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June 1985 A CWC/I Publication

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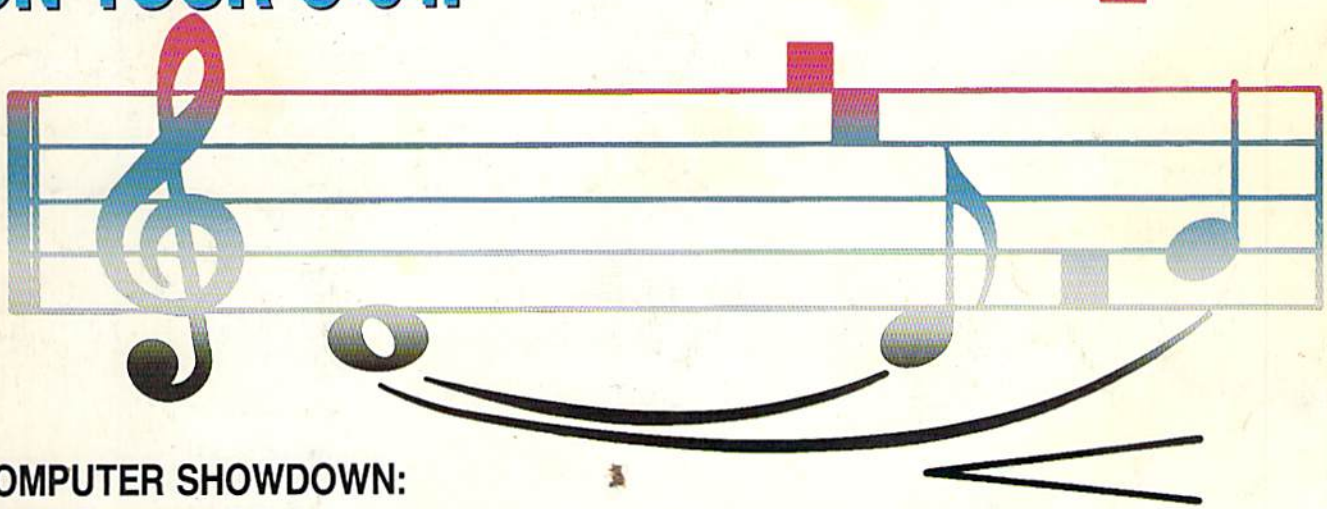

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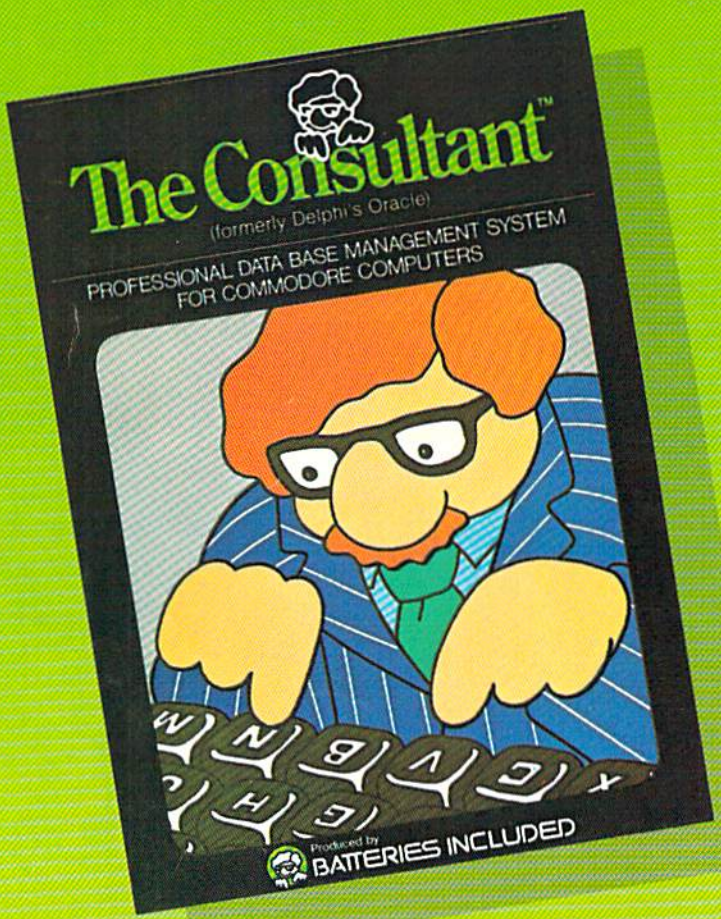

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NOW! FULL SIZE, FULL FEATURE, LETTER QUALITY AT ONLY $353

If you have been searching for a letter quality printer you have probably found the flood of claims and counterclaims to be a real roadblock in your search. Not long ago we were in the same position. We tried to determine which daisy wheel printer had all the features our customers wanted, yet would not set them back a month's salary. Recently several manufacturers have introduced machines that had features we were seaching for. After a thorough assessment, we eliminated one model after the other for lack of one feature or another until we only had one left.

THE RESULTS ARE IN

We found the printer which has all the features anyone could want. The winner is the Aprotek Daisy 1120, a real heavy-duty workhorse printing at 20 characters per second. The manufacturer is Olympic Co. Ltd., a highly respected Japanese firm.

FEATURES GALORE

This printer has it all. To start with, it has a front panel Pitch Selector button with indicators which allows 10, 12, 15 characters per inch (CPI) or Proportional Spacing. There is a Select (Online) button (with indicator) and a Line Feed button. You can also set Top-of-Form or Form Feed with the touch of the TOF button. Other front panel indicators include Power and Alarm.

