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RUN

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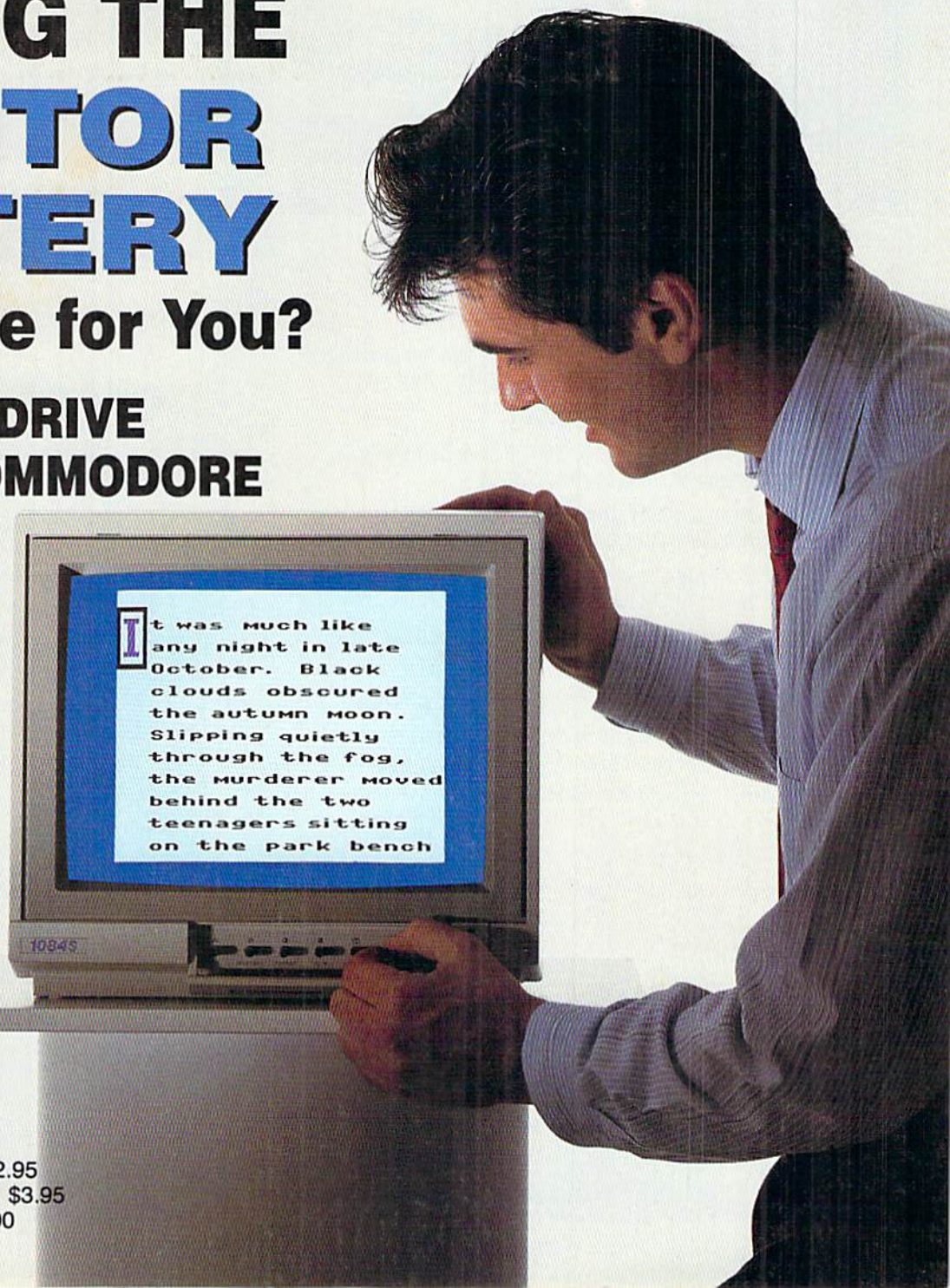

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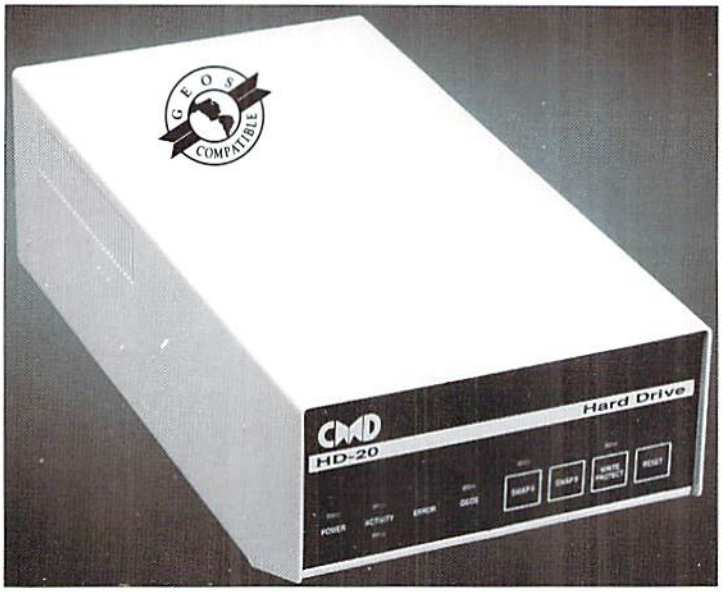

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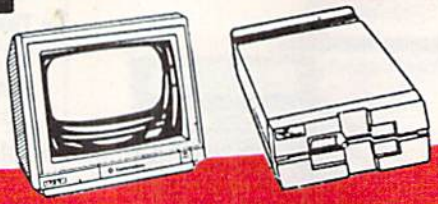

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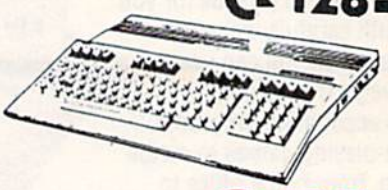

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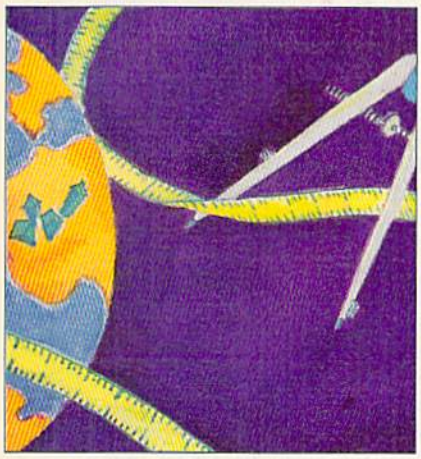

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RUN (ISSN 0741-4285) is an independent journal not connected with Commodore Business Machines, Inc. *RUN* is published monthly, except July and September, by IDG Communications/Peterborough, Inc., 80 Elm St., Peterborough, NH 03458. Phone 603-924-9471. Second-class postage is paid at Peterborough, NH, and at additional mailing offices. Canadian second-class mail registration number is 9565. Subscription rates in U.S. are $22.97 for one year, $34.97 for two years and $48.97 for three years. In Canada and Mexico, the one-year subscription rate is $27.97, with U.S. funds drawn on a U.S. bank. Foreign surface mail subscriptions are $42.97 for one year, and foreign air mail one-year subscriptions are $77.97, with U.S. funds drawn on a U.S. bank. *RUN* is nationally distributed by International Circulation Distributors. **Postmaster**: Send address changes to *RUN*, Subscription Services, PO Box 58711, Boulder, CO 80322-8711. (Canadian address changes to *RUN*, PO Box 1051, Fort Erie, Ontario, Canada L2A 5N8.)

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SPECIAL PROGRAMMING INSERT 2
RUN's June/July issue contained a free pullout card of commands for the C-64/128. In the center of this issue, *RUN* readers will find another pullout programmer's card, which includes many C-64 and C-128 Poke and Peek commands for easy reference.

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*** It's going to be a long, hot summer, so relax and leave the typing to us. These programs are available on the August/September/October 1990 ReRUN disk. To order, see the card facing page 16.**

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RUNning Ruminations

As editor of *RUN*, I have little opportunity for complacency. Readers are quick to let me know when *RUN* is on the right track or off the course completely.

I'd like to address three issues that readers have recently brought to my attention.

First, long-time computer users have likened the current state of the C-64 market to their experiences with abandoned computers, such as the TRS-80, TI-99/4A, IBM PC jr. and Coleco's Adam.

That comparison is as riddled with holes as the Berlin Wall. The ubiquitous C-64, the world's most popular home computer, is a phenomenal worldwide marketing success that may never be duplicated. In terms of volume sales, Commodore's figures rival those of McDonald's. In fact, if Commodore were in the fast-food business, we'd probably be munching on Commodore Combos instead of Big Macs.

If computers are hamburgers, then Commodore is the McDonald's of the computer business.

Commodore machines are simply not abandoned computers—there are too many users, too much software, too much enthusiasm and excitement in users' groups and in the homes. Even today, eight years after the C-64's introduction, new users are still discovering the potential of these machines. Computers become abandoned when their technology becomes outdated, support disappears, users become disinterested and a cost-effective replacement is introduced. None of this has happened yet. While the market *has* declined dramatically in recent years, there is enough interest in this market so that the 64 will be spared the "abandoned" tag for quite some time.

Second, another often-heard comment about the state of the market concerns the lack of available Commodore products. Readers ask, "Has Commodore stopped production of the C-64? I can't seem to locate a store that carries them."

We recently met with a company official who informed us that Commodore is definitely still manufacturing and shipping the C-64. It is still available through mail order and discount stores. In fact, Commodore is considering a plan to market a new C-64 package that includes computer, disk drive and an assortment of bundled software—all for under $300. This is similar to the so-called Test Pilot Package, aimed at helping new users "take off" with their machines. With the kind of software bundled with this package, the emphasis, however, will be on productivity applications, rather than games. This marketing emphasis is a direct response to those who view the Commodore machines as toys that users have outgrown.

And third, to those readers who have stated that they enjoy the magazine, but could live without our game coverage, I refer you to the ProTips column, which premieres in this issue on page 38. You'll discover tips, shortcuts and secrets to using productivity software. What our Gold Mine column has done for the game player, we promise the ProTips column will do for productivity users. As always, we invite readers to share their computing knowledge with others by sending in submissions to the column.

Dennis Brisson

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MAGIC

Animate your 40-column screens; keep track of free disk blocks; and discover ROM chip secrets.

By TIM WALSH

$59C 64/128 Border Animator

Animate your C-64 and C-128 40-column screens with 64/128 Border Animator. It puts animated lights on the screen like those you see on TV game shows and in store windows. To use it in your own programs, replace lines 60–70 with your own text message. The default colors can be customized by changing the values of the last three Pokes in line 80 to your own colors by entering values from 0 to 15.

```
Ø REM 64/128 BORDER ANIMATOR - RICHARD PEN
  N                                    :REM*71
1Ø POKE5328Ø,Ø:POKE53281,Ø:POKE53265,11
                                       :REM*2Ø9
2Ø FORU=679TO714:READQ:POKEU,Q:CK=CK+Q:NEX
  T                                    :REM*49
3Ø IFCK<>4894THENPRINT"ERROR IN DATA":END
                                       :REM*3Ø
4Ø DATA169,Ø,141,14,22Ø,173,18,2Ø8,2Ø1,25Ø
  ,2Ø8,249,174,36,2Ø8,173,35,2Ø8 :REM*197
5Ø DATA141,36,2Ø8,173,34,2Ø8,141,35,2Ø8,14
  2,34,2Ø8,169,1,141,14,22Ø,96   :REM*12Ø
6Ø PRINT"{SHFT CLR}{8 CRSR DNs}{CTRL 8}"TA
  B(11)"ILLUMINATED BORDERS"     :REM*22Ø
7Ø PRINTTAB(19)"{2 CRSR DNs}BY":PRINTTAB(1
  4)"{2 CRSR DNs}RICHARD PENN"     :REM*2
8Ø POKE53282,2:POKE53283,1:POKE53284,6
                                       :REM*215
9Ø PRINT"{HOME}":PRINT"{2 SPACEs}";:FORT=1
  TO12:PRINT"{CTRL Ø}{SHFT SPACE}{CTRL 9}
   {SHFT SPACE}";:NEXT           :REM*85
1ØØ FORT=1TO7:PRINT"{CTRL Ø}{SHFT SPACE}{C
    RSR DN}{CRSR LF}{CTRL 9} {CRSR DN}{CRS
    R LF}{SHFT SPACE}{CRSR DN}{CRSR LF}";:
    NEXT                           :REM*86
11Ø FORT=1TO12:PRINT"{CTRL Ø}{SHFT SPACE}{
    2 CRSR LFs}{CTRL 9} {2 CRSR LFs}{SHFT
    SPACE}{2 CRSR LFs}";:NEXT      :REM*96
12Ø FORT=1TO7:PRINT"{CTRL Ø}{SHFT SPACE}{C
    RSR UP}{CRSR LF}{CTRL 9} {CRSR UP}{CRS
    R LF}{SHFT SPACE}{CRSR UP}{CRSR LF}";:
    NEXT:POKE53265,91              :REM*112
13Ø SYS679:GETA$:IFA$THENPRINT"{SHFT CLR}"
    :POKE53265,27:GOTO15Ø          :REM*159
14Ø FORDL=1TO54:NEXT:GOTO13Ø       :REM*1Ø1
15Ø REM PLACE YOUR PROGRAM HERE    :REM*95
```

—Richard Penn, Montreal, Quebec, Canada

$59D 1541/1571 Free Block Reader

If you write Basic programs that access files on disk, you can use my C-64 and C-128 routine, 1541/1571 Free Block Reader, which keeps track of the number of free disk blocks on both the 1541 and 1571.

When run, the program reads information from the disk, then displays a message stating the number of blocks free. If you want to use 1541/1571 Free Block Reader in your own programs, simply add a Return statement at the end of my subroutine.

```
Ø REM 1541/1571 FREE BLOCK READER - FRANK
  J. LIVERS                        :REM*182
1Ø OPEN15,8,15,"IØ:"               :REM*158
2Ø PRINT#15,"M-R"CHR$(25Ø)CHR$(2)  :REM*52
3Ø GET#15,A$:IF A$=" " THEN A$=CHR$(Ø)
                                   :REM*21Ø
4Ø PRINT#15,"M-R"CHR$(252)CHR$(2)   :REM*4
5Ø GET#15,F$:IF F$=" " THEN F$=CHR$(Ø)
                                   :REM*1Ø2
6Ø X=ASC(A$):F=ASC(F$):BF=X+F*256:PRINT"BL
   OCKS FREE = ";BF:CLOSE15:END    :REM*199
```

—Frank J. Livers, Mason City, IA

$59E Color Roller 64

Color Roller 64 differs from other machine language color-cycling programs in that three different colors "roll" down any text printed on the screen. After typing in my program below and running it, begin by entering SYS 49152,C1,C2,C3,SP.

Variable C1 is the first color, C2 is the second, and C3 the third, with the value of each variable ranging from 0 to 15. SP is the rolling speed, where 1 is the fastest and 255 the slowest. Simply mix the colors and add speed to get any one of a variety of effects desired. You can end the rolling action with SYS 49358.

```
Ø REM COLOR ROLLER 64 - JERRY DICKSON
                                   :REM*61
1Ø FORT= 49152 TO 49374:READD:POKE T,D:CK=
   CK+D:NEXT                       :REM*71
2Ø IF CK <> 27434 THEN PRINT"ERROR IN DATA
   ..."                           :REM*249
3Ø SYS 49152,1,2,3,6              :REM*1Ø4
4Ø PRINTCHR$(147)"SYS 49152,C1,C2,C3,S1 TO
    ACTIVATE."                     :REM*17
5Ø DATA 32,155,183,142,6Ø,3,32,155,183,142
   ,61,3,32,155,183,142,62,3,32    :REM*56
6Ø DATA 155,183,134,251,12Ø,162,36,142,2Ø,
   3,162,192,142,21,3,88,96,32,181:REM*245
7Ø DATA 192,174,66,3,224,1,2Ø8,3,76,49,234
   ,173,6Ø,3,16Ø,Ø,153,Ø,216,153  :REM*255
8Ø DATA 12Ø,216,153,24Ø,216,153,1Ø4,217,15 ►
```


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```
   3,224,217,153,88,218,153,2Ø8    :REM*15Ø
9Ø DATA 218,153,72,219,153,192,219,2ØØ,192
   ,4Ø,2Ø8,224,173,61,3,16Ø,Ø,153 :REM*24Ø
1ØØ DATA 4Ø,216,153,16Ø,216,153,24,217,153
    ,144,217,153,8,218,153,128,218:REM*194
11Ø DATA 153,248,218,153,112,219,2ØØ,192,4
    Ø,2Ø8,227,173,62,3,16Ø,Ø,153  :REM*179
12Ø DATA 8Ø,216,153,2ØØ,216,153,64,217,153
    ,184,217,153,48,218,153,168    :REM*194
13Ø DATA 218,153,32,219,153,152,219,2ØØ,19
    2,4Ø,2Ø8,227,173,62,3,141,63,3:REM*155
14Ø DATA 173,61,3,141,62,3,173,6Ø,3,141,61
    ,3,173,63,3,141,6Ø,3,76,49,234 :REM*16
15Ø DATA 238,65,3,173,65,3,197,251,2Ø8,9,1
    69,Ø,141,65,3,141,66,3,96,169 :REM*11Ø
16Ø DATA 1,141,66,3,96,12Ø,162,219,142,2Ø,
    3,162,192,142,21,3,88,96,76,49:REM*1Ø9
17Ø DATA 234,Ø                     :REM*242
```

—JERRY DICKSON, SANDWICH, IL

$59F 1581 SECRET MESSAGES

Did you know that there are secret messages buried deep within the Commodore 1581 disk drive's ROM chips? If you're curious and want to discover who designed the 3½-inch drive's hardware and software and who it is dedicated to, enter my program, 1581 Secret Messages, and run it to reveal the secrets. Be certain to set U to the drive number (usually 8 or 9) of the 1581.

