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RUN

December 1985 A CWC/I Publication

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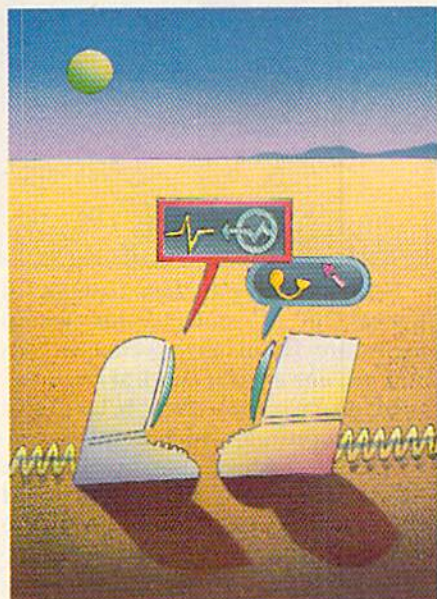
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RUNNING RUMINATIONS



RUNaway Winners Announced

Who is the typical RUN reader?

Based on profiles of the recently announced winners of RUN's Giveaway Sweepstakes, he's a technician with an extensive background in electronics and several years' experience with computers.

Or, "he" could be a she, as in the case of the grandmother from Maine who is a complete novice to computers.

Or, he is a 14-year-old high school freshman who aspires to become an aeronautical engineer.

RUN appeals to a wide variety of readers, and the winners and entrants in the contest reflect this.

Inexperienced and skilled, young and old, subscriber and non-subscriber—RUN readers by the tens of thousands sent in their

entries for our first-ever \$30,000 sweepstakes. Over 90,000 submissions in all.

The grand drawing was held, and the five lucky winners were randomly chosen by RUN staff members. We wish to extend our congratulations to those five winners, who will share the \$30,000 worth of prizes. We're sure that these hardware and software prizes will be put to good use.

We would also like to extend our appreciation to all of those RUN readers who entered the contest, and to the over 100 advertisers who generously contributed their products as prizes.

Profiles and photos of the five lucky winners follow. If you don't see your name and picture below, well, better luck next time, and thank you for reading RUN.



Fourteen-year-old **Rick Lawson**, of Kansas City, Missouri, has his eyes on the future. He plans to go to Cal Tech and become an aeronautical engineer.

In the meantime, though, he'll stick with computing, which he's been involved in for the past two years. Along with a C-64, Rick owns an IBM computer, monitor and disk drive and an Epson printer. He'd like to get his hands on some engineering software. Upon hearing that he was

one of the RUNaway winners, Rick responded, "This is great. Now I won't have to buy a new C-128."

A B+ student, Rick enjoys reading, TV, radio, video games, miniature golf, movies and drawing.

"I couldn't believe that I could be so lucky. I've never won anything in my life, so this came as a complete surprise."

This was **Mike Gazer's** reaction upon hearing that he had been selected as one of the five winners of RUN's Great RUNaway contest.

Mike, who lives in Brantford, Ontario, Canada, jumped on the Commodore bandwagon three years ago, and now uses a C-64, 1541 disk drive, Pocket Modem, Mannesmann Tally Spirit 80 printer and a color TV for a monitor.

Mike uses his system to keep track of names and addresses for his father's mailing list, to balance his checkbook and to create letters and essays for school. His parents would add another use—running up long-distance phone bills by calling different BBSs with his modem.



It's not surprising that Mike, who is a high school senior at North Park Collegiate, wants to pursue a career in computers.

However, life isn't all chips and blips for Mike. He holds two part-time jobs—as a stock boy and as a furniture salesman—and enjoys playing tennis and baseball and watching football. He's even managed to earn a couple of academic awards—one in history, the other in English—and work as a counselor at a summer camp.

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GUARANTEED SOFTWARE



VIZASTAR for the C128

Vizastar, the integrated spreadsheet, database and graphics program that has the Commodore 64 world raving, is now available for the C128. It boasts 80 columns, and has over 40K of free memory in the spreadsheet. Those who already own Vizastar 64 will be pleased to know that your existing files can be read by Vizastar 128. Also, you can upgrade to the 128 version. Call us for details and pricing.

"The only other comparable product would be Lotus 1-2-3 for the IBM PC; nothing in the C64 world comes even close to the features of Vizastar."

AHOY July 85

"I found Vizastar would do anything Lotus 1-2-3 could, and then some. It's my Commodore choice to become the standard against which the others will be judged."

INFO 64 Magazine, Issue #7

"Vizastar is an exceptional package that rivals the features of programs such as Lotus 1-2-3 and offers C64 owners the kind of integrated software previously only available for higher-priced systems."

RUN Magazine, June 1985

"I scrutinized, tested and experimented with Vizastar extensively, but could find no weaknesses whatsoever. It is the most comprehensive, most flexible, most powerful and easiest to use integrated software package I've worked with."

Commodore Microcomputer, Sept/Oct 1985

"I use an IBM PC at work with Lotus 123. I feel Vizastar is just as good and in some ways better than 1-2-3."

Steven Roberson, NC. End User

"I have used Multiplan and Superbase; both are good pieces of software, but are inadequate when compared to Vizastar."

Jim Mathews, WA. End User

"So good, I bought a second C64 and Vizastar for my office. A wild bargain! You've saved me from having to buy IBM and Lotus."

Philip Ressler, MA. End User



VIZAWRITE CLASSIC for C128

This is the new word processor from Vizastar's author, Kelvin Lacy and is the successor to Omniwriter, which he also wrote. All the features of Omniwriter are there, plus many significant enhancements, like auto pagination, on-line help, pull-down menus, full-function calculator and more. Up to 8 'newspaper-style' variable-width columns can help with newsletters.

Three different proportionally-spaced "near letter quality" fonts are also built-in for use with Commodore or Epson compatible printers. You can merge almost any other word processor file directly into Vizawrite, including Paper Clip and Omniwriter. Naturally, it is also compatible with Vizastar. At all times, what you see on the screen is exactly the way it will be printed out. Vizawrite can do mail-merges and has an integrated 30,000 word spelling checker that you can expand yourself.

PROGRAM SPECIFICATIONS

Both Vizawrite and Vizastar are written in 100% machine language and run in the 128's FAST mode, making it lightning fast. They require a C128 with 80 column color or monochrome monitor. Both come with a cartridge, a diskette, a backup, and a reference manual. Vizastar also includes a 50 page tutorial book. Both work with 1541 or 1571 disk drives.

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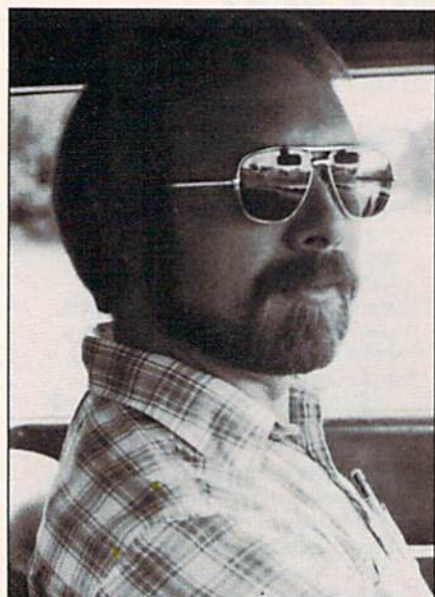
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Running Ruminations



"You're kidding me! I'll be getting a C-128 sooner than I expected," was **Ron Hall's** reaction to the news that he was one of the lucky prize winners.

An experienced computerist of three years, Ron owns a VIC-20, C-64, Datassette, 1541 disk drive, MPS-801 printer, 1702 monitor and VICModem. Amateur astronomy and telecommunications are two of the applications for which Ron uses his system.

Ron lives in Duncan, Oklahoma, with his wife, Carol, and daughter, Stephanie, and is a switching equipment technician with Southwestern Bell Telephone.

When he's not computing, Ron enjoys water skiing, bicycling, hunting, reading and amateur astronomy.

Tony Pellegrini, of Fairview, New Jersey, can't wait to receive his \$6000-\$7000 worth of prizes.

Tony expressed shock, disbelief and surprise at being one of the five winners, telling us that he had never been such a big winner. "I've won small monetary prizes before," said Tony, "but never anything that could be so adaptable to so many various uses."

Tony intends to take advantage of the C-128's terrific music and graphics abilities, and to use his new system for inventory in hobby applications (bowling and model trains are among his hobbies).

Tony has been computing for one-and-a-half years, and owns a C-64,

1541 disk drive, 802 printer and KoalaPad.

A test desk technician at the New York Telephone Company for the past 15 years, Tony, who is single, is presently studying for his real estate salesperson's license.



Lucy Whitman, of Machias, Maine, is very inexperienced when it comes to computers. However, she has five children and two grandchildren who are eager to make use of all her prizes.



"This is great. My children will love it!" Lucy told us upon hearing that she'd been chosen as one of the Great RUNaway recipients.

While Lucy and her children explore the world of software and hardware, Lucy will continue to keep order at Machias Valley Bowling Lanes, which she owns.

Lucy, a widow, enjoys cooking, bridge and, of course, bowling.



And the winners are... Choosing the winners of the Great RUNaway contest was a barrel of fun for RUN magazine staffers: (from left) Dennis Brisson, editor-in-chief; Susan Tanona, review editor; Marilyn Annucci, copy editor; Marcia Burke, mailroom supervisor; and Guy Wright, former RUN technical editor and currently editor-in-chief of AmigaWorld.

This is the most interesting football game I have seen.
Howard Boldebeck
Lombard, IL
Police

Thank you for the great game, with printer options.
Daniel H. Antolec
Monona, WI
Police

SUPER BOWL SUNDAY is a very enjoyable game.
Charles M. Bolton
Jacksonville, Arkansas
US Air Force

Excellent game. Best sports simulation I've seen.
Richard G. Miller
Duluth, Georgia
Engineer

The game is unbelievable! A++!
Matt Ritchie
Cisco, TX
Student

Great game, very realistic.
James Antonaccio
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Architect

SUPERBOWL SUNDAY is the "BEST" football game I ever played.
Michael Cwirko
Monroe, NY
Student

Good games — would like good baseball game!
Scott Peterson
Vernon Hills, IL
Sales Manager

"Nice Animation!"
Kevin McGill
Spring, Texas
Student

Excellent game! Can you expand it (more plays, more teams?)
James Heironimus
Enon, Ohio

Doctor Commodore.ca
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SUPERBOWL SUNDAY is a great game.
Rick Bray
Eugene, Oregon
Clerk

Very good game.
Mike Trimarco
Franklin Park, IL

Finally a good graphics, statistical football program. Would like more printer options.
John Sievila
Waukesha, WI
Photo Engraver

This game is fun to get into!
Taylor Thompson
Arlington, Texas
Student

This program is fantastic!
Chris Calkins
Seffner, FL
Computer Technician

Excellent quality — OK.
Michael Zoyrko
Neah Bay, WA
USAF

The best game you've come up with yet.
R. Michael Leshner
Whitehall, PA
Engineer

Make a diskette for "SUPER BOWL SUNDAY" that allows me to create teams.
Rick Dakesian
Lincoln Park, MI

Great game!
Chuck Shea
Las Vegas, NV

More disks! — Coaches disk to create teams; great teams from past — not Super Bowl; college teams.

Greg Addy
Elgin, IL
Credit Approver

Very realistic, would like other sports.
N. Sideratos
Brooklyn, New York
Student

A great game.
Derek Aiello
Warminster, PA
Student

One of the very best sports games!
Jeffrey D. Mailey
Philadelphia, PA
Insurance

I was wondering if you sell 1985 teams, & if you update the disk.
Rick Rosenthal
Peabody, MA
Student

Very impressive game. Good concept and implementation.
Patrick K. Moriarty
Richmond, VA
Programmer

Very realistic simulation with excellent graphics.
Jay Hertel
Sterling, Illinois
Student

These type of games are great to play with your kids (sharpen the mind).
Rod Phillips
Craig, CO
Jeweler

Your game is great, just keep on coming out with more.
Joe Yovino
Cincinnati, Ohio
Student

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MAGIC



Compiled by *LOUIS F. SANDER*

**MAGIC is tricks, MAGIC is fun.
MAGIC is doing what cannot be done.**

Every month, Magic brings you brief and useful computer tricks from around the world—tricks to make computing easier, more enjoyable or more exciting. We number our tricks in hex, the counting system of sorcerers and computerists.

Magic solicits your simple hardware ideas, short programs, useful programming techniques, little-known computer facts and similar items of interest. We look for new or recycled material that can be implemented with a minimum of time, effort or theoretical knowledge and that is of current value to Commodore computerists (Plus/4 and C-16 owners, too). RUN will pay up to \$50 for each trick accepted. Send your tricks to:

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If you enclose a self-addressed stamped envelope, we'll send you a Trick Writer's Guide. Readers outside the United States may omit the stamp.

In this season, when Peace on Earth and Goodwill Toward Men are prominent in every heart, it's satisfying to know that that's what Magic promotes. By sharing ideas from around the world, we make that world a better place to be, at least in our computer rooms.

The other side of the season, of course, is giving and receiving! Lucky are the Magic readers' loved ones, since they're never short of Christmas gift ideas. In fact, I just heard a fellow singing "The 128 Days of Christmas." He may have had a new computer in mind, or maybe just the number of gifts he's asked for. Either way, it's certain he shares our holiday wish to you—Merry CHR\$(ISTMAS) and Happy New Gear!

\$278 Easy C-64 RUN—Are you tired of typing R-U-N over and over again while working with Basic? Enter **POKE 816,32** and your weariness will vanish. After that

Poke, pressing the shifted run/stop key will automatically run your program! You can return to normal by **POKE 816,165** or by hitting the stop/restore combination.

Craig Johnson
Juneau, AK

\$279 Spritestorm—Here is an upgraded version of last month's Commodore 128 one-liner. This one features multicolor sprites that change as they move about. Some of the changes are a sight to behold.

```
10 FOR L=1 TO 255 : FOR J=3584 TO 4095 : POKE J,L : NEXT :  
FOR K=1 TO 8 : SPRITE K,I,K,I,I,I : MOVSPR K,50*K#K :  
NEXT : NEXT
```

For another variation, add STEP2 after the 4095.

Mary Lee McCafferty
Butler, PA

\$27A Typing in programs—To lessen the wear and tear on my precious copies of *RUN*, I use a copy machine to reproduce any programs I intend to type into the computer. As I type, I can mark, cut, spindle or mutilate the copy to my heart's content, with no chance of mutilating my magazine.

If the program doesn't run properly, it is much easier to compare a listing with the copy than to work with the whole magazine.

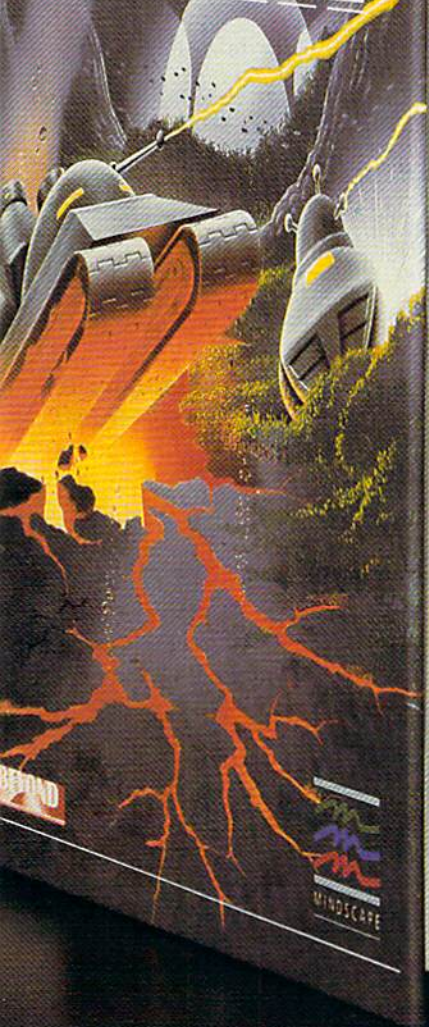
Geneva Hamilton
Fortuna, CA

\$27B Printing practice—I have a five-year-old son who is just learning to form his alphabet on special lined paper. You may remember it from your own school days, with its widely spaced lines for the tops and bottoms of the capitals and its dotted line in between for the tops of the lowercase letters.

Instead of buying this paper, I wrote a short program to have my printer form the lines, just like the practice sheets, and to print my son's name at the top of the page. The list-

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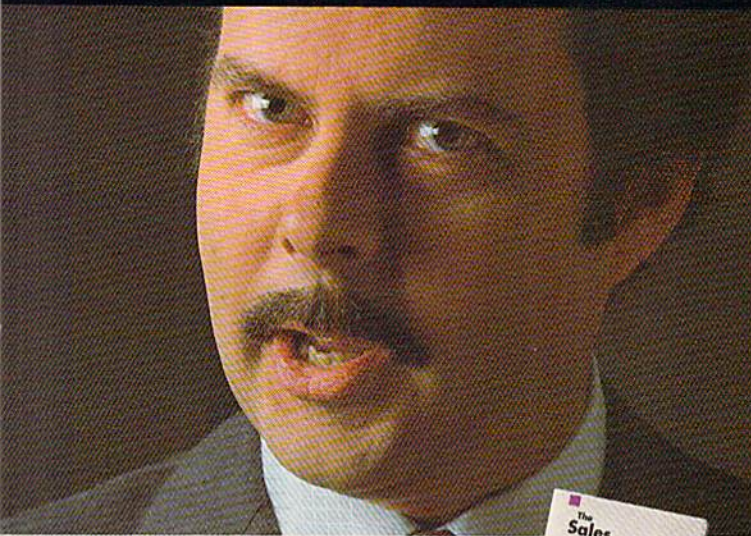
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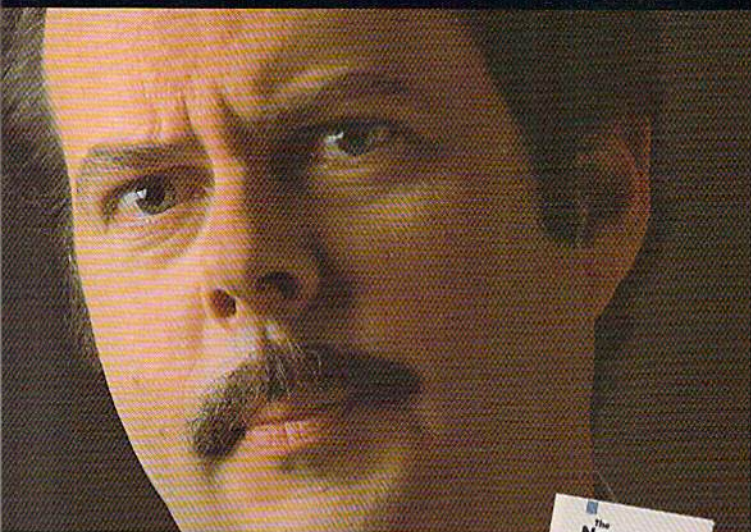


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R Magic

ing below shows a version for Commodore printers, where CHR\$(195) is the horizontal line corresponding to shifted C and CHR\$(45) is the minus sign or dash.

If you have a different printer, it shouldn't be hard to make it print similar characters with the line spacing appropriate to your needs.

```
100 REM PRINTING PRACTICE - D. BORKIN
110 T$="PRACTICE FOR MATTHEW"
120 FORJ=1TO79:SL$=SL$+CHR$(195):NEXT
130 FORK=1TO79:DL$=DL$+CHR$(45):NEXT
140 OPEN4,4
150 PRINT#4,SPC(40-LEN(T$)/2);T$
160 FORJ=1TO9
170 PRINT#4:PRINT#4,SL$
180 PRINT#4:PRINT#4,DL$
190 PRINT#4:PRINT#4,SL$
200 NEXT
210 CLOSE4
```

David Borkin, Jr.
Dearborn, MI

\$27C Designs!—Here are two short programs that will give you a swatch of fabric, wallpaper, gift-wrapping paper or a rack of Christmas neckties. Run program #1, and you'll get an interesting repetitive pattern, chosen at random. Press any key except S, and you'll get a totally different one. Press S, and you'll get a table of numbers that are characteristic of that design. Run program #2 and enter those numbers, and you'll see the design repeated.

The possibilities in this are endless, and some of the designs are striking to behold. The odds are 2,519,040 to 1 against seeing the same one twice.

```
100 REM DESIGNS! #1 - ELIZABETH OMAN
110 REM PRESS 'S' TO SEE SPECS
120 REM PRESS OTHER KEY TO SEE DESIGNS
130 B=INT(RND(0)*16):S=INT(RND(0)*39)+2
140 CH=INT(RND(0)*256)
150 CC=INT(RND(0)*16):IF CC=B THEN130
160 POKE53280,B:POKE53281,B:PRINT" {SHFT CLR
}"
170 FOR L=-1 TO 1000 STEP S
180 POKE1024+L,CH:POKE55296+L,CC
190 NEXT
200 GETA$:IF A$="" THEN 200
210 IF A$="S" THEN 230
220 GOTO 130
230 PRINT" {CTRL 1}";:IFB=0THENPRINT" {CTRL 2
}"
240 PRINT"BACKGROUND="B
250 PRINT"STEP="S:PRINT"CHARACTER="CH
260 PRINT"CHARACTER COLOR="CC:GOTO200

300 REM DESIGNS! #2 - ELIZABETH OMAN
310 INPUT"BACKGROUND (0-15)";B
320 INPUT" {6 SPACES}STEP (1-41)";S
330 INPUT"CHARACTER (0-255)";CH
340 INPUT"CHAR COLOR (0-15)";CC
```



```

350 POKE53280,B:POKE53281,B:PRINT"{SHFT CLR
}"
360 FOR L=-1 TO 1000 STEP S
370 POKE1024+L,CH : POKE55296+L,CC
380 NEXT
390 GETAS:IFAS$=""THEN390
400 POKE53281,6:PRINT"{SHFT CLR}{CTRL 2}":E
ND

```

Elizabeth Oman
Lindsborg, KS

\$27D Season's spritings—These sprites add festive finery to all your Christmas greenery. Though brilliant in their way, their strong points are form and symmetry. Plug them into last month's display programs or put them on the screen yourself.

```

81 REM CHRISTMAS SPRITE #1 - L. SANDER
82 DATA 000,126,000,003,255,192,015,255
83 DATA 240,031,255,248,063,255,252,063
84 DATA 255,252,127,255,254,127,255,254
85 DATA 127,255,254,127,255,254,127,255
86 DATA 254,063,255,252,063,255,252,031
87 DATA 255,248,015,255,240,003,255,192
88 DATA 000,126,000,000,000,000,000,000
89 DATA 000,000,000,000,000,000,000,013

```

```

91 REM CHRISTMAS SPRITE #2 - L. SANDER
92 DATA 000,000,000,000,000,000,000,000
93 DATA 000,000,024,000,000,024,000,000
94 DATA 060,000,000,060,000,000,126,000
95 DATA 063,255,252,015,255,240,003,255
96 DATA 192,000,255,000,001,255,128,001
97 DATA 231,128,003,195,192,003,000,192
98 DATA 006,000,096,000,000,000,000,000
99 DATA 000,000,000,000,000,000,000,099

```

L.F.S.

\$27E Sprite troubles—When checking for sprite collisions on some C-64s, you find a colliding sprite that suddenly disappears. These are called sparkles, and the best way to avoid them is to check each location twice. If you detect a collision on the first check but not on the second, your collision was really a sparkle.

Steven Davis
Address Unknown

\$27F DEF FN wizardry—Commodore Basic only allows one argument in user-defined functions, but this limit should not be taken seriously. I use functions with no arguments or with multiple arguments.

For example, when using the Read statement, it's useful to know from which line the data is being read. On the C-64, the line can be found by entering:

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Continued on p. 166.

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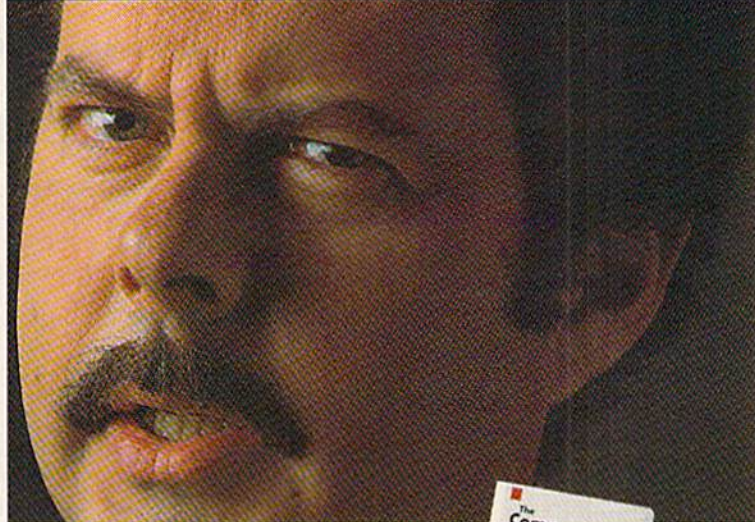
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Compiled by SUSAN TANONA

Hacker

This Puzzle Will Test all Your Computing Skills. Are You up to the Challenge?

The best way to describe Hacker is to say as little as possible and to hope you'll be sufficiently intrigued that you rush out and buy it.

The mystery begins as soon as you open the package. Your only instructions are on how to load the disk.

After a brief loading interval, the screen turns blue and letters appear on the screen, clacking in the manner of a teletype or a message being received by modem. The message itself—"Logon, please!"—is enough to indicate you've accidentally engaged your modem and have made contact with—someone.

You try logging on, only to be informed that you have made an error. Please try again. Press H for help and you'll be told that the code word for help is now the same as the name of the test site. Test site?

You try again, are rebuffed, and told the datalink will be terminated in five seconds. The seconds are counted down while you try to think of what the code word might be. Then, the cursor stops.

It starts again, writing gibberish on the screen, when suddenly, a message tells you security has been breached, and a second message welcomes you. You're in! Through a glitch in the



host computer, you've been admitted to—what?

Almost before you can react, the screen changes to show you a blueprint of a subterranean robot unit. Screen instructions tell you to aim the laser (laser?) at various parts of the robot as the nomenclature is flashed upon the screen.

Let's assume you do it. Once again, the screen changes. The lower half shows a map of the world, the upper seems to show a window flanked by cryptic labels.

The screen clears, back to the familiar, non-graphic screen of the datalink. They seem to think you're one of them and the message you read is truly frightening in its implications:

What these people are about to do could have global consequences.

The only way for you to save the world is to hang on, maintain the link, maintain the deception and learn as much as you can about whatever is going on.

If you manage to maintain the link, all of your computer skills will be called upon. You'll have to solve logical problems; you'll have to build sparse clues into theories and then test them; you'll continually be running a maze that is usually blind; you'll have to traffic with spies all over the globe; you'll have to decipher phrases in many foreign languages; you'll have to put together evidence that will show the world what these people are doing.

They know an intruder is in the system. You're going to have to bluff your way past checkpoints, memorize code words and run that maze, before time runs out and they pull the plug.

You can be quite sure that you'll keep going back to this puzzle, again and again, until you finally have it solved. Hacker is that kind of game.

I'll admit I was a bit put off by the graphics screens. I expected Hacker to be an all-text adventure, completely emulating a tenuous modem contact. But, by the time I had solved my second or third puzzle and was allowed to proceed, I was completely caught up in the game and the only conclusion I came to was that this game was done just right. (*Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043. C-64/\$29.99 disk.*)

Ervin Bobo
St. Peters, MO

Report Card

- A** *Superb!*
An exceptional program that outshines all others.
- B** *Very Good.*
One of the better programs available in its category. A worthy addition to your software library.
- C** *Good.*
Lives up to its billing. No hassles, headaches or disappointments here.
- D** *Mediocre.*
There are some problems with this program. There are better on the market.
- E** *Poor.*
Substandard, with many problems. Should be deepsixed!

A Printer For All Reasons

Search For The Best High Quality Graphic Printer

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

Our Objective Was Simple

We wanted to find that printer which had all the features you could want and yet be sold directly to you at the lowest price. We didn't want a "close-out special" of an obsolete product that some manufacturer was dumping, so we limited our search to only those new printers that had the latest proven technology. We wanted to give our customers the best printer on the market today at a bargain price.

The Results Are In

The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the SP-1000 from Seiksha, a division of Seiko (one of the foremost manufacturers in the world). We ran this printer through our battery of tests and it came out shining. This printer *can* do it all. Standard draft printing at a respectable 100 characters per second, and with a very readable 12 (horizontal) by 9 (vertical) character matrix. This is a full bi-directional, logic seeking, true descender printer.

"NLQ" Mode

One of our highest concerns was about print quality and readability. The SP-1000 has a print mode termed Near Letter Quality printing (NLQ mode). This is where the SP-1000 outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 24 (horizontal) by 18 (vertical). This equates to 41,472 addressable dots per square inch. Now we're talking *quality* printing. It looks like it was done on a typewriter. You can even print graphics using the standard graphics symbols built into your computer. The results are the best we've ever seen. The only other printers currently available having resolution this high go for \$500 and more *without* the interface or cable needed to hook up to your computer.

Features That Won't Quit

With the SP-1000 your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 35 character styles including 13 double width and 3 reversed (white on black) styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print 10, 0, 6, & 2. This fantastic

machine will do it automatically, through easy commands right from your keyboard. Do you sometimes want to emphasize a word? It's easy, just use **bold** (double strike) or use *italics* to make the words stand out. Or, if you wish to be even more emphatic, underline the words. You can combine many of these modes and styles to make the variation almost endless. Do you want to express something that you can't do with words? Use graphics with your text — even on the same line. You have variable line spacing of 1 line per inch to infinity (no space at all) and 143 other software selectable settings in between. You can control line spacing on a dot-by-dot basis. If you've ever had a letter or other document that was just a few lines too long to fit a page, you can see how handy this feature is. Simply reduce the line spacing slightly and ... VOILA! The letter now fits on one page.

printing when new, but quickly starts to fade. To keep the printers output looking consistently dark, the ribbons must be changed quite often. The SP-1000 solves this problem by using a wide (1/2") ribbon cartridge that will print thousands of pages before needing replacement. (When you finally do wear out your ribbon, replacement cost is only \$11.00. Order #2001.)

The Best Part

When shopping for a printer with this quality and these features, you could expect to pay around \$500 or more. *Not now!* We sell this fantastic printer for **only \$259.95!** You need **absolutely nothing else to start printing — just add paper.**

No Risk Offer

We give you a 2-week satisfaction guarantee. If you are not completely satisfied for any reason we will promptly refund your purchase. A 1-year warranty is included with your printer. The warranty repair policy is to repair or replace and reship to the buyer within 72 hours of receipt.

The Bottom Line

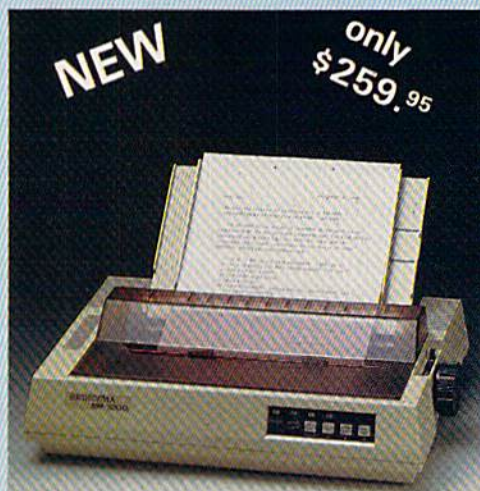
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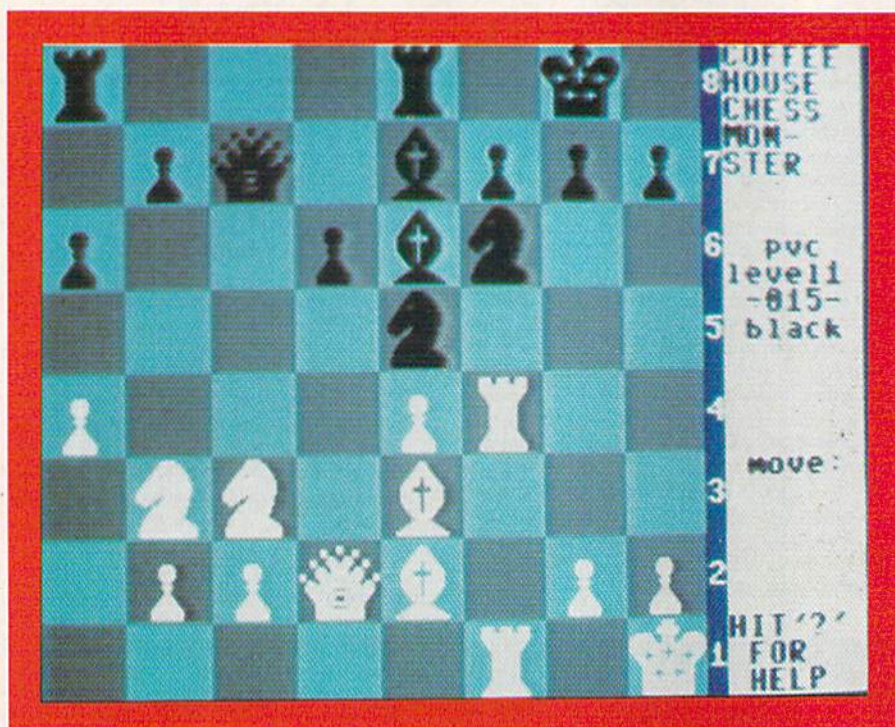
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Paul Whitehead Teaches Chess



A Tutorial to Help You Sharpen Your Skills as a Chess Player

Paul Whitehead Teaches Chess is a terrific program for the serious chess player. It includes chess rules and strategy for the beginning and intermediate player, plus the "Coffeehouse Chess Monster," which is the best chess game I've seen on the C-64. Graphics are outstanding and the system is speedy, especially since nearly every screen includes a hi-res chessboard.

I can't recommend this program if you've never played chess. The program has all the information to begin play, but a novice may have trouble putting it together without outside help. Printed documentation is brief. It tells how to load the program and access the excellent internal documentation. Nothing in the package gives a plan for learning chess systematically from the ground up.

However, a chess player with a little experience can spend many profitable and fascinating hours with this chess tutor. Easy-to-use menus break up the rules of the game, the tactics of the pieces, chess openings and end-game strategy into manageable chunks. Each section is illustrated with one or more chessboards. (Two data disks provide 631 such boards, most of which are part of short play sequences.)

Getting around the tutor is quite simple. One-key commands step you backward or forward through successive menus or example moves. You can access any chessboard by number, or switch back and forth between the tutor and the game.

The boards tell the story in this program. Explanations are brief. The result is that you can go through the tutorial many times, learning new things as your playing skill matures.

The Coffeehouse Chess Monster game is excellent. The board and pieces are beautiful, and play is smooth and fast, without the distraction of redrawing the screen after each move.

The game offers eight levels of play. Games match you against the computer or another player, or you

can watch the computer play itself. Level 8 permits infinite time for plays, although you can force the computer to move. Playing time on other levels varies from ten seconds per move to about two minutes.

For the student, this game offers several valuable features. When the computer moves, it prints each move it is considering on the screen. Also, if you make a bad play and don't realize it for several moves, you can undo as many moves as you wish. This lets you experiment with different strategies.

If you are only mildly interested in chess, Paul Whitehead Teaches Chess is probably not for you. But if you love the game and want to become a power player, this program is a must. And, when you've learned all it has to teach, Enlightenment has expert-level titles waiting in the wings. (Enlightenment, Inc., 1240 Sanchez St., San Francisco, CA 94114. C-64/\$49.95 disk.)

Annette Hinshaw
Tulsa, OK

ApSoft-64



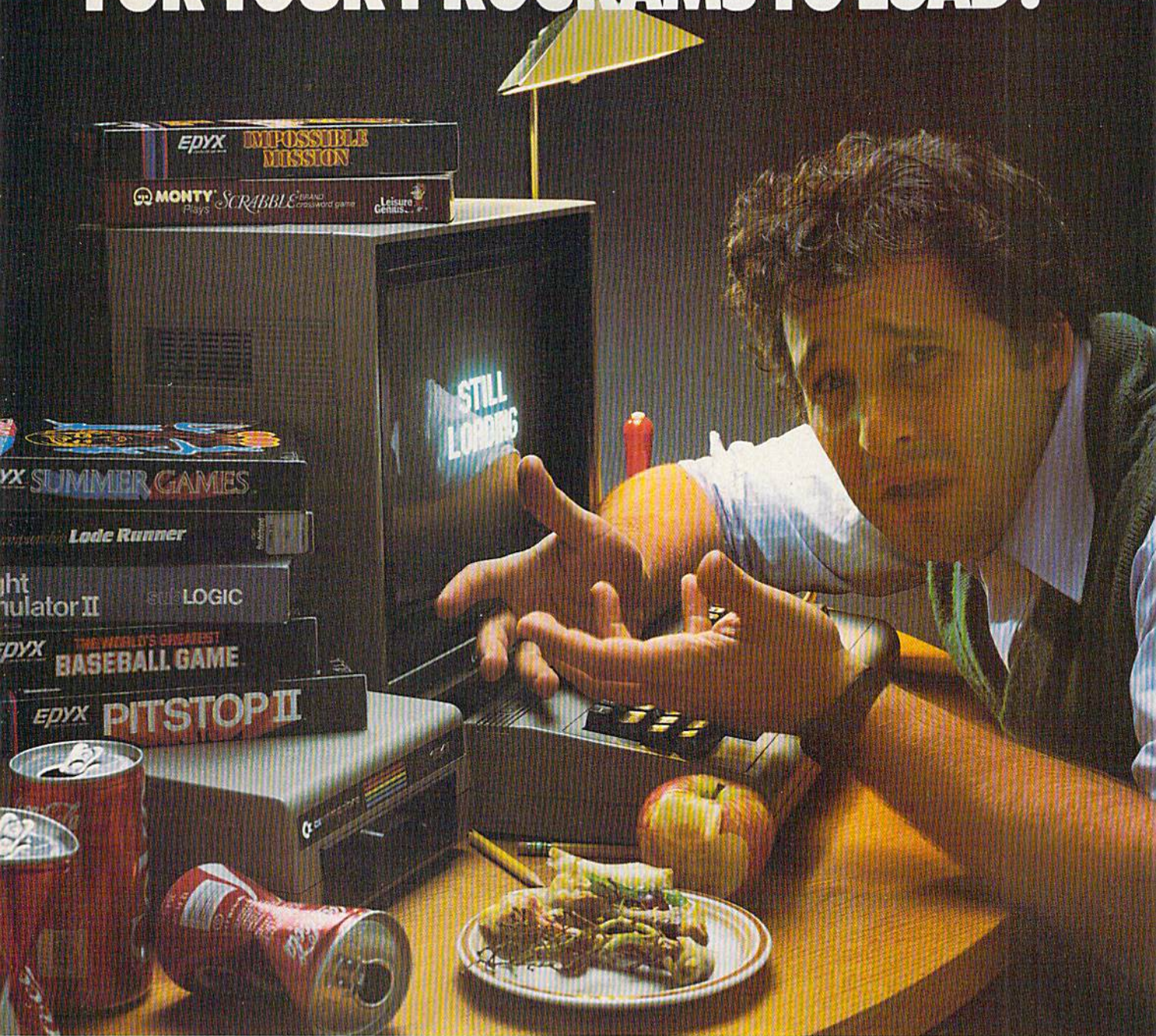
This Package Lets You Run Many Apple Programs On Your Commodore 64

The C-64 has prompted the creation of many different Basic extensions over the years. There is yet another CBM Basic extender out now, but this one has a new twist.

ApSoft-64 gives the C-64 added speed (up to five times faster for disk loads) and easy-to-use graphics and sound commands. The twist is that it adds compatibility with many Apple II programs through the use of 45 extra Basic commands, many of which are identical to Applesoft Basic.

ApSoft-64 doesn't actually give your C-64 the ability to read AppleDOS disks, but it does let you type in Applesoft listings from a hard copy, save them onto your Commodore formatted disks and then load and run them whenever the ApSoft-64 program is

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You're tired of waiting forever for your Commodore 64 programs to load. But it's no use glaring at your disk drive. Calling it names won't help, either. It was born slow — a lumbering hippo. You need the FAST LOAD CARTRIDGE from EPYX. FAST LOAD transforms your Commodore 64 disk drive from a lumbering hippo into a leaping gazelle. With FAST LOAD, programs that once took minutes to load are booted up in a matter of seconds.

FAST LOAD can load, save and copy your disks five times faster than normal. It plugs into the cartridge port

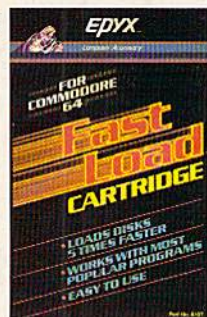
of your Commodore 64 and goes to work automatically, loading your disks with ease. And that's only the beginning. You can copy a single file, copy the whole disk, send disk commands, and even list directories without erasing programs stored in memory.

And unlike other products, the FAST LOAD CARTRIDGE works with most programs, even copy protected ones, including the most popular computer games.

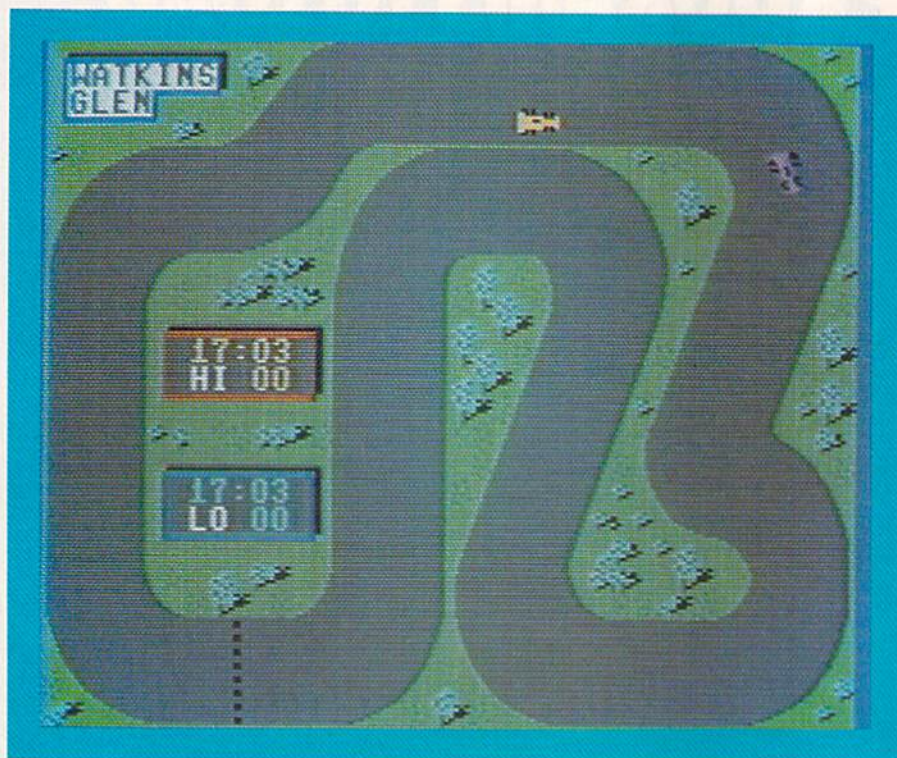
The FAST LOAD CARTRIDGE from Epyx. Easy to insert, easy to use and five times faster. So why waste time waiting for your disks to load?

Speed them up with FAST LOAD!

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EPYX™



resident in memory. You can also continue to run many of your C-64 programs with ApSoft-64.

Using a C-64 terminal program, or the small one provided with ApSoft-64, you can download public domain Apple programs from BBSs and other on-line sources, save them to your Commodore disks and later run them with ApSoft-64 in memory. Additionally, you can use ApSoft-64 for creating your own programs.

With ApSoft-64 active, you can run no-frills Applesoft programs. Some of these Apple programs may need some modifications before you can run them successfully. Among the problem areas are those Apple programs with commands for disk, file handling, scrolling windows, hardware functions and programs that contain machine language routines. Problems are to be expected, and FS! Software has done a good job of anticipating the difficulties.

Included on the disk is a program that will help you to analyze and convert Applesoft programs to the C-64. Also provided is a well-documented manual that gives memory maps of ApSoft-64 and the C-64, a list of reserved words and DOS-command conversions.

disk are many short demo programs and several public domain programs that are well known among Apple users.

ApSoft-64 claims to make your C-64 "think it's an Apple." My first question was, "Why bother?" The C-64 has so many excellent programs, full-featured Basic extensions and public domain software libraries that it seems like gilding the lily to add Apple compatibility.

There is one good reason for using ApSoft-64. For students who have a C-64 at home and an Apple II at school, ApSoft-64 could be the answer to homework problems. A student could do programming homework on a C-64 (running like an Apple), make a hard copy of the assignment, and bring it back to school for evaluation by the teacher or to type in on the school's Apple for testing. The student wouldn't be able to share disks between the two computers, but the hard-copy program listings could be shared and the programming practice at home would be helpful.

Also, if the school has a BBS, Apple programs could be downloaded to the home C-64, and C-64 ApSoft-64 programs could be uploaded into the school computer.

ApSoft-64 is worth looking into if

you have both an Apple II and a C-64 on which you do programming. (FS! Software, PO Box 635, Faribault, MN 55021. C-64/\$39.95 disk.)

Margaret Morabito
RUN staff

On-Track Racing

A

Here's a Car-Racing Simulation That's Realistic and Fast-Paced

At first glance, you might not think On-Track Racing is capable of providing the kind of realistic racing excitement that several other driving-simulation programs might. On-Track's graphics appear somewhat simplistic—the cars more closely resemble strange insects than precision racing machines.

But the first time you boot up the game, you'll realize that looks are, indeed, deceiving, as game play more than makes up for the relative lack of sophisticated graphics.

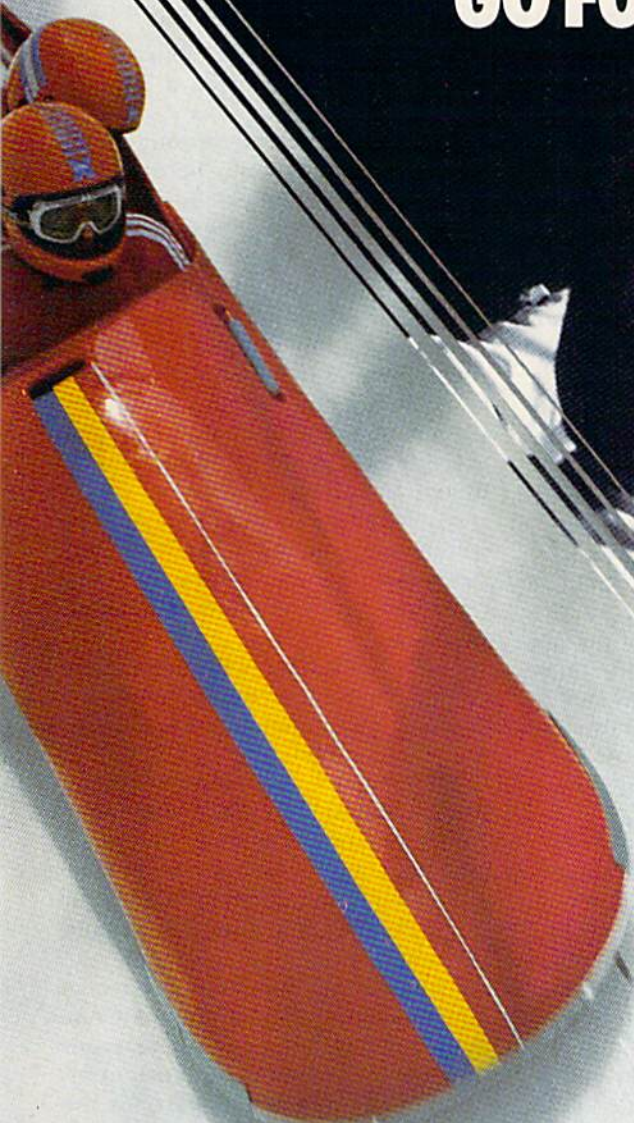
On-Track is an easy game to play, but a difficult one to master. Maneuvering your car around the track is much more difficult than the manual makes it sound. The cars are very responsive and move quickly around the racetrack. The slightest movement of the joystick will send your racer careening wildly off the racing surface and onto the grass. That's the kind of precise steering you'd find in a high performance race car.

The cars handle the way real racing cars handle. When you go into a turn, the car will have a tendency to slide sideways; you can use this to your advantage during competition, the way professional racers do.

Don't, however, get the idea that you need to have raced—or even driven—cars to enjoy this game. Even if you've never driven a real car, you'll soon find yourself getting a feel for the kind of handling and maneuvering you need to get around a race-track as quickly as possible.

The many play options available in On-Track help guarantee you won't soon grow bored with it. You

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	APPLE	MAC	ATARI	C64/128
Summer Games	✓		✓	✓
Summer Games II	✓			✓
Winter Games	✓	✓		✓



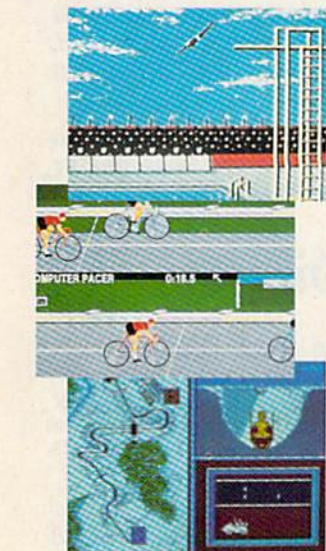
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can run solo practice laps, race against a real opponent or challenge a computer-controlled foe. You can drive a manual or automatic-shift racer and choose a car that best suits your requirements for any combination of acceleration, top speed, handling and braking ability. Then decide whether you want to run on a paved or dirt surface and choose from any one of ten famous courses on which to compete. Finally, indicate whether you want to compete for best time or greatest distance covered.

The options are presented in sequence and are menu driven, so it helps to familiarize yourself with them before you begin making your selections. Making your choices is a very simple procedure, but the program's instructions make it seem difficult. The program's only real fault, in fact, is an instruction booklet that is a bit confusing and also somewhat childish in its treatment of the game.

The game, on the other hand, is anything but childish. Actually, most small kids will probably have a great deal of difficulty maneuvering around the track. That's not a criticism, but rather, a compliment. The graphics may look childish, but game play is very sophisticated.

Don't compare On-Track to other driving-simulation games, as it doesn't try to be like them. This program has a lot going for it. If you do go for a spin with On-Track, I don't think you'll be disappointed. (*Gamestar*, 1302 State St., Santa Barbara, CA 93101. C-64/\$29.95 disk.)

Scott Wasser
Wilkes-Barre, PA

Super C Language Compiler

*This Package is a Solid
Implementation of the
C Programming Language*

The C programming language has received a lot of attention over the past few years, owing to its

facility for use in a wide variety of applications.

Abacus Software's Super C Language Compiler is a fairly complete implementation of the C language (the standard Kernighan and Ritchie version). In fact, Super C incorporates some features, such as enumerated types, that have become part of the language, but have not yet been implemented on other C packages.

Super C does have some shortcomings. The compiler does not support either bit fields or in-line assembly code, nor can programs make use of command-line arguments. In addition, I found that most public domain C source code needed to be changed somewhat in order for it to compile using Super C. If you plan to write software for your Commodore, you won't run across these problems. If you plan to modify software to run on your C-64, however, I recommend first becoming thoroughly familiar with all of Super C's nuances.

The Super C package consists of a 195-page manual and a copy-protected distribution disk. The disk contains a loader program, a copy utility, a screen editor, a compiler, a linker, a standard header file, two library files and some sample files and programs.

The documentation is broken down into two major parts: a user's guide, which consists of a tutorial on using the package and a basic introduction to C; and a system guide, which deals with the same subjects in more detail. I found this organization confusing, requiring a lot of page-flipping. The index, too, is difficult to use because entries are keyed to section number instead of page number.

One of the nice features of the compiler is that compilation errors are automatically written to a disk file that you can reference when you are debugging the source code. Another plus is having two text areas in the editor, which allows you to refer to one file while working on another, or transfer blocks of text between areas.

One questionable feature of the editor allows the programmer to assign a color to each line of source code. This is of limited value, because I think it's a difficult feature to make

use of, and it results in source files having to be stored in a special format.

Software development using Super C is an arduous task, because the distribution disk must be swapped with the disk holding the source code at each step of the edit-compile-link cycle in order to load the respective Super C program. Programmers will soon tire of this endless disk swapping. Owning two disk drives won't help, as Super C does not directly support multiple devices.

Once debugged, programs can be linked to run from Super C or directly from Basic. The latter option will save you the headache of loading the Super C loader every time you want to run a compiled and linked program.

Abacus Software will answer any of your questions over the phone. When I asked them about support for command-line arguments, in-line assembler code and multiple drives, I was told that such ideas were being considered or in the works. I was also told that registered users will be charged a nominal fee (\$10-\$15) for upgrades, but that bug fixes would be free.

I suspect that Super C will have an appeal among two groups of Commodore users: those who are eager to learn C; and those who are interested in developing software for the C-64 in a language other than Basic. Super C is slightly overpriced, yet within the bounds of reasonable cost for an adequate C programming language package. (*Abacus Software*, PO Box 7211, Grand Rapids, MI 45910. C-64/\$79.95 disk.)

Alex Lane
Jacksonville, FL

Show Director

*A Program that Will
Inspire a New Generation
Of Movie Directors*

Show Director is my kind of educational software. It combines superb graphics, ease of use and fea-

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You've joined an elite Rescue Squadron, flying to the hostile planet Fractalus to confront the ruthless enemy Jaggies head on. The mission is a treacherous one for, as everyone knows, the cyanitric acid atmosphere on Fractalus is fatal and Jaggi saucers are cunning. You're needed to rescue Ethernor pilots shot down and stranded on that brutal planet, and to help lead our forces to victory . . . for the merciless Jaggi onslaught must be stopped to preserve the future of our galaxy.

Rescue on Fractalus! is a rescue and space action game with realistic 3-D flight simulation. You pilot your Valkyrie Fighter through the canyons and around the mountain peaks of the planet Fractalus to rescue fellow

pilots, do battle with enemy saucers and destroy enemy gun emplacements.

We supply the Long Range Scanner, Dirac Mirror Shield and Anti-Matter Bubble Torpedoes . . . YOU supply the skill and guts! Take the challenge: The perils of Fractalus await you.

C64/128 ATARI APPLE

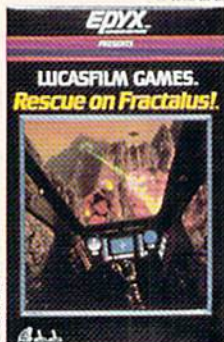
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Circle 12 on Reader Service card.

tures that are sure to quicken young minds.

This is a discovery program, rather than a drill program. Hidden within that discovery are the beginnings of word processing skills, creative writing and the elements of drama and graphics design. Despite some limitations, Show Director successfully touches upon a universal, mind-expanding experience—the love of stories.

Creating stories is what Show Director is all about. You, the director, write a script of up to three pages, before or after you create animated scenes to go along with your script. Each show may have up to three scenes, with as many as four characters in a scene.

To construct a scene, you begin by selecting a background. Show Director provides twelve ready-made backgrounds and a Design Your Own Background feature. You page through the scenes with a joystick or the cursor keys. The twelve scenes divide into four settings that should spark any child's imagination: a prehistoric cave, a haunted mansion, an enchanted forest and pyramids in a desert.

The Design Your Own Background option doesn't require drawing skills. This screen is divided lengthwise into three pieces. The program offers four choices for each section, and you can mix and match the three levels, creating a total of 24 possible combinations.

You choose a cast to play in the scene from among 40 characters (people, animals and objects) that range from cave people and monsters to a butterfly or a motorcycle. All cast members can be animated for 30 seconds within a scene.

As the cast members move, they change perspective. For example, if you move the caveman to your left, you see his left profile. The animation is smooth and the result is quite realistic. As you place additional cast members into a scene, the program replays the moves you've already programmed so that your characters don't get in one another's way.

Once you lay out the action in your scene, you can add sound effects or mood music by choosing whatever is appropriate from a menu. The menu also provides an Oops option, in case you change your mind.

Show Director has some annoying limitations. It's easy to create a scene, but making everything in the scene come out the right way takes practice and patience. I would also like to have the option to save successful scenes separately, so I can mix them for more than one show. The script is your written story, and it always precedes all of the scenes in the show. I would like to be able to play a page of narrative before each scene.

I recommend Show Director in spite of these limitations. Even beginners can create an impressive-looking show. The program is designed for children ages eight and older. It is simple enough not to frustrate its youngest users, but it will also challenge and entertain much older would-be directors. (*Mindscape, 3444 Dundee Road, Northbrook, IL 60062. C-64/\$34.95 disk.*)

Annette Hinshaw
Tulsa, OK

The Sea Voyagers

*Sail for New Worlds
With History's most
Daring Adventurers*

CBS Software has established itself as a publisher of software that is both educational and entertaining. One of its latest C-64 releases, *The Sea Voyagers*, is an interactive history lesson that is based on 30 of the world's greatest sea-faring explorers. Through a series of four learning activities, the program teaches you about the voyages of men such as Vespucci, Balboa, Ponce de Leon and Magellan, and then tests you on what you have learned.

The first activity, "Explorer Profile," lets you select any of the 30 explorers and provides you with a graphics presentation of his life and voyages. In addition to the explorer's portrait and full name, the profile screen features a map of the world on which an animated line traces the explorer's voyages.

Other information detailed on the profile screen includes the voyager's

life span, voyage dates, the countries he sailed for, the names of his ships and a list of other achievements.

"Who Goes There?" is a one-player quiz that challenges you to identify a randomly selected explorer based on a series of clues. After each clue, you are given a chance to name the explorer. The fewer clues you require, the more points you score.

The third activity, "Explorer Mix," presents you with three explorers and three facts that you must correctly match. Although this may help to reinforce what you've learned in the first two activities, it's really not challenging enough to be much fun. First, assuming the original combination is incorrect, there are only five other possible combinations. Second, many of the facts are dead giveaways, so you can often narrow the choice down to one or two combinations. This activity would have been much better using five to seven explorers and maybe even a timer to create more of a challenge.

Finally, "Explorer Match" is a poker-type game that uses the voyagers as playing cards. You are dealt five explorer cards and may discard once in order to create your best hand. You hold onto explorers with something in common (such as the country for which they sailed). This activity has two difficulty levels and can be played either solo or against a friend. Again, even the difficult level is a little too easy; but it's still an interesting way to get a history lesson.

The Sea Voyagers comes with a flexible vinyl overlay for the keyboard that makes learning and playing the four activities a breeze. The program also features on-screen instructions and a 27-page booklet that provides brief biographical sketches of the explorers, background information on their reasons for exploring, sea vessel design, and more.

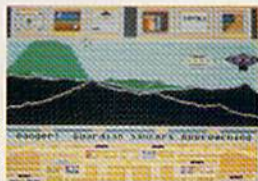
Although some of the activities could be just a bit more challenging, this program presents a lot of valuable historical information in an entertaining format. (*CBS Software, One Fawcett Place, Greenwich, CT 06836. C-64/\$39.95 disk.*)

Bob Guerra
Charlestown, MA

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Abandoned war hulks litter the Rift—crammed with exotic weapons and technology. The lifelike fractal graphics take you to this mythical land of the Ancients. The mind's-eye point of view puts you right in the driver's seat of a Surface Rover. A hulk looms before you—your mind races, feverishly planning a strategy. What weapons do you need to survive? What technology will fetch the highest price? If you can pack your battered Rover full—you'll be rich beyond your wildest dreams.

Who will be the Guardians—genetically

engineered mutants—stand watch over their creators' technology. And they deal swiftly and ruthlessly with characters like techno-scavengers.

But you've got a plan. If you and your trusty Science Droid can scavenge the right combination of weapons and technology—and get off the planet alive—you'll make it big. Destroy the Guardian base and you'll even be a hero! The treasures of the Ancients are yours . . . if you've got what it takes.

C64/128

ATARI

APPLE

Koronis Rift



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Magnificent Modems

With all the recent interest in telecommunications, you may be thinking about getting involved. This comparison of several popular modems available for your Commodore should help you get started.

By JOE MOONEY

If you're in the market for a modem, this article should help you decide what kind of package is best for you. I've taken a look at several popular modem/software packages available for the C-64, with the hope of giving you a good idea of the kinds of choices you have. Once you know what features are available to you and which of those you'll need, selecting the right modem will be a much simpler task.

Until recently, modems and high-quality software were generally sold separately. Although many modems were sold with some form of software, it was usually of very rudimen-

tary quality (such as a dumb terminal emulator, written in Basic). Today, the trend is toward selling modems and high-quality software as one package. This can save you money, because the cost of these packages is usually less than that of the hardware and software if purchased separately.

Modem Uses

There are many things you can do with a modem/software package. It allows you to access commercial information services such as CompuServe and The Source, as well as local bulletin board systems.

You can also use a modem package to access a computer system where you work, allowing you to do some of your work at home, or transfer files back and forth.

If you have a friend with a modem, you can communicate with one an-

other through your computers. In most cases, you don't have to have the same kind of computer, provided that your communications software is reasonably flexible. It is also possible to transfer text files and programs between your computers.

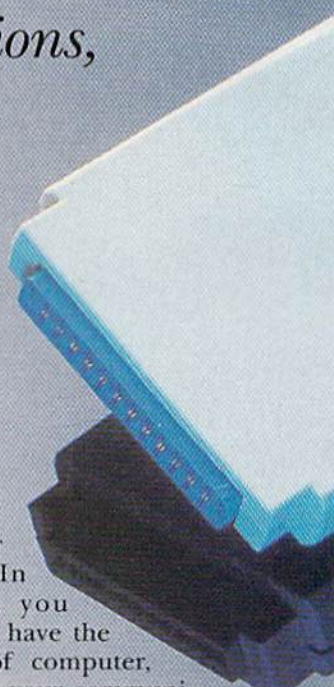
This is only a beginning. There is much more that you can do with a modem. For more information on the subject, see Margaret Morabito's series on telecommunications, which began in the May 1985 issue of *RUN*.

Volks 6420

This package consists of the Volks 6420 modem, manufactured by Anchor Automation, and AutoCom IV software, from Madison Computer.

Address all author correspondence to Joe Mooney, 3275 Mountain Highway, Apt. 309, North Vancouver, BC, Canada V7K 2H4.

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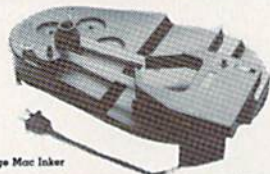
At Christmas I no more
desire a rose
Than wish a snow in May's
new fangled mirth
But like of each thing
that in season grows
—King Lear



MacInker A Gift For Christmas A Gift For All Seasons

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The AutoCom IV software offers certain convenient features not found in the other packages. It has the ability to dial and automatically log onto a host system. A unique log-on sequence can be specified for each number in the program's phone list. Using its automatic log-on capability, the software can access another system at a preset time, and then transfer its memory buffer to the remote system. Thus, you can send data during the off-peak times of the day and take advantage of reduced rates offered by long distance carriers and information services.

One drawback to this feature is that the automatic log-on sequence must be specified with less than 39 characters. This is an arbitrary and unfortunate restriction.

This package will also automatically answer calls, storing any received data in its 30,000-character buffer.

AutoCom IV provides a block-check protocol to transfer Basic or machine language files. Unfortunately, because this is not a common error-checking protocol (such as XModem or Punter), it can only be used for transfers between two C-64s, both of which must be using AutoCom software.

A rather nice touch is the screen-saver feature, which clears your monitor screen if the keyboard has not been used for more than ten minutes.

There are no disk-wedge commands provided, so you must exit the program in order to format a disk, delete a file, and so on.

The 6420 modem has an Answer/Originate switch and a built-in speaker, and it provides touch-tone and rotary dialing. Unlike the Modem/300, which emits a loud, unpleasant noise when not in use, the 6420's speaker produces a barely audible sound that didn't bother me at all.

This package boasts the longest war-

ranty period—five years—of any of the products reviewed here. The manual is short, clear and well-written.

Overall, this is a high-quality product. Its strong points are the dual-mode dialing ability and automatic calling and log-on capabilities. The package's drawback is its software, which is not as feature-packed as some of the other packages. (*Anchor Automation, 6913 Valjean Ave., Van Nuys, CA 91406. \$99.*)



Modem/300 (1660)

The Modem/300 package consists of a Commodore model 1660 modem and terminal software, called HiggyTerm.

HiggyTerm is a high-quality terminal program, although it does not have as many features as the other packages. This, however, has certain advantages; the program is very easy to use, it loads more quickly than any of the other programs and it has the largest memory buffer—over 40,000 bytes.