To load a sheet of paper, simply place it in the feed slot and pull the paper bail lever. PRESTO! The paper feeds automatically to a 1 inch top margin and the carriage aligns to the selected left margin. In this manner, each page can have identical margins automatically. You can continue to compute while the Daisy 1120 is printing. The built in 2K buffer frees up your computer while printing a page or two allowing you to go to your next job.

To really put your printer to work, the Cut Sheet Feeder option is great for automatic printing of those long jobs. Also available is the adjustable Tractor Feed option. Compare our option prices! Best of all the Daisy 1120 is quiet: only 57 dB-A (compare with an average of 62-65 dB-A for others).

COMPLETE COMPATIBILITY

The Daisy 1120 uses industry standard Diablo® compatible printwheels. Scores of typeface styles are available at most computer or stationary stores. You can pop in a 10, 12, 15 pitch or proportional printwheel and use paper as wide as 14". At 15 CPI you can print 165 columns—great for spreadsheets.

The Daisy 1120 uses the Diablo Hytype II® standard ribbon cartridges. Again universally available.

Not only is the hardware completely compatible, the control codes recognized by the Daisy 1120 are Diablo 630® compatible (industry standard). You can take advantage of all the great features of word processing packages like Wordstar®, pfs: Write®, Microsoft Word® and most others which allow you to automatically use superscripts, subscripts, automatic underlining, boldface (shadow printing) and doublestrike.

The printer has a set of rear switches which allow the use of standard ASCII as well as foreign character printwheels. Page length can be set to 8, 11, 12, or 15". The Daisy 1120 can also be switched to add automatic line feed if required.

THE BEST PART

When shopping for a daisy wheel printer with all these features (if you could find one), you could expect to pay $600 or $700 dollars. The options would add much more. *Not now!* We have done our homework. We can now offer this printer for only $353. Order yours today!

NO RISK OFFER

Try the Daisy 1120 for 2 weeks. If you are not satisfied for ANY reason we will refund the full price—promptly. A full 1-year parts and labor warranty is included.

THE BOTTOM LINE

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June 1985 RUN Vol. 2, No. 6

FEATURES

24 MAKING MUSIC ON THE C-64
Reviews of music programs and products for the C-64 and C-128 (in C-64 mode).
By Tom Benford

36 C-64 BIG LETTERS
Now you can type onto your screen 48 colorful letters, numbers and other symbols, four times their normal size.
By Jimmie W. Bernard

46 THE C-128: HOW DOES IT STACK UP?
A close look at the C-128 in relation to its two main competitors—the Apple IIc and IBM PCjr.
By Margaret Morabito

50 CALL THE DOCTOR
A remedy for just about all your disk problems and a valuable tool for regular disk checkups.
By John Tanzini

66 BAD BLOCKS?
Find out what's preventing your programs from loading and what to do about it.
By Joseph J. Shaughnessy

74 C-64 SHUFFLE
Careful planning and shooting are the keys to winning this game.
By Buck Childress

80 TELECOMMUNICATIONS... ON-LINE WITH DOW JONES
This month features the Dow Jones News/Retrieval service—the best for financial and investment news.
By Margaret Morabito

94 A DOZEN WILL DO IT
A little creative programming turns your C-64's eight function keys into 12.
By Ronald Greenberg

102 DOUBLE YOUR BASIC!
This extended Basic lets you add to your C-64 not only all the PET's Basic 4.0 commands, but also new commands for sprite graphics, music and disk.
By Robert Rockefeller

Page 46

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DEPARTMENTS

6 RUNNING RUMINATIONS
An optimistic forecast for Commodore

8 MAGIC
Hints and tips that will let you perform computing wizardry.

12 SOFTWARE GALLERY
Fleet System 2
1541 Physical Exam
F-15 Strike Eagle
Fast Load
Vizastar 64
HomePak
Print Shop
Sky Travel

76 MAIL RUN

78 RUN'S GREAT GIVEAWAY
Over $30,000 in prizes—the biggest Commodore giveaway ever! Find out how you can be a winner in the Great RUNaway.

114 HARDWARE GALLERY
SG-15 printer
Cardkey-1
Okimate 10

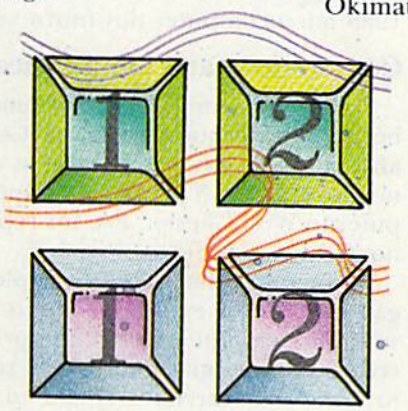
118 COMMODORE CLINIC
A questions-and-answers column to help your ailing computer.

