700 PRINTTAB(CX)TD$(X+331):REM*54
4710 PRINTTAB(CX)TD$(X+332):REM*127
4720 PRINTTAB(CX)TD$(X+333):REM*54
4730 PRINTTAB(CX)TD$(X+334):REM*127
4740 PRINTTAB(CX)TD$(X+335):REM*54
4750 PRINTTAB(CX)TD$(X+336):REM*127
4760 PRINTTAB(CX)TD$(X+337):REM*54
4770 PRINTTAB(CX)TD$(X+338):REM*127
4780 PRINTTAB(CX)TD$(X+339):REM*54
4790 PRINTTAB(CX)TD$(X+340):REM*127
4800 PRINTTAB(CX)TD$(X+341):REM*54
4810 PRINTTAB(CX)TD$(X+342):REM*127
4820 PRINTTAB(CX)TD$(X+343):REM*54
4830 PRINTTAB(CX)TD$(X+344):REM*127
4840 PRINTTAB(CX)TD$(X+345):REM*54
4850 PRINTTAB(CX)TD$(X+346):REM*127
4860 PRINTTAB(CX)TD$(X+347):REM*54
4870 PRINTTAB(CX)TD$(X+348):REM*127
4880 PRINTTAB(CX)TD$(X+349):REM*54
4890 PRINTTAB(CX)TD$(X+350):REM*127
4900 PRINTTAB(CX)TD$(X+351):REM*54
4910 PRINTTAB(CX)TD$(X+352):REM*127
4920 PRINTTAB(CX)TD$(X+353):REM*54
4930 PRINTTAB(CX)TD$(X+354):REM*127
4940 PRINTTAB(CX)TD$(X+355):REM*54
4950 PRINTTAB(CX)TD$(X+356):REM*127
4960 PRINTTAB(CX)TD$(X+357):REM*54
4970 PRINTTAB(CX)TD$(X+358):REM*127
4980 PRINTTAB(CX)TD$(X+359):REM*54
4990 PRINTTAB(CX)TD$(X+360):REM*127
5000 PRINTTAB(CX)TD$(X+361):REM*54
5010 PRINTTAB(CX)TD$(X+362):REM*127
5020 PRINTTAB(CX)TD$(X+363):REM*54
5030 PRINTTAB(CX)TD$(X+364):REM*127
5040 PRINTTAB(CX)TD$(X+365):REM*54
5050 PRINTTAB(CX)TD$(X+366):REM*127
5060 PRINTTAB(CX)TD$(X+367):REM*54
5070 PRINTTAB(CX)TD$(X+368):REM*127
5080 PRINTTAB(CX)TD$(X+369):REM*54
5090 PRINTTAB(CX)TD$(X+370):REM*127
5100 PRINTTAB(CX)TD$(X+371):REM*54
5110 PRINTTAB(CX)TD$(X+372):REM*127
5120 PRINTTAB(CX)TD$(X+373):REM*54
5130 PRINTTAB(CX)TD$(X+374):REM*127
5140 PRINTTAB(CX)TD$(X+375):REM*54
5150 PRINTTAB(CX)TD$(X+376):REM*127
5160 PRINTTAB(CX)TD$(X+377):REM*54
5170 PRINTTAB(CX)TD$(X+378):REM*127
5180 PRINTTAB(CX)TD$(X+379):REM*54
5190 PRINTTAB(CX)TD$(X+380):REM*127
5200 PRINTTAB(CX)TD$(X+381):REM*54
5210 PRINTTAB(CX)TD$(X+382):REM*127
5220 PRINTTAB(CX)TD$(X+383):REM*54
5230 PRINTTAB(CX)TD$(X+384):REM*127
5240 PRINTTAB(CX)TD$(X+385):REM*54
5250 PRINTTAB(CX)TD$(X+386):REM*127
5260 PRINTTAB(CX)TD$(X+387):REM*54
5270 PRINTTAB(CX)TD$(X+388):REM*127
5280 PRINTTAB(CX)TD$(X+389):REM*54
5290 PRINTTAB(CX)TD$(X+390):REM*127
5300 PRINTTAB(CX)TD$(X+391):REM*54
5310 PRINTTAB(CX)TD$(X+392):REM*127
5320 PRINTTAB(CX)TD$(X+393):REM*54
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5350 PRINTTAB(CX)TD$(X+396):REM*127
5360 PRINTTAB(CX)TD$(X+397):REM*54
5370 PRINTTAB(CX)TD$(X+398):REM*127
5380 PRINTTAB(CX)TD$(X+399):REM*54
5390 PRINTTAB(CX)TD$(X+400):REM*127
5400 PRINTTAB(CX)TD$(X+401):REM*54
5410 PRINTTAB(CX)TD$(X+402):REM*127
5420 PRINTTAB(CX)TD$(X+403):REM*54
5430 PRINTTAB(CX)TD$(X+404):REM*127
5440 PRINTTAB(CX)TD$(X+405):REM*54
5450 PRINTTAB(CX)TD$(X+406):REM*127
5460 PRINTTAB(CX)TD$(X+407):REM*54
5470 PRINTTAB(CX)TD$(X+408):REM*127
5480 PRINTTAB(CX)TD$(X+409):REM*54
5490 PRINTTAB(CX)TD$(X+410):REM*127
5500 PRINTTAB(CX)TD$(X+411):REM*54
5510 PRINTTAB(CX)TD$(X+412):REM*127
5520 PRINTTAB(CX)TD$(X+413):REM*54
5530 PRINTTAB(CX)TD$(X+414):REM*127
5540 PRINTTAB(CX)TD$(X+415):REM*54
5550 PRINTTAB(CX)TD$(X+416):REM*127
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5570 PRINTTAB(CX)TD$(X+418):REM*127
5580 PRINTTAB(CX)TD$(X+419):REM*54
5590 PRINTTAB(CX)TD$(X+420):REM*127
5600 PRINTTAB(CX)TD$(X+421):REM*54
5610 PRINTTAB(CX)TD$(X+422):REM*127
5620 PRINTTAB(CX)TD$(X+423):REM*54
5630 PRINTTAB(CX)TD$(X+424):REM*
```

M E M O R Y

MD ES}{COMD X}" :REM*102	TRL Ø)" :REM*115	207Ø :	:REM*88
143Ø RETURN :REM*34	177Ø DATA "(CTRL 9)STOP(CTRL Ø)" :REM*24Ø	208Ø DATA 2Ø :	:REM*93
144Ø :	" :REM*223	209Ø DATA "(2 SPACES){CTRL 8}{CTRL N}{2 SPACES}" :REM*23Ø	
145Ø REM SOUND :REM*5Ø	178Ø DATA "(COMD 3){COMD *}{CTRL L 9}{2 SPACES}{CTRL Ø}{SHFT LB.}" :REM*54	210Ø DATA "(CTRL 2){CTRL 9}{SHFT LB.}{SHFT Y}{CTRL Ø}{SHFT M}" :REM*11	
146Ø POKE54276,32+1 :REM*17Ø	179Ø DATA "(CTRL 2){CTRL Ø}{COMD L}{COMD K}{2 SPACES}" :REM*2Ø5	211Ø DATA "(CTRL 9){CTRL 2}{SHFT LB.}{SHFT Y}{SHFT LB.}{COMD *}" :REM*159	
147Ø POKE54273,SF :REM*186	" :REM*178	212Ø DATA "(COMD 7){COMD *}{CTRL L 9}{2 SPACES}{SHFT X}{CTRL L Ø}{SHFT LB.}" :REM*97	
148Ø POKE54277,2:POKE54278,24Ø+8 :REM*178	180Ø :	213Ø :	:REM*132
149Ø POKE54276,32 :REM*19	" :REM*69	214Ø DATA "(2 SPACES){CTRL 8}{SHFT P}{2 SPACES}" :REM*3Ø	
150Ø RETURN :REM*1Ø8	181Ø DATA "(COMD 3){CTRL 9}{SHFT LB.}{2 SPACES}{COMD *}{CTRL Ø}" :REM*189	215Ø DATA "(CTRL 2){CTRL 9}{SHFT LB.}{SHFT Y}{CTRL Ø}{SHFT M}" :REM*121	
151Ø :	" :REM*38	216Ø DATA "(CTRL 9){CTRL 2}{SHFT LB.}{SHFT Y}{SHFT LB.}{COMD *}" :REM*2Ø9	
152Ø :	" :REM*44	217Ø DATA "(COMD 7){COMD *}{CTRL L 9}{2 SPACES}{SHFT X}{CTRL L Ø}{SHFT LB.}" :REM*83	
153Ø DATA 2 :REM*231	182Ø DATA "(CTRL Ø){CTRL 2}{STOP" :REM*117	218Ø :	:REM*182
154Ø DATA "{CTRL 8}{CTRL 9}{SHFT LB.}{COMD @}{COMD @}{COMD *}" :REM*34	" :REM*64	219Ø DATA 4 :	:REM*112
155Ø DATA "{CTRL 9} . ." :REM*169	183Ø DATA "(COMD 3){COMD *}{CTRL L 9}{2 SPACES}{CTRL Ø}{SHFT LB.}" :REM*26	220Ø DATA "(CTRL 9){COMD 3}{SHFT LB.}{COMD *}{CTRL Ø}" :REM*196	
156Ø DATA "{CTRL 9}{2 SPACES}{SHFT S}{2 SPACES}" :REM*41	184Ø DATA "(CTRL 2){CTRL Ø}{COMD L}{COMD K}{2 SPACES}" :REM*115	221Ø DATA "{CTRL 9}{LOVE}{CTRL Ø}" :	:REM*82
157Ø DATA "(COMD *){CTRL 9}{SHFT T J}{SHFT C}{SHFT K}{CTRL Ø}{SHFT LB.}" :REM*151	" :REM*183	222Ø DATA "(COMD *){CTRL 9}{2 SPACES}{CTRL Ø}{SHFT LB.}" :REM*1Ø7	
158Ø :	185Ø :	223Ø DATA "(COMD *){SHFT LB.}{2 SPACES}" :REM*69	
159Ø DATA "{CTRL 8}{CTRL 9}{SHFT T LB.}{SHFT U}{SHFT U}{COMD *}" :REM*63	186Ø DATA 4Ø :REM*183	224Ø :	:REM*242
160Ø DATA "{CTRL 9}{SHFT Q}{SHFT Q}" :REM*111	187Ø DATA "(CTRL 9){COMD 3}{CTRL 2}{CTRL 5}{CTRL 8}{CTRL 1}" :REM*118	225Ø DATA "(CTRL 9){COMD 3}{SHFT LB.}{COMD *}{CTRL Ø}" :REM*61	
161Ø DATA "{CTRL 9}{2 SPACES}{SHFT S}{2 SPACES}" :REM*123	188Ø DATA "(CTRL 9){COMD 7}{COMD 6}{CTRL 3}{CTRL 8}{CTRL 5}" :REM*41	226Ø DATA "(CTRL 9){YOU}{CTRL Ø}" :	:REM*4Ø
162Ø DATA "(COMD *){CTRL 9}{SHFT T J}{SHFT W}{SHFT K}{CTRL Ø}{SHFT LB.}" :REM*122	189Ø DATA "(CTRL 9){COMD 3}{COMD 7}{COMD 6}{CTRL 5}{CTRL 8}{TRL 2}" :REM*54	227Ø DATA "(COMD *){CTRL 9}{2 SPACES}{CTRL Ø}{SHFT LB.}" :REM*189	
163Ø :	190Ø DATA "(CTRL 9){CTRL 8}{CTRL 4}{CTRL 2}{COMD 6}{CTRL 5}" :REM*17Ø	228Ø DATA "(COMD *){SHFT LB.}{2 SPACES}" :REM*155	
164Ø DATA 2 :REM*72	191Ø :	229Ø :	:REM*37
165Ø DATA "(CTRL Ø){COMD 6}{CTRL 9}{SHFT LB.}{CTRL 2}{COMD 6}{COMD *}{CTRL Ø}" :REM*142	192Ø DATA "(CTRL 9){COMD 7}{COMD 6}{CTRL 3}{CTRL 8}{CTRL 5}" :REM*17	230Ø DATA 2 :	:REM*234
166Ø DATA "(COMD 6){CTRL 9}{SHFT T LB.}{CTRL 2}{SHFT Q}{COMD 6}{COMD *}" :REM*86	193Ø DATA "(CTRL 9){COMD 3}{COMD 7}{COMD 6}{CTRL 5}{CTRL 8}{TRL 2}" :REM*3Ø	231Ø DATA "(CTRL 6){COMD *}{COMD 6}{SHFT N}{2 SPACES}" :REM*183	
167Ø DATA "(CTRL Ø){CTRL 9}{CTRL 2}{CTRL 7}{CTRL 2}{TRL Ø}" :REM*173	194Ø DATA "(CTRL 9){CTRL 8}{CTRL 4}{CTRL 2}{COMD 6}{CTRL 5}" :REM*146	232Ø DATA "(CTRL 9){COMD 3}{SHFT T LB.}{COMD T}{COMD *}{CTRL RL Ø}" :REM*196	
168Ø DATA "(CTRL Ø){CTRL 9}{CTRL 2}{CTRL 7}{CTRL 2}{TRL Ø}" :REM*167	195Ø DATA "(CTRL 9){COMD 3}{CTRL 2}{CTRL 5}{CTRL 8}{COMD 1}" :REM*134	233Ø DATA "(CTRL 9){3 SPACES}{CTRL 2}{CTRL Ø}" :REM*197	
169Ø :	196Ø :	234Ø DATA "(COMD 3){COMD *}{CTRL L 9}{COMD @}{CTRL Ø}{SHFT LB.}" :REM*83	
170Ø DATA "(CTRL Ø){COMD 6}{CTRL 9}{SHFT LB.}{CTRL 2}{COMD 6}{COMD *}{CTRL Ø}" :REM*248	197Ø DATA 2 :REM*229	235Ø :	:REM*97
171Ø DATA "(COMD 6){CTRL 9}{SHFT T LB.}{CTRL 2}{SHFT Q}{COMD 6}{COMD *}" :REM*132	198Ø DATA "(CTRL 2){CTRL 9}{SHFT LB.}{3 SPACES}{COMD *}" :REM*229	236Ø DATA "(CTRL 6){COMD *}{COMD 6}{SHFT N}{2 SPACES}" :REM*197	
172Ø DATA "(CTRL Ø){CTRL 9}{CTRL 2}{CTRL Ø}{SHFT T}{CTRL L 9}{CTRL 2}{CTRL Ø}" :REM*128	199Ø DATA "(CTRL 9){CTRL Ø}{RIP}{CTRL 9}" :REM*245	237Ø DATA "(CTRL 9){COMD 3}{SHFT T LB.}{COMD T}{COMD *}{CTRL RL Ø}" :REM*61	
173Ø DATA "(CTRL Ø){CTRL 9}{CTRL 2}{CTRL Ø}{SHFT T}{CTRL L 9}{CTRL 2}{CTRL Ø}" :REM*138	200Ø DATA "(CTRL 9){5 SPACES}" :REM*178	238Ø DATA "(CTRL 9){COMD L}{CTRL ▶	
174Ø :	201Ø DATA "(CTRL 9) 1781" :REM*215		
175Ø DATA 8Ø :REM*81	202Ø :		
176Ø DATA "(COMD 3){CTRL 9}{SHFT T LB.}{2 SPACES}{COMD *}{C	203Ø DATA "(CTRL 2){CTRL 9}{SHFT LB.}{3 SPACES}{COMD *}" :REM*6Ø		