This is the only package in this review whose software is not copy-protected. Thus, you can keep a copy of the modem software on the same disk as your datafiles, eliminating the need to constantly switch disks.

I found it rather frustrating that when you change terminal parameters (such as parity and stop bits), any existing connection is broken. Thus, you must log off each time you wish to change these parameters.

Although it does transfer text files, the software does not provide an error-checking transfer protocol.

The Modem/300 can make a connection using either touch-tone or rotary dialing. I have mixed feelings about the built-in speaker. Although it's handy when placing a call, it can be quite annoying at times. From the moment the C-64 is powered up until a connection is made, the modem

RITEMAN



A classic is now in print

The **RITEMAN C+** is a dot matrix printer that's classic in its own right. For a lot of good reasons. First of all, it's built to work with Commodore* computers. This **plug-in capability** makes the rest of its features even more attractive.

It has **front-loading capability** that makes it unique in the field. Its **friction feed** will even print on a single post card. It prints the first line of every sheet so there's no more wasted paper.

It has **105 cps capability** and a **built-in stand** that lets you keep continuous-feed paper right under the **RITEMAN C+** for simple, efficient space saving. Even the ribbon lasts longer than other printers! And that's not all. There's an entire line of state-of-the-art RITEMAN classics, compatible with the IBM** and Apple*** computers.

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Riteman. Printers that make the right impression.

RITEMAN Division of C.I.TOH

C. Itoh Digital Products, Inc. 1011 Francisco Street, Torrance, CA 90502

emits a loud, very aggravating noise.

The manual is clear and easy to understand, with high-quality binding and printing.

The advantages of the Modem/300 package are its ease of use, dual-mode dialing capability, large memory buffer and unprotected terminal software. Although it has somewhat fewer software features than the other packages, you should find it quite adequate for general-purpose use. (*Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380. \$119.95.*)



MPP 1064

The MPP 1064 modem, originally manufactured by Microbits Peripheral Products and packaged with VIP Terminal software (from Softlaw Corp.) is now being marketed by Supra Corp., which has lowered the price of the modem and no longer includes the VIP Terminal software. Because these two products worked so well together, I decided to keep them in this review and continue to treat them as a package. However, you will now have to buy the modem and software separately.

The VIP Terminal software provides menus and icons to control its operation. Menu options can be selected by either the keyboard or a joystick. I found the extensive buffer management features (especially the full-screen editor) to be very useful. I also like being able to use the 64- and 80-column screen formats.

The only negative point about the software is that it has a rather small memory buffer (about 7K). However, this is not a serious limitation, because data can be uploaded or downloaded directly to a disk file; thus, the buffer size is not too important (see "Communications Software: A Vital Link," by Jim Grubbs, *RUN*, November 1985).

The 1064 modem appears to be very well designed and built. This is the only modem with status LED indicators, its own power supply and a cable that attaches to the user port. The only switch is an on/off switch; everything else is automatic.

The manual is clearly written and even contains a brief data communications tutorial. I did notice a few more typographical errors in this manual than in the others.

Overall, I was quite impressed with this package, as it is both powerful and easy to use. (*Supra Corp., 1133 Commercial Way, Albany, OR 97321. \$69.95.*)

Mitey Mo

The Mitey Mo modem is manufactured by Computer Devices International and comes bundled with Smart 64 software, from Microtechnic Solutions.

The terminal package offers a number of very powerful features, as well as a great deal of flexibility. As a result, the software is more difficult to use than the other packages.

This is the only package that offers the option of redefining the entire character set. This feature allows you to communicate with virtually any system. An accompanying disk wedge gives you complete control over the 1541 disk drive.

I found the XModem file-transfer protocol to be quite useful. It's one of the most common of error-checking protocols, especially with local bulletin board systems. The software provides a number of file-conversion utilities, including conversions to and from CompuServe .IMG format files.

One handy feature is the screen-dump option, which sends the current screen contents to the printer.

Another unique feature of the software is its ability to support a variety of 80-column cartridges (such as Video Pak 80 and XL-80, from Data 20 Corp., and BI-80, from Batteries Included). The software can emulate a VT-100 terminal when used in conjunction with the XL-80 cartridge.

Although the software is copy protected, a utility is provided to make backup copies of the system disk. This process takes 22 minutes.

The manual is larger and more comprehensive than any of the others. Unfortunately, its poor organization makes it somewhat difficult to use.

The Mitey Mo modem performed quite well for me, and I did not encounter any notable problems or lim-



itations. This package offers a wealth of features, many of which are not included in the other packages. As it is less easy to master than the other packages, I would not recommend the Mitey Mo package to those who intend to make only infrequent use of their modems. However, if you have special requirements or will use your modem often, you should definitely consider the many features offered by this package. (*Computer Devices International, 1345 Doolittle Drive, San Leandro, CA 94577. \$119.95.*)

Recommendations

Before I state my preferences, I'd like to make it clear that all the packages I tested performed adequately. There are no poor-quality packages here, and the average modem purchaser would most likely be satisfied with any one of them. No single package offers every possible feature; whichever package you choose, you will have to make some trade-offs.

Also, note that I have made this choice without regard to price. I suggest you look closely at the combination of prices and features before deciding on the package that's right for you.

The best package, overall, is the MPP 1064 modem with the VIP Terminal software. It's the easiest to use. Both the hardware and software are of very high quality, with many powerful features. Unfortunately, as I mentioned earlier, you will now have to purchase the hardware and software separately.

Commodore Compatibility

The Modem/300 states that it is compatible with the Commodore 64, SX-64, Plus/4 and VIC-20 computers. The Modem/300's terminal software will not work with the VIC, so a simple Basic program is included for use



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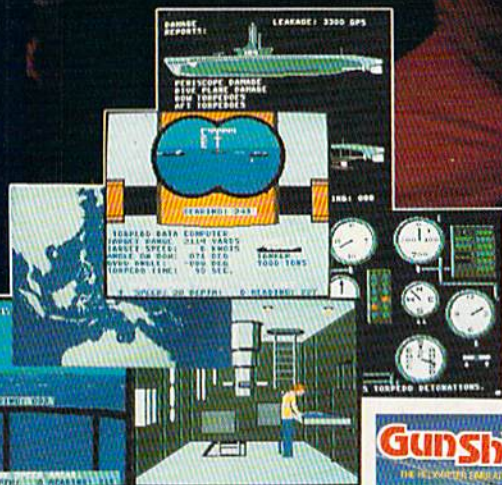
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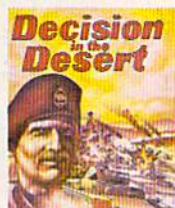
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	Volks 6420	Modem/300 (1660)	MPP 1064	Mitey Mo
Hardware				
Direct connect to phone line	Y	Y	Y	Y
Direct connect to computer	Y	Y	N	Y
All cables included	Y	Y	Y	Y
Standard phone plugs (RJ 11)	Y	Y	Y	Y
Answer/Originate modes	Y	Y	Y	Y
On/off switch	N	N	Y	N
Auto dial: rotary	Y	Y	Y	Y
touch-tone	Y	Y	N	N
detects busy signal	N	N	N	N
Auto answer	Y	Y	Y	Y
Status indicators: power LED	N	N	Y	N
off hook LED	N	N	Y	N
carrier detect LED	N	N	Y	N
speaker	Y	Y	N	N
Software				
Protocols supported:				
full duplex	Y	Y	Y	Y
half duplex	Y	Y	Y	Y
Punter	N	N	Y	N
XModem	N	N	Y	Y
CBM ASCII to ASCII	Y	Y	Y	Y
Xon/Xoff	Y	Y	Y	Y
Screen size: 40 column	Y	Y	Y	Y
other size via software	N	N	64/80/106	N
other size via hardware	N	N	N	80
User-selectable features:				
# substitutable characters	0	0	3	255
redefine Xon/Xoff codes	N	N	Y	Y
add line feed to return	Y	Y	Y	Y
Disk functions:				
selectable device number	N	N	Y	Y
number of functions ¹	0	1	4	7
Memory buffer: editor	N	N	Y	N
maximum size	30K	40K	7K	28K
Programmable function keys:				
maximum number	0	16	20	4
maximum characters per key	0	28	127	255
Generate break signal	Y	N	Y	Y
File conversions:				
program to .IMG	Y	N	N	Y
.IMG to program	N	N	N	Y
Basic to text	N	N	Y	Y
text to Basic	Y	Y	Y	Y
Automatic data transfer:				
dial/log on/upload/hang up	Y	N	N	N
answer/download/hang up	Y	N	Y	Y

¹ Possible disk commands: Directory, Rename, Format, Delete, Validate, Copy and Read Error Message.

A comparative look at the modems mentioned in the article. Details of Commodore's 1670 modem were not available at press time.

with this machine. The MPP, Volks 6420 and Mitey Mo modems do not claim to be compatible with any Commodore computers other than the C-64. I strongly suspect that the modem hardware is compatible with the SX-64, Plus/4 and VIC-20, but the software might not be.

Interpreting the Chart

I have prepared a chart that lists the most prominent features of the hardware and software of the four packages. Keep in mind that the package with the most features may not necessarily be the best for you, because all features are not equally desirable. I recommend that you weigh the various features based on their importance to you and your communications needs.

CBM 1670 Modem

(At the time of publication, Commodore had not yet released the 1670 modem. However, we are able to provide you with a pre-release look at the new 1200-baud modem, courtesy of Harry Flaxman, a SYSOP of Delphi's Flagship Commodore. Contact HARRYF on Delphi.—Eds.)

The Commodore 1670 Modem 1200 is a 300/1200-baud, direct-connect smart modem. It plugs directly into the user port of the C-64 or C-128 without any interface.

In outward appearance, the modem is identical to the 1660 Modem/300, also marketed by Commodore. However, outward appearances aren't everything! Housed inside the 1-inch deep, 2.5-inch-wide by 4-inch-long white plastic case is a radically different modem!

For those of you unfamiliar with a 1200-baud modem, it is usually a combination of two modems in one. First, for low-speed communications, it can operate as a 300-baud modem. It is also a 1200-baud modem for high-speed communications (1200 baud is approximately four times faster than 300 baud). What does this mean to the average telecommunicator?

Well, depending on what you're doing and how much time you spend on a commercial network, the High-Speed mode can help you save on connect charges, since transfer rates are almost four times as fast if you're downloading a lot of files. On the other hand, if you're reading and replying to messages, 300 baud may be the way to go.

The 1670 modem shares the same commands as the Hayes 1200-baud

modem. To perform a function, you need only load a terminal and type commands directly to the modem. Hayes-specific commands are preceded by the attention command (AT).

If, for example, you want your modem to dial a phone number using tone dialing, you simply have to type from the terminal:

```
ATDT1234567
```

where 1234567 is the number you'd like to dial. The modem will wait 30 seconds to detect a carrier, and then let you know whether or not it has done so by sending a result code. The result code will appear as one of the following:

```
CONNECT
CONNECT 1200
NO CARRIER
```

The number of rings the modem ignores before answering the phone is adjustable by an AT command. According to the command ATSO=x (where x is the number of rings from 0 to 255), the modem will answer the phone after that many rings. If you're skeptical about whether your new modem is actually dialing the phone and connecting, listen to the built-in speaker. It automatically turns on when the modem dials and shuts off when a connect occurs or when time expires before a connection is made.

Sending an ATM0 will turn the speaker off completely. ATM1 will turn the speaker to Normal mode, which leaves it on until a connection occurs or time expires. ATM2 turns the speaker on all of the time. The speaker is clear in sound and has no telltale clicking and popping as does the Modem/300.

As the modem is powered up, it defaults to auto-answering the phone on one ring, shuts off echo (you won't see what you type to the modem) and sets result codes. The speaker is set to M1 (on until carrier detect). ATZ resets the modem to power-up default values.

I find the 1670 to be a good alternative to a Hayes or compatible modem. Although the modem can only be used with a Commodore machine, the price is right, predicted to be below \$200 at the time of release. I'd rather not have the Answering mode activated on power-up, but many Hayes-compatible modems use that as a standard default setting. The 1670 is a sleekly compact unit, and mine performs flawlessly. Since I received it, my Hayes modem hasn't left the shelf. [R]

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Magic Shop (BRODERBUND)	7	105 sec	105 sec*	105 sec*	21 sec
Hitchhiker: a Guide to the Galaxy (INFOCOM)	7	70 sec	70 sec*	**	68 sec*
On-field Football (GAMESTAR)	7	159 sec	66 sec	53 sec	56 sec
EASY FINANCE I (COMMODORE)	7	58 sec	13 sec	13 sec	11 sec

* = Will not fast load — defaulted back to regular load.

** = Failed to load at all.

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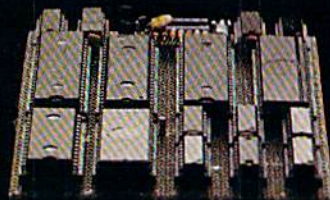
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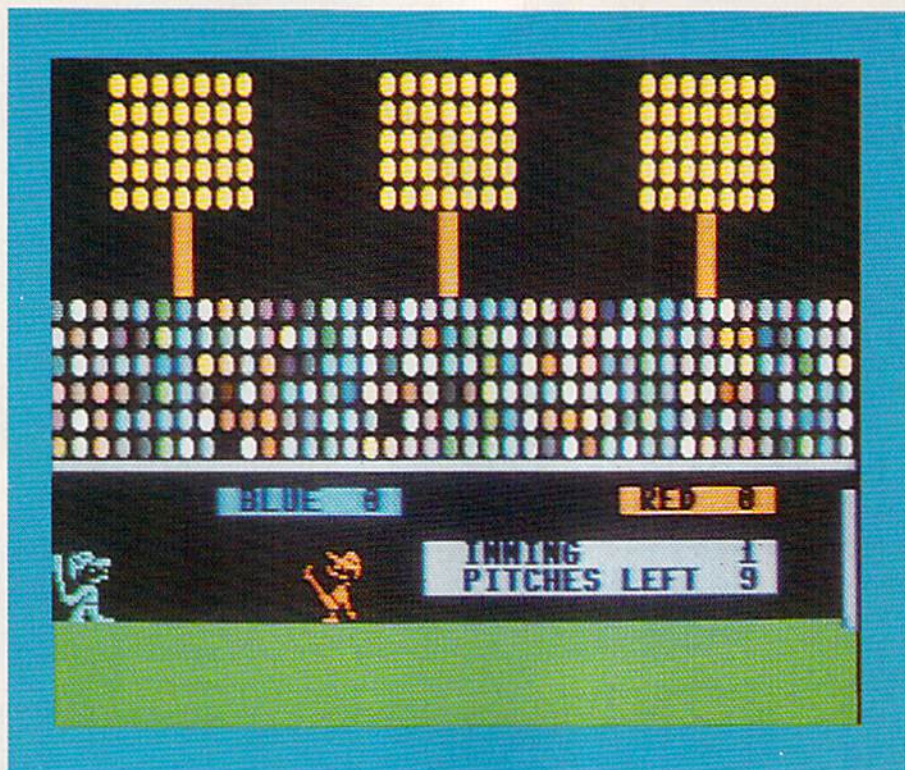
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The concept is simple. In each of the nine innings, you and your opponent get a certain number of pitches; you try to hit as many balls over the fence as you can. If you play alone, you can hit for both sides. To swing, you simply press the fire-button (joystick in port 2). You have the option of allowing the computer to do all the pitching; or, you or your opponent, depending on who's pitching, may control the type of pitch thrown.

If you opt for player-controlled pitching, you'll need to plug a second

joystick into port 1. Depending on joystick positions, you have nine pitches available (see Table 1).

To release your pitch, just point the joystick in the proper direction and press the button. By mixing up the pitches, the defensive player can effectively prevent the batter from getting into a "groove." If the computer is controlling the pitches, it will do the mixing automatically.

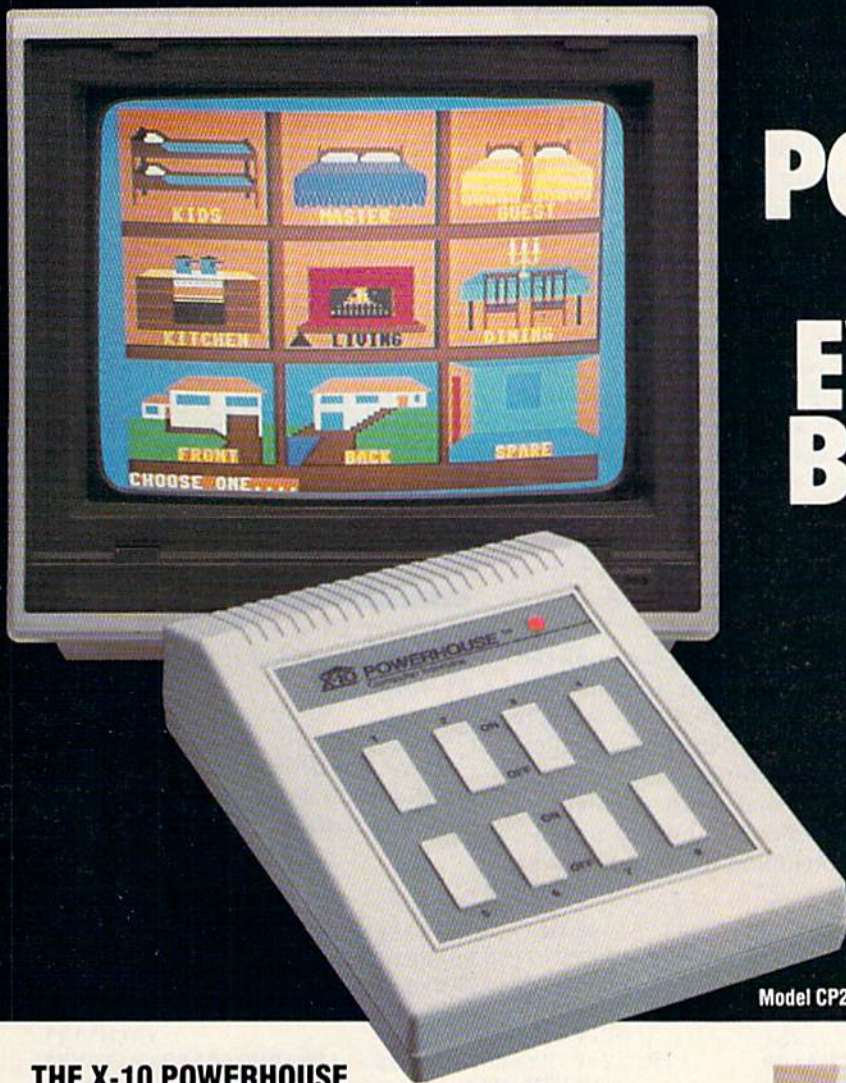
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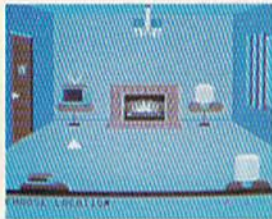
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LEFT—straight fastball	RIGHT—Straight slowball
LEFT/UP—rising fastball	RIGHT/UP—rising slowball
LEFT/DOWN—sinking fastball	RIGHT/DOWN—sinking slowball
UP—medium riser	DOWN—medium sinker
NO DIRECTION (fire-button)—medium straight ball	

Table 1. Pitches available to you in Home Run Derby, according to joystick positions.

The computer looks for perfect timing. If you swing when the ball is within nine pixels of your strike zone (dead center of batter's body), you'll hit it somewhere. Of course, the closer to dead center, the farther the ball will carry.

Another factor in the ball's carry is the speed of the pitch; just as in real baseball, a blazing fastball is easier to put into the seats than a change-up. (That also ought to keep Goose Gossage-style pitchers from throwing nothing but heat.)

The risers and sinkers are dandy pitches because, if they are out of the strike zone, they will result in nothing better than a foul tip. However, some don't sink or rise quite out of the

strike zone, and these are very hit-able. Not only that, but if the batter lays off the ones that look too high or too low, an automatic umpire will call balls and strikes. If the pitch is a ball, then it doesn't count against the batter. So, if you can just lay off those forkballs, sliders, knucklers and rising fastballs, you won't lose any of your nine pitches. That, of course, is easier said than done.

The rest of the game is completely self-explanatory, even if you know nothing about baseball. A complete game takes about five minutes, unless you go extra innings.

The game makes use of many of the 64's excellent sound and graphics features, including two-part harmony,

sound effects, animated sprites and a smoothly arcing batted ball, with shadow. I used an interrupt routine to create a stylized crowd that seems to be quite involved in the ballgame. All the action is controlled via machine language, so the game plays smoothly.

After you've invested time typing in Home Run Derby, be sure to save it before running it. If you'd rather not type it in yourself, send me \$4. I'll supply the disk, a mailer and a copy of the program.

So, enjoy a nice summer evening under the lights playing Home Run Derby. There's a long drive! It's going, going... ☐

Address all author correspondence to Mark Jordan, 70284 C.R. 143, Ligonier IN 46767.

Home Run Derby is available on both the disk and cassette versions of the Fall edition of ReRUN.

Editors

Listing 1. Home Run Derby program.

```

10 DIMJ(26),JS(26):FORT=16TO26:READJ(T),JS(
T):NEXT :REM*168
15 POKE53281,5:PRINT"{COMD 7}{SHFT CLR}","{
CRSR DN}{CTRL 1} CONTROL PITCHES{2 SPACE
S}Y/N?":JJ=49192:JV=56321 :REM*1
20 GETP$:IFP$=""THEN20 :REM*160
25 POKE53281,0:POKE53280,0:PRINT,"{COMD 8}P
LEASE WAIT . . ." :REM*25
30 X$="{HOME}{17 CRSR DNs}{5 CRSR RTs}{CTRL
2}" :B$=X$+"{CRSR RT}BALL":S$=X$+"STRIKE
":BS$=X$+"{CTRL 9}{CTRL 1}{6 SPACES}"
:REM*140
35 S=54272:F0RL=0TO24:POKES+L,0:NEXT
:REM*197
40 V=53248:POKEV+16,128:F0RT=0TO7:POKET+204
0,192+T:NEXT :REM*8
45 F0RT=12288TO12414:POKET,0:NEXT :REM*171
50 F0RT=12736TO12798STEP3:POKET,252:POKET+1
,0:POKET+2,0:NEXT :REM*44
55 S3=196:TU=1:X=8:Y=3:GOSUB235:POKEV+39,1:
POKEV+40,0:POKEV+46,4:POKEV+23,128
:REM*217
60 F0RT=1TO5:READA,B:POKEA,B:NEXT:F0RT=1TO8
:READA(T),B(T),C(T),D(T),E(T):NEXT
:REM*180
65 IFG=1THEN80 :REM*49
70 F0RT=12416TO12735:READA:POKET,A:NEXT
:REM*34
75 F0RT=49152TO49648:READA:POKET,A:NEXT
:REM*239
80 SYS49478:PRINT"{HOME}";:L$="{CTRL 8}{3 C
RSR RTs}{7 SHFT Qs}{3 CRSR RTs}":REM*196
85 F0RT=1TO3:PRINTL$;:NEXT:PRINT:C=C+1:IFC<
5THEN85 :REM*143
90 L$="{6 CRSR RTs}{CTRL 9}{COMD 1}{6 CRSR
RTs}":K=K+1:IFK<4THEN85 :REM*218
95 PI=9:IN=1:GOSUB330:GOSUB280 :REM*193
100 POKEV+21,155:POKEV+6,25:POKEV+7,189:POK
EV+14,82:POKEV+15,171:GOSUB310 :REM*246
105 POKEV+8,120:POKEV+9,189:POKE2043,194:PO
KE2044,S3 :REM*111
110 YY=0:XY=RND(0)*30+1:YX=RND(0)*3+2:IFYX<
3THENYY=XY :REM*168
115 PY=1:IFP$="N"THENPY=0:GOTO130 :REM*199
120 J1=31-(PEEK(JV)AND31):IFJ1<16THEN120
:REM*136
125 YX=JS(J1):POKE780,J(J1):JJ=49195:REM*31
130 PRINTBS$:S3=S3+1:F0RT=1TO300:NEXT
:REM*22
135 POKE2044,S3:IFS3<198THEN130 :REM*79
140 POKEV,120:POKEV+1,200:POKEV+31,0:POKEV+
2,120:POKEV+3,215 :REM*42
145 POKE49406,192:POKE49663,1:POKEV+16,128:
POKE2,YX:POKE49230,PZANDPY:SYS JJ
:REM*87
150 A=PEEK(V+1):X=ABS(37-(PEEK(V))):IFPEEK(
2043)=195THEN165 :REM*154
155 IFA<198ORA>202THENPI=PI+1:PRINTB$:GOTO1
85 :REM*19
160 PRINTS$:GOTO185 :REM*198
165 IFX>9THEN185 :REM*253
170 IFA<198ORA>202THENSYS49547:GOTO185
:REM*48
175 X=19-X*2-YX:IFX<1THENX=1 :REM*37
180 GOSUB190:POKE2044,196:SYS49274 :REM*232
185 GOSUB195:S3=196:GOTO100 :REM*73
190 POKE251,X+YY:POKE254,X:RETURN :REM*84
195 IFTU=-1THEN210 :REM*19
200 X=8:Y=3:GOSUB235:IFPEEK(V+16)=131ANDPEE
K(V)>85THENBL=BL+1 :REM*102
205 GOTO215 :REM*63
210 X=3:Y=8:GOSUB235:IFPEEK(V+16)=131ANDPEE
K(V)>85THENRE=RE+1 :REM*70
215 IFPI>1THEN230 :REM*201
220 TU=-TU:JV=JV+TU:PZ=PZ-TU:IFTU=1THENIN=I
N+1:GOSUB330:IFIN>9THENGOSUB240:REM*128

```


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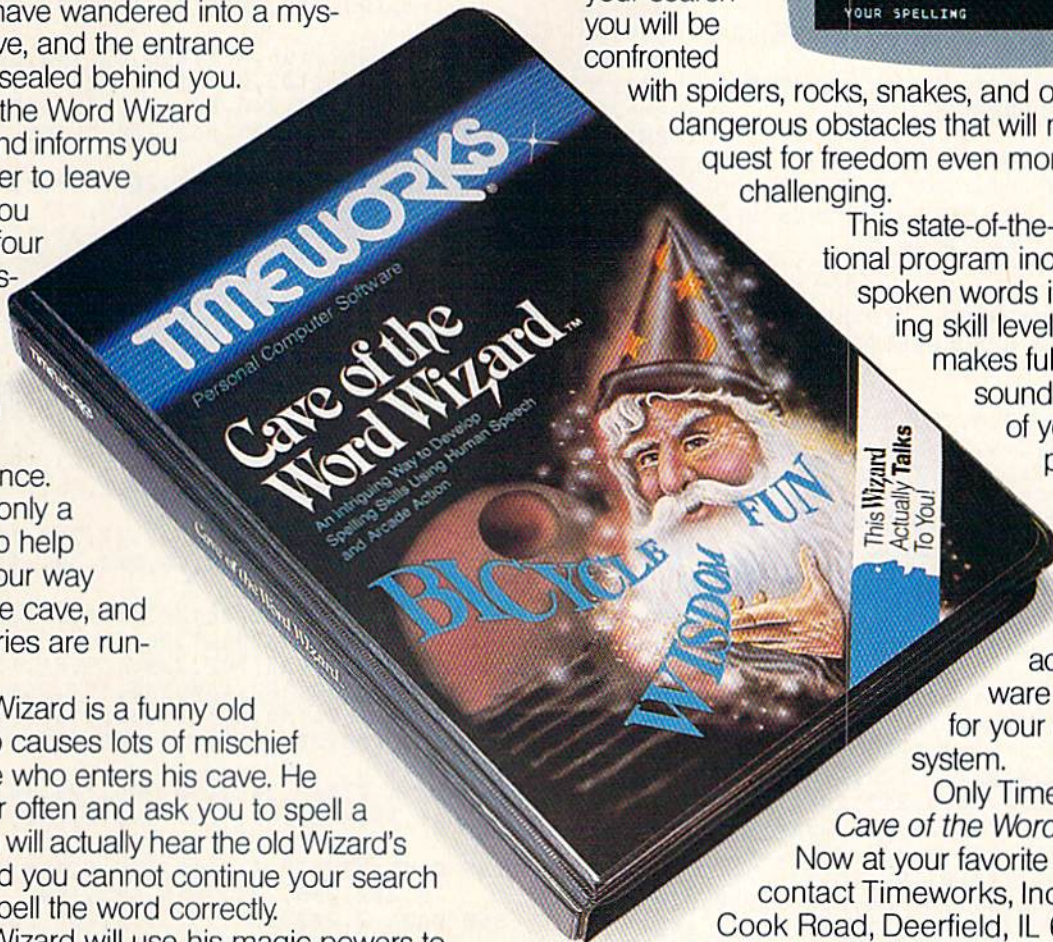
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- SwiftCalc with Sideways
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Listing 1 continued.

```

225 GOSUB230:PI=10:GOSUB280:POKEV,0:POKEV+1      425 DATA 1,207,224,1,247,224,0,251,224,0,12
,0:POKEV+3,0:GOTO195                          :REM*201      5,112,0,62,112,0,20,48,0                      :REM*52
230 PI=PI-1:GOSUB330:RETURN                      :REM*86      430 DATA 28,60,0,28,28,0,254,0,0,0,0,0,0,0,
235 FORT=43T045:POKEV+T,X:NEXT:POKEV+41,Y:P      0,0,0,0,1                      :REM*69
OKEV+42,Y:RETURN                                :REM*177      435 DATA 240,0,3,252,0,7,254,0,7,255,0,3,12
240 IFRE=BLTHENRETURN                            :REM*214      7,128,15,207,128,63,15                          :REM*118
245 FORT=55296TOT+240:POKET,0:NEXT              :REM*209      440 DATA 128,2,97,192,3,190,96,0,127,120,0,
250 WI$="BLUE":IFRE>BETHENWI$="RED":REM*252      255,188,1,231,190,3,143,127                      :REM*233
255 PRINT"(HOME){3 CRSR DNs}{CTRL 8}{CTRL 9    445 DATA 7,13,183,14,24,255,28,57,254,28,33
}"", "{2 SPACES}NICE GAME, "WI$"{2 SPACES    ,239,0,7,63,233                      :REM*186
}"", "{2 CRSR DNs}", " PLAY AGAIN?{2 SPA    450 DATA 120,169,13,141,20,3,169,192,141,21
CES}Y/N":POKE198,0                              :REM*7        ,3,88,96,162,31,234,173,27                      :REM*155
265 GETAS:IFA$=""THEN265                          :REM*178      455 DATA 212,201,240,176,249,168,173,27,212
270 IFA$<>"N"THENCLR:RESTORE:G=1:GOTO10        :REM*60        ,41,15,153,64,217,234,202,208,236
:REM*91      460 DATA 76,49,234,234,173,27,212,201,64,14
275 END                                           :REM*22      4,12,201,192,176,16,169,0,141                  :REM*119
280 POKES+5,35:POKES+6,247:POKES+24,15          :REM*25      465 DATA 88,192,76,77,192,169,206,141,91,19
285 POKES+12,35 :POKES+13,247                    :REM*86      2,76,72,192,169,238,141,91,192                :REM*112
290 FORT=1T08:POKES,B(T):POKES+1,A(T):POKES    470 DATA 169,8,141,88,192,173,0,220,41,16,2
+7,D(T):POKES+8,C(T)                            :REM*83      40,32,173,27,212,201,8,176                      :REM*159
295 POKES+4,17:POKES+11,17                       :REM*106      475 DATA 3,238,1,208,206,0,208,206,2,208,17
300 FORI=1TOE(T)*50:NEXT                          :REM*159      3,0,208,240,16,164,2,202                      :REM*122
305 POKES+4,16:POKES+11,16:FORI=1TO50:NEXT:    480 DATA 208,253,136,208,250,76,77,192,169,
NEXT                                              :REM*114      195,32,193,193,96,169,143,141,253
310 POKES+5,192:POKES+6, 64+7:POKES+1,6:POK    :REM*109      485 DATA 192,169,16,141,163,192,169,38,141,
ES,59:POKES+4,128                                :REM*49      156,192,169,206,141,182,192,234,198
315 POKES+19,15:POKES+20,248:POKES+14,99:PO    :REM*82
KES+15,159                                        :REM*132      490 DATA 251,165,251,208,23,198,80,165,80,2
320 POKES+12,15:POKES+13,247:POKES+7,128:PO    08,13,24,102,253,165,253,133,80:REM*113
KES+8,8:POKES+18,128                            :REM*205      495 DATA 201,0,240,89,133,252,165,254,133,2
325 RETURN                                         :REM*128      51,198,252,165,252,208,7,165,253
330 PRINT"(HOME){15 CRSR DNs}", "{2 CRSR LFs    :REM*208
}{CTRL 9}{CTRL 7} BLUE{4 SPACES}{3 CRSR      500 DATA 133,252,238,1,208,238,2,208,238,0,
LFs}"BL,, "{CTRL 3}{2 CRSR LFs} RED{4 S      208,173,0,208,208,5,169,131                      :REM*23
PACES}{3 CRSR LFs}"RE                          :REM*195      505 DATA 141,16,208,32,159,193,173,255,193,
335 PRINT,, "{CRSR DN}{CTRL 5}{CTRL 9}{2 CRS    240,42,173,30,208,201,129,208,36
R LFs}{2 SPACES}INNING{10 SPACES}{3 CRS    :REM*192
R LFs}"IN:PRINT,, "{CTRL 5}{CTRL 9}{2 CR    510 DATA 169,17,141,11,212,238,1,208,32,184
SR LFs}{2 SPACES}PITCHES LEFT{4 SPACES}    ,193,169,16,141,11,212,206,2                      :REM*201
{3 CRSR LFs}"PI                                :REM*94      515 DATA 208,206,0,208,173,1,208,205,3,208,
340 RETURN                                         :REM*143      208,231,234,234,234,234,234,96 :REM*125
345 DATA 99,3,0,3,255,3,,,99,2,0,2,255,2,,,    520 DATA 76,143,192,173,182,192,201,238,240
99,4,0,5,255,5                                  :REM*80      ,28,169,8,133,80,133,253,169,16:REM*116
350 DATA 12361,124,12364,248,12288,112,1229    525 DATA 133,251,169,0,141,163,192,169,102,
1,240,12294,224                                :REM*101      141,156,192,169,238,141,182,192,76
355 DATA 0,0,0,0,0,16,195,12,143,6,33,135,2    :REM*27
5,30,2,28,49,22,96,2                          :REM*246      530 DATA 143,192,169,34,141,253,192,169,193
360 DATA 25,30,21,31,2,21,31,16,195,2,25,30    ,141,254,192,173,16,208,201,131,208
,21,31,8,18,209,15,210,16                      :REM*204
365 DATA 40,190,0,241,239,0,243,126,252,243    :REM*45
,187,252,243,240,96,243,163,24,115           :REM*116
:REM*236      540 DATA 233,193,162,240,169,81,157,63,5,20
370 DATA 160,8,113,128,120,112,131,192,56,6    2,208,250,162,160,138,157,255,3:REM*116
5,0,56,63,0,56,127,128,24,251                :REM*125      545 DATA 157,159,4,157,255,215,157,159,216,
375 DATA 128,31,239,128,31,223,128,7,50,128    202,208,241,162,200,169,160,157,31
,0,127,128,0,247,128,1,247,128                :REM*181
:REM*48      550 DATA 7,202,208,250,169,128,141,27,212,1
380 DATA 1,227,224,3,243,254,168,0,254,7,1,    41,15,212,169,129,141,18,212,162
223,7,3,119,191,3,126,255                      :REM*135
385 DATA 3,187,239,3,240,30,3,147,14,1,128,    :REM*188
124,1,131,220,0,193,28,0                      :REM*232
390 DATA 63,56,0,127,184,0,255,240,0,255,22    :REM*61
4,0,255,224,0,114,128,0,127                  :REM*197      555 DATA 40,169,120,157,47,6,169,4,157,47,2
395 DATA 128,0,125,128,0,251,128,0,243,224,    18,202,208,243,76,0,192,164
1,243,248,168,0,252,0,1,254                    :REM*74      560 DATA 2,202,208,253,136,208,250,206,0,20
400 DATA 0,3,255,0,2,223,0,255,251,0,255,25    8,206,2,208,173,2,208,208,237 :REM*74
5,128,2,7,128,14,231,128                      :REM*229      565 DATA 96,173,16,208,201,131,208,18,173,0
405 DATA 8,7,128,110,224,128,63,192,128,4,1    ,208,201,96,144,6,169,0,141 :REM*197
,0,3,254,0,0,62,128,0                          :REM*150      570 DATA 255,193,96,169,1,141,255,193,160,6
410 DATA 31,196,0,15,238,0,15,254,0,9,62,0,    ,202,208,253,136,208,250,96,141 :REM*50
15,244,0,3,240,0,31                            :REM*45      575 DATA 251,7,173,0,208,201,47,176,4,201,2
415 DATA 252,168,0,56,60,0,30,126,0,7,239,0    8,176,4,32,139,193,96,169 :REM*243
,3,251,56,55,127,112,56                      :REM*80      580 DATA 1,133,253,133,252,133,80,169,129,1
420 DATA 103,112,30,39,120,5,230,28,4,8,14,    41,4,212,141,18,212,169,128,141:REM*164
2,112,7,3,192,3,135,192                      :REM*47      585 DATA 18,212,96,169,128,141,4,212,76,182
,192                                           :REM*153

```




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Program	Star-Dos	Reg. Load	Mach 5	Fast Load	MAGNUM LOAD
Pitstop II	?	144 sec.	43 sec.	41 sec.	31 sec.
Music Shop	?	105 sec.	105 sec.	105 "	21 sec.
Hitchhiker's Guide to the Galaxy	?	70 sec.	70 sec.	N.G.	68 sec.
On-field Football	?	149 sec.	66 sec.	63 sec.	56 sec.
EASY FINANCE I	?	58 sec.	13 sec.	13 sec.	11 sec.

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For 1541 or MSD Version

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for Combo Version

*Will not fast load - defaulted back to regular load

**Failed to load at all

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Track Trap disk expanded manual **\$9⁹⁵** US

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Programed by Jim Drew

Are both collections of 20 programs per diskette (that works out to about \$1.00 per program!) that help you explore and enhance your Commodore 64 and/or 128 and 1541 disk drive. Now you can unlock many secrets formerly known only to top machine language programmers by using these sophisticated "tools." If you have ever been curious about the inner workings of your computer system, now is your chance to dig in and find answers with the help of these programs. These collections of programs have gotten rave reviews from actual users, and we are sure that you, too, will be pleased.

The programs include on each diskette are listed below

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 Imbedded Track Number Creator
 Disk Manipulation System
 3 Minute Copy (backup program)
 Diskette Matcher (compare sectors)
 Unscratch A File (recover file)
 View BAM (block allocation map)
 1541 Read/Write Test
 1/2 Track Reader
 Header Reader (display disk header)
 Sync Maker
 Device Number Change (disk drive)
 Electronic Arts Backup
 Drive Mon (disk drive m/1 monitor)
 Diskette File Log (start end address)
 Write-Protect Sensor Test
 Repair A Track (recover data)
 Fast Format (10 seconds)
 1/2 Track Formatter

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TOP SECRET STUFF II

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 Copy \$A000-\$FFFF (under ROMS)
 Display G.C.R. (All sector data)
 Un-Write Protect (diskette)
 Unnew Program
 Wedge - \$8000
 Smooth Scroll (messages up screen)
 Koala Dump (koala pad screen dump)
 Disk Manipulation System
 Disk Eraser (20 second clean wipe)
 Split Screen (TWO screen colors)
 Disk Protection System (stops copies)
 Write Protect (diskette)
 Boot Maker (autobook BASIC programs)
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RUN's Great Communicator— Runterm Plus

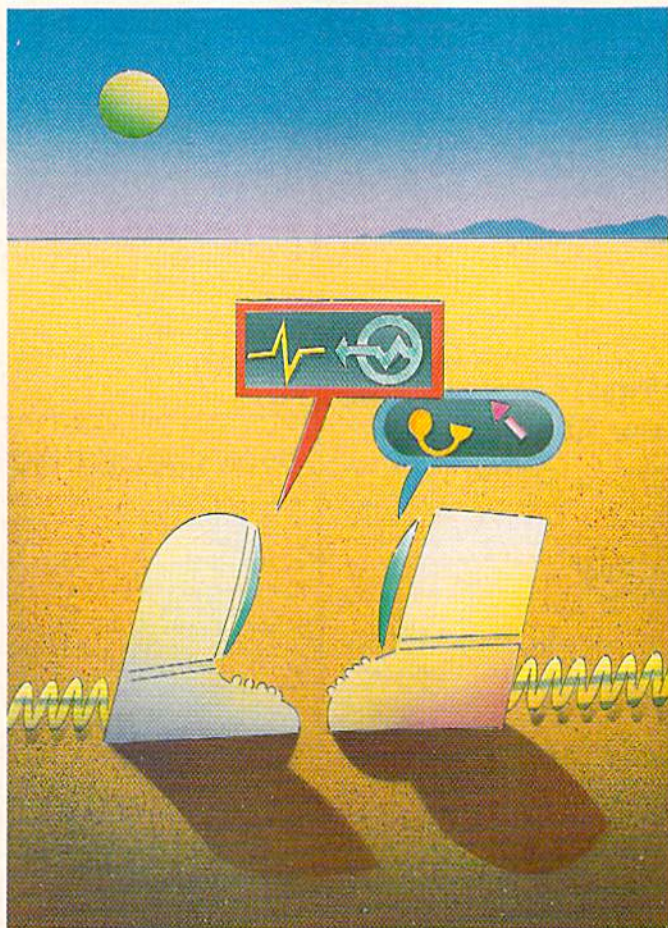
Here's Part 1 of a professional-quality terminal program that you can easily enter and use for telecommunicating with your Commodore.

By *ROBERT SIMS*

Runterm Plus is a full-featured terminal program that will communicate with any computer that uses either standard ASCII or Commodore ASCII data format. The program can transfer files by capture buffer, as well as by automatic protocols, which ensure error-free transmission. It also has one feature that lets you view high-resolution graphics and another that lets you play games through your modem.

Because the machine code for Runterm Plus is over 14,000 bytes, *RUN* will be publishing the program in two parts. However, you won't have to wait another month to use the program.

This month's article, Part 1, provides you with a CBM ASCII terminal program that operates in half-duplex, with the capability of uploading and downloading text files through the buffer. With this setting, you can



call any Commodore computer that's running a CBM ASCII terminal program in half-duplex.

This program is set up to work with the VIC-Modem, the 1650 Auto-Modem and other modems that are compatible with these. Next month, you'll get Pokes to make the program work with Mitey Mo and HESModem II.

Part 2, which will appear in the January issue of *RUN*, includes the automatic file-transfer routines and the modem game features, as well as the standard ASCII and full-duplex capability that you'll need to call the national networks. You will be able to upload and download program files with this part.

Because Runterm Plus is written entirely in machine language, you can't enter it in the same way you'd enter a Basic program. I have written a special program, ML Perfect Typist (p. 50 in this issue), that will help

you enter Runterm Plus without worrying about typing errors.

Use ML Perfect Typist to enter Part 1 of Runterm Plus, then save it to disk as an incomplete program under the name RUNTERM PLUS. You will be using this program next month when you enter Part 2. Before you use the program, clear your com-

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Circle 93 on Reader Service card.

C= key +	FUNCTION
A	View hi-res - toggle
B	Display buffer to screen
C	Close buffer
D	Display disk directory
G	Play a modem game
H	Change border color
I	Change background color
J	Change text color
K	Redefine DElete key
L	Load a file to buffer
N	Scratch a file
O	Open the buffer
P	Print buffer contents
Q	Quit the program

Press any key to continue

W	Word wrap status
X	Upload or download a file
Y	Upload buffer w/prompt
Z	Zero buffer

f8 key toggles between command mode and graphics mode.

>Transfer Complete<

puter by entering SYS64738; then load Part 1 back into your computer, using:

```
LOAD"RUNTERM PLUS",8,1
```

and set that disk aside; don't use it again until you type in part 2 next month. Insert another disk into the drive and enter the following Pokes:

```
POKE 2049,11
POKE 2050,8
POKE 2051,10
POKE 2052,0
POKE 2053,158
POKE 2054,50
POKE 2055,53
POKE 2056,57
POKE 2057,52
POKE 2058,0
POKE 2059,0
POKE 2060,0
```

Then save this to your new disk, using: `SAVE"RUNTERM PLUS.1",8`

or another filename of your choice.

These Pokes set up Part 1 of Runterm Plus so you can load and save it to disk just as you do a Basic program.

In Part 2, you'll learn to set up the complete program in the same way.

To use Runterm Plus, insert the disk into your drive. If you are using the VIC-Modem, set it for Originate. For the Commodore 1650 Auto-Modem or compatibles, set the modem for Originate and Telephone (Voice). Then enter:

```
LOAD"RUNTERM PLUS.1",8
```

and press the return key. When the load is finished, type RUN and hit the return key; you'll see the opening screen. Pressing CMD-M will display the menu of features available. When you're ready to go on-line, switch the modem (except the VIC-Modem)

Control Codes

National services and some local bulletin boards require that you enter a log-on code, which tells the host computer that you are ready to go. CompuServe, for example, waits for a Control-C (ASCII3) or a Return. If you are calling Delphi via Tymnet, you'll be asked to enter your terminal identifier (you type A).

In addition to the log-on code, you will need to send and receive other special control codes. The most common codes are composed of the first 27 characters in the ASCII character set—Control-A through Control-Z and Escape.

To generate these codes with Runterm Plus, hold down the CTRL key and press the appropriate key. CTRL-A sends a binary 1, CTRL-T (or the delete key) sends a binary 20, and so on. To send the escape character, hold down the CTRL and press the colon key. (ESC is often used on CompuServe.)

You should also be aware that if you press the home key, a CTRL-S (pause) is sent to the other computer. If you hit this key accidentally, then you should send a CTRL-Q (press the cursor-down key) to resume transmission. Pressing the run/stop key will send a CTRL-C, which is used as a cancel code on many systems.

Other Special Keys

In the process of communicating with another computer, you will need to perform several auxiliary operations, such as checking the disk directory, capturing data in a buffer and saving it to disk, or preparing to receive a file. These operations are performed using local commands,

generated via a combination of the Commodore logo key and letter keys.

For example, you can read the disk directory by holding down the Commodore logo key and pressing the D key. As it does for all local commands, Runterm Plus sends a CTRL-S (ASCII 19) to the other computer; this puts it on hold, so incoming data won't get mixed into the directory contents. The program then retrieves the disk directory and displays it to the screen.

When the last byte of the directory is displayed, Runterm Plus sends the other computer a CTRL-Q, telling it to resume transmission. All this is done automatically, so you needn't worry about it; I'm telling you this for your information only.

There are two more disk-maintenance commands—Logo-N and Logo-R. Use Logo-N to scratch a disk file. Simply type in the name of the file to be scratched, and Runterm Plus will remove it from the directory. Logo-R is used to rename a file. At the filename prompt, enter the change in this format:

```
newname = oldname
```

and hit the return key.

To see a menu of these local commands and the keys that generate them, hold down the Commodore logo key and Press M when Runterm Plus is running.

Buffer Commands

The Logo-O combination opens the 29K capture buffer; Logo-C closes it; and Logo-Z resets the pointers to the beginning of the buffer.

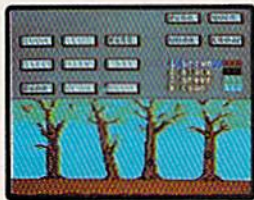
To capture characters, you must first open the buffer by pressing

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—James Levy, Chairman/CEO Activision, Inc.

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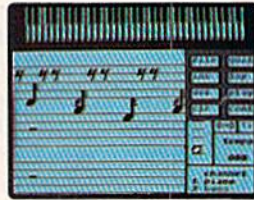
SceneMaker



SpriteMaker



SoundMaker



MusicMaker



The Editor

"(GameMaker is)... designed for everyone who has ever wanted to build his own computer game, but never had the time to learn assembly language."

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There's no question! Now is the time to turn that great game idea of yours into a real piece of computer software. With GameMaker, Garry Kitchen brings you the single most powerful computer game design tool ever offered. But he didn't stop with just power. He put all the tools of his trade together and then made them more accessible than ever before for owners of the Commodore 64/128 and the Apple II series computers. GameMaker includes these incredible tools:

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The Editor. This is where you bring together all the components you created with SceneMaker, SpriteMaker, SoundMaker, and MusicMaker. All the commands needed to make a game program are listed for you. Just choose the ones you want to use, put them in order, and presto! Your new game is off and running.

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Logo-O. When it's full (about 117 blocks), you will see a Buffer Full message mixed in with the incoming characters. Any further data that's transferred will appear on the screen, but will not be captured.

Logo-B allows you to view the buffer contents on screen, and Logo-P will send the buffer contents to the printer, stripping out screen codes and control codes that your printer can't handle. You can abort either of these operations by pressing CTRL-X. (It may take the program a few seconds to acknowledge your command and stop the operation.) For faster results, hold down both the CTRL key and X until the abort is accomplished.

Two commands allow you to save the buffer contents to disk. Logo-U will save into a disk file all characters in the buffer. The program will ask you to supply the filename and file-type (program or sequential). Logo-S also saves buffer contents, but edits out screen codes and control codes so the saved file can be printed later.

The program handles all characters as Commodore ASCII. If you are calling a standard ASCII database,

characters are translated to standard ASCII as they are sent. Incoming characters are converted to Commodore ASCII before they are stored. This means that all text will be in a format compatible with your computer, so you don't have to concern yourself with conversions.

File and Buffer Transfers

There are three ways of transferring files with Runterm Plus. The first involves loading the file from disk to the program's buffer area and uploading the data from there. (You cannot perform program transfers with Part 1, but only text file transfers from the buffer.)

Second, using the XModem protocol, you can transfer files directly to and from your disk. Again, there is no need for conversion; programs transferred by XModem are ready to run when the transfer is done.

The third means of file transfer is via the Bozart transfer protocols. XModem and Bozart protocol transfers will be discussed in detail in next month's article.

If you wish to upload via the buffer, use the Logo-L command to load the

file into the buffer—it will be loaded over anything that was there before.

To transfer the buffer contents to the other computer, you have two choices: Logo-V or Logo-Y. Logo-V will send the entire buffer contents without pause.

Logo-Y will ask you to enter a prompt character. The routine will then upload each line of the buffer, pausing after it sends each carriage return. During the pause, Runterm Plus examines incoming characters for the designated prompt character, which signals that the other computer is ready to receive the next line.

This transfer method is specially designed so you can upload messages from your disk to bulletin board systems. Generally, you can compose a message on your word processor and store it to disk as a CBM ASCII text file. Then, when you're on-line and want to send your message to the bulletin board, load the file using Logo-L and, when the BBS tells you to enter your message, press Logo-Y and supply the prompt character. Runterm Plus will then send the message contents automatically.

To use Logo-Y, you must, of course, know the prompt character being sent by the other computer. In most cases, this prompt character will be the last character in a menu or a start-of-line marker. Before using the Logo-Y command, try to notice which prompt character is being used.

On CompuServe, the prompt is usually a greater-than (>) or a colon (:). On Delphi, the prompt is usually a linefeed (you type CTRL-J when asked to supply the prompt) sent after a carriage return. Other systems simply send the return without a linefeed. If you don't see an obvious prompt character, try the linefeed or carriage return. Better yet, check the service's documentation or ask the SYSOP.

When you initiate either of these uploads, you'll be told that the upload is in process. When the upload is finished, the cursor will return and you'll be told that the transfer is complete. You can abort these uploads by entering CTRL-X.

Screen Commands and Word Wrap

Three commands—Logo-H, Logo-I and Logo-J—change the border, background and text colors, respectively. If you are using Commodore ASCII, then you can also use the regular key combinations to change text color, just as you do when the C-64 is in Immediate mode.

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Since the C-64 has a 40-column screen, and most telecommunication services use an 80-column format, you'll often find that incoming data will wrap around the screen, leaving the first part of a word dangling on the end of the previous screen line. If this irritates you or makes the words hard to read, then you need Logo-W.

When Runterm Plus boots up, the Logo-W routine is set to eliminate word wrap. The screen is formatted for 40 columns. Broken words are erased from the previous line and moved to the next line for ease of reading.

However, there are times—typing in messages, for example—when you want to use 80-column format to keep up with spacing and the number of characters in a line. To turn off the justification routine, just type Logo-W. Each time you do this, the program will toggle and tell you its current status.

Some services—Delphi is one—

have automatic word wrap. When using such services, you may want to set Runterm Plus to 80-column format (allow word wrap) so that the two justification features will not work against one another.

Graphics and Logo Commands

While the C-64's function keys are handy, there aren't enough of them. That's why Runterm Plus uses the logo key command format. As long as you're communicating with another computer that's using standard ASCII, there's no conflict. If, however, you are using Commodore ASCII and want to send the graphics characters represented by the logo and letter key combination, you must use the f8 key to leave Command mode and enter Graphics mode.

The f8 key is a toggle that switches the program between two states. When Runterm Plus is booted, it is in Command mode. This means you can use the logo key to generate local commands. If you are using Com-

modore ASCII and wish to send graphics characters, then just hit f8 to go into graphics mode: hit it again when you need to use commands. Each time you toggle with f8, the program tells you which mode you have selected.

Logo-Q is used to end the program cleanly. If you hit it by mistake, the program allows you to change your mind.

In Part 2, I'll document the remaining commands and discuss how you can use Runterm Plus to upload and download files on local bulletin boards and national networks.

If you don't feel like typing, and want a disk copy of the complete machine code for Runterm Plus, send me \$6, specifying that you want Runterm Plus, and I'll send you a copy. [R]

Address all author correspondence to Robert Sims, 7818 Summerfield Road, Summerfield, NC 27358.

Listing 1. Runterm Plus program.

```

0001 22 0A A5 01 29 FE 85 01 20 E7 FF 86 04
0002 20 2C 1C A2 21 86 37 A0 0A 84 38 50 03
0003 18 20 99 FF 20 90 16 A2 00 8E 4F 18 04
0004 26 A2 1D 86 FB A2 41 86 FC AC 4F CA 05
0005 26 A9 00 91 FB 20 2F 1E A6 FC E0 4F 05
0006 42 90 F0 AE 4F 26 E0 72 90 E9 20 D6 05
0007 2C 1C A9 0E 8D 20 D0 A9 01 8D 21 DB 03
0008 D0 A2 00 8E DC 41 A9 EB 8D 19 1C 7B 05
0009 A9 20 8D 1A 1C 20 0A 1C AE 50 26 FF 02
0010 E0 01 F0 03 4C 57 0B A9 15 85 FB CA 04
0011 A9 3F 85 FC A0 00 8C 4F 26 AC 4F 10 05
0012 26 B1 FB 8D AF 41 20 D2 FF 20 2F 9B 05
0013 1E AD AF 41 C9 00 D0 EB A9 20 20 35 05
0014 D2 FF 20 D2 FF 20 D2 FF 20 4A 1C 47 06
0015 A2 00 8E 3D 41 20 30 18 AD AF 41 C2 03
0016 C9 31 90 F6 C9 37 B0 F2 A2 00 8E 62 06
0017 1C 42 C9 31 D0 08 A2 01 8E 1D 42 D1 03
0018 4C F5 0A C9 32 F0 13 C9 33 F0 36 7D 05
0019 C9 34 F0 47 C9 35 F0 69 C9 36 F0 8D 06
0020 57 4C BF 0A 20 AC 1E A2 00 8E 11 AB 03
0021 42 8E 3C 41 A2 03 8E 3B 41 A2 7F 32 04
0022 8E 3A 41 AE 1D 42 E0 01 D0 05 A9 8B 04
0023 14 8D 3A 41 4C 6E 0B 4C 6E 0B 20 DD 02
0024 AC 1E A2 01 8E 3C 41 A2 00 8E 11 D1 03
0025 42 A2 02 8E 3B 41 4C 6E 0B 20 AC 9A 03
0026 1E A2 00 8E 11 42 8E 3C 41 A2 03 6B 03
0027 8E 3B 41 A2 7F 8E 3A 41 4C 6E 0B 14 04
0028 20 2C 1C 20 7D 26 A2 00 8E 11 42 CA 02
0029 4C 6E 0B A9 06 8D 93 02 A9 10 8D F9 03
0030 94 02 A2 01 8E 3C 41 8E 0F 42 A2 E3 03
0031 02 8E 3B 41 AE 56 26 E0 26 D0 2E 59 04
0032 A9 22 8D 19 1C A9 26 8D 1A 1C 20 5F 03
0033 0A 1C 20 58 1B AD AF 41 20 D2 FF 68 04
0034 C9 41 F0 07 C9 4F 0B 4C 6E 0B FB 04
0035 A9 40 8D 57 26 4C A3 0B A9 02 8D 48 04
0036 57 26 20 29 1D AD 54 26 8D 03 DD 9B 03
0037 AD 54 26 8D 03 DD AD 57 26 8D 01 71 04
0038 DD AD 56 26 8D 03 DD AD 57 26 8D 50 05
0039 01 DD AD 56 26 8D 03 DD AD 57 26 C5 04
0040 8D 01 DD 20 1C 1D AE 50 26 E0 01 F1 03
0041 D0 03 20 2C 1C A2 00 8E 1D 41 4C 3E 03
0042 C7 10 20 29 0F A2 01 8E 10 42 A2 7E 03
0043 00 8E 50 41 20 CC FF 20 E4 FF 8D C5 05
0044 AF 41 C9 00 D0 03 4C 6A 0C A2 01 1D 04
0045 8E 50 41 AD AF 41 8D AF 41 C9 13 42 05
0046 F0 07 C9 11 F0 0C 4C 2A 0C 20 07 A4 03
0047 16 20 48 0F 4C E5 0B 20 18 16 20 66 02
0048 48 0F 4C E5 0B AD AF 41 C9 A1 90 5A 05
0049 36 C9 C0 B0 32 AE 3D 41 E0 00 D0 AE 05
0050 2B C9 A4 F0 27 C9 A6 F0 23 C9 A8 D4 06
0051 F0 1F C9 A9 F0 1B C9 BA F0 17 8D D6 06
0052 AF 41 8D 4D 41 A2 00 8E 50 41 20 20 04
0053 48 0F AD 4D 41 8D AF 41 4C 62 0F 01 04
0054 4C 95 0C A2 00 8E 50 41 20 9D 1D BE 03
0055 AD AF 41 C9 00 D0 03 4C ED 0B AE 62 05
0056 3C 41 E0 01 F0 08 A2 01 8E 5B 41 5B 04
0057 4C 2C 29 AE B2 41 E0 01 D0 03 4C 7B 04
0058 C9 0C AE 50 41 E0 00 D0 03 4C DC 29 05
0059 0C C9 8C D0 2E AD AF 41 8D 4D 41 52 05
0060 20 48 0F AD 4D 41 8D AF 41 AE 3D 56 04
0061 41 E0 00 D0 08 A2 01 8E 3D 41 4C 31 04
0062 3F 16 A2 00 8E 3D 41 4C 3F 16 A9 8B 03
0063 00 8D AF 41 4C DC 0C C9 85 90 07 D5 04
0064 C9 8D B0 03 4C C9 0C 20 48 0F AD 8E 04
0065 AF 41 C9 00 D0 03 4C E5 0B 20 CC F5 04
0066 FF AE 1D 41 E0 01 D0 73 AE 0F 42 70 05
0067 E0 01 F0 33 AE 50 41 E0 00 F0 2C 82 05
0068 4C 1A 0E 20 E1 18 AE 13 42 E0 01 B5 03
0069 F0 58 AE 21 41 8E 4F 26 AE 22 41 B1 04
0070 86 FC 20 17 1E AE 4F 26 8E 21 41 30 04
0071 A6 FC 8E 22 41 4C 66 0D 4C 56 0F 4A 04
0072 C9 14 F0 D3 AC 21 41 8C 4F 26 AE A5 05
0073 22 41 86 FC A2 00 86 FB AD AF 41 EE 05
0074 AC 4F 26 91 FB 20 2F 1E AE 4F 26 87 04
0075 8E 1F 41 8E 21 41 A6 FC 8E 22 41 BC 04
0076 8E 20 41 20 07 19 AE 29 41 E0 01 74 03
0077 F0 C4 AE 50 41 E0 01 D0 0A AE 0F B8 05
0078 42 E0 01 F0 03 4C 20 0E AD AF 41 7B 04

```

Continued on p. 168.

SMASH HITS!

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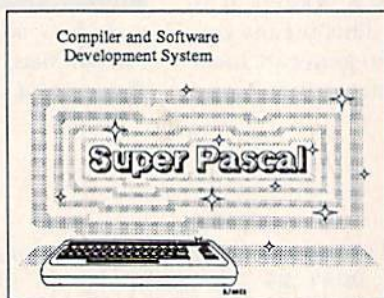


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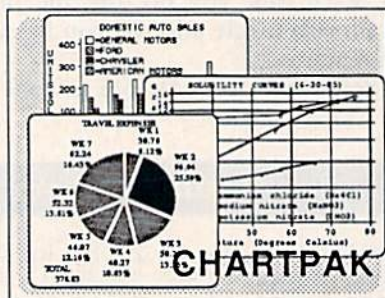
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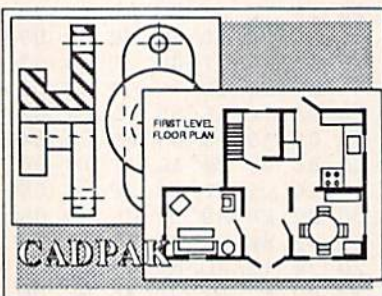
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WEL	Stock	20	07/29/1982	12/09/1985	107.33	1855.01	127.74	14.06	27

Summary

Portfolio: portfolio

Alias: Master 1885 Securities & Grand Rapids USA 49518

18/1/1985

Position	Type	Unit	Amount
The Dow	Stock	873/1/1985	61.00
The Dow	Stock	07/31/1985	30.00
The Dow	Stock	06/30/1985	30.00
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ML Perfect Typist For the C-64

Enter machine language programs quickly and accurately with this ML checksum, which also serves as the entry program for Runterm Plus, a high-quality terminal program featured elsewhere in this issue.

By ROBERT SIMS

ML Perfect Typist is a checksum for machine language programs to be run on the C-64 (or the C-128 in C-64 mode). It is also the entry program for Runterm Plus (see p. 42 in this issue). To use it, you first type it in as you do any Basic program in *RUN*.

When you load and run ML Perfect Typist, the Basic portion of the program Pokes into memory the machine code from the Data statements and executes the code.

Typing in Machine Language Listings

Machine language listings in *RUN* consist of a series of program lines, each of which begins with a four-digit number, the line number, followed by 13 pairs of characters, separated by spaces.

You do not enter the line number; the program enters it for you automatically. The spaces in the lines are for ease of reading only; they also appear automatically.

The pairs of characters are hexadecimal numbers. The first eleven pairs are the program's machine code. The last two pairs in each line are checksum values used by ML Perfect Typist to ensure that you've entered the line correctly.

To type in a machine language listing, first load and run ML Perfect Typist. At the opening menu, select 1 to enter a new program.

You will see a line number on the screen. Find this line number in the listing and type in the characters that follow the line number. ML Perfect Typist automatically takes care of spacing on the screen. If you make a mistake, simply delete your error and retype the character.

When you've typed in the 13 pairs of characters, compare what you see on the screen with the line in the magazine. If they're the same, press the return key. If you find an error, use the delete key to back up to the incorrect character. Type the correct character, then reenter the rest of the line. Check it again, then press the return key.

If the line has been entered correctly, ML Perfect Typist will prompt you with the number of the next line to be entered. If you've made a mistake, Perfect Typist will alert you to this and prompt you to enter the same line again.

The line is not processed until you press the return key and ML Perfect Typist verifies the contents. The line is then converted to binary numbers and stored in its proper place in memory.

Safety Features

ML Perfect Typist will accept only the keys 0-9, A-F, delete and return.

If, for example, you mean to press the 7 key but hit the T key instead, ML Perfect Typist will ignore the T and wait for you to press a valid key.

In case of power failure or other disaster, it's a very good precaution to save your entries to disk every 50 lines or so.

Command Codes

There are three command codes, generated with the CTRL key: CTRL-A, CTRL-C and CTRL-E.

If you enter CTRL-A (hold down the CTRL key and press A), the program will abort. Only use CTRL-A if you become hopelessly confused while entering a listing. CTRL-A causes ML Perfect Typist to end without saving the entered lines to disk.

Use CTRL-C to cancel entry of a line. When you type CTRL-C, ML Perfect Typist will erase the line and prompt you to enter it again. Only the current line is affected.