124 NEW PRODUCTS RUNDOWN

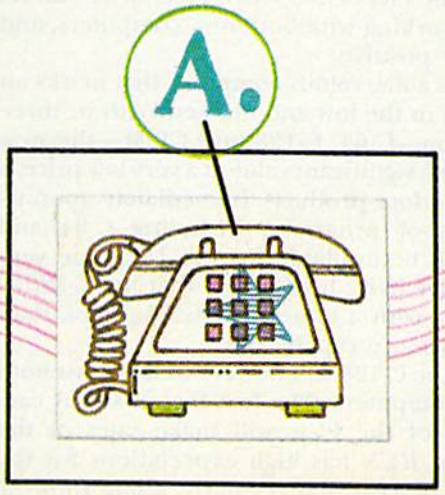
125 HOW TO TYPE IN LISTINGS

125 RUN AMOK

128 COMING ATTRACTIONS



Page 94



Page 50

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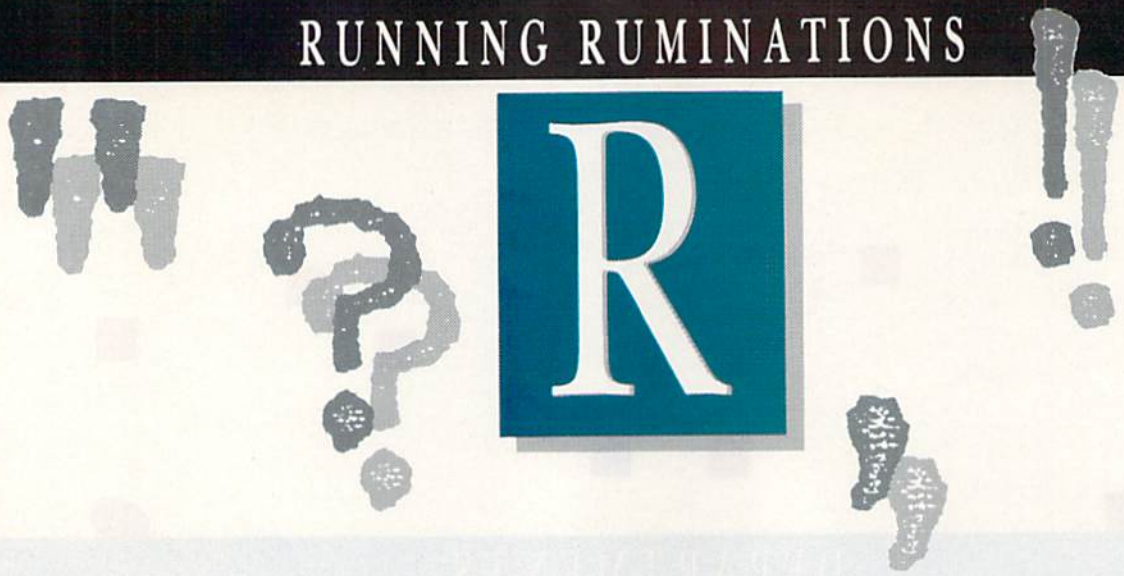

Wall Street's Commodore Syndrome

Recently, articles about Commodore appeared in two prestigious publications. In its "Inside Wall Street" column, *Business Week* ran an article titled "People Problems Have Commodore Against the Wall." *The Wall Street Journal* quickly picked up the theme and carried a negative story during the week of March 19 on Commodore's financial condition.

These stories center on the fact that Commodore sales and earnings were very low during the latest quarter and that the next 18 months would be financially difficult for Commodore. Meanwhile, at Commodore Amiga in California, there are reports of trouble, which is being stirred by the current low price of Commodore stock. It's important to take a look at what these articles *didn't* say.

The Commodore 128 and Amiga

Commodore's annual report and history show that the company has experienced four straight years of growth in sales, income and earnings per share since 1980. In its rise to the top of the low-end computer market, Commodore has maintained an effective advantage over all other entrants. No company can be expected to continue this stunning performance without a few periods of difficulty, which usually occur during a transitional phase when the company is retooling to introduce a new machine. Such is the case now with Commodore.

Both of the above articles mentioned Commodore's new products, but they failed to describe the new computers correctly. The fact is that *RUN*'s technical editors have spent hours working with both new computers, and their report is very positive.

The new C-128 is a marvelous computer that marks an important advance in the low-end market. With its three modes of operation—C-64, C-128 and CP/M—the new C-128 will give users a significant value at a very low price, a hallmark of Commodore products. Immediately upon its release, thousands of programs, including C-64 and CP/M software, will be available for the 128. One very important difference here, however, is that the C-128 is a serious computer with a more professional look than the C-64 and many more capabilities.

In our opinion, the C-128 will do very well against both Apple and Atari computers. The fact that IBM has cancelled production of the PCjr will make sales of the C-128 even greater. *RUN* has high expectations for the C-128, which we'll be covering regularly, along with the C-64, Plus/4 and C-16. So it should be an exciting time.

The new Amiga microcomputer will bring a number of advanced, heretofore unavailable technologies to the upscale consumer and business markets at a very affordable price. Its graphics, sound capabilities and speed are just a few of the superior computing powers the new Amiga will bring to users. In addition, at the time of this writing, the major software developers are busy churning out programs for the Amiga. *RUN* believes the new Amiga will pose a serious challenge to both Apple and IBM and will sell very well over the next few years.

And the Winner Is. . . Commodore!

Commodore will win a very strong following with new users and its current loyal customers. Commodore will also impress the investment community and business press with its new products and marketing position. The current downslide will appear as a quirk in Commodore's financial performance from 1980–1990 and, in retrospect, the company will be seen as having weathered the 1984–1985 microcomputer downturn very well. **ST**

Commodore at Your Service

"Where's Commodore's customer service?" has always been a nagging question among Commodore owners. The answer could now be as close as down the street or the next town over. The days of shipping your broken computer to West Chester, PA, for repair or replacement are now history.

Commodore has recently implemented a major reorganization and expansion of its customer service and support capability. Under the program, Commodore is creating a national network of regional service centers to make local service available to all its customers.

To find out which dealer and service location is closest to you, call Commodore's new toll-free customer support hot line (800-247-9000) between 9 AM and midnight, Monday through Friday.

For the next couple of months, *RUN* will be compiling and publishing a complete geographical listing of Commodore service centers for your convenience.

Jump on Our *RUN*ning Board

RUN invites you to contact its bulletin board (*RUN*ning Board), which provides up-to-date information about *RUN* and the Commodore industry, as well as useful computing hints and tips. You can get on-line any time, 24 hours a day, seven days a week, by dialing 603-924-7632.

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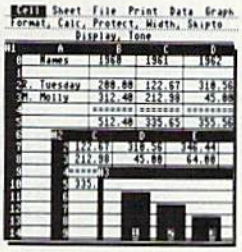
BELIEVE IT OR NOT!