	204Ø DATA "(CTRL 9) BOO!" :REM*236		
	205Ø DATA "(CTRL 9){5 SPACES}" :REM*252		
	206Ø DATA "(CTRL 9) 1781" :REM*26		

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RL 2}{SHFT U}{CTRL Ø}{COMD J}" :REM*2Ø2	274Ø DATA 2 :REM*144	3Ø7Ø DATA 5Ø :REM*118
239Ø DATA "{COMD 3}{COMD *}{CTRL L 9}{COMD Ø}{CTRL 2}){CTRL Ø}{2 SPACES}" :REM*76	275Ø DATA "{CTRL 2}SIMON" :REM*243	3Ø8Ø DATA "{COMD 3}{CTRL 9}{SHFT LB.}{CTRL Ø}{CTRL 8}{2 SPACES}{COMD 3}{SHFT LB.}." :REM*2Ø2
24ØØ :REM*147	276Ø DATA "{CTRL 2}SAYS," :REM*9	3Ø9Ø DATA "{COMD 3}{SHFT LB.}{CTRL 8}{CTRL 9}{SHFT LB.}{COMD *}{COMD 1}{SHFT LB.}" :REM*44
241Ø DATA 2 :REM*91	277Ø DATA "{5 SPACES}" :REM*198	31ØØ DATA "{CTRL 9}{COMD 7}{2 SPACES}{CTRL 8}{COMD +}{COMD 7}{2 SPACES}" :REM*33
242Ø DATA "{CTRL 9}{CTRL 2}{2 SHFT A}{3 SPACES}" :REM*77	278Ø DATA "{5 SPACES}" :REM*22Ø	311Ø DATA "{CTRL 9}{COMD 7}{2 SPACES}{CTRL 8}{COMD +}{COMD 7}{2 SPACES}" :REM*43
243Ø DATA "{CTRL 9}{2 SPACES}{SHFT A}{2 SPACES}" :REM*32	279Ø :REM*43	312Ø :REM*1Ø2
244Ø DATA "{CTRL 9}{2 SPACES}{SHFT A}{2 SPACES}" :REM*46	28ØØ DATA "{CTRL 2}YOU{2 SPACES}" :REM*214	313Ø DATA "{COMD 3}{CTRL 9}{SHFT LB.}{CTRL Ø}{CTRL 8}{COMD *}{COMD 3}{SHFT LB.}{COMD 3}{COMD *}{CTRL 8}{CTRL 9}{SHFT LB.}{COMD *}{COMD 1}{COMD *}" :REM*235
245Ø DATA "{CTRL 9}{3 SPACES}{SHFT A}{2}" :REM*1Ø8	281Ø DATA "{CTRL 2}CAN'T" :REM*2Ø4	314Ø DATA "{COMD 3}{COMD *}{CTRL L 8}{CTRL 9}{SHFT LB.}{COMD *}{COMD 1}{COMD *}" :REM*75
246Ø :REM*223	282Ø DATA "{CTRL 2}FIND" :REM*85	315Ø DATA "{CTRL 9}{COMD 7}{2 SPACES}{CTRL Ø}{CTRL 8}{COMD +}{COMD 7}{2 SPACES}{CTRL 9}{2 SPACES}{CTRL Ø}{CTRL 8}{COMD +}{COMD 7}{2 SPACES}" :REM*182
247Ø DATA "{CTRL 9}{CTRL 2}{2 SHFT A}{COMD *}{CTRL L Ø}" :REM*76	283Ø DATA "{CTRL 2}IT!{2 SPACES}" :REM*15Ø	316Ø DATA "{CTRL 9}{COMD 7}{2 SPACES}{CTRL Ø}{CTRL 8}{COMD +}{COMD 7}{2 SPACES}{CTRL 9}{2 SPACES}{CTRL Ø}{CTRL 8}{COMD +}{COMD 7}{2 SPACES}" :REM*14Ø
248Ø DATA "{CTRL 9}{CTRL 2}{2 SPACES}{SHFT A}{COMD 7}{COMD +}{COMD *}" :REM*28	284Ø :REM*89	317Ø :REM*144
249Ø DATA "{CTRL 9}{CTRL 2}{2 SPACES}{SHFT A}{2 SPACES}" :REM*242	285Ø DATA 4Ø :REM*145	318Ø DATA 2 :REM*94
25ØØ DATA "{CTRL 9}{3 SPACES}{SHFT A}{2}" :REM*19Ø	286Ø DATA "{CTRL 2}{5 COMD +s}" :REM*136	319Ø DATA "{COMD 3}{3 SHFT Qs}{CTRL 6}{2 SHFT Cs}" :REM*125
251Ø :REM*2	287Ø DATA "{CTRL 2}{COMD +}{CTRL L 9}{3 COMD +s}{CTRL Ø}{COMD +}" :REM*153	32ØØ DATA "{CTRL 2}{3 SHFT Qs}{CTRL 6}{2 SHFT Cs}" :REM*134
252Ø DATA 2ØØ :REM*3	288Ø DATA "{CTRL 2}{COMD +}{CTRL L 9}{3 COMD +s}{CTRL Ø}{COMD +}" :REM*147	321Ø DATA "{COMD 7}{3 SHFT Qs}{CTRL 6}{2 SHFT Cs}" :REM*93
253Ø DATA "{CTRL 2}{CTRL 9}{2 SPACES}{HFT Qs}{CTRL Ø}{CTRL 8}{COMD +}{SHFT Q}{COMD +}" :REM*144	289Ø DATA "{CTRL 2}{5 COMD +s}" :REM*23Ø	322Ø DATA "{CTRL 8}{3 SHFT Qs}{CTRL 6}{2 SHFT Cs}" :REM*167
254Ø DATA "{CTRL 2}{CTRL 9}{5 SPACES}{HFT Qs}" :REM*217	29ØØ :REM*133	323Ø :REM*212
255Ø DATA "{CTRL 2}{CTRL 9}{SHFT Q}{CTRL Ø}{CTRL 8}{COMD +}{CTRL Ø}{SHFT Q}{CTRL 9}{COMD +}{CTRL 2}{SHFT Q}" :REM*236	291Ø DATA "{CTRL 2}{CTRL 9}{5 C OMD +s}" :REM*166	324Ø DATA "{COMD 3}{3 SHFT Qs}{CTRL 6}{2 SHFT Cs}" :REM*163
256Ø DATA "{CTRL 2}{CTRL 9}{5 SPACES}{HFT Qs}" :REM*44	292Ø DATA "{CTRL 2}{CTRL 9}{COMD +}{CTRL Ø}{3 COMD +s}{CTRL RL 9}{COMD +}" :REM*2	325Ø DATA "{CTRL 2}{SHFT Q}{CTRL L 6}{2 SHFT Cs}{CTRL 2}{2 SHFT Qs}" :REM*7Ø
257Ø :REM*78	293Ø DATA "{CTRL 2}{CTRL 9}{COMD +}{CTRL Ø}{3 COMD +s}{CTRL RL 9}{COMD +}" :REM*2Ø	326Ø DATA "{CTRL 6}{2 SHFT Cs}{COMD 7}{3 SHFT Qs}" :REM*1Ø9
258Ø DATA "{CTRL 2}{CTRL 9}{2 SPACES}{HFT Qs}{CTRL 8}{COMD +}{CTRL Ø}{SHFT Q}{CTRL 9}{COMD +}" :REM*118	294Ø DATA "{CTRL 2}{CTRL 9}{5 C OMD +s}" :REM*132	327Ø DATA "{CTRL 8}{2 SHFT Qs}{CTRL 6}{2 SHFT Cs}{CTRL 8}{SHFT Q}" :REM*61
259Ø DATA "{CTRL 2}{CTRL 9}{5 SPACES}{HFT Qs}" :REM*1Ø	295Ø :REM*2Ø3	328Ø :REM*7
26ØØ DATA "{CTRL 2}{CTRL 9}{SHFT Q}{CTRL 8}{CTRL Ø}{COMD +}{SHFT Q}{COMD +}{CTRL 9}{CTRL 2}{SHFT Q}" :REM*186	296Ø DATA 2 :REM*123	329Ø DATA 2ØØ :REM*3Ø
261Ø DATA "{CTRL 2}{CTRL 9}{5 SPACES}{HFT Qs}" :REM*3Ø	297Ø DATA "{COMD 3}{CTRL Ø}{2 SPACES}{CTRL 9}{2 COMD *s}{CTRL Ø}" :REM*237	33ØØ DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{SHFT LB.}{CTRL 6}{2 SHFT Cs}{CTRL 8}{SHFT Q}" :REM*45
262Ø :REM*124	298Ø DATA "{COMD 3}{CTRL Ø}{CTRL RL 9}{SHFT LB.}{CTRL Ø}{SHFT Q}{CTRL 9}{SHFT Q}{CTRL Ø}" :REM*58	331Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
263Ø DATA 1ØØ :REM*119	299Ø DATA "{COMD 3}{CTRL 9}{3 SPACES}{SHFT M}{CTRL 1}{CTRL L Ø}{SHFT Q}" :REM*82	332Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
264Ø DATA "{5 SPACES}" :REM*72	3ØØØ DATA "{COMD 3}{CTRL 9}{2 SPACES}{CTRL Ø}{SHFT LB.}{2 SPACES}" :REM*24	333Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
265Ø DATA "{COMD 7}{4 SPACES}2" :REM*99	3Ø1Ø :REM*247	334Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
266Ø DATA "{COMD 7}E=MC" :REM*6	3Ø2Ø DATA "{COMD 3}{CTRL Ø}{2 SPACES}{CTRL 9}{2 COMD *s}{CTRL Ø}" :REM*223	335Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
267Ø DATA "{5 SPACES}" :REM*1Ø6	3Ø3Ø DATA "{COMD 3}{CTRL Ø}{CTRL RL 9}{SHFT LB.}{CTRL Ø}{SHFT Q}{CTRL 9}{SHFT Q}{CTRL Ø}" :REM*8	336Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
268Ø :REM*184	3Ø4Ø DATA "{COMD 3}{CTRL 9}{2 SPACES}{SHFT C}{SHFT I}{CTRL L 1}{CTRL Ø}{SHFT Q}" :REM*52	337Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
269Ø DATA "{5 SPACES}" :REM*118	3Ø5Ø DATA "{COMD 3}{CTRL 9}{2 SPACES}{CTRL Ø}{SHFT LB.}{2 SPACES}" :REM*42	338Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
27ØØ DATA "{CTRL 2}{4 SPACES}2" :REM*244	3Ø6Ø :REM*34	339Ø DATA "{COMD 7}{CTRL 9}{2 SPACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*1Ø4
271Ø DATA "{CTRL 2}E=MC" :REM*149		
272Ø DATA "{5 SPACES}" :REM*152		
273Ø :REM*238		

MEMORY

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3330 DATA "(COMD 7){CTRL 9}{2 S
PACES}{COMD 3}{2 COMD +s}{COMD 7}" :REM*114
3340 : :REM*75
3350 DATA "(COMD 7){CTRL 9}{2 S
PACES}{CTRL 2}{SHFT LB.}{COMD *}{COMD 7}" :REM*182
3360 DATA "(COMD 7){CTRL 9}{2 S
PACES}{CTRL 2}{2 COMD Es}{COMD 7}" :REM*27
3370 DATA "(COMD 7){CTRL 9}{2 S
PACES}{CTRL 2}{2 SPACES}{COMD 7}" :REM*186
3380 DATA "(COMD 7){CTRL 9}{2 S
PACES}{CTRL 0}{CTRL 8}{2 C
OMD +s}{CTRL 9}{COMD 7}" :REM*25
3390 : :REM*117
3400 DATA 60 :REM*201
3410 DATA "(COMD 6){CTRL 9}{SH
FT LB.}{COMD *}{CTRL 0}{2
SPACES}" :REM*143
3420 DATA "(CTRL 9){SHFT Q}{CTRL 0}{2 SPACES}" :REM*9
3430 DATA "(CTRL 9){SHFT LB.}{SH
FT Q}{COMD *}{CTRL 0}" :REM*137
3440 DATA "(COMD 3){COMD M}{CO
MD J}{2 SPACES}" :REM*153
3450 : :REM*185
3460 DATA "(COMD 6){CTRL 9}{SH
FT LB.}{COMD *}{CTRL 0}{2
SPACES}" :REM*253
3470 DATA "(CTRL 9){SHFT W}{TRL 0}{2 SPACES}" :REM*121
3480 DATA "(CTRL 9){SHFT LB.}{SH
FT W}{COMD *}{CTRL 0}" :REM*36
3490 DATA "(COMD 3){COMD M}{CO
MD J}{2 SPACES}" :REM*175
3500 : :REM*235
3510 DATA 40 :REM*62
3520 DATA "(CTRL 9){COMD 6}{$1{3
SPACES}" :REM*88
3530 DATA "(CTRL 9){CTRL 0}{SH
FT LB.}{CTRL 9}{LB.}{CTRL
0}{COMD *}{CTRL 9}" :REM*102
3540 DATA "(CTRL 9){3 SPACES}{$1
}" :REM*115
3550 DATA "(5 SPACES)" :REM*199
3560 : :REM*44
3570 DATA "(CTRL 9){COMD 6}{$1{3
SPACES}" :REM*150
3580 DATA "(CTRL 9){COMD *}{LB
.}{SHFT LB.}" :REM*209
3590 DATA "(CTRL 9){3 SPACES}{$1
}" :REM*141
3600 DATA "(5 SPACES)" :REM*20
3610 : :REM*90
3620 DATA 100 :REM*73
3630 DATA "(COMD 7){***}{COMD 3}=" :REM*180
3640 DATA "(COMD 7){***}{CTRL 2}=" :REM*213
3650 DATA "(COMD 3)====" :REM*35
3660 DATA "(CTRL 2)====" :REM*132
3670 : :REM*158
3680 DATA "(COMD 7){***}{COMD 3}=" :REM*250
3690 DATA "(COMD 7){***}{CTRL 2}=" :REM*225
3700 DATA "(COMD 3)====" :REM*76
3710 DATA "(CTRL 2)====" :REM*187
3720 : :REM*204
3730 DATA 120 :REM*221
3740 DATA "(CTRL 2){CTRL 9}{C={2
SPACES}" :REM*28
3750 DATA "(CTRL 9){CTRL 5}{SH
FT M}{SHFT M}{CTRL 2}" :REM*10
3760 DATA "(CTRL 9){CTRL 5}{S
HFT M}{CTRL 2}" :REM*106
3770 DATA "(CTRL 9){SHFT W}{S
HFT W}" :REM*32
3780 : :REM*240
3790 DATA "(CTRL 2){CTRL 9}{C={2
SPACES}" :REM*42
3800 DATA "(CTRL 9){COMD 7}{S
HFT M}{CTRL 2}" :REM*136
3810 DATA "(CTRL 9){COMD 7}{SH
FT M}{SHFT M}{CTRL 2}" :REM*120
3820 DATA "(CTRL 9){SHFT W}{S
HFT W}" :REM*114 ■