```
Ø REM 1581 SECRET MESSAGES - JOEL M. RUBIN
                                   :REM*172
1Ø U=9: REM SET U TO UNIT NUMBER OF THE 15
   81                              :REM*152
2Ø OPEN 1,U,15,"B-?"                :REM*55
3Ø GET#1,A$:PRINT A$;:IF ST=Ø GOTO 3Ø
                                   :REM*246
4Ø PRINT#1,"B-*"                   :REM*186
5Ø GET#1,A$:PRINTA$;:IF ST=Ø GOTO 5Ø
                                   :REM*172
```

—JOEL M. RUBIN, SAN FRANCISCO, CA ■

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.*

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News and New Products

Earn a college degree online; use your C-64 for business; and play a kinder, gentler arcade game.

By HAROLD R. BJORNSEN

Playing in Perfect Harmony

SAN JOSE—In the arcade game for the C-64, **The Game of Harmony**, you use strategy and concentration to avoid destroying constantly moving orbs. Gently maneuvering like-colored orbs together keeps them from blowing up. The program contains 50 increasingly challenging configurations, and the Mantra mode takes you to any level to practice free of time restrictions. $29.95. Accolade, 550 S. Winchester Blvd., Suite 200, San Jose, CA 95128.

Check Reader Service number 400.

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WHEELING, IL—Micro Format (533 North Wolf Rd., Wheeling, IL 60090) introduces **Professional Banner Band** computer paper. It's 9½ inches wide, 150 feet long and cut with ½-inch micro-perf margins. There are no cross perforations, so the paper can be cut right at the end of any banner, sign or large graphic. Each roll is available in a variety of colors and themes, with a suggested retail price of $19.95.

Check Reader Service number 410.

Under New Management

FARMINGTON, NM—Turn your C-64 into a business machine with **Store Talk**. The program stores statistics for 300 employees, data on over 3000 inventory items and over 200 records for purchase orders and accounts receivable. Its indexing system lets you retrieve information on an item by entering its number or description. Store Talk also prints out custom-designed business forms. $39.95 plus $2 s/h. Pro-Tek, PO Box 5131, Farmington, NM 87499.

Check Reader Service number 401.

Earn a Degree In Your Own Home

ROCKVILLE, MD—GEnie (401 N. Washington St., Rockville, MD 20850) adds the online tutoring and continuing education services of the **Computer-Assisted Learning Center** (CALC) to its menu of online offerings. Educational services are provided by an experienced staff of educators who teach in their local schools. CALC is operated by Margaret Morabito, a veteran of online instructional programs and *RUN*'s former technical manager. For subscription information, call 1-800-638-9636.

Check Reader Service number 404.

Protect Your Computer System

MOUNT LAUREL, NJ—The **DataGard Silver Series** offers surge protection for your computer and peripherals. Two power strip models, with four or six outlets apiece, have six-foot, double-insulated cords and master switches with built-in pilot lights.

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Prices range from $9.95 to $64.95. SL Waber, Inc., 520 Fellowship Rd., Mount Laurel, NJ 08054.

Check Reader Service number 411.

Computer Help For the Handicapped

Editor's note: After receiving an enthusiastic response to a story published in RUN *(see The Resource Center, February 1987) regarding his software programs for the handicapped, Don Peterson set up the Computer Foundation for Handicapped Children (CFHC). What follows is an update on the progress of the Foundation's efforts.*

Through a grant, the Foundation now employs a blind programmer. Two volunteer blind programmers also contribute to CFHC's software library, which has grown to over 200 C-64 and VIC-20 programs. Examples of software included are talking programs, Braille lessons, SID music songs and joystick-operated programs for printing, drawing and creating. The titles are for the blind, deaf, non-verbal, retarded and physically handicapped.

Over 20,000 copies of the programs have been distributed. They are mailed anywhere in the world for an average handling charge of 20 cents apiece. Don emphasizes that affordability, along with excellent performance, is what he's promoting. He has also obtained dozens of computers that he has donated to needy handicapped persons.

You can write to CFHC at 2645 E. Southern A326, Tempe, AZ 85282 for a free Sampler disk and program listing.

Fried Anions

ROHNERT PARK, CA—Zenion Industries (5430 Commerce Blvd., Rohnert Park, CA 94928) introduces **Screen E.L.F.**, an electronic unit that sits atop your monitor and generates a steady stream of anion-enriched air. The air flow, covering a radius of six feet, replaces the harmful air cations—a health risk to humans—that are generated from the high voltages used by monitors. Healthier air is available for $79.95.

Check Reader Service number 405.

128 Integrated Software

SARASOTA, FL—Computers, Etc! (4521-A Bee Ridge Rd., Sarasota, FL 34233) has released two new programs for the C-128. Each retails for $39.95.

128 Publisher integrates text and graphics to construct everything from newsletters to business forms and lets you import text from your own word processor.

128 Illustrator is an 80-column, hires drawing package that lets you create color graphics and assists you in drawing simple geometric figures. With it, you can also create clip art and import artwork to 128 Publisher.

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- Compactor: Efficient compacting techniques — 3 programs per disk — 6 if you use both sides.
- Single File: All programs saved as a single file for maximum compatibility.
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- Fully Compatible: Works with 1541/C/II, 1581, 1571 and with C64, 128, or 128D (in 64 Mode).
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-What gives Burst Nibbler its power? Conventional nibblers have to decode the data from the disk before it can transfer it using the serial port bus - when non-standard data are encountered they are beat. Burst Nibbler transfers data as raw GCR code via the parallel cable without the need to decode it, so you get a perfect copy of the original.
-Will nibble up to 41 tracks -Copy a whole disk in under 2 min -Installs in minutes - no soldering required on 1541 (1571 requires soldering)

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*Record any sound digitally into memory and then replay it with astounding effects * Playback forwards/backwards with echo/reverb/ring modulation *Full sound editing and realtime effects menu with waveforms *Powerful sequencer plus load & save function *Line In - Mic In - Line Out and feedback controls

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*Full specification MIDI at a realistic price *MIDI In - MIDI Out - MIDI Thru *Compatible with Digital Sound Sampler and Advanced Music system
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*Powerful modular program for creating, editing, playing and printing out sheet music *Playback music through internal sound system or MIDI *Input music with the editor, piano keyboard emulator or a MIDI synthesizer *Contains 6 modules: Editor, MIDI, Keyboard, Synthesizer, Linker and Printer

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*Accepts 3 cartridges *Power on/off any slot *Onboard fuse *Reset button *Save wear & tear on your expansion port

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*Replacement for the actual kernal inside your 64 *Loads/saves most programs at 5-6 times normal speed *Inproved DOS support including 10 sec. format *Programmed function keys: Load, Directory, Old etc. *Return to normal kernal at the flick of a switch *File copier *Special I/O loader *Lots more! *fitted in minutes *No soldering usually required

ROBOTARM -Only $89.99

*Full 5 axis movement with human like dexterity to manipulate small objects *Comes with C-64 interface & software, finger jaws, shovel scoop, magnetic attachment and 2 JOYSTICKS *Uses 4 D cells *Works with or without interface *22" total length

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*Windows, icons, pull down menus & pointing devices *Operates in HiRes mode *Full control over color attributes *16 pens, 8 random sprays, 16 user definable brushes *Windows can be cut, pasted, inverted, enlarged, reduced, squashed, stretched, flipped & rotated *3 levels of magnification *Lines, points, rectangles, triangles, circles, & rays with elastic facility *Solid & textured fill with 32 user definable patterns *All information on screen - no need to switch between picture & menu *Compatible with keyboard, joystick, mouse & Koala Pad

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*Top quality, easy to use EPROM programmer for the 64/128 *Menu driven software/hardware package makes programming, reading, verifying, copying EPROM'S simplicity itself *Program 2716 thru 27256 chips @ 12.5, 21 or 25 folts *Full feature system - all functions covered including device check/verify *The most comprehensive, friendly and best value for the money programmer available for the 64/128 *Ideal companion for Superom Expander, 16K EPROM board or any EPROM project
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*8 sockets each accept 8K thru 32K EPROM's *Onboard operating system - no programs to load *Menu driven - just press a key to load program *Select any slot under software control *Code generator feature will take your own programs and turn them into auto start programs (Eprom burner required)

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*The ultimate disk toolkit for the 1541 with more features than most for less *Absolute must for serious disk hacker *DISK DOCTOR V2 *HEADER/GAP EDITOR *DISK LOOK - recover lost files *Disassemble any program from disk to screen or printer *File compactor *Fast disk copy *Fast file copy *10 sec formatter *Error edit *Much, much more!

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*Battery backed to last up to 2 years *Make your own cartridges - even auto start types without the need for an EPROM burner *Can be switched in/out via software *Turn your cartridge into a 32K RAM DISK with our RAM DISK software - Only $14.99

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Circle 154 on Reader Service card.

MAIL RUN

Readers ask where's the software, where's the support, and what's wrong with Commodore?

SEARCHING FOR GREATER PRODUCTIVITY

The idea that productivity software may be esoteric is a judgment better left to your readers (see Mail RUN, "That's the Way the Cookie Crumbles," May 1990). Even esoteric software is often useful when adapted to other purposes. Also, your flippant request for pastry does not help those searching for greater productivity.

—DOUGLAS IRELAND
FLUSHING, NY

If you're searching to improve your computer's productivity, turn to RUN*'s new column, ProTips, elsewhere in this issue. It's chock-full of tips to use with your favorite productivity programs.*

—EDITORS

HEXED BY HEX LOADERS

Recently, the spaces between the three groups of hexadecimal characters in the Data statements in *RUN*'s listings have been replaced with asterisks. It's much easier for me to press the space bar and to find mistakes when I list a program to the screen. Will you return to using spaces?

—JAMES S. TINGLEY
LAUREL, MD

We substituted asterisks for spaces because many readers ignored the spaces and thus ran into problems. We hope this solution generates less confusion.

—EDITORS

YOU'RE NOT ALONE

Please tell me that I'm not alone when I say that I don't want to spend hundreds of dollars for quality programming for my home computer!

I fully understand using programs like Lotus at the office; I use them myself. But, at home? Cosmi's SwiftCalc and Berkeley Softworks' GEOS are more than adequate for my uses. In some ways, I find them more flexible than the expensive software I use at work.

So, I don't understand why the C-64/128 market is dwindling. Even though Commodore's support is almost nonexistent, there seem to be enough software and hardware developers to keep everyone's systems running for a long time to come.

When I buy a new software package now, I ask for that company's continued support on the software registration form. If this sounds paranoid, just look at the shelves in your favorite computer store. It's scary!

—THOMAS L. MESSER
KISSIMMEE, FL

Much of RUN*'s mail concerns the same topic, Tom, so you're not alone. Of all 64/128 users, it might be interesting to learn what percentage agree with you.*

—EDITORS

WHATEVER HAPPENED TO. . .?

A few years ago I saw an advertisement for a Spartan, which attaches to the Commodore computer so that the user could run Apple II+ software. Are they still available? Could this be an alternative to the problems brought up in your January 1990 editorial, which addressed software support?

—BARBARA VANZANDT
LIVONIA, NY

The Spartan generated much interest when it was first announced in late 1984. When RUN *finally received a Spartan for review two years later, we were told that the product was finally shipping. Unfortunately, the Spartan never made it to market.*

While it worked quite well, some C-64 software would not load. Also, the Spartan was technically demanding to hook up and had, we felt, a limited appeal. To our knowledge, there is no product on the market that will allow you to run Apple software on your Commodore.

—EDITORS

OVER 7,280,000 SOLD

"The Personal Computing 500" article in the October 1989 issue of *Personal Computing* lists the top personal computers worldwide of the last decade. Number one is the C-64 with 7,280,000 units sold. How can Commodore ignore this?

If CBM would realize that the C-64 is the best buy for the money, then maybe we'd see a resurgence of this great little machine that gave so many people their first introduction to computing.

—JEROME D. VALENTINE
TAMARAC, FL

MEETING HIS NEEDS

For five years, my C-64 system has met my needs at minimum expense. I am alarmed that some Commodore users think it's time to upgrade. Haven't they read about the many new and improved programs reviewed regularly in *RUN*? It's not time yet to relegate the C-64 to just fun and games. Let's encourage the production of new and improved software by buying and using some of them.

—LEONARD K. MADSEN
AUDUBON, IA

RUN *has published many productivity disks, including Productivity Paks I, II and III, and RUN Works, which contains RUN Paint, Label Base, Money Manager and other programs. Our most recent addition is the GEOS Companion, an accessory disk for owners of Berkeley Softworks' GEOS. It contains ten programs for both the C-64 and C-128, including applications, animation, utilities, music, clip art and fonts.* RUN *will continue to provide disk products for all computing interests.*

—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.*

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MAVERICK v5

Proof That Thousands Of Heads Are Better Than One.

Most of you know that **Maverick** is the most advanced and reliable archival utility system made for the Commodore 64/128 series of computers. But many of you don't have a clue as to how it got that way. Well, we can't take all the credit. **Maverick** is actually the result of a collaboration between our programers and our customers.

Each person buying a **Maverick** receives a registration card with an area for comments. We read each and every card that comes in. So in addition to praises and the very rare curse *(only 1 in 1000 Maverick customers ever request a refund)* we also get comments like these:

"I wish you had a compare program."

"How about adding 1541, 1581 fast loaders?"

"Would be nice to make additional GEOS 5.25 inch boot disks also."

"Please support 1764 Ram Expansion Unit."

When our customers talk, we listen. All of the above has been done to **Maverick** v5, along with many other customer inspired enhancements.

Take a look at the **Maverick** v5 Technical Spec Sheet at the right. It goes into the kind of detail that other companies don't dare go into -- you can't elaborate on features you don't have. Ask around about us -- check with your friends, your local users group or BBS, or national networks like Quantum Link. Our company and our products have a hard-earned reputation of excellence that we're very proud of.

One last thing to consider: this is our final version of **Maverick**. We will still continue to develop **Maverick** Parameter Modules and other **Maverick** products such as RAMBOard, but this is the final version of the core system itself. Why? Quite simply, because we can't find any more room for improvement. Think about that. If you've been waiting for the very best archival system money can buy, your time has arrived. **Maverick** v5. Software that's as good as we -- and a few thousand other people -- can possibly make it.

TECHNICAL SPECIFICATIONS

NEW: *All modules* now have directory files & allow fast autobooting with 1541/71/81. They also support slow boot mode for hard drives & other compatible devices. Directories are organized for easy filecopying of modules by end user. REU and 64K Video RAM is auto-sensed and utilized whenever applicable.

Fast Data Copiers: Single and dual 1541/71 support. Single and dual 1581 support.

NEW: Single Drive 1571 Double Sided Copier.

GCR Nybble Copiers: Single and dual 1541/71 Support. These are the most powerful software based nybblers on the market.

RAMBOard Nybbler: Working in conjunction with one or two 1541, 1541 II, or 1571 RAMBOards, this copier allows automatic coping of many of the toughest protection schemes on the market.

Sector Map Editor W/Data Scanner: Allows high speed error scans and data searches. Supports 1541 and 1571 formats.

Maverick GCR Editor: A powerful tool for the experienced hacker.

GEOS Parameter Menu: Up to date parameters to completely deprotect your entire GEOS library.

GEOS Sector Editor: Accessible from desktop. Includes mouse support.

GEOS File Copier: Desktop accessible. Copies multiple files fast.

NEW *GEO-BOOT:* Now supports 1571, and 1541 drives as well as the 1581 disk drive. After using this feature, your entire GEOS library becomes file-copyable.

Quick File Copier: Supports 1541/71/81 formats - any direction. Includes more features than any other Commodore file copier ever created.

Parameter Menu: Maverick now boasts almost 500 parameters (see other page) that either copy or completely strip the copy protection from the world's newest and finest programs. Some parameters require the RAMBOard to use.

Directory Editor: The ultimate tool to organize your library. Supports 1541/71/81 disk formats.

6502 M/L Monitor: Scrolling display. Includes Drivemon. Directory Recovery: Recover blown 1541 disks. **NEW:** Now works with 1571 and 1581 as well.

Track & Sector Editor: Supports 1541, 1571, and 1581 formats.

Relative File Copier: Supports any Commodore compatible disk drive.

REU & 64K VDC Quick Test: Exclusive Maverick features.

RAMBoard Track Editor: Not for the inexperienced. The most powerful whole track editor made. Allows macros to auto copy every track, even if each track requires special settings. This is the next best thing to writing your own custom copiers. When you use this utility you'll understand why our customers are trashing unprofessional, poorly coded whole track editors written by incompetent programmers.

File Track & Sector Tracer: Identify, view and edit any sector in any program file - fast. Supports 1541/71/81 disk formats.

High Speed Seq & Prg File Viewer: Now you can view or print your sequential and program files without having to load the application that created them.

NEW *Disk Compare Program:* Supports dual 1541/71/81. This utility is the fastest, most full featured Compare Utility ever created!

Extensive new documentation
Over 50 pages of easy-to-follow instructions!

The New MAVERICK v5

Only $39.95

NOW INCLUDES PARAMETER MODULES 1-8

REGISTERED MAVERICK OWNERS:
You may upgrade to the new v5 Master Disk for only $9.95!

Parameter Module #8 is also available for only $9.95!
(Includes Parameter Modules 5 - 8)

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COD CHARGES: -- COD available to previous customers only in all 50 US states. Please add $3.50 in addition to your S&H charges.

OTHER POLICIES -- Washington State residents must add 7.6% to their order for state sales tax. Defective items are replaced at no charge, but must be returned to us postpaid within 30 days of invoice date. All in stock orders are processed within 24 hours. US (48 state) software orders over $100.00 will be shipped 2nd Day Air at no additional charge above the normal $3.50 S&H fee. All prices, policies, and specifications are subject to change without notice. All sales are final unless authorized by management.

Please Note: Several features in the Technical listing now *require* the use of RAMBOard, the disk drive expansion device available seperately from Software Support International.

Circle 17 on Reader Service card.

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SOFTWARE GALLERY

Here's your ticket to a lineup of exciting sports activities this month: online, between the goalposts, on the ice, court and track!

By BETH S. JALA

USA TODAY SPORTS CENTER ..... B+

Online Sports: Up Close And Personal

All right, sports fans, listen up! There's an online service available from that colorful national paper, *USA Today*, that's just for people like you. If you've got a C-64 and a modem, you have 24-hour-a-day access to the USA Today Sports Center, where you can get the latest scores on all your favorite teams or play board or card games.

You can call the Sports Center with any terminal program, but the system really shines when you use the graphics telecommunications program, SportsWare, designed specifically for it.

Sports Center's main menu offers the following: Fantasy Sports Games lets you draft players and compete against other teams; Sports Newsroom gives you the latest-breaking stories in the sports world; an in-depth News and Stats section presents volumes of statistics for all professional and college teams; and Decisionline has odds and point spreads for those who like to "invest" in their favorite teams. There are also areas common to most online services: Chat and Mail, Member Events and Services, Shopping, and Board and Card Games.

One of my favorite features is the free clipping service offered in the Sports Newsroom. If you register by telling the system which teams you follow, whenever you log on, you can go to your clippings file and see which articles have been deposited for your perusal. Another terrific item is the SportsTicker, which keeps you posted on the scores of ongoing games for your favorite teams.

The chess section is exceptional. You can join an online tournament and receive a Sports Center rating, play a live "blitz" game or watch a game in progress. Best of all, the Sports Center keeps track of every move in every game, so you can analyze your play and study your opponents.

Unfortunately, the Sports Center isn't without a few problems. For instance, since most of the standings and statistics screens are formatted for 80 columns, the second half of each row wraps to the line below making it difficult to associate numbers with their respective column headings. Also, if you use SportsWare, you have to get offline and reload the program before you can view your captured buffer.

The only other drawback is price. Besides the initial membership fee of $14.95, the Sports Center costs between $4.95 and $17.95 per hour of access time, depending on your access method and whether you use the service during business hours or leisure time. There is a monthly minimum charge of $9.95, and the optional dedicated communications software will set you back another $24.95 if purchased along with your membership; $29.95 if you add it later. You should be aware that you can use some services, such as the SportsTicker, only if you've got this software. Finally, there is also a fee for changing your member name or online "handle."

USA Today's Sports Center is an excellent source of current sports information. If you can't wait for tomorrow's newspaper to find out tonight's scores, or don't already subscribe to an online service and have an insatiable appetite for the latest sports statistics, you should definitely give Sports Center a look. *(Four Seasons Executive Center, Building 9, Terrace Way, Greensboro, NC 27403. C-64/Prices above.)*

—BOB GUERRA
CHARLESTOWN, MA

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!

MONDAY NIGHT FOOTBALL ... A–

Are You Ready For Some Football Any Day of the Week?

To commemorate the 20th anniversary of Monday Night Football, Data East has released a disk version of the ABC hit. This adaptation allows for multi-team playoffs, human versus human and human versus computer confrontations, and a special option pitting two players against the computer.

Essentially an arcade game, the MNF teams are generic. Nevertheless, all positions are individualized. There's even a team Modification mode that adjusts each player's strengths and weaknesses. In addition, with the Playmaker utility, you can vary existing plays or create unlimited offensive moves to save to disk.

You choose game options from a series of menus that generally work quite well. Don't press too hard on the fire-button, however, or you'll move through the menus too quickly and make unwanted selections.

Kickoffs, punts and 30 running and passing plays are available to your offense. Your defense has 12 options, as well as the ability to blitz, intercept passes and recover fumbles. Standard ►

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- Includes: MS-DOS 3.3 and GW-Basic 3.22.
- 25 lines x 80 characters. • Cursor control keys.
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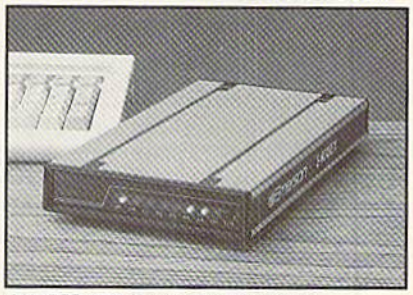

- 2400 BPS 100% Hayes compatible modem.
- Communications software: ComBase from Pinnacle Publishing Inc. • Auto dial (tone or pulse), with call progress detection (dial tone, busy). • Full or half duplex AT 2400 and 1200 BPS auto fallback. • Fully Hayes compatible, runs most popular communications software.
- RS-232C data interface. • 8 status indicators and 6 self test modes. • Auto or manual answer selectable.
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- 60 KB built-in text memory with 20 phrase capability.
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- 58,000 character text memory. • Tutorial disk included.
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- Model #: KX-W1500.
- Dim.:17-3/4" x 13-1/8" x 10-3/16".
- Wt: approx. 21 lbs.
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- 9600 baud. • 16-level gray scale for photos & drawings.
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- Printing width: 8.5".
- Model #: FX2010.
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Mfr. Sugg. Retail: **$1,399.99**

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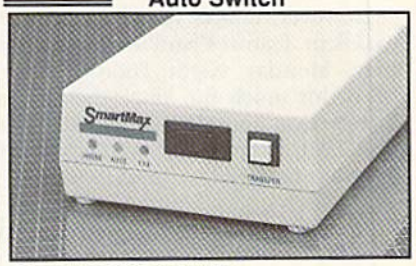

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penalties are called on either team.

You select plays quite easily via joystick. Controlling the defense takes little effort, as does handling the offensive running game. Passing requires you to cycle through helmet icons to find a receiver. Should your receiver be covered, you can look for an alternate—if you haven't already been tackled.

You have an overhead view of most of the action. All 22 players are sharply rendered, as is the vertically scrolling field. Voice synthesis is used throughout and is particularly effective in the Frank Gifford introduction.

On the down side, despite the yellow triangle above the active player, I found it difficult to identify the ball carrier or the principal defender. Equally disappointing was the absence of certain documented features, like the halftime trivia game.

A separate screen is employed for scoring field goals or extra points. Since the challenge is minimal and the loading time lengthy, you'll soon forego the pleasure of kicking these points. For similar reasons, you'll probably toggle off the cheerleader screen, the Goodyear blimp and other frills before too long.

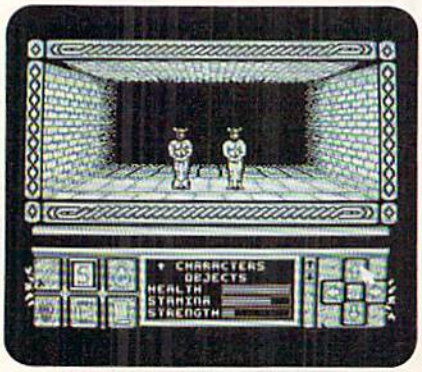
However, thanks to a host of other excellent features and exciting game play, Monday Night Football hasn't been this much fun since the days of Dandy Don and Howard Cosell. *(Data East USA, Inc., 1850 Little Orchard St., San Jose, CA 95125. C-64/$39.95.)*

—LEN POGGIALI
SYRACUSE, NY

DEATH BRINGER ..... B+

Venture Forth, Brave Warrior And Protect Mezron

As a barbarian warrior, you must recover the five gems of Zator for King Rohan of Mezron. If you're successful, you'll prevent the evil wizard Azazael from obtaining the magical gems and using their power to destroy Mezron.



Death Bringer's icon-based interface makes role-playing easy.

You begin in the palace's throne room. To help get you started, King Rohan gives you a dagger, a healing potion and some food. Before you leave the palace, be sure to take the lantern that's in the chest by the king's throne. You'll also need spells, more powerful weapons and some assistance from the people of Mezron.

A large action window at the top of the screen displays a first-person view of the area in front of you. Below that are four arrows you select with a pointer and use to control your movement. At the bottom of the screen is a set of five icons, which represent the submenus called combat, commands, potions, spells and fitness.

The best feature of the Death Bringer interface is its flexibility. You can move the pointer with either a joystick or the keyboard, access the submenus simply by pressing one through five, or use the cursor keys to control movement.

Another innovative aspect of Death Bringer is its graphic system of inventory control. When you call up the inventory screen, you see a large picture of your character beneath two pull-down menus labeled "you" and "here." The menu you select drops down to reveal a list of items in your possession or at your current location. These lists are composed of pictures rather than words, and you take or drop the images by dragging them from one list to the other with the pointer.

Death Bringer isn't as complex as many other role-playing games, with only one character to control, a smaller world to explore and fewer monsters, spells and weapon types. However, I found it refreshing to deal only with a brief manual and one double-sided disk. It was even nicer to boot the game and discover eye-catching graphics and terrific sound effects. Death Bringer is proof that an RPG doesn't have to be enormous in scope to be entertaining. *(Cinemaware; distributed by Electronic Arts, 1820 Gateway Drive, San Mateo, CA 94404. C-64/$29.95.)*

—BOB GUERRA
CHARLESTOWN, MA

WIN, LOSE OR DRAW ..... B

Test Your Imagination In this TV Game Takeoff

If you're familiar with the TV show of the same name and are as artistic as an average toddler, you might approach Win, Lose or Draw (WLD) with some consternation. After all, the object of the TV game is to get your teammates to guess a secret word or saying by drawing a picture of it. Fortunately, with the disk version, the computer does all the artwork, while you're kept busy trying to make identifications and type in answers before your time runs out.

Contestants compete against a computer player or another human. The latter is preferable, since the computer plays a mediocre game at best. Not only does it take a long time to reply to even the easiest problems, but the program also doesn't let it play the "Speed Word Round" for extra points.

Contestants gather in the living room setting of Win, Lose or Draw.

After choosing a character, you're transported to a living room setting where the six contestants from both teams are assembled. Nearby is a large sketching pad. This screen re-creates the atmosphere of the show, and suggests that WLD, like its TV counterpart, may be played by groups.

The main screen is a blowup of the pad. Below is a message line stating the current category. First one team and then the other are given a picture to identify, for a total of three puzzles each. You can type in your answer at any point during the drawing or even when the image is completed, as long as you don't take more than 60 seconds. Wrong guesses are not penalized, but the sooner you get the correct answer, the more points you earn. If you fail, your opponent has 20 seconds to make a correct guess.

During the "Speed Word Round," you must try to recognize as many forms as you can within 90 seconds. After you and your opponent are finished, the computer announces the winner (ties are possible). The victor's name, number of wins and accumu-

Continued on page 50.

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Picture Perfect

No need to be fuzzy about your video needs. This article presents a clear image of which monitor is right for you.

By TIM WALSH

FEW TOPICS ARE more confusing for the neophyte C-64 or C-128 user than choosing the right video monitor. Even if you're an experienced user planning to upgrade, you may have trouble swimming through the sea of choices. So, whether you're selecting a monitor for the first time or looking for a replacement, you should know the monitor basics, and that's what this article is all about. I'll look at both Commodore monitors and third-party monitors. Some are available new and some must be found at computer flea markets, users' group sales or used-equipment dealers, or in classified guides.

Vive La Différence!

When it comes to video capabilities, most experienced Commodore computerists know that significant differences exist between the C-64 and C-128. However, for the benefit of newcomers, both computers have a 40-column Color Composite mode that displays 16-color images and requires a color composite monitor. In addition, the C-128 offers an 80-column RGB (red-green-blue) mode that requires an RGB monitor or combination color composite/RGB monitor for color output.

A monochrome (one-color) composite monitor can also be used with the C-64 or the C-128 in 40-Column mode. Likewise, a color or monochrome composite monitor can be used in the C-128's 80-Column mode, but even the color monitor will produce only monochrome images. If you do want to use a composite monitor in 80-Column mode, you'll need a cable with a DA-9 RGB plug at the computer end and an RCA jack at the monitor end. One source of these special cables is the Computer Shoppe of Alabama (1310 2nd Ave. NW, Suite C, Cullman, AL 35055). They'll sell you one for $9.95.

You needn't worry about getting the proper cable or cables for normal use when buying a new monitor, because the cable(s) will come with it. If you buy used, the cable(s) may not be included, and then you'll have to find (or make) them yourself. Look for them at dealers and flea markets.

Here's a rundown of what cable(s) to get for various computer/monitor combinations. For a color composite monitor used with a C-64, you need a cable with a 6-pin DIN plug (older model 64s require an 8-pin plug) at the computer end and three RCA pin jacks at the monitor end. The three jacks go into the chroma (red), luma (yellow) and audio (white) sockets in the back of the monitor. For a color composite monitor with a C-128 in 40-Column mode, you need a 6-pin DIN plug at the computer end and the RCA jacks at the monitor end.

For an RGB monitor with a C-128 in 80-Column mode, you need a DA-9 RGB plug at the computer end and an RCA jack at the monitor end. A combination color composite/RGB monitor requires two cables. Also, a Commodore 1902A monitor requires special cables, described in the section below on that monitor.

Because the C-128 has two video ports, it works quite nicely with two monitors connected simultaneously. For instance, you can connect an RGB or monochrome monitor to the RGB port and a color composite monitor to the composite port, then toggle between the 40- and 80-Column modes by pressing escape X.

Make sure you don't waste money on a monitor that offers features your computer can't use. For example, many premium-priced multisync monitors that generate excellent hi-res displays with the right computer and video output controllers will produce only marginal improvement with a C-128 in 80-Column mode; the C-128 can't use these monitors the way they were designed to be used in Hi-Res mode. Even if you upgrade to a more powerful computer such as an ►

ILLUSTRATED BY JOHN HART

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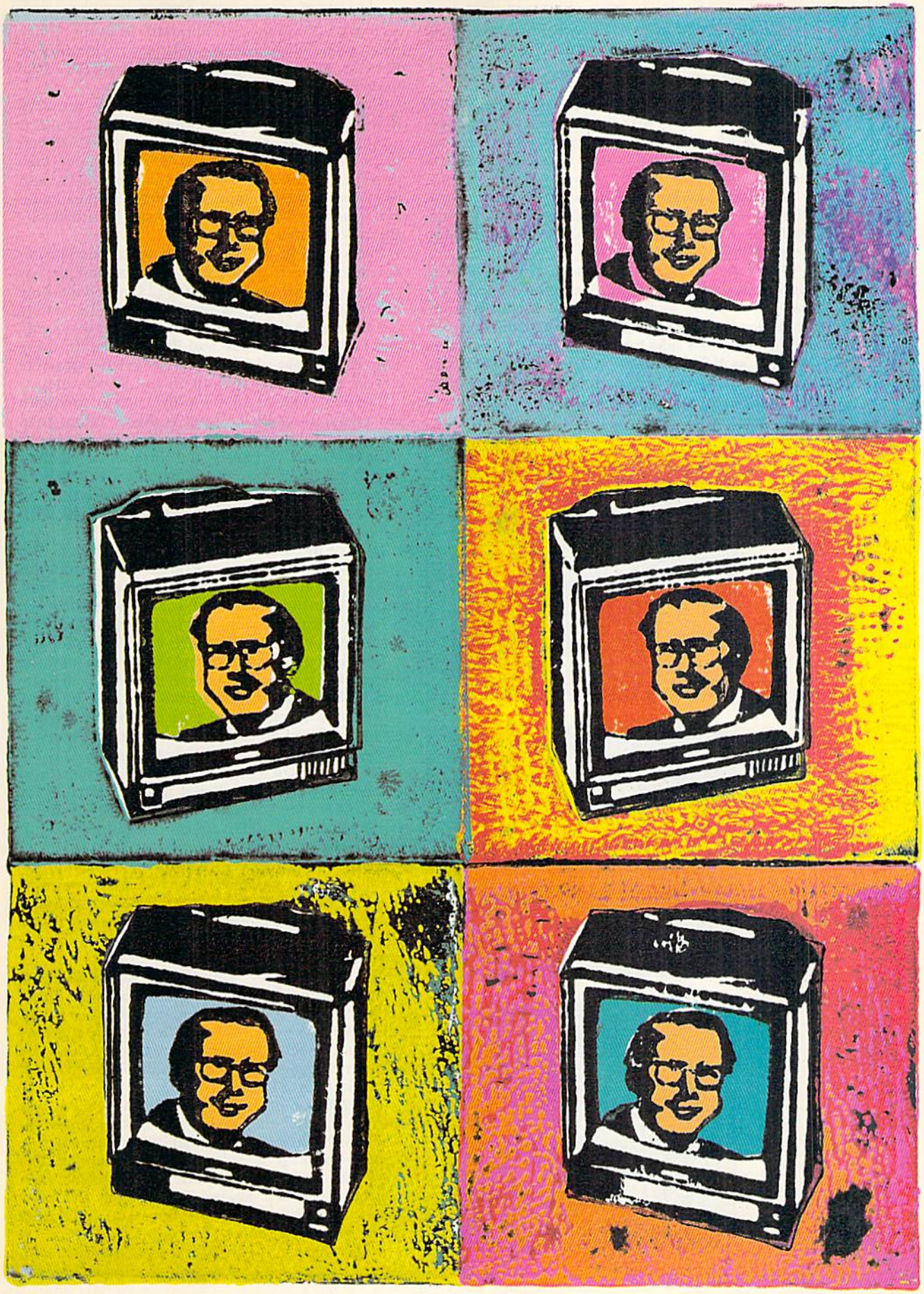

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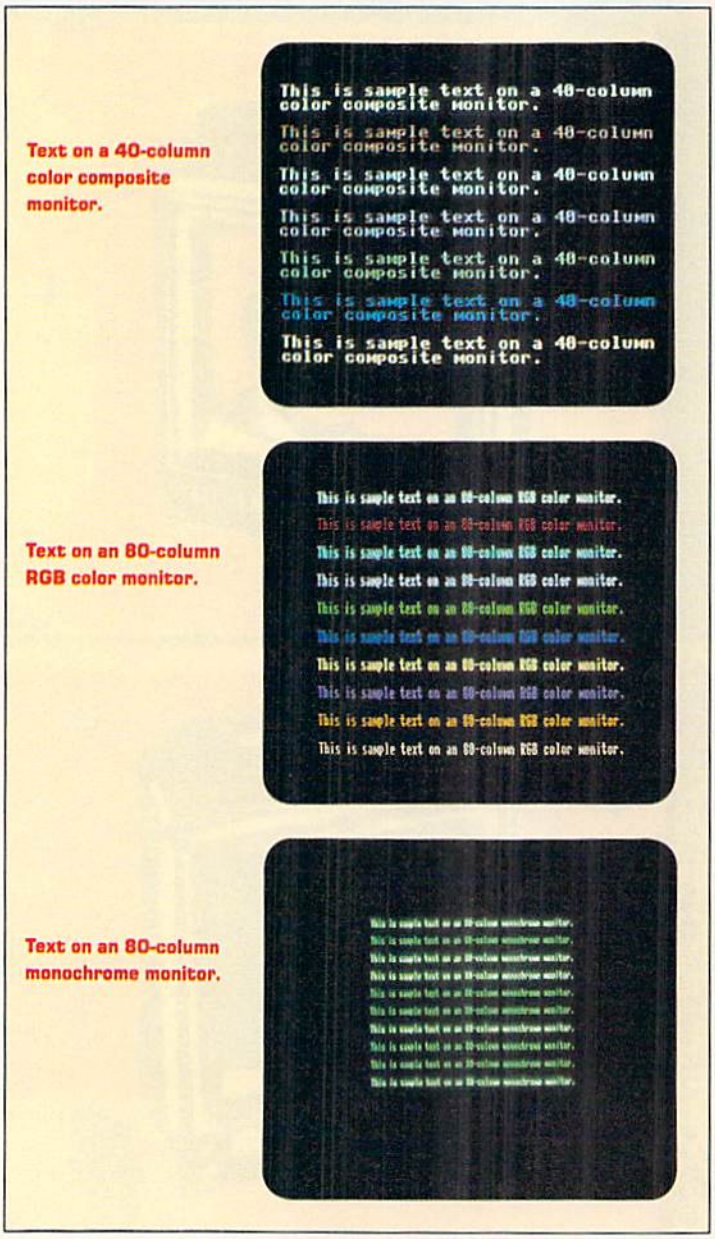
Amiga 2000, you'll need a $500 video card to eliminate the flickering that normally occurs in hi-res.

Scanning the Commodore Field

The following is a sampling of Commodore monitors frequently used with the C-64 and C-128. Prices for second-hand monitors are based on personal experience and consultation with Commodore dealers and repair centers.

Three Commodore monitors are available new at this time: the hard-to-get 1802 and the easy-to-get 1084S and 1084D. All others must be found through second-hand sources.

The color composite **1701** and **1702** have been around for a long time, but they offer some advantages over newer models. Quality construction gives them a service life of many years, and front and rear audio and video jacks make them perfect candidates for use as VHS or 8mm VCR monitors. A sliding switch on the rear of the monitors lets you toggle control between the front and rear jacks. I use a retired 1702 to output both audio from my Amiga 2500/30 and video from miscellaneous video devices. Because of their durability, expect to pay $75–$125 for a 1701 or 1702.



A somewhat newer version of the 1702, the **1802** is also a no-frills color composite monitor. It sports a more contemporary appearance than the 1702, but, lacking the front video and audio jacks, is not quite as versatile. However, if you want a good, 40-column color composite monitor, the 1802 is a fine choice. You'll have to contact mail order firms for availability and price on this one.

Introduced in 1985, the **1902** was an early combination color composite/RGB monitor designed by Commodore for use with the C-128. A fine machine in many respects, it was once very popular among C-128 users. A sliding switch on the front panel toggles between Composite and RGB modes. In using several 1902s over the years, I've found they generate a crisp, clear display in both 40 and 80 columns.

The 1902, like the 1902A below, can't be used with the Amiga, because its input is digital rather than analog. It is, however, 100 percent compatible with most CGA-type PC clones, and was sold as the monitor of choice with the older Commodore PC-10s back in 1986 and '87. To get full-color RGB characters and graphics with a 1902 and PC, simply plug the RGB cable into the 1902's RGB port.

Most of the 1902s I've used have, over time, developed some sort of old-age disease, with symptoms ranging from random snapping noises and overheating to losing the 40- or 80-column screen display, or both. For this reason, don't pay much over $100 for a used 1902, regardless of its apparent condition.

Commodore introduced the **1902A** soon after the 1902. While this monitor offers both Color Composite and RGB modes, it differs from the 1902 in many aspects. For starters, it uses push buttons for toggling between 40 and 80 columns. It also has an unusual "green" button that switches both the 40- and 80-column screens to monochrome green. Perhaps most notable is the 1902A's special serial connectors for both composite and RGB that call for special cables. Don't buy a used 1902A unless you can purchase it with the original cables.

In spite of the special cabling, the 1902A can be used with other computers, such as CGA-equipped MS-DOS machines. Just remove the "normal" RGB plug from the back of your C-128 and insert it into the MS-DOS computer, and you'll have an 80-column color monitor.

The 1902A is my least favorite composite/RGB monitor, primarily because, in both modes, the image is blurry and hard to focus, and the colors are pastel. Also, my experience with a number of these monitors has shown that by the time they're three to five years old, something goes wrong. With that in mind, don't pay more than $125 for a 1902A.

The **2002**, another composite/RGB monitor, was introduced after the 1902A. The 2002 is almost indistinguishable from the earlier 1902, providing the same crisp image in both 40 and 80 columns. The colors are perfect and require no adjustment when switching between modes. In addition, the 2002 sports the traditional chroma, luma and audio jacks in the back of the unit.

While sharing the 1902's pluses, the 2002 also suffers that monitor's ills, such as overheating and

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premature burnout. In spite of this, it's a machine worth considering, especially because of its crystal-clear picture. Expect to pay $100–$150 for a 2002, depending on its condition.

The **1084**, **1084S** and **1084D** are Commodore's latest composite/RGB monitors. These models are compatible with computers that output an analog RGB signal, making them good choices if you upgrade to another computer, such as an Amiga. They work with everything from the C-64/C-128 to the Amiga and various CGA-equipped PCs.

The 1084D is the current production model, but the 1084S is also available new. They both offer stereo sound, a Color Composite mode, and digital and analog RGB modes. They also come with all the required cabling for use with any Commodore computer, including an Amiga. Prices run $300–$325 at most dealers and mail order houses.

A Look at Magnavox Monitors

For several years now, both Commodore dealers and mail order firms have been selling Magnavox monitors with new Commodore computers. One reason for this is because brand-name Commodore monitors are actually built by Magnavox. Another reason is that most firms bundle the proper Commodore-compatible cables with the computers and monitors they sell. You can most likely obtain the color composite Magnavox 8702 for the C-64 at a price of $170–$200.

The Magnavox 8762 and 8764 are the combination color composite/RGB monitors most dealers recommend for the C-128. I've used the 8764 and found that it markedly resembles the Commodore 1902A, both in design and screen image. The 8762 and 8764 sell for $230–$250.

Note that while most C-64 and C-128 users buy Commodore and Magnavox monitors, you are by no means restricted to them. Commodore computers produce a standard video output that is compatible with many brands of monitors available both used and new. If you're in doubt about compatibility, ask the seller.

Working with Monochrome Monitors

With brand-new prices starting at well under $100, monochrome composite monitors are a real bargain for the budget-minded shopper who doesn't mind one-color output. They're great especially for the C-128's 80-Column mode, displaying sharp characters that are easier on the eyes than those produced by a color composite monitor in 80-Column mode. However, note that, in most cases, monochrome monitors don't output any sound. Again, you'll need a cable with an RGB plug at the computer end and an RCA jack at the monitor end to use a monchrome monitor with your C-128. Many brands of Commodore-compatible monochrome monitors are available through dealers, mail order houses and used-equipment sources.

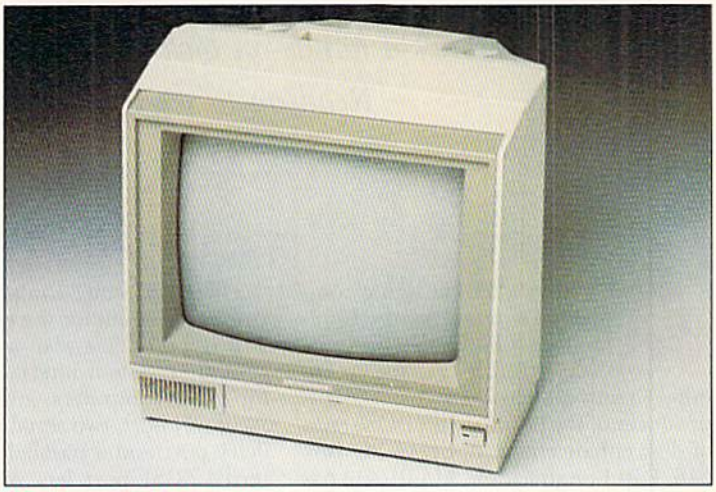
Turn on the Television Set

Hooking up a TV to your C-64 or C-128 is another inexpensive solution to the "which-monitor-should-I-buy" dilemma, but don't expect as good an image as a monitor provides. When you buy a C-64 or C-128, an RF modulator for connecting the computer to the TV comes in the box.

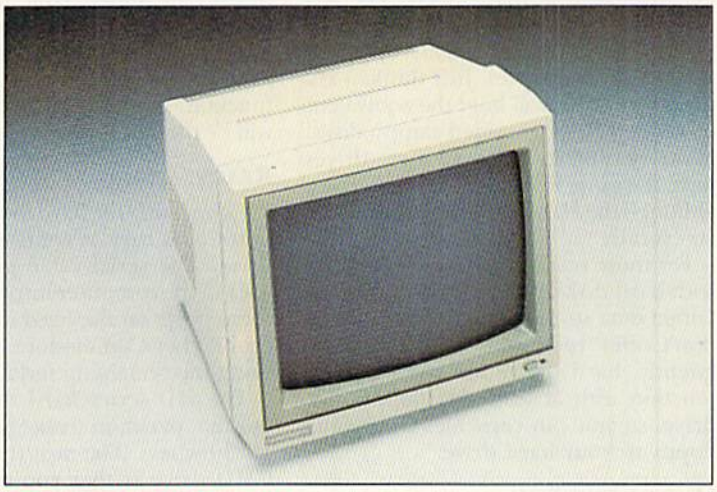
If you're a C-128 user, you may want to look for a color TV that can double as an RGB computer monitor. Such TVs are rare, but they do exist.

With all these basics in mind, you're ready to shop for your new—or used—video monitor. Consider all the factors, then select the one that's best financially and functionally for you. ■

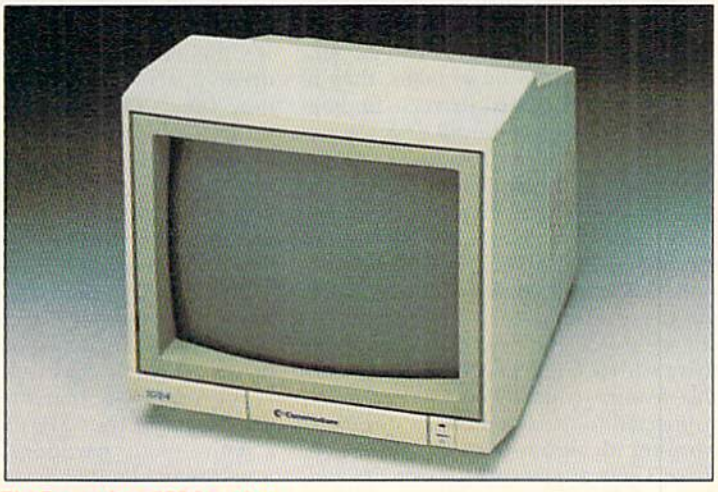
Tim Walsh monitors the technical side of RUN *as the magazine's technical manager.*



The Commodore 1802 monitor.



The Commodore 1902A monitor.



The Commodore 1084 monitor.

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Hard-Drivin' News

Here's a hands-on look at CMD's long-awaited hard drive. Read on to see if it's right for your needs.

By JOHN RYAN

At a time when declining commercial support for the Commodore 8-bit line seems to be the rule rather than the exception, Creative Micro Designs (CMD—producer of the popular JiffyDOS series of disk enhancement devices—PO Box 646, East Longmeadow, MA 01028) has released three new hard disk drives targeted squarely at that market. The HD series hard drives come in three sizes: 20 ($599.95), 40 ($799.95) and 100 ($1299.95) megabytes. Just think, a 20-megabyte drive will hold the equivalent of about 115 single-sided floppy disks! Memory capacity aside, all three drives have the same features and capabilities, although the HD-100 has a slightly faster access rate.

For those readers who are unfamiliar with hard disk drives, they are self-contained data storage units that normally don't offer removable media. Consequently, hard drives are used in conjunction with at least one floppy disk drive, so you can copy files from your floppy to your hard drive.

Out of the Box

I was pleasantly surprised by the compactness of the HD-40 I received for review. The unit is an inch or two longer, and just a knuckle or so taller, than a Commodore 1581 disk drive, so finding room for it on my cluttered desk was no problem. All the controls for the drive are located on the front and accessed via a plastic membrane keypad. Power, activity and error LEDs can be found there, as well as a GEOS activity light. A remarkable Swap 8 and Swap 9 feature on the control panel lets you easily change the default device number of the drive with a single keypress. Moreover, this feature commands another drive connected to the system to swap device number designation with the hard drive. Gone are messy DIP switches and cumbersome device selection programs.

The back panel contains the power switch and input for the external power supply. There's also a SCSI (small computer system interface, a standard for many computers, and pronounced "scuzzy") port, two serial ports, an auxiliary port and a parallel port. The external SCSI port lets you connect or chain the CMD drive with other SCSI devices for Amiga, IBM and Macintosh computers (with the appropriate interface or controller). Currently, the parallel and auxiliary ports have no real function, but, according to CMD, they will be used in future upgrades.

Ready. . . Set. . .

Connecting the hard drive to the computer is as easy as connecting a floppy drive: The serial cable goes from the back of the computer into one of the two serial ports on the hard drive. You can chain other Commodore disk drives by using the remaining serial port.

The HD series hard drives operate on the partition concept familiar to 1581 owners. The neat thing about the CMD drive is that you can configure each partition on the disk (and there can be up to 254 of them) as a Commodore 1541, 1571 or 1581 disk drive. It's this emulation that sets the CMD drives apart from their closest competitor, Xetec's Lt. Kernal. Through some rather sophisticated circuitry, partitions are arranged so that the computer accesses and uses each as if it were an actual floppy drive (with improved speed). For this reason, CMD has achieved a high degree of compatibility with those programs that depend on the internal mapping (sector layout and block availability maps) of Commodore drives.

For programs that do not rely on drive formats, the CMD drive also offers a native-mode partition. Native partitions are not limited in size as are Commodore partitions, which can be only as large as the disk format they emulate. Also, native partitions can use up to 16 megabytes of disk space. In addition, native partitions provide for true MS-DOS-type subdirectories that can be accessed with path names (the device name, followed by the partition name, followed by the subdirectory name or names). The native partitions do not necessarily provide faster access to the hard drive. In fact, in some cases they are actually slower than Commodore partitions.

Each CMD disk drive has been formatted and preconfigured with several partition formats by the time it leaves the factory, so it can be used right out of the box. You can reconfigure partitions using a utility disk packaged with the drive. This disk contains several useful programs for specifying partition format, deleting and creating partitions and setting default partitions and device numbers.

Go!

The CMD hard drive also supports other formats that are integral to Commodore computing, foremost among them GEOS. A GEOS utility disk that comes with the drive contains configuration files that let you access the HD like any other storage device recognized by GEOS. Extensive testing revealed that the drive operates very well within the GEOS environment. The utility disk also includes a handy GEOS program for moving from partition to partition. By using one or more GEOS partitions (especially 1581 partitions), you should never again lack disk space for your geoPaint or geoWrite files.

Beyond disk space, the access rate with an HD is much faster than with a standard GEOS disk, and you'll loathe ever having to use a 1571, or especially a 1541, again. As of this writing, you cannot boot GEOS directly from the HD, but that capability is in the works

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Front view of HD-40 with various LEDs illuminated.

Rear view of HD-40 displays the drive's many ports.

and may be offered in DOS upgrades. (Since the HD operating system resides on the hard drive itself, upgrades can be installed easily by just running them as they're released by CMD.)

The somewhat forgotten CP/M compatibility offered by the C-128 is actively supported by the CMD drive and uses a special 1581-C partition. After years of listening to my 1571 groan under the CP/M operating system, it's refreshing to have speedy access to my CP/M programs. I had difficulty trying to format a drive partition under CP/M, but later discovered that my CP/M boot disk isn't compatible with the HD. You'll have difficulty formatting HD partitions with CP/M system disks dated earlier than May 1987.

Pluses and Minuses

Aside from storing large amounts of data, most hard drives are fast—far faster than their floppy cousins. Note the load and save times in Table 1 and the substantial decrease with the HD. However, this decrease blurs noticeably for 1571 and 1581 HD partitions, and 128 mode does not benefit quite as much as 64 mode. While the 1581 is normally a speed demon when compared to the 1571, this advantage seems to diminish in HD emulation. Also notice that each partition format seems constrained by the type of drive it's emulating. For instance, access to a 1541 partition is slower than to a 1581 partition.

In comparison to Xetec's Lt. Kernal, the HD is slower because it is a serial device and must operate within the limits of Commodore capability. However, another product from CMD, RAMLink, will allow parallel connection for high-speed access.

CMD also offers (and recommends for use with the HD) a hardware jewel called JiffyDOS that can substantially reduce load and save times. JiffyDOS is a DOS replacement kit for the C-64 and C-128 that not only speeds up disk access several times over, but puts DOS Wedge-type commands at your disposal. With JiffyDOS installed, the HD's access rate approaches that of a parallel hard disk system. The CMD hard drive also features a real-time clock capability that records the time and date on each file.

I tested the CMD hard drive with dozens of non-copy-protected programs, CP/M and GEOS and ran into very few compatibility problems. However, this isn't to say the HD is 100 percent Commodore compatible, for it's not. The drive has an occasional problem with Basic 7.0 commands and absolutely will not run programs with disk-based copy protection. Furthermore, fast-load cartridges and software that reprograms the disk drive for fast loads and saves (probably 99.9 percent of the copy-protected commercial games available today) cannot be copied to the HD. This presents potential HD owners with the same dilemma faced by 1581 owners for the last three years—and some may argue it dooms the HD to duty as a simple mass storage device. CMD is actively courting software developers to support the HD, most notably Berkeley Softworks and Timeworks, two heavy hitters in the Commodore productivity software arena.

A couple of HD procedures may seem clumsy, especially if you're a seasoned Amiga or IBM hard drive user:

First, partitions can be selected in two ways. One involves typing a command string such as OPEN 15,8,15,"CP (partition number)":CLOSE 15. While C-128 owners can define function keys to automate much of this, C-64 owners must either do a lot of typing or rely on JiffyDOS or the DOS Wedge to simplify the process. You can also access a partition by keying in a binary-type code on the HD's front panel, using the swap 8, swap 9 and write-protect keys, but this method is cumbersome and requires a bit of finger gymnastics.

Second, housekeeping can take a lot of time using the HD Tools program on the utility disk. If, for example, you delete a partition (especially a low-numbered partition), it can take up to 25 minutes for the Tools program to clean up the disk. While there is a good reason for this (each partition must move down one slot to compensate for the deletion), the wait can be frustrating. Your good disk organization can lessen the time. As of this writing, there's no 128 version of HD Tools, so housekeeping must be done in 64 mode.

In addition to these procedural problems, the HD manual is vague and incomplete in some places. For example, the information on using CP/M with the HD is woefully incomplete. ►

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Creative Micro Designs is aware of the problems I've noted and will have corrected many of them by the time you read this. They are completely rewriting the documentation, plus developing a C-128 Tools program, faster file- and disk-copy routines, CP/M utilities and Q-Link software, which will let you log onto Q-Link from the hard drive itself (sorry, not Club Caribe). Moreover, future upgrades will provide a device translation scheme for assigning device numbers to specific partitions. As I've previously noted, CMD is working closely with the GEOS people to release a version of GEOS that will boot directly from the HD.

CMD has long been known for their excellent customer support and, in fact, have a dedicated technical support area on Q-Link (located in CIN, Hardware Support). There you can talk directly with CMD personnel or interact with other HD owners, especially handy if you have a technical problem. CMD is also actively developing products that will enable more commercial software to operate with the HD series drives.

When it comes to price versus performance, if you need just a bit more storage capacity and speed, you might buy a 1581 disk drive and leave it at that. If, however, your storage and speed requirements exceed the limits of a 1581 (bulletin board SYSOPs, programmers and small-business offices come to mind), then an HD purchase may make sense. As far as hard drives go, the HD is relatively inexpensive—a few hundred dollars less than the Lt. Kernal. And its sophistication and compatibilities make it attractive. I must admit, I greeted the prospect of reviewing the HD-40 with a bit of skepticism, partly due to the drive's price and partly because of its compatibility claims. Now. . .well, I'm sorry I have to send the review unit back. ■

John Ryan is an air traffic control instructor who moonlights as one of RUN's *contributing editors.*

Table 1. Average load and save times, in seconds, with a file size of 105 blocks.

C-64 Benchmarks	Load	Save	C-128 Benchmarks	Load	Save
1541 floppy	108.20	107.40	1571 floppy	6.63	50.47
1581 floppy	54.37	40.18	1581 floppy	5.25	22.25
1541 CMD HD	44.30	34.89	1571 CMD HD	4.21	22.38
1581 CMD HD	44.27	34.76	1581 CMD HD	4.19	22.66
Native partition	43.82	34.78	Native partition	4.18	23.57

Note: Many of these times can be reduced considerably with JiffyDOS installed.

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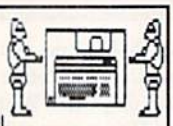

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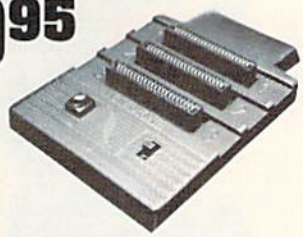

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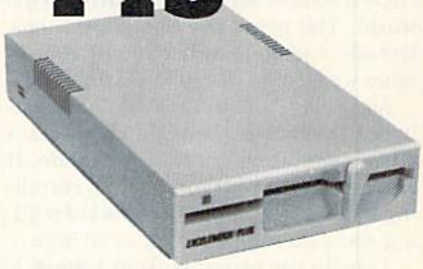

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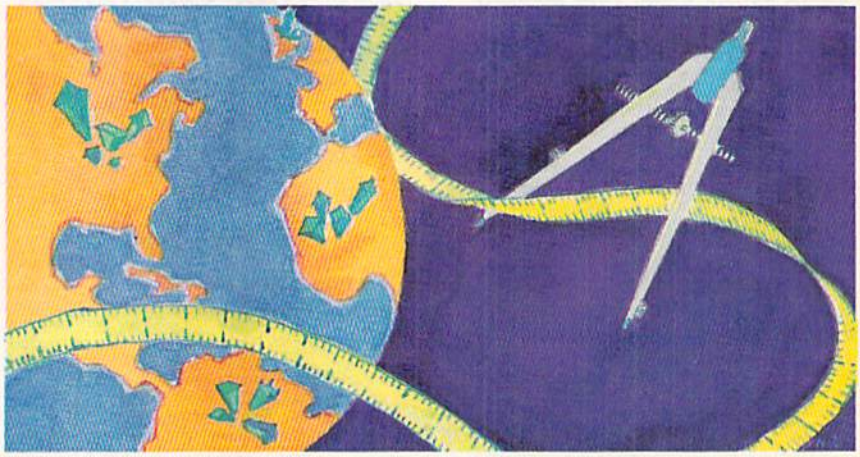

By LARRY PANKEY

The May 1988 issue of *Commodore Magazine* contained a type-in Basic program by Leo W. Brenneman entitled Air Miles. Written for the C-64, it calculated great circle distances between cities around the world. The many city names and their latitude and longitude (lat/lon) coordinates were contained in Data statements.

Air Miles 128 is an 80-column enhanced version of the original that takes advantage of the C-128's Fast mode. It also increases program speed by searching the Data statements, instead of reading the data into memory as strings.

Type in the program from Listing 1, using *RUN*'s Checksum program to detect any typing errors. Then save it to disk with the name Air Miles 128.

The program first displays a main menu screen that includes a brief description of Air Miles 128 and its five main menu options.

Selecting option 1, Directory of Cities, brings up a submenu for viewing a list of all cities in the Data statements or just those beginning with a particular letter. (Note: To save space in the magazine, we've limited the number of cities listed in the Data statements. See "Adding Data," below, to include additional cities of your choosing or order the August/September/October ReRUN to obtain the original listing of cities.)

When you select main menu option 2, Distance Between Cities, the program asks for the names of two cities. If you type a name that's not in the data, or spell it differently than in the data, the program displays a "Not in List. Check Menu Option 1" message. Then, after three seconds, it asks for the city again. Pressing the ↑ (up-arrow) key at any time restores the main menu.

If the program finds the two cities, it displays the distance between them in statute miles, nautical miles and kilometers. Then you can press F7 to return to the main menu or F1 to type in another pair of cities. To repeat a city from the last pair, just press the ← (left-arrow) key, and the name appears.

Option 3, Enter Latitudes and Longitudes, lets you type in coordinates for two locations of your own choosing. The program calls them Point A and Point B. Again, you can press F7 to return to the main menu or F1 to continue.

Option 4, Print Hard Copy of Cities, is similar to option 1, except that all city data is sent to your printer.

Option 5, Quit, provides an exit from Air Miles 128 to Basic.

The program allows 22 characters for a city name. If you try to enter more characters than are allowed at this, or any, prompt, the screen flashes red, and the speaker beeps. Air Miles 128 also has a trap routine to catch syntax errors.

A Geography Lesson

The location of any point on the earth can be identified by its latitude, or distance north or south of the equator, and its longitude, or distance east or west of Greenwich, England. Latitudes run from 0 degrees at the equator to 90 degrees, north or south, at the poles. The northern hemisphere lies north of the equator, the southern hemisphere south of it. Latitude lines on maps, connecting all points of like latitude, are called parallels.

Longitude lines are called meridians and run north and south from pole to pole. The eastern and western hemispheres are defined by the 180th meridian, on the opposite side of the world from the Greenwich meridian. The International Date Line runs, with a few deviations, along the 180th meridian.

Latitude and longitude are usually stated in degrees, minutes ($^1/_{60}$ of a degree) and, sometimes, seconds ($^1/_{60}$ of a minute). Air Miles 128 doesn't use seconds, since one second latitude represents only about 100 feet.

Adding Data

The Data statements are grouped according to first letter of city name, those names beginning with A in lines 1000–1020, those beginning with B in lines 2000–2030, and so on. If you enter additional cities of your own choosing, be ►

RUN it right: **C-128 (in 80-Column mode)**

ILLUSTRATED BY NATALIA RAPHAEL

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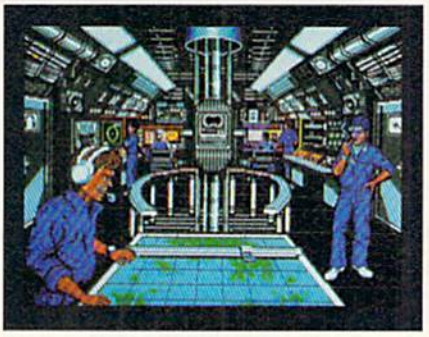
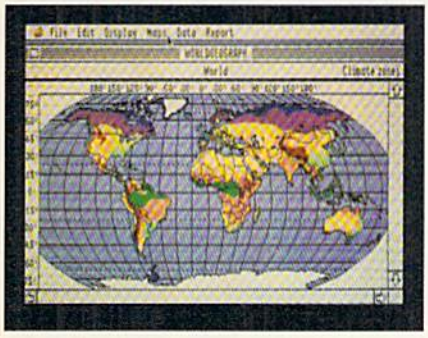
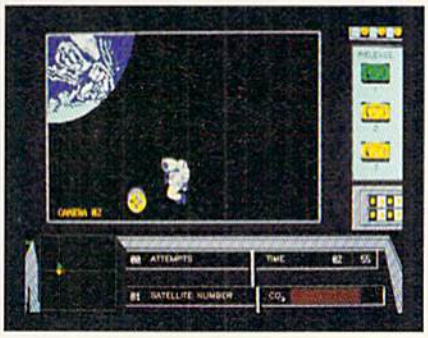
See The World







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sure to follow this scheme, and don't renumber the program. The data search method relies on cities being separated in this fashion. The line

DATA {UP ARROW},,,,,,

must always be the last line in any alphabetical group. However, you can change that line's number—for example, in this listing, line 1030 can become line 1980 as long as it remains the last line in the "A" group.

To add a city to the data, insert a new line number within the proper group, then type the word DATA followed by the city name, degrees latitude, minutes latitude, N or S, degrees longitude, minutes longitude, and E or W. If you don't know the minutes, type 0. Each Data line must contain six commas. If you end up with more than 100 cities in an alphabetical group, change the number in the DIMC$(101) statement in line 3 to your new quantity plus 1.

Air Miles lets you add more cities of your choosing.

Look in a world atlas for major cities' coordinates. When you have identically named cities in different states or countries, add the state or country name—it can be abbreviated—to one or both. However, don't put a comma between the city name and the state or country.

Mariners and fishermen can find coordinates using oceanographic charts. Of course, you won't have ready-made names for places on the water; you'll have to be creative. For instance, you might name a special fishing spot Bank 207 or Bank 14, for the depth in fathoms. The spot would then go into the B group of Data statements. Use your imagination in naming other places you want to include in the program. R

Larry Pankey enjoys taking apart and improving Basic programs to get them to run better and faster.

Listing 1. Air Miles 128 program. (Available on ReRUN disk. See order card facing page 16.)