- A neutrino has neither mass nor a charge, but travels at the speed of light!
- A 1950 study predicted all computing in the U.S. through 1999 could be done by 5000 computers!
- An integrated program with the power of Lotus 1-2-3 is available on the C64!

Until now, while useful programs existed for the C64, you had to use different commands for each. Even worse, they couldn't share data. Now there *is* one integrated program with the power of Lotus 1-2-3: **VIZASTAR.** It has a spreadsheet, a database and graphics. It took Kelvin Lacy, who wrote the acclaimed "Omniwriter" for Hesware, 15 months to develop Vizastar. It is totally menu-driven and written 100% in 6502 machine code. You can go instantly from spreadsheet to database or graphics and data is shared by all. It is compatible with virtually all word processors and printers. All Vizastar commands can be automated, so you can create your own applications and run them with one keystroke. Bet you think, with integration must come compromises. Nope. Read on and decide for yourself.



Actual Screen Dump Printed by VIZASTAR

The VIZASTAR Spreadsheet

It is a full-featured spreadsheet, as powerful as Multiplan. But much faster — faster than many on the IBM-PC! Remarkably, 10K of memory is available for spreadsheet use. Below VIZASTAR is compared against the other leading spreadsheets.

	CALC RESULT	MULTI-PLAN	VIZA STAR
No. of Rows	254	255	1000
No. of Columns	63	63	64
Vary Indiv. Columns	NO	YES	YES
Date Calculations	NO	NO	YES
No. of Windows	2	8	9
Built-in Functions	21	39	33
Link Spreadsheets	NO	YES	NO
Sort	NO	YES	YES
Program Mode	NO	NO	YES
Money-back Guarantee	NO	NO	YES
Retail Price	99.95	99.95	119.97

The VIZASTAR Database

It is a fast, random-access database, with file size limited only by available disk space. Create file layouts by simply painting a picture of the layout on up to 9 screens, showing where each field starts and ends. Vizastar does the rest. You can modify the layout at any time. To process the data, you use the familiar environment of the spreadsheet.

The VIZASTAR Graphics

Open a window anywhere and display a high-resolution bar or line graph of spreadsheet or database data. Or display the data as a pie chart or spectacular, 3-D multibar graph.

"I have been using Vizastar daily. I find it is the most powerful spreadsheet on the market for the C64 and the only spreadsheet that I will personally recommend for serious use."

Richard Tsukiji, President,
U.S. Commodore Users Group

"The power and design of Vizastar is spectacular. One of the "Best 5" software for the C64 of the 1000s I've seen."

Mike Hayes, Commodore Dealer

[Vizastar is] a phenomenal piece of programming which could turn the home computer market on its head."

California Magazine 2/85

RISK-FREE OFFER

VIZASTAR comes with a cartridge, a 1541 diskette with a backup, reference and tutorial manuals. The 50 page tutorial manual is full of examples and pictures, to guide you step-by-step. Vizastar is priced at *ONLY* $119.97. The power of Vizastar may be hard to believe, but its value is hard to beat. We are so positive you will be delighted with it that we offer a hard-to-believe 15 day Money-Back Guarantee. Try it Risk-Free. Call us today or send a check or Money Order. VISA/MC accepted.

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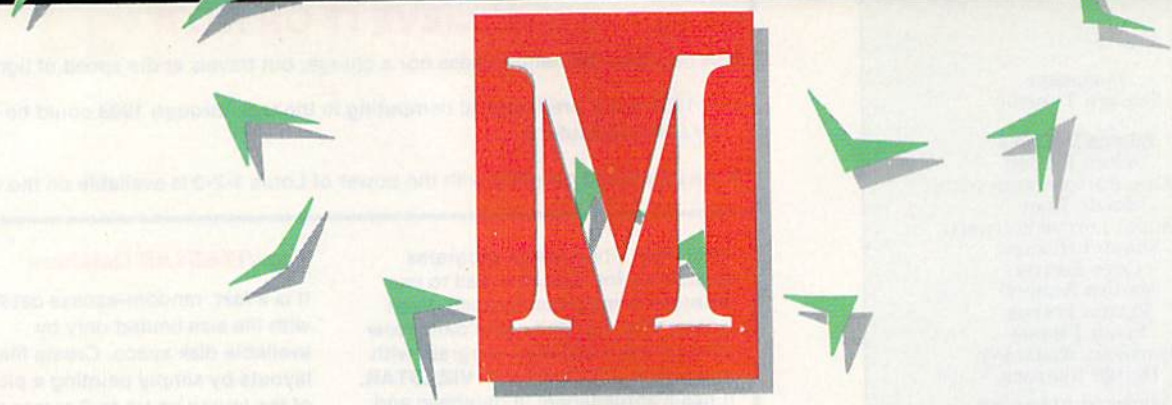

Compiled by LOUIS F. SANDER

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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). We typically pay $10 for each trick accepted. Really super ones get $20–$50. Send your tricks to:

MAGIC
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PO Box 101011
Pittsburgh, PA 15237

If you enclose a self-addressed stamped envelope, we'll send you a Trick Writer's Guide. International readers may omit the stamp.

What is so rare as a day in June? A short and powerful utility program, that's what! Well, here are half a dozen, created just for you. (And, of course, another amazing amalgam of astounding alchemical arcana.)

$1FA Automatic UNNEW—After a Basic program has been killed by a New or a Reset, you can use a machine language Unnew program to resurrect it. The Basic program below creates a most unusual Unnew—one that does its magic without being run. If you have a C-64 or VIC-20, plus a Commodore disk drive, you can use it to put the Unnew program on any disk you choose.