Handling Incomplete Programs

CTRL-E has two uses. First, use it if you want to end a session before you've entered the complete listing. Be sure, of course, to have a disk in the drive, or you'll lose the data you've already entered. Instead of entering the next line, Press CTRL-E.

RUN It Right

C-64; C-128 (in C-64 mode); disk drive

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The collective brainpower of the computers sold in the next two years will equal that of all the computers sold from the beginning to now. Four years from now it will have doubled again.

It's hard to remember that this is science fact, not fiction. How do people keep pace with change like this? That's where we come in. We're CW Communications Inc.—the world's largest publisher of computer-related newspapers and magazines.

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You'll be asked for a filename. Then a short menu will be displayed. Choose option 2. When you select option 2, ML Perfect Typist will save the incomplete file to disk.

Caution: You *must* use option 2 to save your incomplete file! If you use option 1, you'll never be able to recover your program for further line entry. Also, if you name a file that exists on the disk, ML Perfect Typist will scratch the old file and replace it with the new one.

Later, when you're ready to resume entering the listing, load and run ML Perfect Typist and select 2 from the opening menu. You'll then receive a prompt for the filename. Enter the name of the incomplete file and press the return key. ML Perfect Typist will load that file into memory and then display your next line number. This is a handy feature because it always identifies the next line to be entered. Resume entry by typing in the character pairs in the line whose number is displayed.

Storing a Completed Program

The second use for CTRL-E comes when you have entered the last line of a listing. When you are prompted

with a line number larger than the last line number in the listing, enter CTRL-E and supply the filename. Next, you will see the menu. Select option 1 for storing a completed program, and ML Perfect Typist will store it to disk. Again, you *must* have a disk in the drive before you enter CTRL-E.

Caution!

If you follow instructions, ML Perfect Typist will give you an error-free copy of the machine language program you enter. However, keeping in mind the theory that, if anything can go wrong, it will, take precautions. When entering your program lines be sure that you are entering them in the correct sequence. Do this by checking the line number on the screen against the one you are entering from the magazine.


Also, you will notice that all lines, except the last one, are the same length. Therefore, when you have entered all the characters in any line except the last one, your cursor should be in the 40th column on the screen. If it isn't, you must have left out one or more characters. If you press the return key at this point, you

should get an error message and a prompt to retype the line.

ML Perfect Typist uses the last two character pairs of each line you enter as a checksum, to see whether you've entered the line correctly. There is a slight chance that, if you leave characters out of a line, ML Perfect Typist will add up the value of the characters, compare them to the last two character pairs, find a match and store an incorrect line. To avoid this, always check that your cursor is in the 40th position before you press the return key.

For the special case of the last line, just check to be sure you've entered the correct number of characters.

If you enter too many characters in a line, ML Perfect Typist will alert you to this and prompt you to enter the same line again.

If you don't want to type in ML Perfect Typist, send me \$6, and I'll send you a copy on disk. I'll supply the disk, mailer and postage. 

Address all author correspondence to Robert Sims, 7818 Summerfield Road, Summerfield, NC 27358.

Listing 1. ML Perfect Typist (and Runterm entry) program.

```

0 REM ML ENTRY :REM*214
1 REM ROBERT SIMS :REM*73
2 REM 7818 SUMMERFIELD RD :REM*206
3 REM SUMMERFIELD, NC 27358 :REM*249
4 REM 919-643-7840 :REM*206
5 REM :REM*67
10 FORB=9728TO11675:READ A:POKEB,A:PRINT". "
;:NEXT :REM*238
20 POKE631,83:POKE632,89:POKE633,83:POKE634
,57:POKE635,55:POKE636,50:POKE637,56
:REM*216
30 POKE638,13:POKE198,8 :REM*98
40 NEW:END :REM*140
101 DATA 165,1,41,254,133,1,32,231,255,32,1
93,42,32,129,42,162,0,142,33 :REM*233
102 DATA 46,142,34,46,76,69,38,32,204,255,1
69,3,32,195,255,32,231,255,96 :REM*144
103 DATA 169,0,141,235,45,169,0,133,251,169
,48,133,252,96,32,170,42,169,149
:REM*249
104 DATA 141,110,42,169,45,141,111,42,32,98
,42,96,32,38,38,169,165,141,110 :REM*66
105 DATA 42,169,44,141,111,42,32,98,42,32,1
61,42,32,58,43,32,170,42,173 :REM*69
106 DATA 238,45,201,49,240,11,201,50,240,10
,201,1,208,216,76,26,38,76,21 :REM*16
107 DATA 39,32,179,42,32,176,41,174,32,46,2
24,1,208,3,76,26,38,224,3 :REM*17
108 DATA 240,236,32,112,44,174,237,45,169,8
2,157,156,45,232,169,0,157,156,45:REM*6
109 DATA 142,237,45,32,29,43,174,241,45,224
,1,240,206,32,29,44,172,235,45 :REM*139
110 DATA 173,238,45,145,251,32,3,44,32,28,4
2,173,236,45,201,0,240,232,32 :REM*100

```

```

111 DATA 204,255,169,3,32,195,255,32,153,44
,173,238,45,141,34,46,32,153,44 :REM*3
112 DATA 173,238,45,141,33,46,162,3,142,233
,45,32,153,44,173,238,45,201,48 :REM*14
113 DATA 144,23,201,58,176,19,174,233,45,15
7,149,45,206,233,45,174,233,45,224
:REM*179
114 DATA 255,208,226,76,21,39,169,215,141,1
10,42,169,44,141,111,42,32,98,42
:REM*138
115 DATA 162,0,142,33,46,142,34,46,76,69,38
,32,107,43,32,52,38,162,0 :REM*143
116 DATA 142,233,45,174,233,45,169,0,157,17
7,45,238,233,45,174,233,45,224,56
:REM*46
117 DATA 144,238,162,0,142,233,45,32,58,43,
173,238,45,201,20,208,28,32,137:REM*243
118 DATA 44,174,233,45,224,0,240,236,206,23
3,45,173,233,45,24,106,144,226,169
:REM*68
119 DATA 20,32,137,44,76,55,39,201,1,208,3,
76,26,38,201,3,208,3,76 :REM*27
120 DATA 24,39,201,5,208,6,32,183,43,76,175
,40,201,13,208,3,76,174,39 :REM*74
121 DATA 174,233,45,173,238,45,157,189,45,2
38,233,45,173,233,45,24,106,176,5
:REM*37
122 DATA 169,32,32,137,44,174,233,45,224,27
,176,3,76,55,39,169,117,141,110 :REM*52
123 DATA 42,169,45,141,111,42,32,98,42,76,2
4,39,162,0,142,233,45,142,31 :REM*67
124 DATA 46,174,33,46,142,26,46,174,34,46,1
42,27,46,162,25,142,30,46,174 :REM*200
125 DATA 30,46,189,189,45,201,0,208,13,206,
30,46,174,30,46,224,0,208,236 :REM*217
126 DATA 76,24,39,141,29,46,206,30,46,174,3
0,46,189,189,45,141,239,45,32 :REM*194

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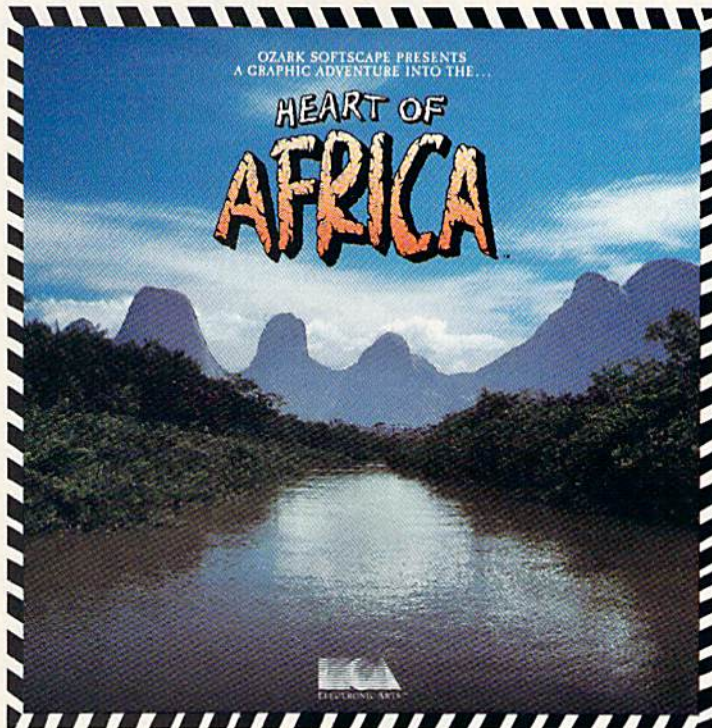

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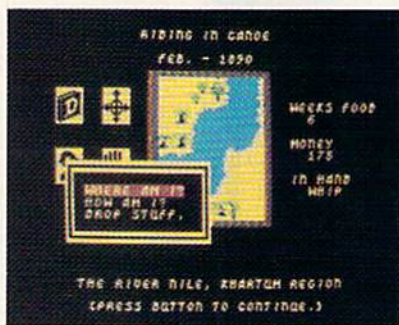
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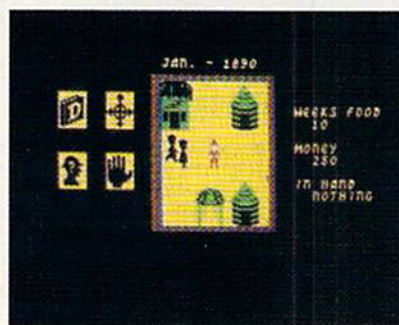
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Listing 1 continued.

127 DATA 47,44,173,29,46,141,239,45,32,79,4
4,173,239,45,141,29,46,206,30 :REM*121

128 DATA 46,174,30,46,189,189,45,141,28,46,
206,30,46,174,30,46,189,189,45 :REM*12

129 DATA 141,239,45,32,47,44,173,28,46,141,
239,45,32,79,44,173,239,45,141 :REM*125

130 DATA 28,46,32,162,40,32,47,44,32,162,40
,32,79,44,174,31,46,173,239 :REM*112

131 DATA 45,157,177,45,238,31,46,24,173,239
,45,109,26,46,141,26,46,169,0 :REM*107

132 DATA 109,27,46,141,27,46,174,233,45,236
,30,46,144,206,174,29,46,236,27:REM*118

133 DATA 46,208,47,174,28,46,236,26,46,208,
39,174,31,46,142,30,46,162,0 :REM*145

134 DATA 142,31,46,174,31,46,189,177,45,172
,235,45,145,251,32,3,44,238,31 :REM*100

135 DATA 46,174,31,46,236,30,46,144,231,76,
21,39,169,134,141,110,42,169,45:REM*101

136 DATA 141,111,42,32,98,42,76,24,39,174,2
33,45,189,189,45,141,239,45,238:REM*168

137 DATA 233,45,96,32,179,42,32,176,41,174,
32,46,224,1,240,243,224,3,240 :REM*249

138 DATA 239,32,112,44,174,237,45,169,87,15
7,156,45,232,169,0,157,156,45,232
:REM*218

139 DATA 142,237,45,169,3,162,8,160,3,32,18
6,255,173,237,45,162,155,160,45 :REM*69

140 DATA 32,189,255,32,192,255,32,211,42,17
4,241,45,224,1,208,3,76,154,41 :REM*130

141 DATA 169,253,141,110,42,169,44,141,111,
42,32,98,42,32,161,42,32,58,43 :REM*155

142 DATA 173,238,45,141,239,45,201,49,240,4
,201,50,208,239,32,58,43,173,238
:REM*198

143 DATA 45,201,13,240,10,201,20,208,242,32
,210,255,76,8,41,173,239,45,201:REM*125

144 DATA 50,240,3,76,106,41,162,0,142,233,4
5,174,233,45,189,149,45,172,235 :REM*80

145 DATA 45,145,251,32,3,44,238,233,45,174,
233,45,224,4,144,232,173,33,46 :REM*113

146 DATA 172,235,45,145,251,32,3,44,173,34,
46,172,235,45,145,251,32,3,44 :REM*224

147 DATA 173,235,45,141,239,45,165,252,141,
240,45,32,38,38,162,3,32,201,255
:REM*177

148 DATA 172,235,45,177,251,32,210,255,32,3
,44,166,252,236,240,45,144,238,174
:REM*210

149 DATA 235,45,236,239,45,144,230,76,26,38
,32,204,255,169,3,32,195,255,169
:REM*227

150 DATA 15,32,195,255,32,231,255,32,193,42
,76,175,40,162,48,142,156,45,162
:REM*136

151 DATA 58,142,157,45,162,2,142,233,45,162
,0,142,32,46,32,37,42,173,238 :REM*57

152 DATA 45,201,20,208,16,32,137,44,174,233
,45,224,3,144,236,206,233,45,76 :REM*36

153 DATA 196,41,201,1,208,6,141,32,46,76,23
9,41,201,3,208,4,141,32,46 :REM*243

154 DATA 96,32,137,44,173,238,45,201,13,208
,3,76,16,42,174,233,45,224,18 :REM*18

155 DATA 176,12,173,238,45,157,156,45,238,2
33,45,76,196,41,174,233,45,169,0
:REM*247

156 DATA 157,156,45,142,237,45,96,32,183,25
5,41,64,141,236,45,96,32,204,255
:REM*166

157 DATA 32,228,255,201,0,240,246,141,238,4
5,201,1,240,43,201,3,240,39,201 :REM*81

158 DATA 13,240,35,201,20,240,31,201,32,144
,223,201,91,144,23,201,97,144,215
:REM*116

159 DATA 201,125,144,15,201,187,240,11,201,
193,144,203,201,219,144,3,76,37,42
:REM*109

160 DATA 96,162,0,142,234,45,32,204,255,174
,234,45,189,98,42,141,238,45,201
:REM*152

161 DATA 0,240,9,32,137,44,238,234,45,76,10
6,42,96,32,204,255,169,151,32 :REM*181

162 DATA 137,44,169,147,32,137,44,173,24,20
8,41,253,141,24,208,169,14,141,32
:REM*160

163 DATA 208,169,1,141,33,208,96,32,204,255
,169,62,32,137,44,96,32,204,255 :REM*37

164 DATA 169,13,32,137,44,96,169,105,141,11
0,42,169,45,141,111,42,32,98,42:REM*242

165 DATA 96,169,15,162,8,160,15,32,186,255,
169,0,32,189,255,32,192,255,96 :REM*119

166 DATA 32,204,255,162,0,142,241,45,162,15
,32,198,255,162,0,142,234,45,32:REM*212

167 DATA 228,255,172,234,45,153,242,45,238,
234,45,201,13,208,240,169,0,172,234
:REM*31

168 DATA 45,153,242,45,173,242,45,201,50,14
4,21,32,204,255,162,1,142,241,45:REM*18

169 DATA 169,242,141,110,42,169,45,141,111,
42,32,98,42,32,204,255,96,169,3 :REM*57

170 DATA 162,8,160,3,32,186,255,173,237,45,
162,156,160,45,32,189,255,32,192
:REM*194

171 DATA 255,32,204,255,32,211,42,96,32,204
,255,32,228,255,141,238,45,201,20
:REM*237

172 DATA 240,35,201,13,240,28,201,1,240,27,
201,3,240,23,201,5,240,19,201 :REM*24

173 DATA 48,144,223,201,58,144,8,201,65,144
,215,201,71,176,211,32,137,44,96
:REM*199



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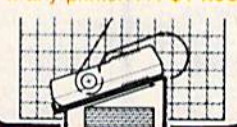
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174	DATA	162,3,142,234,45,174,234,45,189,149,45,201,57,208,38,174,234,45,224	:REM*238
175	DATA	0,240,14,169,48,174,234,45,157,149,45,206,234,45,76,112,43,169,48	:REM*149
176	DATA	141,149,45,141,150,45,141,151,45,141,152,45,76,169,43,170,232,138,174	:REM*24
177	DATA	234,45,157,149,45,238,33,46,174,33,46,224,0,208,3,238,34,46,96	:REM*51
178	DATA	162,3,142,234,45,174,234,45,189,149,45,201,48,208,21,174,234,45,224	:REM*80
179	DATA	0,240,26,169,57,174,234,45,157,149,45,206,234,45,76,188,43,170,202	:REM*7
180	DATA	138,174,234,45,157,149,45,76,245,43,169,48,141,149,45,141,150,45,141	:REM*194
181	DATA	151,45,141,152,45,206,33,46,174,33,46,224,255,208,3,206,34,46,96	:REM*107
182	DATA	238,235,45,174,235,45,224,0,208,2,230,252,96,206,235,45,174,235,45	:REM*10
183	DATA	224,255,208,2,198,252,96,32,204,255,162,3,32,198,255,32,207,255,141	:REM*191
184	DATA	238,45,32,204,255,96,173,239,45,201,58,144,15,41,15,24,105,9,10	:REM*190
185	DATA	10,10,10,141,240,45,76,78,44,41,15,10,10,10,141,240,45,96	:REM*245
186	DATA	173,239,45,201,58,144,11,41,15,24,105,9,141,239,45,76,102,44,41	:REM*70
187	DATA	15,141,239,45,173,239,45,13,240,45,141,239,45,96,174,237,45,169,44	:REM*139
188	DATA	157,156,45,232,169,80,157,156,45,232,169,44,157,156,45,232,142,237,45	:REM*200
189	DATA	96,72,169,20,32,210,255,104,32,210,255,169,164,32,210,255,96,32,16	:REM*31
190	DATA	44,172,235,45,177,251,141,238,45,96,13,13,32,49,41,32,78,69,87	:REM*52
191	DATA	32,80,82,79,71,82,65,77,13,32,50,41,32,80,82,79,71,82,65	:REM*11
192	DATA	77,32,80,65,82,84,73,65,76,76,89,32,69,78,84,69,82,69,68	:REM*212
193	DATA	13,13,0,13,78,79,84,32,65,78,32,73,78,67,79,77,80,76,69	:REM*113
194	DATA	84,69,32,70,73,76,69,46,32,84,82,89,32,65,71,65,73,78,46	:REM*110
195	DATA	13,13,0,13,32,49,41,32,83,84,79,82,69,32,84,72,69,32,67	:REM*53
196	DATA	79,77,80,76,69,84,69,68,32,80,82,79,71,82,65,77,13,13,32	:REM*188
197	DATA	50,41,32,83,84,79,82,69,32,65,78,32,73,78,67,79,77,80,76	:REM*23
198	DATA	69,84,69,32,80,82,79,71,82,65,77,32,65,78,68,13,32,32,32	:REM*74
199	DATA	32,70,73,78,73,83,72,32,73,84,32,76,65,84,69,82,13,13,0	:REM*59
200	DATA	48,49,50,51,52,53,54,55,56,57,65,66,67,68,69,70,70,73,76	:REM*242
201	DATA	69,78,65,77,69,32,62,32,0,13,13,73,78,69,32,84,79,79	:REM*175
202	DATA	32,76,79,78,71,13,0,13,13,69,78,84,82,89,32,69,82,82,79	:REM*222
203	DATA	82,13,0,48,48,48,48,13,0,64,0	:REM*191

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By MARGARET MORABITO

Viewtron, created by Knight-Ridder Newspapers, Inc., is a new on-line general-interest network that made its national appearance in October. It isn't a brand-new network, however; Viewtron began in 1983 as a regional network, serving single-function terminals in southern Florida. It was very successful as an on-line network, providing in the Miami area a variety of consumer and information services, including on-line banking.

After two years, Viewtron has become a national network and is now compatible with personal computers such as Apple II and Commodore. It provides services to fit the needs of both home users and businesses and has many special services targeted exclusively at Commodore owners. Viewtron allows full-color graphics telecommunications, a perfect way to take advantage of the C-64 and C-128.

Commodore-Specific Services

Viewtron offers databases filled with reviews of Commodore products. It already has over 500 reviews of various Commodore software pro-

grams in categories including education, entertainment, business, word processing and personal use. The number of reviews is growing as Viewtron adds up-to-date reviews biweekly.

Various sources are tapped for these reviews, including computer magazines. *RUN* is participating in Viewtron's review section. We are posting our Software Gallery on Viewtron and will be updating it monthly in 1986.

Additionally, Viewtron offers an advice section for Commodore computerists. Subscribers can leave questions about hardware and software products, and both the experts and other subscribers will participate in answering them.

If you wish, you may buy software for your Commodore computer on Viewtron. Many of the software products reviewed are available for purchase at discount prices. This on-line buying will be handled by a major mail-order company.

An interesting and different section on Viewtron is the electronic auction, which is held 24 hours a day.

For sale is Commodore-specific software and hardware, as well as appliances and brand-name merchandise. Every 15 minutes, the price of an auctioned item is dropped and continues to drop until someone bids on it. This opens up all kinds of savings opportunities, if you're interested in participating.

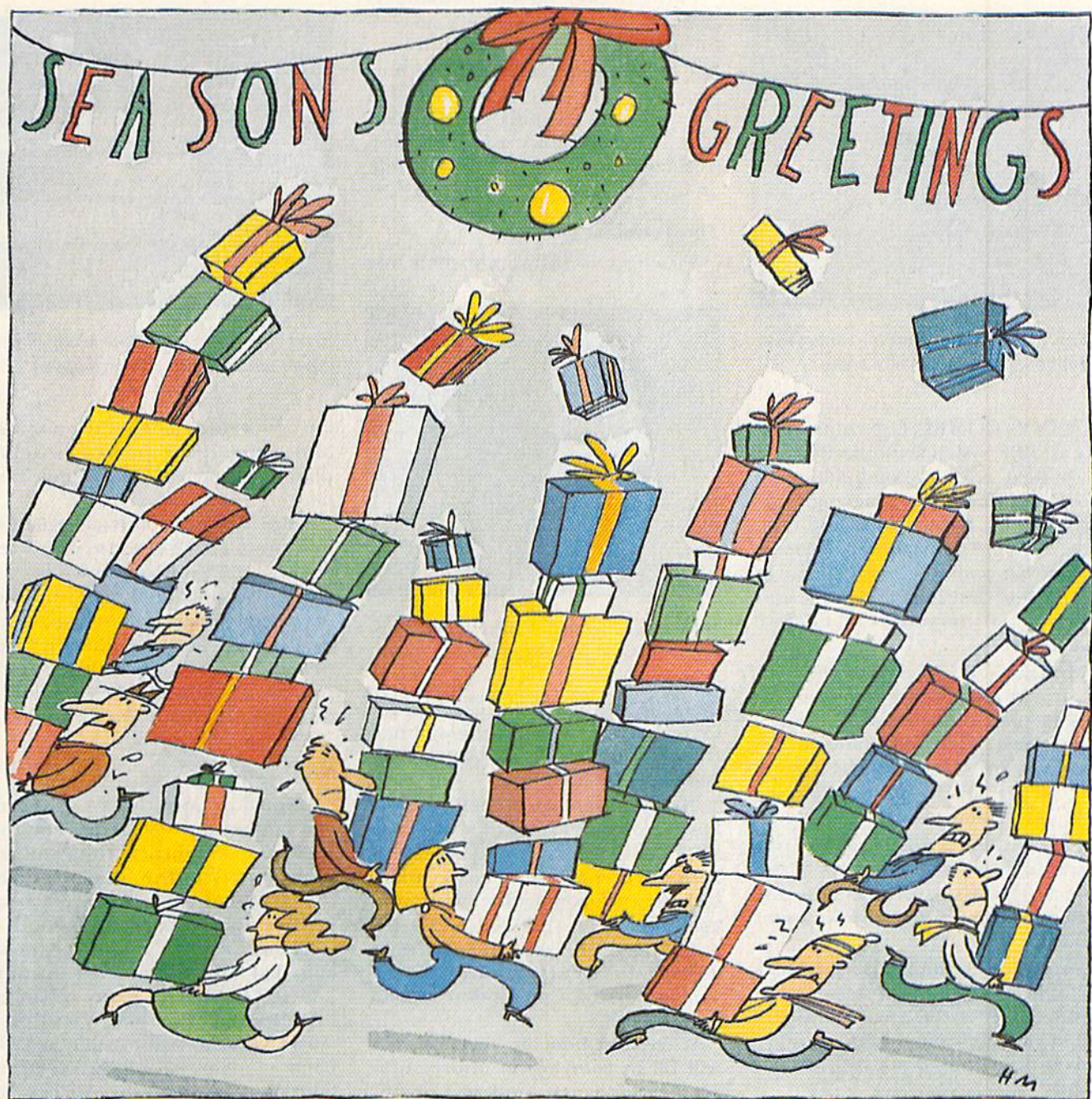
In addition to the consumer and information services, there is also a large communications section. The Commodore bulletin board network is indexed by software, hardware and general Commodore questions.

Also, you may set up a special-interest group (SIG) on Viewtron for free.

Viewtron will also be offering eight special-interest groups tailored to Commodore users: For Starters, Advanced, Off-Beat, Artists Anonymous, Musical Madness, Games, User Groups and Software Developers.

For Starters will provide information for new C-64, C-128 and Amiga owners. The Advanced SIG offers technical information about Commodore computers, including topics on 65XX machine language, 1541/

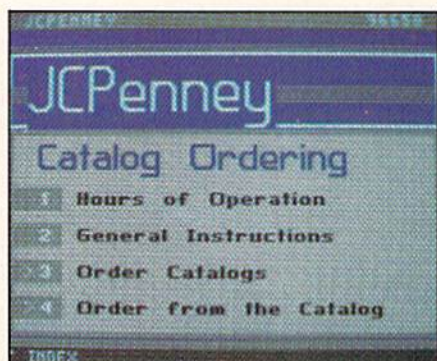
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Off-Beat offers a combination of movie madness, role-playing, creative writing, trivia, games and chatting. Artists Anonymous provides a forum that on-line artists can use to share their drawings and trade tips with other artists using Commodore computers.

Musical Madness is designed for musicians and others interested in making music on their computers. Commercial music programs will be discussed on this SIG. The Games SIG allows for swapping Commodore games and ideas.

User Groups is open only to Commodore User Group officers. Here, you can discuss your ideas and concerns about running your own user's group.

Software Developers is a new idea for a SIG. If you are a software developer, this is the area where you can meet other Commodore software developers and discuss industry trends.

Like most on-line networks, Viewtron has a national CB, or citizen's band radio. This computerized ver-

sion of a CB radio includes special channels for information about Commodore software and hardware.

Other Services

Viewtron is not exclusively a Commodore network, although it does place great emphasis on Commodore users. This network also holds many services that you would expect to find on networks like The Source, CompuServe and Delphi.

News, weather forecasts, sports scores, stock prices, airline schedules and fares, consumer reports and movie and book reviews are all available on-line.

Furthermore, on-line banking is available. Viewtron was very successful in southern Florida with its on-line banking service. Banking is now becoming available on a national level. You can pay bills, get your current account balance and leave electronic messages for your bank while on-line.

The Terminal Software

Viewtron is software-specific for

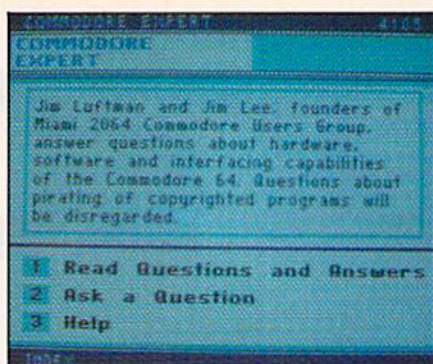


On-line banking with Viewtron puts banking services at your fingertips.

the C-64 and C-128 (in C-64 mode). Other on-line networks that fall into this category are PlayNet, Quantum-Link and TeleLearning.

To take advantage of Viewtron, you have to buy a starter kit, which costs \$9.95. With the kit, you get one free hour on-line, a user's guide and a disk that is compatible with your computer. The disk holds the terminal program, which is specifically tailored to Viewtron and takes advantage of the Commodore's color and sound.

When you boot up the disk, you will fill in your log-on information. This includes the kind of Commodore computer and modem that you're using, your identification number and password (both provided in



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Viewtron's Advantages

Viewtron is implementing some new marketing strategies. For one, they do not charge a subscription fee like most other networks do. You essentially are only paying the price of a public-domain disk or their terminal program. Also, you do not get charged extra for using a 1200-baud modem, as you do on many of the other major networks.

Furthermore, there is no monthly minimum usage fee on Viewtron. You only pay for what you use, and how much you use is totally up to you. The going rate for on-line time on Viewtron is nine cents a minute (\$5.40/hour) on weekday nights and on weekends, and 22 cents a minute (\$13.20/hour) for prime time during weekdays.

For more information about Viewtron, contact: ViewData Corporation of America, Inc., 1111 Lincoln Road, 7th Floor, Miami Beach, FL 33139.

The field of telecommunications is rapidly widening, and it's clear that Commodore owners are among a select group that is gathering much attention from the on-line networks. When you see so many networks making their software Commodore-specific, you know that there must be a marketing reason behind it.

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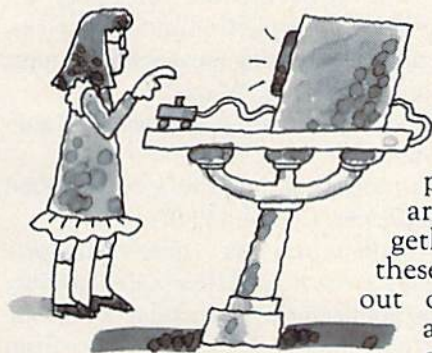
Next month, we'll take a look at BRS, one of the largest information networks for serious research and study. ®

Address all author correspondence to Margaret Morabito, c/o RUN editorial, 80 Pine St., Peterborough, NH 03458.

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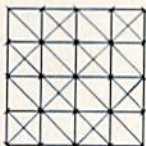


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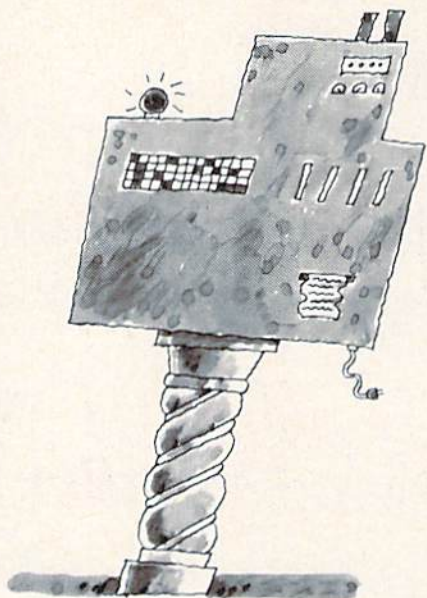
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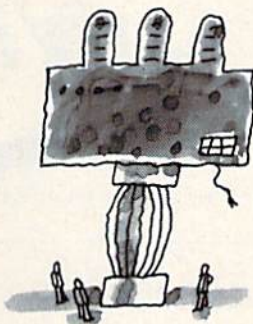
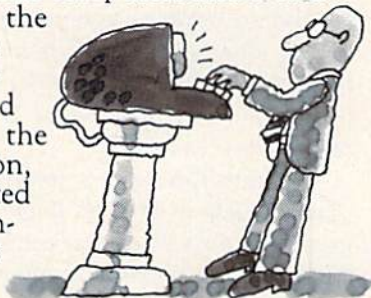
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DISK COMMANDS ON THE C-128

By DAVID DARUS and
LOUIS WALLACE

*Here's an overview
of the C-128 mode
disk commands,
along with a
disk utility for
autobooting your
programs.*

The C-128's Basic 7.0 includes a large number of high-level DOS commands. These commands allow the C-128 owner to use a disk drive without having to resort to cryptic statements. All DOS statements can be used from Program mode, allowing the programmer to take full advantage of the disk drive.

Disk commands fall into several categories. There are housekeeping commands such as Backup, Collect, Concat, Copy, Header, Rename and Scratch. There are file-information commands like Catalog and Directory. In the file-transfer category, you have DLoad, DSave, BLoad, BSave and DVerify. You can also load and run a Basic program in one statement by using RUN"filename"; or load and execute a machine language program with BOOT"filename".

The last category deals with data-file programming commands. These include Append, DClear, DClose, DOpen and Record, as well as the Basic 2.0 Get#, Print# and Open/Close commands. Finally, the C-128 has the capability of autobooting a Basic or machine language program when the computer is turned on.

The Disk Commands

Remember the first time you tried to format a disk with the 1541? Most people are initially confused by having to open channels and send disk commands. On the C-128, the Header command does all that. The syntax is

```
HEADER "diskname",Iid,D0, <ON Un>
(PParameters within the inequality signs are optional and may be omitted.) The diskname is any string of characters up to 16, and id is any two-digit code. D0 indicates drive 0, but you may use D1 on a dual drive. U stands for device n, so this command would format a disk on a second drive (device n). The I,D and U prefixes are required if these parameters are used. The device number is optional and defaults to device 8. A nice feature of the Header command is that when you use it in Direct mode, you're prompted with "Are you sure?" before the command is executed, just in case you want to change your mind.
```

The Scratch command will also ask you to confirm before it erases a file from the disk. Its syntax is

```
SCRATCH"filename" <,Dn,Un>
```

If you have a dual drive you can also use

```
BACKUP D0 TO D1 <ON Un>
```

to form and duplicate a disk in drive 0 to drive 1, using the default device 8 or adding the option ON Un for a different drive number. The Copy command will copy files to another disk on a dual drive or to the same disk on a single drive. To change a filename to something different, you use

```
RENAME "old name" TO "new name"
<,Dn,Un>
```

Sometimes you need to validate a disk that has had a lot of files written



JAMES ENDICOTT

RUN It Right

C-128; 1571 disk drive


```

APPEND #lfn, "filename" <,Dn> <ON, Un>
BACKUP source Dn TO destination Dn <ON, Un>
BLOAD "filename" <,Dn> <,Un> <,Bn> <Pstart address>
BOOT <"filename" <,Dn> <ON, Un>>
BSAVE "filename" <Dn> <,Un> <,Bn>, Pstart address TO Pend address
CATALOG <Dn> <ON, Un> <,wildcard string>
CLOSE file number
CMD logical file number <, write list>
COLLECT <Dn> <ON, Un>
CONCAT "file2" <,Dn> TO "file1" <,Dn> <ON, Un>
COPY "source filename" <,Dn> TO "destination filename" <,Dn> <ON, Un>
DCLEAR <Dn> <ON, Un>
DCLOSE <#lfn> <ON, Un>
DIRECTORY <Dn> <ON, Un> <,wildcard string>
DLOAD "filename" <,Dn> <,Un>
DOPEN #lfn, "filename<,S/P>" <,Lrecord len> <,Dn> <ON, Un> <,W>
DSAVE "filename" <,Dn> <ON, Un>
DVERIFY "filename" <,Dn> <ON, Un>
GET# file number, variable list
HEADER "diskname" <,lid> <,Dn> <ON, Un>
INPUT# file number, variable list
LOAD "filename" <,device number> <,relocate flag>
OPEN lfn,dev numb <,sec addr> <,"filename,filetype,mode"> /<,cms string>
PRINT# file number, print list
RECORD #lfn, record number <,byte number>
RENAME "oldfilename" TO "newfilename" <,Dn> <,Un>
RUN "filename" <,Dn> <,Un>
SAVE <"filename"> <,device number> <,EOT flag>
SCRATCH "filename" <,Dn> <,Un>
VERIFY "filename" <device number> <,relocate flag>

```

Table 1. C-128 disk commands.

and erased on it. Or perhaps you have files with an asterisk that will not scratch properly. In these cases, the Collect <Dn ON, Un> command should be used to free the disk space for use. You can merge two files together with the command

```

CONCAT "file2" <,Dn> TO "file 1"
<,Dn> <ON, Un>

```

File 1 will now have file 2 added to the end of it.

File directories can be retrieved in three ways. You have the Directory and Catalog commands, each of which lists the disk filenames to the screen, or you can use the C-64 LOAD"\$",8 if you want to load into memory a directory that can be listed to a printer.

You can still load a program with LOAD "filename",8. However, there are several new methods on the C-128. You can load a Basic program (without the ,8) using

```
DLOAD "filename" <,Dn>
```

No device number is needed if it is device 8, and you don't even have to add the last quote mark. You can load

machine code or binary data with

```
BLOAD "filename" <,Dn> <,Un>
<,Bn> <,Pstart address>
```

If only the filename is given in a BLoad, the file is loaded from device 8 to the address from which it was saved. You may specify the drive, device, RAM bank and address by using the extra parameters.

To save a Basic file, you can use DSAVE "filename" <,Dn> <ON, Un> in addition to the C-64 Basic 2.0

```
SAVE "filename",8
```

For binary files, you use

```
BSAVE "filename" <,Dn> <,Un>
<,Bn>, Pstart address TO Pend address
```

The start and stop addresses are in decimal and are required; the bank number is optional and can be any of the 16 banks (0-15).

You can verify a Basic file in memory with a file on the disk by using DVERIFY "filename" <,Dn> <ON, Un>

To verify a binary file, use Basic 2.0

```
VERIFY "filename",8,1
```

One of the really nice features is

the ability to load and run a Basic or machine language program by using one command. For Basic, it is

```
RUN "filename" <,Dn> <,Un>
```

which loads a program called filename from disk and runs it. Machine language uses

```
BOOT "filename" <,Dn> <,Un>
```

which loads a machine language program to the location from which it was saved and begins executing it at that address. Using Boot without any parameters will also cause an auto-boot disk to load and run its designated program.

To make it easier to use sequential and relative datafiles on the C-128, several new commands have been added to those found in C-64 Basic 2.0. Opening a file can be done with

```
DOPEN #lfn, "filename<,s/p>" <,Ln>
<,Dn> <,ON Un> <,W>
```

Only the filename and a logical file number (lfn = 0-255) are required to read a sequential file. Program and sequential files can be specified using p or s with the filename. A relative file is indicated when its length is given (L = 1-255). When writing a program or sequential file, you must include the W parameter.

If you wanted to add data to an existing file, you would use the Append command. Its syntax is

```
APPEND #lfn, "filename" <,Dn> <ON, Un>
```

This command opens the file and adds to the end of the file all subsequent data directed to it. This makes it easy to update sequential data. These commands can be used in place of Basic's Open command for many file operations.

The Get# and Print# commands for reading and writing files are used the same way as in Basic 2.0. However, relative files have additional support in the new Record command. This command positions the relative-file pointers to a specified byte within a particular record. Its syntax is

```
RECORD #lfn, record number <,byte
number>
```

The record number can be in the range of 0 to 65535, and the byte number is from 1 to 254. When you're writing to a relative file with a record number higher than the last record in the file, new records are created to expand the file. The byte number directs the file pointer to start at an exact point within a record, so you can gain access to a certain segment of that record.

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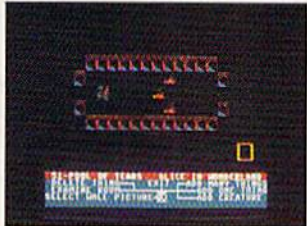
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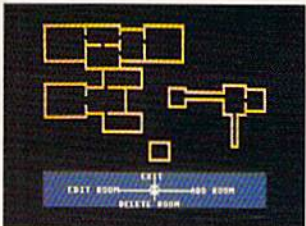
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To close one or all open files on a specific device, you can use DClose. The syntax for this command is

```
DCLOSE <#lfn ON, Un>
```

where, again, lfn is the logical file number and Un is used to specify at which device to direct the command. DClear is used to clear all open channels and all open files. It is equivalent to the Initialize command in C-64 Basic 2.0. The DClear syntax is

```
DCLEAR <Dn ON, Un>
```

The Basic 2.0 Close command functions as before and is used to close a specific logical file number.

Autobooting Programs

Another new feature of the C-128 is its ability to autoboot programs on specially prepared disks that are in the drive when the computer is first turned on. This allows application software to load and run itself without the user being required to do anything except turn on the computer. You can also use this feature in your own programs to customize the computer on power-up. You may choose whatever color combination you like best. For example, you can define the programmable function keys to meet your requirements every time you turn on the computer.

To cause a program to autoboot, the program—Basic or machine language—must first be present on the disk. The key, however, is what the computer finds on track 1, sector 0. Whenever the computer is turned on, it reads track 1, sector 0, looking for a special data pattern in much the same way it does when a cartridge is plugged into the machine. If that information is present, the data at track 1, sector 0 is read into the computer at \$0B00 (2816). As part of system initialization, that data, if present, is executed.

The format of the data at track 1, sec-

tor 0 is very specific. The first three bytes must be the letters CBM, followed by CHR\$(0) repeated four times. Next is an optional booting message, which can be up to 16 characters long, followed by two more CHR\$(0)s.

After that are machine language instructions that point to the address of the Run or Boot command and execute that command. The address used is in low-byte/high-byte form and is calculated by adding to 2186 the length of the booting message plus 15. The low byte is that address combined with 255 by the And command; the high byte is the calculated address divided by 256. The machine language instructions are CHR\$(162), CHR\$(low byte), CHR\$(160), CHR\$(high byte), CHR\$(76), CHR\$(165) and CHR\$(174).

Next is the string RUN"filename" or BOOT"filename," followed by CHR\$(0). The Run command is used if a Basic program is loaded and run, and BOOT is used if a machine language program is loaded and executed.

Autoboot Maker

Since this can be quite a tedious task every time you want to make an autoboot disk, we have written an autoboot maker utility program for the C-128.

Autoboot Maker (Listing 1) effortlessly writes that special sequence of data to track 1, sector 0. The program asks you for a booting message as well as the name of the program to autoboot. It also asks if the program is Basic or machine language and sets up the disk accordingly.

To protect you from overwriting a previously created autoboot disk, the program checks to see if the special data sequence is already present. If so, you are given the option to quit or to rewrite the autoboot code. Furthermore, to protect you from over-

writing the autoboot sequence, the BAM (block allocation map) is updated to inform the disk drive that all of track 1 is being used, and it should not write any new data there. This results in the loss of 20 disk blocks (out of 1328). However, if you use the Collect command on an autoboot disk, it will make track 1 available for data storage, and the autoboot code could be destroyed.

Carefully type in the Autoboot Maker program and save it to disk before running it. When you run it the first time, the screen will go blank for a while, as the C-128 goes into Fast mode and draws the graphics screen. After about 20 seconds, the screen is saved to disk under the names AUTO.PIC and AUTO.COL. On subsequent runs, the graphics screen will load up directly from disk. On the 1571, this takes about three seconds to load.

You are then prompted to insert a disk to which the autoboot code is to be written. You must already have saved onto your disk a 128-mode program that you want autobooted before you run Autoboot Maker. You will be prompted for all needed information, and the customized autoboot code will be quickly written to your disk.

Autobooting disks is one of the ways the C-128 has made disk control user-friendly. Use it to customize the computer to your specifications. Now, all you'll have to do is place your specially prepared Autoboot-made disk into the 1571 drive and then turn on your C-128. Your program will automatically load and run. This would be particularly useful if you had a menu or a disk directory program that was autobooted. [R]

*Address all author correspondence to
Louis R. Wallace, 6124B SW 11 Place,
Gainesville, FL 32607.*

Listing 1. Autoboot Maker program.

```
10 REM C128 AUTOBOOT DISK MAKER           :REM*80
20 COLOR1,1:COLOR0,6:COLOR4,6             :REM*6
30 GRAPHIC1,1                             :REM*12
40 RENAME"AUTO.PIC" TO "AUTO.PIC"        :REM*58
50 E$=LEFT$(D$$,2)                         :REM*76
60 IFE$<>"63"THEN GOSUB 620:ELSE BLOAD"AUTO.C
   OL",D0:BLOAD"AUTO.PIC",D0              :REM*12
70 CLR:GOTO 500                             :REM*236
80 REM INSERT DISK                         :REM*242
90 S1$="INSERT DISK TO AUTOBOOT"         :REM*230
```

```
100 S2$="PRESS SPACEBAR WHEN READY.":GOSUB 8
   20                                     :REM*64
110 DO:GETKEY A$:LOOP UNTIL A$=" ":GOSUB 850
   :REM*214
120 RETURN                                 :REM*178
130 REM CHECK TRACK 1 SECTOR 0 FOR DATA ALR
   EADY THERE                             :REM*148
140 OPEN1,8,15:OPEN2,8,2,"#":GOSUB 480
   :REM*106
150 PRINT#1,"U1: ";2;0;1;0               :REM*46
160 GET#2,A$:GET#2,B$:IFASC(A$+CHR$(0))<>0
   RASC(B$+CHR$(0))<>0 THEN GOSUB 190
   :REM*196
170 CLOSE2:CLOSE1:RETURN                  :REM*110
180 REM REWRITE AUTO BOOT (Y/N)          :REM*88
190 S1$="ALREADY AN AUTOBOOT DISK!":REM*64
```


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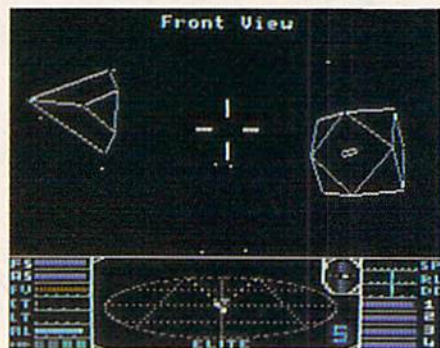
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```

200 S2$="SHOULD I CONTINUE? (Y/N)":GOSUB820
                                :REM*156
210 GETKEY A$                   :REM*192
220 IFA$="Y"THEN GF=1:GOSUB850:RETURN
                                :REM*100
230 IFA$="N"THEN GOSUB 850:CHAR1,7,6,"{6 SP
ACEs}PROGRAM STOPPED",1:CLOSE2:CLOSE1:S
LEEP5:GRAPHIC0:COLOR5,14:END:ELSE GOTO2
10                               :REM*142
240 REM WRITE TRACK 1, SECTOR 0. :REM*232
250 S1$="{3 SPACES}ENTER BOOTUP MESSAGE":S2
$="" :GOSUB820                   :REM*68
260 DN$="" :GOSUB890:DN$=W$     :REM*75
270 GOSUB850:S1$="ARE YOU BOOTING A BASIC O
R"                               :REM*21
280 S2$="{5 SPACES}ML PROGRAM (B/M){5 SPACE
s}":GOSUB820                   :REM*223
290 GETKEY A$                   :REM*17
300 IF A$="B" OR A$="{SHFT B}" THEN ML=0:GO
SUB850:GOTO 320                 :REM*171
310 IF A$="M" OR A$="{SHFT M}" THEN ML=1:GO
SUB850:ELSE GOTO290            :REM*45
320 GOSUB850:S1$="{3 SPACES}PROGRAM TO AUTO
BOOT?":S2$="" :GOSUB820       :REM*229
330 NM$="" :GOSUB890:NM$=W$:IFLEN(NM$)=0THEN
330                               :REM*215
340 GOSUB850:CHAR1,7,6,"WRITING AUTO BOOT..
." :REM*5
350 ML$="CBM"+CHR$(0)+CHR$(0)+CHR$(0)+CHR$(
0)+DN$+CHR$(0)+CHR$(0)+CHR$(162):REM*83
360 AD=2816+LEN(DN$)+15        :REM*19
370 ML$=ML$+CHR$(ADAND255)+CHR$(160)+CHR$(A
D/256)+CHR$(76)+CHR$(165)    :REM*139
380 ML$=ML$+CHR$(175)         :REM*223
390 IF ML=0 THEN ML$=ML$+"RUN" :REM*147
400 IF ML=1 THEN ML$=ML$+"BOOT" :REM*21
    
```

```

410 ML$=ML$+CHR$(34)+NM$+CHR$(0) :REM*107
420 OPEN1,8,15:OPEN2,8,2,"#":GOSUB480
                                :REM*131
430 PRINT#1,"B-P:";2;0         :REM*133
440 PRINT#2,ML$;               :REM*123
450 PRINT#1,"U2:";2;0;1;0:GOSUB480 :REM*137
460 CLOSE2:CLOSE1:RETURN      :REM*145
470 REM READ ERROR CHANNEL    :REM*93
480 IFDS>1THENGGRAPHIC0,1:PRINTDS$:CLOSE2:CL
OSE1:END                         :REM*23
490 RETURN                     :REM*37
500 REM MAIN BODY             :REM*207
510 GF=0                       :REM*129
520 COLOR1,7:S1$="{3 SPACES}C128 AUTO BOOT
MAKER"                           :REM*218
530 S2$="{2 SPACES}BY D DARUS & L WALLACE":
GOSUB820:SLEEP5                 :REM*222
540 GOSUB80:REM INSERT DISK   :REM*156
550 GOSUB140:REM CHECK TRACK 1 SECTOR 0 FOR
DATA ALREADY THERE.            :REM*134
560 GOSUB250:REM WRITE TRACK 1, SECTOR 0.
                                :REM*126
570 IFGF=1THEN610             :REM*214
580 OPEN1,8,15:FORT=0TO20:PRINT#1,"B-A:";0;
1;T:NEXT                       :REM*18
590 IFDS=65THENGOSUB190:GOTO610 :REM*2
600 IFDS>0THENPRINTDS$        :REM*136
610 CLOSE1:S1$="ALL DONE!":S2$="PRESS ANY K
EY TO END":GOSUB850:GOSUB820:GETKEY A$:
GRAPHIC0,1:COLOR5,14:END      :REM*234
620 FAST:GRAPHIC1,1:COLOR1,3  :REM*110
630 CHAR1,13,2,"AUTODISK MAKER" :REM*104
640 COLOR1,1                  :REM*148
650 BOX1,40,32,280,186       :REM*180
660 CIRCLE1,160,105,32,25    :REM*152
670 CIRCLE1,160,150,8,5,270,90 :REM*124
680 DRAW1,152,150 TO 152,170 :REM*196
690 DRAW1,168,150 TO 168,170 :REM*82
700 CIRCLE1,160,170,8,5,90,270 :REM*148
710 CIRCLE1,195,125,5,4      :REM*60
720 BOX1,276,63,280,70      :REM*130
730 DRAW0,280,64 TO 280,69  :REM*168
740 COLOR1,7                 :REM*184
750 BOX1,56,40,264,71,,1    :REM*58
760 COLOR1,1                 :REM*12
770 PAINT1,45,40            :REM*79
780 SLOW                     :REM*61
790 BSAVE"AUTO.PIC",B0,D0,P8192 TO P16191
                                :REM*113
800 BSAVE"AUTO.COL",B0,D0,P7168 TO P8191
                                :REM*107
810 RETURN                   :REM*103
820 CHAR1,7,5,S1$,1          :REM*51
830 CHAR1,7,7,S2$,1         :REM*67
840 RETURN                   :REM*133
850 COLOR1,7:CHAR1,7,5,"{26 SPACES}",1:REM
26 SPACES                       :REM*13
860 CHAR1,7,6,"{26 SPACES}",1:REM 26 SPACE
S                               :REM*155
870 CHAR1,7,7,"{26 SPACES}",1:REM 26 SPACE
S                               :REM*37
880 RETURN                   :REM*173
890 CT=0:XP=7:TX$="" :W$=""   :REM*109
900 GETKEY TX$               :REM*57
910 A=ASC(TX$)               :REM*87
920 IFA=13THENRETURN        :REM*83
930 IFA=20ANDLEN(W$)>0THENW$=LEFT$(W$,LEN(W
$)-1):TX$="" :GOTO980         :REM*15
940 IFA=20THEN900           :REM*147
950 IFA$=CHR$(34)THEN900    :REM*179
960 IFLEN(W$) >=16 THEN900   :REM*109
970 XP=XP+1:W$=W$+TX$      :REM*131
980 CHAR1,XP,7,TX$,1:IFA=20THENXP=XP-1
                                :REM*105
990 GOTO900                 :REM*219
    
```

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CP/M and the C-128

Explore the C-128's CP/M 3.0. This tutorial discusses two data-storage techniques, CP/M's resident commands and how to copy system files.

By ALEX LANE

"Okay," some of you new CP/M users are saying to yourselves as you and the A> prompt face off over your C-128, "so what do I do now?"

Others of you may have heard that CP/M is hard to learn and have therefore skipped trying out CP/M until "later."

Well, if you've never played around with CP/M or any other operating system, the A> prompt on your video screen can be pretty intimidating the first time you are faced with it. However, as you learn about CP/M, taking one small step after another, that A> rapidly loses its menace.

First Steps

Loading CP/M into your C-128 is fairly simple. The chances are that everything you have already connected to your C-128 is sufficient for you to run CP/M, but let's run down the checklist, just in case you have any doubts.

In addition to the C-128 itself, you'll need a disk drive. If you already own a 1541, that will do for now; later, you might consider moving up to a 1571, which is faster and capable of reading different formats.

If you're using a television set as a video display for your C-128, you will only be able to run CP/M in 40-col-

umn mode and will have to scroll across the screen using the control key along with the cursor-left and cursor-right keys. To get the maximum out of the C-128's CP/M mode, however, I strongly suggest you get an inexpensive (less than \$100) monochrome monitor, which gives you the benefit of all 80 columns.

Finally, you need a disk called a system disk, which contains the CP/M operating system.

MFM versus GCR

With the C-128 in CP/M mode, the new 1571 disk drive is capable of reading disks with information that has been stored using either the GCR (group code recording) or MFM (modified frequency modulation) data-storage techniques. There has been a lot of confusion about these techniques, with some people worrying about whether or not their 128 can run various CP/M packages.

GCR and MFM refer to the way the disk hardware stores information on a disk. The details of how this is done are not important, but you should be aware that the 1541 drive can only use the GCR method to store and retrieve disk information, while the 1571 can use either the GCR or MFM method.

The method used to store a program has absolutely no effect on whether the program will or will not run on the C-128. In other words, you can copy CP/M programs from an MFM disk on a 1571 to a GCR disk on a 1541 without any problems. I've heard some people talking about "GCR programs" and "MFM programs"; to me, this makes about as much sense as describing a song being played on the radio as an "AM song" or an "FM song."

The CP/M disk that came with the C-128 was written onto the disk using the GCR technique. I hesitate to use the term "GCR format," because "format" is better reserved for a discussion about how data is organized on the disk in tracks and sectors; more about that some other time.

Having been stored using GCR, the software can be read by both the 1541 and 1571 disk drives, making CP/M available to C-128 owners, no matter which drive they own.

Booting the System Disk

Instead of residing in a read-only memory (ROM) chip inside the computer, the CP/M operating system must be loaded from disk every time it is to be used. The C-128's CP/M Plus can be booted in either of two ways.

RUN It Right

C-128 (in CP/M mode)

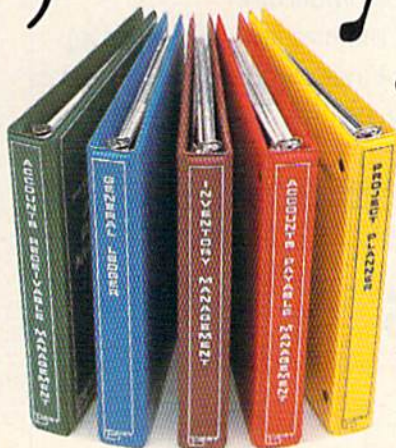


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The first way is to turn on the disk drive, insert the CP/M system disk and turn on the C-128. The computer will automatically scan the disk in the drive and, having found the CP/M system tracks, will load them into memory while a message on the screen announces

BOOTING CP/M PLUS

followed by a display of information that is of no interest to us right now.

The second way to load CP/M Plus is from C-128 mode. Insert the CP/M system disk in the drive and then either type the Boot command or press the reset next to the C-128's on/off switch. After a few seconds, CP/M will be loaded, and the Console Command Processor (CCP) will be ready to take orders.

The Six Resident Commands

There are only six commands you can type in right now that won't make the CCP try to access the disk. These commands are:

TYPE
DIR
USER
DIRSYS
RENAME
ERASE

Let's quickly see what these commands do.

TYPE. If you have a file made up of printable characters, you can list these to the screen by entering

A> TYPE filename <return>

where "filename" is the file specification of the desired file. CP/M Plus will then list a screen's worth of file, display "Press Return to Continue" and wait for you to press the return key before continuing.

If you try to use the Type command with a file that contains non-printable characters (like a COM file), CP/M may list a few nonsense characters, but will then return you to the system prompt.

There are several options available with the Type command, most commonly the listing of multiple files; but to do that, you'll need the file TYPE.COM on the disk.

DIR. This command displays a list of filenames. At the left edge of the screen, DIR prints the letter designating the drive ("A"). Filenames are then displayed, five across and separated by colons. For example, the system disk enclosed with the C-128 shows the following directory:

```
A: CPM+   SYS:CCP   COM:HELP
   COM:HELP HLP:KEYFIG COM
A: KEYFIG HLP:FORMAT COM:PIP
   COM:DIR   COM:COPYSIS COM
```

With DIR, there are a lot of bells and whistles that can be called forth, including lists that show the time and date a file was created or updated, its protection status and other features; but these require the file DIR.COM to reside on the disk.

USER. This command lets you change from one user area to another. The default user area (the one the system leaves you in after it's finished booting) is area 0.

Changing user areas is simple. For example, from the A> prompt, type:

A> USER 1<return>

You should now see a prompt that reads: 1A>.

Now type DIR again; this time, the response is: "No File," which should tell you that all the files in area 0 are invisible to a user in area 1. Now type:

1A> USER 0<return>

You'll be back at the A> prompt, and DIR will work as before.

The User command lets you organize your files into as many as 16 groups. This is handy if you have many small (1-2K) files on a disk and don't want to hunt through them all every time you invoke DIR.

DIRSYS. Another way CP/M Plus lets you organize and protect your files is by letting you assign them attributes. Some files can be assigned a system (SYS) attribute, which means that (if they're in user area 0) they can be accessed from any user area on the same drive.

Just as files in other user areas don't show up when you call for a directory, files with the SYS attribute don't either. DIRSYS lets you locate any system files from any user area.

ERASE. This command, followed by a filename, causes the file to be deleted from the directory. (One of the first public domain programs you might want is UNERA.COM, which finds deleted entries and tries to restore the original file.)

As with DIR, there are a number of options available, but these require assistance from a disk file.

RENAME. This command is followed by two filenames separated by an equals (=) sign. For example,

A> RENAME NEWFILE = OLDFILE
<return>



will cause the file named Oldfile to be renamed Newfile.

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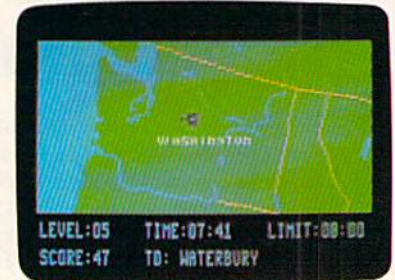
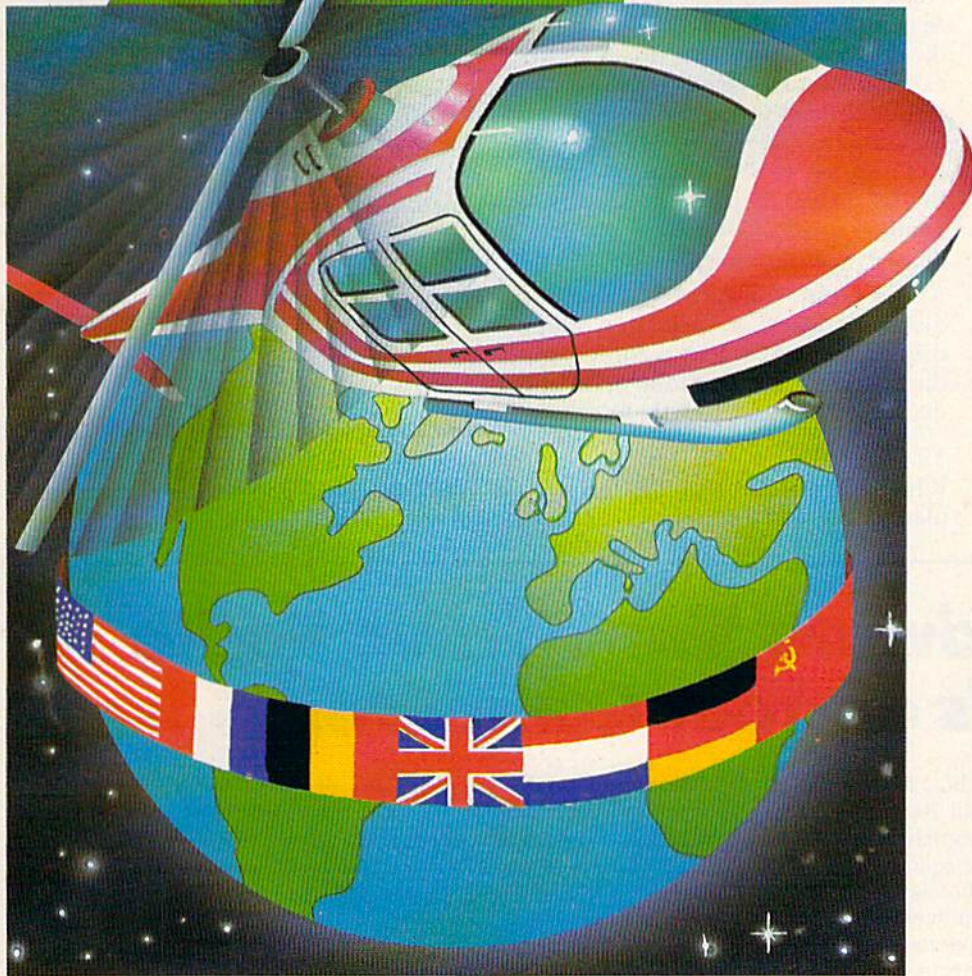
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As with DIR and Erase, you can ask for options, but you need a disk file to handle them.

Creating a System Disk

Before you begin experimenting with CP/M Plus, create another system disk using as a model the one that came with your C-128. While you're at it (and if you have the time), it might not be a bad idea to back up the software entirely!

Settling down with a couple of blank disks by your side and the system disk in the drive, type:

```
A> FORMAT<return>
```

Since the CCP doesn't understand the command "FORMAT," it will try to find a .COM file on the disk with the same name. Once found, the program will be loaded into memory and begin to run automatically.

Once everything settles down, the program will display the type of drive attached to the system, as well as your formatting options. Use the cursor-up and cursor-down keys to make your choice (either C-128 single-sided or, if you have a 1571, C-128 double-sided); then press the return key, remove the CP/M Plus system disk, insert a blank disk and press \$.

Circle 91 on Reader Service card.

After a few minutes, the program will ask if you want to format another disk. Repeat the foregoing drill until you've formatted all the disks you'll need for now; then type N to exit the program. You'll be returned to the A> prompt.

Assuming for the moment you want to copy only the CP/M Plus system, reinsert the system disk and enter:

```
A> PIP E:=A:CPM+.SYS<return>
```

This loads the copy program PIP and copies the file CPM+.SYS from the A: drive to an imaginary drive, called the E: drive. (In reality, this E: drive, called a "virtual" drive, is an identity assumed temporarily by the A: drive for the purpose of copying files.)

If you use a 1541 drive, while the file is being copied, you will be prompted once with:

```
INSERT DISK E IN DRIVE A
```

At this point, you remove the system disk and insert a formatted blank disk. Once CPM+.SYS is copied, put the system disk back in the drive and do the same for CCP.COM by typing:

```
A> PIP E:=A:CCP.COM<return>
```

When you're done, you'll have a complete copy of the system.

Now, if you want to copy the entire disk, you can use the PIP command with each file. If you want to save wear and tear on your fingers from the start, you can type:

```
A> PIP E:=A:*. * <return>
```

This will cause all the files to be copied, one after the other. Be prepared, however, to set aside some time for this. It takes a while to copy 160K of files. Note: Don't issue the PIP E:=A:*. * command after copying CPM+.SYS and CCP.COM, because PIP will do exactly as you say and copy everything, including a second copy of CPM+.SYS and CCP.COM!