```
1 GOTO2:---AIR MILES 128:REM*39
2 IFPEEK(215)<>128THENPRINT"{SH
  FT CLR}{4 CRSR DNs}THIS PROGR
  AM RUNS IN 128/8Ø COLUMN ONLY
  !":END                    :REM*2Ø9
3 CLR:FAST:DIMC$(1Ø1):COLOR6,1:
  PRINT"{SHFT CLR}"CHR$(142)CHR
  $(11):KB=2Ø8:TRAP196      :REM*14
4 POKE828,183:REM---C64 FUNCTIO
  N KEYS                    :REM*193
5 DATA 27,79,15,18,156,32,146,1
  57,5,143                  :REM*64
6 FORA=1TO1Ø:READB:CR$=CR$+CHR$
  (B):NEXT                  :REM*148
7 E$=CHR$(27):UL$=E$+CHR$(45)+C
  HR$(1):NU$=E$+CHR$(45)+CHR$(Ø
  )                         :REM*58
8 CU$=CHR$(142):CD$=CHR$(142):U
  $=CHR$(2):UO$=CHR$(13Ø)
                            :REM*47
9 L$="{57 COMD Ts}"         :REM*155
1Ø TL$="{CTRL 5}{SHFT U}{5Ø SHF
  T *s}{SHFT I}"            :REM*1Ø5
11 ML$="{SHFT -}{5Ø SPACEs}{SHF
  T -}"                     :REM*194
12 BL$="{SHFT J}{5Ø SHFT *s}{SH
  FT K}{HOME}"              :REM*247
13 HL$="{CTRL 5}{34 SHFT *s}"
                            :REM*64
14 RE$="RETURN":M1$="{CTRL 8}[{
  COMD 8}1{CTRL 8}]{CTRL 4}"
                            :REM*1
15 M2$="{CTRL 8}[{COMD 8}2{CTRL
   8}]{CTRL 4}":M3$="{CTRL 8}[
  {COMD 8}3{CTRL 8}]{CTRL 4}"
                            :REM*244
16 M4$="{CTRL 8}[{COMD 8}4{CTRL
   8}]{CTRL 4}":M5$="{CTRL 8}[
  {COMD 8}5{CTRL 8}]{CTRL 4}"
                            :REM*89
17 LC$=CD$+"{CTRL 8}LAST CITY.
  PRESS {COMD 6}"+RE$+"{CTRL 8
  } FOR MENU{HOME}"+CU$
                            :REM*1Ø6
18 SR$="{CTRL 8}PRESS {COMD 6}S
  PACE {CTRL 8}TO CONTINUE OR
  {COMD 6}"+RE$+"{CTRL 8} FOR
  MENU"                     :REM*153
19 UA$=CD$+"{CTRL 8}PRESS '{COM
  D 6}{UP ARROW}{CTRL 8}' TO A
  BORT"+CU$                 :REM*161
2Ø DE$="{47 SPACEs}"        :REM*156
21 CL$=UL$+"LATITUDE"+NU$+"{9 S
  PACEs}"+UL$+"LONGITUDE"+NU$
                            :REM*125
22 DM$="CITY{2Ø SPACEs}DEG{2 SP
  ACEs}MIN{3 SPACEs}HEM{3 SPAC
  Es}DEG{2 SPACEs}MIN{3 SPACEs
  }PAR"                     :REM*11Ø
23 REM---INSTRUCTIONS       :REM*6
24 WINDOW14,Ø,66,12,1       :REM*156
25 PRINTTL$:FORA=1TO1Ø:PRINTML$
  :NEXT:PRINTBL$:WINDOW17,1,64
  ,12                       :REM*17
26 CHAR,1Ø,Ø,"{COMD 3}*{CTRL 2}
  *{COMD 7}*{CTRL 2}{2 SPACEs}
  AIR{2 SPACEs}MILES 128 {COMD
   7}*{CTRL 2}*{COMD 3}*"
                            :REM*184
27 CHAR,Ø,2,CD$+"{CTRL 4}THIS P
  ROGRAM CALCULATES STRAIGHT L
  INE DISTANCE"             :REM*216
28 CHAR,Ø,3,"BETWEEN TWO CITIES
   OF THE WORLD.{2 SPACEs}IT A
  LSO CAL-"                 :REM*229
29 CHAR,Ø,4,"CULATES THE DISTAN
  CE BETWEEN TWO POINTS, BASED
  "                         :REM*143
3Ø CHAR,Ø,5,"ON LATITUDE AND LO
  NGITUDE.{3 SPACEs}PRESS{2 SP
  ACEs}OPTION "+M1$         :REM*1Ø9
31 CHAR,Ø,6,"IN THE MENU{2 SPAC
  Es}TO{2 SPACEs}PREVIEW THE{2
   SPACEs}CITIES{2 SPACEs}ON F
  ILE."                     :REM*21
32 CHAR,Ø,7,"ENTER CITY NAMES A
  T OPTION "+M2$+".{2 SPACEs}E
  NTER LAT/LON"             :REM*9
33 CHAR,Ø,8,"LOCATIONS AT OPTIO
  N "+M3$+". OPTION "+M4$+" WI
  LL PRINT"                 :REM*184
34 CHAR,Ø,9,"A HARD COPY OF CIT
  IES ON FILE. HAPPY TRAVELING
  "+CU$                     :REM*4Ø
35 WINDOW14,12,66,24,1:PRINTTL$
  :FORA=1TO11:PRINTML$:NEXT:PR
  INTBL$                    :REM*47
36 REM---MENU               :REM*59
37 OL$="{CTRL 5}{7 SHFT *s}{COM
  D 3} MENU {CTRL 5}{7 SHFT *s
  }":GOSUB48                :REM*75
38 CHAR,5,1,M1$+"{COMD 8} DIREC
  TORY OF CITIES"           :REM*195
39 CHAR,5,3,M2$+"{COMD 8} DISTA
  NCE BETWEEN CITIES"       :REM*185
4Ø CHAR,5,5,M3$+"{COMD 8} ENTER
   LATITUDES & LONGITUDES"
                            :REM*2Ø3
41 CHAR,5,7,M4$+"{COMD 8} PRINT
   HARD COPY OF CITIES":REM*14
42 CHAR,5,9,M5$+"{COMD 8} QUIT"
                            :REM*252
43 EC=Ø:R=3963.34:NM=.8684:KM=1
  .6Ø934                    :REM*225
44 POKEKB,Ø:DO:GETKEYK$:K=VAL(K
  $):LOOPUNTILK>ØANDK<6
                            :REM*144
45 ONKGOTO5Ø,75,121,14Ø,167
                             :REM*68
46 WINDOW16,13,63,23,1:LL=Ø:GOT
  O37                       :REM*159
47 REM---HEADER             :REM*239
48 WINDOW3Ø,12,5Ø,13:CHAR,Ø,Ø,C
  U$+OL$:WINDOW16,13,63,23:RET
  URN                       :REM*221
49 REM---DIRECTORY          :REM*49
```

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HOW FAR IS IT?