The first time you run the printed program, verify that CS = 8620; if it doesn't, you've made a mistake. Once CS = 8620, delete lines 1 and 2, then save the result, using some appropriate name. When you run it again, it will put an Unnew program onto your disk. Once you have it there, you can resurrect any program that you have erased with the New command by entering:

```
LOAD"UNNEW.AUTO",8,1
```

As soon as the load is finished, your lost program will reappear, intact; there's no need to type RUN or SYS.

```
1 FORJ=1TO68:READX:CS=CS+X:NEXT
2 PRINT"CS="CS"(SHOULD BE 862Ø)":STOP
1Ø REM AUTOMATIC UNNEW - ERIC HAVER
2Ø OPEN2,8,2,"UNNEW.AUTO,P,W"
3Ø PRINT#2,CHR$(128);CHR$(1);
4Ø READA
5Ø IFA<>234THEN PRINT#2,CHR$(A);:GOTO4Ø
6Ø FOR J=1 TO 7Ø:PRINT#2,CHR$(2);:NEXT
7Ø PRINT#2,CHR$(A);:READ A:IFA>ØTHEN 7Ø
8Ø CLOSE 2
91 DATA 16Ø,ØØ3,2ØØ,177,Ø43,2Ø8,251,2ØØ
92 DATA 2ØØ,152,16Ø,ØØØ,145,Ø43,165,Ø44
93 DATA 2ØØ,145,Ø43,133,Ø6Ø,16Ø,ØØØ,132
94 DATA Ø59,162,ØØØ,2ØØ,2Ø8,ØØ2,23Ø,Ø6Ø
95 DATA 177,Ø59,2Ø8,245,232,224,ØØ3,2Ø8
96 DATA 242,2ØØ,2Ø8,ØØ2,23Ø,Ø6Ø,132,Ø45
97 DATA 164,Ø6Ø,132,Ø46,Ø32,Ø89,166,Ø32
98 DATA Ø51,165,Ø76,116,164,234,234,234
99 DATA Ø76,128,ØØ1,ØØØ
```

Eric Haver
Pittsburgh, PA

$1FB Basic UNNEW for the C-64—This program creates a single Basic line with an Unnew program embedded in a REM statement. Add the line to any other program, and you can resurrect a mistakenly erased program by entering SYS 2065.

Line 0 must be a REM, one quote, exactly 66 characters of any sort, then a closing quote. It cannot contain extra spaces. If you get an error when running the program, something is wrong with your Data statements. If all is well, the program will list a transfigured line 0, plus the numbers 11–23, with the cursor on the 11. Pressing the return key 13 times will delete all lines but 0.

Save line 0 for future use; you can add it to any program by listing it, loading the other program, putting your cursor on the listed line 0, then pressing the return key. This line can be renumbered, but it must always be the first line in your program.

```
1 REM"66 CHARACTERS - SEE TEXT"
1Ø FORJ=1TO66:READK:L=L+K:NEXT:RESTORE
11 IFL<>8939THENPRINT"DATA ERROR":STOP
12 FORJ=1TO66:READK:POKE2Ø54+J,K:NEXT
```


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```
13 PRINT"{SHFT CLR}{4 CRSR DNs}":FORJ=1ØTO2
   3:PRINTJ:NEXT
14 PRINT"{HOME}";:LIST-1
15 DATA Ø85,Ø78,Ø78,Ø69,Ø87,Ø5Ø,Ø48,Ø54
16 DATA Ø53,Ø58,16Ø,ØØ3,2ØØ,177,Ø43,2Ø8
17 DATA 251,2ØØ,2ØØ,152,172,187,255,145
18 DATA Ø43,165,Ø44,2ØØ,145,Ø43,133,Ø6Ø
19 DATA 172,187,255,132,Ø59,174,187,255
2Ø DATA 2ØØ,2Ø8,ØØ2,23Ø,Ø6Ø,177,Ø59,2Ø8
21 DATA 244,232,224,ØØ3,2Ø8,242,2ØØ,2Ø8
22 DATA ØØ2,23Ø,Ø6Ø,132,Ø45,164,Ø6Ø,132
23 DATA Ø46,Ø96
```

Louis F. Sander
Pittsburgh, PA

$1FC Emergency UNNEW—Under most conditions, the following C-64 Direct mode line will recover a Basic program so it can be listed on the screen or printer. This will, I hope, give you enough information to enter it again.

```
POKE 2050,1 : SYS 42291
```

Do not try to edit a program thus resurrected; doing so can result in an unrecoverable crash. You must use the New command with the resurrected program, then reenter it from scratch. If the program is short enough to list on a single screen, you can list it, use New again, then use your cursor and return keys to reenter each line.

Mike Oehrtman
Stillwater, OK

$1FD ROMwriter—It's often useful to write the C-64's ROM programs into the underlying RAM, usually by entering something like:

```
10 FOR J = 40960 TO 49151 : POKE J,PEEK(J) : NEXT
```

This takes over 30 seconds to accomplish, but there's a way to do it in less than a second, using Basic's own mass-move routine, located at 41919. Here's how:

```
10 POKE 95,0 : POKE 96,160
20 POKE 90,0 : POKE 91,192
30 POKE 88,0 : POKE 89,192
40 SYS 41919
```

Line 10 points to the start of the code to be moved, and line 20 points to the byte one location higher than its end. Line 30 points to the byte one location higher than the end of its new position. (In this case, these are 40960, 41952 and 41952, respectively.) The SYS initiates the movement.

The same routine, with different pointers, of course, can be used to move other areas of memory. Because of the techniques used, moves in a downward direction will succeed only if the source and destination areas do not overlap.

James Pellechi
Middle Island, NY

$1FE C-64 List freezer—The following lines will Poke a machine language routine into empty memory locations at 679–688, then set the vector IQPLOP at 774–775 to point to the start of the routine. Once that has been done, you can temporarily halt a program listing by pressing the CTRL, Commodore, shift or shift-lock keys. The feature will stay active until you reset your computer.