```

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Thoroughbird Racing

*Ostriches on the go, to win or place or show,
make a fine racing date on your C-128!*



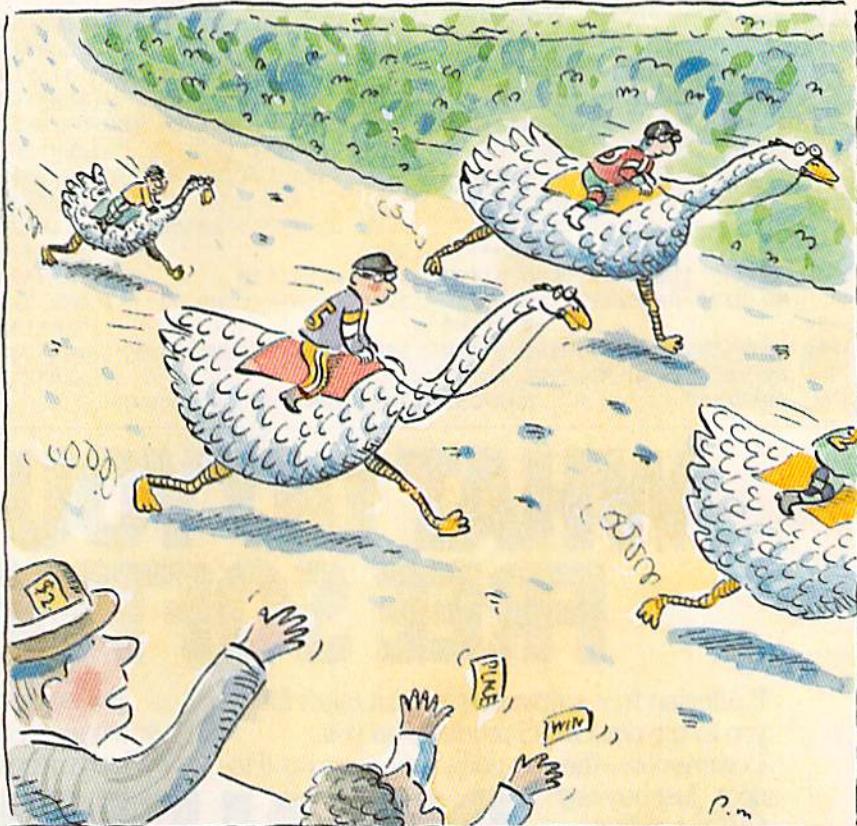
By HUGH MC MENAMIN

Thoroughbird Racing depicts a racetrack such as you've probably never seen before, since the entrants are two-legged and feathered. That's right; in each race, you bet on your choice among five fleet-footed ostriches, each sporting a jaunty jockey. Wagers of \$2-\$200 on win, place, show or parlay (win and place) pay 4 to 1, 2 to 1, even and 15 to 1, respectively. Up to eight fans can wager on a race, each starting with a kitty of \$200. If Lady Luck has come with someone else, you can always borrow more from the track.

As the afternoon begins, you find yourself at the pari-mutuel window, placing your bet on the first race. The race itself is enlivened by the sound of avian feet pounding the dirt, and it concludes with an official finish photo. Your winnings and the status of your kitty are then shown, along with each bird's record for the afternoon so far.

You and your fellow fans can watch up to ten races in an afternoon, and, when you leave the track, your winnings or losses are displayed. You may want to stick your head in the sand!

Thoroughbird Racing consists of two programs: Thoroughbird Racing proper (Listing 1) and Spritemaker (Listing 2). Spritemaker generates a disk file, entitled Sprites, that the program needs



in order to operate. Type in the listings using RUN's Checksum program to ensure accuracy.

Hugh McMenamin, retired after a career as a physician, is an avid Commodore programmer and, obviously, a race enthusiast.

Listing 1. Thoroughbird Racing program.

```
10 ONAGOTO150 :REM*160
20 FORX=1TO8:SPRITE$,$:NEXT:PRI
  NTCHR$(142) :REM*10
30 CLR:REM THOROUGHBIRD RACING
  BY HUGH MC MENAMIN :REM*57
40 B1$="V1T8U904SG05SCSEIGSGSGS
  GIGIESESESEIEICIEICO4IGQRM
  :REM*95
50 B2$="O4SG05SCSEIGSGSGSGIGIGI
  EICO4IGSGSGSGIG05.ICIRM
60 C1$="V1T04IGIAIGIAIB05IDIEI
  DIGI#FIAIGI#FIAIGIEIDIDIEIDI
  GIEID04IBWAM :REM*94
70 C2$="V1T804QG05.HC.SD04.SG05
  .SDQEQESE.SF.SC.QEIDQC
  :REM*77
80 C3$="IDIEIEIDQCIDIEQEIDIEQEI
  CIDQD04.SA.SA.SAQAB05.HCM
  :REM*13
90 SS=54272:V=53248:RN=1
  :REM*124
100 FAST:GOSUB243:GOSUB240:SL
  OW :REM*143
110 FORX=1TO5:READO$(X):NEXT
  :REM*186
120 TEMPO12:PLAYB1$:PLAYB2$
  :REM*132
130 PRINTTAB(10)"BY HUGH MC MENA
  MIN" :REM*201
```