```
5Ø SCNCLR:OL$="{CTRL 5}{SHFT *}{COMD 6} CITIES DIRECTORY {CTRL 5}{SHFT *}":GOSUB48
:REM*14
51 GOSUB66:IFALTHENRESTOREDT:ELSERESTORE2Ø4 :REM*58
52 CHAR,3,1Ø,CD$+SR$+CU$ :REM*186
53 WINDOW16,14,63,22,1 :REM*134
54 FORA=1TO16:C$(A)="":READC$(A):FORB=1TO6:READA$:NEXTB
:REM*169
55 IFAL=1ANDC$(A)="{UP ARROW}"THENAL=Ø:X=1:GOTO58 :REM*15Ø
56 IFC$(A)="LAST"THENX=1:GOTO58 :REM*217
57 IFC$(A)="{UP ARROW}"THENC$(A)="":A=A-1:NEXTA:GOTO58:ELSENEXTA :REM*52
58 FORI=ATO16:C$(I)="":NEXT:A=17 :REM*81
59 FORC=1TO8:PRINTCU$"{COMD 8}"C$(C):NEXT:PRINT"{HOME}";:FORC=9TO16:PRINTTAB(26)C$(C):NEXT :REM*47
6Ø C=17:POKEKB,Ø:IFXTHENX=Ø:WINDOW16,14,63,23:GOTO63:REM*27
61 DO:GETKEYK$:LOOPUNTILK$=CHR$(32)ORK$=CHR$(13) :REM*194
62 IFK$=CHR$(13)THEN46:ELSESCNCLR:GOTO54 :REM*198
63 CHAR,Ø,9,DE$:CHAR,8,9,LC$ :REM*242
64 POKEKB,Ø:DO:GETKEYK$:LOOPUNTILK$=CHR$(13):GOTO46 :REM*59
65 REM---SELECT ALL OR ALPHA :REM*6Ø
66 CHAR,4,1,CD$+"{CTRL 8}SELECT OPTION . . . . . .":REM*2Ø8
67 CHAR,9,3,M1$+"{COMD 8} ALL CITIES" :REM*181
68 CHAR,9,5,M2$+"{COMD 8} ALPHABET LETTER OF CITIES"
:REM*128
69 CHAR,9,7,M3$+"{COMD 8} RETURN TO MENU"+CU$ :REM*254
7Ø POKEKB,Ø:DO:GETKEYK$:K=VAL(K$):LOOPUNTILK>ØANDK<4:ONKGOTO71,72,46 :REM*157
71 AL=Ø:RETURN :REM*1ØØ
72 CHAR,9,9,CD$+"{COMD 6}CITIES FIRST LETTER: "+CU$:N=1:GOSUB169:IFS$="{UP ARROW}"THEN46 :REM*237
73 DT=(ASC(N$)-64)*1ØØØ:AL=1:RETURN :REM*Ø
74 REM---ENTER CITIES :REM*216
75 IFLLTHENLL=Ø:GOTO121:ELSESCNCLR:OL$="{CTRL 5}{3 SHFT *s}{COMD 6} CITY TO CITY {CTRL 5}{3 SHFT *s}":GOSUB48
:REM*14Ø
76 CHAR,14,1Ø,UA$:WINDOW16,13,63,22 :REM*171
77 IFECTHENCHAR,13,8,CD$+"{CTRL 8}PRESS {CTRL 5}{LEFT ARROW}{CTRL 8} FOR SAME CITY"
:REM*48
78 CHAR,2,1,CU$+"{CTRL 8}FIRST CITY: ":N=22:GOSUB169:C1$=N$:IFS$="{UP ARROW}"THEN46
:REM*2Ø3
79 IFS$="{LEFT ARROW}"THENC1$=CM$(1):GOSUB11Ø:SC=Ø:CHAR,15,1,C1$:GOTO84 :REM*176
8Ø GOSUB11Ø:IFSCTHENSC=Ø:GOTO84 :REM*116
81 DT=ASC(LEFT$(C1$,1))-64:RESTORE DT*1ØØØ:J$=C1$:J=1:GOSUB115 :REM*178
82 IFC$(J)="{UP ARROW}"THENGOSUB164:SCNCLR:GOTO78 :REM*151
83 GOSUB117:Y1=RA:D1=V:GOSUB118:X1=RA:D2=V :REM*134
84 CHAR,2,3,"{CTRL 8}SECOND CITY: ":GOSUB169:C2$=N$:IFS$="{UP ARROW}"THEN46 :REM*86
85 IFS$="{LEFT ARROW}"THENC2$=CM$(2):GOSUB112:SC=Ø:CHAR,15,3,C2$:GOTO9Ø :REM*239
86 GOSUB112:IFSCTHENSC=Ø:GOTO9Ø :REM*46
87 DT=ASC(LEFT$(C2$,1))-64:RESTORE DT*1ØØØ:J$=C2$:J=1:GOSUB115 :REM*227
88 IFC$(J)="{UP ARROW}"THENGOSUB164:CHAR,2,3,DE$:GOTO84
:REM*161
89 GOSUB117:Y2=RA:D3=V:GOSUB118:X2=RA:D4=V :REM*62
9Ø REM---LAST CALCS TO SCREEN :REM*49
91 YM(1)=Y1:DM(1)=D1:XM(1)=X1:DM(2)=D2:YM(2)=Y2 :REM*168
92 DM(3)=D3:XM(2)=X2:DM(4)=D4:CM$(1)=C1$:CM$(2)=C2$ :REM*7
93 IFD1<>D3THENY2=-Y2 :REM*85
94 IFD2<>D4THENX2=-X2 :REM*66
95 A=SIN(Y1):B=SIN(Y2):C=COS(Y1):D=COS(Y2):E=COS(X2-X1):F=(A*B)+(C*D*E) :REM*85
96 FF=-ATN(F/SQR(-F*F+1))+({PI}/2) :REM*187
97 SM$=STR$(INT(1Ø*(R*FF+.Ø5))/1Ø) :REM*16
98 NM$=STR$(INT(1Ø*((R*FF)*NM)+.Ø5)/1Ø) :REM*1Ø
99 KM$=STR$(INT(1Ø*((R*FF)*KM)+.Ø5)/1Ø) :REM*2ØØ
1ØØ LD=22-INT(LEN(C1$)+LEN(C2$))/2+.5 :REM*142
1Ø1 WINDOW16,13,63,23,1:REM*2Ø8
1Ø2 CHAR,14,1,"{COMD 8}THE DISTANCE BETWEEN":CHAR,LD,3,"{CTRL 2}"+C1$+"{COMD 8} & {CTRL 2}"+C2$ :REM*226
1Ø3 CHAR,13-LEN(SM$)/2,5,"{CTRL 4}IS.......{CTRL 8}"+SM$+"{CTRL 4} STATUTE MILES,"
:REM*223
1Ø4 CHAR,13-LEN(NM$)/2,7,"OR.....{CTRL 8}"+NM$+"{CTRL 4} NAUTICAL MILES," :REM*49
1Ø5 CHAR,13-LEN(KM$)/2,9,"OR.....{CTRL 8}"+KM$+"{CTRL 4} KILOMETERS" :REM*175
1Ø6 WINDOW24,24,62,24:CHAR,Ø,Ø,"{CTRL 8}PRESS {COMD 6}F1 {CTRL 8}FOR ANOTHER {COMD 6}F7 {CTRL 8}FOR MENU{HOME}"
:REM*18
1Ø7 POKEKB,Ø:DO:GETKEYK$:LOOPUNTILK$=CHR$(133)ORK$=CHR$(136):CHAR,Ø,Ø,HL$ :REM*135
1Ø8 WINDOW17,13,62,23,1:IFK$=CHR$(136)THEN46:ELSEEC=1:GOTO74 :REM*124
1Ø9 REM---SAME CITY? :REM*51
11Ø IFC1$=CM$(1)THENY1=YM(1):D1=DM(1):X1=XM(1):D2=DM(2):SC=1:RETURN :REM*126
111 IFC1$=CM$(2)THENY1=YM(2):D1=DM(3):X1=XM(2):D2=DM(4):SC=1:RETURN:ELSERETURN:REM*95
112 IFC2$=CM$(2)THENY2=YM(2):D3=DM(3):X2=XM(2):D4=DM(4):SC=1:RETURN :REM*235
113 IFC2$=CM$(1)THENY2=YM(1):D3=DM(1):X2=XM(1):D4=DM(2):SC=1:RETURN:ELSERETURN:REM*5Ø
114 REM---CITY CALCS :REM*41
115 READC$(J):FORI=J+1TOJ+6:READC$(I):NEXTI:IFC$(J)="{UP ARROW}"THENRETURN :REM*136
116 IFC$(J)=J$THENRETURN:ELSEJ=J+1:GOTO115 :REM*15
117 D=VAL(C$(J+1)):M=VAL(C$(J+2)):V=ASC(C$(J+3)):GOTO119
:REM*148
118 D=VAL(C$(J+4)):M=VAL(C$(J+5)):V=ASC(C$(J+6)) :REM*67
119 DD=M/6Ø+D:RA=DD/57.2957795:RETURN :REM*69
12Ø REM---LAT/LON ENTRY:REM*142
121 R1=Ø:R2=1:R3=3:PS=Ø:REM*246
122 SCNCLR:OL$="{COMD 6} LATITUDE/LONGITUDE ":GOSUB48
:REM*111
123 CHAR,14,1Ø,UA$:WINDOW16,13,63,22:P$="POINT 'A'"
:REM*144
124 CHAR,6,R1,U$+"{COMD 7}"+P$+":{2 SPACEs}DEG{4 SPACEs}MIN{3 SPACEs}N/S{3 SPACEs}E/W{2 SPACEs}"+UO$ :REM*1Ø
125 CHAR,6,R2,"{CTRL 8}LATITUDE:{3 SPACEs}":N=2:LL=1:GOSUB169:D$=N$:IFS$="{UP ARROW}"THEN138 :REM*132
126 D=VAL(D$):IFD>9ØTHENCHAR,18,R2,"{3 SPACEs}":GOTO125
:REM*8
127 CHAR,25,R2:IFD=9ØTHENM=Ø:PRINT"Ø":GOTO129:ELSEGOSUB169:M$=N$:IFS$="{UP ARROW}"THEN138 :REM*115
128 M=VAL(M$):IFM>6ØTHENCHAR,25,R2,"{2 SPACEs}":GOTO127
:REM*2Ø6
129 CHAR,33,R2:N=1:NS=1:GOSUB169:V$=N$:IFS$="{UP ARROW}"THEN138 :REM*92
13Ø V=ASC(V$):NS=Ø:GOSUB119:IFPTHENY2=RA:D3=V:GOTO131:ELSEY1=RA:D1=V :REM*174
131 CHAR,6,R3,"{CTRL 8}LONGITUDE:{2 SPACEs}":N=3:GOSUB169: ►
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HOW FAR IS IT?