Parting Words

CP/M isn't something you master in one session, and we've only managed to scratch its surface. However, you've come a long way; that A> prompt doesn't look so intimidating anymore, does it? R

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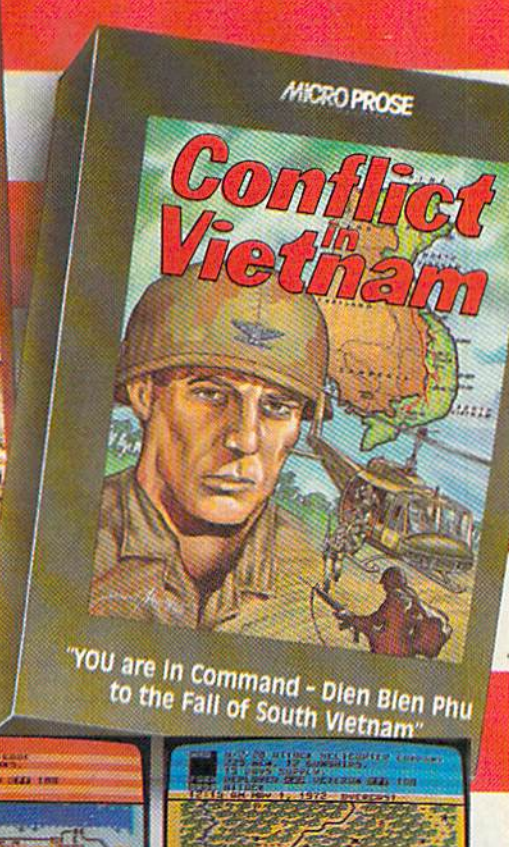
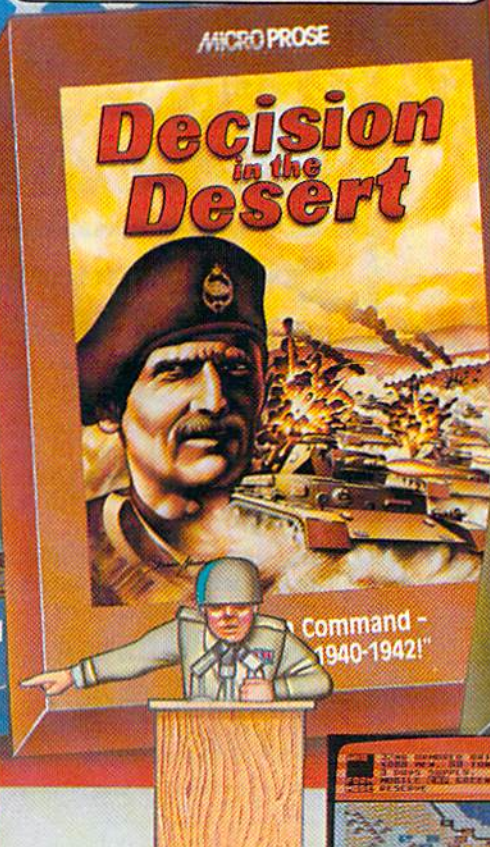
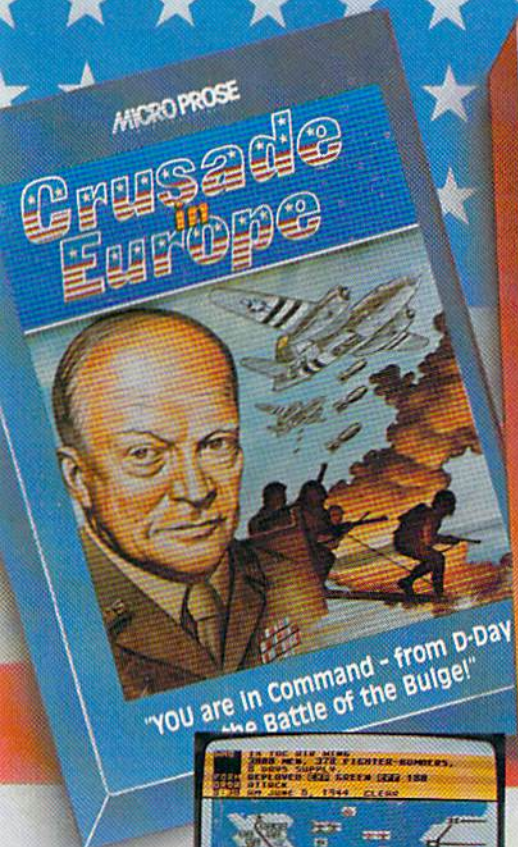


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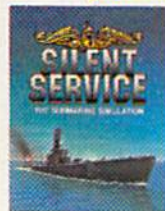
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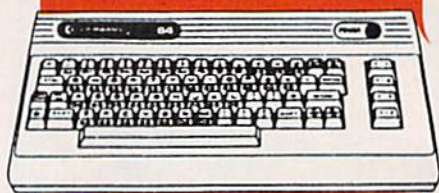
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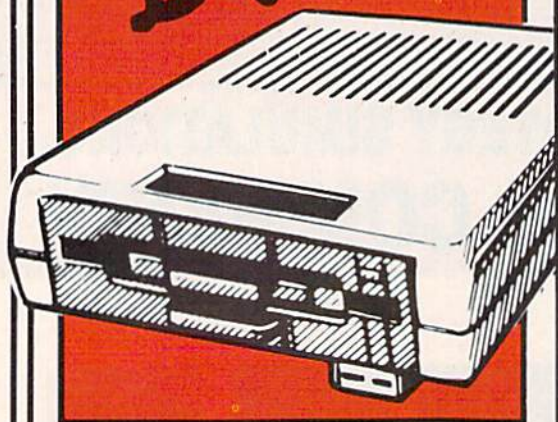


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By WILLIAM B. SANDERS

For machine and assembly language programmers, the C-128's nicest feature is its built-in monitor. In this article, I'll explain how to use the monitor's mini-assembler.

To begin, either press the shifted f8 key or type in

MONITOR <return>

You will now be in the monitor. When you enter the monitor, the major registers are displayed. For example, your screen may look like this:

MONITOR

```
PC      SR      AC      XR      YR      SP
: FB000  00      00      00      00      F9
```

What does that mean? Let's take it one step at a time:

PC—Program counter. The value of the program counter is \$FB000. In the C-128 monitor, the left-most value in a five-digit hexadecimal number is called the bank. The other values represent the address in that bank. The \$B000 is where the built-in monitor resides.

SR—Status register. This tells the conditions of seven one-bit flags. At the outset, they are all cleared, or are of 0 value.

AC—This is the accumulator, or A register.

XR/YR—These are the X and Y registers.

SP—The stack pointer holds the pointer to the return address for sub-routine jumps.

It is important to understand that all default values in the 128 monitor mini-assembler are in hexadecimal. To enter a decimal value, you must place a plus sign (+) in front of the value; this changes the number into hexadecimal form. For example, let's say you want to enter decimal 15. You would enter:

+ 15

and it would be changed to:

0F

This is simply the hexadecimal equivalent of decimal 15.

To convert a number to a different base *while in the monitor*, you need only enter the symbol for the base of the number you wish to convert and press the return key. Use these symbols for your base conversion:

\$ = hexadecimal

+ = decimal

& = octal

% = binary

You can begin with any base and convert to any other base as long as

the number you enter is "legal." Thus, while &77 is a perfectly legal octal number, &88 is not, nor is any digit other than 0 or 1 in a binary number.

Type in the following to see how it works.

\$1300 <return>

You will be presented with:

```
$1300
+ 4864
&11400
%1001100000000
```

In examining the contents of registers and sprite configurations, the binary conversion will be very useful.

Assembling Programs

To assemble programs using mnemonic opcodes, enter:

A <address> <opcode> <operand>

For example, to enter programs in the C-128 mode, you might start as follows:

A F1300 LDA #0D <return>

As soon as you press the return key, your code will look like this:

```
A F1300 AD 0D LDA #$0D
A F1302
```

RUN It Right

C-128

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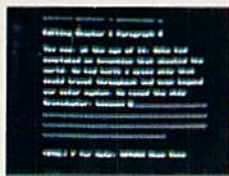
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The "AD 0D" are the machine language hexadecimal values for LDA and 0D. The next available address, F1302, is then given for entering the next set of opcodes and operands.

Using the Correct Banks

When you enter code in the monitor, you enter it in one of 16 banks (\$0-\$F). The left-most value in an address is the bank value. For example, in F1300, the address is 1300 in bank F. The organization of information in bank F is not the same as in bank 0. The default bank when you turn on your C-128 is bank \$F, but when you enter code in the monitor, failure to enter the fifth value for an address puts you in bank 0. When writing programs in the C-128 mini-assembler, use bank \$F (15) for the C-128 mode and bank \$0 (0) for the C-64 mode.

Programming for the C-128 Mode

While many of the addresses used for the C-128 are the same as the ones used in the C-64, some are different. For example, in the C-64 mode, the pointers for the beginning of a Basic program are \$2B and \$2C, while in the C-128 mode, they're \$2D and \$2E. Similarly, the often-used jump to \$E544 is accomplished with a JSR to \$C000 in the C-128 mode, and the free RAM at \$C000 (49152) in the C-64 is not free in C-128 mode.

The most important consideration for programming in the C-128 mode is to access bank F by entering F as the first of the five hex values when you initially begin assembling your code.

Second, begin your programs at F1300, *not* at FC000 or F8000 or (even worse) \$C000 or \$8000. In the 128 mode, the SYS value from Basic is to \$1300 (4864). It is unnecessary to indicate bank F, since, from Basic in the C-128 mode, the default bank is \$F. Once you've entered your first line, you needn't continue entering the bank, as this is done automatically.

In referencing addresses from within the assembly language program, you do not have to reference banks for the level we are discussing. The following shows the correct and incorrect way to reference addresses using the mini-assembler. First, the incorrect way:

```
A F130E STA F1404
```

Now, the correct way:

```
A F130E STA 1404
```

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ample, so let's see if we can do something simple and clear. To start off, enter:

```
A F1300 JSR C000 <return>
```

After the first line, the next available address will come up. Here's the complete program:

```
A F1300 JSR C000 (clear the screen)
A F1303 LDA #52 (load first letter)
A F1305 JSR FFD2 (output to screen)
A F1308 LDA #55 (second letter)
A F130A JSR FFD2 (output to screen)
A F130D LDA #4E (third letter)
A F130F JSR FFD2 (output to screen)
A F1312 RTS (get back)
```

When you're all finished, your listing will appear as follows:

```
. F1300 20 00 C0 JSR $C000
. F1303 A9 52 LDA #$52
. F1305 20 D2 FF JSR $FFD2
. F1308 A9 55 LDA #$55
. F130A 20 D2 FF JSR $FFD2
. F130D A9 4E LDA #$4E
. F130F 20 D2 FF JSR $FFD2
. F1312 RTS
```

There are two ways to execute your program. First, you can exit to Basic with an X <return> and SYS 4864; or, from within the monitor, you can execute the program by entering G F1300. Try it both ways to see what happens. (You get a Syntax error from monitor execution, but don't worry about it; there's nothing wrong.)

Now, let's save and load a program from within the monitor, and I'll show you a neat trick for getting all of your C-64 programs into the C-128 mode. To save a program from within the monitor, you use the S command with the device number. That's very much like the old C-64 Save mode. However, with machine and assembly language programs, you have to include the beginning address and the ending address *plus* 1. Using the example program, you would enter:

```
S"HOTSTUFF",8,F1300,F1313 <return>
```

Saving to disk, you use device number 8. For cassette storage, you would have used a 1. The program begins at F1300 and ends at F1312. The beginning address stays the same, but you add 1 to the ending address to get F1313. Let's call the program "HOTSTUFF."

To get the program back, you just have to indicate the program name and device number. Unless you want it to load at a different address than the one you used for storage, you don't have to add the load address. So, clear that portion of memory you used by entering:

```
F F1300 F1312 FF
```

That will fill (F) the part of memory you used with \$FFs (255s). Now you'll know whether the program you load is really the one you saved. Enter the following:

```
L"HOTSTUFF",8 <return>
```

Now enter:

```
D F1300 <return>
```

to disassemble (D) your code and see if you recovered the program. If you did not, go back and try again.

Transferring Between the C-128 and C-64 Modes

Keeping the program in memory, try the following:

```
T F1300 F1312 0C000
```

That transfers (T) the memory contents of \$F1300-\$F1312 to memory beginning at \$0C000. Not only can you transfer from one part of memory to another, you can transfer from one bank to another. Since \$C000 is free RAM for the C-64, the program should execute in the C-64 mode. But wait! The first JSR is to \$C000; so let's change the \$C000 to \$E544. Here's how.

First disassemble the code at \$0C000 with D C000 <return>. (You don't have to put in the bank number, since it defaults to bank 0.) Then, using your arrow keys, move the cursor up so that it is over the \$C000 in the program and change it to \$E544. Now, you are all set to execute the same code in the C-64 mode. To get to the C-64 mode, don't return to Basic and enter GO 64. Anyone can do that. Enter the following:

```
G FFF4D <return>
```

Not only will that get you to the C-64 mode; it will also impress your friends. Figure out what decimal value C000 is and SYS it from Basic to activate this short program in C-64 mode.

In conclusion, the built-in monitor in your C-128 gives you far more flexibility and power than was available in the C-64. Not only is it possible to write assembly language programs for the C-128 mode, but you can write for the C-64 as well. As more and more people begin using the power of their monitor and mini-assemblers, we'll begin to see faster and more robust programs. ☐

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Circle 43 on Reader Service card.

A Holiday Greeting

Why rely on Hallmark? This program lets you use your C-64 to design and print out your own personalized Christmas cards.

By SCOTT CALAMAR

Once again, the holiday season is upon us, providing an annual opportunity to catch up on correspondence and renew ties with old friends.

The Christmas Card program uses custom characters to print greeting cards that will stand out from others on the mantle this holiday season. Last year, they sparked much more response from friends and family than store-bought cards. They provided a topic of conversation that continued long after the holidays had ended.

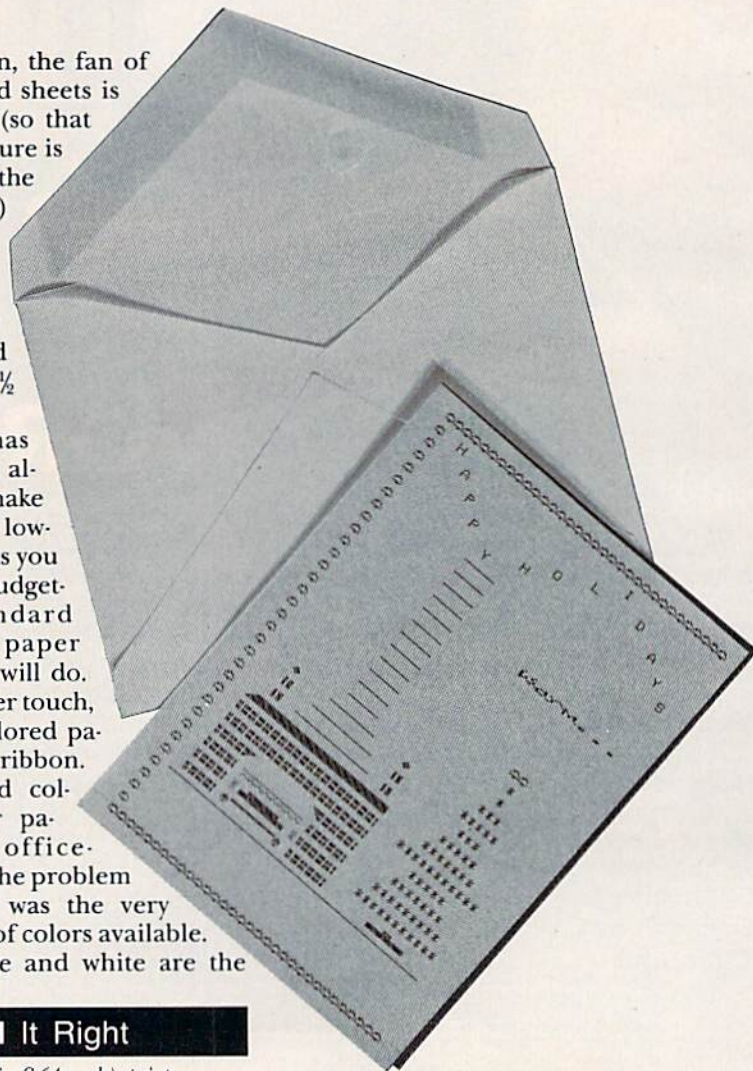
To prevent the usual yule-season writer's cramp, this program includes an option to personalize each card for each recipient. All you have to do is type in the name. Or, if you prefer, you can print by quantity instead. The program can accommodate 100 personalized cards with each printing; but, should you be more popular than that, simply change the Dimension statement in line 2 to the quantity you need.

Printing is a two-step process that (after folding) produces cards that open. To print the pictorial covers and interior text pages, paper is fed into the printer twice. First, the cover is printed on the lower right side of

each page. Then, the fan of attached printed sheets is turned around (so that the printed picture is upside down in the top-left corner) and fed into the printer again. The dimensions of the folded, finished card are $4\frac{1}{4}$ by $5\frac{1}{2}$ inches.

The Christmas Card program allows you to make your cards as low-cost or elegant as you like. For the budget-minded, standard white printer paper and black type will do. If you seek a finer touch, you can buy colored paper or a colored ribbon.

You can find colored computer paper at many office-supply stores. The problem I encountered was the very limited variety of colors available. Shades of beige and white are the



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most common; bold colors seem to be the most difficult to find. I settled for a warm shade of light blue. Colored paper is about four times as expensive as white fanfold, but the package of colored paper will last long after the holiday season is over. (Razor Edge Products manufactures 20-lb. continuous letterhead paper, as well as matching envelopes, in some colors.) If you plan to address the envelopes by hand, or print address labels, you can match the colored paper to reasonably priced envelopes sold at stationery stores.

Broderbund Software sells the most festive variety of colored computer paper. This company manufactures a home printing program (The Print Shop) for the Commodore 64. A package of this replacement paper is perfect, as it includes matching envelopes. But it's also quite expensive.

Colored ribbons are much more difficult to find. In fact, I couldn't find any for the 1525 printer, despite the fact that one or two manufacturers do advertise colored ribbons for all printers.

Getting Started

The Christmas Card program leads

you along each step of the way and provides time to set up your printer and paper.

First, type in the program, paying close attention to the correct symbols and numbers of spaces in the Print#4 statements. Be extra careful not to transpose numbers in the Data statements. Custom characters are used to create a border of holiday bells, the fire in the fireplace and the script print for the message. To simplify typing, you may omit the REM statements in the Data lines. They are provided in case you wish to use the script typeface in other programs.

Save the program to disk or tape before you run it, even though there are no New statements to wipe it from memory. The program is set up for tractor-feed or roll paper (continuous form paper). You can adapt it to printers that operate on a sheet-by-sheet basis by adding a pause subroutine after each sheet is printed. Simply insert WAIT 653,1 before the NEXTNO in lines 100 and 1100. The program will pause after each card to give you time to load the next sheet of paper. Press the shift-lock key to print the next page.

As the program instructs, load the

paper as you would for a word processor. The top-of-the-page perforation should line up with the top of the print head in the printer. The program is set for standard 8½" × 11-inch paper.

After you've loaded the paper and turned on the printer, the program will ask for your name. Type it in as you would like it to appear on the card. Each card will bear this "signature"; but if you'd rather sign them by hand, simply press the return key at this prompt. This will leave a blank space instead of printing a signature.

For my own purposes, I allowed the card to be inscribed and then I handwrote any message I wanted to include. Dedicated computerists may want to generate Christmas form letters with a word processor to inform more distant acquaintances of the year's activities.

Next, the program asks whether cards are to bear the names of recipients. If so, type in each one in the same way that you entered the signature. Press the return key after each family or household. I decided to include an error trapper at this point to catch spelling mistakes. The additional keystroke slows the process slightly, but it could cut down on wasted cards.

To end the list of names, press the return key. The computer will determine the number of cards you've planned and will print covers and interiors accordingly. If you choose not to enter the salutation, you will be asked for the number of cards you wish to print.

Your name and, if you choose, the names of friends and relatives, will be printed in standard Roman upper- and lowercase characters, so be sure to use capital letters where you want them. Your signature is limited to about 70 characters, so if you have a large family, you may want to sign "John, Mary and the children," rather than list all the names individually.

Also note that commas are handled in a special way. To place them between names, either in the signature or the salutation, enclose the line in quotes. Examples are given in the program.

Printing Your Cards

After you've provided the above information, the printing begins. First, the covers are run, and then the program illustrates how to turn the paper. The cover designs are printed at the bottom-right corner of each sheet of paper.

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9 on Reader Service card

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It is important, especially with the 1525 printer, to leave a blank piece of paper before you tear off the fan of completed covers and reinsert the paper for the second step. This last piece will serve as a lead sheet when printing the card interiors. The 1525 will not print at the top of the first piece of paper and invariably wastes a sheet.

Tear off the last sheet at the bottom perforation. Turn the entire fan of paper around so that the designs still face away from the ground but are now upside down in the top left-hand corner of the paper. (Turn the paper around but not over—both designs are printed on the same side of the full sheet.) This is illustrated as the

program runs. Line up the second piece of paper for printing (the first piece is the blank one you left at the end) and then hit the f1 key. The personalized interiors will be printed.

When this two-step process is completed, fold the cards in half horizontally between the printed sides, so that both sides face out. Then fold them in half vertically. This time, the picture should face out and the printing will be inside.

Making these Christmas cards is actually a simple process. Everything you need to know is included in the program.

The Christmas Card program is a fun and unique way to spread holiday cheer. To save even more time,

use a "phone book" database program to print out computerized labels, instead of addressing all the envelopes by hand. Just think—the time you save can be spent in line at your favorite store waiting to pay for this year's equivalent of the Cabbage Patch dolls.

If you'd rather not type in the program, send me a blank disk or cassette, self-addressed stamped envelope and \$3. Santa's elves will send you a copy.

Well, Merry Christmas to all, and to all a good byte. [R]

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

Listing 1. Christmas Card program.

```

1 REM XMAS CARD BY SCOTT CALAMAR      :REM*59
2 CLR:RESTORE:DIMQ$(100):TV=53281:SB=53280:
  PRINTCHR$(14)                        :REM*156
3 POKETV,2:POKESB,5:PRINT"{SHFT CLR}":FOR$F
  =1TO10:PRINT"{CTRL 2}****";:NEXTSF
                                        :REM*247
4 GOSUB400:GOSUB1400:GOSUB1300:GOSUB1200
                                        :REM*180
5 POKETV,2:POKESB,5:PRINT"{SHFT CLR}{2 CRSR
  DNS}{CTRL 8}{SHFT P)RESS {SHFT F)1 {SHFT
  K}{SHFT E}{SHFT Y} TO {SHFT P){SHFT R){S
  HFT I){SHFT N){SHFT T}"
                                        :REM*17
6 GETP$:IFP$<>"{FUNCT 1}"THEN6        :REM*168
7 PRINT"{CRSR DN}{CTRL 1}{SHFT P)RINTING CO
  VERS{2 CRSR DNS}{CTRL 3}"
                                        :REM*105
8 FORNO=1TOHW:PRINT"{CRSR UP){SHFT O)NLY {C
  CTRL 2}"HW-NO+1"{COMD 6} MORE CARD(S) TO G
  O!":IFHW<1THEN110
                                        :REM*230
9 OPEN4,4:FORD=1TO16:PRINT#4,CHR$(10):NEXTD
                                        :REM*129
10 PRINT#4,TAB(40);:FORW=1TO32:PRINT#4,CHR$
  (8)BE$;LL$;:NEXTW:GOSUB213:GOSUB301
                                        :REM*98
11 FORCH=1TO3:GOSUB212:PRINT#4,SPC(10)"{4 S
  HFT *s}":NEXTCH
                                        :REM*73
12 GOSUB212:PRINT#4,SPC(10)"{4 SHFT *s}"CHR
  $(14);
                                        :REM*170
14 PRINT#4,SPC(4)CHR$(8)W$;A$;R$;M$;:PRINT#
  4,CHR$(14)"...CHR$(15)
                                        :REM*138
15 FORCH=1TO4:GOSUB212:PRINT#4,SPC(10)"{4 S
  HFT *s}":NEXTCH
                                        :REM*77
16 GOSUB212:PRINT#4,SPC(10)"{4 SHFT *s}"SPC
  (14)CHR$(8)BE$;LL$;BE$;LL$CHR$(15)
                                        :REM*12
18 GOSUB212:PRINT#4,SPC(10)CHR$(15)"{4 SHFT
  *s}"SPC(15)"*
                                        :REM*68
20 GOSUB212:PRINT#4,SPC(10)"{4 SHFT *s}"SPC
  (15)"*
                                        :REM*154
22 GOSUB212:PRINT#4,SPC(10)"{4 SHFT *s}"SPC
  (14)"****
                                        :REM*240
24 GOSUB212:PRINT#4,SPC(4)"{SHFT Z}"SPC(4)"
  {6 SHFT *s}{4 SPACES}{SHFT Z}{7 SPACES}*
  ****
                                        :REM*66
26 GOSUB212:PRINT#4,SPC(4)"{CTRL 9){SHFT B)
  {CTRL 0}"SPC(3)"{8 SHFT *s}"SPC(3)"{CTRL
  9){SHFT B){CTRL 0}"SPC(8)"****
                                        :REM*34

```

```

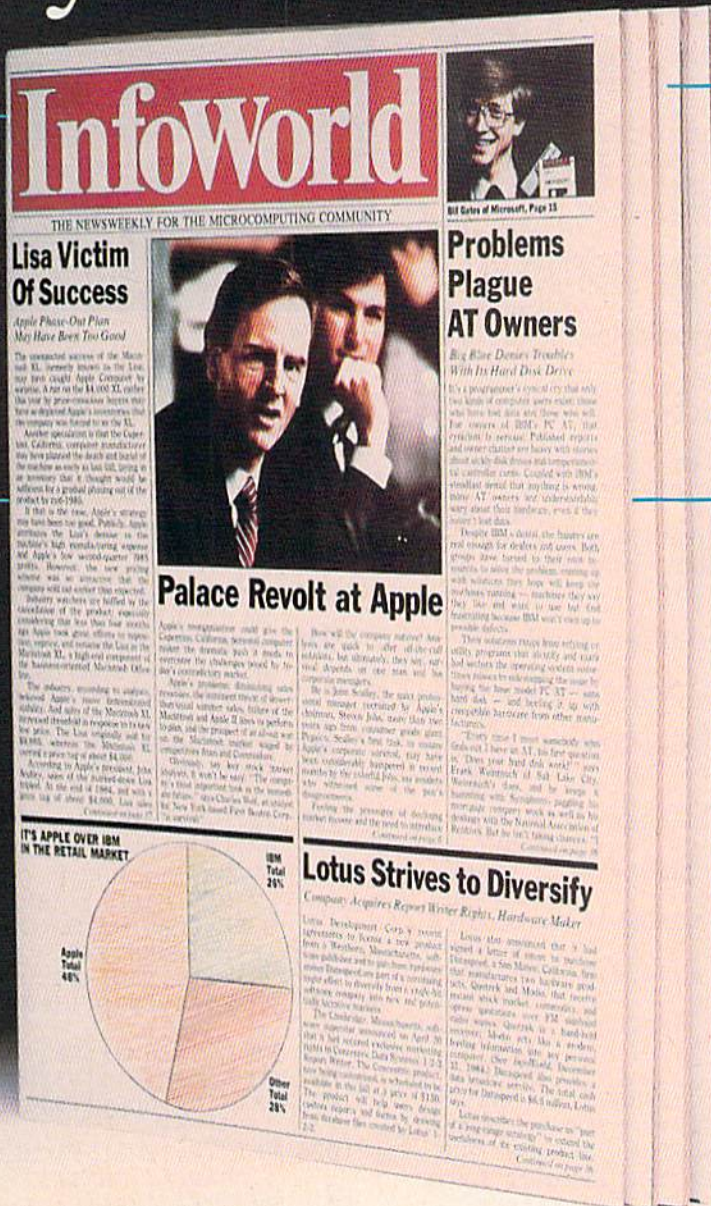
28 GOSUB212:PRINT#4,SPC(4)"{CTRL 9){SHFT B)
  {CTRL 0}"SPC(2)"{10 SHFT *s}"SPC(2)"{CTR
  L 9){SHFT B){CTRL 0}"SPC(7)"*****"
                                        :REM*136
30 GOSUB212:PRINT#4,SPC(2)"{CTRL 9){SHFT LB
  .}{18 SPACES}{CTRL 0}"SPC(5)"*****"
                                        :REM*36
32 GOSUB212:PRINT#4,SPC(2)"{CTRL 9){19 SHFT
  +s){CTRL 0}"SPC(3)"*****"
                                        :REM*112
34 GOSUB212:PRINT#4,SPC(2)"{CTRL 9){19 SHFT
  +s){CTRL 0}"SPC(6)"*****"
                                        :REM*248
36 GOSUB212:PRINT#4,SPC(2)"{CTRL 9){4 SHFT
  +s){CTRL 0){SHFT LB.){8 SPACES}{COMD *}{
  CTRL 9){5 SHFT +s){CTRL 0}"SPC(5)"*****
  "
                                        :REM*178
38 GOSUB212:PRINT#4,SPC(2)"{CTRL 9){4 SHFT
  +s){CTRL 0} ";:FORW=1TO8:PRINT#4,CHR$(8)
  FI$;:NEXTW
                                        :REM*118
39 PRINT#4,CHR$(15)" {CTRL 9){5 SHFT +s){CT
  RL 0}"SPC(4)"*****"
                                        :REM*197
40 GOSUB212:PRINT#4,SPC(2)"{CTRL 9){4 SHFT
  +s){CTRL 0} {COMD -){COMD I){CTRL 9){4 S
  PACES}{CTRL 0){COMD I} {COMD -){CTRL 9){
  5 SHFT +s){CTRL 0}"SPC(3)"*****"
                                        :REM*48
42 GOSUB212:PRINT#4,SPC(2)"{CTRL 9){4 SHFT
  +s){CTRL 0} {SHFT A){6 COMD Us){SHFT A)
  {CTRL 9){5 SHFT +s){CTRL 0}"SPC(6)"{2 CO
  MD Is){CTRL 9} {CTRL 0}{2 COMD Is}
                                        :REM*12
44 GOSUB212:PRINT#4," {34 COMD Ys}"
                                        :REM*56
48 FORL=1TO3:GOSUB213:NEXTL
                                        :REM*152
49 PRINT#4,TAB(40);:FORW=1TO32:PRINT#4,CHR$
  (8)BE$;LL$;:NEXTW
                                        :REM*81
50 PRINT#4,CHR$(15)CHR$(10)
                                        :REM*224
100 CLOSE4:NEXTNO
                                        :REM*184
110 PRINT"{SHFT CLR){CTRL 2){5 CRSR DNS){SH
  FT T)HE COVER IS FINISHED!"
                                        :REM*170
120 PRINT"{CRSR DN){SHFT N)OW, TEAR OFF THE
  PRINTED":PRINT"PAPER LEAVING ONE BLANK
  SHEET"
                                        :REM*152
122 PRINT"AFTER THE LAST CARD..."
                                        :REM*232
125 PRINT"{2 CRSR DNS){SHFT H)IT {SHFT R){S
  HFT E){SHFT T){SHFT U){SHFT R){SHFT N)
  WHEN READY":INPUTPV$
                                        :REM*99
127 PRINT"{SHFT CLR){CRSR DN){SHFT G)OOD. {
  SHFT N)OW TURN THE CONNECTED SHEETS":PR
  INT"SO THAT THE DESIGN"
                                        :REM*163
128 PRINT"YOU JUST PRINTED IS FACING OUT, B
  UT":PRINT"IS NOW IN THE"
                                        :REM*206

```


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Listing 1 continued.

```
130 PRINT"UPPER LEFT-HAND CORNER OF THE PAP
ER..." :REM*236
131 PRINTSPC(12)"{CRSR DN}{UP ARROW}{2 SPAC
Es}{UP ARROW}{2 SPACES}{UP ARROW}"
:REM*105
132 PRINT"{7 COMD @s}{5 SPACES}{8 COMD @s}"
:REM*24
134 PRINT"{COMD G}{5 SPACES}{COMD M}{5 SPAC
Es}{3 COMD +s}{4 SPACES}{COMD M}"
:REM*38
136 PRINT"{COMD G}{5 SPACES}{COMD M}{5 SPAC
Es}{3 COMD +s}{4 SPACES}{COMD M}"
:REM*40
138 PRINT"{COMD G}{5 SPACES}{COMD M}{5 SPAC
Es}{COMD G}{6 SPACES}{COMD M}" :REM*2
140 PRINT"{COMD G}{3 SPACES}{3 COMD +s}{5 S
PACES}{COMD G}{6 SPACES}{COMD M}"
:REM*148
142 PRINT"{COMD G}{3 SPACES}{3 COMD +s}{5 S
PACES}{COMD G}{6 SPACES}{COMD M}"
:REM*150
144 PRINT"{7 COMD Ts}{5 SPACES}{8 COMD Ts}"
:REM*44
145 PRINT"{SHFT A}S{11 SPACES}{SHFT I}NSERT
":PRINT"PRINTED{6 SPACES}LIKE THIS"
:REM*249
148 PRINT"{2 CRSR DNs}{SHFT L}INE TOP OF PA
PER WITH FIRST":PRINT"UPSIDE-DOWN DESIG
N" :REM*156
149 PRINT"WITH PRINTER HEAD":PRINT"{SHFT H}
IT {SHFT R}{SHFT E}{SHFT T}{SHFT U}{SHF
T R}{SHFT N} WHEN READY" :REM*27
150 INPUTPV$:GOTO1000 :REM*62
212 PRINT#4,TAB(40)CHR$(8)BE$;LL$;CHR$(15);
:RETURN :REM*50
213 PRINT#4,TAB(40)CHR$(8)BE$;LL$;CHR$(15);
:RETURN :REM*233
214 PRINT#4,CHR$(16)"79"CHR$(8)BE$;LL$;CHR$
(15):RETURN :REM*44
215 RETURN :REM*17
301 GOSUB212:PRINT#4,"{2 SPACES}H{22 SPACES
}I :REM*218
302 GOSUB212:PRINT#4,"{4 SPACES}A{17 SPACES
}L{5 SPACES}D :REM*89
304 GOSUB212:PRINT#4,"{6 SPACES}P{11 SPACES
}O{12 SPACES}A" :REM*31
305 GOSUB212:PRINT#4,"{8 SPACES}P{6 SPACES}
H{17 SPACES}Y" :REM*64
306 GOSUB212:PRINT#4,"{11 SPACES}Y{23 SPACE
s}S" :REM*127
310 RETURN :REM*113
400 PRINT"{5 SPACES}{SHFT C}{SHFT H}{SHFT R
}{SHFT I}{SHFT S}{SHFT T}{SHFT M}{SHFT
A}{SHFT S}{SHFT C}{SHFT A}{SHFT R}{SHF
T D}{SHFT M}{SHFT A}{SHFT K}{SHFT E}{S
HFT R}":PRINT"{5 SPACES}{CTRL 8}{SHFT P
}ART 1 - {SHFT C}OVER" :REM*239
402 PRINT"{CRSR DN}{CTRL 2}{SHFT I}NSERT BL
ANK PAPER":PRINT"INTO YOUR {SHFT C}OMMO
DORE" :REM*47
403 PRINT"PRINTER SO THAT" :REM*128
404 PRINT"THE TOP OF THE FIRST SHEET":PRINT
"LINE UP WITH THE" :REM*31
405 PRINT"PRINT HEAD.":PRINT"{CTRL 1}{2 CRS
R DNs}{SHFT R}EMEMBER TO {SHFT T}{SHFT
U}{SHFT R}{SHFT N}{SHFT O}{SHFT N}{SH
FT P}{SHFT R}{SHFT I}{SHFT N}{SHFT T}{S
HFT E}{SHFT R}!" :REM*130
410 PRINT"{2 CRSR DNs}{COMD 6}{SHFT H}IT {C
TRL 9}{CTRL 8}{SHFT R}{SHFT E}{SHFT T}{
SHFT U}{SHFT R}{SHFT N}{CTRL 0}{COMD 6}
WHEN READY!":INPUTPV$:RETURN :REM*69
1000 POKESB,2:POKETV,5:PRINT"{SHFT CLR}":FO
RT=1TO10:PRINT"{CTRL 2}****";:NEXTT
:REM*223
```

CHRISTMAS CARD MAKER
Part 1 - Cover

Insert blank paper
into your Commodore
printer so that
the top of the first sheet
lines up with the
print head.

Hit RETURN when ready!

```
1001 PRINT"{CRSR DN}{CTRL 2}{SHFT X}{SHFT M
}{SHFT A}{SHFT S}{SHFT C}{SHFT A}{SHF
T R}{SHFT D} -- {SHFT I}NTERIOR--"
:REM*228
1002 PRINT"{2 CRSR DNs}{SHFT H}IT {CTRL 1}{
SHFT F}1 {SHFT K}{SHFT E}{SHFT Y}{CTRL
2} WHEN READY TO PRINT INTERIORS"
:REM*155
1003 GETF1$:IFF1$<>"{FUNCT 1}"THEN1003
:REM*188
1006 OPEN4,4:PRINT"{SHFT CLR}{2 CRSR DNs}{S
HFT P}{SHFT R}{SHFT I}{SHFT N}{SHFT T}
{SHFT I}{SHFT N}{SHFT G}{2 CRSR DNs}":
POKESB,2:POKETV,5 :REM*111
1007 FORNO=1TOHW:IFHW<1THEN1110 :REM*218
1008 FORD=1TO19:PRINT#4,CHR$(10):NEXTD
:REM*255
1009 PRINT"{SHFT CLR}{2 CRSR DNs}{CTRL 2}{S
HFT P}{SHFT R}{SHFT I}{SHFT N}{SHFT T}
{SHFT I}{SHFT N}{SHFT G}{2 CRSR DNs}":
PRINT"{CTRL 1}{SHFT O}NLY "(HW-NO)+1"
MORE CARD(S) TO GO!!" :REM*28
1010 IFTZ=1THEN1350 :REM*207
1011 PRINT#4,TAB(45)CHR$(13) :REM*22
1013 PRINT#4,CHR$(13)CHR$(13)CHR$(13)
:REM*136
1015 PRINT#4,CHR$(15)TAB(52)"...";:PRINT#4,
CHR$(8)W$;I$;S$;H$;E$;S$ :REM*132
1016 PRINT#4,CHR$(15)CHR$(13)CHR$(13)
:REM*141
1020 PRINT#4,TAB(55)CHR$(8)F$;O$;R$;:PRINT#
4,CHR$(15)CHR$(32); :REM*3
1022 PRINT#4,CHR$(8)A$:PRINT#4,CHR$(15)CHR$
(13)CHR$(13) :REM*65
1024 PRINT#4,TAB(52)CHR$(8)GC$;L$;O$;WS$;I$
;N$;G$ :REM*202
1025 PRINT#4,CHR$(15)CHR$(13)CHR$(13)
:REM*151
1026 PRINT#4,TAB(48)CHR$(8)HC$;O$;L$;I$;D$;
A$;Y$;:PRINT#4,CHR$(15)CHR$(32);
:REM*100
1028 PRINT#4,CHR$(8)SC$;E$;A$;S$;O$;N$
:REM*248
1030 PRINT#4,CHR$(15)CHR$(13)CHR$(13)CHR$(1
3) :REM*46
1032 PRINT#4,CHR$(17)TAB(MA)SIG$CHR$(145)
:REM*14
1050 FORT=1TO3:PRINT#4,CHR$(10):NEXTT
:REM*170
1100 NEXTNO :REM*192
1110 PRINT"{SHFT CLR}{CTRL 1}{5 CRSR DNs}{S
HFT F}INISHED!":CLOSE4 :REM*140
```


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Listing 1 continued.

- 1112 PRINT"{SHFT CLR}{CTRL 1}{SHFT N}OW YOU MAY SEPARATE THE CARDS AND{6 SPACES}F OLD EACH LIKE THIS:" :REM*4
- 1114 PRINTSPC(8)"{16 COMD Ps}" :REM*62
- 1116 FORL=1TO7:PRINTSPC(8)"{7 COMD +s}"SPC(8)"{COMD N}":NEXTL :REM*232
- 1117 PRINTSPC(10)"{6 CRSR UPS}{CTRL 7}{3 UP ARROWS}" :REM*225
- 1118 PRINTSPC(8)"{SHFT U}PSIDE-":PRINTSPC(9)"DOWN":PRINTSPC(8)"{SHFT P}ICTURE{2 CRSR DNs}{CTRL 1}" :REM*148
- 1120 PRINTSPC(8)"{COMD H}{CTRL 2}-----{CTRL 1}{COMD N}" :REM*4
- 1122 PRINTSPC(8)"{COMD H}{14 SPACES}{COMD N}" :REM*50
- 1124 FORL=1TO6:PRINTSPC(8)"{COMD H}{7 SPACE s}{7 COMD +s}{COMD N}":NEXTL :REM*112
- 1126 PRINTSPC(8)"{16 COMD Ys}" :REM*74
- 1128 PRINT"{5 CRSR UPS}"SPC(16)"{CTRL 7}... {SHFT W}ARM":PRINTSPC(17)"{SHFT W}ISHE S":PRINTSPC(16)"{SHFT M}ESSAGE" :REM*174
- 1130 PRINT"{8 CRSR UPS}"SPC(33)"{CTRL 2}{CT RL 9}1":PRINTSPC(24)"{LEFT ARROW}{SHFT F}OLD HERE {SHFT F}{SHFT I}{SHFT R}{S HFT S}{SHFT T}" :REM*254
- 1132 PRINT"{7 CRSR DNs}{2 SPACES}{CTRL 9}1{ CTRL 0}{2 SPACES}- {SHFT H}OLD SHEET L IKE THIS AND FOLD" :REM*170
- 1134 PRINT"{7 SPACES}THE TOP HALF DOWN {SHF T A}{SHFT W}{SHFT A}{SHFT Y} FROM YOU" :REM*54
- 1136 PRINT"{CRSR DN}{CTRL 8}{SHFT H}IT {SHF T R}{SHFT E}{SHFT T}{SHFT U}{SHFT R}{S HFT N} WHEN READY":INPUTPV\$:REM*12
- 1140 PRINT"{SHFT CLR}{CRSR DN}{CTRL 1}{SHFT C}ARD SHOULD LOOK LIKE THIS TO YOU NO W:" :REM*160
- 1141 PRINT"{SHFT C}OVER IS ON THE LEFT FACI NG":PRINT"AWAY FROM YOU" :REM*199
- 1142 PRINTSPC(8)"{CRSR DN}{16 COMD Ps}" :REM*242
- 1144 PRINTSPC(8)"{COMD H}{6 SPACES}{CTRL 2} {SHFT -}{CTRL 1}{7 SPACES}{COMD N}" :REM*26
- 1146 FORL=1TO6:PRINTSPC(8)"{COMD H}{6 SPACE s}{CTRL 2}{SHFT -}{CTRL 1}{7 COMD +s}{ COMD N}":NEXTL :REM*164
- 1148 PRINTSPC(8)"{16 COMD Ys}" :REM*96
- 1150 PRINT"{5 CRSR UPS}"SPC(16)"{CTRL 7}... {SHFT W}ARM":PRINTSPC(17)"{SHFT W}ISHE S":PRINTSPC(16)"{SHFT M}ESSAGE" :REM*196
- 1152 PRINT"{2 CRSR DNs}"SPC(15)"{CTRL 2}{UP ARROW}":PRINTSPC(8)">>>>{3 SPACES}{CT RL 9}2{CTRL 0}" :REM*234
- 1153 PRINTSPC(15)"{CRSR DN}{SHFT N}OW FOLD IN HALF HERE" :REM*105
- 1154 PRINTSPC(15)"PULLING COVER TOWARD YOU" :PRINTSPC(15)"SO MESSAGE PAGE IS" :REM*70
- 1156 PRINTSPC(15)"INSIDE AND YOU'RE LOOKING ":PRINTSPC(15)"{CRSR UP}AT THE COVER." :REM*186
- 1160 PRINT"{CRSR DN}{CTRL 7}{SHFT H}IT {SHF T R}{SHFT E}{SHFT T}{SHFT U}{SHFT R}{S HFT N} WHEN DONE.":INPUTPV\$:REM*24
- 1164 PRINT"{SHFT CLR}{2 CRSR DNs}{CTRL 1}{S HFT T}HAT WASN'T SO HARD, WAS IT?" :REM*126
- 1172 PRINT"{2 CRSR DNs}{CTRL 2}{SHFT H}IT { CTRL 9}{SHFT F}1{CTRL 0} KEY TO MAKE M ORE CARDS" :REM*166
- 1174 PRINT"{2 CRSR DNs}{CTRL 7}{SHFT A}NY O THER KEY WILL RESET COMPUTER BUT{3 SPA CES}WON'T ERASE PROGRAM" :REM*86

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Listing 1 continued.

```

1176 GETEN$:IFEN$=""THEN1176      :REM*112
1178 IFEN$="{FUNCT 1}"THENRUN     :REM*216
1180 PRINT"{CTRL 2}{4 CRSR DN$}{SHFT M}{SHF
T E}{2 SHFT R$}{SHFT Y}{SHFT SPACE}{SH
FT C}{SHFT H}{SHFT R}{SHFT I}{SHFT S}{
SHFT T}{SHFT M}{SHFT A}{SHFT S}, "SIG$
      :REM*208
1185 FORT=1TO2000:NEXT            :REM*45
1190 POKE53280,14:POKETV,6:PRINT"{CTRL 2}{S
HFT CLR}"CHR$(142):END          :REM*104
1200 PRINT"{2 CRSR DN$}{SHFT T}{SHFT H}{SHF
T A}{SHFT N}{SHFT K}{SHFT SPACE}{SHFT
Y}{SHFT O}{SHFT U}"            :REM*176
1201 FORC=1TO6:READFI:FI$=FI$+CHR$(FI):NEXT
C                                :REM*13
1202 FORC=1TO6:READW:W$=W$+CHR$(W)+CHR$(W):
NEXTC                            :REM*28
1204 FORC=1TO6:READA:A$=A$+CHR$(A)+CHR$(A):
NEXTC                            :REM*202
1206 FORC=1TO6:READR:R$=R$+CHR$(R)+CHR$(R):
NEXTC                            :REM*224
1207 FORC=1TO6:READM:M$=M$+CHR$(M)+CHR$(M):
NEXTC                            :REM*155
1208 FORC=1TO6:READBE:BE$=BE$+CHR$(BE):NEXT
C                                :REM*70
1209 FORC=1TO6:READLL:LL$=LL$+CHR$(LL):NEXT
C                                :REM*229
1210 FORC=1TO6:READI:I$=I$+CHR$(I)+CHR$(I):
NEXTC                            :REM*4
1212 FORC=1TO6:READS:S$=S$+CHR$(S)+CHR$(S):
NEXTC                            :REM*140
1214 FORC=1TO6:READH:H$=H$+CHR$(H)+CHR$(H):
NEXTC                            :REM*98
1216 FORC=1TO6:READE:E$=E$+CHR$(E)+CHR$(E):
NEXTC                            :REM*112
1218 FORC=1TO6:READF:F$=F$+CHR$(F)+CHR$(F):
NEXTC                            :REM*26
1220 FORC=1TO6:READO:O$=O$+CHR$(O)+CHR$(O):
NEXTC                            :REM*246
1222 FORC=1TO6:READGC:GC$=GC$+CHR$(GC)+CHR$(
GC):NEXTC                       :REM*204
1224 FORC=1TO6:READL:L$=L$+CHR$(L)+CHR$(L):
NEXTC                            :REM*6
1226 FORC=1TO6:READWS:WS$=WS$+CHR$(WS)+CHR$(
WS):NEXTC                       :REM*20
1228 FORC=1TO6:READN:N$=N$+CHR$(N)+CHR$(N):
NEXTC                            :REM*88
1230 FORC=1TO6:READG:G$=G$+CHR$(G)+CHR$(G):
NEXTC                            :REM*204
1232 FORC=1TO6:READHC:HC$=HC$+CHR$(HC)+CHR$(
HC):NEXTC                       :REM*160
1234 FORC=1TO6:READD:D$=D$+CHR$(D)+CHR$(D):
NEXTC                            :REM*220
1236 FORC=1TO6:READY:Y$=Y$+CHR$(Y)+CHR$(Y):
NEXTC                            :REM*138
1238 FORC=1TO6:READSC:SC$=SC$+CHR$(SC)+CHR$(
SC):NEXTC:RETURN                :REM*232
1300 HW=0:PRINT"{SHFT CLR}{3 CRSR DN$}{SHFT
D}O YOU WANT EACH CARD PERSONALIZED W
ITH"                              :REM*229
1301 PRINT"THE NAMES OF RECIPIENTS? (Y/N)?"
:NN=0                             :REM*154
1302 GETZZ$:IFZZ$=""THEN1302     :REM*105
1304 IFZZ$<>"Y"THENIFZZ$<>"N"THEN1302
      :REM*243
1305 IFZZ$="N"THENPRINT"{2 CRSR DN$}{SHFT H
}OW MANY CARDS?":INPUTPG$:HW=VAL(PG$):
TZ=0:RETURN                      :REM*64
1310 POKETV,1:PRINT"{SHFT CLR}{CRSR DN}{CTR
L 6}{SHFT O}KAY, TYPE IN THEIR FIRST N
AMES":TZ=1:NN=0                 :REM*67
1311 PRINT"{SHFT T}HEN PRESS {SHFT R}{SHFT
E}{SHFT T}{SHFT U}{SHFT R}{SHFT N}"
      :REM*66
    
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Listing 1 continued.

```

1312 PRINT"{CTRL 7}{CRSR DN}{SHFT T}HE '{SH
FT D)EAR' AND FINAL COMMA WILL{9 SPACE
s}BE ON THE CARD." :REM*147
1313 PRINT"{CTRL 5}{CRSR DN}{SHFT F}OR EXAM
PLE, TYPE: {COMD 1}{SHFT B}OB & {SHFT
M}ARY{CTRL 5} AND HIT{3 SPACES}{SHFT R
}{SHFT E}{SHFT T}{SHFT U}{SHFT R}{SHFT N
}" :REM*110
1315 PRINT"{CRSR DN}{COMD 4}{SHFT I}F YOU N
EED COMMAS BETWEEN NAMES ON A";:REM*32
1316 PRINT"{3 SPACES}CARD PUT THE LINE IN Q
UOTES" :REM*97
1317 PRINT"{SHFT E}XAMPLE, TYPE {CTRL 6}"CH
R$(34)"{SHFT J}OHN, {SHFT M}ARY AND CH
ILDREN"CHR$(34) :REM*48
1318 PRINT"{CRSR DN}{SHFT P}RESS {SHFT R}{S
HFT E}{SHFT T}{SHFT U}{SHFT R}{SHFT N}
AND NOTHING ELSE":PRINT"TO END LIST"
:REM*91
1319 PRINT"{CRSR DN}{CTRL 3}{CTRL 9}{SHFT D
}EAR{CTRL 0}" :REM*232
1320 NN=NN+1:Q$="":INPUT"{CTRL 3}";Q$(NN):I
FQ$(NN)="THENHW=NN-1:RETURN :REM*61
1322 PRINT"{CRSR UP}{CTRL 5}{CTRL 9}{2 SPAC
Es}"Q$(NN)"{2 SPACES}"SPC(5)"{CTRL 0}{
CTRL 7}{SHFT C}ORRECT? (Y/N)" :REM*161
1326 GETXX$:IFXX$="THEN1326 :REM*95
1328 IFXX$<>"Y"THENIFXX$<>"N"THEN1326
:REM*37
1330 IFXX$="N"THENQ$(NN)="":NN=NN-1:PRINT"{
CRSR UP}{CTRL 1}{SHFT T}{SHFT R}{SHFT
Y}{SHFT A}{SHFT G}{SHFT A}{SHFT I}{SH
FT N}:{22 SPACES}" :REM*177
1340 GOTO1320 :REM*119
1350 PRINT#4,CHR$(15)TAB(41)CHR$(17)"{SHFT
D)EAR "Q$(NO)",CHR$(145) :REM*161
1352 PRINT"{SHFT P}RINTING CARD FOR "Q$(NO)
"{8 SPACES}":PRINT"{2 CRSR UPS}":GOTO1
013 :REM*93
1400 PRINT"{SHFT CLR}{2 CRSR DNS}{CTRL 2}{S
HFT H}OW WOULD YOU LIKE TO SIGN THE CA
RDS?" :REM*61
1402 PRINT"{CRSR DN}{SHFT U}SE CAPITAL AND
SMALL LETTERS" :REM*53
1404 PRINT"{CRSR DN}{SHFT I}F YOU NEED TO U
SE COMMAS, ENCLOSE THE{2 SPACES}LINE I
N QUOTES" :REM*23
1406 PRINT"{2 CRSR DNS}{SHFT E}XAMPLE: {SHF
T T}YPE IN {COMD 6}{SHFT J}OHN & {SHFT
M}ARY {SHFT S}MITH" :REM*141
1408 PRINT"{CRSR DN}{CTRL 2}{SHFT O}R{COMD
6} "CHR$(34)"{SHFT J}OHN, {SHFT M}ARY
& THE {SHFT S}MITH FAMILY"CHR$(34)
:REM*65
1410 SIG$="":INPUT"{CTRL 1}{2 CRSR DNS}";SI
G$:IFSIG$="THEN1412{2 SPACES}"
:REM*195
1411 PRINT"{CRSR UP}{CTRL 9}{CTRL 8}{2 SPAC
Es}"SIG${2 SPACES}" :REM*4
1412 PRINT"{COMD 8}{SHFT C}ORRECT? (Y/N)":
:REM*145
1414 GETXX$:IFXX$="THEN1414 :REM*173
1416 IFXX$<>"Y"THENIFXX$<>"N"THEN1414
:REM*249
1418 IFXX$="N"THEN1410 :REM*119
1420 SG=LEN(SIG$):IFSG>70THENPRINT"{CTRL 9}
TOO LONG!":GOTO1410 :REM*7
1422 MA=(75-SG):RETURN :REM*157
1502 DATA194,164,146,164,194,164:REMFIRE
:REM*27
1504 DATA254,161,152,160,230,153:REM-W-
:REM*209
1506 DATA160,240,200,200,188,192:REM SMALL
A :REM*53
1508 DATA196,184,132,130,132,136:REM SMALL
R :REM*173
1510 DATA252,136,176,136,188,192:REM SMALL
M :REM*201
1511 DATA0,48,168,166,166,227,226,166,168,4
8,0,0:REM BELL :REM*0
1512 DATA192,160,154,250,192,192:REM SMALL
I :REM*87
1514 DATA192,200,212,212,164,132:REM SMALL
S :REM*123
1516 DATA132,255,136,136,248,192:REM SMALL
H :REM*167
1518 DATA192,252,228,212,204,160:REM SMALL
E :REM*229
1520 DATA 0,254,145,145,145,146:REM SMALL F
:REM*143
1522 DATA144,184,196,196,188,144:REM SMALL
O :REM*37
1524 DATA132,190,193,209,241,246:REM CAP G
:REM*47
1526 DATA192,160,254,201,199,160:REM SMALL
L :REM*73
1528 DATA184,196,176,192,184,196:REM SMALL
W :REM*225
1530 DATA136,248,132,132,248,192:REM SMALL
N :REM*189
1532 DATA 204,212,210,210,252,144:REM SMALL
G :REM*171
1534 DATA193,255,136,136,255,193:REM CAP H
:REM*75
1536 DATA184,196,196,200,254,193:REM SMALL
D :REM*42
1538 DATA144,204,208,208,188,0:REM SMALL Y
:REM*150
1540 DATA166,201,201,201,201,177:REM CAP S
:REM*220

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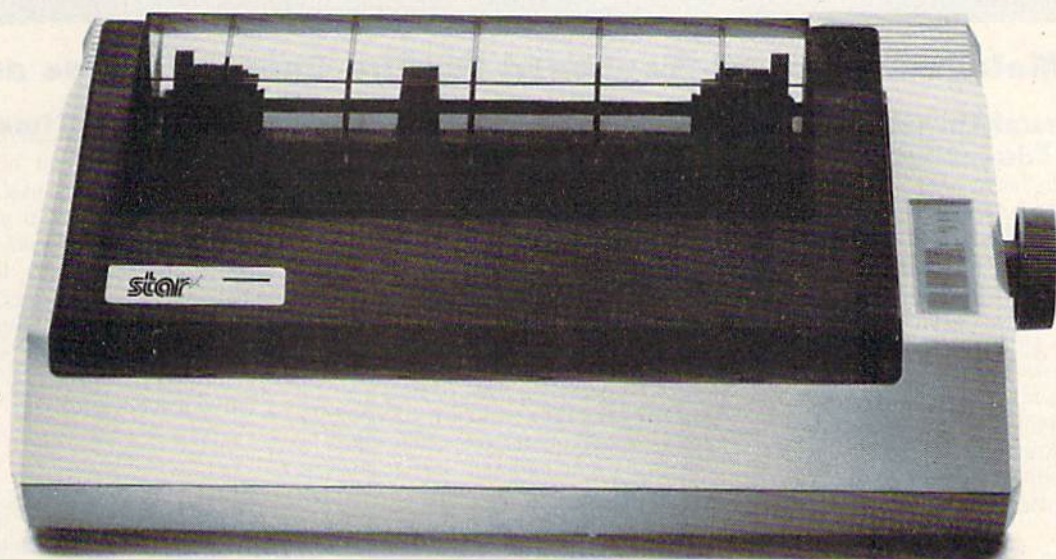
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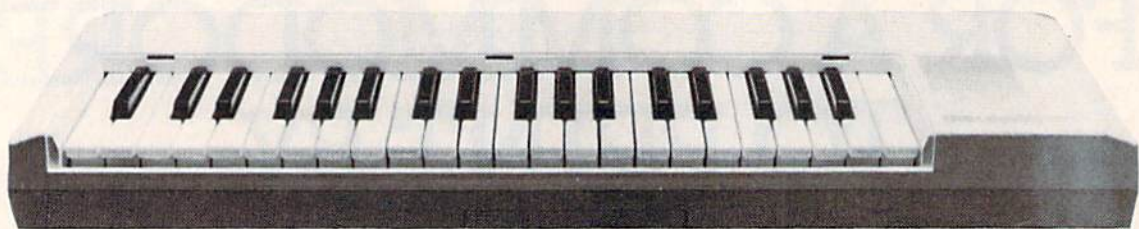
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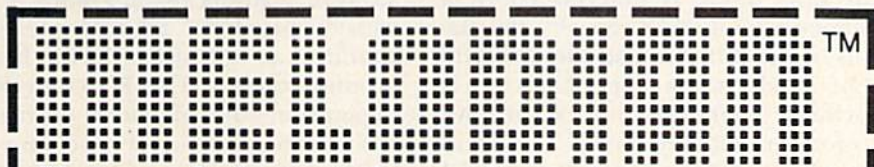
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C-64 Color Expansion

Finally, an adequate, easy-to-understand explanation of the C-64's Extended Background Color mode, which lets you create spectacular text displays.

By LOUIS F. SANDER

The C-64's Extended Background Color (EBC) mode is like the glyphs on Pharaoh's tomb: terribly intriguing, but incomprehensible to anyone but a high priest or a Ph.D. And that's a shame, since EBC mode is an easy-to-use feature that can add color, flash and finish to even the simplest program.

As with so many computer features, the difficulty lies not with the feature itself, but with the explanations its creators have written for it. I hope what we have on these pages is a Rosetta stone that can open the EBC mode for use by every C-64 programmer.

What EBC Mode Does

EBC mode allows expanded use of color in C-64 text displays. When working with EBC mode, the programmer has independent control of the print and background colors for every character on the screen. All 16 C-64 colors can be used in any combination, but only four different background colors can be active at one time. As a programmer, you can think of EBC mode as a super-enhanced reverse-field capability, and you can use it to create spectacular text presentations.

I've emphasized the word *text*, because enabling EBC mode *disables* all the graphics characters that appear on the front surfaces of your keys. It also disables the shifted versions of the characters A through Z, so you

can use either upper- or lowercase letters, but not both together on the same screen. As in normal background mode, you select upper- or lowercase by pressing the shift and Commodore keys simultaneously, or by printing CHR\$(14) or CHR\$(142).

The print color of any character in EBC mode is determined as it is in normal background mode: When printing a character, its color depends on the currently effective print color; when Poking a character, its color depends on the contents of the appropriate location in color memory.

The *background* color of a character in EBC mode is determined in a somewhat unusual way—by the status of the shift key and the RVS On/Off mode when the character is printed. There are four background colors, numbered from 0–3, and here's how they're tied to the printed character:

Character	Bkgd Color#
RVS off, unshifted	0
RVS off, shifted	1
RVS on, unshifted	2
RVS on, shifted	3

In EBC mode, shift and RVS on/off control the background on which the character is printed, but they have no effect on the character itself. The character will appear unshifted and in its normal color, on a back-

ground color selected by the shift and/or RVS keys.

If you print an unshifted light blue A, it will appear as a light blue A on background color 0. (Whether it's upper- or lowercase, of course, will depend on the currently active character set.) If you print a *shifted* light blue A, it will show up as an *unshifted* light blue A on background color 1. If you print the same two characters with RVS enabled, they'll show up as unshifted light blue A's on background colors 2 and 3, respectively.

These rules also apply when you Poke the characters to the screen instead of printing them. Poking a reversed shifted "X," for example, will produce an unshifted X on background color 3. The X's color will depend on color memory; on many 64s, this means that the X's color will be the same as the screen color, unless something else has been put into color memory. But because of the different background color, you can see the X!

The background colors are determined by Poking locations 53281–53284 with color values selected from the list on p. 61 of your C-64's user's guide. You can Poke the following locations with any color you'd like, but these values are automatically put there when you turn on the power or when you press the stop/restore key combination.

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Bkgd Color#	Location	Poke	Color
0	53281	6	Blue
1	53282	1	White
2	53283	2	Red
3	53284	3	Cyan

You may notice that 53281 is the same location used in non-EBC mode to set the screen color. It has exactly the same function in EBC mode—it sets the screen color, which is also background color 0.

To get into and out of EBC mode, you make Pokes to location 53265. Bit 6 of that location turns EBC mode on (1) and off (0), while the remaining bits control other video functions. It is important to avoid disturbing those other bits, so the *Commodore 64 Programmer's Reference Guide* suggests this Poke to enable EBC mode: POKE 53265, PEEK(53265) OR 64

Bit-dabblers among you will recognize this as a Poke to set bit 6, while leaving the others alone. The Poke to clear bit 6, which disables EBC mode, is:

POKE 53265, PEEK(53265) AND 191

This line will enable or disable EBC mode, whichever is appropriate:

POKE 53265, (PEEK (53265) AND NOT 64) OR (64 AND NOT PEEK (53265))

There's a shorter way to control EBC mode, if you haven't set any other special video modes. I've worked with this method for quite a while without any problems. To enable EBC mode, just enter:

POKE 53265,91

To disable it, enter:

POKE 53265,27

If you should get into trouble with these, simultaneously hit the stop and restore keys and try again. By the way, the stop/restore combination disables EBC mode all by itself.

The accompanying demonstration program (Listing 1) lets you experiment with EBC mode. It prints a line of text using all four combinations of shift and RVS, then prints some Direct mode commands on the screen. By positioning your cursor on the appropriate Direct mode command and pressing the return key, you can see the effect of various Pokes on the printed line of text.

The first Poke enables EBC mode. The second disables it, then puts your cursor back on the first Poke line. By repeatedly pressing the return key,

you can alternately switch in and out of EBC mode. By moving the cursor down to the other lines and changing the Poked values, you can alter the selected background colors. By changing the color-control character in line 110, then running the program again, you can experiment with other character colors.

When you first run the program, note that the cursor turns red as soon as EBC mode is enabled. This makes sense if you realize that the cursor is just a reverse-field space and that background color 2, corresponding to reverse-field characters, is red when you turn on the power. Poke a 0 into 53283 and watch the cursor change to black.

Details and Fine Points

If you've followed along this far, you have a good understanding of EBC mode, and you'll want to start using it in your own programs. Before you do, though, there are some rules you should know about the EBC mode character sets.

The 64-character limitation is easy to deal with if you consider where those characters are placed on the

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keys. When using unshifted, unreversed characters (background color 0), you can use any character printed on the tops of your keys, plus the space bar.

If you'll look at your keyboard right now, you'll see *two* symbols on each number key, as well as on several keys in the bottom two rows. The upper symbols on these keys are important punctuation marks, and you *do* have access to them with background color 0. So, strictly speaking, "unshifted" and "text" aren't perfect names for the keys that produce characters on background 0. What you really get are all the letters and numbers, plus all the important punctuation marks, plus space. If you count them, you'll find there are 64 such characters, all printed on the top surfaces of the keys.

When using unshifted, *reversed* characters (background color 2), the same characters are also accessible. In this case, the space character appears as a solid block of background color 2.

Important things happen to your keyboard when using either of the background colors created by *shifted* characters (#1 and #3). In these cases, only the alphabet keys (A-Z) and the space and up-arrow characters are produced as normal by the keyboard. Neither the numbers nor the shifted punctuation marks will work. (They will show up on background color 0.)

The missing characters *can* be produced by using CTRL and various keys, but there's no simple relationship between the key and the character it produces. Because of this limitation in backgrounds 1 and 3, you should use backgrounds 0 and 2 for your most complex text, saving 1 and 3 for the simpler copy.

It's important to note that screen Pokes don't share this limitation; unlike keyboard characters, screen Pokes work identically with all four backgrounds.

Finally, you can use EBC mode with non-standard character sets. When you do, your character set will be limited to 64 characters, which is the same as the limitation for standard characters.