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

```

140 A=1:BLOAD"SPRITES",B$,P3584 :REM*19 :REM*121
150 FOR I=1 TO 8:SPRSAVI,A$(I):NEXT :REM*105 :REM*243
160 BD=8: SX=54296: BC=7 :REM*254 :REM*104
170 POKE 53281,6:POKE 53280,14:POKE 640 IFKI(X)<1 THEN PRINT"(4 CCSR UPs)":GOTO 630 :REM*243
180 REM ODDS SCREEN :REM*56 :REM*104
190 PRINT"(SHFT CLR)"TAB(132)"(CTRL 2)THOROUGHBIRD":PRINTT 650 SPRSAVA$(1),7 :REM*104
190 AB(55)"RACING" :REM*227 :REM*85
200 PRINTTAB(48); "YOU CAN BET F 660 IFKI(X)>4 THEN GOSUB 580:GOTO 6 :REM*85
200 OUR WAYS: :REM*160 :REM*231
210 PRINTTAB(47)"<1> WIN{5 SPACES}PAYS{2 SPACES}4 TO 1" 670 IFKI(X)=4 THEN 760 :REM*231
210 :REM*118 :REM*70
220 PRINTTAB(7)"<2> PLACE{3 SPACES}PAYS{2 SPACES}2 TO 1" 680 WINDOW$,0,39,10,1 :REM*70
220 :REM*201 :REM*116
230 PRINTTAB(7)"<3> SHOW{4 SPACES}PAYS{3 SPACES}EVEN" 690 PRINT"(HOME){2 CCSR DNs} HOW MUCH DO YOU BET? <$2 TO 2
230 :REM*166 :REM*47
240 PRINTTAB(7)"<4> PARLAY{2 SPACES}PAYS 15 TO 1" :REM*239 700 INPUT"(CRSR DN){4 SPACES}BET":B(X)=0 :REM*47
250 PRINTTAB(86)"PARLAY - PICK 710 IFB(X)<2 THEN PRINT"(3 CCSR UPS)":GOTO 700 :REM*128
250 WIN AND PLACE :REM*134 720 IFB(X)>200 THEN GOSUB 580:GOTO 700 :REM*116
260 PRINTTAB(46)"EACH PLAYER IS 730 B(X)=INT(B(X)):X=X+1 :REM*213
260 LOANED $200" :REM*245 :REM*209
270 PRINTTAB(42)"YOU (CTRL 9) MAY(CRTL 0) BORROW MORE FROM 740 IFEN(X)>0 THEN 930 :REM*9
270 THE TRACK :REM*57 :REM*127
280 TEMPO12:PLAYC1$ :REM*233 750 RETURN :REM*182
290 SPRSAVA$(6),8:SPRSAVA$(1),7 :REM*198 760 WINDOW$,0,39,10,1 :REM*182
290 :SPRCOLOR2,3 :REM*198 770 PRINT"(SHFT CLR){2 CCSR DNs}{2 SPACES}YOU PICKED NO.":O(X);TO WIN":PL(X)=0 :REM*74
300 MOVSPR8,132,176:MOVSPR7,144 780 INPUT"(CRSR DN){2 SPACES}ENTER PLACE NUMBER":PL(X) :REM*170
300 ,171 :REM*213 :REM*157
310 PRINT"(SHFT CLR)":X=1:EN(X) 790 IFPL(X)<1 THEN PRINT"(3 CCSR UPS)":GOTO 780 :REM*143
310 =0:GOSUB 2320 :REM*255 :REM*107
320 WINDOW$,0,39,10,1 :REM*248 800 IFPL(X)>5 THEN GOSUB 580:GOTO 780 :REM*88
330 SPRITE8,1,8,1,1,1,1:SPRITE7 810 IFPL(X)=O(X) THEN PRINT"(SHFT CLR){CRSR DN} DUMMY YOU BET ON "O(X)" TO WIN":SLEEP2:GOTO 770 :REM*221
330 ,1,11,1,0,0:REM BOOKIE :REM*169 820 GOTO 680 :REM*148
340 PRINT"(HOME){CRSR DN}{2 SPACES}WHAT IS YOUR NAME":NA$="" 830 WINDOW$,0,39,10,1 :REM*252
340 :REM*135 :REM*244
350 INPUT"(2 CCSR DNs){2 SPACES}PIGEON ";NA$(X) :REM*167 840 PRINT"(HOME){2 CCSR DNs}{2 SPACES}ANY MORE PLAYERS? "; :REM*244
360 IFNA$(X)=="ORNA$(X)" THEN PRINT"(4 CCSR UPS)":GOTO 350 850 GOSUB 2160 :REM*152
360 :REM*191 :REM*253
370 FORAN=1 TO LEN(NA$(X)) 860 IFX>8 THEN 900 :REM*253
370 :REM*121 :REM*126
870 IFA$<>"Y"ANDA$<>"N"THEN PRINT"(2 CCSR UPS)":GOTO 840 :REM*126
880 IF A$="Y"THEN 320 :REM*112
890 GOTO 920 :REM*206
900 PRINT"(CRSR DN){2 SPACES}Sorry EIGHT IS THE MAXIMUM{2 SPACES}NUMBER{6 SPACES}(CRS

```

THOROUGHBIRD RACING

```

R DN) OF PLAYERS PERMITTED"
      :REM*14
910 SLEEP1      :REM*48
920 EN(X)=1      :REM*173
930 SPRITE7,0:SPRITE8,0:WINDOW0
,0,39,24,1      :REM*154
940 FAST:GOSUB2440:SLOW:REM TRA
CK:REM*141
950 TEMPO12:PLAYB1$      :REM*110
960 REM RUN RACE      :REM*73
970 SPRITE7,0:SPRITE8,0:REM*1
980 FORX=1TO5STEP2:SPRSAVA$(8),
X:NEXT:FORX=2TO4STEP2:SPRSA
VA$(7),X:NEXT      :REM*241
990 FORX=1TO5:MOVSPRX,0,233-X*1
4:NEXT      :REM*190
1000 FORX=1TO5:SPRITE1,X*2-1,
1,0,0,0:NEXT:SPRITE5,1,8
      :REM*57
1010 PRINT"(HOME)"TAB(24)TAB(6
8)"(CTRL 1)(CTRL 9)RACE";R
N      :REM*86
1020 FORX=1TO5STEP2:SPRSAVA$(BD
),X:NEXT:FORX=2TO4STEP2:SP
RSAVA$(BC),X:NEXT      :REM*82
1030 W=INT(RND(1)*5)+1:G(W)=INT
(RND(1)*3)+1      :REM*97
1040 FORI=1TO5:MOVSPRI,+2+G(I),
+0:NEXT      :REM*35
1050 IFPEEK(V+16)<>0THENGOTO108
0      :REM*86
1060 FORJ=5TO15STEP8:POKESX,J:P
OKESX,P:FORKO=0TO10:NEXT:N
EXT      :REM*115
1070 BD=8+(BD=8):BC=7-(BC=7):GO
TO1020      :REM*137
1080 PRINT"(HOME)(CTRL 1)":;FAS
T      :REM*121
1090 REM RESULTS      :REM*234
1100 FORI=0TO4:JJ(I)=PEEK(V+I*2
):JK(I)=PEEK(V+16)AND2(UP
ARROW)I      :REM*174
1110 IFJK(I)>0THENJJ(I)=JJ(I)+2
55      :REM*138
1120 NEXT      :REM*230
1130 FORX=1TO14:PRINTG$;:NEXT:F
ORX=1TO9:PRINTHH$;:NEXT
      :REM*96
1140 PRINTG$;"(CTRL 9){20 SPAC
E}s)OFFICIAL PHOTO{5 SPACES}
(2 HOMEs)":POKE2023,160:PO
KE56295,0      :REM*128
1150 PRINT"(HOME)(CTRL 9){10 SP
ACES)OFFICIAL RESULTS"
      :REM*16
1160 PRINT"(HOME)(CTRL 1){3 CRS
R DNs)":PRINTTAB(5)"(CTRL
9)WIN":PRINTTAB(5)"(CTRL 9
)PLACE":PRINTTAB(5)"(CTRL
9)SHOW(CTRL 0)(HOME){3 CRS
R DNs}"      :REM*197
1170 J=265:CO=0      :REM*148
1180 FORX=0TO4:IFJJ(X)=JTHENPRI
NTTAB(15)"(CTRL 9)":X+1;O$(
X+1):CO=CO+1:D(CO)=X+1
      :REM*215
1190 IFCO=1THENS=D(CO) :REM*156
1200 IFCO=2THENK=D(CO) :REM*183
1210 IFCO=3THEND=D(CO):X=4:GOTO

```



Sometimes a bird wins by a beak.

```

      1240      :REM*8      1690 TT(NR)=TA(NR)*-1:TA(NR)=TA
      1220 NEXT      :REM*67    1700 SPRSAVA$(4),7:SPRSAVA$(5),
      1230 J=J-1:GOTO1180      :REM*128 8:SPRITE7,1,5      :REM*232
      1240 SLOW      :REM*36    1710 PRINT"(CRSR DN){3 SPACES}Y
      1250 GOSUB 2170      :REM*58  OU OWE THE TRACK $"";TT(NR)
      1260 FORX=1TO5:SPRITE1,0:NEXT
      :REM*248    1720 PRINT"(CRSR DN){3 SPACES}P
      1270 REM PAY OFF      :REM*104 LEASE DON'T EVEN THINK(17
      1280 PRINT"(SHFT CLR){2 CRSR DN
      S)":GOSUB2320      :REM*8 SPACES){CRSR DN)ABOUT LEAV
      1290 WINDOW0,0,39,10,1 :REM*162 1730 GOSUB2210      :REM*244
      1300 SPRITE8,1,8,1,1,1,1:SPRITE
      7,1,11,1,0,0:REM BOOKIE 1740 RETURN      :REM*93
      :REM*102    1750 TA(NR)=TA(NR)+B(NR):REM*15
      1310 GOSUB2410:NR=1      :REM*143 1760 PRINT"(HOME){CRSR DN}{2 SP
      1320 IFEN(NR)=1THEN1840:REM END ACES)SO OK{2 SPACES}";SE$(NR
      FLAG      :REM*19      :REM*137
      1330 SPRSAVA$(1),7:SPRSAVA$(6),
      8:SPRITE7,1,11      :REM*96 1770 IFTA(NR)<0THEN1690 :REM*33
      1340 ONKI(NR)GOTO1360,1410,1450
      ,1500      :REM*113 1780 PRINT"(CRSR DN){2 SPACES}Y
      :REM*227
      1350 REM WIN      :REM*158 1790 IFSES(NR)="MR. "THEN1810
      1360 IFO(NR)=STHEN1380 :REM*24  :REM*184
      1370 GOSUB1600:GOTO1560 :REM*82 1800 GOSUB2220:GOTO1830:REM*230
      1380 B(NR)=(B(NR)*4) :REM*2 1810 SPRSAVA$(4),7      :REM*242
      1390 GOSUB1750:GOTO1560:REM*103 1820 POKESS+24,15:SOUND3,900,60
      1400 REM PLACE      :REM*119 ,2,400,50,2,2048:SLEEP1
      1410 IFO(NR)=SORO(NR)=KTHEN1430
      :REM*142 1830 RETURN      :REM*179
      1420 GOSUB1600:GOTO1560:REM*108 1840 GOSUB2170      :REM*138
      1430 B(NR)=(B(NR)*2) :REM*104 1850 FORI=1TO8:SPRITEI,0:NEXT
      1440 GOSUB1750:GOTO1560:REM*177
      :REM*86
      1450 IFO(NR)=SORO(NR)=KORO(NR)=
      DTHEN1480      :REM*97 1860 WINDOW0,0,39,24,1 :REM*61
      1460 GOSUB1600:GOTO1560:REM*180 1870 POKES3281,6:POKE53280,14:P
      OKE646,1      :REM*23
      1470 REM SHOW      :REM*176 1880 FAST:PRINT"(SHFT CLR)"
      1480 GOSUB1750:GOTO1560:REM*217 :REM*172
      1490 REM PARLAY      :REM*115 1890 L(K)=L(K)+1:U(D)=U(D)+1:W(
      1500 IFO(NR)<>STHEN1520:REM*204 S)=W(S)+1      :REM*53
      1510 IFPL(NR)=KTHEN1530:REM*136 1900 PRINTTAB(133);"PAST RECORD
      1520 GOSUB1600:GOTO1560:REM*200 S{4 CRSR DNs}"      :REM*31
      1530 B(NR)=INT(B(NR)*15):REM*80 1910 PRINT"(6 SPACES)NO:1 ";W(1
      1540 GOSUB1750      :REM*85 );"WIN";L(1);"PLACE";U(1);
      1550 REM MORE RACES? :REM*232 "SHOW(CRSR DN)"      :REM*196
      1560 NR=NR+1      :REM*84 1920 PRINT"(6 SPACES)NO:2 ";W(2
      1570 IFNR>8THEN1590 :REM*243 );"WIN";L(2);"PLACE";U(2);
      1580 GOSUB2410:GOTO1320:REM*202 "SHOW(CRSR DN)"      :REM*114
      1590 GOTO1840      :REM*128 1930 PRINT"(6 SPACES)NO:3 ";W(3
      1600 IFTA(NR)<B(NR)THEN1670 :REM*166 );"WIN";L(3);"PLACE";U(3);
      1610 PRINT"(HOME){CRSR DN}{2 SP :REM*225
      1940 PRINT"(6 SPACES)NO:4 ";W(4