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    D$=N$:IFS$="{UP ARROW}"THEN
    138                    :REM*161
132 D=VAL(D$):IFD>18ØTHENCHAR,1
    8,R3,"{4 SPACEs}":GOTO131
                           :REM*69
133 CHAR,25,R3:IFD=18ØTHENM=Ø:P
    RINT"Ø":GOTO135:ELSEN=2:GOS
    UB169:M$=N$:IFS$="{UP ARROW
    }"THEN138              :REM*89
134 M=VAL(M$):IFM>6ØTHENCHAR,25
    ,R3,"{2 SPACEs}":GOTO133
                           :REM*131
135 CHAR,39,R3:N=1:EW=1:GOSUB16
    8:V$=N$:IFS$="{UP ARROW}"TH
    EN138                  :REM*113
136 V=ASC(V$):EW=Ø:GOSUB119:IFP
    THENX2=RA:D4=V:P=Ø:GOTO93
                           :REM*43
137 X1=RA:D2=V:C1$=P$:P=1:P$="P
    OINT 'B'":C2$=P$:R1=5:R2=6:
    R3=8:GOTO124           :REM*163
138 LL=Ø:P=Ø:NS=Ø:EW=Ø:GOTO46
                           :REM*13Ø
139 REM---PRINT HARD COPY
                           :REM*132
14Ø SCNCLR:OL$="{CTRL 5}{3 SHFT
     *s}{COMD 6} PRINT CITIES {
    CTRL 5}{3 SHFT *s}":GOSUB48
                           :REM*36
141 GOSUB66:IFALTHENRESTOREDT:E
    LSERESTORE2Ø4          :REM*1ØØ
142 CLOSE15:OPEN15,4,15:CLOSE15
    :IFST<>ØTHEN161        :REM*17Ø
143 SCNCLR:CHAR,8,3,"{CTRL 8}AD
    JUST YOUR PRINTER PAPER, TH
    EN"                    :REM*167
144 CHAR,8,5,"PRESS ANY KEY TO
    BEGIN PRINTING":POKEKB,Ø:GE
    TKEYK$:J=1:P=Ø         :REM*9Ø
145 CLOSE4:OPEN4,4:PRINT#4,SPC(
    2Ø)"LATITUDES AND LONGITUDE
    S OF WORLD CITIES" :REM*2Ø4
146 PRINT#4,SPC(12)L$:PC=3:GOSU
    B156                   :REM*7Ø
147 READC$(J):FORA=J+1TOJ+6:REA
    DC$(A):NEXTA:IFALANDC$(J)="
    {UP ARROW}"THENAL=Ø:GOTO16Ø
                           :REM*185
148 IFC$(J)="{UP ARROW}"THENJ=1
    :GOTO147               :REM*198
149 IFC$(J)="LAST"THEN16Ø
                           :REM*38
15Ø IFP=5THENPRINT#4,SPC(12)L$:
    P=Ø:PC=PC+1            :REM*148
151 IFPC=ØTHENGOSUB156 :REM*154
152 PRINT#4,SPC(12)C$(J)SPC(24-
    LEN(C$(J)));:FORB=J+1TOJ+6
                           :REM*187
153 PRINT#4,SPC(5-LEN(C$(B)))C$
    (B);:IFB=J+3THENPRINT#4,"{2
     SPACEs}";             :REM*4Ø
154 NEXTB:PRINT#4:P=P+1:PC=PC+1
    :IFPC=>58THENPRINT#4,CHR$(1
    2):P=Ø:PC=Ø            :REM*14Ø
155 J=J+1:GOTO147          :REM*112
156 PRINT#4,SPC(4Ø)UL$"LATITUDE
    "NU$SPC(9)UL$"LONGITUDE"NU$
                           :REM*7
157 PRINT#4,SPC(12)"CITY"SPC(22
    )"DEG{2 SPACEs}MIN{3 SPACEs
    }HEM{3 SPACEs}DEG{2 SPACEs}
    MIN{3 SPACEs}PAR"      :REM*93
158 PRINT#4,SPC(12)L$:PC=PC+2:R
    ETURN                  :REM*31
159 PRINT#4,SPC(15)CL$:PRINT#4,
    SPC(15)DM$:PRINT#4,SPC(15)L
    $:PC=3:RETURN          :REM*2Ø5
16Ø IFPC=ØTHENCLOSE4:GOTO46:ELS
    EPRINT#4,CHR$(12):CLOSE4:GO
    TO46                   :REM*1Ø8
161 SCNCLR: CHAR,12,5,CHR$(15)+
    "{CTRL 8}TURN YOUR PRINTER
    ON!!"+CHR$(143)        :REM*56
162 CHAR,1Ø,1Ø,"{CTRL 8}PRESS {
    COMD 6}RETURN{CTRL 8} FOR T
    HE MENU":GOTO64        :REM*185
163 REM---CITY NOT LISTED
                           :REM*242
164 PRINT"{COMD 3}{CRSR DN}{6 S
    PACEs}NOT IN LIST. CHECK ME
    NU OPTION "M1$:SLEEP3
                           :REM*2Ø2
165 PRINT"{CRSR UP}"DE$:RETURN
                           :REM*119
166 REM---QUIT             :REM*246
167 TRAP:PRINT"{2 HOMEs}{SHFT C
    LR}{CTRL 4}"CHR$(12);:POKE8
    28,173:END             :REM*79
168 REM---GET STRING       :REM*36
169 GOSUB17Ø:PRINTCHR$(32):IFS$
    ="{UP ARROW}"ORS$="{LEFT AR
    ROW}"THENRETURN:ELSEGOSUB18
    4:RETURN               :REM*187
17Ø S$="":N$="":POKEKB,Ø
                           :REM*168
171 PRINTCR$;:GETKEYS$:AS=ASC(S
    $)                     :REM*65
172 IFS$="{LEFT ARROW}"ANDEC=1A
    NDLEN(N$)<1THENRETURN
                           :REM*15
173 IFS$="{UP ARROW}"THENRETURN
                           :REM*7
174 IFLEN(N$)<1AND(AS=13 OR AS=
    2Ø OR AS=45 OR AS=46)THEN17
    1                      :REM*147
175 IFAS=13THENRETURN      :REM*181
176 IFAS=2ØTHENN$=LEFT$(N$,LEN(
    N$)-1):PRINTCHR$(2Ø);:GOTO1
    71                     :REM*162
177 IFLEN(N$)>=NTHENGOSUB193:GO
    TO171                  :REM*183
178 IFLLTHEN188            :REM*43
179 IFLEN(N$)<1ANDAS>47ANDAS<58
    THEN171                :REM*128
18Ø IFAS=32ANDLEN(N$)<1THEN171
                           :REM*11
181 IFAS=32 OR AS=45 OR AS=46TH
    EN183                  :REM*81
182 IFAS>64ANDAS<91THEN183:ELSE
    IFAS<48 OR AS>57THEN171
                           :REM*91
183 N$=N$+S$:PRINTS$;:GOTO171
                           :REM*98
184 FORJ=LEN(N$)TO1STEP-1:IFXTH
    EN187                  :REM*66
185 IFASC(MID$(N$,J,1))<>32THEN
    X=1:GOTO187            :REM*2Ø8
186 IFASC(MID$(N$,J,1))=32THENN
    $=LEFT$(N$,(LEN(N$)-1))
                           :REM*158
187 NEXT:X=Ø:RETURN        :REM*164
188 IFNSTHEN191:ELSEIFEWTHEN192
                           :REM*176
189 IFAS<48 OR AS>57THEN171
                           :REM*243
19Ø N$=N$+S$:PRINTS$;:GOTO171
                           :REM*1Ø1
191 IFS$<>"N"ANDS$<>"S"THEN171:
    ELSE19Ø                :REM*218
192 IFS$<>"E"ANDS$<>"W"THEN171:
    ELSE19Ø                :REM*216
193 REM---RED FLASH & SOUND
                           :REM*159
194 COLOR6,11:FORDY=1TO1ØØ:NEXT
    :COLOR6,1:SOUND1,1ØØØ,5:SOU
    ND1,25ØØ,5:RETURN      :REM*Ø
195 REM---TRAP ERRORS      :REM*1Ø9
196 IFER=3ØTHENRESUME:ELSESCNCL
    R:OL$="{CTRL 5}{3 SHFT *s}{
    COMD 6} TRAP{2 SPACEs}ERROR
    S {CTRL 5}{3 SHFT *s}":GOSU
    B48                    :REM*7
197 CHAR,Ø,1Ø,DE$:CHAR,13,2,CHR
    $(15)+"{COMD 3}AN ERROR HAS
     OCCURED{CTRL 2}{CTRL G}"+C
    HR$(143)               :REM*155
198 CHAR,14-LEN(STR$(EL))/2,4,"
    {CTRL 4}ERROR LINE NUMBER:{
    CTRL 2}"+STR$(EL)      :REM*21Ø
199 CHAR,11,6,"{CTRL 4}SYSTEM E
    RROR NUMBER:{CTRL 2}"+STR$(
    ER)                    :REM*15Ø
2ØØ CHAR,18-LEN(ERR$(ER))/2,8,"
    {CTRL 4}ERROR IS: {CTRL 2}"
    +ERR$(ER)              :REM*141
2Ø1 IFPRTHENPR=Ø:PRINT#4:CLOSE4
                           :REM*97
2Ø2 TRAP196:GOTO162        :REM*171
2Ø3 REM---CITY DATA        :REM*136
2Ø4 REM---CITY DATA        :REM*137
1ØØØ DATA ACAPULCO,16,51,N,99,5
    6,W                    :REM*163
1Ø1Ø DATA ATHENS,37,58,N,23,46,
    E                      :REM*82
1Ø2Ø DATA ATLANTIC CITY,39,21,N
    ,74,27,W               :REM*221
1Ø3Ø DATA {UP ARROW},,,,,,
                           :REM*251
1Ø4Ø :                     :REM*78
2ØØØ DATA BALTIMORE,39,17,N,76,
    37,W                   :REM*1Ø7
2Ø1Ø DATA BOSTON,42,22,N,71,4,W
                           :REM*218
2Ø2Ø DATA BUENOS AIRES,34,3Ø,S,
    58,2Ø,W                :REM*191
2Ø3Ø DATA BUFFALO,42,53,N,78,53
    ,W                     :REM*36
2Ø4Ø DATA {UP ARROW},,,,,,
                           :REM*237
2Ø5Ø :                     :REM*52
3ØØØ DATA CAIRO,3Ø,1,N,31,14,E
                           :REM*5
3Ø1Ø DATA CALCUTTA,22,36,N,88,2
    4,E                    :REM*247
3Ø2Ø DATA COLUMBUS,39,58,N,83,Ø
    ,W                     :REM*132
3Ø3Ø DATA {UP ARROW},,,,,,
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                              :REM*211
3Ø4Ø :                        :REM*22
4ØØØ DATA DALLAS,32,47,N,96,49,
     W                        :REM*65
4Ø1Ø DATA DA NANG,16,4,N,1Ø8,13
     ,E                       :REM*128
4Ø2Ø DATA DULUTH,46,47,N,92,6,W
                              :REM*199
4Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*191
4Ø4Ø :                        :REM*18
5ØØØ DATA EDMONTON,53,3Ø,N,113,
     3Ø,W                     :REM*58
5Ø1Ø DATA EUGENE,44,5,N,123,4,W
                              :REM*15Ø
5Ø2Ø DATA EUREKA CA,4Ø,47,N,124
     ,9,W                     :REM*84
5Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*139
5Ø4Ø :                        :REM*249
6ØØØ DATA FAIRBANKS,64,51,N,147
     ,43,W                    :REM*82
6Ø1Ø DATA FORT WORTH,32,45,N,97
     ,18,W                    :REM*212
6Ø2Ø DATA FUJI,35,9,N,138,39,E
                              :REM*131
6Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*1Ø3
6Ø4Ø :                        :REM*197
7ØØØ DATA GALVESTON,29,18,N,94,
     48,W                     :REM*233
7Ø1Ø DATA GREENSBORO,36,4,N,79,
     48,W                     :REM*37
7Ø2Ø DATA GUADALAJARA,2Ø,4Ø,N,1
     Ø3,2Ø,W                  :REM*144
7Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*67
7Ø4Ø :                        :REM*161
8ØØØ DATA HANOI,21,5,N,1Ø5,55,E
                              :REM*198
8Ø1Ø DATA HONOLULU,21,19,N,157,
     52,W                     :REM*24Ø
8Ø2Ø DATA HOUSTON,29,46,N,95,22
     ,W                       :REM*212
8Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*111
8Ø4Ø :                        :REM*189
9ØØØ DATA IDAHO FALLS,43,3Ø,N,1
     12,2,W                   :REM*236
9Ø1Ø DATA ISTANBUL,41,Ø,N,29,Ø,
     E                        :REM*62
9Ø2Ø DATA ITHACA NY,42,27,N,76,
     3Ø,W                     :REM*5Ø
9Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*27
9Ø4Ø :                        :REM*169
1ØØØ DATA JACKSON,32,18,N,9Ø,1
     2,W                      :REM*125
1Ø01Ø DATA JUAREZ,27,37,N,1ØØ,4
     4,W                      :REM*24
1Ø02Ø DATA JUNEAU,58,18,N,134,2
     5,W                      :REM*21Ø
1Ø03Ø DATA {UP ARROW},,,,,,
                              :REM*55
1Ø04Ø :                       :REM*85
11ØØØ DATA KALAMAZOO,42,17,N,85
     ,35,W                    :REM*133
11Ø1Ø DATA KANSAS CITY,39,6,N,9
     4,35,W                   :REM*163
11Ø2Ø DATA KLAMATH FALLS,42,13,
     N,121,46,W               :REM*124
11Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*51
11Ø4Ø :                       :REM*113
12ØØØ DATA LANSING,42,44,N,84,3
     3,W                      :REM*69
12Ø1Ø DATA LOS ANGELES,33,45,N,
     118,16,W                 :REM*194
12Ø2Ø DATA LOUISVILLE,38,15,N,8
     5,46,W                   :REM*134
12Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*22Ø
12Ø4Ø :                       :REM*1Ø9
13ØØØ DATA MADISON WI,43,4,N,89
     ,24,W                    :REM*177
13Ø1Ø DATA MADRID,4Ø,25,N,3,45,
     W                        :REM*8Ø
13Ø2Ø DATA MOSCOW,55,45,N,37,35
     ,E                       :REM*241
13Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*232
13Ø4Ø :                       :REM*25
14ØØØ DATA NASHVILLE,36,1Ø,N,86
     ,47,W                    :REM*9
14Ø1Ø DATA NEW YORK,4Ø,43,N,74,
     Ø,W                      :REM*18
14Ø2Ø DATA NORTH POLE,9Ø,Ø,N,Ø,
     Ø,E                      :REM*232
14Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*132
14Ø4Ø :                       :REM*37
15ØØØ DATA OAHU,21,28,N,157,58,
     W                        :REM*173
15Ø1Ø DATA ORLANDO,28,33,N,81,2
     3,W                      :REM*214
15Ø2Ø DATA OSLO,59,55,N,1Ø,45,E
                              :REM*249
15Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*224
15Ø4Ø :                       :REM*192
16ØØØ DATA PALM SPRINGS,33,5Ø,N
     ,116,33,W                :REM*138
16Ø1Ø DATA PARIS,48,5Ø,N,2,2Ø,E
                              :REM*Ø
16Ø2Ø DATA PROVIDENCE,41,49,N,7
     1,24,W                   :REM*152
16Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*2Ø4
16Ø4Ø :                       :REM*22Ø
17ØØØ DATA QUEENSTOWN,42,4,S,14
     5,35,E                   :REM*71
17Ø1Ø DATA QUINCY MA,42,15,N,71
     ,Ø,W                     :REM*143
17Ø2Ø DATA QUEBEC,46,52,N,71,13
     ,W                       :REM*32
17Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*56
17Ø4Ø :                       :REM*136
18ØØØ DATA RALEIGH,35,47,N,78,3
     9,W                      :REM*177
18Ø1Ø DATA ROME,41,54,N,12,3Ø,E
                              :REM*31
18Ø2Ø DATA ROTTERDAM,51,55,N,4,
     3Ø,E                     :REM*199
18Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*2Ø
18Ø4Ø :                       :REM*244
19ØØØ DATA SACRAMENTO,38,35,N,1
     21,29,W                  :REM*88
19Ø1Ø DATA ST. LOUIS,38,37,N,9Ø
     ,12,W                    :REM*33
19Ø2Ø DATA SYRACUSE, 43,3,N,76,
     9,W                      :REM*194
19Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*16
19Ø4Ø :                       :REM*2Ø8
2ØØØ DATA TACOMA,47,14,N,122,2
     6,W                      :REM*1Ø5
2Ø01Ø DATA TUCSON,32,13,N,11Ø,5
     8,W                      :REM*28
2Ø02Ø DATA TULSA,36,1Ø,N,95,55,
     W                        :REM*1Ø3
2Ø03Ø DATA {UP ARROW},,,,,,
                              :REM*124
2Ø04Ø :                       :REM*2Ø4
21ØØØ DATA UKIAH CA,39,9,N,123,
     13,W                     :REM*17Ø
21Ø1Ø DATA UKIAH OR,45,8,N,118,
     56,W                     :REM*71
21Ø2Ø DATA UTICA NY,43,6,N,75,1
     4,W                      :REM*68
21Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*72
21Ø4Ø :                       :REM*56
22ØØØ DATA VALDEZ,61,7,N,146,16
     ,W                       :REM*55
22Ø1Ø DATA VANCOUVER BC,49,15,N
     ,123,1Ø,W                :REM*48
22Ø2Ø DATA VIRGINIA BEACH,36,51
     ,N,75,59,W               :REM*232
22Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*165
23ØØØ DATA WACO TX,31,33,N,97,9
     ,W                       :REM*116
23Ø1Ø DATA WASHINGTON,38,54,N,7
     7,2,W                    :REM*2ØØ
23Ø2Ø DATA {UP ARROW},,,,,,
                              :REM*183
23Ø3Ø :                       :REM*1Ø6
24ØØØ DATA XENIA IL,38,38,N,88,
     38,W                     :REM*88
24Ø1Ø DATA XENIA OH,39,41,N,83,
     56,W                     :REM*193
24Ø2Ø DATA {UP ARROW},,,,,,
                              :REM*219
24Ø3Ø :                       :REM*7Ø
25ØØØ DATA YELLOWSTONE PARK,44,
     4Ø,N,11Ø,3Ø,W            :REM*124
25Ø1Ø DATA YOSEMITE PARK,37,45,
     N,119,4Ø,W               :REM*7
25Ø2Ø DATA YUMA,32,43,N,114,37,
     W                        :REM*167
25Ø3Ø DATA {UP ARROW},,,,,,
                              :REM*217
25Ø4Ø :                       :REM*1Ø4
26ØØØ DATA ZAMBOANGA,6,59,N,122
     ,3,E                     :REM*71
26Ø1Ø DATA ZANZIBAR,6,12,S,39,1
     2,E                      :REM*91
26Ø2Ø DATA ZION,42,27,N,87,5Ø,W
                              :REM*2Ø8
26Ø3Ø DATA ZURICH,47,22,N,8,32,
     E                        :REM*148
26998 DATA {UP ARROW},,,,,,
                              :REM*17
27ØØØ DATA LAST,,,,,,         :REM*125
```

■

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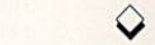

By JIM BORDEN

When I needed a flexible mouse driver for my C-64, I wrote one to do the job. Called Mouse.P1, it works with a mouse plugged into port 1, and offers several features that make it easy to use from Basic.

The mouse sprite (I used the corners of the normal cursor) is located in a window on the screen. The default window is the full screen, but five memory locations, 990–994, let you move the window almost anywhere. Mouse.P1 also lets you get both the row and column of the mouse sprite and the status of either button with Peeks from Basic.

The locations that pass information back and forth between Basic and Mouse.P1 are listed in Table 1. Note that the maximum X position is a two-byte value. Use the formulas shown for the Poke values, where R is the row number you want, 1–25, and C is the column number, 1–40. The Pokes are used only to change the window to limit the mouse sprite's movement.

Type in the Basic loader in Listing 1, using *RUN*'s Checksum program to check for typing errors, and save it to disk. Then run it to write MOUSE.P1, the machine language code, to disk. Next, type in and save Listing 2, a three-part demo program that illustrates how to use Mouse.P1.

The Demo

Load the demo program, then run it. First it loads Mouse.P1 and activates it with SYS 49152. At that point, the sprite appears on the screen.

Part of the machine language code defines a sprite for the mouse. If you want another shape for the sprite, you must activate Mouse.P1 first and then change the sprite. Poke the data for the new shape into locations 921–939 in steps of three.

The next lines of the demo set up the variables for the Peek addresses, so it's easy to remember what to peek. For example, if you want to get the row number of the mouse sprite, just use PEEK (RN). The demo gives examples of all the Peeks and Pokes.

As I mentioned, the demo program is actually three demos in one. The first is a very simple lo-res drawing program, with a working part that contains only five lines of Basic code. The other lines are REM and Print statements.

First the drawing program waits to detect a mouse button being pressed. If both buttons are down, the program clears the screen and jumps to the next part of the demo. Line 110 calculates the screen position to peek or poke, then checks to see if the shift/clear-home key combination is being pressed. If line 110 finds those keys down, it clears the screen for another drawing. Line 120 handles the left button. If it's down, the character at location SP is erased to normal video. Line 130 handles the right button by changing the character to reverse video (or turning it on).

As the program is written now, the screen contains only spaces or reverse spaces (and the characters on the original screen until they're cleared). However, two ten-year-old girls "tested" the program for over two hours, so, even though it's simple, it's fun.

The second section of the demo shows the use of a menu (or a multiple-choice question in this case). Here the column isn't required, so only the row is checked. If the row is within the range of answers and either button is down, the chosen answer is highlighted. Line 250 tells you if the answer is incorrect. The correct answer is then shown, and ►

Table 1. Locations that pass information between Basic and Mouse.P1.

POKE 990,(8*R+34)	Minimum Y position (row) of the mouse
POKE 991,(8*R+34)	Maximum Y position of the mouse
POKE 992,(8*C+8)	Minimum X position (column) of the mouse
POKE 993,((8*C+8) AND 127)	Maximum X position (low byte) of the mouse
POKE 994,-((8*C+8)>255)	Maximum X position (high byte) of the mouse
PEEK (RN)	Row number of the mouse sprite (1–25)
PEEK (CN)	Column number of the mouse sprite (1–40)
PEEK (LB)	Left button status (0=up; 1=down)
PEEK (RB)	Right button status

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a message is printed telling you to release the button. Next, line 270 waits until both buttons are up. Finally, lines 280 and 290 wait for a button press before moving on to the last part of the demo. This is necessary so you can see if your answer was correct.

The last part of the demo shows how to read moves for a game such as tic-tac-toe. Lines 370–390 set up a window the same size as the game board, and lines 470 and 480 reset the window to the full screen. The program *doesn't* play the game; it just shows how to read the row and column to get a move. It also rounds off the move to the center of the chosen box. This method can be helpful if you want to use a large board like the one shown in games of your own design.

I've found one minor glitch in the demo that I can't get rid of. To shift F1, Z, C, B, M or space, you must use the *left* shift key. The right one won't work with these keys most of the time.

With Mouse.P1, it's simple to read the status and position of the mouse (as a row and column) and to set up custom window limits for the mouse sprite. Use it—writing a mouse into your Basic programs can be a lot easier than you think. R

Jim Borden is a toolmaker by trade, a freelance programmer and a former RUN *Magic columnist.*

Listing 1. Basic loader for Mouse.P1 program. (Available on ReRUN disk. See order card facing page 16.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) MOUSE.M
  L                          :REM*61
5 OPEN 8,8,8,"MOUSE.ML,P,W"
                             :REM*212
6 CT=Ø:PRINT"{SHFT CLR}":REM*56
1Ø READ A$:IF A$="-1" THEN CLOS
  E8:PRINT:PRINT"ALL DONE!":EN
  D                          :REM*129
12 PRINT"{HOME}READING LINE "+S
  TR$(CT):CT=CT+1            :REM*141
15 IF LEN(A$)<62 THEN 55
                             :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
  2Ø)+MID$(A$,43,2Ø)         :REM*242
25 FOR I=1 TO 3Ø             :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                             :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55                  :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55                  :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                             :REM*67
5Ø NEXT:GOTO 1Ø              :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
  O 7Ø                       :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
  A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
  ):GOTO 7Ø                  :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
  Ø)+RIGHT$(A$,LEN(A$)-42)
                             :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
  T$(C$,1):L$=RIGHT$(C$,1)
                             :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
  SC(H$)-55                  :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
  SC(L$)-55                  :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                             :REM*148
95 NEXT:GOTO 1Ø              :REM*16Ø
1ØØ REM HEX DATA FOR MOUSE.ML
                             :REM*183
1Ø1 DATA ØØCØA9Ø18D15DØA9ØE8D*F
  8Ø7A23FA9ØØ9D8ØØ3CA*1ØFAA98
  18D9CØ38DABØ3              :REM*2Ø1
1Ø2 DATA A9C38D99Ø38DAEØ38D99*Ø
  3A92A8DDEØ38DØ1DØA9*EA8DDFØ
  3A91Ø8DEØØ38D              :REM*121
1Ø3 DATA ØØDØA9488DE1Ø3A9Ø18D*E
  2Ø3A255BD31EA9D99C1*CA1ØF7A
  968A2CØ8DE4C1              :REM*161
1Ø4 DATA 8EE5C178A9998D14Ø3A9*C
  18D15Ø3586ØAD19D4AC*95C12Ø5
  BC18C95C1186D              :REM*158
1Ø5 DATA ØØDØ8DØØDØ8A6D1ØDØ8D*1
  ØDØ8A3Ø1E38ADE1Ø3ED*ØØDØADE
  2Ø3ED1ØDØBØØC              :REM*148
1Ø6 DATA ADE1Ø3AEE2Ø38DØØDØ8E*1
  ØDØ4CBDCØAD1ØDØ3ØØE*ADEØØ33
  8EDØØDØA9ØØED              :REM*161
1Ø7 DATA 1ØDØ9ØEAADEØØ3A2ØØFØ*D
  DAD1AD4AC96C12Ø5BC1*8C96C13
  849FF6DØ1DØ8D              :REM*22
1Ø8 DATA Ø1DØCDDFØ39ØØ5ADDFØ3*B
  ØØ8CDDEØ3BØØ3ADDEØ3*8DØ1DØA
  D1ØDØ4AADØØDØ              :REM*1Ø8
1Ø9 DATA 2Ø85C1988DE3Ø38EE5Ø3*A
  DØ1DØ38E91A182Ø85C1*8EE4Ø39
  8ØAØDE3Ø38DE3              :REM*213
11Ø DATA Ø3A9ØØ8D93C18D94C1A9*F
  E488DØØDCAEØ1DC8A48*29Ø1DØØ
  3EE93C168291Ø              :REM*2Ø
111 DATA DØ3EE94C168382ABØE3*A
  97F8DØØDCA2ØØAD94C1*4AFØØ1E
  88EE6Ø3A2ØØAD              :REM*35
112 DATA 93C14AFØØ1E88EE7Ø38A*Ø
  DE6Ø3DØØ34C87EA6Ø8C*98C18D9
  7C1A2ØØ38ED98              :REM*62
113 DATA C1297FC94ØBØØ74AFØ12*A
  C97C16ØØ9CØC9FFFØØ8*386AA2F
  FAC97C16ØA9ØØ              :REM*226
114 DATA 6Ø6A1869Ø14A4AAØØØ9Ø*Ø
  1C8AACA6ØØØØØØØØØØ*ØØ
                             :REM*5Ø
115 DATA -1                  :REM*226
```