EBC Mode Highlights

In summary, here are the most striking features of Extended Background Color mode:

1. EBC mode exists so you can display individual text characters on as many as four different colored backgrounds.

2. EBC mode and its background colors are controlled by Pokes to five locations on the VIC chip.

3. Selection among the background colors is made by using the shift and RVS keys.

4. Enabling EBC mode disables all the graphics characters, so an EBC mode screen must be all text, which can be either printed or Poked to the screen.

5. Depending on the character set you select, the text will be upper- or lowercase.

6. EBC mode works with the first 64 characters from standard or custom-character sets.

7. On backgrounds 0 and 2, the keyboard can produce any character printed on the tops of your C-64 keys, plus a space. In practice, backgrounds 1 and 3 are limited to the letters and the space.

Well, that's all there is to Extended Background Color mode. I promised you could create spectacular text presentations, so let me show you what I had in mind.

If you'll type and run the Li'l Dazzler program, Listing 2, you'll get an idea of EBC mode's capabilities and perhaps get some inspiration, too. It shows every character color printed on every background color. I've made no attempt to optimize the color combinations, so much more attractive displays are possible. Creating them is left as a challenge for you. [R]

Address all author correspondence to Louis F. Sander, 153 Mayer Drive, Pittsburgh, PA 15237.

Listing 1. Demonstration program.

```
10 REM ** EXTENDED BACKGROUND DEMO **
20 REM :REM*196
30 REM{8 SPACES}LOUIS F. SANDER :REM*82
40 REM :REM*58
50 REM :REM*102
60 PRINT"{SHFT CLR}"; :REM*40
70 PRINT"{COMD 7}";:REM PRINT COLOR
80 :REM*158
90 PRINT"ONE","{SHFT T}{SHFT W}{SHFT O}","
{CTRL 9}THREE{CTRL 0}","{CTRL 9}{SHFT F}
{SHFT O}{SHFT U}{SHFT R}{CTRL 0}{2 CRS
R DNS}" :REM*112
100 PRINT"POKE 53265,91{2 CRSR DNS}"
110 :REM*162
120 PRINT"POKE 53265,27 :PRINT{CTRL 9}"CHR$
(34)"{7 SHFT Qs}" :REM*104
130 PRINT"{CRSR DN}" :REM*100
140 PRINT"POKE 53281,6{2 CRSR DNS}":REM*242
150 PRINT"POKE 53282,1{2 CRSR DNS}":REM*152
160 PRINT"POKE 53283,2{2 CRSR DNS}":REM*68
170 PRINT"POKE 53284,3" :REM*84
180 PRINT"{HOME}" :REM*182
```

Listing 2. Li'l Dazzler program.

```
10 REM ** LI'L DAZZLER **
20 REM
30 REM LOUIS F. SANDER
40 REM
50 PRINT" {SHFT CLR}{2 CRSR DNS}"
60 POKE53281,1
70 FORI=0TO15
80 :POKE 646,I
90 :PRINT "HUES {SHFT H}{SHFT U}{SHFT E}{S
HFT S} {CTRL 9}HUES{CTRL 0} {CTRL 9}{SH
FT H}{SHFT U}{SHFT E}{SHFT S}{CTRL 0} "
100 ;
110 :J=J+1:IFJ=2 THEN J=0:PRINT
120 NEXTI
130 POKE53265,91
140 FORI=0TO15
150 :FORT=1TO600:NEXTT
160 :FORJ=0TO2
170 :POKE53282+J,I+J
180 : NEXTJ
190 NEXTI
200 POKE53265,27
210 PRINT"{COMD 7}"
```


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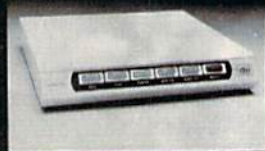
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Smith Corona 400%
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Star Gemini X & SG series
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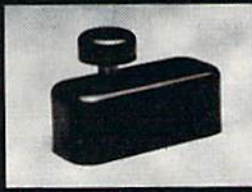
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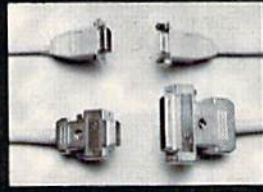
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128 Perfect Typist

By JAMES E. BORDEN

128 Perfect Typist (Listing 1) is similar to the 64 Perfect Typist that was first published in *RUN's* September issue. If you've used 64 Perfect Typist, you'll know how to use 128 Perfect Typist.


Be sure your C-128 is in 128 mode before typing in 128 Perfect Typist. After you've typed in the program, save it before running it. When you run it, you'll see the start-up screen. 128 Perfect Typist will always have the same SYS addresses: 5120 for on and 5150 for off. As with the 64 version, the only way to disable 128 Perfect Typist is with the SYS 5150 (off)

■
You have the C-64 checksum. Now here's one for the C-128, allowing you to enter your programs quickly and accurately.
■

command (or Reset, but that's a little drastic).

The 128 Perfect Typist will work on either a 40- or 80-column screen.

Also, it lets you use the C-128's automatic line numbering. If Auto is on, the checksum will be printed below the line just entered, and the C-128 will print the next line number below the checksum. Although this allows fewer lines on the screen, they'll appear automatically.

For more detailed information on how to use *RUN's* proofreader programs, see p.00 in this issue. 

Address all author correspondence to James E. Borden, 641 Adams Road, Carlisle, PA 17013.

Listing 1. 128 Perfect Typist program.

```
1 REM 40/80 COL 128 MODE PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17013
7 REM
10 FORX=5120TO5379:READD:T=T+D:POKEX,D:NEXT
20 IFT<>28312 THENPRINT"(2 CRSR DNS)ERROR I
N DATA...":END
25 A$="":IFPEEK(215)=128THENA$="{20 SPACES}
"
30 PRINT"{SHFT CLR}"A$"{CRSR RT}"*****
*****"
40 PRINTA$"{CRSR RT}"** 128 PERFECT TYPIST I
S NOW ACTIVE **"
50 PRINTA$"{CRSR RT}"**{2 SPACES}SYS 5120=ON
{7 SPACES}SYS 5150=OFF{2 SPACES}**"
60 PRINTA$"{CRSR RT}"*****
*****":SYS5120:NEW
5120 DATA 173,005,003,201,020,208,001,096,1
41,045
5130 DATA 020,173,004,003,141,044,020,162,0
43,160
5140 DATA 020,142,004,003,140,005,003,096,2
34,234
5150 DATA 173,044,020,141,004,003,173,045,0
20,141
5160 DATA 005,003,096,032,013,067,140,255,0
19,162
5170 DATA 000,142,252,019,142,253,019,142,2
54,019
5180 DATA 189,000,002,201,032,240,008,201,0
48,144
5190 DATA 007,201,058,176,003,232,208,238,1
89,000
```

```
5200 DATA 002,240,054,201,032,208,005,172,2
54,019
5210 DATA 240,042,201,034,208,010,072,173,2
54,019
5220 DATA 073,001,141,254,019,104,072,238,2
53,019
5230 DATA 173,253,019,041,007,168,104,024,0
72,024
5240 DATA 104,016,001,056,042,136,016,246,1
09,252
5250 DATA 019,141,252,019,232,208,197,173,2
52,019
5260 DATA 024,101,022,024,101,023,141,252,0
19,169
5270 DATA 042,032,241,020,032,188,020,160,0
02,185
5280 DATA 185,020,032,241,020,136,016,247,1
65,116
5290 DATA 208,009,165,117,208,005,169,145,0
32,241
5300 DATA 020,172,255,019,096,013,032,032,1
62,000
5310 DATA 173,252,019,232,056,233,100,176,2
50,105
5320 DATA 100,202,240,003,032,232,020,201,0
10,176
5330 DATA 005,205,252,019,240,015,162,000,2
32,056
5340 DATA 233,010,016,250,024,105,010,202,0
32,232
5350 DATA 020,170,072,138,009,048,032,241,0
20,104
5360 DATA 096,170,173,000,255,072,169,000,1
41,000
5370 DATA 255,138,032,210,255,104,141,000,2
55,096
```


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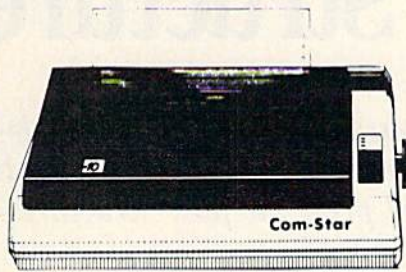
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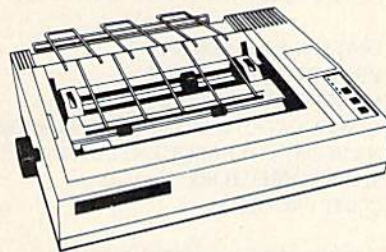
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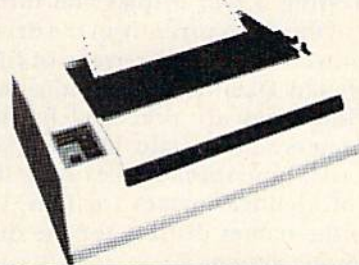
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Datafile Structure Utility

This latest addition to the Datafile series lets you examine sequential files from that series and print the files' structures.

By MIKE KONSHAK

The Datafile Structure utility, or DFStructure, allows you to peek at the sequential files created by Datafile or other programs. DFStructure reads the files generated by the following programs and produces a printout, on either screen or printer.

These programs are: Datafile (database program; RUN, November 1984); DFReport and DFMail (both sub-programs of Datafile; December 1984); and DFCalc (companion program to Datafile; in the recent ReRUN Productivity Pak). The last three programs produce format files for printing out records that Datafile creates.

Each program in the Datafile series writes sequential files to the disk using a unique code that precedes the filename. It is possible for all these programs to create files with the same name. The difference, which becomes apparent only when you view the disk directory, is in the special characters that precede the filenames.

The following codes, which precede the filename, SAMPLE, are written by the respective programs:

```
DATAFILE.....DF] SAMPLE FILE
DFREPORT....RP] SAMPLE FILE
DFMAIL.....ML] SAMPLE FILE
DFCALC.....CR] SAMPLE FILE
```

Every sequential file in the Commodore operating system is further identified on the directory with a SEQ after the filename.

Beginning DFStructure

To use DFStructure, first type

LOAD"DFSTRUCTURE",8 and press the return key. Then type RUN <return>. You'll first see an introduction screen, followed by this menu:

```
[ DATAFILE OR FORMAT FILE SELECTION ]
```

```
[D]ATAFILE RECORD FILES
[R]EPORT FORMAT FILES
[M]AILING LABEL FORMAT FILES
[C]ALCULATED REPORT FORMAT FILES
[N]ON-DATAFILE SEQUENTIAL FILES
[$] DISK DIRECTORY
[Q]UIT PROGRAM
```

```
[ PRESS THE APPROPRIATE KEY ]
```

(Letters or words surrounded by brackets denote reversed printing on the screen and normally identify a prompted key to be pressed. Letters or a word surrounded by inequality signs denote an actual key to press.)

Pressing \$ will display the directory of the disk currently in the drive. When you view the directory of files created by Datafile, you'll notice that the filenames are preceded by two characters and a right bracket (i.e., DF). . .). These special codes allow the use of identical names for files, yet keep the names distinct for the disk operating system.

Pressing D, R, M, C or N will initiate a prompt for the name of your sequential file. If the file is one of the Datafile programs, just enter the name without the special characters. If not, you must type in the name exactly as shown on the disk directory.

After you enter the name and press

the return key, the program will search out the data from the disk and display it. Different files use different routines, but they are all very simple to understand.

If, for example, you want to see the format of the datafile MAIL LIST, you press the D key to view the structure of the file. You'll be asked for the name of the file. If you had previously entered a filename, it would automatically be printed at this point. Do *not* use the special codes as they appear on the directory, but enter the name as shown below.

```
ENTER NAME OF SEQUENTIAL FILE:
```

```
? MAIL LIST <Return>
```

If you enter a filename that is either not on the disk or not a Datafile file, then you will receive a File Not Found error message.

After you enter the filename, the disk drive will start running and the screen will display the following (assuming you are reading the format of the sample file MAIL LIST):

```
[ STRUCTURE OF DATAFILE MAIL LIST ]
```

```
# RECORDS POSSIBLE IN FILE [ 192]
# RECORDS IN CURRENT FILE [ 4]
# FIELDS IN EACH RECORD [ 8]
```

```
[# TITLE OF FIELDS LENGTH]
[1] LAST NAME ..... 15
[2] FIRST NAME ..... 10
[3] CODE..... 5
[4] STREET ..... 32
[5] CITY..... 23
```

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- [6] STATE 2
- [7] ZIP 5
- [8] PHONE 12

- [S]CAN RECORDS
- [P]RINT STRUCTURE
- [E]XIT

You'll notice that the red light on the disk drive is still on at this time. The file is actually still open, waiting for your next decision.

Pressing E will exit you back to the main menu, closing the file in the process. The red light should then go out.

Pressing P will produce a hard copy of the file structure by sending the data to the printer. The printout will be similar to that shown on the screen. When the printer has finished its operation, you'll be returned to the above screen.

Pressing S will allow you to view in turn the datafile records in the current file structure. Before DFStructure begins this operation, it shows the following:

PRESS [CTRL] SLOW [F7] START/STOP
[F1] EXIT

Pressing any key will then start reading and displaying the records in the datafile. The record number will be displayed before each record, followed by the field number and the data within each field.

Pressing <CTRL> will slow down the scanning operation so that you may view the data more easily.

Pressing the f7 key will stop the operation after a record has been printed on the screen, and pressing f7 will again start the scan.

Pressing the f1 key will let you exit the scan and bring you back to the structure screen.

Datafile Record File Structures

Each of the various files created by the Datafile series will have different information contained within a structure display. As shown above, Datafile record files contain the following information:

- Number of records possible in file.
- Number of records in the current file.
- Number of fields within each record.
- Title of each field.
- Length of each field.
- Data contained in each record in fields.
- Index number for sorting records.

You may view the actual string and numerical data, as they appear on the disk, by selecting the Non-Data-

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file Sequential File option at the main menu. This will show you the exact sequence of the contents of the datafile as it resides on the disk. The data will be displayed serially, without any format or labels.

If you use this option, the filename must be entered exactly as it appears on the disk directory (i.e., MAIL LIST is actually DFJ MAIL LIST on the directory). This option may be used for any sequential file that you may have in your library.

DFReport Format File Structure

Report format files, created by DFReport and used for the purpose of producing printed reports in custom forms, will contain the following:

- Number of lines in report title.
- Data for each title line.
- Number of columns in the report.

- Position of each column.
- Header data for each column.
- Which datafile fields appear in each column.
- Whether or not totaling of the last column was chosen.

DFMail Format File Structure

Label format files, created by DFMail, are used to print Datafile records on labels. The custom label structure file contains the following:

- Number of rows on label.
- Which datafile fields appear in each row.

DFCalc Format File Structure

The calculated reports, simulating the types of reports produced by spreadsheets, are created by DFCalc. These format file structures contain the following data:

- Number of lines in report title.
- Data in each title line.
- Number of columns in report.
- Position of each column.
- Header data for each column.
- Contents of each column (datafile fields, rec# or equation).
- Equation(s) for column, if chosen.
- Justification of each column.
- End-of-column operation (totals, averages, NOOP).

DFStructure is especially useful when dealing with calculated reports, because it allows you to use information found in other report formats to help you design new formats. [R]

Address all author correspondence to Mike Konshak, 4821 Harvest Court, Colorado Springs, CO 80917.

Listing 1. DFStructure program.

```

40000 REM DFSTRUCTURE PROGRAM 1.0 - DATAFILE
      UTILITY BY MIKE KONSHAK (C)1985
      :REM*117
40002 POKE53281,0:POKE53280,8:PRINT"{CTRL 8}"
      :REM*61
40004 REM----DIM ARRAYS
      :REM*11
40006 DIM F$(25),T$(25),L$(25),ML$(9,4)
      :REM*79
40008 DIM F(17),C$(17,15),PC(18),TT$(5),HC$(
      17)
      :REM*33
40010 FORI=1TO50:S$=S$+CHR$(32):D$=D$+"":B$
      =B$+"-":NEXTI
      :REM*81
40012 GOTO4032
      :REM*121
40014 REM----DISK ERROR CHECK
      :REM*185
40016 INPUT#15,EN,EMS,ET,ES:IFEN<20OREN=62TH
      ENET=0:RETURN
      :REM*195
40018 PRINT"{CRSR DN}{CTRL 9}{COMD 3}DISK E
      RROR{CTRL 0}"EN{CRSR LF},"EM$","ET"{
      CRSR LF},"ES"{CTRL 8}":ET=8
      :REM*143
40020 PRINT"{CRSR DN} PRESS {CTRL 9}{COMD 6}
      ANY KEY{CTRL 8}{CTRL 0} TO CONTINUE":G
      OSUB4026
      :REM*231
40022 CLOSE5:CLOSE15:CLOSE4:RETURN
      :REM*149
40024 REM----GET
      :REM*197
40026 GETA$:IFA$=""THEN4026
      :REM*229
40028 RETURN
      :REM*5
40030 REM----OPENING SCREEN
      :REM*229
40032 PRINT"{SHFT CLR}{CTRL 9}{5 SPACES}DAT
      AFILE STRUCTURE DUMP{10 SPACES}{CTRL 0}
      "
      :REM*221
40034 PRINT"{CRSR DN}{3 SPACES}THIS PROGRAM
      WILL READ AND DISPLAY"
      :REM*147
40036 PRINT"{5 SPACES}THE STRUCTURE OF DATAF
      ILES AND"
      :REM*237
40038 PRINT"{4 SPACES}PRINTER FORMAT FILES C
      REATED BY:"
      :REM*31
40040 PRINT"{CRSR DN}{4 SPACES}{CTRL 9}DATAF
      ILE{CTRL 0} AND ITS SUBPROGRAMS:"
      :REM*239
40042 PRINT"{CRSR DN}{9 SPACES}{CTRL 9}DFREP
      ORT{CTRL 0} AND {CTRL 9}DFMAIL{CTRL 0}
      "
      :REM*53
40044 PRINT"{CRSR DN}{3 SPACES}AS WELL AS TH
      E PROGRAM:"
      :REM*123

```

```

40046 PRINT"{CRSR DN}{16 SPACES}{CTRL 9}DFCA
      LC{CTRL 0}"
      :REM*95
40048 PRINT"{CRSR DN}{3 SPACES}THE {CTRL 9}D
      ATAFILE{CTRL 0} SERIES IS WRITTEN BY:"
      :REM*109
40050 PRINT"{CRSR DN}{12 SPACES}MIKE KONSHAK
      "
      :REM*171
40052 PRINT"{9 SPACES}4821 HARVEST COURT"
      :REM*121
40054 PRINT"{5 SPACES}COLORADO SPRINGS, CO.
      80917"
      :REM*191
40056 PRINT"{CRSR DN}{4 SPACES}AND PUBLISHED
      IN {CTRL 9}RUN MAGAZINE{CTRL 0}"
      :REM*255
40058 PRINT"{2 CRSR DNs}{5 SPACES}PRESS {CTR
      L 9}{COMD 6}ANY KEY{CTRL 8}{CTRL 0} TO
      CONTINUE":GOSUB4026
      :REM*157
40060 REM----SELECTION SCREEN
      :REM*231
40062 PRINT"{SHFT CLR}{CTRL 9}{2 SPACES}DAT
      AFILE OR FORMAT FILE SELECTION{3 SPACE
      s}{CTRL 0}"
      :REM*95
40064 PRINT"{2 CRSR DNs}{6 SPACES}{CTRL 9}D(
      CTRL 0)ATAFILE RECORD FILES"
      :REM*171
40066 PRINT"{CRSR DN}{6 SPACES}{CTRL 9}R{CTR
      L 0}EPORT FORMAT FILES"
      :REM*161
40068 PRINT"{CRSR DN}{6 SPACES}{CTRL 9}M{CTR
      L 0}AILING LABEL FORMAT FILES"
      :REM*127
40070 PRINT"{CRSR DN}{6 SPACES}{CTRL 9}C{CTR
      L 0}ALCULATED REPORT FORMAT FILES"
      :REM*159
40072 PRINT"{CRSR DN}{6 SPACES}{CTRL 9}N{CTR
      L 0}ON-DATAFILE SEQUENTIAL FILE"
      :REM*67
40074 PRINT"{CRSR DN}{6 SPACES}{CTRL 9}$(CTR
      L 0} DISK DIRECTORY"
      :REM*39
40076 PRINT"{CRSR DN}{6 SPACES}{CTRL 9}Q{CTR
      L 0}UIT PROGRAM"
      :REM*125
40078 PRINT"{CRSR DN}{CTRL 9}{7 SPACES}PRES
      S THE APPROPRIATE KEY{6 SPACES}{CTRL 0}
      "
      :REM*161
40080 GOSUB4026:K=0:IFA$="Q"THENPRINT"{SHFT
      CLR}":END
      :REM*239
40082 IFA$="D"THENK=1
      :REM*197
40084 IFA$="R"THENK=2
      :REM*223
40086 IFA$="M"THENK=3
      :REM*109
40088 IFA$="C"THENK=4
      :REM*123
40090 IFA$="N"THENK=5
      :REM*19
40092 IFA$="$"THEN4494
      :REM*115

```


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Listing 1 continued.

```

4094 IFK<=ØORK>5THEN4Ø8Ø           :REM*189      418Ø FORI=1TOF                       :REM*84
4096 REM----GET NAME OF FILE        :REM*25Ø      4182 PRINT#4,ILEFT$(F$(I)+D$,27)L$(I)  :REM*22
4098 PRINT"{CRSR DN} ENTER NAME OF SEQUENTIAL FILE:{CRSR DN}" :REM*1ØØ
41ØØ PRINT" ? "NF$:INPUT"{CRSR UP} ";NF$:IFNF$=""THEN4Ø62 :REM*18Ø
41Ø2 FL=Ø:ONKGOTO41Ø6,4188,427Ø,4328,4416 :REM*218
41Ø4 REM----READ DATAFILE SEQ FILE :REM*216
41Ø6 OPEN15,8,15                     :REM*188
41Ø8 OPEN5,8,5,"Ø:DF] "+NF$+",S,R":GOSUB4Ø16:IFET=8THEN4Ø62 :REM*246
411Ø IFEN=62THENGOSUB4Ø18:GOTO4Ø62 :REM*218
4112 INPUT#5,R,F,X:GOSUB4Ø16:IFET=8THEN4Ø62 :REM*16Ø
4114 IFFL=1THEN4118                  :REM*216
4116 :                                :REM*12
4118 FORI=1TOF:INPUT#5,F$(I),L$(I):NEXTI:GOSUB4Ø16:IFET=8THEN4Ø62 :REM*216
412Ø IFFL=1THEN4154                  :REM*2Ø6
4122 PRINT"{SHFT CLR}{CTRL 8} {CTRL 9}{2 SPACES}STRUCTURE OF DATAFILE{2 SPACES}{CTRL 2}"NF$ :REM*13Ø
4124 PRINT"{CTRL 8}{CRSR DN} # RECORDS POSSIBLE IN FILE {CTRL 2}{CTRL 9}"R :REM*22Ø
4126 PRINT"{CTRL 8} # RECORDS IN CURRENT FILE{2 SPACES}{CTRL 2}{CTRL 9}"X:REM*234
4128 PRINT"{CTRL 8} # FIELDS IN EACH RECORD {4 SPACES}{CTRL 2}{CTRL 9}"F :REM*26
413Ø PRINT"{CTRL 8} {CTRL 9} #{3 SPACES}TITLE OF FIELDS{12 SPACES}LENGTH" :REM*52
4132 FORI=1TOF                       :REM*36
4134 PRINT"{CTRL 8} {CTRL 9}"I"{CTRL Ø}{CTRL 2}"TAB(6)LEFT$(F$(I)+D$,27)TAB(33)L$(I) :REM*76
4136 NEXTI                            :REM*14Ø
4138 PRINT"{CTRL 8}{CRSR DN} {CTRL 9}S{CTRL Ø}CAN RECORDS {CTRL 9}P{CTRL Ø}RINT STRUCTURE {CTRL 9}E{CTRL Ø}XIT" :REM*198
414Ø GOSUB4Ø26:IFA$="E"THENCLOSE5:CLOSE15:GOTO4Ø62 :REM*1Ø2
4142 IFA$="P"THEN417Ø                 :REM*4
4144 IFA$="S"THEN415Ø                 :REM*1Ø4
4146 GOTO414Ø                         :REM*176
4148 REM----SCAN RECORDS             :REM*144
415Ø PRINT"{CRSR DN} PRESS {CTRL 9}CTRL{CTRL Ø} SLOW {CTRL 9}F7{CTRL Ø} START/STOP {CTRL 9}F1{CTRL Ø} EXIT":GOSUB4Ø26 :REM*68
4152 IFFL=1THEN41Ø6                  :REM*234
4154 FORI=1TOX:PRINT"{CTRL 8} {CTRL 9}RECORD "I :REM*14Ø
4156 FORJ=1TOF:INPUT#5,REC$:PRINT"{CTRL 8} "J"{CTRL 2}"REC$:NEXTJ :REM*21Ø
4158 GETA$:IFA$="{FUNCT 1}"THEN4166:REM F1 :REM*116
416Ø IFA$="{FUNCT 7}"THENGOSUB4Ø26:REM F7 :REM*36
4162 NEXTI                            :REM*166
4164 PRINT"{CTRL 8} PRESS {CTRL 9}ANY KEY{CTRL Ø} TO CONTINUE{CTRL 2}":GOSUB4Ø26 :REM*168
4166 CLOSE5:CLOSE15:FL=1:GOTO4122 :REM*228
4168 REM----PRINT DATAFILE STRUCTURE:REM*4Ø
417Ø OPEN4,4:PRINT#4,"{3 SPACES}STRUCTURE FOR DATAFILE ** "NF$" **" :REM*174
4172 PRINT#4,B$:PRINT#4,"# RECORDS POSSIBLE IN FILE:"R :REM*158
4174 PRINT#4,"# RECORDS IN CURRENT FILE : "X :REM*148
4176 PRINT#4,"# FIELDS IN EACH RECORD{3 SPACES}:"F:PRINT#4,B$ :REM*21Ø
4178 PRINT#4,"#{2 SPACES}TITLE OF FIELDS{12 SPACES}LENGTH":PRINT#4,B$ :REM*218
418Ø FORI=1TOF                       :REM*84
4182 PRINT#4,ILEFT$(F$(I)+D$,27)L$(I)  :REM*22
4184 NEXTI:PRINT#4,B$:PRINT#4:CLOSE4:GOTO4122 :REM*174
4186 REM----READ DFREPORT STRUCTURE:REM*254
4188 OPEN15,8,15                     :REM*14
419Ø OPEN5,8,5,"Ø:RP] "+NF$+",S,R":GOSUB4Ø16:IFET=8THEN4Ø62 :REM*1Ø8
4192 IFEN=62THENGOSUB4Ø18:GOTO4Ø62 :REM*44
4194 INPUT#5,PW,NL,NC:GOSUB4Ø16:IFET=8THEN4Ø62 :REM*12Ø
4196 FORI=1TONL:INPUT#5,TT$(I):NEXTI:GOSUB4Ø16:IFET=8THEN4Ø62 :REM*13Ø
4198 FORI=1TONC:INPUT#5,PC(I),HC$(I) :REM*172
42ØØ FORJ=1TO3:INPUT#5,ML$(I,J):NEXTJ:GOSUB4Ø16:IFET=8THEN4Ø62 :REM*86
42Ø2 INPUT#5,A1$:GOSUB4Ø16:IFET=8THEN4Ø62 :REM*4Ø
42Ø4 CLOSE5:CLOSE15                 :REM*7Ø
42Ø6 REM----DISPLAY DFREPORT STRUCTURE :REM*25Ø
42Ø8 PRINT"{SHFT CLR}{CTRL 8} {CTRL 9}STRUCTURE OF DFREPORT FORMAT:{CTRL 2}"NF$ :REM*21Ø
421Ø PRINT"{CTRL 8}{CRSR DN} # LINES IN REPORT TITLE {CTRL 2}{CTRL 9}"NL :REM*13Ø
4212 FORI=1TONL:PRINT"{CTRL 8} {CTRL 9}"I;"{CTRL Ø}{CTRL 2}"TT$(I):NEXTI :REM*14
4214 PRINT"{CTRL 8} # COLUMNS IN REPORT{5 SPACES}{CTRL 2}{CTRL 9}"NC :REM*14Ø
4216 PRINT"{CTRL 8} {CTRL 9} # POS COLUMN HEADER{6 SPACES}CONTENTS{4 SPACES}" :REM*134
4218 FORI=1TONC                       :REM*194
422Ø PRINT"{CTRL 8} {CTRL 9}"I"{CTRL Ø}{CTRL 2}"TAB(2)PC(I)TAB(8)LEFT$(HC$(I),18) ; :REM*148
4222 PRINTTAB(27)"{CTRL 8}FIELDS:{CTRL 2}"ML$(I,1)+"ML$(I,2)+"ML$(I,3) :REM*25Ø
4224 NEXTI:IFA1$<"1"THEN4228 :REM*24
4226 PRINT"{CRSR DN}{CTRL 8} COLUMN{CTRL 2}"NC"{CRSR LF}{CTRL 8}, IS TO BE TOTALED":GOTO423Ø :REM*1Ø6
4228 PRINT"{CRSR DN}{CTRL 8} NO TOTALING OF COLUMNS" :REM*114
423Ø PRINT"{CTRL 8}{CRSR DN} {CTRL 9}P{CTRL Ø}RINT STRUCTURE {CTRL 9}E{CTRL Ø}XIT" :REM*17Ø
4232 GOSUB4Ø26:IFA$="E"THEN4Ø62 :REM*19Ø
4234 IFA$="P"THEN424Ø :REM*56
4236 GOTO4232 :REM*122
4238 REM----PRINT DFREPORT STRUCTURE:REM*52
424Ø OPEN4,4 :REM*8
4242 PRINT#4,"{3 SPACES}STRUCTURE OF DFREPORT FORMAT ** "NF$" **" :REM*212
4244 PRINT#4,B$:PRINT#4,"# LINES IN REPORT TITLE:"NL:PRINT#4,B$ :REM*242
4246 FORI=1TONL:PRINT#4,"TITLE" I;" :TT$(I) :NEXTI:PRINT#4,B$ :REM*244
4248 PRINT#4,"# COLUMNS IN REPORT{4 SPACES}:"NC:PRINT#4,B$ :REM*254
425Ø PRINT#4,"#{2 SPACES}POS{2 SPACES}HEADER{14 SPACES}CONTENTS":PRINT#4,B$ :REM*66
4252 FORI=1TONC                       :REM*228
4254 PRINT#4,RIGHT$(S$+STR$(I),3)+RIGHT$(S$+STR$(PC(I)),4); :REM*23Ø
4256 PRINT#4,"..LEFT$(HC$(I)+D$,2Ø); :REM*242
4258 PRINT#4,"DATAFILE FIELDS:"ML$(I,1)+"ML$(I,2)+"ML$(I,3) :REM*124
426Ø NEXTI:PRINT#4,B$:IFA1$<"1"THEN4264 :REM*12Ø

```



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- Works with all normal (composite video input) green monitors.
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Listing 1 continued.

```

4262 PRINT#4,"COLUMN"NC", IS TO BE TOTALED" :REM*242
      :GOTO4266 :REM*70
4264 PRINT#4,"NO TOTALING OF LAST COLUMN" :REM*154
      :REM*100
4266 PRINT#4,B$:PRINT#4:CLOSE4:GOTO4232 :REM*70
      :REM*128
4268 REM----READ DFMAIL STRUCTURE :REM*96
4270 OPEN15,8,15 :REM*236
4272 OPEN5,8,5,"0:ML] "+NF$+",S,R":GOSUB401 :REM*126
      6:IFET=8THEN4062 :REM*118
4274 IFEN=62THENGOSUB4018:GOTO4062 :REM*208
4276 INPUT#5,RW:GOSUB4016:IFET=8THEN4062 :REM*216
      :REM*186
4278 FORI=1TORW :REM*166
4280 FORJ=1TO3:INPUT#5,ML$(I,J):NEXTJ:NEXTI :REM*148
      :GOSUB4016:IFET=8THEN4062 :REM*226
4282 CLOSE5:CLOSE15 :REM*134
4284 REM----DISPLAY DFMAIL STRUCTURE :REM*58
      :REM*148
4286 PRINT"{SHFT CLR}{CTRL 8} {CTRL 9} STRU :REM*214
      CTURE OF DFMAIL FORMAT:{CTRL 2}"NF$ :REM*34
      :REM*92
4288 PRINT"{CRSR DN}{CTRL 8} # ROWS ON LABE :REM*246
      L{2 SPACES}{CTRL 2}{CTRL 9}"RW :REM*46
4290 PRINT"{CTRL 8} {CTRL 9} #{2 SPACES}CON :REM*240
      TENTS OF ROW (DATAFILE FIELDS)" :REM*240
      :REM*4
4292 FORI=1TORW :REM*86
4294 PRINT"{CTRL 8} {CTRL 9}"I"{CTRL 0}{CTR :REM*100
      L 2}"; :REM*28
4296 PRINTTAB(6)ML$(I,1)+"ML$(I,2)+"ML$(I :REM*100
      ,3) :REM*28
4298 NEXTI :REM*60
4300 PRINT"{CTRL 8}{CRSR DN} {CTRL 9}P{CTRL :REM*122
      0}RINT STRUCTURE {CTRL 9}E{CTRL 0}XIT :REM*172
      " :REM*188
4302 GOSUB4026:IFAS="E"THEN4062 :REM*122
4304 IFAS="P"THEN4310 :REM*172
4306 GOTO4286 :REM*188
4308 REM----PRINT DFMAIL STRUCTURE :REM*135
4310 OPEN4,4 :REM*123
4312 PRINT#4,"{3 SPACES}STRUCTURE OF DFMAIL :REM*191
      FORMAT ** "NF$ " **" :REM*81
4314 PRINT#4,B$:PRINT#4,"# ROWS ON LABEL:"R :REM*21
      W:PRINT#4,B$ :REM*23
4316 PRINT#4,"{2 SPACES}#{3 SPACES}CONTENTS :REM*33
      OF LABEL (DATAFILE FIELDS)":PRINT#4,B :REM*159
      $ :REM*159
4318 FORI=1TORW :REM*81
4320 PRINT#4,RIGHT$(S$+STR$(I,3)+"{3 SPACE :REM*21
      S)"ML$(I,1)+"ML$(I,2)+"ML$(I,3) :REM*23
      :REM*122
4322 NEXTI:PRINT#4,B$ :REM*33
4324 PRINT#4:CLOSE4:GOTO4286 :REM*159
4326 REM----READ DFMAIL STRUCTURE :REM*242
4328 OPEN15,8,15 :REM*154
4330 OPEN5,8,5,"0:CR] "+NF$+",S,R":GOSUB401 :REM*70
      6:IFET=8THEN4062 :REM*184
4332 IFEN=62THENGOSUB4018:GOTO4062 :REM*184
4334 INPUT#5,PW,NL,NC:GOSUB4016:IFET=8THEN4 :REM*4
      062 :REM*14
4336 FORI=1TONL:INPUT#5,TT$(I):NEXTI:GOSUB4 :REM*14
      016:IFET=8THEN4062 :REM*56
4338 FORI=1TONC:INPUT#5,PC(I),HC$(I):REM*56
4340 FORJ=0TO14:INPUT#5,C$(I,J):NEXTJ:NEXTI :REM*118
      :GOSUB4016:IFET=8THEN4062 :REM*208
4342 CLOSE5:CLOSE15 :REM*216
4344 REM----DISPLAY DFMAIL STRUCTURE :REM*216
      :REM*112
4346 PRINT"{SHFT CLR}{CTRL 8} {CTRL 9}{2 SP :REM*12
      ACES}STRUCTURE OF DFMAIL FORMAT:{CTRL :REM*12
      2}"NF$ :REM*152
4348 PRINT"{CTRL 8}{CRSR DN} # LINES IN REP :REM*23
      ORT TITLE {CTRL 2}{CTRL 9}"NL :REM*113
4350 FORI=1TONL:PRINT"{CTRL 8} {CTRL 9}"I;" :REM*77
      {CTRL 0}{CTRL 2}"TT$(I):NEXTI :REM*149
4352 PRINT"{CTRL 8} # COLUMNS IN REPORT{5 S :REM*109
      PACES}{CTRL 2}{CTRL 9}"NC :REM*133
4354 PRINT"{CTRL 8} {CTRL 9} #{2 SPACES}POS :REM*89
      {3 SPACES}HEADER{22 SPACES}" :REM*143
4356 FORI=1TONC :REM*135
4358 PRINT"{CTRL 8} {CTRL 9}"I"{CTRL 0}{CTR :REM*123
      L 2}"TAB(5)PC(I)TAB(10)HC$(I) :REM*191
4360 NEXTI :REM*81
4362 PRINT"{CTRL 8} PRESS {CTRL 9}ANY KEY{C :REM*21
      CTRL 0} TO SEE MORE{CTRL 2}":GOSUB4026 :REM*23
      :REM*27
4364 PRINT"{SHFT CLR}{CTRL 8} {CTRL 9}{2 SP :REM*33
      ACES}STRUCTURE OF DFMAIL FORMAT:{CTRL :REM*159
      2}"NF$ :REM*159
4366 PRINT"{CRSR DN}{CTRL 8} {CTRL 9}#{2 S :REM*81
      PACES}CONTENTS/EQUATION{12 SPACES}J EO :REM*21
      C" :REM*23
4368 FORI=1TONC :REM*33
4370 PRINT"{CTRL 8} {CTRL 9}"I"{CTRL 0}{CTR :REM*159
      L 2}"TAB(5)C$(I,1)TAB(9)C$(I,14); :REM*159
4372 PRINTTAB(34)C$(I,0)TAB(38)C$(I,13) :REM*123
      :REM*123
4374 NEXTI :REM*191
4376 PRINT"{CTRL 8}{CRSR DN} {CTRL 9}S{CTRL :REM*81
      0}EE LAST {CTRL 9}P{CTRL 0}RINT STRUC :REM*21
      TURE {CTRL 9}E{CTRL 0}XIT" :REM*23
4378 GOSUB4026:IFAS="E"THEN4062 :REM*33
4380 IFAS="S"THEN4346 :REM*159
4382 IFAS="P"THEN4388 :REM*123
4384 GOTO4378 :REM*159
4386 REM----PRINT DFMAIL STRUCTURE :REM*159

```



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Listing 1 continued.

```
4388 OPEN4,4:CS=LEFT$(B$+B$,71) :REM*165
4390 PRINT#4,"{(11 SPACES)}STRUCTURE OF DFCAL
C FORMAT ** "NF$" ** :REM*85
4392 PRINT#4,C$:PRINT#4,"# LINES IN REPORT
TITLE:"NL:PRINT#4,C$ :REM*175
4394 FORI=1TONL:PRINT#4,"TITLE" I;": "TT$(I)
:NEXTI:PRINT#4,C$ :REM*9
4396 PRINT#4,"# COLUMNS IN REPORT:"NC:PRINT
#4,C$ :REM*115
4398 PRINT#4,"{2 SPACES}# POS{2 SPACES}HEAD
ER{14 SPACES}CONTENTS"; :REM*167
4400 PRINT#4,"/EQUATION{16 SPACES}JUST{2 SP
ACES}EOC":PRINT#4,C$ :REM*211
4402 FORI=1TONC :REM*123
4404 PRINT#4,RIGHT$(S$+STR$(I),3)+RIGHT$(S$
+STR$(PC(I),4); :REM*125
4406 PRINT#4,"..LEFT$(HC$(I)+D$,20)+LEFT$(
C$(I,1)+D$,3); :REM*167
4408 PRINT#4,LEFT$(C$(I,14)+D$,31)+LEFT$(C$(
I,0)+D$,6)+C$(I,13) :REM*29
4410 NEXTI:PRINT#4,C$ :REM*7
4412 CLOSE4:GOTO4364 :REM*141
4414 REM----READ GENERIC SEQUENTIAL FILE
:REM*167
4416 OPEN15,8,15 :REM*243
4418 OPEN5,8,5,"0:"NF$+",S,R":GOSUB4016:IF
ET=8THEN4062 :REM*141
4420 IFEN=62THENGOSUB4018:GOTO4062 :REM*17
4422 CLOSE5:CLOSE15 :REM*33
4424 PRINT"{SHFT CLR} {CTRL 9}GENERIC SEQUE
NTIAL FILE READER{CTRL 0}" :REM*201
4426 PRINT"{CRSR DN} DATA FROM FILE CHOSEN
WILL BE PRINTED" :REM*107
4428 PRINT" IN ONE COLUMN, AS THE FILE IS R
EAD." :REM*159
4430 PRINT"{2 CRSR DNs} SEND TO {CTRL 9}S{C
TRL 0}CREEN OR {CTRL 9}P{CTRL 0}RINTER
? OR {CTRL 9}E{CTRL 0}XIT" :REM*157
4432 GOSUB4026:IFA$="E"THEN4062 :REM*135
4434 IFA$="S"THEN4442 :REM*211
4436 IFA$="P"THEN4464 :REM*179
4438 GOTO4432 :REM*101
4440 REM----SCREEN PRINT :REM*195
4442 PRINT"{SHFT CLR}{CRSR DN} PRESS {CTRL
9}CTRL{CTRL 0} SLOW {CTRL 9}F7{CTRL 0}
START/STOP {CTRL 9}F1{CTRL 0} EXIT":G
OSUB4026 :REM*51
4444 OPEN15,8,15 :REM*15
4446 OPEN5,8,5,"0:"NF$+",S,R":GOSUB4016:IF
ET=8THEN4062 :REM*169
4448 IFEN=62THENGOSUB4018:GOTO4062 :REM*45
4450 GET#5,Z$:IFST<>0THEN4460 :REM*31
4452 PRINTZ$; :REM*87
4454 GETA$:IFA$="{FUNCT 7}"THENGOSUB4026
:REM*105
4456 IFA$="{FUNCT 1}"THENGOTO4460 :REM*227
4458 GOTO4450 :REM*57
4460 CLOSE5:CLOSE15 :REM*71
4462 GOTO4488 :REM*161
4464 REM---HARDCOPY :REM*119
4466 OPEN4,4:OPEN15,8,15 :REM*141
4468 OPEN5,8,5,"0:"NF$+",S,R":GOSUB4016:IF
ET=8THEN4062 :REM*191
4470 IFEN=62THENGOSUB4018:GOTO4062 :REM*67
4472 PRINT"{SHFT CLR}{CRSR DN} PRESS {CTRL
9}CTRL{CTRL 0} SLOW {CTRL 9}F7{CTRL 0}
START/STOP {CTRL 9}F1{CTRL 0} EXIT{CR
SR UP}":GOSUB4026 :REM*175
4474 PRINT#4,"SEQUENTIAL FILE ** "NF$" **":
PRINT#4,B$ :REM*155
4476 GET#5,Z$:IFST<>0THEN4486 :REM*113
4478 PRINT#4,Z$; :REM*73
4480 GETA$:IFA$="{FUNCT 7}"THENGOSUB4026
:REM*131
4482 IFA$="{FUNCT 1}"THENGOTO4486 :REM*193
4484 GOTO4476 :REM*21
4486 PRINT#4,B$ :REM*175
4488 CLOSE5:CLOSE15:CLOSE4 :REM*175
4490 PRINT" PRESS {CTRL 9}ANY KEY{CTRL 0} T
O CONTINUE{12 SPACES}":GOSUB4026:GOTO4
424 :REM*121
4492 REM----DIRECTORY :REM*185
4494 OPEN15,8,15:OPEN5,8,0,"$0":PRINT"{SHFT
CLR}":GOSUB4016:IFET=8THEN4062:REM*27
4496 GET#5,A1$,A2$ :REM*89
4498 GET#5,A1$,A2$ :REM*91
4500 GET#5,A1$,A2$ :REM*93
4502 IFA1$<>""THENA0=ASC(A1$) :REM*231
4504 IFA2$<>""THENA0=A0+ASC(A2$)*256
:REM*187
4506 PRINTMID$(STR$(A0),2);TAB(3); :REM*11
4508 GET#5,A2$:IFST<>0THEN4526 :REM*11
4510 IFA2$<>CHR$(34)THEN4508 :REM*167
4512 GET#5,A2$:IFA2$<>CHR$(34)THENPRINT"{CT
RL 9}"A2$"{CTRL 0}";:GOTO4512 :REM*253
4514 GET#5,A2$:IFA2$=CHR$(32)THEN4514
:REM*89
4516 PRINTTAB(20);:A3$="" :REM*237
4518 A3$=A3$+A2$:GET#5,A2$:IFA2$<>""THEN451
8 :REM*89
4520 PRINTLEFT$(A3$,3) :REM*35
4522 GETA$:IFA$<>""THENGOSUB4530 :REM*171
4524 IFST=0THEN4498 :REM*67
4526 PRINT" BLOCKS FREE";:A0=0 :REM*249
4528 CLOSE5:CLOSE15:PRINTTAB(25)"PRESS {CTR
L 9}ANY KEY{CTRL 0}":GOSUB4026:GOTO406
2 :REM*23
4530 GOSUB4026:RETURN :REM*31
```

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RUN DECEMBER 1985 / 123

Easy Assembly VII

By WILLIAM B. SANDERS

For those of you with C-128s, the following routines can be entered with your C-128's machine language monitor and run in the C-64 mode. However, everything will be automatically converted into hexadecimal. Remember, if a number in any of these listings does not have a dollar sign (\$) in front of it, it is decimal. When using your C-128 monitor, just put a plus sign (+) in front of all decimal numbers.

For example, if you see

```
LDA #49 (or LDA# 49)
```

you should enter:

```
LDA # + 49
```

Read the C-128's *System Guide* for details on entering code with the built-in mini-assembler. The first listing in this article shows how to enter code in the C-128 format used in the mini-assembler. Programs beginning at 49152 should be begun at \$C000 in your C-128 monitor.

I won't elaborate on the C-128 mode here, as it would be a bit confusing. However, you will be able to transfer a lot of the material in this column to the C-128 mode, since both microprocessors (6510 and 8502) use the same opcodes. Just be patient and enjoy learning about assembly language programming.

Toward Simpler Programming

As you learn more about programming in assembly language, you'll find simpler, quicker and less cumbersome solutions to problems. For example, consider two Basic programs that count to 10. A *simple* so-

This month's installment deals with three fundamental programming structures—sequence, branch and loop—and the opcodes to use them.

lution would be to have something like this:

```
10 FOR X=1 TO 10 : PRINT X : NEXT X
```

A more complex solution would be to have a program that required the programmer to do all the work, as illustrated in the following.

```
10 PRINT 1
20 PRINT 2
30 etc.
```

The first example uses the *loop* structure; the second uses a *sequential* structure. Up to this point, you've been using the less-elegant *sequential* structure, since you haven't learned how to use opcodes that allow you to take advantage of the other structures. The three structures I'll cover here are sequence, branch and loop.

The Sequence

In flowcharting, a sequence can be diagrammed as a sequential arrangement of tasks:



Figure 1. Sequential Structure flowchart.

The following is an example that counts from 1 to 3.

LN	LABEL	OPCODE	OPERAND	COMMENT
1		JSR	\$E544	TASK A
2		LDA	#49	TASK B
3		JSR	\$E716	TASK C
4		LDA	#50	TASK D
5		JSR	\$E716	TASK E
6		LDA	#51	TASK F
7		JSR	\$E716	TASK G
8		RTS		TASK H

ADRS	OPCODE	OPERAND
49152	JSR	\$E544
49155	LDA#	49
49157	JSR	\$E716
49160	LDA#	50
49162	JSR	\$E716
49165	LDA#	51
49167	JSR	\$E716
49170	RTS	

A C000	JSR	E544
A C003	LDA	#+49
A C005	JSR	E716
A C008	LDA	#+50
A C00A	JSR	E716
A C00D	LDA	#+51
A C00F	JSR	E716
A C012	RTS	

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So far, there's nothing you don't already know. The sequence goes from one task to the next. Further on, you'll see how to accomplish the same task with a loop. First, though, you must learn branching and the opcodes used therein.

The Branch

In Basic, you know that the branch is a decision point at which you can take more than a sequential step. For example, the following uses a simple branch structure:

```
10 INPUT "ENTER 'Y' OR 'N' ";YNS$
20 IF YNS$="Y" THEN GOTO 100
30 IF YNS$="N" THEN GOTO 200
40 END
100 PRINT "YES" : END
200 PRINT "NO" : END
```

In a flowchart diagram, it would look like this:

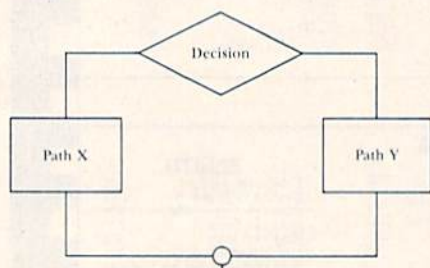


Figure 2. Branch Structure flowchart.

Now you'll have to learn to compare and branch. The "compare" opcodes compare either the contents of the A, X or Y register with an immediate value or the contents of an address. Let's examine the use of compare in the Immediate mode.

CMP Compare with the contents of the accumulator
 CPX Compare with the contents of the X register
 CPY Compare with the contents of the Y register

Once a comparison has been made, it's necessary to tell the program to jump out of sequence. This is done with "branch" opcodes. Let's look at two that are used in conjunction with the compare opcodes.

BNE Branch if the value is Not Equal
 BEQ Branch if the value is Equal

In the following example, I'm going to show the importance of using labels for branching and the sequence of the compare and branch instructions.

LN	LABEL	OPCODE	OPERAND	COMMENT
1		JSR	\$E544	
2		LDA	#89	"Y"
3		CMP	#89	"Y"?
4		BEQ	YES	If="Y"
5		CMP	#78	"N"?
6		BEQ	NO	If="N"
7		RTS		
8	YES	LDA	#2	TASK X
9		STA	\$D020	
10		RTS		
11	NO	LDA	#5	TASK Y
12		STA	\$D021	
13		RTS		

(*Before you run this program, see if you can guess what will happen.)

ADRS	OPCODE	OPERAND
49152	JSR	\$E544
49155	LDA#	89
49157	CMP#	89
49159	BEQ	49166

49161	CMP#	78
49163	BEQ	49172
49165	RTS	
49166	LDA#	2
49168	STA	\$D020
49171	RTS	
49172	LDA#	5
49174	STA	\$D021
49177	RTS	

Let's see what happened. The accumulator was loaded with the value 89, the ASCII value for Y. Then, in line 3, the value in the accumulator was compared with 89. Since the value was the same as the accumulator, the program branched to YES, by jumping over lines 5-7. (YES is just an address, but it's a lot easier to use than first having to figure out the branch address, as we did in the second program listing.)

The YES line loads the accumulator with a 2 and puts it in the border color register, turning it red. The RTS instruction in the next line then ends the program in line 10 instead of continuing through line 13. To test this procedure yourself, clear the screen to the default colors and change the value in line 2 from 89 to 78. This should turn the background color green and leave the border color alone.

The Loop

In assembly language programming, a loop is really a type of branch. Basically, the program branches back to an address to execute the same code a number of times. By comparing a value in the loop, the program can adjust the number of times the loop is performed. The following is the flowchart representation of a loop.

Continued on p. 130.

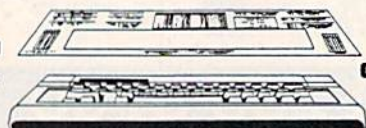
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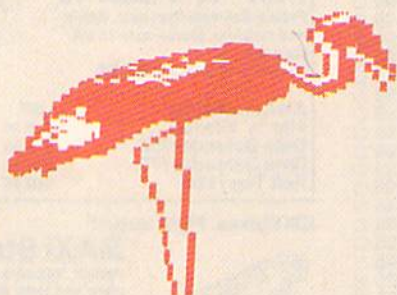
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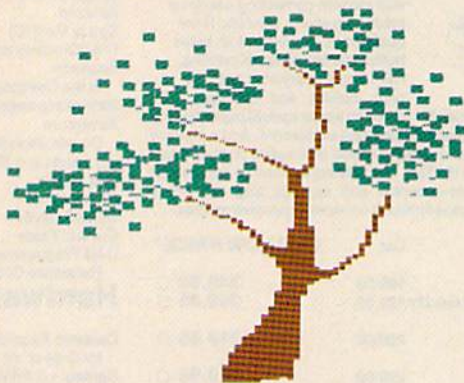
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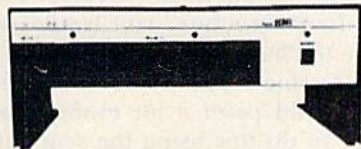
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From p. 126.

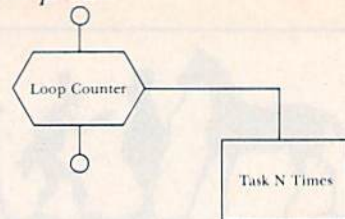


Figure 3. Loop Structure flowchart.

LN LABEL OPCODE OPERAND COMMENT

```

1 JSR $E544
2 LDX #49
3 LOOP TXA
4 JSR $E716
5 INX
6 CMP #51 51 YET?
7 BNE LOOP LOOP IF NOT
8 RTS
  
```

ADRS OPCODE OPERAND

```

49152 JSR $E544
49155 LDX# 49
49157 TXA
49158 JSR $E716
49161 INX
49162 CMP# 51
49164 BNE 49157
49166 RTS
  
```

Compare the above listing with the first one in this article. Both programs took eight lines of code to print "123" at the top of the screen. In terms of using the loop structure over the simple sequential structure, this may initially seem like no saving at all.

However, let's say you wanted to "count" to 9 instead of to just 3. Using the loop structure, you would only have to change line 6 from 51 to 58. Thus, using the same amount of code, you could print a lot more. If you tried to do this using the sequential structure, you would need to add a lot more lines of code.

As you use more sophisticated structures in programming, you'll continue moving from the complex to the simple. Now, let's see if you can print the entire alphabet by changing only lines 2 and 6.

Questions and Answers

Q: Can I run my machine and assembly language programs on a C-128?

A: Yes, but only in the C-64 mode. If you've been entering the programs we've had in this series, you can even transfer the object code to the C-128 monitor. Just type

LOAD "FILENAME",81

and enter the monitor. Enter D C000

<return>, and a disassembled listing of your code will appear. If you enter and assemble the code in the C-64 mode, and then return to the C-128 mode with a reset and enter the monitor, your code will appear!

Q: Are the Kernal and the other built-in routines the same in the C-128 as in the C-64, or am I going to have to learn a whole new set of jump addresses?

A: On the C-128, in the C-64 mode, everything is the same as on the C-64, including the Kernal addresses and other built-in routines.

However, if you plan on programming in the C-128 mode, be prepared to learn about bank switching. For instance, there's a register at \$D020 that changes the border color of your C-64 and C-128. If you enter the monitor in the C-128 mode and put a value in \$D020, nothing happens. However, if you put a value in \$FD020, you can watch the screen change.

To make matters more confusing, if, from Basic, you POKE 53280,N (53280 = \$D020 with N being a value from 0-15) from either the C-128 or C-64 mode, you'll get a border color.

In short, you get 100% compatibility between the C-64 and the C-128 if the C-128 is in the C-64 mode. Otherwise, there are differences between the C-128 mode and C-64 mode in machine and assembly language programming.

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64 BasicAid

Here's a useful programming aid that lets you add Renumber, Find and Change to your list of Basic commands.

By *ROBIN FRANZEL*

The Commodore 64's full-screen editor makes it easy to write Basic programs. However, there are some features missing from the editor that would make you and your C-64 far more efficient. Even experienced programmers occasionally find the need to add more lines where there isn't any room. And the ability to find or change a string of characters makes debugging and corrections very easy!

BasicAid lets you add Renumber, Find and Change to your list of Basic commands. It resides in location \$C400 and can operate concurrently with *RUN*'s previously published screen dump ("Print Your Screen," December 1984) and disk directory ("The Key to Your Disk Directory," August 1985) programs, as well as with the DOS wedge program. To enter the program, just type in the Basic loader (Listing 1) and save it. A checksum routine will indicate which lines, if any, have typing errors. Once you've correctly entered it, load and run it. The new commands now at your disposal are Renum, Find, Change and Reset.

Renumber Command

To renumber program lines, including all the Goto, Gosub and If...Then branch targets and multiple branches (as in "ON A GOTO 100,200,300"), use the Renum com-

mand. The Renum command will start the program with line 10 and renumber by ten. To begin at another line number, you may enter that line number after the Renum command. The increment will remain ten unless you specify otherwise by adding a comma and the increment amount. For example,

```
RENUM 100,5
```

will make the first line of your program 100, the next line 105, then 110 and so on. (It takes approximately five seconds to renumber a 10K Basic program.)

Find Command

To find a string of data in your program, use the Find command. The text you wish to find must be enclosed within delimiters. The delimiter may be any character. For example, to find each occurrence of the Print command, you could enter:

```
FIND /PRINT/
```

What if you wanted to find Goto, only as a command and not as a word in, say, a Print or REM statement? FIND /GOTO/ will find all Goto instructions, except for those within Print and REM statements. Since the interpreter will not try to tokenize a command when in Quote mode, you could also use a quote mark as your delimiter:

```
FIND "GOTO"
```

To be sure that you have found all of your selections, the program displays the word "hit" every time it finds what you requested. After finding eight of your selections, the program displays

```
CONTINUE Y/N
```

Y will display the next eight lines of "hits," then the message again, while N will return you to Command mode.

Change Command

The Change command works like the Find command, except that the text you want to locate and the text you want to put in your program should be separated by your delimiter. Let's say you've mistakenly used the variable A\$ for two different reasons, so you want to change some of the A\$ variables to COST\$. Enter the following:

```
CHANGE /A$/COST$/
```

The first line with A\$ will be displayed followed by the message:

```
U=UPDATE C=CONTINUE S=STOP
```

U will cause the line to be changed and redisplayed, and it will display the next occurrence of A\$; C will not cause the line to be changed, but will display the next line; and S will return you to Basic.

RUN It Right

C-64; C-128 (in C-64 mode)

It's interesting to note the size limitation of the Find or Change strings. The buffer that holds the string is only ten characters long, but the length of the string is not necessarily limited to ten characters. For example,

```
FIND /PRINT"ENTER NUMBER"/
```

will trigger a String Too Long error, but

```
FIND /GOSUB10:GOSUB100:RETURN/
```

will not. This is because the Basic interpreter will convert Basic commands (unless within quotes) to a one-byte token, so that the latter example is only ten bytes long!

The only instance I can think of when you'd need to remove the BasicAid program from operation is when you want to load a machine language program that uses the same memory space. In that case, the system will crash because the Basic vector will cause a jump to code that isn't set up to handle input. Therefore, you must restore the vector to its original value by entering the Reset command. This will disable the new commands; if you want to reenable them, enter SYS 50176.

How the Program Works

A Basic wedge program usually changes the CHRGET routine so that the wedge can examine the characters in the input buffer. BasicAid achieves this a little differently. It changes the vector for the character dispatch in location \$0308. This to-

kenizes the input and allows other programs that change the CHRGET routine, such as the wedge, to function concurrently with BasicAid.

Because this program actually changes memory where Basic resides, let's first see how a Basic program links in memory. Here's a one-line program in Basic:

```
10 PRINT:GOTO 10
```

In memory, this program will look like this:

\$0801 0C 08	Address of next line (low byte, high byte)
\$0803 0A 00	Current line number (low byte, high byte)
\$0805 99	Token for Print command
\$0806 3A	The colon (ASCII)
\$0807 89	Token for Goto
\$0808 20 31 30	Blank and branch target
\$080B 00	End-of-line indicator
\$080C 00 00	Next line, or end of program

Let's renumber the program. I built a table that contains the original hexadecimal line numbers and the new line numbers generated. If the line numbers get too big, then an error message will be displayed and the renumbering function will not work. I put the line number table under Basic, so that no memory will be wasted.

During the implementation of the line numbers, a search is made for the Goto, Gosub and Then tokens. If a line containing one of these tokens is found, then the token within the line is converted from ASCII to hex. The ta-

ble is searched for a match; if one is found, a new number is generated, placed into a hold area and converted to ASCII. This ASCII number must now be placed in the program.

BasicAid moves your program to the top of Basic memory, then brings it back to Basic memory area one line at a time. This way, the program only needs to be shifted twice. It's shifted to allow for the new line number, which may be shorter or longer than the old number.

The Find command first validates the input, then compares the first character of the find string with each line of program code. If there is a match, then successive characters are checked until the end of the input buffer is reached. The line is then displayed.

If the Change command is invoked, then the difference in the lengths of the "from" and "to" strings is computed and the program is shifted left or right to provide the correct amount of space for the "to" string.

BasicAid is surely worth your typing time. However, if you'd rather not type it in and would like me to send you a copy on disk, just send me \$3 and a self-addressed, stamped mailer. R

Address all author correspondence to Robin Franzel, 5521 Harvey Lane, Alexandria, VA 22312.