```

THOROUGHBIRD RACING

THOROUGHBIRD RACING

```

TRL 6}{SHFT -}{2 SPACES}";           Cs}{COMD R}{4 SHFT Cs}{CO
:REM*170
2610 IFINT((12-X)/2)=(12-X)/2TH     MD R}{4 SHFT Cs}{COMD R}{4
ENPRINTINT(ABS((12-X)/2));          SHFT Cs}{COMD R}{4 SHFT C
:REM*63
2620 PRINT:{2 SPACES}NEXT           :REM*171
:REM*195
2630 PRINT"(CTRL 9){2 SHFT Cs}{    2640 RETURN           :REM*212
COMD R}{4 SHFT Cs}{COMD R}{4 SHFT
Cs}{COMD R}{SHFT C}{HOME}":          2650 DATA" MIDNIGHT{5 SPACES}",
" RED WIDOW{4 SPACES}"," P
URPLE LADY{2 SPACES}"," BL
:REM*135

```

Listing 2. Spritemaker program.

```

1 REM SPRITEMAKER 128 BY HUGH M    12 IFLEN(A$)<21THENB$=A$:GOTO15
CMENAMIN           :REM*54          :REM*112
2 SA=3584           :REM*121          13 IFLEN(A$)<42THENB$=LEFT$(A$,
:REM*199           20)+RIGHT$(A$, (LEN(A$)-21)):GOTO15
:REM*101
4 IFLEN(A$)<62THEN12           14 B$=LEFT$(A$, 20)+MID$(A$, 22, 2
:REM*147           0)+RIGHT$(A$, LEN(A$)-42):REM*243
5 B$=MID$(A$, 1, 20)+MID$(A$, 22, 2
:REM*133           15 FORI=1TOLEN(B$)/2 :REM*148
6 FORI=1TO30           :REM*160          16 CS=MID$(B$, (I*2)-1, 2):H$=LEF
7 C$=MID$(B$, (I*2)-1, 2):H$=LEFT
$(C$, 1):L$=RIGHT$(C$, 1)          T$(C$, 1):L$=RIGHT$(C$, 1)
:REM*200           :REM*195
8 H=VAL(H$):IFH$>"9"THENH=ASC(H
$)-55           :REM*112          17 H=VAL(H$):IFH$>"9"THENH=ASC(H
$)-55           :REM*103
9 L=VAL(L$):IFL$>"9"THENL=ASC(L
$)-55           :REM*151          18 L=VAL(L$):IFL$>"9"THENL=ASC(L
$)-55           :REM*158
10 BY=H*16+L:POKESA,BY:SA=SA+1
:REM*200           19 BY=H*16+L:POKESA,BY:SA=SA+1
:REM*193
11 PRINT".":NEXT:GOTO3:REM*186    20 NEXT:GOTO3           :REM*114
:REM*186

```

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```

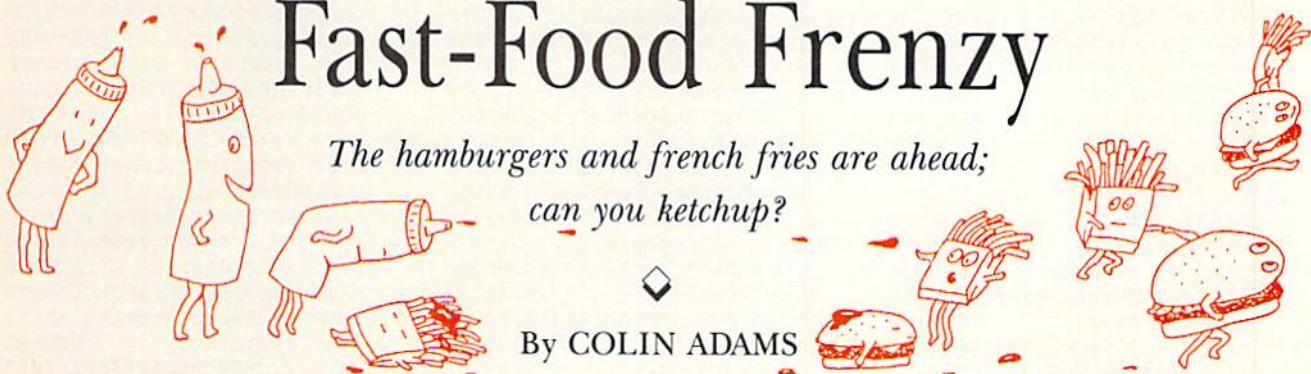
UE SMOKE{3 SPACES}"," YELL
OW BIRD{2 SPACES}":REM*213
2660 POKESS+24,15:SOUND3,44000,
30,0,41000,80,2,2300:FOR=1
TO525:NEXT:SOUND3,40000,2
5,1,10000,400,2,3000:RETUR
N :REM*151
2670 POKESS+24,15:SOUND1,39000,
36,0,36000,500,2:RETURN
:REM*135
21 BSAVE"SPRITES",B0,P3584TOP40
96 :REM*248
22 END :REM*150
100 DATA 007E0003FFC0FFFF01F F
FF01FFFF81FFFF8DC7C 7BFEEF
F7FFFFE7FFFFE :REM*151
110 DATA FFFFFFFDFFFFB1FC3F81F F
FF80FFFF003FFC000FF 00007E0
0007E00007E00 :REM*237
120 DATA 007E0000007E0003FFC0 0
FFFF01FFFF01FFFF81F FFFF8DC7
C7BFDFDF7FFF :REM*92
130 DATA FE7FFFFE7FFFFFDEFF7B 1
F3CF81FC3F80FFFF003 FFC000F
F00007E00007E :REM*179
140 DATA 00007E00007E0000007E 0
003FFC00000001FFFF0 1FFFF81
FFFF8DFC7BDD :REM*82
150 DATA DEFF7E3FF7FFFFEFFFF F
FDFFF7B1FFC80F83F8 0FFFF00
3FFC000FF000 :REM*150
160 DATA 7E00007E00007E00007E 0
0D5007E0003FFC00FFF F01FFFF
01FFFF81C3C38 :REM*251
170 DATA DFDBFBFE7E7F7FFFFE7F F
FFFEFFFF003FFC0 :REM*16
180 DATA 00FF00007E00007E0000 7
E00007E00D500000000 0000005
500005000055 :REM*255
190 DATA 0000000000000000000000000
01400B55E02D6978B9 556EED5
57BBB55EE2E55 :REM*25
200 DATA B80B96E00ED7B00B96E0 0
ED5B83B00EEEC00BB2A 0000000
000000550000 :REM*128
210 DATA 55000055000000000000000
0000000014003B55EC 2D69783
9556C2D55783B :REM*251
220 DATA 55EC2E55B83B96EC0ED7 B
00B96E00ED7B00B82E0 0E0B02
A000006000047 :REM*72
230 DATA 0000F40000E600018200 0
341001EA1607FE2FBFF FE0FFFF
E07FFFC03FFF8 :REM*9
240 DATA 01FFF00005E0000A0000 1
C00000A000011000020 800404
00040300000000 :REM*148
250 DATA 060001070003C4000382 0
00702000DC2003B0200 FFC467F
FFCFFFFC8FFF :REM*11
260 DATA F807FFF003FFE0003D80 0
7E1000402000807FE10 0001200
000C0000000000 :REM*34
270 DATA 0000,-1 :REM*251

```

Circle 81 on Reader Service card.

Fast-Food Frenzy

*The hamburgers and french fries are ahead;
can you ketchup?*



In Ketchup Attack, a shoot-'em-up game that you'll play with relish, a barrage of hamburgers and french fries descends toward the squeezable ketchup bottle poised at the bottom of the screen.

To dispatch the incoming edibles, move the bottle left and right with a joystick in port 2 and squirt ketchup at them by pressing the firebutton. Hitting a bag of fries raises your score by 20 points, a burger by 30.

Of course, while you're squirting the fast foods, you must avoid colliding with

them; each collision costs a "life." You start play with four lives, lose one to each collision, but then gain one for every level completed. To complete a level, you must splat a number of burgers equal to your level number multiplied by ten. In other words, at level two you must splat 20 burgers.

The game is written entirely in machine language, encoded into Basic Data statements. Type in Listing 1, using *RUN*'s Checksum program to detect typing errors, and save a copy to disk before you run it.

After you have run Listing 1, which creates the actual machine language program called Ketchup Attack, type in and save the following small boot program on the same disk.

```
10 IF A=0 THEN A=1:LOAD"KETCHUP
ATTACK",8,1 :REM*228
20 SYS 49152 :REM*186
```

To play the game, just load and run the boot program.

An 11th grade student in Canada, Colin Adams is a self-taught programmer.

Running Instructions: Type in, save and run Listing 1 and then the boot program in the text. To play, load and run the boot program.

Listing 1. Machine language creator program. (Available on ReRUN disk. See page 37.)