Listing 2. Mouse.P1 demo program. (Available on ReRUN disk. See order card facing page 16.)

```
1Ø REM - REVERSE BLOCKS DEMO FO
  R MOUSE DRIVER             :REM*1Ø9
2Ø IF X>Ø THEN SYS49152:GOTO 4Ø
                             :REM*176
3Ø X=1:LOAD "MOUSE.ML",8,1
                             :REM*1
4Ø RN=996:CN=997:LB=998:RB=999
                             :REM*199
5Ø REM ROW/COL NUM; LEFT/RIGHT
  BUTTON                     :REM*52
6Ø PRINT"{CTRL 1}{SHFT CLR}LEFT
   BUTTON=REVERSE-RIGHT BUTTON
  =NORMAL"CHR$(142)          :REM*127
7Ø PRINT" PRESS BOTH BUTTONS TO
   EXIT THE PROGRAM"         :REM*144
8Ø PRINT" --USE SHIFT/CLR KEYS
  TO CLEAR SCREEN--"         :REM*53
9Ø IF PEEK(LB)=1 AND PEEK(RB)=1
  GOTO 14Ø:REM BOTH DOWN=EXIT
                             :REM*181
1ØØ SP=983+PEEK(RN)*4Ø+PEEK(CN)
  :GET A$:IF A$="{SHFT CLR}"T
  HEN PRINTA$                :REM*168
11Ø IF PEEK(LB)THEN POKE SP,PEE
  K(SP) OR 128:REM RVS ON
                             :REM*234
12Ø IF PEEK(RB)THEN POKE SP,PEE
  K(SP)AND127:REM RVS OFF
                             :REM*228
13Ø GOTO9Ø                   :REM*15
14Ø REM - MENU SELECTION DEMO
                             :REM*125
15Ø PRINT"{SHFT CLR}WHAT IS THE
   CAPITAL OF TEXAS?"        :REM*66
16Ø DN$="{HOME}{17 CRSR DNs}":A
  $(1)="DALLAS":A$(2)="HOUSTO
  N"                         :REM*15Ø
17Ø A$(3)="AUSTIN":A$(4)="WACO"
  :A$(5)="NOT GIVEN"         :REM*81
18Ø PRINT"{CRSR DN}";:FORX=1TO5
  :PRINT" "A$(X):NEXT:REM*136
19Ø PRINT"{CRSR DN}[USE LEFT OR
   RIGHT BUTTON TO SELECT]"
                             :REM*218
2ØØ R=PEEK(RN)-2:B=PEEK(LB)+PEE
  K(RB)                      :REM*Ø
21Ø IF R<1 OR R>5 OR B=Ø THEN2Ø
  Ø                          :REM*94
22Ø PRINTLEFT$(DN$,R+2)" {CTRL
  9}"A$(R);LEFT$(DN$,12)
                             :REM*177
23Ø IF R<>3THEN PRINT"THAT IS N
  OT CORRECT."               :REM*84
24Ø PRINT"AUSTIN IS THE CAPITAL
```


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```
    OF TEXAS.":PRINT"{CRSR DN}
    RELEASE BUTTONS..." :REM*53
25Ø IF PEEK(LB)+PEEK(RB)>Ø GOTO
     25Ø                :REM*15Ø
26Ø PRINT"{CRSR UP}PRESS EITHER
     BUTTON..."         :REM*159
27Ø IF PEEK(LB)+PEEK(RB)=Ø GOTO
     26Ø                :REM*216
28Ø REM - GAME SQUARE DEMO
                        :REM*148
29Ø PRINT"{SHFT CLR}THIS DEMO U
    SES A WINDOW TO CONTAIN THE
    "                   :REM*88
3ØØ PRINT"MOUSE MARKER SPRITE.{
    2 SPACES}THE POKES ARE IN"
                        :REM*111
31Ø PRINT"LINE NUMBERS 35Ø-37Ø
    OF THE PROGRAM.{CRSR DN}"
                        :REM*1Ø8
32Ø PRINT"THIS DEMO WILL {CTRL
    9}MARK{CTRL Ø} THE SQUARES
    ON A"               :REM*75
33Ø PRINT"TIC-TAC-TOE BOARD (BU
    T WON'T PLAY!){CRSR DN}"
                        :REM*216
34Ø POKE 99Ø,98:POKE 991,162:RE
    M Y-MIN - MAX       :REM*1Ø1
35Ø POKE 992,96:POKE 993,16Ø:PO
    KE 994,Ø:REM X-MIN, MAX (LO
    ,HI)                :REM*168
36Ø POKE53248,98:POKE53249,16Ø:
    REM POS WITHIN WINDOW
                        :REM*85
37Ø A$="{COMD A}{SHFT *}{COMD S
    }":C$="{COMD Z}{SHFT *}{COM
    D X}":B$="{SHFT B}{CRSR RT}
    {SHFT B}":PRINT LEFT$(DN$,9
    ),"{CTRL 9} 1{2 SPACEs}2{2
    SPACEs}3"           :REM*224
38Ø PRINT ,"{2 CRSR DNs}{CTRL 9
    } 4{2 SPACEs}5{2 SPACEs}6"
                        :REM*2
39Ø PRINT ,"{2 CRSR DNs}{CTRL 9
    } 7{2 SPACEs}8{2 SPACEs}9"L
    EFT$(DN$,8);        :REM*234
4ØØ FOR X=1TO3:PRINT,"{CTRL 9}"
    A$A$A$:PRINT,"{CTRL 9}"B$B$
    B$:PRINT,"{CTRL 9}"C$C$C$:N
    EXT X               :REM*91
41Ø T$(Ø)="O":T$(1)="X":FOR X=1
     TO 9               :REM*167
42Ø PRINTDN$;"SELECT SQUARE FOR
     "T$(X AND 1):GOSUB47Ø
                        :REM*145
43Ø NEXT X:PRINTDN$;" GAME IS O
    VER - WHO WON?"     :REM*33
44Ø POKE 99Ø,42:POKE 991,234:RE
    M FULL SCREEN Y VAL.
                        :REM*236
45Ø POKE 992,16:POKE 993,72:POK
    E 994,1:REM FULL SCREEN X V
    ALS                 :REM*42
46Ø END                 :REM*78
47Ø REM WAIT FOR MOUSE BUTTON (
    EITHER)             :REM*57
48Ø Y=PEEK(LB) OR PEEK(RB):IFY=
    Ø GOTO 48Ø:REM WAIT :REM*85
49Ø REM CALULATE SQUARE POS FOR
     PEEK & PRINT       :REM*55
5ØØ R=PEEK(RN):R1=INT((R+1)/3)*
    3                   :REM*82
51Ø C=PEEK(CN):C1=INT((C+1)/3)*
    3                   :REM*24
52Ø PK=983+R1*4Ø+C1:IF PEEK(PK)
    <176 OR PEEK(PK)>186 GOTO48
    Ø:REM TAKEN         :REM*22
53Ø PRINTLEFT$(DN$,R1);TAB(C1-1
    )T$(X AND 1)        :REM*36
54Ø Y=PEEK(LB) OR PEEK(RB):IFY>
    Ø GOTO 54Ø:REM WAIT FOR REL
    EASE                :REM*3Ø
55Ø RETURN              :REM*182
```

■

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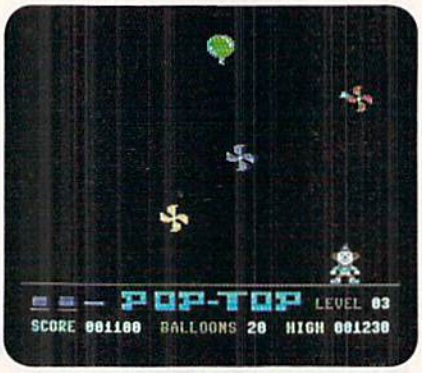
Pop-Top!

Combine a kid, a clown and balloons, and fun bursts out all over!

By TONY BRANTNER

Children really get a bang out of Pop-Top, a colorful C-64 game that combines arcade action with a nonviolent theme. The star of Pop-Top is Topper the clown. You move Topper back and forth across the bottom of the screen by using a joystick plugged into port 2. Press the firebutton, and Topper's hat pops off his head, zips to the top of the screen and drops down to make a pinpoint landing back on its owner's head.

Your goal in Pop-Top is to make the hat burst the balloons that are floating across the top of the screen. This entails positioning Topper for a good "shot," then moving him to guide the hat's trajectory while airborne. It also means making sure the hat doesn't tangle with a fedora-munching pinwheel that's passing across the screen. The game progresses through five difficulty levels, starting with a single pinwheel and adding another at each additional level.



Help Topper break all the balloons with his cap.

Topper starts with a wardrobe of three hats. One or two lost are replaced when you hit 20 balloons and move to the next level. If you lose all three, the game ends and resets to level 1.

Your score for each balloon popped is ten multiplied by the current difficulty level. You also receive a bonus of 100 points for each hat remaining as you move to a new level.

The bottom of the screen displays your running score, your highest score for the current game session, the number of hats left at the current level and the number of balloons you must still pop to reach 20 and proceed to the next level.

Type in the hex loader in Listing 1, using *RUN*'s Checksum program to detect any typing errors, and save the loader to disk. Then run it to write the machine language file POPTOP ML to disk. When you're ready to play Pop-Top, just load and run the machine language file like a Basic program. ®

Computer programmer, Tony Brantner, is especially fond of C-64 graphics.

Listing 1. Pop-Top loader program. (Available on ReRUN disk. See order card facing page 16.)

```
Ø REM THIS LIST 1 CREATES (AND
  SHOULD NOT BE CALLED) POPTOP.
  ML                        :REM*45
5 OPEN 8,8,8,"POPTOP.ML,P,W"
                           :REM*153
6 CT=Ø:PRINT"{SHFT CLR}":REM*56
1Ø READ A$:IF A$="-1" THEN CLOS
   E8:PRINT:PRINT"ALL DONE!":EN
   D                       :REM*129
12 PRINT"{HOME}READING LINE "+S
   TR$(CT):CT=CT+1         :REM*141
15 IF LEN(A$)<62 THEN 55
                           :REM*254
2Ø B$=MID$(A$,1,2Ø)+MID$(A$,22,
   2Ø)+MID$(A$,43,2Ø)      :REM*242
25 FOR I=1 TO 3Ø           :REM*181
3Ø C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                           :REM*2Ø9
35 H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55               :REM*85
4Ø L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55               :REM*136
45 BY=H*16+L:PRINT#8,CHR$(BY);
                           :REM*67
5Ø NEXT:GOTO 1Ø            :REM*115
55 IF LEN(A$)<21 THEN B$=A$:GOT
   O 7Ø                    :REM*184
6Ø IF LEN(A$)<42 THEN B$=LEFT$(
   A$,2Ø)+RIGHT$(A$,(LEN(A$)-21
   )):GOTO 7Ø              :REM*176
65 B$=LEFT$(A$,2Ø)+MID$(A$,22,2
   Ø)+RIGHT$(A$,LEN(A$)-42)
                           :REM*14Ø
7Ø FOR I=1 TO LEN(B$)/2:REM*221
75 C$=MID$(B$,(I*2)-1,2):H$=LEF
   T$(C$,1):L$=RIGHT$(C$,1)
                           :REM*14Ø
8Ø H=VAL(H$):IF H$>"9" THEN H=A
   SC(H$)-55               :REM*56
85 L=VAL(L$):IF L$>"9" THEN L=A
   SC(L$)-55               :REM*84
9Ø BY=H*16+L:PRINT#8,CHR$(BY);
                           :REM*148
95 NEXT:GOTO 1Ø            :REM*16Ø
1ØØ REM HEX DATA FOR POPTOP 64
                           :REM*223
1Ø1 DATA Ø1Ø8ØBØ8ØAØØ9E323Ø36*3
    1ØØØØØØAØØØB9A1ØD99*4Ø3EC8D
    ØF7B9A1ØE994Ø          :REM*213
1Ø2 DATA 3FC8CØBFDØF5A9ØØ8D2Ø*D
    Ø8D21DØ8D17DØ8D1BDØ*8D1DDØA
    9FF8D1CDØA9Ø3          :REM*1Ø9
1Ø3 DATA 8D25DØA9Ø18D26DØA9Ø4*8
    D27DØA9Ø28D28DØA9Ø8*2ØD2FFA
    98E2ØD2FFA993          :REM*188
1Ø4 DATA 2ØD2FFAØ27A964992ØØ7*A
    9ØB992ØDB881ØF3A215*AØØB182
    ØFØFFA9F7AØØC          :REM*136
1Ø5 DATA 2Ø1EABA9Ø185Ø62Ø9DØB*A
    9AC8D68ØFA9ØØ8D7ØØF*A91485F
    DA9Ø285FEA216          :REM*177
1Ø6 DATA AØØ1182ØFØFFA972AØØD*2
```

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

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```
    Ø1EABA9ØØ85Ø5A9AF8D*6ØØFA9C
    38D61ØFAD68ØF          :REM*222
1Ø7 DATA 8D69ØFAD7ØØF8D71ØFA9*F
    98DF8Ø72ØEEØ92ØFAØA*AØØ42Ø8
    DØA881ØFAA5Ø6          :REM*1Ø7
1Ø8 DATA 2Ø74ØC8E95Ø78D96Ø72Ø*8
    2ØCA4Ø688CØØ59ØØ2AØ*Ø4B9AEØ
    C8D15DØA2B3A9          :REM*83
1Ø9 DATA ØC2ØØ7ØCE6Ø3A5Ø34A9Ø*Ø
    62ØB3Ø92ØF4Ø92Ø4ØØA*2ØD2ØA2
    Ø82ØCA2Ø3AØØØ          :REM*98
11Ø DATA C8DØFDCADØFAA5Ø5DØ19*A
    5FDDØD8A2ØA2Ø68ØBC6*FE1ØF7A
    4Ø6C8CØ1ØBØØ2          :REM*19Ø
111 DATA 84Ø64C8BØ8AD1ED Ø4A9Ø*B
    D2Ø33ØB9ØB8CØØ59Ø14*A9Ø285Ø
    5A6Ø62Ø68ØB2Ø          :REM*166
112 DATA BCØBC6FD2ØFAØA4CF3Ø8*2
    ØDAØBA5FEØA1865FEA8*A943997
    1Ø79972Ø7A92Ø          :REM*63
113 DATA 9999Ø7999AØ7C6FE1ØØ7*A
    5FDDØØA4C24Ø9A5FDFØ*9F4CA2Ø
    8A2D5A9ØC2ØØ7          :REM*164
114 DATA ØCA9ØØ8D15DØA2ØAAØØ8*1
    82ØFØFFA987AØØD2Ø1E*ABA9232
    Ø6CØCA2ØA2ØFF          :REM*59
115 DATA E9A9ØF2Ø6CØCADØØDC29*1
    ØDØDB4C7AØ8ADØØDC4A*4A29Ø3A
    8B9A2ØCFØ2E18          :REM*184
116 DATA 6D68ØFAAAD7ØØF79A6ØC*D
    ØØ7EØ189Ø1D4CD8Ø9EØ*41BØ168
    E68ØF8D7ØØF8E          :REM*57
117 DATA 69ØF8D71ØF8A4A4A29Ø3*A
    8B9AAØC2CA9FA8DF9Ø7*6ØA4Ø5D
    ØØDADØØDC291Ø          :REM*167
118 DATA DØ3BC884Ø52ØA8ØBAD6Ø*Ø
    F49ØF29ØFØ91Ø8DØ1D4*AD6ØØF4
    A4A4A4A4AA4Ø5          :REM*47
119 DATA CØØ2BØØF85Ø238AD6ØØF*E
    5Ø2C921BØ11E6Ø56Ø18*6D6ØØFC
    9AF9ØØ6A9ØØ85         :REM*21Ø
12Ø DATA Ø5A9AF8D6ØØF6ØAØØ4A5*Ø
    34A29Ø11869FD99FAØ7*881ØFAE
    6FCA5FCC9119Ø          :REM*117
121 DATA 34A5Ø685FCAØØ4AD1BD4*2
    93FDØØ32ØBAØA18B96A*ØF7978Ø
    FAAB972ØF797D          :REM*136
122 DATA ØFFØØAEØ599ØØ62Ø8DØA*4
    C89ØA9972ØF8A996AØF*881ØD26
    ØA2ØØAD1BD429          :REM*178
123 DATA Ø1FØØ3E8A958996AØF8A*9
    972ØF98ØAØA85Ø2ØAØA*1865Ø26
    9559962ØFAD1B          :REM*2Ø9
124 DATA D429Ø71869Ø29929DØA2*Ø
    ØAD1BD429Ø7FØØ4C9Ø4*9ØØ3CAØ
    9FC9978ØF8A99          :REM*44
125 DATA 7DØF6ØA5Ø329Ø3DØ21AD*6
    7ØFFØ1CA4FB18AD6FØF*79A3ØCA
    AAD77ØF79A7ØC          :REM*17
126 DATA FØØ4EØ59BØ168E6FØF8D*7
    7ØF6ØA5FD2Ø74ØC8ED8*Ø78DD9Ø
    7A5FDFØ26A2ØØ          :REM*228
127 DATA AD1BD429Ø1FØØ3E8A958*8
    6FB8D6FØF8E77ØFA9FF*8DFFØ7A
    D1BD429Ø71869          :REM*19
128 DATA Ø28D2EDØA9338D67ØF6Ø*A
    ØØ538B962ØFED6ØØFC9*13BØ231
    8AD68ØF69ØE85          :REM*2Ø5
129 DATA 39AD7ØØF69ØØ853A38A5*3
    9F96AØFAAA53AF972ØF*DØØ6EØ1
    BBØØ2386Ø881Ø          :REM*74
13Ø DATA CF186ØAØØ438B9C7Ø769*Ø
    ØC93A9ØØ2A93Ø99C7Ø7*881ØEFC
    ADØE9AØØØB9C7          :REM*64
131 DATA Ø7D9E1Ø79Ø13DØØ6C8CØ*Ø
    69ØF16ØAØØ5B9C7Ø799*E1Ø7881
    ØF76ØAØØ5A93Ø          :REM*178
132 DATA 99C7Ø7881ØFA6ØA9198D*Ø
    5D4A9Ø98DØ6D4A21Ø8E*Ø4D4E88
    EØ4D46ØAD1BD4          :REM*116
133 DATA Ø9Ø8291F8DØ8D4A9Ø88D*Ø
    CD4A9ØØ8DØDD4A28Ø8E*ØBD4E88
    EØBD46Ø2Ø4FØC          :REM*132
134 DATA A9FØ8DØ6D4A9118DØ4D4*A
    9ØA85Ø4A5Ø485Ø2A5Ø2*ØAØAØA8
    DØ1D4A9Ø22Ø6C          :REM*144
135 DATA ØCC6Ø2DØEFC6Ø4DØE74C*4
    FØC8639853A2Ø4FØCA9*3C2Ø6CØ
    CA9138DØ5D4A9          :REM*66
136 DATA 4E8DØ6D4A9ØØ85Ø4A5Ø4*Ø
    A1865Ø4A8B139FØ2385*Ø2A21Ø8
    EØ4D4C8B139FØ          :REM*223
137 DATA ØD8DØ1D4C8B1398DØØD4*E
    88EØ4D4A5Ø22Ø6CØCE6*Ø44C21Ø
    CAØ17A9ØØ99ØØ         :REM*16
138 DATA D4881ØFAA9FF8DØED48D*Ø
    FD4A98Ø8D12D4A98F8D*18D46Ø1
    865A2C5A2DØFC          :REM*58
139 DATA 6ØA23ØC9ØA9ØØ5E9ØAE8*D
    ØF7Ø93Ø6ØA2Ø78AØAA8*BD6ØØF9
    9Ø1DØBD68ØF99          :REM*136
14Ø DATA ØØDØBD7ØØF4A26Ø2CA1Ø*E
    8A5Ø28D1ØDØ6ØØØ1FF*ØØØØØØF
    FØØFAFBFCFA93          :REM*184
141 DATA ABD7EFFF18145B18145B*Ø
    A16E5ØA145BØA122CØA*145BØA1
    6E5ØA145BØA12          :REM*64
142 DATA 2CØA145B18111BØØ1815*5
    CØ61ØF5Ø61ØF5ØC1ØF5*1Ø12FEØ
    4ØØØ181ØF51E           :REM*141
143 DATA ØØØ18152DØ4ØØØ1815*2
    DØØ9FA2C6BBACC6BBA2*C6BB2ØC
    6A2C6ACC6BBA2          :REM*1Ø7
144 DATA C6BBØD2Ø2Ø2Ø2Ø2Ø2Ø2*2
    Ø2Ø2Ø2Ø9A12BE92C4BE*12A192A
    2A112BE92C4BE          :REM*13
145 DATA C42Ø122Ø922Ø12A192A2*A
    112BE92C4BE2Ø1C4C45*56454C2
    ØØ53Ø31ØDØD2Ø          :REM*136
146 DATA 9953434F52452ØØ53Ø3Ø*3
    Ø3Ø3Ø3Ø2Ø2Ø8142414C*4C4F4F4
    E532ØØ53Ø3Ø2Ø          :REM*228
147 DATA 2Ø9E484947482ØØ53Ø3Ø*3
    Ø3Ø3Ø3ØØØ9C12CCBA1D*CCBA1DC
    CBAØD2ØA3A32Ø          :REM*198
148 DATA A3A32ØA3A3ØØ9647414D*4
    52Ø4F5645522E2E2E5Ø*5245535
    32Ø425554544F          :REM*1Ø3
149 DATA 4EØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ          :REM*2Ø8
15Ø DATA ØØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØ28ØØ*ØØ28ØØØ
    Ø3CØØØØAAØØØØ          :REM*156
151 DATA ØØØØØØØØØØ26ØØFFØØ2B*B
    EE8AB3CEAABEBEA2BEB*E8ØBBEE
    ØØ3EBCØØØFFØØ          :REM*43
152 DATA Ø23C8ØØ2828ØØ6AA9Ø16*9
    694125584FØ55ØFFØFF*ØFØ2AA8
    ØØA82AØØAØØAØ          :REM*98
153 DATA ØFØØFØ51ØØ4555ØØ5526*Ø
    ØFFØØ2BBEE8AB3CEAAB*EBEA2BE
    BE8ØBBEEØØ3EB          :REM*228
154 DATA CØØØFFØØØ23C8ØØ6828Ø*1
    6AA9Ø1296943E55843C*553CØAF
    F3CØAAA8ØØAØ2          :REM*84
155 DATA 8ØØ3428ØØ443CØØ5Ø114*Ø
    ØØ15426ØØFFØØ2BBEE8*AB3CEAA
    BEBEA2BEBE8ØB          :REM*75
156 DATA BEEØØ3EBCØØØFFØØØ23C*8
    ØØ2829ØØ6AA94169684*1255BC3
    C553C3CFFAØØ2          :REM*1Ø8
157 DATA AAAØØ28ØAØØ281CØØ3C1*1
    Ø144Ø5Ø154ØØØ26ØØØØ*ØØØ8ØØØ
    Ø28Ø28Ø28ØAAØ          :REM*83
158 DATA 2AØAA82AØA8Ø2A8AØØØA*8
    8ØØØØ3ØØØØØ8A8ØØ28A*AØØA82A
    ØAA82AØ2A8ØAØ          :REM*23
159 DATA ØAØØAØØØØØ8ØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØ*ØØØØØØA
    8ØØØ2AØØØØ2AØ          :REM*133
16Ø DATA ØØØ2AØØØØ2AØØØ8ØAØØØ*A
    Ø22AØA82AA8AABAA8AA*AØA82A2
    Ø28ØØ28Ø8ØØ2A          :REM*17Ø
161 DATA ØØØØ2AØØØØ2AØØØØ2AØØ*Ø
    ØA8ØØØØØØØØØØØØØØØ*ØØØØØØØ
    ØØØØØØ2AAØØØA          :REM*167
162 DATA AE8Ø2AABAØ2AAAEØAAAA*E
    8AAAAB8AAAAB8AAAAB8*BAAAA8B
    AAAA8AAAAA82E          :REM*Ø
163 DATA AAAØ2BAAAØØAAA8ØØ2AA*Ø
    ØØØ1ØØØØØCØØØØ1ØØØ*ØØ3ØØØØ
    ØØ4ØØØØØØØØØ          :REM*43
164 DATA ØØØØØØØØØØØØØØØØØØ*Ø
    ØØØØØØØØØØØØØØØØØØ*ØØØØØØØ
    ØØØØØØØØØØØØ          :REM*8
165 DATA ØØØØØØ            :REM*62
166 DATA -1                :REM*2Ø
```

■

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ProTips

Discover the secrets to using Commodore productivity software in this new column.