```
10 FOR J = 679 TO 688 : READ K : POKE J,K : NEXT
20 POKE 774,167 : POKE 775,2 : NEW
30 DATA 072,173,141,002,208,251,104,076,026,167
```

If you wish, you can add these lines to the Basic part of the C-64 wedge program. That way, this useful feature will be enabled along with the wedge.

John P. Valengavich
New Britain, CT

$1FF Compatible color RAM—Different versions of the C-64 behave differently when you Poke characters to the screen, and often you must Poke the color as well as the character. Below is a Basic loader for a machine language subroutine. It clears the screen and instantly fills color RAM with the cursor color. It eliminates all those extra Pokes and makes your program usable on all versions of the C-64.

As an added bonus, it can be used to change the color of all characters without clearing the screen. You can make it a part of your main program or run it separately, then have the main program use it. The loader lines will put the machine language into memory, ready to use until the computer is turned off.

After running the loader lines, SYS 828 will clear the screen and set your color memory to the current cursor color. To change the colors of all characters on the screen without clearing the screen, use SYS 828 + 5. The commands work either in Direct mode or in a program.

The machine language can be relocated to any place you have 28 bytes of free memory. You need only change the value of AB in line 10 and replace the 828s, mentioned above, with the new value of AB.

```
10 AB = 828 : FOR J = AB TO AB + 27 : READ K : POKE J,K : NEXT
20 DATA 169,147,032,210,255,173,134,002,041,015,162,000,157,000
30 DATA 216,157,000,217,157,000,218,157,000,219,232,208,241,096
```

C.J. Mohler
Walnut Creek, CA

$200 Machine language in tape buffer—On the C-64, it's easy to keep any machine language routine in the cassette buffer, even while loading or saving; just type POKE 179,4 before your tape activity. The computer will then use screen memory for its tape activities, leaving your machine language intact in 828–1019. If you don't like the resulting screen disruption, choose another location and Poke it into 178 and 179.

Michael L. Smith
Pacific, MO

$201 Tricky screen formatting—If you use horizontal lines to divide your screen, this routine will let you print them in most unusual ways. Use GOSUB 1210 to print a line that starts in the center and moves simultaneously toward both ends. Use GOSUB 1220 to

Continued on p. 111.

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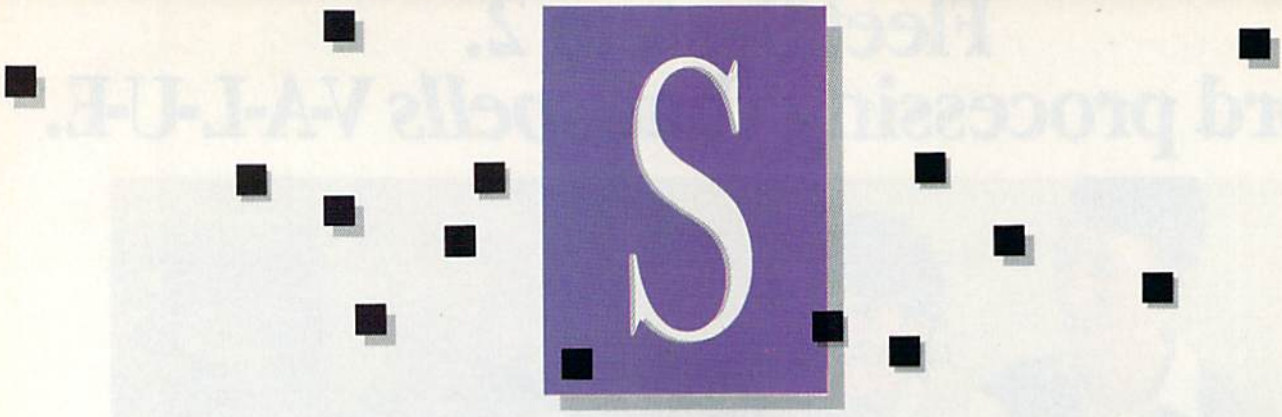

Compiled by SUSAN TANONA

Fleet System 2

A

A Professional-Quality Word Processor for Serious Applications

Fleet System 2 is an excellent package that combines a professional word processor with a very fast spelling checker. It is an especially ideal tool for college students and for business applications.

The package offers all the standard features of a word processor, including right, left and center justification, underlining, automatic pagination, block manipulation and print preview.

You can work with a 40-, 80- or 120-column screen (the latter two are achieved by horizontal scrolling across the screen). The program displays a status line at the top of the screen that tells you where the cursor is located and which of the five modes you're using (Insert, Shift, Numeric, Extra Text or Function).

This program will store between eight and nine pages of text, and allows you to link files to create documents of unlimited length. While this is fairly standard, the program also offers extra options, such as global search and replace, which allows you to use a single command to revise a document that is made up of several files.

Fleet System 2 has an extensive repertoire of disk commands. Text can be stored several different ways, depending on your own individual needs. It can be stored in screen-code files, ASCII files or printer files. The printer file is especially intriguing, as the text can be sent over a modem to another Commodore computer and be printed out.