```

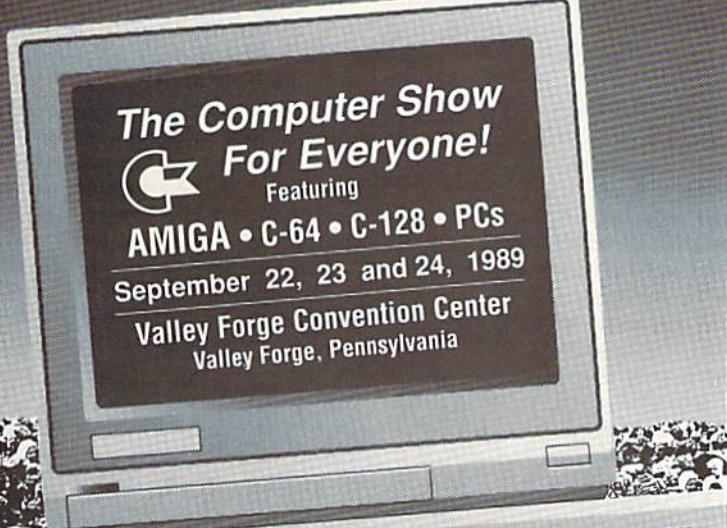
0 REM LISTING 1 CREATES (AND SHOULD NOT BE CALLED) KETCHUP ATTACK :REM*124
5 OPEN 8,8,8,"KETCHUP ATTACK,P,W" :REM*254
6 CT=0:PRINT"(SHFT CLR)":REM*56
10 READ A$:IF A$="-1" THEN CLOS E8:PRINT:PRINT"ALL DONE":END :REM*23
12 PRINT"(HOME)READING LINE "+STR$(CT):CT=CT+1 :REM*141
15 IF LEN(A$)<62 THEN 55 :REM*254
20 B$=MIDS(A$,1,20)+MIDS(A$,22,20)+MIDS(A$,43,20) :REM*242
25 FOR I=1 TO 30 :REM*181
30 C$=MIDS(B$, (I*2)-1,2):H$=LEF T$(C$,1):L$=RIGHT$(C$,1) :REM*209
35 H=VAL(H$):IF H$>"9" THEN H=A SC(H$)-55 :REM*85
40 L=VAL(L$):IF L$>"9" THEN L=A SC(L$)-55 :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY); :REM*67
50 NEXT:GOTO 10 :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT O 70 :REM*184
60 IF LEN(A$)<42 THEN B$=LEFT$(A$,20)+RIGHT$(A$, (LEN(A$)-21 )):GOTO 70 :REM*176
65 B$=LEFT$(A$,20)+MID$(A$,22,20)+RIGHT$(A$,LEN(A$)-42) :REM*140
70 FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MIDS(B$, (I*2)-1,2):H$=LEF T$(C$,1):L$=RIGHT$(C$,1) :REM*140
80 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
90 BY=H*16+L:PRINT#8,CHR$(BY); :REM*148
95 NEXT:GOTO 10 :REM*160
100 REM KETCHUP ATTACK :REM*43
101 DATA 00C02046C0205DC22090*C 220FAC120C6C020B0C2*20ABC02 0D8C5209DC320 :REM*62
102 DATA DFC42075C52036C1208F*C 12007C32057C320C6C3*200CC4C EEDC8AEDEC8D0 :REM*78
103 DATA E6A9008D04D08D05D04C*2 1C0A00B952C690030*C8D0F7A 000B952C79900 :REM*235
104 DATA 31C8C04190F5A9C08DF8*0 7A9C18DF907A9C28DFA*07A9C38 DFB078DFC078D :REM*214
105 DATA FD07A9C48DFE078DF07*A 9FB8D1CD0A9028D25D0*A9058D2 6D0A907A00099 :REM*233
106 DATA 27D0C8C008D0F8A9018D*2 868200EC6CEDAC820E9*C120DFC ►

```

RUN it right: C-64; joystick

FAST-FOOD

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TELECOMPUTING WORKSHOP

Loren's latest and greatest list of telecomputing tools of the trade.

By LOREN LOVHAUG

TELECOMMUNICATING CAN often add new meaning to the adage, "Nothing worth doing is easy." Fortunately, armed with a few choice tools and a little experience, some of the tedium can be rendered more palatable.

One of my goals for this column has been to help you acquire the tools and experience necessary to make your online sessions more enjoyable. Here's a look at what I call my "odds and ends" list. These utilities are sometimes difficult to classify, but are easy to justify.

OMEGA-Q

In my opinion, Omega-Q is the single greatest thing to happen to C-64/128 telecommunications since 1200-baud modems became affordable. This utility is likely to take the place of at least a dozen programs as your favorite utility disk.

Omega-Q combines the best features of a disk-file copier and sequential file reader/printer. It also has the ability to dissolve files that have been combined or compressed with any of the major C-64/128 file-transfer utilities, including those created with Arc, Lynx, Library and Arkive. (For a discussion of the aforementioned, see this column in the June 1989 issue of *RUN*.) In addition, Omega-Q can dissolve a disk full of self-dissolving Arc- or SIDplayer-type music files at one time!

The program is menu driven, well documented and so precisely implemented that it could serve as an example to Commodore programmers of how to create a straightforward, yet comprehensive, application.

Omega-Q supports both single and multiple drive configurations (including any combination of 1541, 1571 and 1581), and lets you perform a variety of disk housekeeping functions like file copying, batch scratching and disk formatting. Other useful disk functions—file locking and unlocking, file unscratching and file-type changing—are also supported. I salute Robert Stoerle for creating what I consider to be the finest, all-inclusive telecommunications

utility in the Commodore world.

Omega-Q has been licensed to Quantum Computer Services, so it can't be placed on any other commercial telecommunications system. However, user's groups and BBS SYSOPs can get permission from Q-Link to distribute and retransmit the program. I strongly recommend that anyone with access to Q-Link download this program.

VELVEETA 64 AND VELVEETA 128

Long-time Commodore programmer, Kevin Hisel, is responsible for some of the greatest 64/128 public domain utilities, including his famous Disk Doctor programs. One of his lesser-known triumphs is Velveeta, so named because it transforms and blends sequential text files into a generic format. For instance, Velveeta can be prompted to strip carriage returns that often terminate lines (especially in files buffered during online sessions), making text much easier to reformat with word processors.

In addition, Velveeta can be told to strip the non-alphanumeric formatting characters that some word processors add to text. You can also have the program remove leading and trailing spaces from justified text, as well as add two spaces after punctuation marks at the ends of sentences.

Even if you only capture an occasional text file or exchange word-processed text via modem, I strongly suggest you download Velveeta from Q-Link, GENIE or your local BBS.

EBBSTERM44/128

Ed Parry's EBBSTERM is a very simple, bare-bones C-128 terminal program that could easily go unnoticed in the sea of public domain programs. However, if you use GENIE or any other non-Commodore-exclusive telecommunications network or BBS, you might want to grab this little wonder. What makes EBBSTERM so special is that it supports some very fast and convenient file-transfer protocols not nor-

mally found in Commodore 8-bit terminal programs. Examples of these are the 1K Xmodem and Ymodem batch (multi-transfer) as well as the standard Xmodem and Punter.

On a system like GENIE that supports Ymodem batch transfers, you can use EBBSTERM to specify that multiple files automatically be transmitted and saved to your disk without user intervention. Simply, this means that you can tell the system you're downloading from to send the files you want, and Ymodem batch takes care of the details.

GEOS CONVERT (V2.1 OR LATER)

According to Berkeley Softworks, there are now 500,000 GEOS users worldwide. Many of these people are using GEOS to create beautiful artwork, sharp character fonts and even custom applications.

However, due to the data filetypes and extra information Berkeley encodes in GEOS directories, GEOS files can't be easily transferred by most conventional terminal packages. To solve this dilemma, Berkeley and some talented GEOS programmers have created file conversion utilities that transform GEOS files into specially encoded sequential or program files.

These utilities run under GEOS and utilize standard point-and-click-type file requestors and gadgets. Although there are a number of versions of this utility, I strongly recommend that you look for versions 2.1 or later, authored by renowned GEOS programmer Bill Coleman, as his are generally faster and more thorough. ■

Loren Lovhaug is a programmer and writer with lots of telecommunications experience. Along with being SYSOP of Q-Link's C-128 Special Interest Group, he publishes Twin Cities 128, a newsletter for C-128 users. You can write to him care of Telecomputing Workshop, RUN Magazine, 80 Elm St., Peterborough, NH 03458.

You can also send him electronic mail on QuantumLink (LOVHAUG) or GENIE (Sparrow.J).

GAMES GALLERY

From board game to mainframe to personal computer, here's a look at the evolution of fantasy role-playing games.

By JOHN RYAN

ADVANCED DUNGEONS AND DRAGONS (AD&D), which appeared as a board game in the 1970s, caught on quickly, making the transition from cottage industry to world-wide success story. Aside from an active imagination, this early AD&D required little in the way of resources or equipment, other than a player's handbook and dice, and it was avidly played by hosts of college students, perhaps as an antidote to dull books.

In retrospect, it seems perfectly logical that AD&D's next metamorphosis should be to the computer. Actually, one of the most successful pre-1980s' computer games was written for a mainframe. Called Adventure, it had a cult-like following among college campus techies and business people whose companies boasted mainframe computers. Then, as the first personal computers began to make their way out of Silicon Valley, it didn't take long to see that AD&D and other games would lend themselves well to the PC medium.

PURE WIZARDRY

In 1981, when Wizardry: Proving Grounds of the Mad Overlord (see *RUN*'s Software Gallery for November 1988) was released for the Apple computer, the world was introduced to fantasy role-playing (FRP) on a personal level; its success was phenomenal.

The Wizardry series, now numbering five, proved that the essence of AD&D could be brought to life on PCs. The two Commodore versions basically present the same gaming style: You must gather together and equip a group of six adventurers, and then set off in search of exciting experiences in underground mazes.

In keeping with the AD&D configuration, Wizardry lets you create characters of different races—elves, dwarves and gnomes, among others. Each character can possess varying levels of strength, IQ, piety, vitality, agility and luck. (You'll notice that many authors go to great lengths to avoid the same characteristics listed in the original AD&D manuals: strength, intelligence,



Wizardry I.



Ultima IV.

wisdom, dexterity, constitution and charisma.)

The dungeons of Wizardry are really the heart of the program, for it is there where characters either die a quick death or slowly gain the resources to grow into superior fighters through experience and gold gained in battle. Dying in Wizardry is very easy to do, and since you need characters developed in Wizardry I to play the second scenario, losing a key player can be a traumatic experience. It's no wonder that Wizardry players tend to be fanatical about periodically backing up character disks or purchasing special editors that let them bring dead characters back to life.

THE BRITISH INVASION

The years from 1981 to 1983 were a confusing time, beset by a market frantic

in its efforts to introduce new arcade games to satisfy the appetite of the software-hungry public. Richard Garriott—pegged early on in life with the nickname, Lord British—saw things differently, and was eager to produce a product that could bring the flavor of AD&D to the public, yet present it in a style consistent with his own personal philosophy. Late in 1980, Ultima I was born. The game's marginal success moved Garriott to create Ultima II, which laid the groundwork for a string of best-selling Ultima sequels.

The Ultima sagas evolved into a genre of their own. Gone were the simple, hack and slash, find-the-treasure adventures with stark 3-D corridors and parry-thrust-parry battles. Welcome to the realm of Britannia, a mythical land of chivalry and dragons, and the benevolent Lord British himself.

As the years passed, each new Ultima grew in sophistication, changing from good versus evil contests into more intricate adventures. In Ultima IV (Software Gallery, June 1986), we began to see honesty, humility and justice, which led many gamers to reverse their long-standing inclination to kill everything in sight!

In Ultima V (see Games Gallery in *RUN*'s February 1989 issue), Lord British has vanished, and you must face personal and moral dilemmas as you travel through Britannia in search of him. The game is four disks long, and the detail is astounding. Ultima has become the king of spot animation. You'll find waterfalls, clocks that tick, mirrors that reflect, and a working, traveling populace.

Veterans of previous Ultimas will be glad to know that they can use their old characters. If you go into Ultima V afresh, you spend more time—at least initially—trying to survive while recruiting other characters for your party.

Ultima VI, now under development, should be ready within two years.

THEY SAW FARTHER

The Bard's Tale series can trace its roots back to Wizardry. Many Bard's



GAMES GALLERY

Tale command structures are virtually identical to Wizardry's. But where Wizardry was basic design, bare-bones graphics, with a rather shallow plot, Bard's Tale I (Software Gallery, July 1986) bolted from the gates with a clear-cut mission: Give the player a D&D environment, three-dimensional graphics, a town, dungeons to move around in and skull-knocking puzzles and plot twists. These qualities, incorporated by programmers Brian Fargo and Michael Cranford, proved successful. Bard's Tale quickly moved to the top of the software charts soon after its release in 1985.

Bard's Tale I, staged in the mythical town of Skara Brae, sets you and five other comrades in search of the evil wizard, Mangar. Like Wizardry, there are a host of character classes, races and professions to choose from. Perhaps the most ambitious addition to this type of game, however, is the inclusion of four separate spellcaster classes and over 80 different spells!

By the time Bard's Tale II: Destiny Knight (Software Gallery, April 1987) appeared in 1986, it found an active gaming public with a voracious appetite for more of the saga. While it is clearly a more ambitious program than its predecessor, Bard's Tale II is, perhaps, the easiest of the trilogy to master.

The current installment, Bard's Tale III: Thief of Fate (Software Gallery, January 1989), finds the town of Skara Brae in ruins, leaving you to quest through seven different dimensions in search of a character with the ominous name of The Evil One.

Each successive Bard's Tale improved the speed, graphics and quality of play. Happily for the pencil-weary adventurer, BT III includes an auto-mapping feature that helps you explore its mind-boggling 84 dungeon levels. In addition, you'll find over 500 monsters to contend with. For variety, there are now 13 different character classes, including seven types of spellcasters. Fortunately, although it's not necessary, characters created in earlier games can be ported over to the newest releases.

While the Bard's Tale series has neither the interaction nor plot sophistication of the Ultima line, it does a remarkably good job of creating a world that will keep most gamers hopping for hundreds of hours.

I WAS A TEENAGE ULTIMA

Released last year, Deathlord is a wolf dressed in Ultima clothing. Here we see Ultima trademarks like overhead views, complete with spot animation, line-of-

sight barriers and other types of graphics. This is not to say, however, that the game is unoriginal or without merit.

Deathlord is an immense program

that will take the average gamer approximately 150 to 200 hours to complete. It's also the first fantasy role-playing game to be set in the Orient.

Table 1. Adventuring hints and tips.

Bard's Tale I:

—The name of the one god is Tarjan. You'll need to know this in order to enter the catacombs.

—If your party dies, you'll be returned to the guild, without gold. Always make a copy of your character disk after each important session. If you get killed, you can create a temporary character who can use your back-up party's pooled gold to resurrect most of the deceased party. If you're not worried about losing the experience points, you can simply load the party from the back-up disk. Immediately resave the resuced party!

—Keep your spare-character slot filled with a powerful, non-playing character, especially before a big battle. Monsters will tend to attack them first.

Bard's Tale II:

—The six gods are Lanitar, Alliria, Ferofist, Werra, Sceadu and Valarian.

—Stuck at the double door in the beginner's dungeon? Just sing a "Watchwood" melody.

—Although it's expensive, the dream spell can be used to gain entry to any dungeon.

Bard's Tale III:

—You'll need a wineskin (or something similar) to get past Valarian's tower.

Ultima IV:

—You'll find a special horn on an island off the tip of Spiritwood. Search the island well.

—Need a sextant? Ask for item "d" in Vesper.

—When questioned about the "Pure Axiom" in the Chamber of the Codex, answer with the translated eight letters you saw in each of the eight shrines. The key is in the order in which you used the stones to enter the Codex!

—What to do with the horn when you find it? Blow it often near the Shrine of Humility.

Ultima V:

—Lord British will appear in your dreams. This is the only way you'll be promoted from one level to another.

—You'll find the keep of the Shadowlords in a rocky place south of Minoc.

—Looking for a grapple? Talk to a lord in Empath Abbey.

—If all else fails, you can use a cannon to blow up the door of this famous lord's apartment.

—The only way enabling you to fly is found in this man's bedroom. Is it shag or medium pile?

Deathlord:

—The Guards are long on memory. Once you are on their bad side, don't bother coming back to town.

—Need a sea ticket? Kill a sailor.

—Sleep on a full stomach.

Table 2. Manufacturers' addresses.

Wizardry series

Sir-Tech Software
PO Box 245
Ogdensburg, NY 13669

Ultima series

Origin
136-B Harvey Rd.
Londonderry, NH 03053

Bard's Tale series; Deathlord

Electronic Arts
1820 Gateway Drive
San Mateo, CA 94404

Pool of Radiance; Hillsfar; Heroes of the Lance; Dungeon Masters Assistant

Strategic Simulations, Inc.
1046 N. Rengstorff Ave.
Mountain View, CA 94043

GAMES GALLERY

You have been called upon by the emperor of Kodan to vanquish the source of evil that has brought death and destruction upon the land. This entails traveling the large continent, exploring a vast array of dungeons, towns and pyramids, and interacting with the game's various entities.

The program is certainly ambitious, but it falls somewhat short of where the Ultima and Bard's Tale series have gone. It doesn't offer the strategic battles of Ultima, nor does it provide for the crisp, detailed monster graphics of Bard's Tale.

While Deathlord is interesting and notable in some ways, I found the Oriental flavor to be more window dressing than an active plot ingredient. I feel that players coming off Ultima or Bard's Tale campaigns may step away from Deathlord feeling like they've just eaten Chinese food: full, but still hungry.

THE CIRCLE IS COMPLETE

In 1988, Strategic Simulations entered a licensing agreement to produce computer FRP games under the AD&D



Pool of Radiance.

logo, resulting in the titles Pool of Radiance, Hillsfar, Heroes of the Lance and Dungeon Masters Assistant.

Pool of Radiance and Hillsfar are FRP games that follow the lines of true AD&D. We can once again generate players with strength, intelligence, wisdom, dexterity, constitution and charisma, while rediscovering ability scores, multiple classes, honest-to-goodness alignments, saving throws and spell books.

Both games place you in a three-dimensional world filled with monsters and bad guys. While they may not have quite the sophistication or plot twists of an Ultima or a Bard's Tale, they'll feel like a comfortable pair of old jeans to die-hard AD&D players.

CONCLUSION

Where the FRP genre will finally end up is anyone's guess, because there are a number of other games that have made a major impact on the industry: Wizard's Crown, Questron, Legacy of the Ancients, Phantasie and Times of Lore, to name a few. The appeal of these games has also spawned a new class of role-playing game involving science fiction. Wasteland, Mars Saga and Project Firestart are examples of this new genre.

I could go on and on, and still leave much unsaid about the fascinating realm of fantasy role-playing games. ■

John Ryan, this month's games guru, is one of R&N's steadily prolific contributing editors.

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RUN'S CHECKSUM

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. When typing in a program from **RUN**, first load and run **RUN's Checksum**. The screen will display a SYS number 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.

With this new version, 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 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 SYS number. Save the finished program.

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. 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 clear home key

{2 CCSR 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

{FUNCT 1}—press the F1 key

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

Listing 1. RUN's Checksum program. This program is available on RUN's BBS for users to download.