Listing 1. BasicAid loader.

```

10 DATA 169,24,141,8,3,169,196,141,9,3,96,1
   :REM*150
20 DATA 228,141,8,3,169,167,141,9,3,76,116,
   :REM*226
30 DATA 160,0,132,11,162,255,232,200,177,12
   :REM*254
40 DATA 166,201,240,246,201,128,240,18,232,
   :REM*128
50 DATA 16,250,230,11,160,0,189,167,201,208
   :REM*90
60 DATA 228,167,165,11,10,170,189,159,201,7
   :REM*248
70 DATA 201,72,96,169,255,208,2,169,0,141,6
   :REM*88
80 DATA 169,8,141,61,3,32,150,196,32,124,19
   :REM*190
90 DATA 4,32,1,197,176,45,32,45,197,173,60,
   :REM*124
100 DATA 240,9,32,104,197,164,168,144,236,1
   :REM*238
110 DATA 146,198,176,23,160,4,206,61,3,208,
   :REM*156

```

```

120 DATA 8,141,61,3,32,148,197,224,89,208,4
   :REM*76
130 DATA 4,208,206,76,116,164,162,0,152,24,
   :REM*160
140 DATA 133,122,144,2,230,123,32,115,0,240
   :REM*38
150 DATA 32,240,247,141,62,3,32,115,0,240,6
   :REM*34
160 DATA 62,3,240,16,157,75,3,232,224,11,20
   :REM*126
170 DATA 32,115,0,205,62,3,208,52,138,240,4
   :REM*130
180 DATA 69,3,173,60,3,208,1,96,162,0,32,11
   :REM*138
190 DATA 0,240,28,205,62,3,240,16,157,85,3,
   :REM*82
200 DATA 224,11,208,238,32,115,0,205,62,3,2
   :REM*84
210 DATA 138,240,4,142,70,3,96,104,104,76,8
   :REM*172
220 DATA 104,104,76,113,165,177,170,208,8,3
   :REM*214
230 DATA 160,4,144,245,96,162,0,221,75,3,24
   :REM*242
240 DATA 200,208,234,200,232,236,69,3,240,1
   :REM*244

```


Listing 1 continued.

```

250 DATA 240,223,221,75,3,240,240,208,216,1
    32,168,24,1990 :REM*236
260 DATA 96,165,170,133,95,165,171,133,96,1
    73,0,3,1400 :REM*63
270 DATA 72,173,1,3,72,169,13,32,210,255,16
    9,94,1263 :REM*139
280 DATA 141,0,3,169,197,141,1,3,160,1,132,
    15,963 :REM*175
290 DATA 200,177,170,170,200,177,170,133,21
    134,20,76,1648 :REM*163
300 DATA 232,166,104,141,1,3,104,141,0,3,24
    ,96,1015 :REM*37
310 DATA 169,127,162,201,32,174,197,32,207,
    255,201,13,1770 :REM*173
320 DATA 240,3,170,208,246,224,85,240,12,22
    4,67,240,1959 :REM*9
330 DATA 6,224,83,208,227,56,96,24,96,32,83
    ,200,1335 :REM*21
340 DATA 32,17,201,32,45,197,144,243,169,10
    9,162,201,1552 :REM*25
350 DATA 32,174,197,32,207,255,201,13,240,3
    ,170,208,1732 :REM*235
360 DATA 246,224,78,240,4,224,89,208,231,96
    ,133,166,1939 :REM*173
370 DATA 134,167,160,0,177,166,240,6,32,210
    ,255,200,1747 :REM*19
380 DATA 208,246,96,200,177,122,240,36,24,1
    52,101,122,1724 :REM*159
390 DATA 133,122,144,2,230,123,32,74,201,14
    0,61,3,1265 :REM*93
400 DATA 141,62,3,160,0,177,122,240,21,32,2
    53,174,1385 :REM*211
410 DATA 32,74,201,140,60,3,240,15,160,0,16
    9,10,1104 :REM*177
420 DATA 141,61,3,140,62,3,169,10,141,60,3,
    32,825 :REM*255
430 DATA 60,201,32,23,198,176,18,32,106,198
    ,32,178,1254 :REM*103
440 DATA 198,32,106,198,32,207,198,32,124,1
    98,32,15,1372 :REM*39
450 DATA 199,32,67,201,76,116,164,32,116,19
    8,160,3,1364 :REM*33
460 DATA 177,170,145,180,136,177,170,145,18
    0,136,173,62,1851 :REM*157
470 DATA 3,145,180,136,173,61,3,145,180,24,
    165,180,1395 :REM*105
480 DATA 105,4,133,180,144,2,230,181,32,146
    ,198,144,1499 :REM*43
490 DATA 11,160,3,169,0,145,180,136,16,251,
    24,96,1191 :REM*99
500 DATA 173,60,3,109,61,3,141,61,3,144,195
    ,238,1191 :REM*195
510 DATA 62,3,173,62,3,201,250,208,185,169,
    85,162,1563 :REM*91
520 DATA 201,32,174,197,56,96,169,254,133,1
    80,169,159,1820 :REM*156
530 DATA 133,181,208,8,169,0,133,180,169,16
    0,133,181,1655 :REM*30
540 DATA 165,43,133,170,165,44,133,171,160,
    0,177,170,1531 :REM*102
550 DATA 141,63,3,200,177,170,141,64,3,96,1
    60,0,1218 :REM*112
560 DATA 173,63,3,133,170,173,64,3,133,171,
    177,170,1433 :REM*172
570 DATA 141,63,3,200,177,170,141,64,3,13,6
    3,3,1041 :REM*230
580 DATA 208,2,56,96,24,96,160,2,177,180,14
    5,170,1316 :REM*250
590 DATA 200,177,180,145,170,32,146,198,176
    ,12,165,180,1781 :REM*34
600 DATA 105,4,133,180,144,232,230,181,208,
    228,96,56,1797 :REM*252
610 DATA 165,45,229,43,141,67,3,165,46,229,
    44,141,1318 :REM*96
620 DATA 68,3,56,169,255,237,67,3,133,164,1
    33,180,1468 :REM*26
630 DATA 169,159,237,68,3,133,165,133,181,1
    65,43,133,1589 :REM*88
640 DATA 166,165,44,133,167,169,96,141,14,2
    01,32,220,1548 :REM*22
650 DATA 200,169,76,141,14,201,165,180,133,
    164,165,181,1789 :REM*216
660 DATA 133,165,96,160,4,132,168,132,169,1
    77,164,145,1645 :REM*82
670 DATA 170,136,16,249,164,168,177,164,208
    ,68,164,169,1853 :REM*90
680 DATA 145,170,200,24,152,160,0,101,170,1
    45,170,170,1607 :REM*194
690 DATA 165,171,105,0,200,145,170,134,170,
    133,171,164,1728 :REM*246
700 DATA 168,200,152,24,101,164,133,164,169
    ,0,101,165,1541 :REM*124
710 DATA 133,165,160,0,177,164,200,17,164,2
    08,188,145,1721 :REM*74
720 DATA 170,136,16,251,24,169,2,101,170,13
    3,45,165,1382 :REM*2
730 DATA 171,105,0,133,46,96,164,169,145,17
    0,230,168,1597 :REM*122
740 DATA 230,169,164,168,201,137,240,12,201
    ,141,240,8,1911 :REM*196
750 DATA 201,167,240,4,169,0,240,156,162,0,
    177,164,1680 :REM*70
760 DATA 201,48,144,11,201,58,176,7,157,75,
    3,232,1313 :REM*10
770 DATA 200,208,239,224,0,240,45,132,168,1
    42,69,3,1670 :REM*105
780 DATA 177,164,201,44,240,2,169,0,141,125
    ,199,32,1494 :REM*35
790 DATA 202,199,32,234,199,32,41,200,162,0
    ,164,169,1634 :REM*103
800 DATA 189,85,3,240,6,145,170,200,232,208
    ,245,132,1855 :REM*113
810 DATA 169,76,28,199,201,32,208,249,240,1
    98,169,0,1769 :REM*131
820 DATA 174,69,3,157,75,3,169,75,133,122,1
    69,3,1152 :REM*235
830 DATA 133,123,32,67,201,32,74,201,140,71
    ,3,141,1218 :REM*29
840 DATA 72,3,32,60,201,96,32,60,201,169,0,
    133,1059 :REM*11
850 DATA 180,169,160,133,181,173,72,3,160,3
    ,209,180,1623 :REM*129
860 DATA 144,29,208,9,136,173,71,3,209,180,
    240,21,1423 :REM*7
870 DATA 200,165,180,24,105,4,133,180,144,2
    ,230,181,1548 :REM*227
880 DATA 177,180,136,17,180,208,218,56,96,1
    60,1,177,1606 :REM*237
890 DATA 180,153,71,3,136,16,248,24,96,32,6
    7,201,1227 :REM*225
900 DATA 172,71,3,173,72,3,133,98,132,99,16
    2,144,1262 :REM*197
910 DATA 56,32,73,188,32,221,189,32,60,201,
    162,0,1246 :REM*149
920 DATA 189,1,1,157,85,3,240,3,232,208,245
    ,142,1506 :REM*109
930 DATA 70,3,96,164,168,152,72,24,101,170,
    133,164,1317 :REM*175
940 DATA 133,166,165,171,105,0,133,165,133,
    167,56,165,1559 :REM*3
950 DATA 45,229,166,141,67,3,165,46,229,167
    ,141,68,1467 :REM*129
960 DATA 3,56,173,69,3,237,70,3,72,144,82,2
    08,1120 :REM*83

```



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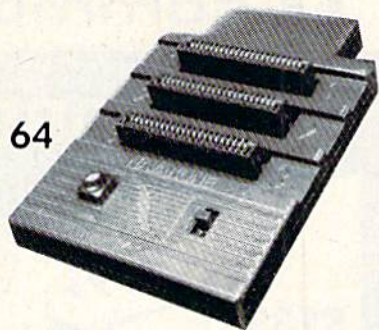
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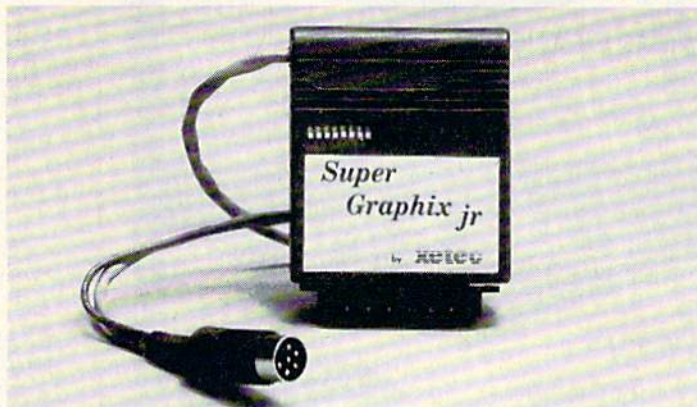
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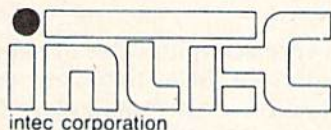
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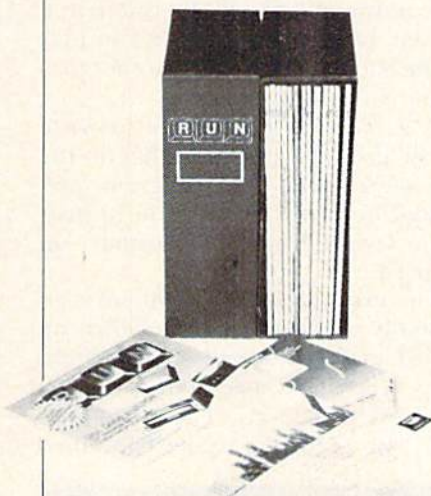
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The Twelve Days of Christmas

By WILLIAM E. FORRESTER

Here's a musical program that will put you and your Commodore 64 into the spirit of the season.

I received quite a bit of mail from readers of *RUN* following the appearance of "A Commodore Christmas Carol" (*RUN*, Dec. 1984). Many readers wanted to know how to translate the Christmas music programs written for the VIC-20 to run on a Commodore 64. Unfortunately, direct translation is not possible, due to the complexity of the 64's SID chip. Controlling the SID chip by means of the 64's built-in Basic is, in fact, rather cumbersome.

By far the easiest way to write music for the 64 is to use a song-editor program, such as "SID Serenade" (*RUN*, Oct. 1984). Commercial software (e.g., Master Composer) can also be used for that purpose. Aside from the relative ease with which music can be written using such utilities, the music itself will be interrupt-driven, which means that it can play in the background while another program is running.

It is, of course, possible to write music programs in Basic that do the job quite well. The program presented here will enable you to hear "The Twelve Days of Christmas" on your 64.

The programming technique is essentially the same as that shown on p. 187 of the *Commodore 64 Programmer's Reference Guide*. The program contains two loops. The first (lines 100-260) reads the values contained

in Data statements, converts those values into frequency and other information and puts the results into a two-dimensional array in memory. The second loop (lines 330-420) retrieves information from the array and produces sounds via the SID chip's three musical voices.

One trick that saves a lot of work when you're using this general method of programming is to include flags in your Data statements to mark the end of musical phrases. I used a value of 0 to mark the end of the various phrases in this program. These 0s are placed into the memory array when the Read loop is executed. Line 410 checks for the occurrence of these flags during the Play loop and sends control to line 720 when found. Lines 720-810 then serve to set the array pointer (AP) to the location where the next phrase begins.

Be careful when you type in the Data statements and any lines containing Pokes. One additional piece of advice is to deactivate any wedge that you might have loaded in prior to running the program. The wedge will otherwise have a very noticeable effect on the music's tempo. ®

Address all author correspondence to William E. Forrester, R.D. 3, Box 174, Oswego, NY 13126.

RUN It Right

C-64; C-128 (in C-64 mode)

12 DRUMMERS DRUMMING
 11 PIPERS PIPING
 10 LORDS A-LEAPING
 9 LADIES DANCING
 8 MAIDS A-MILKING
 7 SWANS A-SWIMMING
 6 GEESE A-LAYING
 5 GOLDEN RINGS
 4 CALLING BIRDS
 3 FRENCH HENS
 2 TURTLE DOVES
 A PARTRIDGE IN A PEAR TREE

Listing 1. *The Twelve Days of Christmas program.*

```

1Ø PRINT"{SHFT CLR}{3 CRSR DN}{2 CRSR RTs}
  SETTING UP---" :REM*25Ø
2Ø PRINT"{2 CRSR DN}PLEASE WAIT 3Ø SECS." :REM*148
3Ø DIMFQ(11) :REM*148
4Ø FORI=ØTO11:READFQ(I):NEXT :REM*164
5Ø S=54272:FORL=ØTO24:POKES+L,Ø:NEXT :REM*212
6Ø DIMH(2, 2ØØ),L(2, 2ØØ),C(2, 2ØØ):REM*214
7Ø V(Ø)=65:V(1)=65:V(2)=65 :REM*17Ø
8Ø POKES+3,15 :POKES+1Ø,8 :POKES+17,8 :REM*32
9Ø POKES+22,128:POKES+23,244 :REM*14
1ØØ FORK=ØTO2 :REM*58
11Ø AP=Ø :REM*4Ø
12Ø READNM :REM*22Ø
13Ø IFNM=-1THENH(K,AP)=Ø:L(K,AP)=Ø:C(K,AP)=
  Ø:GOTO26Ø :REM*76
14Ø IFNM=ØTHENH(K,AP)=Ø:L(K,AP)=Ø:C(K,AP)=Ø
  :GOTO25Ø :REM*168
15Ø WA=V(K):WB=WA-1:IFNM<ØTHENNM=-NM:WA=Ø:W
  B=Ø :REM*242
16Ø DR%=NM/128:OC%=(NM-128*DR%)/16 :REM*54
17Ø NT=NM-128*DR%-16*OC% :REM*21Ø
18Ø FR=FQ(NT) :REM*86
19Ø IFOC%=7THEN21Ø :REM*216
2ØØ FORJ=6TOOC%STEP-1:FR=FR/2:NEXT :REM*144
21Ø HF%=FR/256:LF%=FR-256*HF% :REM*112
22Ø IFDR%=1THENH(K,AP)=HF%:L(K,AP)=LF%:C(K,
  AP)=WA:AP=AP+1:GOTO12Ø :REM*2
23Ø FORJ=1TODR%-1:H(K,AP)=HF%:L(K,AP)=LF%:C
  (K,AP)=WA:AP=AP+1:NEXT :REM*6
24Ø H(K,AP)=HF%:L(K,AP)=LF%:C(K,AP)=WB :REM*148
25Ø AP=AP+1:GOTO12Ø :REM*192
26Ø NEXT :REM*15
27Ø DU=2Ø :REM*73
28Ø FORK=ØTO2:H(K,Ø)=Ø:L(K,Ø)=Ø:NEXT:REM*31
29Ø POKES+5,9:POKES+6,Ø :REM*23
3ØØ POKES+12,9:POKES+13,Ø :REM*31
31Ø POKES+19,9:POKES+2Ø,Ø :REM*75
32Ø POKES+24,31 :REM*227
33Ø AP=Ø:J=1 :REM*2Ø5
34Ø PRINT"{SHFT CLR}{CTRL 1}{6 CRSR DN}" :;
  CO=J:POKE5328Ø,CO:POKE53281,CO+17 :REM*1Ø7
35Ø ONJGOSUB54Ø,53Ø,52Ø,51Ø,5ØØ,49Ø,48Ø,47Ø
  ,46Ø,45Ø,44Ø,43Ø :REM*117
36Ø POKES,L(Ø,AP):POKES+7,L(1,AP):POKES+14,
  L(2,AP) :REM*151
37Ø POKES+1,H(Ø,AP):POKES+8,H(1,AP):POKES+1
  5,H(2,AP) :REM*199
38Ø POKES+4,C(Ø,AP):POKES+11,C(1,AP):POKES+
  18,C(2,AP) :REM*91

```

```

39Ø FORT=1TODU :NEXT :REM*161
4ØØ AP=AP+1 :REM*9
41Ø IFC(Ø,AP)=ØTHEN72Ø :REM*9
42Ø GOTO36Ø :REM*2Ø7
43Ø PRINT"{1Ø CRSR RTs}12 DRUMMERS DRUMMING
  " :REM*45
44Ø PRINT"{12 CRSR RTs}11 PIPERS PIPING" :REM*215
45Ø PRINT"{11 CRSR RTs}1Ø LORDS A-LEAPING" :REM*91
46Ø PRINT"{12 CRSR RTs}9 LADIES DANCING" :REM*137
47Ø PRINT"{12 CRSR RTs}8 MAIDS A-MILKING" :REM*163
48Ø PRINT"{11 CRSR RTs}7 SWANS A-SWIMMING" :REM*215
49Ø PRINT"{12 CRSR RTs}6 GEESE A-LAYING" :REM*127
5ØØ PRINT"{13 CRSR RTs}5 GOLDEN RINGS" :REM*1
51Ø PRINT"{13 CRSR RTs}4 CALLING BIRDS" :REM*99
52Ø PRINT"{14 CRSR RTs}3 FRENCH HENS" :REM*182
53Ø PRINT"{13 CRSR RTs}2 TURTLE DOVES" :REM*94
54Ø PRINT"{7 CRSR RTs}A PARTRIDGE IN A PEAR
  TREE" :REM*216
55Ø RETURN :REM*98
56Ø DATA 34334,36376,38539,4Ø83Ø :REM*138
57Ø DATA 43258,4583Ø,48556,51443 :REM*234
58Ø DATA 545Ø2,57743,61176,64814 :REM*122
59Ø DATA 128,32Ø,32Ø,576,325,325,581,324,32
  5,327,329,33Ø,327,329,327,329,33Ø,Ø :REM*178
6ØØ DATA 592,327,329,586,Ø,592,327,329,33Ø,
  327,Ø :REM*52
61Ø DATA 11Ø4,21Ø,971,2128,336,33Ø,329,327,
  581,586,578,581,327,325,324,322,576 :REM*38
62Ø DATA 329,33Ø,592,338,33Ø,329,325,583,16
  Ø5,-1 :REM*216
63Ø DATA 128,-512,313,314,32Ø,-256,32Ø,322,
  32Ø,-256,58Ø,58Ø,581,576,Ø :REM*72
64Ø DATA 581,1Ø92,Ø,581,1Ø92,Ø :REM*22
65Ø DATA 1Ø93,1Ø93,1Ø93,1Ø92,329,327,325,32
  Ø,569,314,32Ø,314,32Ø,57Ø,324,322 :REM*32
66Ø DATA 32Ø,311,564,576 :REM*48
67Ø DATA 581,1Ø93,58Ø,1593,-1 :REM*194
68Ø DATA 128,-512,3Ø9,311,313,-256,313,314,
  32Ø,-256,32Ø,-256,3Ø4,-256,3Ø9,3Ø8 :REM*234
69Ø DATA 565,Ø,313,314,576,56Ø,Ø,313,314,57
  6,56Ø,Ø :REM*22Ø
7ØØ DATA 1Ø81,1Ø8Ø,1Ø79,1Ø72,1573,311,313,3
  14,313,567,1584,565 :REM*19Ø
71Ø DATA 569,57Ø,576,56Ø,1589,-1 :REM*164
72Ø IFAP=37THENIFJ>5THENAP=51:Q=1:GOTO36Ø :REM*216
73Ø IFAP=37THENIFJ=5THENAP=64:GOTO36Ø :REM*124
74Ø IFAP=37THENIFJ>1THENAP=38 :Z=1:GOTO36Ø :REM*84
75Ø IFAP=37THENAP=136:GOTO36Ø :REM*94
76Ø IFAP=5ØANDZ=J-1THENAP=132:GOTO36Ø :REM*24Ø
77Ø IFAP=5Ø THENZ=Z+1:AP=38:GOTO36Ø :REM*39
78Ø IFAP=63ANDQ=J-5THENAP=AP+1:GOTO36Ø :REM*227
79Ø IFAP=63 THENQ=Q+1:AP=51:GOTO36Ø:REM*115
8ØØ IFAP=164ANDJ=12THENPOKES+24,Ø:END :REM*45
81Ø IFAP=164THENAP=1:J=J+1:GOTO34Ø :REM*161

```


Stack

Moving a few bars from one pile to another sounds easy, until you try this game.

By **GLENN W. ZUCH**

This game of mental skill and logic is based on the popular Towers of Hanoi game. The object of this computer version is to move several bars from one pile to another pile, using a third pile as an intermediary. In moving them, you cannot place a longer bar on top of a shorter one. It sounds simple enough, but there are distinct rules you must follow if you expect to receive a reward for stacking the bars in the fewest possible number of moves.

You will find that this is a very user-friendly game. Everything you are required to do is clearly indicated on the screen. Every mistake you make brings up a prompt to remind you how to get back on the right track. If you follow the directions, none of your errors will count against your final score. You can even become a winner in more than one way.

Finally, you can choose from any one of four levels of difficulty, moving from the easiest to the most difficult as your skill improves.

Playing the Game

When you run this game, you are first greeted by a title in large block letters and an illustration of the beginning stack of bars, each with its own identifying number. This is followed by some simple directions.

You are then given the option of choosing to move from two to five bars. The fewer bars, the easier it will be to solve the game. After you make your choice, the computer will display the starting setup, based on your choice, and tell you which bars you will be moving.

You are then asked which bar you want to move and where you want to move it. You move one bar at a time.

While the computer gives you directions and prompts you when you try to make incorrect entries, you must still make all of the decisions and computations to win. This, as you will soon discover, is not always an easy task.

Eventually, you will succeed in stacking all the bars in the right-most pile. The program will acknowledge if you are able to do this in the fewest possible number of moves. Even if it took you more than the minimum number of moves, you are still a winner! The computer will tell you how many moves you took and the least number of moves required, so that you will have a target to shoot for the next time you play. ®

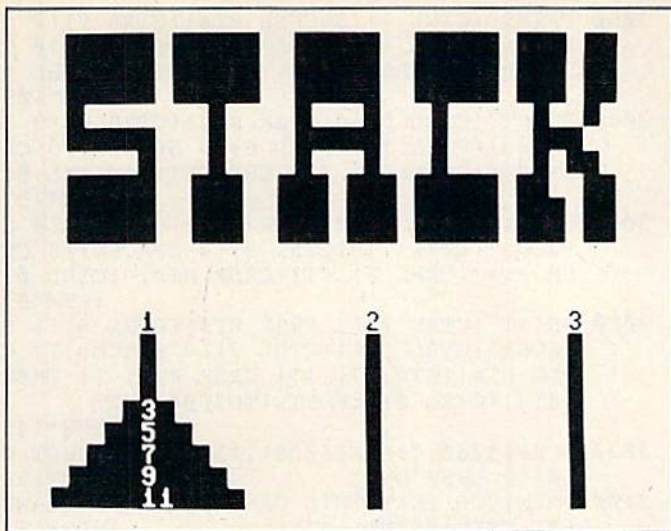
Address all author correspondence to Glenn W. Zuch, 183 Hagen Ave., N. Tonawanda, NY 14120.

Listing 1. The Stack game program.

```
100 REM*****STACK*****           :REM*176
110 GOSUB2000                         :REM*76
120 DIMG(10,4)                       :REM*28
130 FORB=1TO5:FORL=1TO3:G(B,L)=0:NEXTL:NEXTB :REM*174
140 PRINT"{2 CRSR DNs}{3 CRSR RTs}HOW MANY BARS DO YOU WANT TO MOVE :REM*108

150 PRINT"{12 CRSR RTs}(2,3,4 OR 5)? :REM*204
160 INPUT X                           :REM*120
170 D=0                                :REM*86
180 FORZ=1TO5:IFZ=XTHEN300:NEXTZ      :REM*210
300 POKE53281,5:PRINT"{SHFT CLR}{CRSR DN} :REM*119
310 PRINT"{7 CRSR RTs}{CTRL 7}{CTRL 9}{CTRL L 0} :REM*137
320 PRINT"{6 CRSR RTs}{CTRL 2}{CTRL 9} 3 {CTRL 0} :REM*187
```

RUN It Right



Listing 1 continued.

```

330 PRINT"{5 CRSR RTs}{CTRL 2}{CTRL 9}{2 SP
ACES}5{2 SPACES}{CTRL 0} :REM*211
340 PRINT"{4 CRSR RTs}{CTRL 2}{CTRL 9}{3 SP
ACES}7{3 SPACES}{CTRL 0} :REM*11
350 PRINT"{3 CRSR RTs}{CTRL 2}{CTRL 9}{4 SP
ACES}9{4 SPACES}{CTRL 0} :REM*215
360 PRINT"{2 CRSR RTs}{CTRL 2}{CTRL 9}{5 SP
ACES}11{4 SPACES}{CTRL 0}{2 CRSR DNS}
:REM*177
370 PRINT"{CTRL 2}{7 CRSR RTs}1{10 CRSR RTs
}2{10 CRSR RTs}3{CTRL 1} :REM*43
400 N=5:B=11 :REM*123
410 FORC=XTO1STEP-1 :REM*123
420 G(N,1)=B:B=B-2:N=N-1:NEXTC:GOSUB1230
:REM*199
430 IFX=2THENMM$="9 & 11" :REM*97
440 IFX=3THENMM$="7,9 & 11" :REM*107
450 IFX=4THENMM$="5,7,9 & 11" :REM*251
460 IFX=5THENMM$="3,5,7,9 & 11" :REM*145
470 PRINT"{CRSR DN}{CTRL 1}YOU WILL BE MOVI
NG BARS ";MM$ :REM*57
480 PRINT"{CTRL 7}":INPUT"WHICH BAR DO YOU
WANT TO MOVE";B :REM*85
490 IFB=3ANDX=<4THEN530 :REM*195
500 IFB=5ANDX=<3THEN530 :REM*9
510 IFB=7ANDX=<2THEN530 :REM*79
520 IF(B-3)*(B-5)*(B-7)*(B-9)*(B-11)=0THEN5
40 :REM*250
530 PRINT"{CTRL 2}YOU MAY ONLY USE ";MM$;"
:PRINT SPC(10)"ENTER AGAIN!{CTRL 7}":GO
TO480 :REM*242
540 FORY=1TO5:FORR=1TO3:IFG(Y,R)=BTHEN560
:REM*4
550 NEXTR:NEXTY :REM*14
560 FORZ=YTO1STEP-1 :REM*234
570 IFG(Z,R)=0THEN590 :REM*190
580 IFG(Z,R)<BTHEN600 :REM*2
590 NEXTZ:GOTO700 :REM*24
600 PRINT"{CTRL 2}{3 CRSR RTs}THAT BAR IS U
NDER ANOTHER ONE. MAKE{5 CRSR RTs}ANOTH
ER CHOICE.":PRINT"{CTRL 7} :REM*124
610 GOTO480 :REM*182
700 INPUT"PLACE BAR ON WHICH STACK";L
:REM*46
710 IF(L-1)*(L-2)*(L-3)=0THEN800 :REM*234
720 PRINT"{CTRL 2}YOU MUST CHOOSE '1', '2'
OR '3'{CTRL 7}":GOTO700 :REM*186
800 FORY=1TO5:IFG(Y,L)<>0THEN830 :REM*139
810 NEXTY :REM*1
820 GOTO860 :REM*137

```

```

830 IFB<G(Y,L)THEN860 :REM*87
840 PRINT"{CTRL 2}YOU CAN'T PLACE A LONGER
BAR ON TOP OF A SMALLER ONE...TRY AGAIN!
:REM*9
850 PRINT"{CTRL 7}":GOTO480 :REM*185
860 FORW=1TO5:FORC=1TO3:IFG(W,C)=BTHEN910
:REM*239
900 NEXTC:NEXTW :REM*117
910 FORV=1TO5:IFG(V,L)<>0THEN940 :REM*225
920 NEXTV :REM*87
930 V=5:GOTO950 :REM*197
940 V=V-1 :REM*199
950 G(V,L)=G(W,C):G(W,C)=0:GOSUB1230:REM*53
960 D=D+1 :REM*81
970 FORY=1TO5:FORR=1TO2:IFG(Y,R)<>0THEN480
:REM*179
980 NEXTR:NEXTY :REM*189
990 IFD<>2{UP ARROW}X-1THEN1500 :REM*23
1000 GOSUB3190 :REM*3
1200 POKE53281,13:PRINT"{SHFT CLR}{CTRL 1}{
8 CRSR DNS}{8 CRSR RTs}TRY AGAIN{SHFT
SPACE}{ 'Y' OR 'N' }";:INPUT A$:REM*194
1210 IF A$="N" THEN 1330 :REM*72
1220 IFA$="Y" THEN 130 :REM*160
1230 FORJ=1TO5:P=7:FORS=1TO3 :REM*232
1240 IFG(J,S)=0THEN1300 :REM*242
1250 PRINTTAB(P-INT(G(J,S)/2)); :REM*214
1260 FORW=1TOG(J,S) :REM*104
1270 PRINT"{CTRL 4}{CTRL 9} {CTRL 0}";
:REM*152
1280 NEXTW :REM*201
1290 GOTO1310 :REM*37
1300 PRINTTAB(P);"{CTRL 7}{CTRL 9} {CTRL 0}
"; :REM*139
1310 P=P+11 :REM*59
1320 NEXTS:PRINT:NEXTJ:RETURN :REM*113
1330 POKE53280,4:POKE53281,7:PRINT"{SHFT CL
R}{3 CRSR DNS} :REM*47
1340 PRINT"{3 CRSR RTs}THANK YOU...PLEASE P
LAY AGAIN SOON.":FORT=1TO3000:NEXT:PRI
NT"{SHFT CLR} :REM*157
1350 END :REM*77
1500 POKE53280,0:POKE53281,8:PRINT"{SHFT CL
R}{3 CRSR DNS} :REM*213
1510 IFX=2THENM$="3 MOVES" :REM*169
1520 IFX=3THENM$="7 MOVES" :REM*243
1530 IFX=4THENM$="15 MOVES" :REM*97
1540 IFX=5THENM$="31 MOVES" :REM*92
1550 PRINT"{CTRL 2}{9 CRSR RTs}IT TOOK YOU"
;D;"MOVES.{3 CRSR DNS} :REM*230
1560 PRINT"IT COULD HAVE BEEN DONE IN ONLY
";M$;" :REM*6
1570 PRINT"{3 CRSR DNS}{8 CRSR RTs}TRY HARD
ER NEXT TIME!":FORT=1TO5000:NEXT:GOTO
2000 :REM*170
2000 POKE53280,8:POKE53281,3:PRINT"{SHFT CL
R}{4 CRSR DNS}{CTRL 3} :REM*235
2010 PRINT"{CTRL 9}{3 CRSR RTs}{5 SPACES}{C
RSR RT}{5 SPACES}{2 CRSR RTs}{5 SPACES
}{2 CRSR RTs}{5 SPACES}{CRSR RT}{3 SPA
CES}{CRSR RT}{2 SPACES}{CRSR RT}
:REM*221
2020 PRINT"{CTRL 9}{3 CRSR RTs}{5 SPACES}{C
RSR RT}{5 SPACES}{2 CRSR RTs}{5 SPACES
}{2 CRSR RTs}{5 SPACES}{CRSR RT}{3 SPA
CES}{CRSR RT}{2 SPACES}{CRSR RT}
:REM*231
2030 PRINT"{CTRL 9}{3 CRSR RTs}{5 SPACES}{C
RSR RT}{5 SPACES}{2 CRSR RTs}{5 SPACES
}{2 CRSR RTs}{5 SPACES}{CRSR RT}{3 SPA
CES}{CRSR RT}{2 SPACES}{CRSR RT}
:REM*241
2040 PRINT"{CTRL 9}{3 CRSR RTs} {7 CRSR RTs
} {4 CRSR RTs} {3 CRSR RTs} {3 CRSR RT
s} {5 CRSR RTs} {2 CRSR RTs} {CRSR RT}
:REM*183

```


Listing 1 continued.

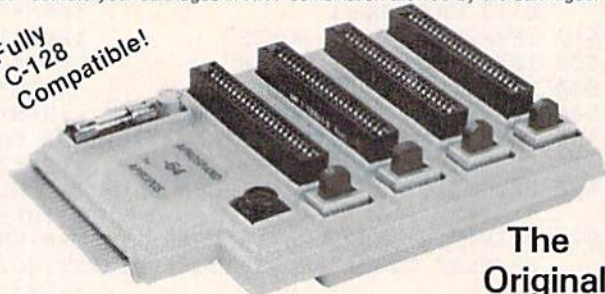
```

2050 PRINT"{CTRL 9}{3 CRSR RTs}{5 SPACES}{3
      CRSR RTs} {4 CRSR RTs}{5 SPACES}{3 CR
      SR RTs} {5 CRSR RTs}{3 SPACES}{CRSR RT
      } :REM*164
2060 PRINT"{CTRL 9}{7 CRSR RTs} {3 CRSR RTs
} {4 CRSR RTs} {3 CRSR RTs} {3 CRSR RT
s} {5 CRSR RTs} {CRSR RT}{2 SPACES}{CR
SR RT} :REM*90
2070 PRINT"{CTRL 9}{3 CRSR RTs}{5 SPACES}{2
      CRSR RTs}{3 SPACES}{2 CRSR RTs}{3 SPA
      CES}{CRSR RT}{3 SPACES}{CRSR RT}{5 SPA
      CES}{CRSR RT}{2 SPACES}{2 CRSR RTs}{2
      SPACES}{CRSR RT} :REM*216
2080 PRINT"{CTRL 9}{3 CRSR RTs}{5 SPACES}{2
      CRSR RTs}{3 SPACES}{2 CRSR RTs}{3 SPA
      CES}{CRSR RT}{3 SPACES}{CRSR RT}{5 SPA
      CES}{CRSR RT}{3 SPACES}{CRSR RT}{2 SPA
      CES}{CRSR RT} :REM*18
2090 PRINT"{CTRL 9}{3 CRSR RTs}{5 SPACES}{2
      CRSR RTs}{3 SPACES}{2 CRSR RTs}{3 SPA
      CES}{CRSR RT}{3 SPACES}{CRSR RT}{5 SPA
      CES}{CRSR RT}{3 SPACES}{CRSR RT}{2 SPA
      CES}{CRSR RT}":PRINT"{2 CRSR DNs}{CTRL
      7}":FORT=1TO1500:NEXT :REM*206
3000 PRINT"{CTRL 1}{7 CRSR RTs}1{12 CRSR RT
s}2{11 CRSR RTs}3{CTRL 7} :REM*223
3010 PRINT"{7 CRSR RTs}{CTRL 9} {12 CRSR RT
s} {11 CRSR RTs} {CTRL 0} :REM*157
3020 PRINT"{7 CRSR RTs}{CTRL 9} {12 CRSR RT
s} {11 CRSR RTs} {CTRL 0} :REM*167
3030 PRINT"{7 CRSR RTs}{CTRL 9} {12 CRSR RT
s} {11 CRSR RTs} {CTRL 0} :REM*177
3040 PRINT"{CTRL 8}{6 CRSR RTs}{CTRL 9} {CT
RL 1}3{CTRL 8} {11 CRSR RTs}{CTRL 7} {
11 CRSR RTs} {CTRL 0} :REM*125
3050 PRINT"{CTRL 1}{5 CRSR RTs}{CTRL 9}{2 S
PACES}{CTRL 1}5{CTRL 1}{2 SPACES}{10 C
RSR RTs}{CTRL 7} {11 CRSR RTs} {CTRL 0}
:REM*109
3060 PRINT"{CTRL 6}{4 CRSR RTs}{CTRL 9}{3 S
PACES}{CTRL 1}7{CTRL 6}{3 SPACES}{9 CR
SR RTs}{CTRL 7} {11 CRSR RTs} {CTRL 0}
:REM*197
3070 PRINT"{CTRL 3}{3 CRSR RTs}{CTRL 9}{4 S
PACES}{CTRL 1}9{CTRL 3}{4 SPACES}{8 CR
SR RTs}{CTRL 7} {11 CRSR RTs} {CTRL 0}
:REM*87
3080 PRINT"{CTRL 2}{2 CRSR RTs}{CTRL 9}{5 S
PACES}{CTRL 1}11{CTRL 2}{4 SPACES}{7 C
RSR RTs}{CTRL 7} {11 CRSR RTs} {4 CRSR
RTs}{CTRL 0}":FORT=1TO3000:NEXT
:REM*148
3090 POKE53280,7:POKE53281,15:PRINT"{SHFT C
LR}{5 CRSR DNs} :REM*154
3100 PRINT"TO PLAY THIS GAME YOU MUST TRANS
FER THE":PRINT :REM*154
3110 PRINT"BARS FROM THE {CTRL 9}LEFT{CTRL
0} STACK TO THE {CTRL 9}RIGHT{CTRL 0}"
:PRINT :REM*226
3120 PRINT"STACK, ONE BAR AT A TIME, NEVER
PUTTING":PRINT :REM*32
3130 PRINT"A LONGER BAR ON A SMALLER ONE.":
PRINT"{3 CRSR DNs} :REM*122
3140 PRINT"{6 CRSR RTs}PRESS {CTRL 9}<RETUR
N>{CTRL 0} TO CONTINUE :REM*14
3150 PRINT"{COMD 8}":INPUT C :REM*100
3160 POKE53280,2:POKE53281,7:PRINT"{SHFT CL
R}{5 CRSR DNs}{CTRL 1} :REM*46
3170 PRINT"{4 CRSR RTs}YOU MAY CHOOSE FROM
2 TO 5 BARS":PRINT :REM*86
3180 PRINT"{7 CRSR RTs}WHEN YOU START THE G
AME.{5 CRSR DNs}":FORT=1 TO 1500:NEXT:
RETURN :REM*180
3190 POKE53280,7:POKE53281,14:PRINT"{SHFT C
LR}{4 CRSR DNs}{CTRL 2} :REM*52
3200 PRINT"{2 CRSR RTs}XXXX{3 CRSR RTs}X{4
CRSR RTs}X{2 CRSR RTs}XXXXX{3 CRSR RTs
}XXXXXX{2 CRSR RTs}XXXXX :REM*148
3210 PRINT"{CRSR RT}X{4 CRSR RTs}X{2 CRSR R
Ts}X{4 CRSR RTs}X{2 CRSR RTs}X{4 CRSR
RTs}X{2 CRSR RTs}X{7 CRSR RTs}X{4 CRSR
RTs}X :REM*230
3220 PRINT"{CRSR RT}X{7 CRSR RTs}X{4 CRSR R
Ts}X{2 CRSR RTs}X{4 CRSR RTs}X{2 CRSR
RTs}X{7 CRSR RTs}X{4 CRSR RTs}X :REM*2
3230 PRINT"{CRSR RT}X{7 CRSR RTs}X{4 CRSR R
Ts}X{2 CRSR RTs}X{4 CRSR RTs}X{2 CRSR
RTs}X{7 CRSR RTs}X{4 CRSR RTs}X :REM*12
3240 PRINT"{2 CRSR RTs}XXXX{3 CRSR RTs}X{4
CRSR RTs}X{2 CRSR RTs}XXXXX{3 CRSR RTs
}XXXXX{3 CRSR RTs}XXXXX :REM*206
3250 PRINT"{6 CRSR RTs}X{2 CRSR RTs}X{4 CRS
R RTs}X{2 CRSR RTs}X{7 CRSR RTs}X{7 CR
SR RTs}X{CRSR RT}X :REM*156
3260 PRINT"{6 CRSR RTs}X{2 CRSR RTs}X{4 CRS
R RTs}X{2 CRSR RTs}X{7 CRSR RTs}X{7 CR
SR RTs}X{2 CRSR RTs}X :REM*96
3270 PRINT"{CRSR RT}X{4 CRSR RTs}X{2 CRSR R
Ts}X{4 CRSR RTs}X{2 CRSR RTs}X{7 CRSR
RTs}X{7 CRSR RTs}X{3 CRSR RTs}X :REM*72
3280 PRINT"{2 CRSR RTs}XXXX{4 CRSR RTs}XXXX
{3 CRSR RTs}X{7 CRSR RTs}XXXXXX{2 CRSR
RTs}X{4 CRSR RTs}X{5 CRSR DNs} :REM*92
3290 PRINT"{4 CRSR RTs}YOU DID IT IN THE LE
AST POSSIBLE{CRSR DN} :REM*104
3300 PRINT"{9 CRSR RTs}NUMBER OF MOVES!!!!
":FORT=1TO2500:NEXT:RETURN :REM*120

```

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Credit Card Keeper

Here's a simple and easy way to keep track of all your credit cards. This program holds information on an unlimited number of cards in three general categories and alphabetically sorts all the information before showing it to you. What could be easier?

By MICHAEL REICH

Credit Card File uses Data statements to hold five pieces of information on each credit card: category, name of card, account number, expiration date and address of issuer.

The program is set up for three categories of credit cards: Gasoline, Stores and Other. You may change these categories to meet your particular needs. For each record (account), the five data items are entered beginning at line 1000. I separated the categories to make it easier to enter the information, but the program will work just as well if you mix them up.

One thing you must keep clear is the *order* of the Data statements for each record. From lines 300-370, the program reads all the data in the order listed above, so the Data statements *must* be in that same order.

Also, if you are missing a piece of information, such as the issuer's address, you must provide a temporary Data statement to hold its place; just create a Data statement with blank spaces. The last Data statement must be the word END, or you'll get an Out of Data error.

I allowed up to 18 letters for each card name, up to 19 characters for the account number, up to five characters for the expiration date (this usually consists of just the month and year—03/84, for example) and up to 39 characters, in two lines, for the issuer's address. You may change the

size of these entries, but I suggest you keep the card names the same length, the account numbers the same, and so on.

How the Program Works

After the program gives you the option of seeing the general instructions that are available, the program moves to the Read routine, which begins at line 300. The first Read statement (line 320) checks the type (TY\$) of the next record. If TY\$=END, the last record has been read and the program jumps to a sort routine at line 4000.

If TY\$ does not equal END, the program executes five more Read commands in line 330. This line picks up the five information items mentioned above and concatenates them into a two-dimensional array (EN\$ [X,Y]) that corresponds to the record type picked up earlier in the Read statement in line 320.

Depending on the value of TY\$, lines 340-360 determine which array element will receive the new information. These lines also keep track of the number of records for each category; these figures become very useful later.

Once all the data is read and filed away in the appropriate array location, the program jumps to the sorting routine that begins at line 4000. This is a simple "bubble" sort to al-

RUN It Right

C-64; C-128 (in C-64 mode); Datasette

phabetize the records in each category. Following the sort, the program moves to the two menus, which begin at line 5000.

Menu Selections

The first menu offers choices of reviewing the files, updating the data or quitting (selecting the Update option simply lists the program beginning at line 1000). Whenever you add or change Data statements, remember to resave the program.

The second menu provides a variety of ways to view the files. You can look at each category separately or at the combined records for all categories. Whichever you choose,


the program will show you the name, number, expiration date and address for each record, one record at a time.

Command Line

During the display of the records, a command line will be displayed at the bottom of the screen. This line shows how to move through the lists of credit cards by pressing one of three keys: N for the next record in the category you selected; P for the prior record; and M to return to the menu.

When you press either N or P, the program checks the array values for category size, obtained in lines 340-360, to see if you have either reached the end or are back at the beginning

of the selected category. In either case, the appropriate message is displayed and the program waits for your next move. Pressing M at any time returns you to the menu.

Well, that's the way Credit Card File works. If you don't want to type in the program, I will provide you with a copy if you send me a blank tape or formatted disk along with a self-addressed stamped mailer and \$3. 

Address all author correspondence to Michael Reich, 754 Rockborough Drive, Stone Mountain, GA 30083.

Listing 1. Credit Card File program.

```

5 REM MOD.CREDIT CARD :REM*251
50 POKE53280,15:POKE53281,15:PRINTCHR$(14)"
  {SHFT CLR}" :REM*142
100 FI$="(SHFT C)REDIT {SHFT C}ARD {SHFT F}
  ILE":L=12 :REM*56
110 M$(1)=" {CTRL 2} {COMD 5}{SHFT N}{CTRL
  2}EXT{9 SPACES}{COMD 5}{SHFT P}{CTRL 2}
  REVIOUS{9 SPACES}{COMD 5}{SHFT M}{CTRL
  2}ENU {CTRL 2}" :REM*174
115 M$(2)=" {COMD 5}{5 SPACES}{COMD T}{12 SP
  ACES}{COMD T}{16 SPACES}{COMD T}{CTRL 2
  }" :REM*209
120 S=25:DIM CN$(S),NO$(S),ED$(S),TY$(S)
  :REM*202
130 M$(3)=" {CTRL 9}{CTRL 2}{SHFT T}HERE ARE
  NO {SHFT P}{SHFT R}{SHFT I}{SHFT O}{SH
  FT R} {SHFT E}NTRIES FOR {SHFT C}ATEGOR
  Y" :REM*210
140 M$(4)=" {CTRL 9}{CTRL 2}{SHFT T}HERE ARE
  NO {SHFT M}{SHFT O}{SHFT R}{SHFT E} {S
  HFT E}NTRIES FOR {SHFT C}ATEGORY"
  :REM*156
150 CL$="{40 SPACES}" :REM*56
170 PRINT"{3 CRSR DNs}{5 CRSR RTs}{CTRL 2}"
  FI$"{3 CRSR DNs}BY {SHFT M}ICHAEL {SHFT
  R}EICH" :REM*142
175 PRINT"{COMD 5}{2 CRSR DNs}{SHFT I}NSTRU
  CTIONS? [Y/N]" :REM*107
180 GETA$:IFA$=""THEN180 :REM*58
185 IFA$="{SHFT Y}"ORA$="Y"THENGOSUB6000
  :REM*169
190 GOTO300 :REM*136
200 REM{4 SPACES}SCREEN LOCATER & PAGE HEAD
  ER :REM*216
202 REM{2 SPACES}*****
  * * * :REM*8
210 PRINT"{HOME}"; :REM*142
220 IFY<>0THENPOKE214,Y-1:PRINT :REM*102
230 POKE211,X:RETURN :REM*160
240 REM :REM*46
250 PRINT"{SHFT CLR}":X=L:Y=1:GOSUB2000:PRIN
  TFI$:X=15:Y=3:GOSUB2000:PRINT"{CTRL 9}{C
  TRL 2}{SHFT M}ENU" :REM*226
260 RETURN :REM*63
300 REM{11 SPACES}READ FILE :REM*167
302 REM{2 SPACES}*****
  * * * :REM*109
320 READTY$:IFTY$="END"THEN390 :REM*39
330 READCN$,NO$,ED$,A1$,A2$ :REM*225
340 IFTY$="{SHFT G}"THENEN$(0,G)=CN$+NO$+ED
  $+A1$+A2$:G=G+1 :REM*253

```

```

350 IFTY$="{SHFT S}"THENEN$(1,SS)=CN$+NO$+E
  D$+A1$+A2$:SS=SS+1 :REM*217
360 IFTY$="{SHFT O}"THENEN$(2,O)=CN$+NO$+ED
  $+A1$+A2$:O=O+1 :REM*83
370 GOTO320 :REM*93
380 REM :REM*187
390 GOTO4000 :REM*101
400 REM{15 SPACES}PRINT FILE :REM*147
402 REM{2 SPACES}*****
  * * * :REM*209
410 PRINT"{SHFT CLR}":REM PRINT PAGE HEADER
  :REM*45
420 FORM=X1TOX2:FORN=0TOY1 :REM*239
430 CN$=LEFT$(EN$(M,N),18):NO$=MID$(EN$(M,N)
  ),19,19):ED$=MID$(EN$(M,N),38,5)
  :REM*207
435 A1$=MID$(EN$(M,N),43,20):A2$=RIGHT$(EN$
  (M,N),8) :REM*124
440 PRINT"{HOME}{5 CRSR DNs}":IFCN$=""THEN5
  60 :REM*135
450 PRINT"{CTRL 9}{COMD 5}{SHFT C}ARD {SHFT
  N}AME:{3 SPACES}{CTRL 0}{CTRL 2} "CN$:
  PRINT :REM*59
460 PRINT"{CTRL 9}{COMD 5}{SHFT C}ARD {SHFT
  N}UMBER: {CTRL 0}{CTRL 2} "NO$:PRINT
  :REM*55
470 PRINT"{CTRL 9}{COMD 5}{SHFT E}XP. {SHFT
  D}ATE:{3 SPACES}{CTRL 0}{CTRL 2} "ED$:
  PRINT :REM*181
475 PRINT"{CTRL 9}{COMD 5}{SHFT A}DDRESS:{5
  SPACES}{CTRL 0}{CTRL 2} "A1$:PRINTTAB(
  15)A2$ :REM*224
480 X=0:Y=22:GOSUB2000:PRINTM$(1)+M$(2)
  :REM*41
490 K=0:GETA$:IFA$=""THEN490 :REM*123
495 A=ASC(A$) :REM*138
500 IFA=77ORA=205 THENGOSUB250:RETURN
  :REM*15
503 IFA$="{SHFT P}"ORA$="P"THENIFC=1THEN565
  :REM*6
504 IFA$="{SHFT P}"ORA$="P"THENNN=N-2:IFN=-
  1THEN560 :REM*75
505 IFC>1THENIFN<0THENX=0:Y=15:GOSUB2000:PR
  INTM$(3):FORK=0TO2000:NEXT :REM*252
510 IFKTHENX=0:Y=15:GOSUB2000:PRINTCL$:N=N+2
  :GOTO490 :REM*27
530 IFA$<>"{SHFT N}"ANDA$<>"N"THEN490
  :REM*254
535 IFC=1THENIFN+1>=Y1THEN570 :REM*53
540 IFN+1>=Y1THENX=0:Y=15:GOSUB2000:PRINTM$(
  4):FORK=0TO2000:NEXT :REM*212
550 IFKTHENX=0:Y=15:GOSUB2000:PRINTCL$:GOTO4
  90 :REM*214
560 IFC<>1THEN NEXTN :REM*42

```


Listing 1 continued.

```

565 IFC=1THENIF(A$="{SHFT P}"ORAS="P")THENIF
    F(N>0 ANDN<=G)THENN=N-1:GOTO430:REM*181
567 IFC=1THENIF(A$="{SHFT P}"ORAS="P")THENIF
    FN=0THENM=M-1:N=G:IFM>=0THEN430:REM*217
568 IFC=1THENIFM<0THENX=0:Y=15:GOSUB200:PRI
    NTM$(3):FORK=0TO2500:NEXT :REM*206
569 IFKTHENX=0:Y=15:GOSUB200:PRINTCL$:GOSUB
    250:RETURN :REM*79
570 IFC=1THENIFN<GTHENNEXTN :REM*138
572 IFC=1THENIFM<>X2THEN NEXTM :REM*36
575 IFC=1THENIFM=X2THENX=0:Y=15:GOSUB200:PR
    INTM$(4):FORK=0TO2000:NEXT:GOTO550
    :REM*47
580 GOTO490 :REM*168
1000 REM{14 SPACES}DATA :REM*57
1003 REM *****{17
    SPACES}GASOLINE :REM*92
1005 : :REM*216
1010 DATA"{SHFT G}","{SHFT P}HILLIPS {SHFT
    P}ETROLEUM","123-456-789-0{6 SPACES}","
    11/85 :REM*203
1015 DATA"{SHFT P}{SHFT O}{SHFT B}OX77,{SHF
    T B}ARTLESVILLE","{SHFT O}{SHFT K} 740
    04" :REM*212
1020 DATA"{SHFT G}","{SHFT T}OTAL {SHFT P}E
    TROLEUM{3 SPACES}","12345-678-90123{4
    SPACES}","NONE " :REM*75
1025 DATA"{SHFT A}LMA{16 SPACES}","{SHFT M}
    {SHFT I} 48801" :REM*103
1030 DATA"{SHFT G}","{SHFT G}ULF {SHFT O}IL
    {SHFT C}ORP.{4 SPACES}","12345-67890{
    8 SPACES}","03/85 :REM*104
1035 DATA"{20 SPACES}","{8 SPACES}" :REM*97
1099 REM *****{16
    SPACES}STORES :REM*15
  
```

```

1100 DATA"{SHFT S}","{SHFT S}EARS {SHFT R}O
    EBUCK & {SHFT C}O","1-23456-78901-2{4
    SPACES}","NONE " :REM*82
1105 DATA"{20 SPACES}","{8 SPACES}" :REM*167
1110 DATA"{SHFT S}","{SHFT J}{SHFT C} {SHFT
    P}ENNEY{9 SPACES}","123-456-789-0{6 S
    PACES}","NONE " :REM*26
1115 DATA"{20 SPACES}","{8 SPACES}" :REM*177
1120 DATA"{SHFT S}","{SHFT M}ONTGOMERY {SHF
    T W}ARD{3 SPACES}","123-456-789-0123{3
    SPACES}","NONE " :REM*162
1125 DATA"{20 SPACES}","{8 SPACES}" :REM*187
1199 REM *****{17
    SPACES}OTHER :REM*233
1200 DATA"{SHFT O}","{SHFT M}ASTER {SHFT C}
    HARGE-{SHFT I}OWA","1234-5678-9012-345
    6","03/84 :REM*202
1205 DATA"{SHFT P}{SHFT O}{SHFT B}OX14361,{
    SHFT O}MAHA{4 SPACES}","{SHFT N}{SHFT
    E} 68114" :REM*237
1210 DATA"{SHFT O}","{SHFT I}NSTANT {SHFT C}
    }ASH{6 SPACES}","1234-5678-9012345{2 S
    PACES}","NONE " :REM*102
1215 DATA"{SHFT P}{SHFT O}{SHFT B}OX{SHFT B
    }-1608,{SHFT M}INNEAP."{SHFT M}{SHFT
    N} 55480" :REM*95
2099 DATA END :REM*223
4000 REM * * * * *
    :REM*237
4002 REM{13 SPACES}BUBBLE SORT :REM*87
4010 PRINT"{SHFT CLR}{5 CRSR DNS}"TAB(10)"{
    SHFT A}LPHABETIZING" :REM*173
4015 PRINT"{4 CRSR DNS}"TAB(10)"{SHFT A}LL
    {SHFT D}ATA":PRINTTAB(10)"{5 CRSR DNS}
    {SHFT P}LEASE {SHFT W}AIT" :REM*212
4020 FORM=0TO2:KK=0:N=G:IFM=1THENN=SS
    :REM*213
4025 IFM=2THENN=O :REM*52
4030 FORI=0TON-1:IFEN$(M,I+1)=""THENKK=KK+1
    :GOTO4140 :REM*21
4040 IFEN$(M,I)>EN$(M,I+1)THENK=1:GOTO4090
    :REM*87
4050 IFEN$(M,I)<=EN$(M,I+1)THENK=0:GOTO4140
    :REM*109
4090 T$=EN$(M,I):EN$(M,I)=EN$(M,I+1):EN$(M,
    I+1)=T$ :REM*47
4140 NEXTI:IFKK<>N-1THEN4025 :REM*152
4160 NEXTM:GOTO5000 :REM*144
5000 REM * * * * *
    :REM*217
5002 REM{12 SPACES}MENU 1 :REM*81
5020 GOSUB250 :REM*209
5030 X=10:Y=5:GOSUB200:PRINT"{CTRL 9} {SHFT
    S}ELECT: " :REM*133
5040 Y=7:GOSUB200:PRINT"{COMD 5}1{2 SPACES}
    {CTRL 2}{SHFT R}EVIEW {SHFT F}ILE":Y=9
    :GOSUB200:PRINT"{COMD 5}2{2 SPACES}{CT
    RL 2}{SHFT U}PDATE" :REM*237
5050 Y=11:GOSUB200:PRINT"{COMD 5}3{2 SPACES}
    }{SHFT Q}UIT{CTRL 2}" :REM*221
5060 GETA$:A=VAL(A$):IFA<1ORA>3THEN5060
    :REM*121
5070 ONAGOTO5200,5090,5100 :REM*131
5080 GOTO5060 :REM*145
5090 LIST1000-4000 :REM*175
5100 REM * * * * *
    :REM*61
5102 REM{12 SPACES}QUIT :REM*95
5110 PRINT"{SHFT CLR}"CHR$(142):END:REM*101
5200 REM * * * * *
    :REM*162
5202 REM{7 SPACES}REVIEW FILE MENU (2)
    :REM*228
5205 : :REM*81
5210 PRINT"{HOME}{4 CRSR DNS}":FORX=5TO11ST
    EP2:PRINTCL$:NEXT :REM*8
  
```

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Listing 1 continued.

```

5220 X=10:Y=5:GOSUB200:PRINT"(CTRL 9){SHFT
R}VIEW:" :REM*170
5230 Y=7:GOSUB200:PRINT"{COMD 5}1{2 SPACES}
{CTRL 2}{SHFT A}LL":Y=9:GOSUB200:PRINT
"{COMD 5}2{2 SPACES}{CTRL 2}{SHFT G}AS
OLINE" :REM*120
5240 Y=11:GOSUB200:PRINT"{COMD 5}3{2 SPACES}
{CTRL 2}{SHFT S}TORES":Y=13:GOSUB200:
PRINT"{COMD 5}4{2 SPACES}{CTRL 2}{SHFT
O}THER" :REM*162
5250 Y=15:GOSUB200:PRINT"{COMD 5}5{2 SPACES}
}{SHFT Q}UIT{CTRL 2}" :REM*38
5260 C=0:GETC$:C=VAL(C$):IFC<1ORC>5THEN5260
:REM*138
5270 IFC=5THEN5000 :REM*152
5280 IFC=1THENX1=0:X2=2:Y1=G :REM*218
5290 IFC=2THENX1=0:X2=0:Y1=G :REM*2
5300 IFC=3THENX1=1:X2=1:Y1=SS :REM*220
5310 IFC=4THENX1=2:X2=2:Y1=O :REM*224
5330 GOSUB400:GOTO5200 :REM*246
6000 REM * * * * * * * * * * * * * * *
:REM*197
6002 REM{12 SPACES}INSTRUCTIONS :REM*169
6003 REM * * * * * * * * * * * * * * *
:REM*200
6010 PRINT"{SHFT CLR}{CTRL 9}"FI$"{CTRL 2}-
{SHFT I}NSTRUCTIONS" :REM*41
6030 PRINT"{SHFT D}ATA FOR EACH CREDIT CARD
IS ENTERED" :REM*27
6040 PRINT"BEGINNING AT LINE 1000." :REM*67
6050 PRINT"{CRSR DN}{SHFT E}ACH CARD HAS TH
E FOLLOWING ENTRIES:" :REM*133
6060 PRINTTAB(5)"{CRSR DN}{CTRL 2}{SHFT T}Y
PE{COMD 5} ({SHFT G} FOR GASOLINE, {SH
FT S} FOR {SHFT S}TORE,{11 SPACES}{SHF
T O} FOR {SHFT O}THER)" :REM*223

```

```

6070 PRINTTAB(5)"{CTRL 2}{SHFT N}AME OF CAR
D{COMD 5} (UP TO 18 LETTERS)" :REM*27
6080 PRINTTAB(5)"{CTRL 2}{SHFT C}ARD {SHFT
N}UMBER{COMD 5} ( UP TO 19 NUMBERS)"
:REM*71
6090 PRINTTAB(5)"{CTRL 2}{SHFT E}XPIRATION
{SHFT D}ATE{COMD 5} (UP TO 5 CHAR-{15
SPACES}ACTERS)" :REM*107
6095 PRINTTAB(5)"{CTRL 2}{SHFT A}DDRESS{COM
D 5} (UP TO 39 CHARACTERS IN TWO{11 SP
ACES}LINES)" :REM*26
6100 PRINT"{CTRL 2}{CRSR DN}{SHFT F}OR EXAM
PLE, HERE IS A SAMPLE ENTRY-" :REM*103
6110 CR$=CHR$(34) :REM*115
6120 PRINTTAB(5)"DATA "CR$"{SHFT G}"CR$","C
R$"{SHFT C}ONOCO{12 SPACES}"CR$","
:REM*213
6125 PRINTTAB(5)CR$"XX-XXX-XXXX{8 SPACES}"C
R$","CR$"05/85"CR$ :REM*0
6130 PRINTTAB(5)"DATA "CR$"1234 {SHFT M}AIN
{SHFT S}T.,{SHFT T}AMPA "CR$","SPC(20
)CR$"{SHFT F}{SHFT L} 11111"CR$
:REM*191
6140 PRINT"{5 CRSR RTs}{COMD 5}{SHFT R}E-SA
VE THE ENTIRE PROGRAM AFTER{11 SPACES}
ENTERING NEW DATA" :REM*211
6150 PRINTTAB(8)"{CTRL 9}{COMD 5}{SHFT P}RE
SS ANY KEY TO CONTINUE" :REM*200
6160 GETA$:IFAS$=""THEN6160 :REM*192
6170 RETURN :REM*108

```

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Display It with Style

*Put some pizzazz into your programs.
These six modules demonstrate the MID\$ function
by animating your program text.*

By L. JAMES CHERRY

Computers may be used for information-handling at high speeds, but the display of text improves when it is printed at a relatively slow pace. The rate should be slightly faster than normal reading speed, and never so fast that it appears to flash on the screen. Being able to control your computer's rate of text display is a desirable feature.

The accompanying Screen Print demonstration program prints text at a predetermined rate and displays it in a variety of formats. To achieve this, you use the MID\$ function with one or more loops and cursor movements. This program is an excellent tutorial on the use of this function.

Each of six subroutines, or modules, performs one type of printing display. You may use any of the modules in another program by assigning your own particular phrase to the string variable in the routine of your choice. Do not make the phrase over 39 characters (including spaces and color assignments) or you may run into wrap-around and formatting problems. These routines would probably be best suited for titles and program introductions.

The MID\$ function can be defined as a substring that is taken out of a larger string. For example, if A\$ = "ABCDEFGHJIJ", and the computer is told to PRINT A\$, it will print ABCDEFGHJIJ. But what if only part of A\$ is needed, such as the first three characters or the two middle ones or even one at a time? This is where the MID\$ comes in handy.

The function is written as MID\$(A\$,X,Y), where (from left to right) the character at position X will be the first character to be printed, and Y will represent the total number of characters you want printed. Therefore: PRINT MID\$(A\$,1,1) will print A; PRINT MID\$(A\$,2,1) will print B; and PRINT MID\$(A\$,4,3) will print DEF. To clear up any lingering confusion, enter the short MID\$ demonstration program (Listing 1).

The Six Modules

When typing in the main program (see Listing 2), note the space between the CL and CD in line 600 and also between CL and CL in line 780.

The first module in Listing 2 is probably the easiest to understand. A\$ is assigned a phrase in line 280,

and A% (in line 290) becomes the total length of that phrase. The first example is 26 characters long and loops through the MID\$ function 26 times, starting in line 300 and printing, in turn and from left to right, each character of A\$. Note that in line 310 there is a TAB. In each module, this function serves to center the text on the screen.

The action takes place between lines 300 and 330. The first time through the loop, X=1, so MID\$(A\$,1,1) = "F". The next time through the loop, X=2. The semicolon at the end of line 310 tells the computer to print the next character on the same line as the previous character, so the line should now read "FI", because MID\$(A\$,2,1) = "I", and so on.

Line 320 is a short delay loop; the computer stays on this line and counts to 60 before continuing on to NEXT X. Changing this counter loop to a larger number causes the printing to slow down even more. Of course, the maximum speed would be attained with no loop at all.

After the program executes the loop the required 26 times, it continues with a Gosub statement in line

RUN It Right

C-64; C-128 (in C-64 mode)

340. The Gosub statement delays the computer for several seconds, clears the screen and returns to the next line in the program, line 350.

The second module is more complicated. First, B\$ is assigned a phrase, the length established in line 430, and a new variable, Y, is assigned the length of B\$ (which is 28 characters long). Instead of printing only one character at a time, the module adds one character to the previously printed character(s) as it completes the loop, reading B\$ from right to left.

The first character printed to the screen is T, the last letter of B\$, because MID\$(B\$,28,1) = "T". Once T is printed, the cursor moves one space to the left (back over the letter), then retreats to the line above, ready to continue on the original line with the next Print statement.

In line 460, the value of Y decreases by 1 and becomes 27. After a short delay, accomplished in line 470, the program loops to line 440, where now X = 2 and Y = 27. Here, the previous character appears to move over one space, with the new character printed in its place. Actually, there is no movement; new characters are being printed over old characters. One additional character of B\$ is printed, reading the string from right to left, starting at the same TAB position.

The third module is different in that it contains, within the main X loop, a nested loop, which controls the character vertically on the screen. The variable V determines how far down the screen the characters "drop" before coming to the row where the completed phrase will be printed out. Again, you want to TAB over the length of C\$(23 characters). The value of X is added to the TAB position each time through the loop, so the next character to be printed will not drop down the same column.

The MID\$ function is the same as in the other modules and only prints one character at a time, reading from left to right. Except for the last time through the vertical loop, the CRSR UP, CRSR LF, CRSR DN and space instructions at the end of line 600 serve to erase each character as it drops down into position. Try leaving out the cursor movements in line 600 and see what happens. Once the vertical (V) movement has been completed, the cursor is sent to the home position and is ready for the next trip through the loop.

The effect of the fourth module is
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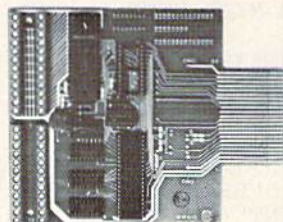
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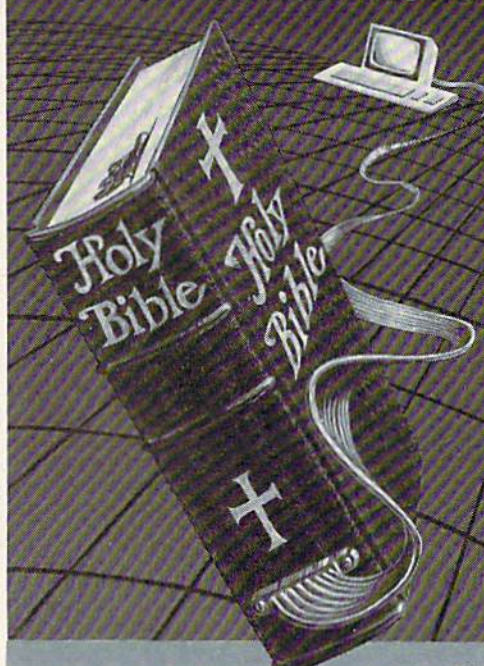
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just the opposite of the third; characters seem to float up from the bottom of the screen, landing on an upper row. To achieve this, you first send the cursor home, then have it moved down ten rows (or more if you like, by changing line 730). Once in the starting position, the first character is printed. The cursor movements in line 780 serve to erase the character as it goes up the screen and move the next printing position up one line, each time through the V loop.