The spelling checker is the one standard feature of the Fleet System 2 package that separates it from many other word processors. Located on the back side of the disk, it can proofread a four-page document in just over one minute. This spelling checker contains over 70,000 words and can store 15,000 additional, user-defined words.

Using the spelling checker, I've been able to increase my typing speed, as I don't have to worry about typing errors; I know misspelled words will be caught. However, the obvious limitation is that it can only spot spelling errors, not grammatical errors. (For example, a spelling checker does not know the difference between their and there.)

The documentation for Fleet System 2 consists of one guide for the word processor and another for the spelling checker. A reference chart with the most frequently-used commands is included. The guides are written in a tutorial format—you learn the functions as you use them. The instructions are very clear, but the friendly style and the effort to avoid computer terms make some sections a bit wordy.

Because of the multitude of format, output and manipulative commands utilized by the Fleet System 2 package, non-typists and home users might be better off using one of the simpler word processors available on the market. There is a lot to become familiar with, and unless you type frequently, you'll probably have to spend considerable time reviewing the commands.

A few features about this program might cause more experienced users some confusion, as certain standard terms have been renamed. For example, you don't move a block of text; you transfer a range. Also, when manipulating blocks of text, you can only move entire lines. Portions of lines cannot be moved unless you push all the text to the next line.

This is very likely one of the best word processors on the market, and with the added feature of the handy spelling checker, it's also quite a bargain. This package will greatly simplify those heavy-duty typing tasks. It's an exceptional value at a reason-

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!

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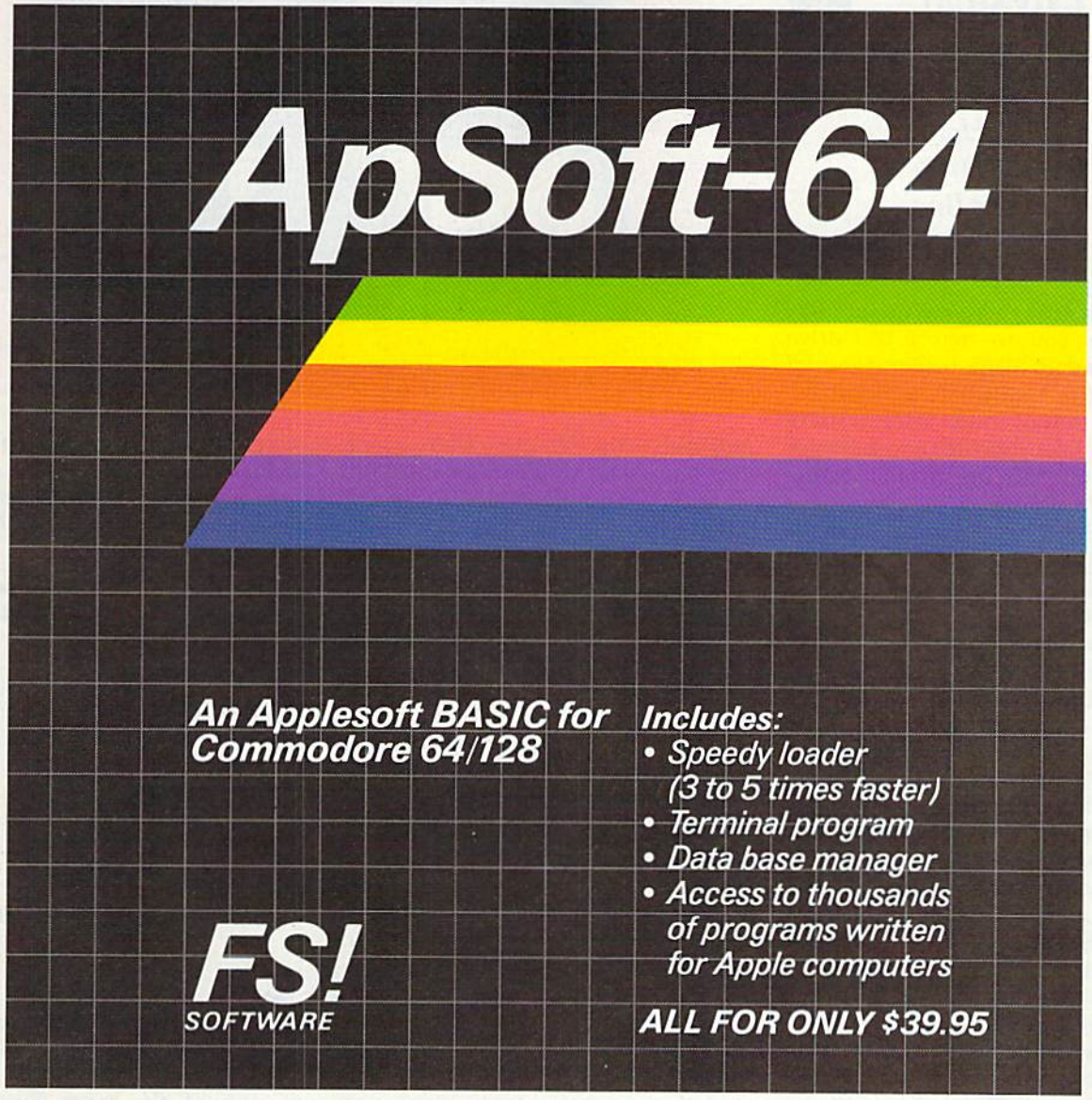

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able price. *(Professional Software, Inc., 51 Fremont St., Needham, MA 02194. C-64/$79.95 disk.)*

David Sachs
Brookline, MA

1541 Physical Exam

B

A Program to Help You Nip Disk Drive Troubles in the Bud

Until now, there was no sure way for you to detect disk-drive misalignment in its early stages, let alone correct it when it occurred. You had to wait for disaster to strike and then take your drive to a service center that had the proper equipment. Now, however, you can make use of the 1541 Physical Exam, a package that is made up of a program on disk and some specially written test tracks.

Disk-head misalignment occurs when the radial position of the read/write mechanism, relative to each disk track, is incorrect. On the 1541 Physical Exam disk, the sectors on tracks 1, 16 and 35 have been written with a special high-precision disk drive. They begin in the correct radial position and move off in both directions, a fraction of an inch at a time.

A properly aligned disk drive should be able to read several of these sectors on either side of the nominal position. As you test your drive, the program displays a visual indicator of how it performs. If the resulting pattern is displaced, or substantially different for different tracks, you have a problem. This entire procedure can be completed in just a few minutes.

The 1541 Physical Exam also includes a test of the position of the mechanical stop that is at one end of the disk read/write device. On older 1541 drives, this stop is immovable. The process of formatting a new disk and the normal operation of some copy-protected programs involve banging the read/write mechanism into this stop. On the older drives, this abuse can result in a constantly changing and deteriorating head alignment.