WELCOME TO THE WORLD of productivity tips! This column is for computerists who want to share their Commodore software expertise with fellow users. Here, you'll discover such valuable information as never-before-published RUN Script commands, how to use Flexidraw's Show Pictures program without light-pen input, and an alternative to the GEORAM expansion unit that also lets you run non-GEOS software.

RUN would like to see *undocumented* productivity "secrets" and tips that you've discovered about or developed from your favorite commercial software. We'll consider tips for applications, databases, spreadsheets, word processors, telecommunications, GEOS, utilities, graphics, business and, especially, *RUN*'s own programs. Take a look at the tips we have for you this month to get an idea of what we're looking for.

AwardWare: The escape key on the C-128 should not be confused with the escape key described in this software's documentation. You should use the left-arrow key below the escape key.

When you need all-caps text, use the caps-lock key instead of shift-lock. Otherwise, the space bar won't work.

—Glen Young
Renton, WA

Fleet System 2+: When printing more than one copy of a document with consecutively numbered pages, place the ↵p#1 command before the Header or Footer command. Your pages will then be numbered properly. This command also works with Fleet System 4.

—Bob Jackson
Protem, MO

Flex File 128: This is my vote for the easiest-to-use, full-featured database. I have a file that's 10,000 records long on a single 3½-inch disk, with over 2000 blocks free! Each field is sorted to its full depth of 40 characters. No other Commodore program could handle this database without extra disk files.

—Michael Habermann
Baltimore, MD

Flexidraw (version 5.5): If you want to use the Show Pictures program but don't have a light pen, here's how. Load Show Pictures and then load your picture into it. When you're asked to choose a border color (which normally requires light-pen input), press the control key and F1 at the same time. This chooses a border color for you, and you'll then be past the only part of the program that requires the light pen.

—Greg Bohlken
Chattanooga, TN

geoCalc 64: One feature lacking in this spreadsheet is an if-then function to handle the prompt, "Enter the result (if zero or less, enter zero)." By using geoCalc's Absolute Value function, you can simulate an if-then test: (a+ABS (a))/2, where a equals the cell number(s) or label(s) of the number(s) or expression you want to test. The result will be either a positive number or zero.

—Geoffrey Sullivan
Needham Heights, MA

geoPublish: The newest version of this desktop publisher comes with the Graphics Grabber, making it very easy to upgrade without sacrificing your existing clip art library.

Use geoPublish to make a letterhead, print it out, make copies of it and then use geoWrite's single sheet print option to print documents on them.

—Ryan Olson
Simi Valley, CA

GEOS (version 2.0): Using a RAM expansion unit with this operating system is a must. The speed and convenience will amaze you. I recommend the 1750 clone from Software Support International (2700 NE Andresen Rd., Vancouver, WA 98661) for about $200. It costs more than GEORAM, which only works with GEOS, but it can be used with other software.

For better print and graphics resolution, try the printer files to reduce the size of the printed text. Then, use a photocopier to magnify it to a final full-size copy. It looks better than one printed directly from GEOS at full size.

—Daniel E. Harris
St. Louis, MO

PaperClip III: I keep my dictionary files on the same 1581 disk as the word processor. When I first boot up, I enter an arbitrary word in the text and spell-check it. This puts the entire dictionary into my REU. From that point on, spell checking takes only a few seconds.

—Daniel E. Harris
St. Louis, MO

RUN Script 128: On the C-128, the escape and N key combination (ESC N) changes the screen from reversed text to normal text, and ESC R changes it back to reversed. ESC U alters the cursor to an underline and ESC S changes it back to a block. ESC Z clears the tab setting and ESC Y restores the eight-column default.

—*RUN* Editors

WordWriter 128: The depressed shift-lock key prevents the selection of WordWriter functions, so, if you're having problems, check to be sure this key is in the up position.

—Glen Young
Renton, WA ■

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GOLD MINE

Building research stations, speeding down a mountain and bidding on experienced wrestlers make up your gaming fun this month!

By LOUIS F. SANDER

ARKANOID II: REVENGE OF DOH: Although the T capsule is great, be sure to have the skill necessary to guide the ball on the corners.

At the end of a level, take the right warp, except in levels 4 and 5. It's easier.

—STUART ROSS
ELMHURST, NY

BLOODSTAR: This game is part of *RUN*'s Fun Pak 128. When you start the game, build a research station and launch a probe to explore the inner planets and their moons. Build a commerce station, a second research station and lots of repair stations. Two research stations will get you to tech level 5 in about two years.

Other players will probably race each other for the inner planets as soon as they reach tech level 2. Try to beat them to a good planet and pour your resources into developing it. Don't worry too much about being attacked by your opponents.

At tech level 5, colonize everything in the system as fast as you can get transports. Build up a colony's welfare and agriculture first, followed by its mining and then its industry. Pairing mines and industry is not a good idea. If you follow my advice, you'll soon be earning 30,000 credits (the maximum) each month.

To get a shuttle off the ground with almost no maintenance points, start with an empty maintenance board. Give each system one maintenance unit, then launch the shuttle. When you get a system fault, don't fix it. Instead, press the G key and let the countdown reach T minus 1. Halt the countdown there, fix the fault, then continue the countdown.

If you want to see this game's hidden trapdoor, press the W, E and R keys at the same time.

—BRUCE D. ROSE
MANHATTAN BEACH, CA

FAST BREAK: Substitute players once in a while, because basketball is a tiring game. A good starting lineup is Dwayne Hightower, "Mercury" Monroe and James "Sky" Tyler.

Don't make inside shooters try an outside shot, or vice versa. When in doubt, pass the ball to an open teammate.

—JOHN HAGENMAIER
INDIANAPOLIS, IN

THE GAMES: WINTER EDITION: For the best possible score in the Luge event, watch the position, steering and drift bars at the bottom of the screen. It's easier to control them than to watch the luger.

In Downhill, put the cameras in the last four positions. This lets you tuck to the finish, and perhaps, equal our best time of 29.83 seconds.

—SHARON & SUSAN MCKENDRICK
BOSTON, MA

HEAVY METAL: When you use the FAV, stay on the trigger and try to enter at an angle. This makes it harder for the incoming shells to zero in on you.

In the TACC, I have better luck using a FAV as the fourth unit. If any of your units are down to one vehicle, engage that unit and use it until it's destroyed.

—DARREL BACON
ADKINS, TX

RAMPAGE: Punch and bite slower. You'll last longer without getting damage points.

—RONEN KAUFFMAN
MARLTON, NJ

OPERATION WOLF: This game is very difficult, so you'll have to fight as hard as you can. It's easy to waste ammunition, so avoid the temptation to keep your hand constantly on the firebutton. Keep your gunsight aimed in one place and chase the men around with it.

Make sure you kill the men in blue first, because they're the ones that throw knives and grenades. Most of the time, it's best to save all your grenades to throw at the helicopters.

At the end of the first and second levels, kill everyone but one soldier, then collect all the guns and cartridges you can.

At the end of the third level, you can stay as long as you want and collect everything you need. When you complete this level, you get almost 20 injury points taken away.

Complete the fourth level as quickly as you can, because when it's over, you'll receive all new stuff!

—TOM THOMPSON
ANKANY, IA

WASTELAND: Of course, when your characters die, you should turn off the computer. But what if they're badly wounded, and you try to get them to a doctor, only to have them die on the way? When this happens, your characters are saved either as dead or as wounded.

Fortunately, I've discovered how to remedy this situation. It only works if you have a back-up character disk or a character disk with different characters. First, when you load the game, answer no to "Do you want to use the last saved game?". Then insert the character disks with your characters on them. When it asks for the disk side where your characters were last saved as dead or wounded, insert the same side of the other character disk. You should start the game right before you were hurt.

Of course, you can avoid these problems by having a current back-up disk.

—AARON MAUPIN
FRESNO, OH

SGT. SLAUGHTER'S MAT WARS: Nobody wants an inexperienced wrestler, so always bid full price at the auctions. The more you pay for a wrestler, the stronger he'll be.

—MATTHEW PHILLIPS
ST. STEPHEN, N.B., CANADA ■

To submit your own C-64/128 game tips for consideration, send them to Gold Mine, PO Box 101011, Pittsburgh, PA 15237.

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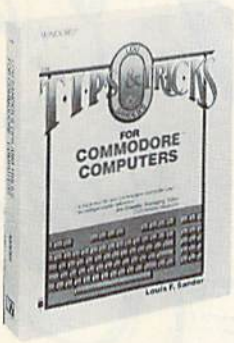

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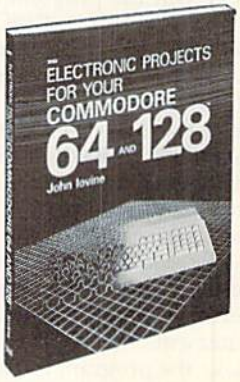

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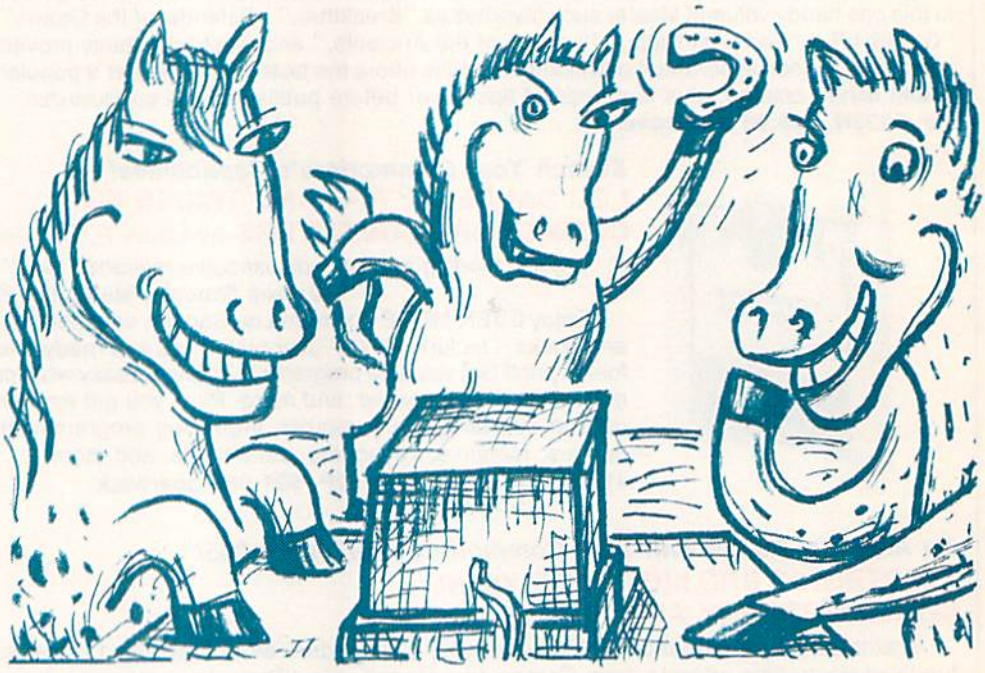
128 Mode

Play a few rounds of Horseshoes (and also examine the listing to see how sprites and graphics work).

By MARK JORDAN



THIS MONTH, we'll take a look at sprites and graphics and combining the two in Horseshoes, a game I wrote. In the program, the Sprite commands create the flying horseshoes and the swinging arms, and the Graphics commands create Guy and Dolly, two limber-armed characters on a colorful background.

After you've typed in Listing 1 and checked for typing errors with *RUN*'s Checksum program, save it to disk. Next, run the program and take a close look at Guy and Dolly. By creating them in two high-resolution sprites (the body plus the head and face), I was able to use three colors in Multicolor mode without sacrificing resolution. Study lines 340–420 to see how I did it.

To create the 28 different arm positions that toss the horseshoes, I would normally generate the needed Data statements, but in this case, it would make the program listing much longer than necessary. Instead, I achieved the same result—and saved a lot of memory—by using the Circle command to make arcs of a circle that I then employed as the arms' different positions. Next, I saved each position to a subscripted variable—ARM$(S,J)—in lines 120–200.

I also designed nine different horseshoe shapes from a single sprite, each shape occupying an eight-by-seven pixel area. By utilizing the SShape, GShape and SPRSAV commands (lines 60–110), each of the nine shapes were derived from the original and transferred to a string variable, HS$(X). So, when the shoe is tossed (lines 690–730), simply cycling through line 720 (the SPRSAV command and the subscript) gives the illusion of a rotating horseshoe.

You can examine the individual parts that make up Guy and Dolly by adding line 55 SPRDEF:STOP to the listing. (Remember to remove this line before playing a game.) The sprite screen will appear when you run the program. Press any number from 2 to 8 to view a sprite. To view another sprite, first erase the previous number with the run-stop key, then enter a new number. To watch the Graphics commands in action, delete the Fast command in line 20.

Horseshoes takes a little over 20 seconds to load in the graphics. It is played with two joysticks—port 1 controls Guy and port 2, Dolly. When you're ready to toss, move the joystick left and right to control arm movement, and press the firebutton to release the shoe. With the right amount of backswing and foreswing, you'll hit at or near the post. Conventional horseshoe scoring is used, with 21 points winning a game. In each round, the player with the best previous score gets the first toss. R

Editor's note: The June/July 128 Mode column offered some advice on cleaning your keyboard. We want to reiterate that readers should disassemble the keyboard (separate and remove the keyboard from its casing) before attempting a major cleaning job.

Mark Jordan is a high school English teacher who enjoys playing Horseshoes.

Listing 1. Horseshoes program. (Available on ReRUN disk. See order card facing page 16.)

```
10 DIM AR$(48,2),HS$(48),TX(48,
   1),TY(48,1)          :REM*175
20 FAST:COLOR0,1:COLOR4,1:GRAPH
   IC1,1                :REM*35
30 LC$=CHR$(14):C2(0)=15:C2(1)=
   5:C3(0)=1:C3(1)=5:C4(0)=13:C
   4(1)=10              :REM*35
40 FORT=0TO37:READA:POKE3072+T,
   A:NEXT               :REM*144
```

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

ILLUSTRATED BY MACIEK ALBRECHT

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```
5Ø FORT=ØTO447:READA:POKE3648+T
   ,A:NEXT              :REM*146
6Ø SPRSAV2,H$:GSHAPEH$,Ø,Ø
                        :REM*144
7Ø FORT=ØTO2:FORI=ØTO2  :REM*54
8Ø SSHAPE A$,I*8,T*7,I*8+7,T*7+
   6                    :REM*215
9Ø GSHAPE A$,1Ø5,8      :REM*178
1ØØ SSHAPE HS$(T*3+I),1ØØ,Ø,123
   ,2Ø                  :REM*2Ø3
11Ø NEXT:NEXT           :REM*232
12Ø WIDTH2:S=-1         :REM*35
13Ø FORT=ØTO223STEP8:S=S+1
                        :REM*192
14Ø FORJ=1TOØSTEP-1:FORI=19TO21
                        :REM*242
15Ø LOCATE 11Ø,28:CIRCLE1,I;T,1
   8,15,T+14Ø,T+18Ø     :REM*94
16Ø IFJ=1ANDI=2ØTHENI=21:REM*56
17Ø NEXT:X=RDOT(Ø):Y=RDOT(1)
                        :REM*36
18Ø SSHAPE ARM$(S,J),X-12,Y-5,X
   +11,Y+15             :REM*21
19Ø SPRSAV AR$(S,J),1   :REM*177
2ØØ NEXT:SCNCLR:NEXT    :REM*239
21Ø COLOR1,1:CHAR,Ø,Ø,"HORSESHO
   ES":COLOR1,15        :REM*1Ø3
22Ø FORT=ØTO7:SSHAPEB$,Ø,T,39,T
   :SSHAPEC$,4Ø,T,79,T:REM*255
23Ø FORI=ØTO2:Y=T*3+I+24:GSHAPE
   B$,13Ø-T*3-I,Y:GSHAPEC$,17Ø
   +T*3+I,Y:NEXT:NEXT   :REM*181
24Ø COLORØ,6:FORT=16TO2Ø:CHARØ,
   25-T,T,LEFT$("{4Ø SPACEs}",
   T+15):NEXT           :REM*128
25Ø CHAR,37,24,LC$+"MBJ"
                        :REM*222
26Ø COLOR1,2:FORT=ØTO2:DRAW1,3Ø
   +T*2,17ØTO75+T*2,125:NEXT
                        :REM*216
27Ø COLOR1,12:DRAW1,275,16ØTO32
   5,16ØTO3ØØ,135TO25Ø,135TO27
   5,16Ø:PAINT1,276,159
                        :REM*176
28Ø SLOW:GRAPHIC1       :REM*122
29Ø COLORØ,2:DRAWØ,29Ø,14ØTO29Ø
   ,15Ø:COLORØ,1        :REM*17
3ØØ COLOR1,14:CHAR,11,21,LC$+"
   {SHFT S} C O R E C A R D ",
   1                    :REM*213
31Ø COLOR1,16:CHAR,11,22,LC$+"{
   13 SPACEs}{SHFT G}AMES ",1
                        :REM*215
32Ø COLOR1,15:CHAR,11,23,LC$+"{
   2 SPACEs}{SHFT G}UY :{2 SPA
   CEs}Ø{6 SPACEs}Ø{2 SPACEs}"
   ,1                   :REM*17Ø
33Ø COLOR1,5:CHAR,11,24,LC$+" {
   SHFT D}OLLY:{2 SPACEs}Ø{6 S
   PACEs}Ø{2 SPACEs}",1
                        :REM*217
34Ø SPRSAV3,A$:COLOR1,15:GSHAPE
   A$,12,136            :REM*172
35Ø SPRSAV4,A$:COLOR1,5:GSHAPEA
   $,45,112             :REM*246
36Ø FORT=ØTO1:FORI=ØTO8:GSHAPEH
   S$(I),T*16Ø+I*18,Ø:NEXT:NEX
   T                    :REM*193
37Ø SPRSAV5,A$:COLOR1,9:GSHAPEA
   $,16,115             :REM*89
38Ø SPRSAV6,A$:COLOR1,1Ø:GSHAPE
   A$,46,9Ø             :REM*175
39Ø SPRITE7,1,8,1:MOVSPR7,4Ø,16
   5                    :REM*143
4ØØ SPRITE8,1,8,1:MOVSPR8,7Ø,14
   3                    :REM*134
41Ø SPRSAVAR$(14,Ø),5:SPRITE5,1
   ,8:MOVSPR5,34,183    :REM*151
42Ø SPRSAVAR$(14,1),6:SPRITE6,1
   ,8:MOVSPR6,65,159    :REM*179
43Ø FORT=1TO4:SPRSAV HS$(8),T:R
   EADX(T),Y(T),C(T),CC(T):SPR
   ITET,1,C(T):NEXT     :REM*149
44Ø PQ=Ø:HT=Ø:H1=Ø:H2=Ø:H3=Ø
                        :REM*175
45Ø FORT=1TO4:MOVSPRT,X(T),Y(T)
   :NEXT                :REM*92
46Ø HH=Ø:P2=1:P3=Ø:P4=-1
                        :REM*133
47Ø IFTU=1THEN HH=5:P2=Ø:P3=1:P
   4=1                  :REM*15Ø
48Ø FOR PL=P2TOP3STEPP4:JY=PL+1
   :HX=PL*3Ø:HY=PL*24:P5=PL+5
                        :REM*117
49Ø FOR TN=ØTO1:HH=HH-P4:REM*48
5ØØ MOVSPR HH,38+HX,187-HY
                        :REM*126
51Ø PO=Ø:PW=Ø:H=8:A1=14:A2=Ø:BK
   =Ø:SPRSAV AR$(A1,PL),P5
                        :REM*96
52Ø DO:LOOP UNTIL JOY(JY)>5
                        :REM*152
53Ø DO:A1=A1+1          :REM*74
54Ø IFA1>27THEN A1=26:BK=BK+1
                        :REM*169
55Ø SPRSAV AR$(A1,PL),P5:SYS3Ø7
   2,,HH,A1             :REM*223
56Ø LOOP UNTIL JOY(JY)=3:A2=A1
                        :REM*42
57Ø DO:PW=PW+1:A2=A2-1:IFA2<1TH
   ENEXIT               :REM*59
58Ø SYS3Ø87,,HH,A2      :REM*185
59Ø SPRSAV AR$(A2,PL),P5:REM*15
6ØØ LOOP UNTIL JOY(JY)>127
                        :REM*154
61Ø MOVSPR HH,45#Ø:H=1:PW=PW+BK
   :HT=A2:IFHT>12THENHT=12
                        :REM*25
62Ø PQ=PW*2.7+HT*4-PL*8:REM*243
63Ø H1=HT*5+1Ø:H2=165-HT*5:H3=(
   H2-H1)/8             :REM*17Ø
64Ø FORT=H1 TO H2 STEP H3
                        :REM*6Ø
65Ø MOVSPR HH,T#6-PL    :REM*123
66Ø FORI=ØTOPQ:NEXT     :REM*62
67Ø SPRSAV HS$(H),HH:H=(H+1)AND
   7                    :REM*99
68Ø NEXT                :REM*41
69Ø DOUNTILRSPPOS(HH,1)>184
                        :REM*237
7ØØ Z=(Z+1)AND1:IFZTHENSPRSAV H
   S$(H),HH:H=(H+1)AND7:REM*41
71Ø LOOP                :REM*177
72Ø MOVSPR HH,Ø#Ø:SPRSAV HS$(8)
   ,HH                  :REM*1Ø8
73Ø SOUND2,6ØØØØ,3,1,1,1,3
                        :REM*61
74Ø X=RSPPOS(HH,Ø):Y=RSPPOS(HH,
   1)                   :REM*1Ø
75Ø AX=ABS(3Ø6-X):AL(HH)=AX
                        :REM*1Ø1
76Ø IFAX<6ANDABS(185-Y)<7THENBE
   GIN                  :REM*142
77Ø SOUND1,12ØØØ,1Ø,Ø,5Ø,19ØØØ
                        :REM*81
78Ø IFY<>188THENMOVSPRHH,+Ø,186
   +TN*2                :REM*113
79Ø IFX<3Ø4THEN MOVSPRHH,+2,+Ø
                        :REM*246
8ØØ IFX>3Ø6THEN MOVSPRHH,-2,+Ø
                        :REM*213
81Ø RI(PL)=RI(PL)+1:GOTO84Ø
                        :REM*13
82Ø BEND                :REM*96
83Ø IFAX<11ANDABS(188-Y)<6THENP
   O(PL)=PO(PL)+1:FORJ=1TO4:FO
   RT=1TO4:SPRITEHH,,CC(T):FOR
   I=1TO2Ø:NEXT:NEXT:NEXT:SPRI
   TEHH,,C(HH)          :REM*141
84Ø SPRSAV AR$(14,PL),5+PL
                        :REM*54
85Ø NEXT:NEXT           :REM*2Ø3
86Ø A=RI(Ø):B=RI(1):RI(Ø)=A-B:R
   I(1)=B-A             :REM*128
87Ø FORT=ØTO1           :REM*18Ø
88Ø RI(T)=RI(T)*3:IFRI(T)<ØTHEN
   RI(T)=Ø              :REM*14Ø
89Ø TU(T)=RI(T)+PO(T)   :REM*237 ►
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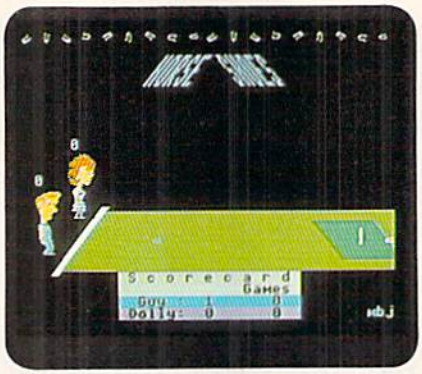
128 MODE