Once the V loop is completed, the program returns to the X loop and the next character.

The fifth module is like the first one, except that the last letter of E\$ is first and the program works its way backwards—reading right to left, but printing left to right.

The sixth module prints right to left. First the TAB is set to where the last letter of the word would fall if it were printed and centered normally. Then in line 1090, each letter is

printed, starting from the right-most character of F\$ and moving two cursors left in each loop. This process continues until it completes the loop.

I hope you find these modules useful in some of your programs. I suggest experimenting with the cursor movements to see what develops. 

Address all author correspondence to L. James Cherry, 2401 Arctic Fox Drive, Fort Collins, CO 80525.

Listing 1. MID\$ demonstration program.

```

100 REM MID$ DEMO :REM*114
110 : :REM*86
115 POKE53280,0: POKE53281,0 :REM*247
120 PRINT"{SHFT CLR}{5 CRSR DNs}" :REM*212
130 LET A$ = "ABCDEFGHI": PRINT"{CTRL 4}" :REM*192
135 PRINT"THIS IS A DEMONSTRATION OF THE MI :REM*201
D${5 SPACES}FUNCTION." :REM*201
140 PRINT"{2 CRSR DNs}POSITION 123456789" :REM*252
145 PRINT"{CTRL 6}LET A$ = ";A$ :REM*173
150 INPUT"{CRSR DN}{CTRL 2}START WITH WHICH :REM*40
CHARACTER:";X :REM*40
155 IF X > LEN (A$) THEN GOTO 200 :REM*95
160 INPUT"{CTRL 2}{2 CRSR DNs}AND PRINT HOW :REM*98
MANY ";Y :REM*98
165 IF (X+Y)-1 > LEN (A$) THEN GOTO 200 :REM*31
170 PRINT"{COMD 6}{3 CRSR DNs}THEREFORE: MI :REM*74
D$ (A$, ";X;"{CRSR LF},";Y;"{CRSR LF}) = :REM*74
";MID$(A$,X,Y) :REM*74
175 PRINT"{2 CRSR DNs}" :REM*227
180 PRINT"TO SEE IT AGAIN PRESS {CTRL 8}<RE :REM*184
TURN>{CTRL 6}" :REM*184
185 GET X$: IF X$ <> CHR$(13) THEN 185 :REM*197
190 GOTO 120 :REM*152
200 REM ===NOT VALID INPUT=== :REM*88
210 PRINT"{CRSR DN}{CTRL 8}NOT A VALID INPU :REM*244
T, TRY AGAIN..." :REM*244
215 FOR DELAY = 1 TO 900: NEXT DELAY :REM*195
220 GOTO 120 :REM*182
230 END :REM*232

```

```

170 POKE53280,0:REM BORDER COLOR BLACK :REM*18
:REM*18
180 POKE53281,0:REM SCREEN COLOR BLACK :REM*164
:REM*164
190 PRINT "{SHFT CLR}": REM CLEAR SCREEN :REM*154
:REM*154
200 PRINT"{CTRL 5}" : REM CURSOR COLOR-PURP :REM*12
LE :REM*12
210 : :REM*186
220 : :REM*196
230 REM ===== :REM*48
:REM*48
240 REM{2 SPACES}FIRST DEMO - CENTERED SPRE :REM*134
AD :REM*134
250 REM{8 SPACES}LEFT TO RIGHT :REM*88
260 REM ===== :REM*79
:REM*79
270 : :REM*247
280 A$ = "FIRST - SLOWLY LEFT TO RIGHT" :REM*25
:REM*25
290 A% = LEN (A$) :REM*23
300 FOR X = 1 TO A% :REM*55
310 :{2 SPACES}PRINT TAB((39-A%)/2)MID$(A$, :REM*51
X,1); :REM*51
320 :{2 SPACES}FOR D = 1 TO 60: NEXT D :REM*67
:REM*67
330 NEXT X :REM*23
340 GOSUB 1320: REM DELAY AND CLEAR:REM*133
350 : :REM*71
360 : :REM*81
370 REM ===== :REM*189
:REM*189
380 REM{9 SPACES}SECOND DEMO :REM*77
390 REM{3 SPACES}SEEMS TO SPREAD FROM A POI :REM*121
NT :REM*121
400 REM ===== :REM*219
:REM*219
410 : :REM*131
420 B$ = "SECOND - SPREAD FROM A POINT" :REM*221
:REM*221
430 B% = LEN (B$): Y = B% :REM*153
:REM*153
440 FOR X = 1 TO B% :REM*69
450 :{3 SPACES}PRINT TAB((39-B%)/2)MID$(B$, :REM*23
Y,X)"{CRSR LF}{CRSR UP}" :REM*23
460 :{3 SPACES}Y=Y-1 :REM*89
470 :{3 SPACES}FOR D = 1 TO 20: NEXT D :REM*213
:REM*213
480 NEXT X :REM*173
490 GOSUB 1320 :REM*49
500 : :REM*221
510 : :REM*231
520 REM ===== :REM*84
:REM*84
530 REM THIRD DEMO - DROP FROM ABOVE:REM*32
540 REM ===== :REM*104
:REM*104
550 : :REM*16
560 C$ = "THIRD - DROP FROM ABOVE" :REM*132

```

Listing 2. Screen Print demonstration program.

```

100 REM ===== :REM*174
:REM*174
110 REM{3 SPACES}SCREEN PRINT DEMONSTRATION :REM*72
:REM*72
120 REM{9 SPACES}BY J. CHERRY :REM*26
130 REM{4 SPACES}2401 ARCTIC FOX DRIVE :REM*12
:REM*12
140 REM{4 SPACES}FT. COLLINS, CO 80525 :REM*130
:REM*130
145 REM :REM*207
146 REM :REM*208
150 REM ===== :REM*224
:REM*224
160 : :REM*136

```


Listing 2 continued.

```

570 C% = LEN (C$) :REM*58
580 FOR X = 1 TO C% :REM*82
590 :{2 SPACES}FOR V = 1 TO 5 :REM*212
600 :{3 SPACES}PRINT TAB((39-C%)/2+X) MID$(
C$,X,1){CRSR UP}{CRSR LF} {CRSR DN}"
:REM*246
610 :{2 SPACES}NEXT V: PRINT"(HOME)"
:REM*222
620 NEXT X :REM*58
630 GOSUB 1320 :REM*190
640 : :REM*106
650 : :REM*116
660 REM =====
:REM*224
670 REM(7 SPACES)4TH DEMO(2 SPACES)BOTTOM U
P :REM*52
680 REM =====
:REM*244
690 : :REM*156
700 D$ = "FOURTH - FROM THE BOTTOM UP"
:REM*144
710 D% = LEN(D$) :REM*74
720 PRINT "{HOME}" :REM*192
730 FOR L = 1 TO 10: PRINT"{CRSR DN}"
:REM*202
740 NEXT L :REM*82
750 FOR X = 1 TO D% :REM*124
760 : FOR V = 1 TO 5 :REM*126
770 :{3 SPACES}PRINT "{2 CRSR UPs}"TAB(((39
-D%)/2)+X) :REM*247
780 :{3 SPACES}PRINT MID$(D$,X,1){CRSR DN}
{CRSR LF} {CRSR LF}{CRSR UP}" :REM*75
790 : NEXT V :REM*123
800 : PRINT"(HOME)" :REM*227
810 : FOR L = 1 TO 10 :PRINT "{CRSR DN}"
:REM*235
820 : NEXT L :REM*247
830 NEXT X :REM*13
840 GOSUB 1320 :REM*145
850 : :REM*61
860 : :REM*71
870 REM =====
:REM*179
880 REM(2 SPACES)5TH DEMO - BACKWARDS LT TO
RT :REM*163
890 REM =====
:REM*199
900 : :REM*111
910 :E$ = "FIFTH - BACKWARDS LEFT TO RIGHT"
:REM*175
920 :E% = LEN (E$): Y = E% :REM*45
930 :FOR X = 1 TO E% :REM*163
940 : PRINTTAB(((39-E%)/2)MID$(E$,Y,1);
:REM*175
950 : Y=Y-1 :REM*69
960 : FOR D =1 TO 50: NEXT D :REM*197
970 NEXT X :REM*153
980 FOR D = 1 TO 1000: NEXT D :REM*229
990 : :REM*201
1000 : :REM*211
1010 REM =====
:REM*197
1020 REM(3 SPACES)6TH DEMO(2 SPACES)-{3 SPA
CES}RIGHT TO LEFT :REM*25
1030 REM =====
:REM*218
1040 : :REM*252
1050 F$ = "SIXTH - OPPOSITE OF THE ABOVE"
:REM*100
1060 F% = LEN (F$): Y = F% :REM*164
1070 PRINT"{4 CRSR DNs}":PRINT TAB(((39)+Y)
/2) :REM*78
1080 FOR X = 1 TO F% :REM*202
1090 : PRINT MID$(F$,Y,1){2 CRSR LFs}";
:REM*12
1100 : Y=Y-1 :REM*220
1110 : FOR D = 1 TO 50: NEXT D :REM*92
1120 NEXT X :REM*48
1130 FOR D = 1 TO 1200: NEXT D :REM*126
1140 : :REM*96
1150 : :REM*106
1160 REM =====
:REM*92
1170 REM(5 SPACES)PROMPT TO SEE IT AGAIN
:REM*50
1180 REM =====
:REM*112
1190 : :REM*146
1200 GS = "{CTRL 6}PRESS <{CTRL 8}RETURN{CT
RL 6}> TO SEE IT AGAIN." :REM*230
1210 PRINT "{10 CRSR DNs}" :REM*242
1220 FOR X = 1 TO LEN (G$) :REM*126
1230 :{2 SPACES}PRINT TAB((39-LEN(G$)+3)/2)
MID$( G$,X,1); :REM*38
1240 :{2 SPACES}FOR D = 1 TO 5: NEXT D
:REM*222
1250 NEXT X :REM*178
1260 : :REM*216
1270 GET X$: IFX$=""THEN 1270 :REM*246
1280 IF X$ = CHR$(13) THEN 100 :REM*51
1290 GOTO 1270:REM IF WRONG GO BACK:REM*201
1300 END :REM*27
1310 : :REM*11
1320 REM ==DELAY BEFORE NEXT DISPLAY==
:REM*13
1330 FOR D = 1 TO 1600: NEXT D :REM*75
1340 PRINT "{SHFT CLR}" :REM*55
1350 RETURN :REM*133
1360 : :REM*61

```

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In each category, programs are listed alphabetically by program name, followed by a short description of the product, the current suggested retail price and the name of the manufacturer. To obtain more information on any product listed, consult the manufacturers' address

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Eduware Services, Inc.

Arithmetic Series

Progressive program that covers concepts; for grades 1-10. \$19.95

Valuware

Arithmetic Teacher

Teaches the basic number facts; tells child when a task has been mastered. \$29.95

H&E Computronics, Inc.

Body Man I

Depicts the human body in detail. \$34.95

Nanosec

The Body Transparent

A game that teaches basic anatomy; learn the names and functions of body parts. \$44.95

Designware, Inc.

Cell Defense

An interactive human biology program designed to teach students aged 10 and up how the body defends itself from disease and adverse conditions caused by age, stress, drugs and alcohol. \$29.95

Human Engineered Software

Chem Lab

Includes more than 50 problems to be solved; robot arms, lab equipment, Bunsen burners, heat and pressure chambers and separable dispensers for gases, liquids and solids. \$39.95

Simon & Schuster

Electronic Publishing Group

Division Shooting Gallery

Ducks containing division fact problems move across the screen in a shooting gallery format; correct answers allow the student to shoot down the ducks. \$39.95; \$54.95 with backup disk

Gamco Industries, Inc.

End Punctuation

Provides drill in the use of end punctuation and motivates students with an arcade-style reward game. \$39.95; \$54.95 with backup disk

Gamco Industries, Inc.

European Nations and Locations

Learn about European countries, their geographies, history and current events. \$44.95

Designware, Inc.

Exploring Logo

A set of software and activity cards that introduces students to the computer, logic and programming. \$59

Sunburst Communications

For Kids Only

Sixty new educational software packages for children ages 1-16. \$11.95

KIDware

Genesis 2

A lesson-authoring system that allows teachers or parents to create computer exercises in a question-and-answer format. \$20

Greenwood Software

The Great Gonzo in WordRider

Strategy adventure game that helps your child develop vocabulary and word-usage skills. \$29.95

Simon & Schuster

Electronic Publishing Group

Hide 'N Sequence

Unscramble sentences from a literary passage until it matches the original version. \$69

Sunburst Communications

Kermit's Electronic Storymaker

Designed to help children aged four and up develop their reading, writing, vocabulary and grammar skills. \$39.95

Simon & Schuster

Electronic Publishing Group

Keyboard Command

Three games to teach keyboard skills, letter recognition, word formation. \$29.95

Trillium Press, Inc.

Leaps and Bounds

Develops reading readiness skills: basic letter and word recognition, counting skills and an understanding of numbers, artistic potential and music appreciation. \$39.95

Muse Software

Learn German

Translates simple sentences in English into German. \$69.95

International Computer Products

Learn Spanish

Translates simple sentences in English into Spanish. \$69.95

International Computer Products

Linkword Language Series

Learn Spanish, French, German and Italian using a system based upon imagery, linking foreign words to acoustically similar English words. \$24.95 each

Artworx Software Co., Inc.

Logic Workout

Introduces students, from the eighth grade to college level, to classical logic and syllogisms. \$34.95

Avant-Garde

Publishing Corp.

Lovejoy's Preparation For the SAT

Drill and practice, tips and techniques for test-taking, on-screen scratch pad, full explanations for all questions; *Lovejoy's Concise College Guidebook* included. \$69.95

Simon & Schuster

Electronic Publishing Group

Math Busters

Teaches children ages 8-14 the four arithmetic processes. \$26.95

Spinnaker Software

Math Double Drill

Animated game teaches math skills; Tutor mode aids beginners; games can be set according to student's ability. \$34.95

Cardinal Software

Math Leap Frog

Frogs containing math problems leap along the logs toward lily pads; correct answers allow the frogs to leap over the water onto lily pads. \$39.95; \$54.95 with backup disk

Gamco Industries, Inc.

M-ss-ng L-nks

Your computer omits the vowels from on-screen words, and you fill in the blanks. \$59

Sunburst Communications

Multiplication Brigade

Multiplication problems appear in the windows of a burning building; correct answers help the bucket brigade put out the fire. \$39.95; \$54.95 with backup disk

Gamco Industries, Inc.

Outdoor Biology

Students gain knowledge about animals' competition for food, basic predator/prey relationships and ecological systems. \$39

MECC

The Perfect Score

Computer preparation program for the Scholastic Aptitude Test exam. \$69.95

Mindscape, Inc.

Picture Builder

Build-it-yourself picture kit; includes 40 build-by-number pictures or create your own; ages 8 to adult. \$29.95

Weekly Reader Family Software

Pinball Math

For learning basic operations of addition, subtraction, multiplication and division. \$39.95

Electronic Courseware

Systems, Inc.

PlayWriter Series

Lets user write and create his/her own hardcover book. Titles include *Adventures in Space*, *Tales of Me*, *Castles and Creatures* and *Mystery!* \$39.95 each

Woodbury Software

Pre-Algebra Series

Designed to support the secondary curriculum for pre-algebra; compatible with many textbooks. \$49.95

JMH Software of Minnesota, Inc.

Roots and Prefixes

Used in conjunction with the *Word Attack!* program; contains 500 words and introduces Greek and Latin prefixes, roots and words originating from them. \$19.95

Davidson & Associates, Inc.

Run for the Money

Learn economic principles, with arcade-style action. \$39.95

Scarborough Systems, Inc.

Same/Not Same Game; Alpha-Bee Sequence

Your child chooses which shape, color, letter or direction is different from the rest; your child sings the Alphabet Song along with a bee. For children ages 3-7. \$26.95

Kidbit Software

Scrambled Verses

Makes a game out of memorizing Bible verses, poetry and other literature. \$29.95

Smoky Mountain Software

Show Director

Lets your child create a variety of shows using pictures, animation, text, music and sound effects. \$34.95

Mindscape, Inc.

Simple Calc

Calculator with simple operations to execute addition, subtraction, multiplication, division, squares and square roots. \$29.95

Electronic Courseware Systems, Inc.

Snowdrifts and Sunny Skies

Learn about weather patterns, folklore and terminology; view a map displaying fronts and pressure areas to predict the weather. \$14.95

Tri Micro

Sort 'Em 1

Children aged five and up learn biblical history by unscrambling illustrations of Bible stories. \$24.95

Smoky Mountain Software

Speed Reader A

Improves adults' reading and comprehension; includes workbook. \$39.95

Navarone Industries, Inc.

Speed Reader B

Improves children's reading and comprehension; includes workbook. \$39.95

Navarone Industries, Inc.

Spelling and Reading Primer

This program teaches spelling and reading skills. \$39.95

Eduware Services, Inc.

Spell It!

Spelling proficiency program for ages ten through adult; contains 1000 of the most commonly misspelled words. \$49.95

Davidson & Associates

Spider Hunt Spelling

This arcade game provides practice in spelling skills and includes student and program management systems. \$39.95; \$54.95 with backup disk

Gamco Industries, Inc.

Stickybear ABC's

Full-screen, full-color animated pictures and sounds representing each letter of the alphabet; for ages 3-6. \$29.95

Weekly Reader Family Software

Stickybear Basketbounce

Your goal is to accumulate points by catching colorful, bouncing, falling objects before you run out of baskets. \$29.95

Weekly Reader Family Software

Stickybear Bop

Accumulate points by bopping all kinds of objects. \$29.95

Weekly Reader Family Software

Stickybear Math

Kids help the Stickybear family out of some sticky situations by solving addition and subtraction problems; ages 6-9. \$29.95

Weekly Reader Family Software

Stickybear Numbers

Groups of big, moving objects, such as trucks and planes, teach numbers and counting; for ages 3-6. \$29.95

Weekly Reader Family Software

Stickybear Opposites

Teaches beginning learners about opposites such as up/down and full/empty; for ages 3-9. \$29.95

Weekly Reader Family Software

Stickybear Reading

Hundreds of word/picture sets and thousands of put-together sentence parts in this animated learning game. \$29.95

Weekly Reader Family Software

Stickybear Shapes

Three animated game activities for children ages 3-6; child names, picks and finds a shape. \$29.95

Weekly Reader Family Software

Stickybear Spellgrabber

Three activities that build word skills; includes over 4000 words. \$29.95

Weekly Reader Family Software

Stickybear Town Builder

Build towns, go on trips, hunt for hidden keys; your child learns map-reading skills; for ages 6-9. \$29.95

Weekly Reader Family Software

Stickybear Typing

Uses jokes, riddles and action games to teach skills for typewriter and computer keyboard mastery. For all ages. \$29.95

Weekly Reader Family Software

Subtraction Defenders

Students defend castle by typing correct answers to subtraction problems to shoot down fireballs. \$39.95; \$54.95 with backup disk

Gamco Industries, Inc.

Success with Reading

An educational and software book series for grades 3-6, to help students and teachers reinforce reading, spelling and syntactic concepts. \$179

Scholastic Software

Survival Math

Four simulations to help students apply math to everyday life. \$59

Sunburst Communications

The Sweet Shoppe

A mathematics program designed for children who are just learning to count and for those who are learning addition and subtraction. \$39.95

Eric Software Publishing

Tinka's Mazes

Graphics and animation encourage children to learn math and solve problems. \$24.95

Mindscape, Inc.

Tink's Subtraction Fair

Children learn subtraction through games, prizes, adventures and arcades. \$24.95

Mindscape, Inc.

Today in History

For each date of the year, displays important historical events and vital statistics of illustrious persons. \$49.95

International Computer Products

U.S. Constitution Tutor

Presents material on the Constitution in a logical and straightforward manner. \$35

MicroLab

Wally's Word Works

Combines the fun of a video game with practice in the use and understanding of the nine parts of speech. \$69

Sunburst Communications

Wordfinder

Designed to strengthen vocabulary and spelling skills in children aged 10 and up. \$34.95

CBS Software

Wordplay

Five language-development games for young users. \$14.95

Apropos Technology

You Can Do Math!

A junior-high level mathematics tutorial designed for students who have trouble with math.

\$49.95

Microtechnic Solutions

Games**1984 Teams Data Disk (Quarterback)**

Contains player statistics for all 1984 teams and several historical NFL teams. \$15

Strategic Simulations, Inc.

CCI Subwar 64

You're in control of a nuclear-powered submarine; your mission is to sail from port, dive, attack, sink surface ships and survive attacks. \$19.95

Clockwork Computers, Inc.

F-15 Strike Eagle

Air combat from the electronic cockpit. \$34.95

MicroProse Software, Inc.

A Christmas Adventure

With Christmas only hours away, you must find Santa, who has mysteriously disappeared from his ice castle at the North Pole. \$24.95

BitCards

AcroJet—The Advanced Flight Simulator

Participate in decathlon of aerobic events in your jet. \$34.95

MicroProse Software, Inc.

Adventure Master

Allows you to create your own adventures; includes three games. \$44.95

CBS Software

Alice in Videoland

A graphics adventure game based on Lewis Carroll's satiric fantasy. \$19.95

Artworx Software Co., Inc.

Backgammon 64

Gammon and backgammon tournament-level games, with user-selectable multicolor board, sound and doubling cube. \$29.95

Future Age Computers

Ballblazer

Split screen and 3-D graphics give you and your opponent a first-person view of the field of play; race across the playfield in your Rotofoil trying to capture the ball and fire it. About \$32

Epyx, Inc.

Barbie

Buy new clothing or create designer clothes for Barbie; cut her hair or make it longer; many combinations. \$39.95

Epyx, Inc.

Beach Head II

Picks up where the original Beach Head left off. \$39.95

Access Software

Black Thunder

Drive your super-powered car armed with missiles and other weapons. \$19.95

Avalon Hill Game Co.

Blue Moon

Five screens of arcade action highlight this British import. \$19.95

3R Import and Export Corp.

BridgePro

Card game of bridge, with one- and two-player options, random hands and help features for beginners. \$35

Computer Management Corp.

Cartels & Cutthroats

Run your own megabucks corporation in the economic jungle of big business. \$39.95

Strategic Simulations, Inc.

Championship Lode Runner

The action is more difficult in this sequel to the original game. \$34.95

Broderbund Software

Chessmate

This chess program saves and prints games; uses single-stroke commands to memorize any board and recall after playing through variations. \$29.95

Cardinal Software

Chipwits

A game that introduces the basic concepts of computer programming. \$34

Epyx, Inc.

Colonial Conquest

Strive for world control in this simulation of the Age of Imperialism. \$39.95

Strategic Simulations, Inc.

Computer Ambush

Man-to-man combat in WWII. \$59.95

Strategic Simulations, Inc.

Computer Quarterback

This game lets you play semi-pro or pro versions of football.

\$39.95

Strategic Simulations, Inc.

Corom

A graphics adventure game in which you free the princess from the Evil Sorcerer. \$19.95

Tri Micro

Countdown to Shutdown

Wend your way through a 2000-room power plant to repair the power cord. \$29.95

Activision, Inc.

Crusade in Europe

A simulation of the American and British struggle against Germany, from the D-Day Invasion to the Battle of the Bulge. \$39.95

MicroProse Software, Inc.

Dave Winfield's

Batter Up!
Practice your batting skills; tutorial on the art of hitting. \$39.95

Thorn EMI Computer

Software

Dawn Patrol

A real-time World War II submarine simulation game. \$24.95

Mark of the Falcon

Decision in the Desert

You are in command in 1940-1942 North Africa. \$34.95

MicroProse Software, Inc.

The Dolphin's Rune:

A Poetic Odyssey
This game draws the player into a mystical underwater world and a quest for the secret to ancient dolphin lore. \$29.95

Mindscape, Inc.

Dreadnaughts

Become Admiral of the World War II battleship Bismarck or relive any naval battle of the first three years of the war. \$30

Avalon Hill Game Co.

Entertainer I

Contains three games: In Trobots, you defend the city against invaders; Shields Up puts you on a destroy mission deep in a nuclear base; Star Crash lets you captain an orbiting space station. \$14.95

Tri Micro

Escape

Use your logic and problem-solving abilities to find a way to escape from your alien jailors. \$25

Infinity Software

Essex

An electronic novel and game in which different outcomes are possible. \$39.95

Broderbund Software

Eureka

Solve mystery to win \$25,000 prize; five games in one. \$39.95

Handic Software

Exodus: Ultima III

Command four-player party to track down and destroy Exodus. \$34.95

Origin Systems, Inc.

Expedition Amazon

Lead your expedition into the rain forest to find the ruins of a fabled Inca citadel. \$34.95

Penguin Software

Falcon Patrol II

You control a Falcon Fighter to combat the enemy's helicopter-attack squadrons. \$19.95

Artworx Software Co., Inc.

Fermi-Pico-Bagels

Game in Logo requiring you to use deductive logic to find secret number generated by the computer. \$19.95

Trillium Press, Inc.

Field of Fire

Lead the Easy Company of the First Infantry Division through eight historical battles in North Africa and Europe. \$39.95

Strategic Simulations, Inc.

Fix-up the Mix-up Puzzler

An electronic jigsaw puzzle featuring six of Dr. Seuss' storybook characters. \$29.95

CBS Software

Frogger II Threedee!

A three-screen game beginning with an undersea battle against deadly creatures and the undercurrent. \$34.95

Simon & Schuster

Electronic Publishing Group

G.I. Joe

Check the computerized World Hot-Spot Map for Cobra activity. Pick the area that needs your help and select any of 16 G.I. Joes for your mission. About \$32

Epyx, Inc.

Games Disk

Includes five games: blackjack, Poker-64, craps, slots and Star Trek. \$14.95

RAK Electronics

Gemstone Warrior

Find the caverns and recover the magical gemstone. \$34.95

Strategic Simulations, Inc.

Ghostbusters

Based on the movie. \$34.95

Activision, Inc.

Ghost Town

A graphics adventure game in which your assignment is to quiet the spirits haunting the township. \$19.95

Tri Micro

Ginger the Cat

Teach children about colors, shapes, letters, numbers and simple arithmetic; includes game disk. \$34.95

Cardinal Software

The Great American**Cross Country Road Race**

You must deal with changing road conditions and speed traps at speeds of up to 100 miles per hour. \$29.95

Activision, Inc.

Gryphon

Battle the gryphon in the sky. This arcade-fantasy game features five levels of sound and animation. \$19.95

Avalon Hill Game Co.

Gunship—The Helicopter Simulation

Attack-helicopter action in the AH-64 Apache. \$34.95

MicroProse Software, Inc.

The Halley Project

Players complete a series of navigational tests in a space simulation game. \$39.95

Mindscape, Inc.

The Heist

A secret agent plans a heist in a gallery of peril. \$35

MicroLab

Hitchhiker's Guide to The Galaxy

You are forced to flee your home and hitch rides with passing spaceships. \$39.95

Infocom, Inc.

Idle Time II

This collection of eight games includes testing your knowledge of U.S. cities, rearranging jumbled words and solving a cube puzzle. \$19.95

Able Software

Imperium Galactum

You struggle to control the stars and create the Imperium Galactum. \$39.95

Strategic Simulations, Inc.

Indiana Jones in the Lost Kingdom

Help Indiana Jones solve puzzles and riddles. \$29.95

Mindscape, Inc.

International Hockey

Provides the same action as its predecessor, Slap Shot Hockey, including speech synthesis and two-player action. \$24.95

Artworx Software Co., Inc.

Jet Combat Simulator

Re-create the high-speed aerodynamic performance of a McDonnell Douglas F-15 Eagle. About \$32

Epyx, Inc.

Jupiter Mission 1999

Two-disk package contains 11 different arcade/strategy tests in your quest of the warship Space Beagle; an interactive space game. \$35

Avalon Hill Game Co.

Jury Trial II

Courtroom strategy game for two or more players. \$49

Navic Software

Kampfgruppe

A tactical game of armored warfare encompassing almost all ground weapons used on the Russian Front from 1941-45. \$59.95

Strategic Simulations, Inc.

Karateka

Karate game. \$29.95

Broderbund Software

Kennedy Approach

Air traffic control tower game. \$34.95

MicroProse Software, Inc.

Kid Pro Quo

Combines a word processor with drawing, sprite animation and music. \$29

Softsync, Inc.

Mad Magazine's Official Spy vs Spy

Challenges you and your opponent to escape from an embassy; includes 36 three-dimensional rooms. \$29.95

First Star Software, Inc.

Master of the Lamps

Help a young prince recapture his kingdom from evil genies. \$29.95

Activision, Inc.

Mech Brigade

A grand-tactical simulation of modern armored warfare, featuring over 70 different weapons types. \$59.95

Strategic Simulations, Inc.

Microbroker

Stock market simulation teaches players to invest, based on their net assets. \$34.95

Cardinal Software

MicroLeague Baseball

Strategy simulation of baseball team management. \$39.95

MicroLeague Sports Association

Mig Alley Ace

Authentic simulation of air combat in the Korean war; includes five separate scenarios. \$34.95

MicroProse Software, Inc.

Mindshadow

A buzzard is your guide as you enter the unknown. \$29.95

Activision, Inc.

Mindwheel

Take a journey into the minds of four deceased people; includes disk and hardcover book. \$39.95

Synapse Software

Miner 2049er II

This sequel to 2049er offers ten all-new action screens and jumping and climbing challenges. \$35

MicroLab

Moebius: The Orb of Celestial Harmony

One-player fantasy role-playing game in an Oriental setting; animated martial arts and sword combat. \$59.95

Origin Systems, Inc.

Monty Plays Scrabble

Play Scrabble against your computer or a friend. \$35

Epyx, Inc.

Mr. Golf

The game is a complete 18-hole course with the standard hazards, such as trees, water holes and sand traps. \$22.95

Apcad Software

Mystery Master: Felony!

Solve 12 crimes; includes map, case profiles, suspects and clues. \$34.95

CBS Software

NATO Commander

Command NATO forces in a confrontation with the Warsaw Pact. \$35

MicroProse Software

On-Court Tennis

This tennis game plays like the real thing. \$29.95

Gamestar, Inc.

On-Field Football

This game places you in the middle of the action and allows you to create your own plays. \$29.95
Gamestar, Inc.

On-Track Racing

Experience the essence of real racing against a champion computer racer or a friend. \$29.95
Gamestar, Inc.

Operation Market Garden

The massive Allied airborne assault to capture the bridges of Holland in 1944. \$49.95
Strategic Simulations, Inc.

Perspectives

Three-dimensional graphics animation program. \$39.95
Pioneer Software

Phantasie

A multiple-character role-playing game set in medieval times. \$39.95
Strategic Simulations, Inc.

Pitstop II

Combine strategy and driving skill to beat your opponent. \$35
Epyx, Inc.

Quink

Eliminate, before your time is up, those entries among eight that do not share a common association. \$34.95
CBS Software

Racing Destruction Set

Test your racing skill with stock cars, formula 1s for Grand Prix races, dirt or street bikes, jeeps, baja bugs, pickup trucks and lunar rovers. \$32.95
Electronic Arts

Raid on Bungeling Bay

Your mission is to stop a war machine from destroying the earth. \$29.95
Broderbund Software

Rails West!

Returns you to the days of the developing railroad business. \$39.95
Strategic Simulations, Inc.

Rainy Day Fun

Provides children ages 5-9 with ten games and puzzles. \$39.95
Thorn EMI Computer Software

Real Estate 64

Monopoly-type game; play in any of six languages in any city, even your own neighborhood. \$39.95
Handic Software

Rescue on Fractalus!

Your mission is to fly your Valkyrie fighter through the Jaggie defenses and rescue the downed Ethercorps pilots. About \$32
Epyx, Inc.

Rock 'n Bolt

A game of strategy and action. \$29.95
Activision, Inc.

Rug Rider

With your magic carpet, you set out to seek fame and fortune and adventure. \$14.95
Tri Micro

Saucer Attack!

Defend Washington, DC, from an invasion of flying saucers. \$29.50

Seastalker

Junior-level interactive fiction game for ages nine and up. \$49.95
Infocom, Inc.

Silent Service—The Submarine Simulation

World War II submarine action in the South Pacific. \$34.95
MicroProse Software, Inc.

Six Gun Shootout

Simulation of man-to-man combat in the Old West; includes ten scenarios (historically accurate and fictional) and 18 weapons. \$39.95
Strategic Simulations, Inc.

Slap Shot Hockey

Features two-player breakout action and a scrolling screen. \$19.95
Artworx Software Co., Inc.

Solo Flight

Realistic flying game. \$34.95
MicroProse Software, Inc.

Space Taxi

Successfully steer the hack through 24 screens. \$29.95
Muse Software

Spelunker

Combines the arcade action of a maze-style game with the strategy of an adventure game. \$29.95
Broderbund Software

Spy Hunter

Fast-action shooting and driving game. \$44.95
Simon & Schuster Electronic Publishing Group

Spy vs Spy II:**The Island Caper**

Players compete to uncover and assemble a missile before a volcano blows up. \$29.95
First Star Software, Inc.

Star League Baseball

Video baseball. \$29.95
Gamestar, Inc.

Star Rank Boxing

A game that focuses on the art of boxing. \$29.95
Gamestar, Inc.

Star Trek:**The Kobayashi Alternative**

Interactive Star Trek text adventure; Star Fleet Command challenges players to find and neutralize the "Bermuda Triangle" of space. \$39.95
Simon & Schuster Electronic Publishing Group

Stealth

Pilot your high-speed fighter 10,000 miles in search of the Black Tower. \$29.95
Broderbund Software

Stellar Conflict

This game offers sound effects, animation and the option to create your own scenarios. \$49.95
Handic Software

Summer Games II

Eight new Olympic events; compete against up to seven opponents or the computer in rowing, triple jump, javelin, high jump, fencing, cycling, kayaking and equestrian. \$30
Epyx, Inc.

Super Bowl Sunday

Re-create the great super bowl games; features hi-res graphics with all 22 players. Actual stats give the game further value if you become the head coach. \$30
Avalon Hill Game Co.

SuperSlot 64

Simulates the mechanical three-wheel, one-arm bandit slot machine; wheels start and slow together, then stop one by one in a random manner; payoff amounts adjustable. \$29.95
Future Age Computers

Super Zaxxon

Updated version of Zaxxon; takes video gamers in their space fighters to beyond the outer limits. \$34.95

Simon & Schuster

Electronic Publishing Group

Suspect

Murder halts the festivities at the home of a wealthy socialite, and fingers begin pointing at you. \$39.95
Infocom, Inc.

Sword of Kadash

Retrieve the Sword of Kadash under guard at the Fortress of the Dragon. \$34.95
Penguin Software, Inc.

Tic-Tac-Max

This game expands upon traditional tic-tac-toe. \$19.95
SourceView Software International

Transylvania

Werewolves, vampires and other creatures stalk you as you search the castle and surrounding forest for the princess. \$34.95
Penguin Software, Inc.

Trivia Flight

Contains more than 4000 trivia questions on three disks. \$26.95
Mark of the Falcon

Trivia Plus

Trivia questions in History and Politics, Geography, the Humanities, Sports and Games, Movies, Science, Television and General Knowledge. \$24.95
Academy Software

Tsushima

The climax of the Russo-Japanese war of 1905; one- or two-player strategy game. \$30
Avalon Hill Game Co.

Ultima IV:**Quest of the Avatar**

Multi-player, multi-quest fantasy role-playing game. \$59.95
Origin Systems, Inc.

Wings of War

Engage in air battles with 36 of WWII's greatest fighters and bombers. \$39.95
Strategic Simulations, Inc.

Wishbringer

An interactive fiction game geared toward the introductory-level player. \$34.95
Infocom, Inc.

Wizard Expansion Set

Sequel to Wizard, with 40 new screens; original Wizard required. \$29.95
Progressive Peripherals & Software, Inc.

Word of Mouth

A trivia game with more than 25 categories of questions, including history, literature, sports, films, science and music. \$29.95
dilithium Press

The World's Greatest Baseball Game

Uses actual players' statistics and your own game-playing ability to determine the outcome of each game. \$29.95
Epyx, Inc.

The World's Greatest Football Game

Lets you develop a winning game plan, then test your strategy against the computer or another person. \$32

Epyx, Inc.

Wurble

A game that encourages the use of spelling and vocabulary skills. \$14.85

Sher-Tek Systems

Xyphus

Fantasy role-playing game for four players. \$34.95

Penguin Software, Inc.

Graphics

3-D World 64

Create three-dimensional drawings to be viewed on-screen or printed out. \$39.95

Graph-Tech Software

Adventure Construction Set

Allows you to design graphics and text adventure games for one to four players. \$50

Electronic Arts

Bank Street StoryBook

Allows your child to create text and animated graphics anywhere on the screen. \$39.95

Mindscape, Inc.

The Banner Machine

Prints large signs with professional-quality graphics characters; eight sizes, borders, 15 background shades and five fonts; additional fonts available. \$49.95

Cardinal Software

Blazing Paddles

A graphics program; accepts input from paddles, joysticks, trackballs, light pens and touch tablets. \$34.95

Baudville, Inc.

CHARED

This is a character editor that allows you to create character sets for different alphabets and correspondence. \$22.95

Apcad Software

ColorMe

Gives your child the creative freedom to design his or her own pictures, coloring books and stickers, and then print them out. \$29.95

Mindscape, Inc.

Easy Graph

Graphing program for children and first-time computer users from age eight to adult; create pictographs, bar and pie charts. \$39.95

Grolier Electronic Publishing, Inc.

Flying Colors

This graphics drawing program is controlled almost entirely by cursor-selected functions. \$39.95

The Computer Colorworks

The Graphics Magician Picture Painter

Allows you to store pictures in a minimal amount of space on a disk, so that you can recall them quickly from your own programs. \$39.95

Penguin Software

Mr. Pixel's Cartoon Kit

Allows your child to select, modify or build cartoon characters and then combine the characters into cartoon features. \$29.95

Mindscape, Inc.

Mr. Pixel's Programming Paint Set

Allows your child to draw on the computer screen in color and use a picture-based programming approach to create drawings. \$29.95

Mindscape, Inc.

The Print Shop

Turn your computer into a personal print shop; includes 60 graphics designs or create your own. \$49.95

Broderbund Software

The Print Shop Graphics Library, Disk Two

Adds 120 new graphics images to Broderbund Software's Print Shop series. Categories include jobs, hobbies, people, places, travel and health. \$24.95

Broderbund Software

Show Director

Allows your child to write a script and then transfer the words into backgrounds, animated characters, music and sound effects to illustrate the story. \$29.95

Mindscape, Inc.

Smart Start

Lets you design graphics and sound effects. \$39.95

Muse Software

Sprite Wiz

Sprite-creation and editing tool; allows for simple animation, movement and piecing together of several sprites. \$20

DJ Software

SpryteByter

Lets you design sprites. \$34.95

Microtechnic Solutions

Video Title Editor

Creates titles, custom messages, colored screens and leaders without snow or noise. \$29.95

Videoware

Zippy Floppy

Includes sprite builder, headline builder and picture builder programs. \$29.95

Trillium Press, Inc.

Hobbies & Unique Applications

64-Beam Calc

For designers, architects, engineers and students who want to determine the deflection and stresses in a structural beam. \$40

Hartley Software

CCI Super Wordfind

Can be used by teachers and crossword puzzle enthusiasts for educational or entertainment objectives. \$26.95

Clockwork Computers, Inc.

ESP Tester

Test your psychic ability alone or with a friend; tests various areas of ESP and keeps score. \$14.95

AC3L Software

TAS-64

Technical analysis charting; capture data from DJN/R or Warner Services, or enter and edit your data; features seven moving averages, three oscillators, trading bands, least squares, five volume indicators and relative charts. \$84.95

Abacus Software

Advisor

Artificial-intelligence development system that permits your computer to replicate logical reasoning and help you to solve problems. \$99.50

Ultimate Media, Inc.

Astrology Horoscope

Produces a chart wheel of planets and nine house systems. \$39.95

Navarone Industries, Inc.

Be Your Own Coach

This is a runner's training tool that aims to minimize injury and maximize abilities. \$79.95

Avant-Garde Publishing Corp.

Build a Book About You

Create personalized storybooks for your children; four adventure stories to choose from, illustrated in color; kits include materials to make two books. \$39.95

Scarborough Systems, Inc.

Character Analyzer I

Companion to Personality Analyzer program; see yourself as others see you. \$39.95

Psycrom Software International, Inc.

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Acquire programming capabilities by constructing your own robot and guiding it through a myriad of pre-programmed sequences and activities. About \$32

Epyx, Inc.

Clearinghouse

Detects suspicious checks. \$49.95

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Conceptor

Utilizes focus recognition to expand your capacity to perceive and classify information. \$49.95

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The Contester

Logging and duplicate contact-checking are fully integrated with automatic transmission of Morse code; designed for practical real-time use during amateur radio contests. \$39.95

Winner's Edge Software

Creative Problem Solving

Allows you to evaluate personal, financial and business problems and print out the best solution. \$29.95

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Crossword Magic

Lets you create and print out crossword puzzles. \$49.95

Mindscape, Inc.

Digital Oscilloscope

With Computer Continuum's analog interface board, this program turns your computer into a dual-trace digital oscilloscope. \$75

Computer Continuum

Dr. Floyd

An artificial intelligence program that responds to questions and answers. \$14.95

Apropos Technology

Ducks

Identifying characteristics of ducks and the ways humans interact with them. \$39
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Family Medical Advisor

Designed to diagnose illness, poisoning or the effects of drug abuse. \$38
Navic Software

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Football Predictor

Predicts outcome of NFL, USFL and college football games using team strength as a basis; designed to beat the point spread. \$99.95
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Forecast!

Attempts to help you understand the science of weather prediction and the causes and effects of weather. \$49.95
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The Gold Disk Subscription Series

Six monthly issues containing a feature program, tutorials, games, music, sound effects and a programming puzzle. \$54.95 (six months); \$99.95 (one year)
Gold Disk

Gold Dog Analysis

A dog race analysis that predicts results of daily races based on racing-form information. \$149.95
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The Gospels

Complete text of the Gospels, with programs to access, search, display and print the text. \$59.95
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Grade Manager III

Comprehensive and flexible grade calculation, for teachers in all areas of education. \$69.95
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The Great International Paper Airplane Construction Kit

This construction kit makes digital aviation easy—just print, fold and fly; based on the book. \$29.95
Simon & Schuster

Electronic Publishing Group

Ham Radio Disk

Comes with 12 amateur radio applications programs, including Ham Antennas, Morse Trainer, Morse Code, WAS Record, WAZ Record and DXCC Record. \$14.95
RAK Electronics

Hidden Words

Word-search puzzle generator. \$19.95
Smoky Mountain Software

The Horse Computer

Gives a class rating for each horse in a race and determines which horses are running out of their classes. \$29.95
H&E Computronics, Inc.

The Hypnotist

Helps you to change your behavior, reduce stress and improve memory; includes biofeedback heart-rate monitor. \$109.95
Psycorn Software International, Inc.

Jogger

This is a runner's log that allows you to record and update your goals and progress as a runner. \$29
Parsons Software

Lottery/Lotto Analysis

Helps predict three-, four-, five- and six-digit numbers for Lottery/Lotto; searches for number patterns from previous winning numbers. \$99.95
Professor Jones

MasterType's Figures and Formulas

Encyclopedia of weights and measures. \$29.95
Scarborough Systems, Inc.

Maximizer: Personal Running Coach

A set of three programs that compares your training progress to specific inputted goals. \$79.95
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The Mind Prober

A psychology program that reveals the hidden motivations, strengths and weaknesses of the person you are probing. \$29.95
Human Edge Software Corp.

Multiple-Choice Quiz Writer

Allows you to create, save and print out multiple-choice and true/false tests. \$29.95
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The Newsroom

Two-disk program allows you to design, produce and print out a professional-looking newspaper, complete with banner, headlines, text and pictures. \$79.95
Springboard Software, Inc.

The Nutritionist

Provides you with individual nutritional requirements. \$34.95
Nanosec

The Original Boston Computer Diet

Keeps track of your food intake and encourages you to lose weight. \$49.95
Scarborough Systems, Inc.

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Topical cross reference for over 140 biblical figures. \$49.95
Bible Research Systems

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Psycorn Software International, Inc.

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Football-prediction program for NFL games. \$49.95
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Plan your entire vegetable garden; adapted for all 50 states. \$29.95
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Determines the dimensions of a variety of geometric shapes on a hi-res screen. \$24.89
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Re-enact any presidential election from 1960 to 1984. \$39.95
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Principles of Composition

This tutorial teaches you about color, texture, composition, designs, shapes and patterns. \$149
Art Instruction Software

Professional Electronic Engineering

Features circuit analysis and modification, active filters design and analysis, bode plots and polynomial roots. \$39.95
Bamtek Co.

The REDUCE System

Energy management and cost reduction system. \$195
Jance Associates, I c.

Remember!

Learning tool to remember information and relationships; essential for studying history, vocabulary, foreign language, chemistry and other subjects. \$79.95
Designware, Inc.

Short Wave Listener

Cartridge program for Morse code reception and radio teletype signals. \$64
Microlog Corp.

Speedalyzer

Analyzes thoroughbred racing information taken from the *Daily Racing Form*. \$25
F&S Software

Sunday School Master Writer

A database program designed for Sunday School record keeping; holds 800 records of members on a single disk. \$99.95
UHL Research Associates, Inc.

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Forth-based language, plus artificial intelligence; graphics I/O and extended math modules. \$99
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"The Word" Processor

Complete text of the Bible, with programs to access, search, display and print the text. \$199.95
Bible Research Systems

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Three programs are included: Thoroughbred Racing Analysis, Harness Racing Analysis and Bet Return Analysis. \$29.95
Software Exchange

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This horse-race analysis program predicts the results of daily races based on racing form information. \$159.95
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Topical cross reference for over 200 biblical subjects. \$49.95
Bible Research Systems

Ultra

Stores the results of up to ten races on disk and will reevaluate the factor values and odds. \$149.95
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Keeps track of up to 150 video programs on up to 50 videotapes. \$49.95
VideoFile

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Create the weather for North America, using various meteorological elements; for ages 12 and up. \$39.95
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Manufacturers' Address List

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Abacus Software

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Grand Rapids, MI 49510

Able Software

PO Box 422
Kulpsville, PA 19443

(ABS)olute Software

1780 Austin Highway
San Antonio, TX 78218

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925 East 900 South
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Mineola, NY 11501

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Arlington Heights, IL 60004

Apcad Software

PO Box 2673
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150 North Main St.
Fairport, NY 14450

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Baltimore, MD 21214

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Ridgecrest, CA 93555

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Southfield, MI 48037

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McMinnville, OR 97128

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CSM Software, Inc.

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Houston, TX 77091

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Central Point Software

9700 S.W. Capitol Highway
#100
Portland, OR 97219

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Clockwork

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Rockville, MD 20853

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Northridge, CA 91324

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Computer Applications Tomorrow

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Birmingham, MI 48012

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Daly City, CA 94015

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3051 India St.
San Diego, CA 92103

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2424 Exbourne
Walnut Creek, CA 94596

Computer

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Cosmi, Inc.

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Camdenton, MO 65020

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Rancho Palos Verdes, CA 90274

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San Francisco, CA 94107

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8285 S.W. Nimbus
Suite 151
Beaverton, OR 97005

Dr. T Music Software

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Watertown, MA 02172

EasyWare

PO Box 32
Hamilton, MT 59840

Educomp

2139 Newcastle Ave.
Cardiff, CA 92007

Eduware Services, Inc.

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San Francisco, CA 94107

Electronic Arts

2755 Campus Drive
San Mateo, CA 94403

Electronic Courseware Systems, Inc.

1210 Lancaster Drive
Champaign, IL 61821

Epyx, Inc.

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Sunnyvale, CA 94089

Eric Software Publishing

1713 Tulare St.
Fresno, CA 93721

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Leonia, NJ 07605

F&S Software

PO Box 570069
Miami, FL 33257

FS! Software

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Faribault, MN 55021

Fabtronics

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Brockport, NY 14420

First Star Software, Inc.

18 East 41st St.
New York, NY 10017

L.J. Fischer

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Redwood City, CA 94061

Full Circle Software, Inc.

PO Box 1373
Dayton, OH 45401

Future Age Computers

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Rome, GA 30161

Gamco Industries, Inc.

PO Box 1911
Big Spring, TX 79721

Gamestar, Inc.

1302 State St.
Santa Barbara, CA 93101

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Arlington Heights, IL 60004

Gold Disk, Inc.

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Mississauga, Ontario, Canada
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Greenwood Software

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New York, NY 10016

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Spring Valley, NY 10977

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San Diego, CA 92101

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Fullerton, CA 92632

Infinity Software

536 Curie Drive
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Cambridge, MA 02140

Info Designs, Inc.

445 Enterprise Court
Bloomfield Hills, MI 48013

Input Systems, Inc.

15600 Palmetto Lake Drive
Miami, FL 33157

Intelligent Software

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Seattle, WA 98121

MII Fitness Software

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Fort Collins, CO 80526

MasterSoft

PO Box 1027
Bend, OR 97702

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6 Hillery Court
Randallstown, MD 21133

MECC

3490 Lexington Ave. North
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1601 Civic Center Drive
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MiccaSoft

406 Windsor
New Braunfels, TX 78130

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100 Graydon Hall Drive
Suite 2301
Don Mills, Ontario, Canada
M3A 3A9

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Softsync, Inc.

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New York, NY 10016

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Costa Mesa, CA 92626

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230 Pleasant St.
Truro, Nova Scotia, Canada
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Timeworks, Inc.

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Deerfield, IL 60615

Touch Technologies, Inc.

609 S. Escondido Blvd.
Suite 101
Escondido, CA 92025

Trillium Press, Inc.

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Madison Square Station
New York, NY 10159

Tri Micro

14072 Station Way
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UHL Research

Associates, Inc.
7926 Berner St.
Long Beach, CA 90808

Ultimate Media, Inc.

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Larkspur, CA 94939

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5467 La Forest Drive
La Canada, CA 91011

Valhala Software

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Ferndale, MI 48220

Valuware

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Reseda, CA 91335

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Los Angeles, CA 90048

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Southfield, MI 48076

Viewdata Corp. of America

1111 Lincoln Road
7th Floor
Miami Beach, FL 33139

VIP Technologies Corp.

132 Aero Camino
Santa Barbara, CA 93117

Vision Information

Products, Inc.
5500 Atherton St.
Suite 306
Long Beach, CA 90815

Weekly Reader Family Software

245 Long Hill Road
Middletown, CT 06457

Winner's Edge Software

2003 Sarazen Place
Reston, VA 22091

Woodbury Software

127 White Oak Lane, CN #1001
Old Bridge, NJ 08857

From p. 13.

```
PEEK(63) + 256 * PEEK(64)
```

If I'm using that specific Peek a lot, I add the following line early in my program.

```
100 DEF FNP(X) = PEEK(63) + 256 * PEEK(64)
```

Then, whenever I want this information, I just type

```
PRINT FNP(X)
```

where X is a dummy argument.

If I want to read bit B from memory location M, I use DEF FN with multiple arguments as follows.

```
200 DEF FNR(B) = (PEEK(M) AND 21B) / (21B)
```

To use it to read bit 3 of memory location 32768, enter:

```
290 M = 32768 : PRINT FNR(3)
```

Other examples are numerous. Just remember the key: Any complex, often-used arithmetic expression can be abbreviated in this fashion.

Dan Reisberg
Brooklyn, NY

\$280 Random numbers—The general formula for producing a random number between A and B is:

$$N = \text{RND}(0) * (B - A) + A$$

If you wanted to choose Ns between 30 and 40, for example, you would use:

$$N = \text{RND}(0) * (40 - 30) + 30$$

You could combine the numbers inside the parentheses, of course, and if you wanted only integers as N, you could use the INT function to get it or use N% rather than N. To correct for the downward rounding in these cases, change the quantity inside parentheses to (1 + B - A).

Mary D. Brigito
Old Forge, NY

\$281 12-day calculator—This totals the number of gifts in the famous Christmas song. By following its logic, you can learn about nested loops.

```
100 REM 12 DAYS OF CHRISTMAS - KRINGLE
110 FOR DAY = 1 TO 12
120 FOR PRESENT = DAY TO 1 STEP - 1
130 PRINT PRESENT;
140 NUMBER = NUMBER + PRESENT
150 NEXT PRESENT
160 PRINT
170 NEXT DAY
180 PRINT "TOTAL PRESENTS =" NUMBER
```

Kris Kringle
Santa Claus, IN

\$282 Detecting peripherals—When a program is running, you can determine whether a specific

device is on-line by executing the following, where DN is the device number in question.

```
40 OPEN15, DN, 15: CLOSE15
50 DI$ = "OK": IF ST < > 0 THEN DI$ = "OFF LINE"
60 PRINT DN; DI$
```

The key is to access the peripheral through channel 15, and then read the status variable ST. If it has a non-zero value, the peripheral is off-line.

Fred Roberts
Charlotte, NC

\$283 Text centering tip—When using a word processor, it's sometimes desirable to center a block of text as a unit, rather than line by line. For instance, if you wanted to center:

```
From: J. Lee
      Riverside, CA
To:   Alexander Papatheophilus
      Greece
```

you'd want to do it as shown, with "From" directly above "To" and the first letters of the names and addresses lined up.

But with most word processors, each line would be individually centered, and the results would be chaotic. A solution is at hand if your word processor recognizes what is called a hard space. (In PaperClip and others, you get a hard space by typing a shifted space.)

If you turn on centering, but use hard spaces for the leading and trailing spaces, the whole block will be centered as a unit. In the above example, when typing the last line, you'd use hard spaces from under the T in To to the G in Greece and from the last letter in Greece until you were under the last letter of Al's last name.

Jerry W. Lee
Riverside, CA

\$284 Tape counter trickery—If your tape counter gets out of sync with your tape, you can easily locate your desired program by first loading or verifying any program on the tape. That puts your tape at the start of the next program, whose normal starting number is the key to the trick. Let's call that number the current program's normal starting number, or CNSN. If your counter showed that number right now, you wouldn't have a problem. To get to the desired program, move your tape to the counter number determined by this formula, where DNSN is the desired program's normal starting number:

$$\text{Counter Reading} = \text{Present Reading} + (\text{DNSN} - \text{CNSN})$$

If the number happens to be negative, add 1000 to it. If it's over 1000, subtract 1000.

Norman K. Creter
Cleveland, OH

\$285 Disk doctor—Do you have a disk that absolutely will not format properly? Try erasing it with a bulk eraser of the kind used to erase magnetic tapes. I have used this trick to reclaim several disks of the bargain variety.

During this process, be sure to keep the disk in its protective envelope to lessen the possibility of contaminating it. Don't worry—the magnetic field will go right through the protective envelope.

Scott Bouslog
Muncie, IN

\$286 Selective directories—If you want to get a directory of all files of a certain type, you can use one of the following commands.

LOAD"\$* = P",8 loads PRG files only
LOAD"\$* = S",8 loads SEQ files only
LOAD"\$* = R",8 loads REL files only
LOAD"\$* = U",8 loads USR files only

David Lim
Pasadena, CA

\$287 Naming programs—I use a standard method for naming programs that involve a loader program. (These tend to be machine language programs that have a Basic loader or Basic programs where one part is loaded by another.)

If I have a two-part chess game, I name the first part "CHESS" and the second part " CHESS". Note the space before the C in the second program.

This way, it's easy to see which programs go together when viewing the disk menu or copying programs. As an added benefit, the second program name doesn't list on the C-64.MENU program that is included on many Commodore disks.

Dave Brown
Wandering River, Alberta
Canada

\$288 Disk Carrier—The Rubbermaid No. 3871 five-cup Square Servin' Saver, available in most discount stores, makes an excellent storage box for disks. It is water- and dust-tight and will hold up to 25 disks. I bought mine for 99 cents.

Marty Amarin
Iowa City, IA

\$289 Disk mailer—Having trouble with disks getting bent in the mail? Get a six-inch square of Styrofoam insulation about one inch thick, put your disk on top of it and wrap it in brown paper. The package is bend-resistant beyond belief, and the styrofoam is so light that it doesn't add to the cost of the postage.

Brian Gasperich
Houghton, MI

\$28A Printing on envelopes—I use my printer for addressing envelopes, but sometimes the envelope slides around as it moves out of the range of the friction-feed device. I solve the problem by inserting a full-size sheet of paper under the envelope's flap, then feeding the envelope-paper combination into the printer.

Also, if your printer has a thickness lever, it's a good idea to set it to "thick" while printing on envelopes.

Alfred Lusher III
Cold Spring, KY

\$28B Paper alarm—It's a good idea to ink a big cross on the third-to-last sheet of paper in the tray. This gives you a timely warning of imminent paper exhaustion.

Ian Haynes
Westville, South Africa

\$28C Thermal paper—If you're not happy with the way your thermal transfer printer works with standard computer paper, be aware that Hammermill makes fanfold paper (item #19900-0) specifically for thermal transfer technology. The paper contains micro perforations and is very smooth on one side. The results are excellent, and the price is comparable to standard computer paper.

Doug Mlodzinski
Canandaigua, NY

\$28D Ghostbusters buster—If you like the Ghostbusters game for the C-64, but don't think \$10,000 is enough to get started with, I've got some good news.

When you're asked for your name at the beginning of the game, type OWEN. When the computer asks if you have an account, answer Yes. When asked for your account number, simply type LIST. The vehicle selection screen will appear, and you'll start the game with \$720,000.

Russel Swift
Address Unknown

\$28E Reset curiosity—When powering up or resetting, hitting the restore key will bring the system to a halt. The computer won't be able to continue, as evidenced by the shrunken border that persists until you reset the system again.

Craig Johnson
Juneau, AK

\$28F Travel tips—When you travel with your computer, always take along a good extension cord and a three-prong adapter for the ac wall socket. It's not a bad idea to take a multi-socket power strip, either, just in case you run out of outlets.

R.W.P. Patterson
Stone Mountain, GA
RUN DECEMBER 1985 / 167

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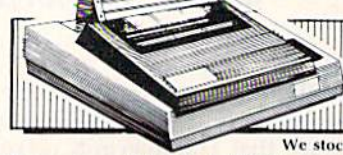
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From p. 47.

0079	C9	20	B0	3B	C9	0D	90	34	F0	35	C9	AB	05
0080	0E	F0	19	C9	11	F0	2A	C9	12	90	26	EC	04
0081	F0	0F	C9	14	F0	23	C9	1C	90	1C	C9	9A	05
0082	1D	F0	18	4C	A1	0D	AD	AF	41	C9	08	DF	04
0083	D0	05	A9	00	8D	AF	41	20	CC	FF	AD	E6	05
0084	AF	41	20	D2	FF	4C	1A	0E	C9	7F	90	81	05
0085	24	C9	81	F0	20	C9	8D	90	F1	C9	92	05	07
0086	F0	D8	C9	8E	F0	D4	C9	90	F0	D0	C9	1B	09
0087	91	F0	E1	C9	94	F0	DD	C9	9D	F0	D9	12	09
0088	C9	A0	90	C0	AD	AF	41	C9	08	D0	05	54	06
0089	A9	00	8D	AF	41	AD	AF	41	20	D2	FF	0D	06
0090	AE	08	42	E0	00	D0	20	C9	20	B0	0B	C6	04
0091	C9	0D	F0	15	C9	14	F0	11	4C	20	0E	8E	04
0092	C9	80	90	0A	C9	8E	90	0F	F0	04	C9	F2	05
0093	A0	90	09	4C	5E	0E	AD	AF	41	8D	4D	C5	04
0094	41	AE	50	41	E0	00	F0	2F	AE	3C	41	08	05
0095	E0	01	F0	08	A2	00	8E	5B	41	4C	2C	7C	04
0096	29	AE	B2	41	E0	01	F0	19	20	AF	1D	00	05
0097	20	CC	FF	AE	1E	41	E0	01	D0	01	60	6B	05
0098	AD	4D	41	C9	22	D0	04	A9	00	85	D4	5E	05
0099	A2	00	8E	B2	41	4C	E5	0B	AD	AF	41	5F	05
0100	C9	14	D0	0D	AE	DC	41	E0	00	F0	69	22	06
0101	CE	DC	41	4C	D5	0E	C9	0D	F0	62	AE	55	06
0102	DC	41	9D	DF	41	E8	8E	DC	41	E0	29	DC	06
0103	90	51	C9	20	F0	58	C9	23	F0	54	C9	72	06
0104	2A	F0	50	C9	2B	F0	4C	A2	2D	F0	48	09	06
0105	A2	01	8E	DD	41	A2	27	8E	DE	41	BD	EB	05
0106	DF	41	C9	22	F0	18	C9	24	F0	14	C9	37	06
0107	28	F0	10	C9	30	90	33	C9	3A	90	08	EA	04
0108	C9	41	90	2B	C9	5D	F0	27	AE	DE	41	3B	06
0109	CA	8E	DE	41	E0	14	F0	14	EE	DD	41	E8	06
0110	BD	DF	41	4C	A5	0E	4C	1A	0E	A2	00	60	04
0111	8E	DC	41	4C	1A	0E	A2	01	8E	DC	41	DC	04
0112	4C	1A	0E	AE	DE	41	E0	27	F0	E9	A2	33	06
0113	00	86	D4	AE	DD	41	8E	DC	41	A9	9D	88	06
0114	20	D2	FF	CA	E0	00	D0	F6	AE	DD	41	9F	07
0115	CA	CA	A9	20	D2	FF	E0	00	D0	F6	67	07	
0116	AE	DE	41	E8	8E	DE	41	BD	DF	41	20	D3	06
0117	D2	FF	E0	28	90	EF	A2	00	86	D4	4C	15	07
0118	1A	0E	A5	D1	85	F3	18	A5	D2	6D	51	D9	05
0119	26	85	F4	A4	D3	B1	D1	49	80	91	D1	D3	07
0120	B1	F3	8D	52	41	AD	86	02	91	F3	60	55	06
0121	A4	D3	B1	D1	49	80	91	D1	AD	52	41	DD	06
0122	91	F3	60	20	CC	FF	A2	00	8E	1D	41	D7	05
0123	4C	E5	0B	60	AD	AF	41	C9	BE	90	03	CE	05
0124	4C	7A	15	C9	B4	90	03	4C	28	13	C9	B7	04
0125	AA	90	03	4C	55	10	C9	A1	D0	16	AE	69	05
0126	50	26	E0	01	F0	03	4C	E5	0B	20	07	2B	04
0127	16	20	75	28	20	18	16	4C	E5	0B	C9	A5	03
0128	A2	D0	06	EE	21	D0	4C	E5	0B	C9	A3	7F	06
0129	D0	16	AE	50	26	E0	01	F0	03	4C	E5	90	05
0130	0B	20	07	16	20	7D	26	20	18	16	4C	27	02
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0135	8D	19	1C	A9	40	8D	1A	1C	20	0A	1C	3B	03
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0137	18	D0	06	20	68	1C	4C	07	10	20	18	B6	02
0138	16	20	00	80	20	18	16	4C	E5	0B	20	EA	02
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0141	41	20	D2	FF	AD	AF	41	C9	00	F0	06	1B	06
0142	20	2F	1E	4C	1D	10	20	E4	FF	C9	00	40	04
0143	F0	F9	A9	30	8D	19	1C	A9	24	8D	1A	87	05
0144	1C	20	0A	1C	20	00	1D	20	EF	1C	20	7A	02
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0146	16	A9	42	8D	19	1C	A9	26	8D	1A	1C	E7	03
0147	20	0A	1C	A2	00	8E	4C	41	20	BC	1E	90	03
0148	20	60	17	20	18	16	4C	E5	0B	C9	AB	29	04
0149	D0	35	20	07	16	A9	E4	8D	19	1C	A9	CF	04
0150	25	8D	1A	1C	20	0A	1C	20	A0	1C	AE	4E	03
0151	4E	41	E0	01	F0	15	20	18	16	AD	55	5C	04
0152	26	8D	01	DD	AD	54	26	8D	03	DD	20	DD	04
0153	E7	FF	4C	E2	FC	20	18	16	4C	E5	0B	33	06

Listing 1 continued.