```

10 REM RUN'S CHECKSUM 64/128 - BOB KODADEK
20 MO=128:SA=3328:IF PEEK(40960)THEN MO=64:SA=4
9152
30 FOR I=0TO169:READB:CK=CK+B:POKE SA+I,B:NEXT
40 IFCK<>20651 THENPRINT"DATA ERROR!":END
50 POKESA+110,240:POKESA+111,38:POKESA+140,234
60 PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
70 PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128
THEN 100
80 POKESA+13,124:POKESA+15,165:POKESA+25,124:PO
KESA+26,165
90 POKESA+39,20:POKESA+41,21:POKESA+123,205:POK
ESA+124,189
100 POKESA+4,INT(SA/256):SYS SA:NEW
110 DATA 120,162,24,160,13,173,4,3,201,24,208,4
,162,13,160,67,142,4,3,140
120 DATA 5,3,88,96,32,13,67,152,72,169,0,141,0,
255,133,176,133,180,166,22
130 DATA 164,23,134,167,132,168,170,189,0,2,240
,58,201,48,144,7,201,58,176
140 DATA 3,232,208,240,189,0,2,240,42,201,32,20
8,4,164,180,240,31,201,34
150 DATA 208,6,165,180,73,1,133,180,230,176,164
,176,165,167,24,125,0,2,133
160 DATA 167,165,168,105,0,133,168,136,208,239,
232,208,209,169,42,32,210
170 DATA 255,165,167,69,168,170,169,0,32,50,142
,169,32,32,210,255,32,210
180 DATA 255,169,13,32,210,255,104,168,96,104,1
70,24,32,240,255,104,168
190 DATA 96,56,32,240,255,138,72,152,72,24,162,
0,160,0,32,240,255,169
200 DATA 42,208,198

```

GEOWATCH

These subroutines make it possible to increase the color memory of geoProgrammer's bitmap screen.

By JAMES E. HOSEK

WITH ITS BUILT-IN GRAPHICS Kernel, text, I/O and math routines, geoProgrammer provides an excellent environment for C-64 programmers. Through its use of menus, icons and interrupt-driven processes within structured programming, it greatly simplifies the task of putting together complex and interactive applications.

However, geoProgrammer lacks routines that manage the color memory for the bitmap screen. In Color Me GEOS, I've designed four routines that let you manipulate the screen's color by filling, saving or restoring specified rectangular areas of color memory.

HOW COLOR MEMORY WORKS

Think of the screen as being made up of 8×8 blocks of pixels. Commonly referred to as a card, each block consists of eight bytes of bitmap data, and each card is assigned one byte of color data.

Color memory is mapped out in exactly the same way as text screen memory—25 rows of 40 color bytes each. In fact, in Bitmap mode, the VIC-II video chip uses the text screen as color memory.

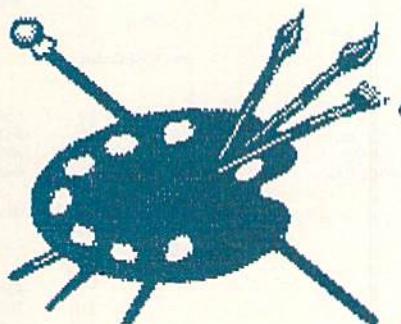
Each byte of color memory is divided into two segments, called nybbles, of four bits each. The top four bits—the first nybble—specify the foreground, or pixel color, for that card. The bottom four bits constituting the second nybble create the card's background color. Together, they specify the color card for that particular 8×8 bitmap card.

For example, to make white dots on a purple background, the color card would have the value $1*16+4=20$ (\$14). Each of the 1000 8×8 sections of bitmap screen can take on one of 256 different color combinations.

SCREENCOLOR

The first routine in Color Me GEOS is called ScreenColor, which lets you initialize the screen, border and mouse colors to the values specified in pseudoregister r0.

ScreenColor takes advantage of rou-



tines within geoProgrammer to change the border and mouse colors, and it accesses ColorBox (see below) to alter the screen color.

COLORBOX

ColorBox lets you work in a rectangular area that must fall within card boundaries. Because icons must be specified as rectangular areas, you can highlight different icons with different foreground colors. ColorBox also distinguishes the menu bar with a different set of colors.

When used in conjunction with SaveColor and RestoreColor (see below), you can create colorful dialog boxes. Since the standard dialog box icons are 6×2 cards in size, you can highlight the different icons within a dialog box.

SAVECOLOR

The SaveColor routine is similar to ColorBox, except that no color card is specified. SaveColor saves the color memory within a rectangular area in a

compacted form. The compacted data consists of two bytes, the first a color-card value, and the second a counter value.

Color memory in the area specified is scanned from right to left and top to bottom. Every time the color-card value changes, a new set of data is saved to the data area.

If you have two calls to SaveColor without restoring the first block of data with RestoreColor, the first set of data is lost.

RESTORECOLOR

The final routine, RestoreColor, complements SaveColor. It restores the previously saved data to a rectangular area. The values for top, left, width and height of this area should be the same as for the previous SaveColor routine; if they are not, the results may be unpredictable.

SaveColor and RestoreColor can be used with dialog boxes, the boundaries of which should fall on the 8×8 card boundaries in order to coincide with color memory.

To use my routines in your own geoProgrammer applications, place a copy of Listing 1 on your work disk and include it in your link file. Listing 2 demonstrates saves for use with ColorBox and SaveColor. Listing 3 is the link file for the demo program.

Now, go ahead and enjoy your newly colored world of GEOS! □

James Hosek is a veterinarian by profession and a veteran C-64 programmer by avocation.

Table 1. Reference sources.

The Official GEOS Programmer's Reference Guide, Bantam Books, 1987.
geoProgrammer User's Manual by Matthew G. Loveless, Berkeley Softworks, 1987.

Mapping the Commodore 64 by Sheldon Leemon, Compute! Books, 1984.
Commodore 64 Programmer's Reference Guide, Commodore Business Machines, Inc., 1983.

G E O W A T C H

Listing 1. Color subroutines for GEOS.