Take your turn at ringing the horseshoes in this two-player game.

```
90Ø SC(T)=SC(T)+TU(T)    :REM*16
91Ø RI(T)=Ø:PO(T)=Ø      :REM*17Ø
92Ø GOSUB1Ø5Ø            :REM*221
93Ø IFSC(T)>2ØANDSC(T)>SC(T+1AN
    D1)THENSOUND1,5ØØØØ,55,,22Ø
    ØØ,5ØØØ:GA(T)=GA(T)+1:GOTO9
    8Ø                   :REM*243
94Ø NEXT                 :REM*42
95Ø IFTU(TU)>TU(TU+1AND1)THEN T
    U=TU+1AND1           :REM*213
96Ø TU(Ø)=Ø:TU(1)=Ø      :REM*22Ø
97Ø GOTO45Ø              :REM*28
98Ø SOUND1,5ØØØØ,55,,22ØØØ,5ØØØ
                         :REM*67
99Ø CHARØ,26,23+T,STR$(GA(T)),1
                         :REM*197
1ØØØ COLOR1,16:CHAR,13,1Ø,CHR$(
     14)+"{SHFT P}LAY AGAIN?{2
     SPACEs}{SHFT Y}/{SHFT N}"
                         :REM*14Ø
1Ø1Ø GETKEYA$            :REM*223
1Ø2Ø IFA$="Y"THEN SC(Ø)=Ø:SC(1)
     =Ø:TU(Ø)=Ø:TU(1)=Ø:CHAR,13
     ,1Ø,"{16 SPACEs}":FORT=ØTO
     1:GOSUB1Ø5Ø:NEXT:GOTO45Ø
                         :REM*37
1Ø3Ø IFA$<>"N"THEN1Ø1Ø    :REM*77
1Ø4Ø END                 :REM*148
1Ø5Ø COLOR1,C2(T):CHAR,19,23+T,
     RIGHT$(" "+STR$(SC(T)),2),
     1:CHAR,C3(T),C4(T),STR$(TU
     (T)):RETURN         :REM*63
1Ø6Ø DATA 192,26,176,1Ø,2Ø2,138
     ,1Ø,17Ø,222,215,17,222,214
     ,17,96,192,Ø,24Ø    :REM*153
1Ø7Ø DATA 14,2Ø2,138,1Ø,17Ø,254
     ,214,17,192,13,176,4,222,2
     15,17,96,254,215    :REM*197
1Ø8Ø DATA 17,96,Ø,48,Ø,8,38,32,
     12,36,48,49,36,14Ø,199,36,
     227,252,6Ø,63       :REM*225
1Ø9Ø DATA 112,24,14,64,14,24,12
     4,63,6Ø,6,227,36,134,14Ø,3
     6,252,48,36,Ø,32    :REM*6
11ØØ DATA 1ØØ,Ø,Ø,12,112,Ø,Ø,25
     2,Ø,2,199,63,62,49,97,97,1
     2,96,63,8,62,Ø,Ø    :REM*25
111Ø DATA 2,Ø,3,Ø,122,Ø,1,253,Ø
     ,1,255,128,1,254,128,1,255
     ,192,Ø,254,192,Ø    :REM*142
112Ø DATA 255,192,Ø,126,192,Ø,6
     3,192,Ø,21,64,Ø,47,192,Ø,6
     1,224,Ø,63,224,Ø    :REM*136
113Ø DATA 31,16Ø,Ø,15,176,Ø,7,2
     Ø8,Ø,3,2Ø8,Ø,7,2Ø8,Ø,15,16
     Ø,Ø,29,32,Ø,31      :REM*169
114Ø DATA 216,Ø,1,136,Ø,3,196,Ø
     ,7,254,Ø,7,251,Ø,7,231,Ø,3
     ,254,Ø,3,252,Ø,1    :REM*199
115Ø DATA 252,Ø,Ø,168,Ø,Ø,252,Ø
     ,1,254,Ø,1,254,Ø,3,255,Ø,3
     ,255,Ø,7,255,Ø      :REM*139
116Ø DATA 15,255,Ø,Ø,236,Ø,Ø,21
     6,Ø,1,152,Ø,1,152,Ø,3,222,
     Ø,3,Ø,15,188,Ø      :REM*29
117Ø DATA 255,254,3,127,254,31,
     2Ø7,252,63,224,8,127,224,8
     ,12Ø,192,8,114      :REM*176
118Ø DATA 198,112,114,26,16Ø,56
     ,4,64,62,Ø,32,28,Ø,16,24,2
     ,16,8,Ø,224,8,1     :REM*11Ø
119Ø DATA Ø,4,142,Ø,4,66,Ø,4,34
     ,Ø,4,28,Ø,4,32,Ø,4,32,Ø,Ø,
     Ø,55,Ø,Ø,127,192    :REM*137
12ØØ DATA 3,255,224,5,251,248,1
     5,255,252,63,255,254,95,25
     5,251,127,255       :REM*78
121Ø DATA 251,111,24Ø,11Ø,23,22
     4,254,127,224,124,125,192,
     Ø,255,192,1Ø8       :REM*146
122Ø DATA 223,128,8,175,128,4,2
     Ø7,32,24,119,48,Ø,125,224,
     112,63,2ØØ,Ø,63     :REM*Ø
123Ø DATA 134,32,15,9,192,3,Ø,Ø
     ,Ø,Ø,Ø,Ø,Ø,128,Ø,Ø,48,Ø,Ø,
     31,24Ø,Ø,31,24Ø     :REM*63
124Ø DATA 7,63,24Ø,13,57,128,13
     ,225,Ø,7,251,128,1,255,192
     ,3,255,224,7,253    :REM*32
125Ø DATA 224,7,255,Ø,7,254,Ø,3
     ,112,Ø,3,188,Ø,3,22Ø,Ø,3,2
     24,Ø,3,192,Ø,3      :REM*61
126Ø DATA 192,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø
     ,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,15,128,
     Ø,31,Ø,Ø,31,128     :REM*71
127Ø DATA Ø,63,252,Ø,63,144,Ø,1
     27,244,Ø,127,248,Ø,223,224
     ,Ø,2Ø7,24Ø,Ø,31     :REM*Ø
128Ø DATA 128,Ø,55,224,Ø,121,19
     2,Ø,248,Ø,Ø,24Ø,Ø,Ø,24Ø,Ø,
     Ø,24Ø,Ø,Ø           :REM*235
129Ø DATA 66,18Ø,4,2,72,175,4,1
     6,4Ø,2Ø5,2,13,48,2ØØ,2,12
                         :REM*49 ■
```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RICK BRUSH,
NRI PROGRAMMER/ANALYST

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COMMODORE CLINIC

A virus-free 64 environment; linking a laptop; and smooth scrolling routines.

By ELLEN RULE

Q *Are there any viruses that can affect my C-64?*

—AARON TEITLEBAUM
TOLEDO, OH

A A virus typically affects a computer that loads its operating system from disk, such as the Amiga, Macintosh and IBM compatibles. With these computers, virus code is read from the disk and writes itself back to other disks. If the operating system disk (the boot disk) is thus infected, the computer becomes infected every time it boots, and continues to infect every write-enabled disk it encounters.

Because the operating system for the C-64 and 128 is permanently encoded on a ROM (read-only memory) chip, the computer starts with a "clean slate" every time it's turned on. A disk-based operating system such as GEOS, however, doesn't have the protection that's offered by ROM encoding. For this reason, it is essential to keep your GEOS boot disk write-protected.

It's more likely that a C-64 or 128 will be affected by a Trojan-horse-type of code. A Trojan horse, like the legendary Greek deception, sneaks onto your disk by hiding in something seemingly innocent, perhaps in an arc or self-dissolving arc (SDA) file. When run, the Trojan horse program might, for example, format the disk in the active drive.

You can protect yourself from this kind of prank by write-protecting disks that contain important data and keeping backup disks up to date. Copy suspicious files onto a scratch disk before dissolving the arc or SDA file or running the program. Shutting the computer off for a few minutes between programs also eliminates unwanted code from the computer's memory.

Q *I have a 1702 monitor and a C-128. Is there a cable switch or software that will change the 40-column monitor display to 80 column? I heard that Briwall (PO Box 129, Kutztown, PA 19530) has a device that would help, but it only gives you an 80-column monochrome screen. Is there anything for color?*

—JIMMY LEUNG
WOODSIDE, NY

A A monochrome composite signal is actually constructed by circuitry within the 128 from the R(ed), G(reen), B(lue) and I(ntensity) signals. The 80-column adaptor cable simply isolates the 80-column monochrome signal output (from pin 7 of the RGBI connector) for viewing on a composite monitor such as the 1702. Presently, I know of no device on the market that actually converts the 128's RGBI signal to a color composite signal.

Q *How can I transfer text files between my Tandy Model 100 Laptop computer and my 64C? Will a null-modem cable do the job? If so, where can I get one? Also, would I need a terminal program for my 64? Which one would you recommend? I have an Omnitronics RS-232 interface, and thought perhaps I could connect it to the RS-232 port on my Tandy.*

—CHARLES M. SPRAGUE
SAN FRANCISCO, CA

A You're on the right track. With telecommunications software running on your 64, your RS-232 interface and a null modem will let you communicate with other computers. The null modem is necessary in order to swap the send-and-receive lines between the computers.

You can purchase a null modem from a computer store or mail order outlet such as VSI (3641 SW Evelyn, Portland, OR 97219). Be sure to select a null modem that has the proper male/female configuration to plug between your interface and your Tandy, and always remember to shut off both computers while plugging and unplugging components.

There are many popular telecommunications programs for the 64. A program like RUN Term has a text buffer feature that captures the incoming text from the modem port and lets you save the contents of the text buffer as a Commodore sequential file. Additionally, RUN Term has the ability to read a sequential file from disk and translate it to the standard ASCII used by many computers.

When doing data transfers, make sure your baud rates, parity and stop bits are set to the same values within the telecommunications software on both computers. To start the transfer, command one computer to ASCII send and the other to ASCII receive.

You may also want to reference the article, "Hook Up to a Portable," and accompanying listing in the February 1987 issue of *RUN*. It describes how to use the Tandy Model 100 and the 64 with a 1650 or 1660 modem. The 1660 modem (300 baud) is available from *RUN* with a 30-day replacement guarantee for $10 plus $3.50 s/h. If you're interested in ordering this modem, call 1-800-343-0728.

Q *Can you give me information regarding any programming books on the market that cover desktop video applications like scroll, crawl, and so on, in Basic or machine language routines?*

—DAVE ARNDT
STROUDSBURG, PA

A Chapter 3, "Programming Graphics," in the *Commodore 64 Programmer's Reference Guide* discusses smooth scrolling. A Basic routine (pages 128–130 in the 1984 version, originally published by Commodore) scrolls the entire screen, pixel by pixel, in any direction. The book is now available for $19.95 from Howard W. Sams & Co., 4300 West 62nd St., Indianapolis, IN 46268. ■

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

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GEOWATCH

Get the hot news about the number of public domain and third-party programs available for GEOS.

By DONALD EAMON

THERE'S A GEOS REVOLUTION going on! It's happening in public domain (PD) and third-party software. The programs mentioned here are just a fragment of those available from third-party developers, QuantumLink and the hundreds of BBSs around the country—all deep reservoirs to be plumbed.

A lot of development is under way in text and graphics manipulation, and most of the programs available are devoted to graphics. However, some serve to strengthen geoWrite. See Table 1 for a list of suppliers and addresses.

TEXT MAGIC

Wrong-Is-Write (version 8.0 on Storm System Disk 1; version 7.0 from Q-Link) transfers ASCII and PETASCII text to and from geoWrite, and changes the filetype of geoWrite files (a must for geoPublishers who don't have GEOS 2.0, since geoPublish upgrades geoWrite 1.1 through 2.0 filetypes to 2.1—beyond your geoWrite's reach). Wrong-Is-Write also strips geoWrite carriage returns and page breaks, and alters fonts and styles.

Unlike geoWrite, **Text Print** desk accessories (DAs) send special commands to the printer in NLQ (near-letter-quality) mode. The Text Print 1.2 collection (Q-Link) creates DAs that send NLQ underline, bold, italic and other commands to Centronics printers. The latest version, 2.1, available from author Terry Van Camp, accesses three drives.

The **QuickView** and **HulmeView** utilities scan geoWrite and PETASCII files, respectively, to find that archival document you wrote way back when. Caution: All non-GEOS files appear in HulmeView's GetFiles box, and trying to read program files can crash the system. Renaming PETASCII text with MS-DOS-style extensions (such as "filename.txt") solves the problem.

Want typeset quality? The **GeoLaser/PubLaser Patch** (Q-Link) converts GEOS LaserWriter applications into raw PostScript datafile utilities. The potential: uploading geoWrite and geoPublish documents in pure PostScript to a Mac/LaserWriter duo for 300 dpi (dots-per-inch) printing, or to a PC/Linotronic union for 1200 dpi printouts.

Table 1. Addresses and prices.

Storm System Disk 1
(Graphic Storm II, Wrong-Is-Write, and more)
Joe Buckley
Storm Systems
464 Beale St.
West Quincy, MA 02169
$20

Text Print 2.1
Terry Van Camp
16604 Cypress
Strongsville, OH 44136
$10 recommended

INvoice
Clicketware
3818 One Way Circle
Suite 398
Addison, TX 75244
$8.95

geoMetrix
c/o Rainbow Software
20224 S. Sprague Rd.
Oregon City, OR 97045-9641
Full charter membership, with access to the PD library and six bimonthly issues of *geoJournal*: $10 per year; newsletter only: $3 per year

QuantumLink
8620 Westwood Center Drive
Vienna, VA 22180
$9.95 per month; 8¢ per minute for Plus services (300/1200 baud)

GET THE PICTURE?

The number of public domain GEOS graphics utilities runs well into double digits, but several stand out:

Graphic Storm converts Commodore hi-res, Print Shop, Doodle!, PrintMaster and Newsroom graphics into geoPaint or photo scrap files. Three versions are available—Graphic Storm II and III are the most powerful.

MacAttack II (Q-Link) provides two-way transfer of MacPaint and geoPaint files, so you can collaborate on bit-map graphics with Mac friends or access MacPaint images from Mac bulletin boards! MacBinary is supported in MacAttack II 1.2, the latest upgrade.

Paint Scrap 2.1 (Q-Link) cuts large scraps from geoPaint files. This is a great geoPublish tool, and in many ways, the mirror image of Paint Pages drivers.

GEOFILE TEMPLATES

INvoice, from the author of Finance Manager, James McKnight, is an automated-billing database template that takes advantage of GEOS 2.0's Calculator (a pop-up desk accessory shipped with GEOS 2.0) for calc-and-paste work. (Without Calculator 2.0 performing the math end, geoFile-to-geoCalc transfers are unduly complex.) The disk contains one file, but clicking on "change layout" from the pull-down menu lists seven sublayouts: Data Entry, Invoice, Business Envelopes, Labels, Aged Accounts Report, Comments and Price List. The Invoice option prints billings, while Aged Accounts tracks overdue accounts receivable.

INvoice uses McKnight's "key field" method for multiple field sorting capability, a feature lacking in geoFile. The learning curve is steep, but worth the effort.

I encountered a problem using INvoice with geoFile 128. Produced with

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geoFile 64, INvoice's field boxes are too small for 80-column field names. Enlarging the boxes in Form Design mode corrects this.

INvoice meets my limited accounting needs. It can also boost the productivity of those who use geoFile and geoCalc for small business bookkeeping.

A Potpourri

Other utilities of particular interest on Q-Link (path: Commodore Software Showcase/GEOS Arena/Software/User Applications) include:

Bilingual Spellchecker, a Spanish/English spelling checker from Nicholas Vrtis and dictionary by "Eduardo B."

GEOSForth, a Forth language for GEOS by Nick Vrtis. Files written in Forth are saved under the VLIR filetype (that is, the disk drive is used as a "virtual storage" device). In this fully implemented Forth environment, commands can be altered as needed.

The utilities **GEOS.TO.BIN** and **BIN.TO.GEOS** added to a 128K Apple IIe, IIc or IIGS offer two-way Commodore-Apple transfer of fonts, text and graphics. GEOS.TO.BIN moves files from Apple GEOS to Commodore GEOS, while BIN.TO.GEOS sends them the other way. The program is written in Applesoft Basic by Terry Van Camp.

QuikTop128, version 2.4, by John F. Howard with Jim Collette, is an alternative to the deskTop for GEOS 64 1.3 to GEOS 128 2.0. A QuikTop screen displays files from eight deskTop pages (or 64 files), supports a "border page," simplifies directory editing and lets you double-click filenames to load programs—similar to the GEOS 128 2.0 deskTop's Text mode. A drawback is that no file transfer is possible between drives.

With the **Time Setter** utility on a system disk, a default time/date selector box appears during loading. Similar to Apple GEOS's no-clock default feature, Time Setter lets you easily set the time and date.

The Ruler 1.5 desk accessory measures any 40-column GEOS screens that display pull-down menus. Ruler's Control Box is relocatable, and the area beneath it can be measured by moving the Box. Useful for fine-tuning geoPublish pages, Ruler accommodates all printers by changing data in the "file" pull-down Info Box.

More Than Just Software

GeoMetrix is a national GEOS users' group headquartered in Portland, Oregon. I received a copy of their newsletter, *geoJournal*, and it is impressive. But geoMetrix is worth a look simply for its massive public domain library—as a matter of fact, you can order most applications mentioned above through them. More Commodore users work with GEOS than with CP/M (which sees solid national support from FOG), so it's natural that a national users' group would form. If you want to tell geoMetrix about your GEOS users' group or SIG, send your name and address, a list of interests and the appropriate subscription money to the address in Table 1.

Most of the suppliers listed here are one-man operations. For ordering information only, send a stamped, self-addressed envelope. ■

Don Eamon runs GEOS SIGs on several BBSs. His username on Q-Link is Geodeamon.

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From page 16.
lated points for all games are saved to disk in "The Champion Corner."

Although WLD's music is grating, the living room setting and characters are pleasantly cartoon-like. Particularly appealing are the line drawings, which more realistically resemble an unskilled human's pictures than ones created by a computer art program. Enough of these are stored on the flip side of the game disk, so that even after a number of turns, few will be repeated.

Four different versions of this game have been released, including the most recent second edition reviewed here. Whether you win, lose or draw, you'll agree that these programs are definite winners! *(Hi Tech Expressions, 584 Broadway, New York, NY 10012. C-64/$14.95.)*

—LEN POGGIALI
SYRACUSE, NY

FACEOFF! ..... B

Cross-Checking, Fighting or Off-Sides: The Action Is on the Rink

FaceOff! is a realistic hockey simulation that lets you participate as player, coach or general manager of your own team. You can play it solo or with a human teammate against a computer-controlled team of Rookies, Veterans or All-Stars. I found FaceOff! particularly enjoyable when battling head-to-head against a joystick-wielding opponent.

You can set periods to three, eight or 20 minutes; have two, four or six on-screen skaters per team; play with standard, relaxed or no hockey rules; and decide whether to allow fighting.

Whenever a player gets a clean shot at the net, "ShotCam" gives you an ice-level view of it from the shooter's perspective. Similarly, whenever a fight breaks out, "FightCam" zooms in on the combatants as they slug it out.

During a game, you can choose any one of your forwards or defensemen as the player under your direct control. You can accomplish everything from passing, goaltending and checking to shooting and even fighting through simple joystick/firebutton combinations; changing lines, pulling your goalie or calling plays are keyboard controlled.

As coach, you assemble your lines and create and edit plays from your personal playbook, which can hold up to 16 plays, but you can only use four during a game.

If you assume the role of general manager, you can choose to manage any of the 20 FaceOff! teams named for the same cities represented by the 20 NHL teams. Once you have a team, you can change its name or the names and stats of players, conduct trades, move players between major and minor league teams, retire players or even sell the franchise. Teams can play single exhibition games or enter into league play for a whole season, including playoffs.

Although I'd recommend FaceOff! to any hockey fan with a C-64, I must admit that the graphics, while adequate, are nothing to rave about. I also found the sound somewhat disappointing. There is, for instance, no audible crowd reaction when a goal is scored. Fortunately, FaceOff!'s realistic action and wide variety of options more than make up for these deficiencies. You'll find that this game successfully captures the excitement of ice hockey. *(Activision; distributed by Mediagenic, 3885 Bohannon Drive, Menlo Park, CA 94025. C-64/$29.95.)*

—BOB GUERRA
CHARLESTOWN, MA

MAGIC JOHNSON'S BASKETBALL ..... A

While Magic Johnson doesn't appear on this software, his mystique has gone into the creation of a superb simulation of real-life, slam-dunk basketball.

You alternately direct one of two players (the one you control has an arrow overhead) around the court with your joystick. You must out-maneuver your opponent's (computer or human) team in a multitude of ball-related gymnastics: passing, stealing, intercepting, shooting, and so on.

The ball automatically dribbles as you move with it. The closer you get to the net, the easier it is to swish one. Good shots are possible from any angle, even from mid-court, but it takes practice.

Realistic graphics show hoops, referee, court and colorful uniforms. Sound effects include a lively crowd roaring when a player scores, and the rapid-fire bounce of your ball on the floor.

Authentic touches abound: the tip-off, the referee blowing his whistle, the scoreboard listing the time remaining, the number of team fouls, and so on.

I found this game easy to play, which is a refreshing change from the counterintuitive, difficult manipulations I've encountered in some kick-and-punch-type programs.

M.J.'s Basketball gets a big boost from its smooth-scrolling court display, slick animation, crisp graphics, meticulous attention to detail and playing dynamics—it deserves lots of "hoopla." *(Virgin Mastertronic, Inc., 18001 Cowan, Irvine, CA 92714. C-64/$14.99.)*

—JOHN DIPRETE

OMNI-PLAY HORSE RACING C

The Omni-Play system is SportTime's designation for games that have add-on "option modules." The horse-racing game, for instance, comes with two modules installed (with future modules planned). One holds the track graphics, the jockeys and 128 horses with varying characteristics. The other allows up to four players to compete in betting against one another and up to 19 computer opponents at the same time.

Woe to the poor bettor who expects quick results from this program. It's painfully slow in loading. One race lasted 2½ minutes, but took five minutes to load without a fast-load cartridge. It takes one full minute to clear two title screens and get to the "user verification sequence" (the copy-protection scheme). Even with a fast-load cartridge, you'll still spend three to five minutes in loading time alone between races. The above times are based on using an option that strips out some graphics sequences.

Once at the game's windows, you can place a variety of bets on horses: win, place and show, along with quinellas, exactas and trifectas. There's even an option to buy a tip from one of many handicappers at the track.

The graphics during the race are adequate. The horses appear about the size of postage stamps, but they're large enough to see who's being nosed out. The horses' names and numbers appear on the screen, too, which makes it easier to track them.

F5 (moves the race to the final stretch) and F7 (moves to the payout board) speed up the play. Yet there's still too much time spent accessing the disk. When real horse races allow 15 minutes between races, three to five minutes in a computer simulation seems rather excessive to me.

Omni-Play Horse Racing packs a lot of information into the game. It has potential, but lacks speed. It'd be fun to play the horses if the disk drive didn't spend so much time horsing around. *(SportTime Software, 3187-G Airway Ave., Costa Mesa, CA 92626. C-64/$34.95; modules $19.95.)*

—LONNIE BROWN ■

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RUN's Checksum & Program Typing Hints

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

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

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

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

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

Control Characters Demystified

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

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

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

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

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

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

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

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

Other Error Messages

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

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

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

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

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

```
10 REM RUN'S CHECKSUM 64/128 - BOB KODADEK
20 MO=128:SA=3328:IF PEEK(4096)THEN MO=64:SA=49152
30 I=0:CK=0:CH=0:LN=190
40 FOR K=0 TO 16
50 FOR J=1 TO 10:READ B:IF B>255 THEN GOTO 170
60 CH=CH+B:POKE SA+I,B:I=I+1:NEXT
70 READ LC
80 IF LC<>CH THEN GOTO 170
90 CH=0:LN=LN+10
100 NEXT K
110 POKESA+11,24:POKESA+111,38:POKESA+140,234
120 PRINTCHR$(147)STR$(MO)" RUN CHECKSUM":PRINT
130 PRINT"TO TOGGLE ON OR OFF, SYS"SA:IF MO=128 THEN 1
    60
140 POKESA+13,124:POKESA+15,165:POKESA+25,124:POKESA+2
    6,165
150 POKESA+39,20:POKESA+41,21:POKESA+123,205:POKESA+12
    4,189
160 POKESA+4,INT(SA/256):SYS SA:NEW
170 PRINT"YOU HAVE A DATA ERROR IN LINE ";LN;"!":END
180 REM DO NOT CHANGE THESE DATA STATEMENTS!
190 DATA 120,162,24,160,13,173,4,3,201,24,884
200 DATA 208,4,162,13,160,67,142,4,3,140,903
210 DATA 5,3,88,96,32,13,67,152,72,169,697
220 DATA 0,141,0,255,133,176,133,180,166,22,1206
230 DATA 164,23,134,167,132,168,170,189,0,2,1149
240 DATA 240,58,201,48,144,7,201,58,176,3,1136
250 DATA 232,208,240,189,0,2,240,42,201,32,1386
260 DATA 208,4,164,180,240,31,201,34,208,6,1276
270 DATA 165,180,73,1,133,180,230,176,164,176,1478
280 DATA 165,167,24,125,0,2,133,167,165,168,1116
290 DATA 105,0,133,168,136,208,239,232,208,209,1638
300 DATA 169,42,32,210,255,165,167,69,168,170,1447
310 DATA 169,0,32,50,142,169,32,32,210,255,1091
320 DATA 32,210,255,169,13,32,210,255,104,168,1448
330 DATA 96,104,170,24,32,240,255,104,168,96,1289
340 DATA 56,32,240,255,138,72,152.72,24,162,1203
350 DATA 0,160,0,32,240,255,169,42,208,198,1304
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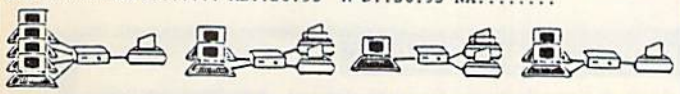

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