0154 C9 AC D0 0C 20 07 16 20 38 19 20 B9 03
 0155 18 16 4C E5 0B C9 AD D0 29 20 07 9B 04
 0156 16 20 EF 1C A9 00 8D 1F 41 8D 21 21 04
 0157 41 A9 5C 8D 20 41 8D 22 41 A9 2D 97 04
 0158 8D 19 1C A9 25 8D 1A 1C 20 0A 1C 37 03
 0159 20 18 16 4C E5 0B C9 AE F0 03 4C DF 04
 0160 96 11 20 07 16 20 EF 1C 20 2C 1C 17 03
 0161 20 E1 18 AE 13 42 E0 01 D0 03 4C BD 04
 0162 80 11 20 29 16 20 73 16 AE 36 41 60 03
 0163 A9 57 9D 86 41 E8 8E 36 41 20 DB EF 05
 0164 17 AE 5A 41 E0 01 F0 57 20 CC FF 17 06
 0165 A2 03 20 C9 FF AC 4F 26 B1 FB C9 C8 06
 0166 20 B0 0F C9 0D F0 1B C9 0E F0 17 44 05
 0167 C9 11 F0 13 4C 66 11 C9 80 90 0C 2C 05
 0168 C9 8D 90 15 C9 8F 90 04 C9 9F 90 87 06
 0169 0D 20 D2 FF 20 30 19 20 E4 FF C9 DC 05
 0170 18 D0 00 20 2F 1E A6 FC EC 20 41 EE 04
 0171 90 C1 F0 03 4C 80 11 AE 4F 26 EC DB 05
 0172 1F 41 B0 03 4C 31 11 20 CC FF A9 E1 04
 0173 03 20 C3 FF A2 00 8E 1D 41 20 00 40 04
 0174 1D 20 18 16 4C E5 0B C9 AF F0 03 C0 04
 0175 4C 55 12 20 07 16 20 EF 1C 20 F9 E3 03
 0176 17 20 E1 18 AE 13 42 E0 01 D0 03 97 04
 0177 4C 3A 12 20 CC FF A2 04 20 C9 FF C2 05
 0178 A9 11 20 D2 FF AC 4F 26 B1 FB C9 F3 06
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 0180 C9 11 F0 13 4C 20 12 C9 80 90 0C F4 04
 0181 C9 8D 90 40 C9 8F 90 04 C9 9F 90 BF 06
 0182 38 8D AF 41 20 CC FF A2 04 20 C9 E5 05
 0183 FF A9 11 20 D2 FF AD AF 41 20 D2 F0 06
 0184 FF 20 CC FF 20 E4 FF C9 18 D0 18 6E 07
 0185 20 CC FF A2 04 20 C9 FF A9 0D 20 08 06
 0186 D2 FF 20 CC FF A9 04 20 C3 FF 4C 51 07
 0187 E5 0B 20 2F 1E A6 FC EC 20 41 90 97 05
 0188 96 F0 03 4C 3A 12 AE 4F 26 EC 1F 0B 05
 0189 41 B0 03 4C C0 11 A9 0D 20 D2 FF 75 05
 0190 20 CC FF A9 04 20 C3 FF A2 00 8E 68 06
 0191 1D 41 20 00 1D 20 18 16 4C E5 0B E4 02
 0192 C9 B0 D0 3E AE 50 26 E0 01 D0 31 4D 06
 0193 20 07 16 AE 1C 42 E0 01 F0 15 A2 92 04
 0194 01 8E 1C 42 A9 83 8D 19 1C A9 40 86 04
 0195 8D 1A 1C 20 0A 1C 4C 91 12 A2 00 5D 03
 0196 8E 1C 42 A9 A5 8D 19 1C A9 40 8D 36 05
 0197 1A 1C 20 0A 1C 20 18 16 4C E5 0B CB 02
 0198 C9 B1 D0 03 4C E5 0B C9 B2 D0 42 DC 06
 0199 20 07 16 20 CC FF A9 0F 20 C3 FF 89 05
 0200 20 90 16 20 0E 1D A2 00 8E 4C 41 96 03
 0201 20 BC 1E AD 76 26 8D 75 26 A2 0F E5 04
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 0203 20 D2 FF A9 3A 20 D2 FF A2 00 8E C0 06
 0204 4C 41 20 8B 17 20 18 16 4C E5 0B A5 03
 0205 A9 8F 8D 19 1C A9 25 8D 1A 1C 20 78 04
 0206 0A 1C AD 08 42 C9 00 F0 18 A9 9C 01 05
 0207 8D 19 1C A9 25 8D 1A 1C 20 0A 1C 68 03
 0208 A9 00 8D 08 42 8D 50 41 4C E5 0B AA 04
 0209 A9 A9 8D 19 1C A9 25 8D 1A 1C 20 96 04
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 0211 E5 0B C9 B4 D0 06 EE 20 D0 4C E5 25 07
 0212 0B C9 B5 D0 18 EE 73 26 AE 73 26 13 06
 0213 E0 10 90 05 A2 00 8E 73 26 BD 63 43 05
 0214 26 20 D2 FF 4C E5 0B C9 B6 F0 03 9B 06
 0215 4C EF 13 20 07 16 20 29 16 A2 12 75 03
 0216 BD 86 41 E8 9D 86 41 CA CA E0 FF 1B 08
 0217 D0 F3 A9 24 8D 86 41 EE 36 41 20 42 06
 0218 D1 1F A2 01 BD 5E 41 CA 9D 5E 41 CF 05
 0219 E8 E8 E0 13 D0 F3 20 DB 17 AE 5A 7B 07
 0220 41 E0 01 D0 06 20 60 17 4C C8 13 92 04
 0221 20 EF 1C 20 CC FF A2 03 20 C6 FF 7D 06
 0222 20 E4 FF AC 4F 26 91 FB 20 2F 1E FB 05
 0223 20 07 19 20 CC FF 20 E4 FF C9 18 EE 05
 0224 F0 22 AE 29 41 E0 01 F0 0A 20 4F 54 05
 0225 1B AE 37 41 E0 00 F0 CF AE 4F 26 E4 05
 0226 8E 1F 41 8E 21 41 A6 FC 8E 20 41 51 05
 0227 8E 22 41 20 CC FF A9 03 20 C3 FF 4D 06
 0228 A2 00 8E 1D 41 20 00 1D 20 18 16 FD 02

0229 4C E5 0B C9 B7 D0 51 20 E1 18 AE 89 06
 0230 13 42 E0 01 F0 41 A9 EE 8D 19 1C A6 05
 0231 A9 24 8D 1A 1C 20 0A 1C 20 E4 FF C0 04
 0232 C9 00 F0 F9 C9 18 F0 29 8D 28 41 8A 06
 0233 20 FC 1B A9 62 8D 19 1C A9 25 8D 48 05
 0234 1A 1C 20 0A 1C A2 01 8E 50 41 8E B6 03
 0235 1E 41 20 A0 18 A2 00 8E 50 41 8E 71 04
 0236 1E 41 8E 1D 41 20 00 1D 4C E5 0B B0 03
 0237 C9 B8 D0 71 20 07 16 20 EF 1C 20 37 05
 0238 E1 18 AE 13 42 E0 01 F0 5B 20 29 5F 05
 0239 16 20 73 16 AE 36 41 A9 57 9D 86 F6 04
 0240 41 E8 8E 36 41 20 DB 17 AE 5A 41 79 05
 0241 E0 01 F0 3F 20 CC FF A2 03 20 C9 7A 06
 0242 FF AC 4F 26 B1 FB 20 D2 FF 20 E4 B3 07
 0243 FF C9 18 F0 28 20 2F 1E A6 FC EC E6 06
 0244 20 41 90 E7 AE 4F 26 EC 1F 41 90 CB 05
 0245 DF 20 CC FF A9 03 20 C3 FF 20 18 85 06
 0246 16 A2 00 8E 1D 41 20 00 1D 4C E5 08 04
 0247 0B 20 68 1C 4C 9D 14 C9 B9 D0 1B 10 05
 0248 20 07 16 A2 01 8E 1D 41 A9 0B 8D 05 04
 0249 19 1C A9 25 8D 1A 1C 20 0A 1C 20 25 03
 0250 18 16 4C E5 0B C9 BB D0 03 4C E5 EC 05
 0251 0B C9 BC D0 1B 20 07 16 A2 00 8E E3 04
 0252 1D 41 A9 1B 8D 19 1C A9 25 8D 1A 55 04
 0253 1C 20 0A 1C 20 18 16 4C E5 0B AE 97 03
 0254 50 26 E0 01 D0 25 1E AE 3B 41 8E 12 14 05
 0255 42 A9 EF 8D 19 1C A9 3E 8D 1A 1C 45 05
 0256 20 0A 1C 20 58 1B AD AF 41 C9 42 81 04
 0257 D0 0B A2 00 8E 3B 41 4C 40 15 4C 75 04
 0258 E5 0B C9 58 F0 0A C9 18 F0 2A 20 28 06
 0259 22 18 4C 0B 15 A2 03 8E 3B 41 A9 01 04
 0260 BE 8D 19 1C A9 3E 8D 1A 1C 20 0A 58 04
 0261 1C 20 CC FF 20 E4 FF C9 55 F0 14 31 07
 0262 C9 44 F0 16 C9 18 D0 F1 AE 12 42 BD 06
 0263 8E 3B 41 20 68 1C 4C E5 0B 20 D2 E3 04
 0264 FF 4C 0F 2C 20 D2 FF 20 7B 32 4C 98 05
 0265 6E 2B C9 BE D0 33 20 E1 18 AE 13 06 06
 0266 42 E0 01 F0 26 A9 50 8D 19 1C A9 A7 05
 0267 25 8D 1A 1C 20 0A 1C A2 01 8E 50 BA 03
 0268 41 8E 1E 41 20 66 18 A2 00 8E 50 58 04
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 0270 E5 0B 20 07 16 20 CC FF 20 EF 1C 51 05
 0271 20 2C 1C 20 E1 18 AE 13 42 E0 01 74 04
 0272 F0 34 AC 4F 26 B1 FB 20 D2 FF 20 12 07
 0273 2F 1E 20 30 19 20 30 19 20 CC FF 1B 04
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 0275 41 90 DE AE 4F 26 EC 1F 41 F0 07 28 06
 0276 20 E4 FF C9 18 D0 CF 20 00 1D 20 F4 05
 0277 18 16 4C E5 0B 20 68 1C 4C FB 15 7F 04
 0278 AD AF 41 48 A9 13 8D AF 41 20 AF 03 06
 0279 1D 68 8D AF 41 60 AD AF 41 48 A9 07 06
 0280 11 8D AF 41 20 AF 1D 68 8D AF 41 77 05
 0281 60 A2 02 8E 4C 41 A9 30 8D 86 41 65 05
 0282 A9 3A 8D 87 41 20 0E 1D 20 BC 1E 97 04
 0283 60 A9 C9 8D 19 1C A9 25 8D 1A 1C 40 05
 0284 20 0A 1C AE 3D 41 E0 00 D0 10 A9 F7 04
 0285 D9 8D 19 1C A9 25 8D 1A 1C 20 0A 73 04
 0286 1C 4C E5 0B A9 DE 8D 19 1C A9 25 8D 05
 0287 8D 1A 1C 20 0A 1C 4C E5 0B 20 84 08 04
 0288 1F AE 36 41 A9 2C 9D 86 41 E8 AD 32 06
 0289 CF 41 9D 86 41 E8 A9 2C 9D 86 41 B6 06
 0290 E8 8E 36 41 60 A9 0F AE 75 26 A0 10 06
 0291 0F 20 BA FF A9 00 20 BD FF 20 C0 70 06
 0292 FF 60 20 CC FF A2 00 8E 5A 41 A2 DB 06
 0293 0F 20 C6 FF A2 00 8E 34 41 8E 5A A6 05
 0294 41 20 E4 FF AC 34 41 99 4A 42 EE 9E 06
 0295 34 41 C9 0D D0 F0 A9 00 AC 34 41 FC 05
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 0312 20 D2 FF AD 78 26 20 D2 FF A9 3A 48 07
 0313 20 D2 FF AE 4C 41 BD 5E 41 C9 00 8A 06
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 0317 20 90 16 60 20 CC FF A9 03 AE 75 1D 06
 0318 26 A0 00 20 BA FF AD 36 41 A2 86 29 06
 0319 A0 41 20 BD FF A9 00 AE 56 41 AC 96 06
 0320 57 41 20 D5 FF 60 A9 03 AE 75 26 21 06
 0321 A0 03 20 BA FF AD 36 41 A2 86 A0 A9 06
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 0324 AC 53 26 20 BA FF A9 00 20 BD FF C7 06
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 0327 A9 4B 8D 19 1C A9 20 8D 1A 1C 20 A9 04
 0328 0A 1C 60 20 CC FF 20 E4 FF 8D AF F8 06
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 0330 F0 0B C9 30 90 E7 C9 3A B0 E3 20 6B 07
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 0332 1A 1C 20 0A 1C 20 E4 FF C9 00 F0 84 05
 0333 F9 60 20 EF 1C AC 4F 26 B1 FB 8D 2B 07
 0334 AF 41 20 1A 0E 20 30 19 20 2F 1E 5C 03
 0335 20 CC FF 20 E4 FF C9 18 F0 10 A6 C4 07
 0336 FC EC 20 41 90 DE AE 4F 26 EC 1F 35 07
 0337 41 D0 D6 60 A9 18 8D AF 41 20 AF A5 06

0338 1D 20 68 1C 60 20 EF 1C AC 4F 26 BF 04
 0339 B1 FB 8D AF 41 20 1A 0E AD AF 41 61 06
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 0345 CD 1F 41 D0 19 A9 5C CD 20 41 D0 72 06
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 0375 41 EE 2F 41 AE 2F 41 E0 3A 90 08 E6 05
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 0380 41 8E 32 41 8E 33 41 6E 2D 41 90 2C 05
 0381 08 A2 00 8E 2A 41 4C 1F 1A A2 02 49 04
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 0384 CE EE 33 41 A2 00 8E 2A 41 4C 1F B6 05
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 0387 B3 41 EE 4C 41 AE 4C 41 E0 06 90 A3 06
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 0398 60 20 EC 1B AD 45 41 CD 49 41 90 2F 06
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 0410 8D 09 DC 8D 08 DC 20 D4 1B 60 AD 99 06
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0446	20	CC	FF	A2	00	8E	10	42	AE	0F	42	2A	06	0480	02	A2	00	8E	0F	42	60	20	58	1B	AD	03	05

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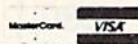
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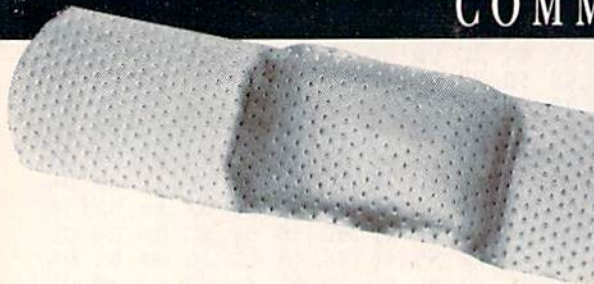


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0496	49	41	4C	20	46	49	4C	45	20	4F	52	C7	04
0497	20	50	52	4F	47	52	41	4D	3F	20	28	B0	04
0498	53	20	4F	52	20	50	29	20	00	A9	5C	C4	04
0499	8D	19	1C	A9	1F	8D	1A	1C	20	0A	1C	86	04
0500	20	E4	FF	8D	AF	41	C9	00	F0	F6	C9	EC	08
0501	50	F0	08	C9	70	F0	04	C9	D0	D0	0C	DF	07
0502	A9	50	8D	AF	41	8D	CF	41	20	D2	FF	FA	07
0503	60	C9	53	F0	08	C9	73	F0	04	C9	D3	37	08
0504	D0	0C	A9	53	8D	AF	41	8D	CF	41	20	0A	07
0505	D2	FF	60	20	22	18	4C	84	1F	A9	00	1C	06
0506	8D	56	41	A9	5C	8D	57	41	20	B8	17	37	06
0507	AD	22	5C	C9	20	F0	06	20	68	1C	4C	F5	05
0508	C9	0C	AD	37	5C	8D	CF	41	AD	20	5C	D7	06
0509	8D	B8	41	AD	21	5C	8D	B9	41	A2	01	D7	06
0510	8E	4C	41	A0	00	8C	4F	26	CE	36	41	FF	05
0511	AE	4C	41	BD	86	41	AC	4F	26	99	86	FE	06
0512	41	99	5E	41	C9	00	F0	09	EE	4C	41	B6	06
0513	EE	4F	26	4C	0A	20	AE	36	41	A9	2C	D4	05
0514	9D	86	41	E8	AD	CF	41	9D	86	41	E8	57	08
0515	A9	2C	9D	86	41	E8	A9	52	9D	86	41	83	07
0516	E8	A9	00	9D	86	41	8E	36	41	60	0D	6B	06
0517	3E	C9	CE	D6	C1	CC	C9	C4	20	C5	CE	7D	09
0518	D4	D2	D9	3C	0D	00	0D	3E	CF	D0	C5	7D	07
0519	D2	C1	D4	C9	CF	CE	20	C1	C2	CF	D2	18	0A
0520	D4	C5	C4	3C	0D	00	0D	3E	CF	4E	45	5B	06
0521	20	4D	4F	4D	45	4E	54	2C	20	50	4C	E1	04
0522	45	41	53	45	3C	0D	00	0D	C9	53	20	BA	04
0523	49	54	20	43	4F	52	52	45	43	54	3F	19	05
0524	20	28	59	20	4F	52	20	4E	29	20	00	25	04
0525	0D	20	20	D4	48	41	4E	4B	20	59	4F	18	05
0526	55	2E	0D	00	0D	D0	52	45	53	53	20	D8	04
0527	41	4E	59	20	4B	45	59	20	54	4F	20	E3	04
0528	43	4F	4E	54	49	4E	55	45	0D	00	0D	8F	04
0529	C3	4F	4E	54	49	4E	55	45	20	41	4E	A5	05
0530	59	57	41	59	3F	20	28	59	20	4F	52	FD	04
0531	20	4E	29	20	00	0D	0D	20	20	20	20	64	03
0532	20	D2	55	4E	54	45	52	4D	20	D0	4C	1D	06
0533	55	53	20	42	59	20	D2	4F	42	45	52	92	05
0534	54	20	D3	49	4D	53	0D	0D	20	20	20	C0	04
0535	20	20	20	20	20	37	38	31	38	20	D3	82	04
0536	55	4D	4D	45	52	46	49	45	4C	44	20	22	05
0537	D2	4F	41	44	0D	20	20	20	20	20	20	8C	04
0538	20	20	D3	55	4D	4D	45	52	46	49	45	87	05
0539	4C	44	2C	20	CE	C3	20	32	37	33	35	79	05
0540	38	0D	20	20	20	20	20	20	20	20	20	81	03
0541	20	20	20	39	31	39	2D	36	34	33	2D	17	04
0542	37	38	35	31	0D	20	20	20	20	20	20	C0	03
0543	20	20	C3	4F	50	59	52	49	47	48	54	98	05
0544	20	31	39	38	35	20	42	59	20	D2	55	19	05
0545	4E	0D	0D	00	0D	0D	C3	3D	20	4B	45	53	04
0546	59	20	2B	20	20	20	20	C6	D5	CE	C3	72	06
0547	D4	C9	CF	CE	0D	0D	20	20	20	C1	20	B8	06
0548	20	20	20	20	20	20	20	D6	49	45	57	BF	04
0549	20	48	49	2D	52	45	53	20	2D	2D	20	87	04
0550	54	4F	47	47	4C	45	0D	20	20	20	C2	17	05
0551	20	20	20	20	20	20	20	20	C4	49	53	87	04
0552	50	4C	41	59	20	42	55	46	46	45	52	38	05
0553	20	54	4F	20	53	43	52	45	45	4E	0D	D9	04

COMMODORE CLINIC



By JIM STRASMA

Do you have a problem or question about your Commodore computer? Commodore Clinic can help. Just send your question (limit one per entry) on a postcard to:

Jim Strasma
Commodore Clinic
PO Box 6100
Macomb, IL 61455-6100

Queries are answered only through this column, but, due to the volume of mail, only those questions that appeal to the majority of our readers will be published. Please do not enclose a self-addressed stamped envelope, since we cannot provide personal responses or answer questions before publication.

UPDATES

Update: In the July issue, Curtis Finke asked about copyrighting a computer program he wrote. For official forms to do this, anyone may write to the following address, requesting Form TX, or call the telephone number any time, 24 hours a day.

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REPAIRS

Q: I have an MPS-801 printer. While printing, the print head shot over to the right side of the carriage, and I can't get it back to the left. Can you help?

Robert Caldwell
Logan, WV

A: The 801 uses an unusual carriage-control mechanism that employs a spring to return the print head to the left margin after each line. It sounds like that spring has either broken or unhooked. Once it is hooked up again or replaced, the printer should resume normal operation.

Q: My 1541 manual reads, "Never remove the diskette when the green drive light is on!" My drive had been wired incorrectly, for the green light remained on continuously. I decided to correct the problem. All you have to do is remove the case, which is held on by four Phillips-head screws, remove the metal shield, clip the wires leading to both the red and green lights and then swap them.

G. Povo
Vancouver, WA

A: Your hint absolutely made my day, proving once again that there is both a software and a hardware solution for almost any problem. Unfortunately, your manual is wrong. The above advice was one of the most

glaring discrepancies in the original 1541 manual; it has since been corrected. There is no need to rewire the drive; just correct your manual to state, "Never remove the diskette when the red drive light is on."

Your note also gives me a chance to warn 1571 disk owners that the green and red lights have been swapped on that model. Thus, the original 1541 manual would not have been incorrect if it had been written for the 1571.

To be sure which light is which, simply turn on your disk drive and note which of the two lights flashes and then turns off, and which one turns on and stays on. The one that flashes is the drive-activity light, whatever its color, and disks should not be removed while it is glowing.

Q: Is there any way that I could get a replacement SID chip from Commodore? I realize that my C-64 is out of warranty. However, is it possible for just one voice to go bad unless it is a defect in the chip that occurred when originally produced? If I cannot get a replacement free of charge, where might I order one and approximately how much will it cost?

Jeff Lozano
Kingsville, TX

A: As with any other consumer product, if you want warranty help from the vendor, test everything during the warranty period. After a year, it is almost impossible to tell whether a faulty chip has always been that way or became so only recently. And yes,



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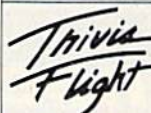
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Commodore Clinic

chips do fail sometimes after working perfectly for months or even years.

You should be able to order a new SID chip for about \$50 from any of Commodore's new authorized service centers. To find the one nearest you, phone Commodore's support number at 215-436-4200.

Q: I can't find a monochrome monitor where the readable part of my 64's display can be adjusted to fill the screen, and that includes Zenith, Amdek and NEC. There is always about 1½ inches left over on all sides, which eliminates about one-fourth of the screen. Dealers say nothing can be done, but there must be a way to change something internally to correct this problem.

William Burton
Prairie Village, KS

A: The 1½-inch border is intentional; it assures that all 40 columns will be visible on typical TV sets, most of which, when new, intentionally throw away the edges of the picture they receive. This is known as overscan. Its purpose is to keep the set from needing further adjustment later, since the size of the display picture tends to shrink over the years.

A few monochrome monitors have horizontal and vertical size controls to adjust the degree of overscan, usually on the back of the cabinet. Others have the same adjustments hidden inside the cabinet. A dealer's service department should be able to adjust most monitors to any border width you want. The Plus/4 model also has an Escape command to select a wide or narrow border within the computer itself.

HARDWARE

Q: I am looking for a color monitor. Will any color composite monitor work with the 64? What are items I should be aware of when buying another brand?

Breit Ketterer
Fairborn, OH

A: Most, but not all, color composite monitors work just fine with



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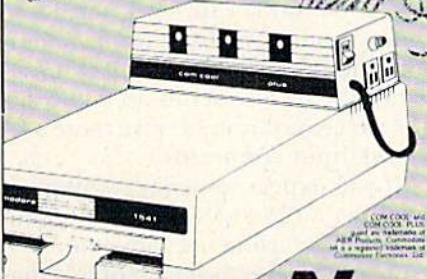
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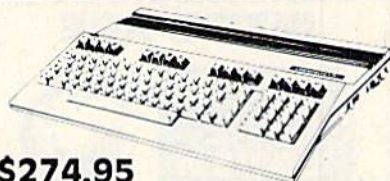
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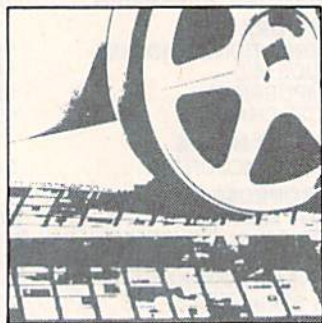
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the 64. Those few that fail seem to have trouble locking in a stable picture, making their incompatibility obvious the moment you try using them with a 64.

Most composite monitors have only one video-in connector, which generally gives satisfactory results. However, for maximum quality, look for a monitor with two separated video inputs, one for chroma (color) and the other for luma (brightness). Since the 64 also sends an audio signal to the monitor, be sure there's an audio-input connector.

If you expect someday to upgrade to either a 128 or an Amiga and want to continue using the same monitor, you may be wise to get a monitor that also has one or more inputs for RGB.

Q: In a store recently, I saw a device that claimed to turn your computer monitor into a television set. Are these devices any good?

Bob Bixby
 Honolulu, HI

A: The version I saw, a Cardco product, is a separate TV tuner, which receives broadcasts via cable or an antenna, and then supplies the TV signal to the monitor via the same connectors used by the computer. However, if you own a video cassette recorder, you may already have an excellent TV converter for your computer monitor. Nearly all VCRs include video- and audio-out connectors that can be plugged directly into your monitor. This allows you to use the monitor to view any show your VCR can receive, as well as prerecorded movies, without having to buy any extra equipment.

Q: I've been thinking about building a RAM disk for the 64, now that RAM chips are dirt-cheap. Has anyone ever produced one for the 64? It would have to behave just like a disk drive except that the storage would be in RAM.

Gonzalo Nin
 Stockton, CA

A: Shortly after the 64 first became available, Richvale Telecom-

munications developed a RAM disk with a capacity of something like 400K, although I'm not sure it was ever sold widely. You can also buy from Letco and other vendors extra RAM in bank-switching cartridges that plug into the 64's cartridge port. However, the key to such devices being true RAM disks is that they must be entirely compatible with "real" disks, a condition that, in practice, is nearly impossible.

First, complete compatibility would require RAM disks to operate just as slowly as other disks, something almost no one would tolerate. Also, most of the commercial programs sold for the 64 have been protected against casual copying by the addition of intentional errors to the disk. RAM disks usually don't duplicate such errors, making them incompatible with programs that are DOS-protected.

The key to a successful RAM disk would have been for Commodore to establish standards for how it should work; then other companies could have modified their programs to work with it. Fortunately, Commodore has just done this by announcing a RAM cartridge for the C-128. When I saw it last summer, Commodore expected it would also work with the 64 and that it would be widely available as you read this.

Q: A few weeks ago, I noticed a static-out touch pad. What exactly is it, and is one worth having?

Daniel Wilde
 Goodlettsville, TN

A: This time of year, static electricity is computer-enemy number 1. Thousands of innocent micros will meet their maker this winter, victims of static shocks brought on by low indoor humidity. The pad you saw is one attempt to prevent such disasters.

The idea is that, after crossing a nylon carpet or other static generator, you touch the pad before touching the computer. The pad is connected to an electrical ground, allowing it to drain off any static charge, just as if you had touched a metal door knob.

The idea behind the pad is excellent and widely used in large computer installations. However, there's

nothing magic about the pad; you can achieve the same goal by touching a nearby radiator or faucet.

I'd also suggest minimizing static at its source, by raising the humidity in your computer room (but not enough to cause condensation inside the computer!) and by either removing carpets from the area around the computer or spraying them with an anti-static solution (almost any carpet cleaner will do).

Q: I have a 1702 color monitor. When I turn it on and hold the back of my hand to the screen, my hairs tingle and stand out straight. Is this radiation that would be harmful to a person?

William Noice
Richfield, OH

A: What you are feeling is a charge of static electricity, often found on the face of both computer monitors and ordinary TV screens. This is quite different from the X-ray leakage that several years ago caused serious scares about color TVs. TVs and monitors have since been redesigned for added safety, and are now routinely tested to be sure they do not emit harmful radiation. You can reduce the buildup of static, and the dirt it attracts, with an anti-static cleaning spray.

Q: I've designed several computer work centers (desks) that require very little or no cutting. They are unique, versatile and relatively inexpensive to build. Would it be better to sell my designs as magazine articles or to compile them in a book, and how do you get a "how-to" book published?

Shirley Gigliotti
117 Rosemont St.
Haverhill, MA 01830

A: I've included your address, in case a publisher is eager to "discover" you. Your idea has merit as both a series of articles and as a book, although you may find it easier to be taken seriously by book publishers after you've already had some articles published in a magazine. Both magazine and book publishers will be

happy to send you author's kits, or guidelines, telling you how to write for publication.

One other factor that may be important is how long you can wait for income. *RUN* pays for articles as soon as they are accepted for publication. Most book publishers, on the other hand, don't pay royalties until several months after the completed book goes on sale.

OTHER

Q: I have to call long distance to access CompuServe. The cost is \$78 an hour for the phone bill alone. Is there a way around this outrageous phone bill?

Rick Strubell
Moodus, CT

A: Yes, you should be able to cut that bill down a lot. Even here in the boondocks, I can call CompuServe for under \$20 an hour. One trick is to call when rates are lowest, after 11 PM, before 8 AM, and on Saturday and Sunday before 5 PM. Another trick is to find the cheapest way to call CompuServe. You can access it much more cheaply via local numbers provided in many large cities by Tymnet, Telenet and similar services, rather than by dialing directly to CompuServe's home in Columbus, Ohio. You may also find that it's cheaper to call across state lines than within your own state.

Finally, an "alternative" phone company, such as MCI or GTE Sprint, may offer low-cost, long-distance service in your community. CompuServe will be happy to give you suggested access numbers, and your phone company can tell you which of those numbers would be least expensive to call, plus whether an alternative phone company offers service in your area.

PROGRAMMING

Q: What is the difference between an assembler and a machine-

language monitor? Can I use a monitor instead of an assembler to write machine language programs?

Troy Lund
Hermantown, MN

A: When computers were first developed, they were programmed directly, in a language composed entirely of numbers that they could execute unchanged. A typical simple instruction was written as 11001000 (binary), with each digit standing for an actual switch within the computer. Later, machine instructions were written in shorter numbers (base 16) that were easier for humans to remember. For the same reason, the numbers were eventually replaced by short words that stood for each instruction, allowing people to write programs as a series of words.

This added a translation step to programming, since computers could still only obey numeric instructions directly. The program that did the translation is called an assembler. Its development was the first great leap forward in software development and heralded the eventual development of Basic.

However, even after the advent of assemblers, there remained a need to view and change numbers in the machine directly, via machine language monitors, so called because they directly monitor the actual values used by the machine.

As this brief history suggests, there is a continuing need in programming for both assemblers and monitors. Short programs can be written entirely with a monitor, but larger programs are much easier to develop with an assembler. Most machine language programmers use at least one of each.

Q: I recently received a practical gift for my 64—the program Print Shop. However, my MPS-802 printer is not compatible with it. Is there a solution?

Bruce Bracebridge
Purcellville, VA

A: I receive several letters a week from people who wish Print Shop were compatible with one printer or

another. Unfortunately, your 802 handles high-resolution graphics differently from the Commodore printers supported by Print Shop.

If Broderbund Software could be sure of selling enough copies of a new version of Print Shop to recover their costs, they might be convinced to do so. So come on, those of you with unusual printers, drop Broderbund a note describing your printer and promising to buy a compatible new version of Print Shop.

Meanwhile, no printer is 100 percent compatible with every program. Before buying either a printer or a program that uses a printer, be sure the compatibility you need is guaranteed. Better yet, test both together before you buy.

Q: I am one of many who bought a 1526 printer, only to find out later that it would not do what I wanted. I have developed a program to print

out on the 1526, using a C-64, character fonts such as Olde English, computer print, a Greek alphabet, small print and large block letters. I would like to know if there is any interest in this program?

Brian Axford
15 Isabel St.
Petawawa, Ontario K8H 1Z1
Canada

A: I imagine you'll be amazed at how much interest your fellow 1526 owners will have in that program, Brian. Thanks for writing.

Q: I often need to change a word or line in a text file. Could you show me a way to edit a sequential file without retyping the whole file?

Peder Sterling
North St. Paul, MN

A: The easy way to edit a text file is with a word processor or terminal

program designed for the purpose. Easy Script, from Commodore, VIP Terminal, from Softlaw, and Paper-Clip, from Batteries Included, are three among many programs with this option. Even programming aids such as SYS RES from Solidus International, and compilers such as Commodore's 6502 assembler/editor include Get and Put commands to ease the editing of sequential files.

Q: I have a 64 and cassette. Is there any Basic statement or short program that will combine programs by loading more than one without erasing previous ones?

Bryson Payne
McCaysville, GA

A: The commands that do what you request are Append and Merge. They are often found in program-

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Copycalc: An electronic spreadsheet. Turns your Commodore into a visible balance sheet; includes screen editor. "Excellent program for budgeting, estimating, or any math-oriented use... well worth the money. Highly recommended." —Midnite Software Gazette.

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mer's aids, such as SYS RES (mentioned above) and PAL, from Pro-Line Software. The difference between the two is that Append attaches to the end of the previously loaded programs each new program that's loaded, regardless of its line numbers, while Merge inserts the new program into the existing program line by line, replacing any duplicated lines with the version currently being loaded. Of the two commands, Merge is usually more useful, but each has its place.

Q: I learned from someone that unless I reformat my disk, I can't save any more programs on it without erasing the whole disk. The problem is that I don't know how to reformat a disk.

Kevin Honakem
Madison, WI

A: I imagine that was said because there is an error on your disk that keeps you from safely adding any more programs to it. Or your disk may simply be full, and something will have to be erased before you can add any more programs or data to it. Ask your helper to be more clear about why you need to reformat the disk. Then, after copying onto another disk any programs or datafiles you want to keep, reformat the disk by entering the Immediate mode command:

OPEN 15,8,15,"N0:BLANK"

(Replace BLANK with your own choice of a name for the disk, up to 16 characters.) Notice that this is almost the same as the command used to format a brand new disk:

OPEN 15,8,15,"N0:BLANK,00"

(replacing "00" with your own one- or two-character disk ID).

Although reformatting a disk takes

less time than the original Format command, it only works on disks that have already been formatted at least once and that don't contain any errors. Both versions erase the disk directory, which is why you need to copy everything you want to keep onto another disk before formatting or reformatting disks.

Q: Does the 64 have any functions like the Locate function on the IBM PC?

Donavon Simonette
Brooklyn, NY

A: The Locate function in PC Basic serves not only to position the cursor at a chosen row and column, but also to change its size and shape, plus turn the cursor off and on. No one function on the 64 does all these things. However, here is a subroutine you can use to easily position the cursor on any desired row and column:

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- 500 REM LOCATE CURSOR
- 510 POKE 781,ROW
- 520 POKE 782,COL
- 530 POKE 783,0
- 540 SYS 65520
- 550 RETURN

Call the subroutine with GOSUB 500, after assigning appropriate values to variables ROW and COL.

Q: I have a program that uses Data statements. Some statements are longer than the 80-column logical line limit. How can I concatenate these to accommodate longer lines?

**John Schenck
Aberdeen, SD**

A: Although there are ways to build data lines longer than 80 columns directly, I prefer to handle such needs by concatenating strings during the program run. To do so, simply read the strings to be concatenated, and then assign them to the same string, using the + sign as a concatenation operator.

Here is an example of a program that reads data lines and combines any over a preset length (five in this example) with the next line of data:

```
10 DATA 123456
20 DATA 789
30 A$ = ""
40 READ B$
50 A$ = A$ + B$
60 IF LEN(B$) > 5 THEN 40
70 PRINT A$
```

Q: My 64 always has displayed an Out of Data error when I run a program with a Read statement. What can I do?

**Louis Minakaki
Brooklyn, NY**

A: An Out of Data error means your program attempted to read more data than the program contains. In the previous example, adding another Read (i.e., 80 READ C\$) statement would cause this error. Accidentally omitting a comma when typing in a data line is a common cause of the error. To trace the problem, add a Print statement just after each Read, to show what has been read, and perhaps a counter variable as well, to show how many items have been read.

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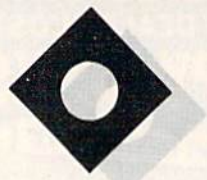
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Compiled by *SUSAN TANONA*

ST10C Hard Disk Drive

A Hard Disk Drive To Increase the Power Of Your Commodore

If you are the system operator of your own BBS, run a small business or a Commodore-equipped computer lab, you've no doubt thought that a disk drive capable of storing large amounts of information would be helpful.

If you are serious about such an application, Computer Specialties, Inc. (CSI) may have your solution.

In a package not quite as big as a bread box and weighing considerably more than a 1541 disk drive, the ST10C offers 10 megabytes (that's 10,000,000 bytes) of storage all in one drive. If you think in terms of blocks, that's over 39,000 blocks of information.

Operation of the ST10C is a snap. For all of its power, there's very little new learning to be done in order to use it.

Hard disk systems are sealed units. You don't change the disks the way you do with a floppy disk drive. The disk itself is contained in a sealed enclosure.

The drive is quite small. The rest of the unit consists of a power supply and, just like the Commodore disk drives, a small computer of its own.

To put the drive to work, you may connect it with a standard serial cord, just like the one you use with a 1541.

When connected this way, however, you'll get all the annoyance of the 1541's slow loading time.

CSI has also included an IEEE connection, and, with the proper interface, the drive can be connected through this to create a noticeable increase in speed.

On the rear panel of the drive are two small switches. One allows you to configure the drive as either device number eight or nine. The other is a safety switch. Normally, it sits in the disable position. This keeps you from accidentally performing a New command on the hard disk. The switch must be thrown to the enable position for you to erase the disk.

Upon power up, the ST10C performs its own diagnostics. These take a bit longer than you may be used to, but there's no need to panic. When all is determined to be in working order, a green LED indicator and the red light on the drive itself will come on.

Also located on the front panel is a backup switch. With a regular disk drive hooked up, you can automatically copy the entire contents of the hard disk to a floppy disk. As each floppy fills up, the green light will flash, prompting you to change disks and continue. What is missing is an automatic way to reboot the hard drive. You can accomplish this using the Butterfield Copy-All program supplied. It would be simpler if this capability were built into the hard drive itself.

I've had the ST10C in continuous operation for over 60 days, with no sign of any problems. I did find the whirring sound of the drive a bit

distracting, but this is a minor drawback and may not bother you at all.

The documentation consists of a 22-page manual. It's definitely not a complete study in disk drive operation. The assumption is made that you are already familiar with Commodore DOS commands and procedures.

The ST10C really shines in a computer lab environment. In conjunction with several additional CSI products, such as a multi-user switch that allows you to hook up a number of computers to the ST10C, this drive can be the basis for a terrific system.

At \$1595, not too many individuals are going to be adding a hard disk drive to their system. However, this unit would be a very useful and viable product for a user's group (perhaps for use with a BBS), a small business or an educational organization. (*Computer Specialties, Inc., 726 East New Haven Ave., PO Box 1718, Melbourne, FL 32902. \$1595.*)

Jim Grubbs
Springfield, IL

PPI with Graphics

A Parallel Printer Interface that's Good Value for Your Money

The PPI with Graphics parallel interface bridges the gap between serial and parallel printers by eliminating the usual set of DIP switches located on most parallel interfaces. This does not imply that the PPI in-

terface is an outdated version of a transparent parallel interface; rather, it is a sophisticated interface designed to allow parallel printers to emulate the Commodore 1525/801 printers and permit control codes to alter print modes.

The PPI is a high-quality interface that is compatible with the C-128 in C-128 mode. The package includes a six-pin DIN serial connector, a power connector, a 36-pin Centronics connector for the printer's port, and an in-line microprocessor housed in a sturdy metal box.

The 16 control codes, which help compensate for the lack of in-line DIP switches, are listed in the 16-page manual that accompanies the interface. These are standard print codes for parallel interfaces.

We have had the PPI in the *RUN* technical department for several months and have exposed the unit to heavy use on a wide variety of parallel printers. The interface's rugged design and ease of use have helped to make it everyone's favorite when a parallel interface is needed.

However, the PPI's power connector for the cassette port won't win any praise from the staff. The plastic connector is substantially more rigid and easier to align with the cassette port than some other parallel interface power connectors on the market; but it is still easily bent with repeated use.

Another common problem with power connectors on parallel interfaces is the tendency for the power cable to break off, and the PPI is no exception. After a few months of use, the power connector's wire did break off. A soldering iron and a dab of electrical solder fixed the unit, but an improved power-connector design is what is really needed to cure this problem permanently.

The PPI with Graphics permits the use of the printer's character set by using a secondary address (either 4 or 5) to bypass the 1525 default character set. A feature of greater significance is the interface's ability to allow simultaneous 1525 emulation and use of the printer's character set. (Two exceptions are noted in the manual.)

I've only extensively tested the control codes and printing examples given in the manual on the Gemini

10X printer. However, I didn't run into any compatibility problems in using the interface with several other printers. Since most software for Commodore computers is designed for the 1525 printer, the importance of the PPI's outstanding 1525 emulation really cannot be overemphasized.

If you're contemplating the purchase of a parallel printer, or would like to replace your existing parallel interface, you'd be wise to try the PPI. Ease of use and superb 1525 emulation make this interface a sound investment for your Commodore. (*D.S.I., 717 South Emporia, Wichita, KS 67211. \$49.95.*)

Tim Walsh
RUN staff



LBoW Cartridge Port Converter

Save Wear and Tear on Your Cartridge Port with This Handy Peripheral

For those of you who frequently use interfaces and cartridge software, the LBoW Cartridge Port Converter will be a relief for your C-64. You simply keep the LBoW plugged into the cartridge port all the time, and instead of wearing out your computer's port, you can let the LBoW take the abuse. The LBoW can really prolong the life of your computer.

Physically, this converter resembles the letter L, and it provides two ports where only one existed before.

One port, vertically mounted on the top of the L, is for use with frequently changed software cartridges (such as games and applications). The other port, horizontally mounted on the back of the L, is best used for permanent attachments, such as transparent IEEE interfaces.

You will find that the vertical port is actually easier to deal with than the traditional horizontal ports of the C-64. You can more easily see what you are doing when you plug in a cartridge, and it is easier to insert it into the LBoW than it is to wrestle with inserting it into the back of the computer.

The LBoW does, however, have its drawbacks. For example, it does not provide a switch that lets you choose which of the two ports you want activated. Because of this, you can't have two software cartridges plugged in at once; the computer won't boot up at all with this configuration.

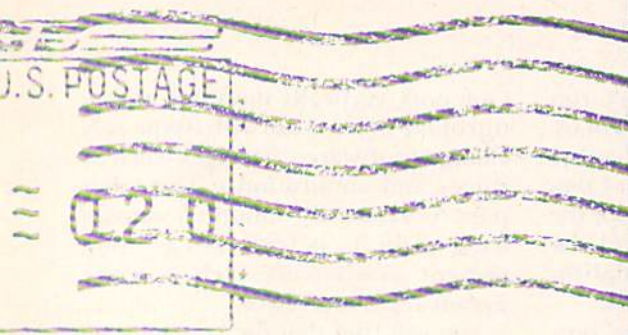
The LBoW will only work with both ports filled if you have some kind of transparent interface plugged into one and a cartridge containing some software plugged into the other. I tested my LBoW with an MSD C-64 IEEE interface, which allowed the software cartridge I had in the top port to run unhindered. It also worked with a MIDI interface and a software cartridge in place. You should be sure that the interface you want to keep plugged in permanently is totally transparent.

In addition to the two cartridge ports of the LBoW, there is also a reset switch. This lets you restart your computer without having to turn off the power switch. A program is also included that will recover a program that may have been lost by a reset.

The LBoW is one of several cartridge expanders on the market today. I like it because of its compact size, but I was disappointed that there was no selector switch. It doesn't benefit those users who want to keep two software cartridges plugged in all the time.

For others, however, the LBoW might work out just right. It's inexpensive, and is nicely designed to match the color and contour of your C-64. (*T.I.E. Limited, 2061 West Mill Road, Milwaukee, WI 53209. C-64/\$19.95.*)

Margaret Morabito
RUN staff



Commodore Customer Support

I recently purchased the C-128 and have been experiencing some problems. Following the advice of the manual, I tried calling the 800 customer-support number. After several attempts, I received a recorded message informing me that this number has been disconnected. What has happened to the customer support center for the C-128?

Bill Corbett III
Holyoke, MA

Local service and information is now available to Commodore computer owners through the creation of a national network of service centers. We published a list of these services, by state, in RUN's July through September issues, with an update in November.

Commodore's toll-free number has been discontinued, but the company has a new service number: 215-436-4200.

Editors

RUN's Copyright Policy

We would appreciate a statement of policy or your permission to place purchased disks of RUN magazine programs in our library at The Jersey Shore Commodore User's Group.

Robert McKinley, Jr.
Tinton Falls, NJ

Unfortunately, we cannot grant you permission to distribute through your user's group library programs published in RUN or on ReRUN. Such a practice is contrary to the copyright law protecting programs published by computer magazines and software manufacturers.

RUN's policy dictates that we retain all rights to published programs, and we do

not transfer those rights to other parties. Making these programs available to user's group members would jeopardize our promotional efforts for both RUN and ReRUN.

Programs published in the magazine and made available through ReRUN are for personal use only. They cannot be copied and distributed. Disclaimers to this effect are published in each magazine issue and on each ReRUN package.

While you may or may not agree with this policy, we hope you understand the magazine's position and concern in protecting the copyright of published programs.

Editors

Hotware?

I wish to comment on Batteries Included's "Stolen Property" ad on p. 81 of your September 1985 issue. I find that ad, which warns against copying copyrighted software, to be, at the very least, offensive and insulting.

Worse yet is the paranoia of the software industry, with their damnable copy-protection schemes that send the 1541 disk drive head banging and crashing to the far limits of its travel, ultimately requiring numerous realignments. Even Commodore's very own, ever-popular Easy Script disk intentionally crashes the head numerous times, taking painfully long to load because of this. One popular game takes almost ten minutes to load because of its "protection"; without it, the same game can be loaded in seconds. Some of these disks are so borderline that, within weeks, they self-destruct and refuse to load, forcing the customer to buy another.

Thanks to new hardware/software

packages, Commodore owners can make unencumbered fast-loading backups of these difficult disks, and I don't blame us for being forced to do so. Furthermore, as more of us want to transfer these programs to hard disk drives, we have no choice but to go through these steps.

I own originals of every program that I use, and it's my documented legal right to make a backup copy to preserve the original. It is also my legal right to loan my originals to another person. If that were ever to change, we would have to burn every public library in this country. None of this is piracy!

David P. Kemmer
Oronoco, MN

Praise for Micro Compiler

Bravo! Victor Cortes' Micro Compiler program ("Byte-Size Compiler," RUN, August 1985) was one of the finest utilities you've published.

Unlike the cheaper commercial compilers, this compiler works amazingly well with true machine code. Thank you for providing such a neat program.

John F. Jarrett
Bronx, NY

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.

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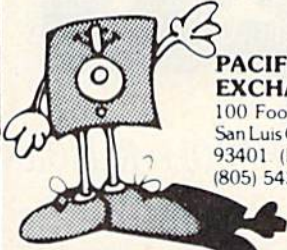
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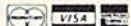
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Compiled by *HAROLD R. BJORNSEN*

Dawn Patrol

Mark of the Falcon (2190 West Drake, Suite 177, Fort Collins, CO 80526) has released Dawn Patrol, a real-time World War II submarine simulation game for the C-64.

As commander of an attack submarine, you must outwit the enemy ships, whose positions and actions are calculated by the computer. Many factors, such as fuel, torpedoes, damage and locations of the enemy vessels, must be considered when planning a strategic attack. The game is easy to learn at the lower levels of difficulty. Dawn Patrol is available on disk for \$24.95.

Check Reader Service number 400.

The Muppets Teach You the Computer

Welcome Aboard is a tutorial that teaches novice computer users how to use their C-64s.

A crew of Muppet characters introduces you to five basic computer applications: programming, word processing and electronic mail, database management, games and computer-aided designs.

Welcome Aboard includes documentation and "The Muppet Guide to Computerese," an illustrated glossary of computer terms.

The program is available on disk for \$24.95 from Broderbund Software, 17 Paul Drive, San Rafael, CA 94903.

Check Reader Service number 401.

Video Digitizer

This package permits you to construct a black-and-white video di-

gitizer at low cost. The package includes machine language software, plans, documentation and a blank printed-circuit board. You supply the components (available at Radio Shack for about \$20) and the time to assemble.

Available for the C-64 for \$39.95 from Kinney Software, Dept. R, 121 N. Hampton Road, Donnelsville, OH 45319.

Check Reader Service number 402.

For VCR Users

VideoFile (from VideoFile, PO Box 480210, Los Angeles, CA 90048) is a program that keeps track of up to 150 video programs on up to 50 videotapes.

It allows you to define three categories for programs, listing the shows by category, in order of length or alphabetically. It searches your VCR tapes for the best space to record new material and can also locate any show on the tapes.

The program will also prevent you from accidentally erasing programs, and it automatically converts VCR counter numbers into an hours/minutes format. Available on disk for the C-64 for \$49.95.

Check Reader Service number 403.

QuantumLink

For a monthly \$9.95 fee, QuantumLink subscribers have 24-hour access to many services, including the Commodore Software Showcase (a software catalog), Commodore Information Network, People Connection, Just For Fun (trivia quizzes, contests

and entertainment news), Shopping Center, Learning Center, News & Information, Customer Service Center and Communications Software.

QuantumLink (8620 Westwood Center Drive, Vienna, VA 22180) also plans to include banking, investment and financial planning services.

New purchasers of Commodore 1660 (300 baud) and 1670 (1200 baud) modems receive communications software and free service for the first month.

Check Reader Service number 404.

For Screen Voyeurs

St. Mars Systems (1400 Clay St., Winter Park, FL 32789) has released Windows, a screen processor utility for the C-64.

Windows gives windowing capabilities to Basic and assembly language programs and features individual window color controls, window move commands, independent window scrolling, cursor positioning routines and an unlimited number of windows. Available on disk for \$24.95.

Check Reader Service number 405.

Free Catalog

MIRC (4000 Middlefield, Palo Alto, CA 94303) is offering a free 80-page catalog describing 157 current market research reports in the communications and computer industries.

Reports are grouped by subject, such as artificial intelligence, components, computers, computer-aided systems, data communications, graphics, lasers, software and work stations.

Check Reader Service number 406.

Idle Time II

Able Software (PO Box 422, Kulpsville, PA 19443) has released the C-64 version of Idle Time II.

Following the parameters set in the original Idle Time, Idle Time II is a collection of eight games that can be played against the computer. Two of the games also feature two-player versions.

Games include testing your knowledge of cities in the United States, rearranging jumbled words and solving a cube puzzle. Available on disk for \$19.95.

Check Reader Service number 407.



Lightning 24

Anchor Automation (6913 Valjean Ave., Van Nuys, CA 91406) releases an intelligent 2400 bps data modem with auto-dial/auto-answer capabilities, low power consumption and three-speed operation.

Designated the Signalman Lightning 24, it operates asynchronously at 2400 bps with an automatic equalizer to ensure clear transmission over all but the worst telephone lines and fallback to 1200 or 300 bps if the telephone line cannot support 2400 bps. Available for the C-64 for \$599.

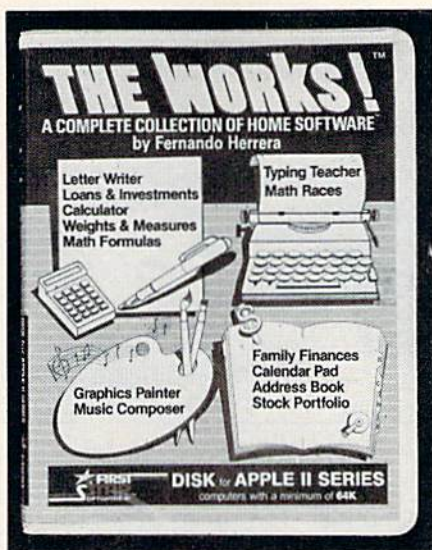
Check Reader Service number 408.

For Food Lovers

Scarborough Systems (55 S. Broadway, Tarrytown, NY 10591) introduces the C-64 version of The Original Boston Computer Diet.

The program develops an individualized diet for you by analyzing personal data such as weight, height and eating habits. These factors are incorporated with data on your psychological and behavioral traits to create a program designed to modify your eating habits. Available on disk for \$49.95.

Check Reader Service number 412.



The Works!

First Star Software (18 East 41 St., New York, NY 10017) has released The Works!, a productivity program for the C-64. The Works! is divided into four categories: organizers, tools, learning and arts.

Among the individual modules are Graphics Painter, Typing Teacher, Music Composer, Letter Writer, Stock Portfolio, Calendar Pad with Index Cards, Calculator, Math Drills, Conversions, Address Book and Finance Record-Keeper. It is available on disk for \$49.95.

Check Reader Service number 410.

Solve Your Problems

Harvsoft (PO Box 725, Kenmore, NY 14217) has released its Creative Problem Solving program for the C-64. It allows you to evaluate personal, financial and business problems by weighting your input. The printed output produced by the program ranks information showing the best solution and includes a breakdown of each idea and an analysis of the factors involved. The program is available on disk for \$29.95.

Check Reader Service number 417.

Fly the Competitive Skies

AcroJet—The Advanced Flight Simulator allows those of you who have soloed in Solo Flight to now pilot your own jet, the BD5-J. In it, you can participate in a decathlon of sport aviation events, including spot

landings, ribbon cuts, acrobatics and other high-performance maneuvers.

AcroJet features 3-D graphics, multiple radio and navigation instrumentation and quick-response maneuverability. Available on disk for the C-64 for \$34.95 from MicroProse Software, 120 Lakefront Drive, Hunt Valley, MD 21030.

Check Reader Service number 413.

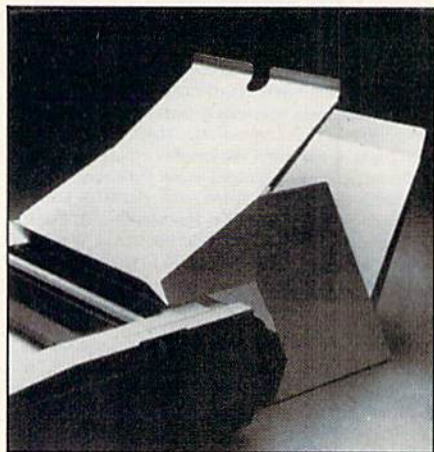
Subscribe to Viewtron

Viewdata Corp. of America (1111 Lincoln Road, 7th Floor, Miami Beach, FL 33139) announces the availability of its Viewtron videotex service to Commodore computer owners.

As a subscriber, you get up-to-the-minute news, weather forecasts, continuous sports scores, current stock prices, airline schedules and fares, consumer reports, movie and book reviews and access to an up-to-date encyclopedia. You can also send electronic messages, pay your bills and get account balances.

To get Viewtron, you must purchase the Viewtron Software Starter Kit for \$9.95. The kit includes a disk with communications software, an ID and password, and a user's manual.

Check Reader Service number 414.



Fanfold I/O System

The Porter system (Peri-Comp, Inc., PO Box 188, Lake Geneva, WI 53147) holds blank paper for the printer and displays and stores the resulting printout. It is positioned behind the printer and holds up to 1000 sheets of fanfold paper.

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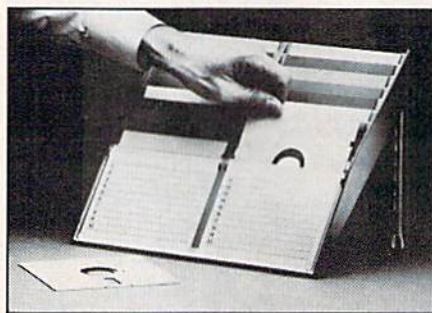
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Diskporter

Potomac Industries (2300 M St. NW, Suite 400, Washington, DC 20037) offers a slim-profile storage case that keeps the labels exposed on 20 disks that it stores for permanent organization and direct access, eliminating the need to flip through files. With its cover flipped back as an easel stand, it doubles as a copyholder without adding to workspace; closed, its dimensions are 1 1/2 inches deep by about one foot square. Diskporter organizers are available for \$29.95.

Check Reader Service number 409.

address labels and an attend/visit report. The program is available on disk for the C-64 at \$99.95 from UHL Research Associates, Inc., 7926 Berner St., Long Beach, CA 90808.

Check Reader Service number 416.

Hide 'N Sequence

In Hide 'N Sequence, a new educational package for the C-64 from Sunburst Communications (39 Washington Ave., Pleasantville, NY 10570), students choose from a series of literary passages whose sentences have been scrambled. The goal is to reassemble the passage until their versions match the original.

The writings are divided into four styles of discourse: narration, exposition, description and persuasion. Students use what they've learned about organization and sequence in different kinds of writings when creating their own stories on the program's built-in editor.

Hide 'N Sequence is available on disk in three separate packages: elementary, junior high and senior high. Each package retails for \$69.

Check Reader Service number 418.

Fly the Unfriendly Skies

In Falcon Patrol II, a new game from Artworx (150 North Main St., Fairport, NY 14450), you control a Falcon Fighter equipped with the latest air-to-ground and air-to-surface missiles to combat the enemy's helicopter-attack squadrons.

The game features 3-D graphics and sound effects and has 16 levels of difficulty. Available on disk for the C-64 for \$19.95.

Check Reader Service number 411.

The Keeper

The Keeper, from Marvco Electronics (15702 S. Neibur Road, Oregon City, OR 97045), is an 8K RAM cartridge with battery backup for the C-64. The Keeper's memory works like the internal RAM of the computer, except that its data is retained after power-down. It also contains software that allows you to create auto-starting programs more easily than with a PROM programmer. The cartridge is available for \$49.95.

Check Reader Service number 419.

Where's Santa Claus?

BitCards (30 W. Service Road, Champlain, NY 12919) has released an enhanced version of A Christmas Adventure, a Christmas game for the C-64.

Santa has mysteriously disappeared in his ice castle at the North Pole and, with Christmas only hours away, his annual gift-delivery run is in jeopardy. Your mission is to explore the many rooms of the castle and its outbuildings, unravel the mystery of Santa's disappearance, and find and free him. Available on disk for \$24.95.

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Church Service

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How to Type in C-64 Listings from RUN

Type in 64 Perfect Typist (see Listing 1) and save it to either tape or disk before running it. If you make a mistake entering the Data statements, a message will be printed on your screen. Correct any errors and save the new version.

When you want to type in a C-64 program from RUN, first load and run 64 Perfect Typist. Two SYS numbers will be displayed on your screen. Jot these down and keep them handy. They are the SYS numbers for deactivating the checksum and reactivating it.

You might want to deactivate the checksum in the middle of your program entry for some reason. The only way to accomplish this, besides turning off the power, is to type SYS 40794 and press the return key.

After 64 Perfect Typist has been loaded and run, start typing in your program lines just as you normally do. The only difference is that after you have pressed the return key to log in your line, a one-, two- or three-digit number will appear below the line on the left-hand margin. This number, the checksum, will be from 0 to 255.

If the number matches the checksum value given in the program listing, the line is correct, and you can type the next line right over the previous line's checksum value. If the checksum values are different, look through the line for typing or spelling errors. Make any needed changes and hit the return key again. Continue until the program is finished.

When you have entered your program, disable 64 Perfect Typist (by typing the SYS disable number that is shown on the start-up screen), and then save the program as usual. If you run the program and get an Out-of-Memory error, turn the computer off and back on. This will clear 64 Perfect Typist out of memory.

You may save part of a program at any time and continue later. If you've already turned your computer off, you'll have to reload and rerun 64 Perfect Typist, then reload the program you were working on, list it and continue where you left off.

Listing 1. 64 Perfect Typist program.

```
1 REM 64 PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17013
7 REM
10 POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
20 PG=PEEK(56):ML=PG*256+60
30 FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
  XT
40 IFT<>16251 THEN PRINT"ERROR IN DATA...":
  END
60 POKEML+4,PG:POKE ML+10,PG:POKE ML+16,PG
70 POKE ML+20,PG:POKE ML+32,PG:POKE ML+38,PG
  G
80 POKE ML+141,PG
89 PRINT"{SHIFT CLR}{CRSR RT}*****
  *****"
90 SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
  IST IS NOW ACTIVE(2 SPACES)**"
100 PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACES}
  SYS"ML+30"=OFF **"
101 PRINT"{CRSR RT}*****
  *****":NEW
110 DATA 173,005,003,201,003,208,001,096
120 DATA 141,105,003,173,004,003,141,104
130 DATA 003,162,103,160,003,142,004,003
140 DATA 140,005,003,096,234,234,173,104
150 DATA 003,141,004,003,173,105,003,141
160 DATA 005,003,096,032,124,165,132,011
170 DATA 162,000,142,240,003,142,241,003
180 DATA 189,000,002,240,051,201,032,208
190 DATA 004,164,212,240,040,201,034,208
200 DATA 008,072,165,212,073,001,133,212
210 DATA 104,072,238,241,003,173,241,003
220 DATA 041,007,168,104,024,072,024,104
230 DATA 016,001,056,042,136,016,246,109
240 DATA 240,003,141,240,003,232,208,200
250 DATA 173,240,003,024,101,020,024,101
260 DATA 021,141,240,003,169,042,032,210
270 DATA 255,169,000,174,240,003,032,205
280 DATA 189,162,003,189,211,003,032,210
290 DATA 255,202,016,247,164,011,096,145
300 DATA 013,032,032
```

How to Type non-C-64 Listings from RUN

For listings other than C-64, we have translated everything we thought might be confusing in any program. When you see something between the curly brackets, all you have to do is press the keys indicated. For example:

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

In some instances, when numerous characters or spaces are repeated, we will represent them this way: {22 spaces} or {17 CRSR LFs}.

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RUN AMOK

Item: An editorial error crept into Table 1 of High-Spirited Sprites in the October 1985 issue (p. 36). Lines 5-8 of the table should read:

- f5: Animates sprites #0 and #1
- f6: Animates sprites #0, #1 and #2
- f7: Translates grid into sprite #0
- f8: Translates sprite #0 into grid

Item: Listings 2 and 3 of Sensational Screen Trilogy (October 1985, p. 90) were inadvertently pasted under the wrong captions. The captions are correct with respect to references in the article, and the REMs in the program identify them correctly; the listings were simply mispositioned.

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January

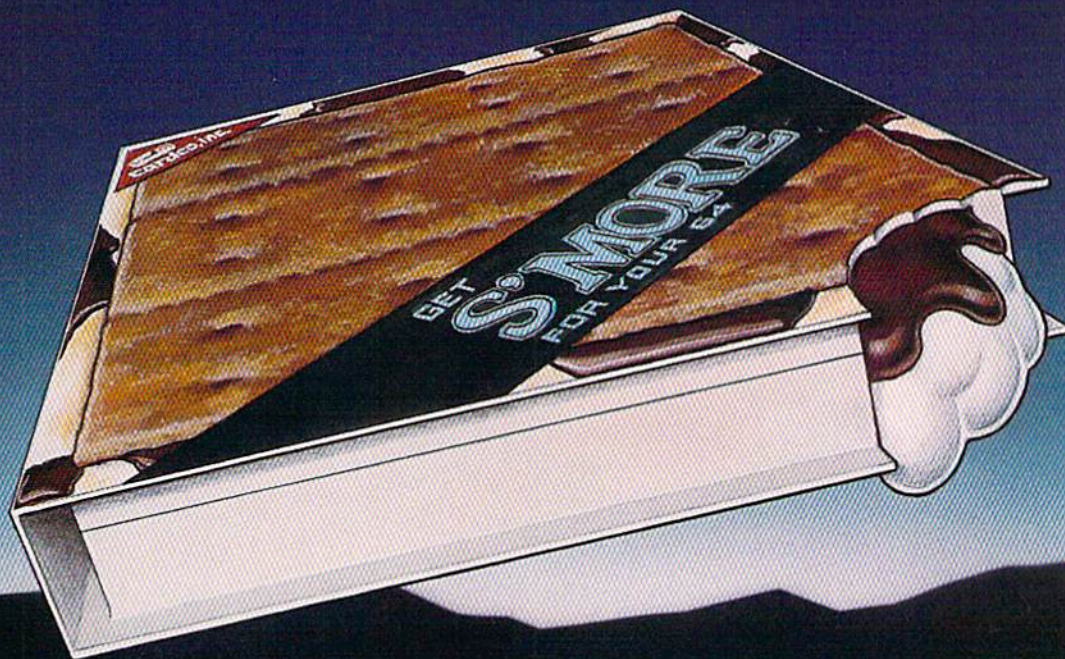
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