```

.if      Pass1          ; include symbol and macro files
.noeqin
.include geosSym
.include geosMac
.eqin
.endif

ScreenColor:
    jsr    InitForIO    ; r8L - FOREGROUND * 16 + BACKGROUND
    MoveB r8H, extclr
    lsr    a
    lsr    a
    lsr    a
    lsr    a
    sta    mob8clk
    jsr    DoneWithIO
    lda    r8L
    jsr    i_ColorBox
    .byte  0, 0, 40, 25
    rts

ColorRam:
    ; Subroutine to calculate color
    ; memory location of top
    ; left corner of specified box.
    lda    #8
    sta    r8H
    lda    r1H
    ; get top
    asl    a
    asl    a
    adc    r1H
    asl    a
    asl    a
    rol    r8H
    asl    a
    rol    r8H
    adc    r1L
    bcc    1000$:
    inc    r8H
    1000$:
    sta    r3L
    lda    r8H
    clc
    adc    #$8C
    sta    r3H
    MoveB r2H, r4H
    rts

i_ColorBox:
    ; Inline Routines
    ldy    #$80
    .byte  $20
    ; .a - FOREGROUND * 16 + BACKGROUND
    ; (for i_ColorBox only)
    ; Inline Pass (data appears immediately after the jsr):
    i_SaveColor:
    ldy    #$40
    .byte  $2C
    ; .byte left column of box (0 - 39)
    ; .byte top row of box (0 - 24)
    ; .byte width of box in cards (1 - [40-left])
    ; .byte height of box in cards (1 - [25-top])
    i_RestoreColor:
    ldy    #$80
    sty    r8H
    ; Retrieve and Store Inline Data
    sta    r8L
    PoplL r3
    ; get return address (data after jsr)
    ldy    #1
    lda    (r3), y
    ; left
    sta    r1L
    iny
    lda    (r3), y
    ; top
    sta    r1H
    iny
    lda    (r3), y
    ; width
    sta    r2L
    iny
    lda    (r3), y
    ; height
    sta    r2H
    tya
    clc
    adc    r3L
    ; calculate new return address
    sta    r3L
    bcc    1000$:
    inc    r3H
    PushL r3
    ; push new address onto stack
    bit    r8H
    ; branch to appropriate routine
    bmi    RestoreColor
    bus    SaveColor

ColorBox:
    ; Fill rectangle with specified color card
    ; r8L - color byte
    ; r1L - left    r1H - top
    ; r2L - width   r2H - height
    jsr    ColorRam ; Calculate memory location of Color RAM
    1000$:
    lda    r8L
    ldy    r2L
    dey
    sta    (r3), y
    dey
    bpl    2000$:
    dec    r4H
    beq    ColorOut
    lda    #40
    clc
    adc    r3L
    sta    r3L
    bcc    1000$:
    inc    r3H
    bne    1000$:
    rts

RestoreColor:
    ; Fill rectangle with data from last SaveColor
    ; r1L - left    r1H - top
    ; r2L - width   r2H - height
    ColorOut:
    jsr    ColorRam
    ldx    #FFF
    stx    r8H
    jsr    GetColorData
    ; Calculate memory location of Color RAM
    ; Set pointer to color data
    2000$:
    ldy    r2L
    dey
    sta    (r3), y
    dex
    cpx    #255
    bne    3000$:
    jsr    GetColorData
    ; Get first set of color data
    ; (a-color card, x - number of bytes)
    ; Restore Color Data
    3000$:
    dey
    bpl    2000$:
    dec    r4H
    beq    RestoreOut
    pha
    lda    #40
    clc
    adc    r3L
    sta    r3L
    pla
    bcc    1000$:
    inc    r3H
    bne    1000$:
    rts

RestoreOut:
    jsr    ColorRam
    ldy    r2L
    GetColorData:
    ; Retrieve 2 bytes of screen color data
    sty    r4L
    sty    r8H
    ldy    $7F40, y
    ; byte 1 - color card
    ldx    $7F40, y
    ; byte 2 - number of bytes for this card
    sty    r8H
    ldy    r4L
    rts

SaveColor:
    ; Scan and store color memory in compacted form
    ; r1L - left    r1H - top
    ; r2L - width   r2H - height
    SaveData:
    jsr    ColorRam
    ; Calculate memory location of Color RAM
    ldx    #FFF
    stx    r8H
    ldy    r2L
    ; Scan color memory
    dey
    lda    (r3), y
    r8L
    ldy    (r3), y
    cmp    r8L
    ; if the same as previous color card,
    ; increase counter value
    3000$:
    beq    pha
    lda    r8L
    jsr    SaveData
    pla
    sta    r8L
    ; and start counting new color card
    inx
    cpx    #FFF
    ; if 255 bytes, then save data and
    ; start new counter
    bne    4000$:
    jsr    SaveData
    dey
    bpl    2000$:
    dec    r4H
    beq    SaveData
    lda    #40
    clc

```

G E O W A T C H

```

    ndc    r3L
    sta    r3L
    bcc    5000$ 
    inc    r2H
    ldy    r2L
    dey
    bpl    2000$ 

SaveData:          ; Saves two bytes of screen color data
    sty    r4L
    ldy    r0H
    iny
    sta    $7F40, 4      ; byte 1 - color card
    iny
    pha
    txa
    sta    $7F40, 4      ; byte 2 - number of bytes
    pla
    sty    r0H
    ldy    r4L
    ldx    #$FF
    rts

```

Listing 2. Demo program.

```

.if      Pass1          ; include symbol and macro files
.noeqn
.include geosSym
.include geosMac
.eqin
.endif

FileStart: L0ndB r8L, DKGREY * 16 + LTGREY      ; Screen Colors
L0ndB r0H, BLUE * 16 + LTGREY      ; Mouse and Border Color
jsr     ScreenColor          ; Set Colors
L0ndW r0, ColorDialog
jsr     DoDloBox            ; Go do Dialog Box
jsr     l_SaveColor          ; Restore Color under Dialog Box
.byte   7, 7, 24, 14        ; ( inline data )
jmp    EnterDeskTop        ; Return to DeskTop

ColorDialog:          ; Dialog Box Definition Table
.byte   SET_DB_POS | 1      ; Set Position
.byte   56, 167
.word   56, 247
.byte   DB_USR_ROUT        ; Call routine to set up color memory
.word   SetUpDB
.byte   OK
.byte   2, 88
.byte   CANCEL
.byte   16, 88
.byte   DBTXTSTR            ; Text for Dialog Box
.byte   4, 18
.word   DBInfo1
.byte   DBTXTSTR
.byte   4, 22
.word   DBInfo2

```

```

    .byte   DBTXTSTR
    .byte   4, 34
    .word   DBInfo3
    .byte   DBTXTSTR
    .byte   4, 46
    .word   DBInfo4
    .byte   DBTXTSTR
    .byte   4, 58
    .word   DBInfo5
    .byte   DBTXTSTR
    .byte   4, 70
    .word   DBInfo6
    .byte   DBTXTSTR
    .byte   88, 94
    .word   Pick
    .byte   DBTXTSTR
    .byte   88, 103
    .word   One
    .byte   0

```

; End of Table

; TEXT DATA

"This is an example of how color can be", 0
 "used to spice up Dialog Boxes in GEOS.", 0
 "Four special Color subroutines allow you", 0
 "to change the border and mouse colors", 0
 "and the background and pixel color of", 0
 "any part or all of the screen.", 0
 "PICK", 0
 "ONE", 0

DBInfo1: ; Save Color Memory under ; Dialog Box ; (inline data) ; Screen Color for Dialog Box ; Call ColorBox using parameters ; from previous call to ; l_SaveColor ; Set color for OK Icon	.byte l_SaveColor .jsr i_SaveColor .byte 7, 7, 24, 14 .word L0ndB r8L, WHITE * 16 + PURPLE .jsr ColorBox .ida #LTRED * 16 + RED .jsr i_ColorBox .byte 9, 18, 6, 2 .ida #LTGREEN * 16 + GREEN .jsr i_ColorBox .byte 23, 18, 6, 2 .ida #YELLOWW * 16 + PURPLE .jsr i_ColorBox .byte 15, 18, 8, 2 .rts
---	--

Listing 3. Link file program.

```

.output  Color_Demo
.seq
.psect  $8400
DEMO.rel
COLOR.rel

```



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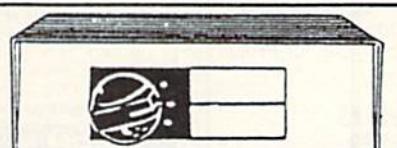
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YOU HAVE TYPED IN A *RUN* PROGRAM and are having some problems getting it to run. After a while, you feel like calling for help, but since we're not next door, it's expensive to call us. But we can share our experiences with you. Having heard from 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. If so, perhaps the answers will help you find and correct the difficulty.

- 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 line that reads the data, usually a For... Next loop. Make sure you have the proper values for the loop, because if 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. More likely, you may have 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.

- You get an Illegal Quantity Error in Line xxx. That means that 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. Just 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. 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 all 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 is printed in each issue. This nifty little program will help you avoid every mistake we mentioned above, except that it won't detect the omission of a line. ■

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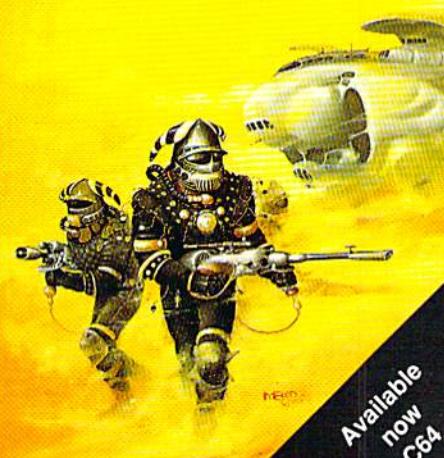
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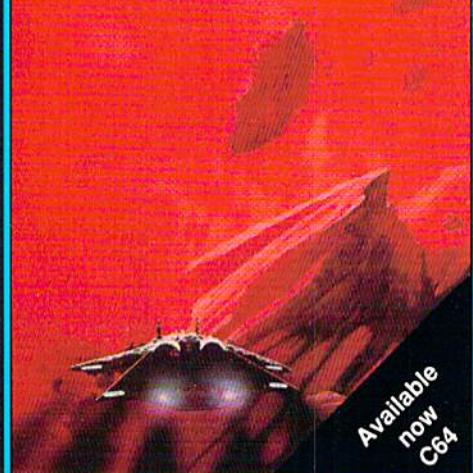
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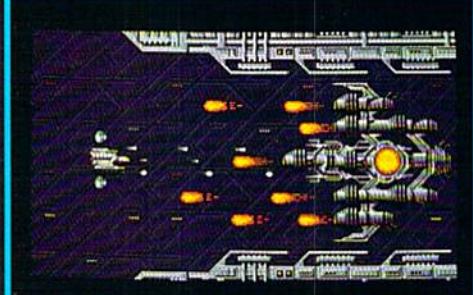
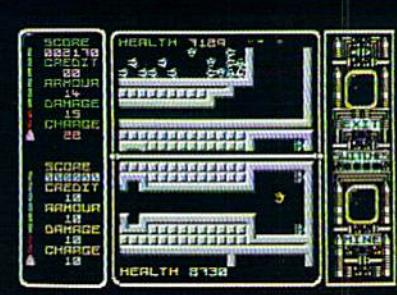


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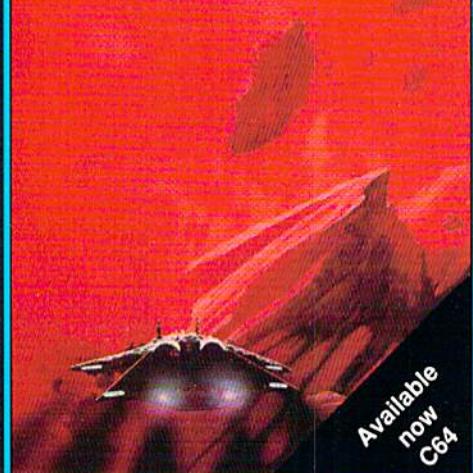
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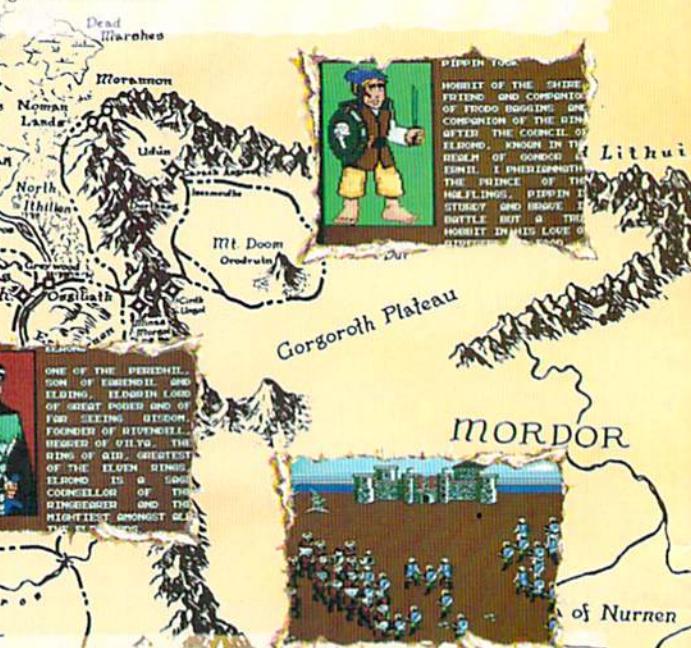
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