As a cure for this source of misalignment, the 1541 Physical Exam includes two quiet-drive stops that have more give and, consequently, are less abusive to the head mechanism.

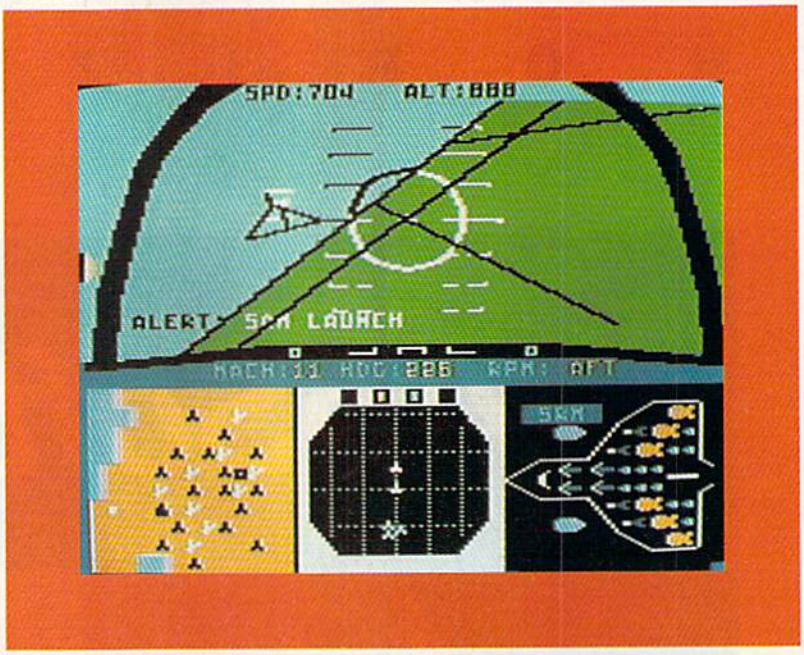
Also included with this package is a separate program that allows you to check the speed at which a disk is rotating. If your drive fails this test, it indicates that either there is some mechanical problem with the drive, or the disk itself is binding in its jacket.

The 1541 Physical Exam software only indicates the presence of an alignment problem in your hardware. To remedy the problem, you must remove the disk-drive mechanism from its case and make some adjustments. Directions are included to help you realign your drive, and if you're inclined toward this kind of tinkering, it's possible to do it by trial and error with simple hand tools.

Regular use of the 1541 Physical Exam gives you something valuable—a warning that your disk-drive alignment is deteriorating. This allows you to take corrective action before your disk files are corrupted.

This is an indispensable product for anyone who uses a 1541 disk drive. Cardinal Software saw a problem and developed a very good solution. I highly recommend the package. *(Cardinal Software, 13646 Jefferson Davis Highway, Woodbridge, VA 22191. C-64/$39.95.)*

David Brooks
Yorktown, VA



F-15 Strike Eagle

A

Take Command of This Sophisticated Combat Flight Simulator

Come fly the unfriendly skies of the volatile regions of the world. You are about to take control of one of the most sophisticated fighter planes ever to defend American interests. The F-15 Strike Eagle is not an arcade game, but, rather, one of the most realistic combat flight simulators I've ever seen for the C-64.

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Armaments include a rotary cannon that can fire 6000 rounds per minute. Your missile inventory is made up of four short-range sidewinders and four medium-range sparrow air-to-air missiles. Rounding out your weapon supply are six groups of general-purpose bombs.

Defensive capabilities consist of a supply of flares that enable you to deploy decoys when you are attacked by surface-to-air missiles (SAMs). The flares radiate heat when dispensed, causing the SAMs to attack the flares instead of your fighter.

The cockpit console displays 29 indicators to help you evade or attack your enemy. Several, such as airspeed, altitude and pitch lines, help you to guide your aircraft. Other indicators include a horizontal-situation display, a radar-electronic warfare display and a weapons-status display. These instruments indicate such things as your location, your targets, various coastlines and rivers (as reference points), airfields and your primary target.

F-15 Strike Eagle offers some incredibly realistic detail and really makes you feel as though you're piloting a powerful fighter plane. It will take some time for you to become familiar with all your instruments and indicators, but it's definitely worth it.

The program allows you to use two joysticks to control your aircraft. The first joystick is the control stick, and is used primarily to maneuver your aircraft and activate your weapons. A second joystick controls the throttle, afterburners, speedbrakes and weapons. The keyboard can be used in place of the second joystick.

You have a choice of three levels of difficulty and seven different types of combat missions, as well as seven regions in which to play the game.

The only drawback that I encountered with this combat simulator was the amount of time that was required to return to base once a mission was completed—up to fifteen minutes of flying time. The graphics and sound effects are exceptional.

The documentation for F-15 Strike Eagle is well-written, providing you with all the necessary information to use the program, as well as the basic principles of aerodynamics to help you keep your fighter in the air.

If you're looking for a chance to experience some high adventure and danger in a realistic and challenging format, F-15 Strike Eagle is for you. The game certainly lived up to my expectations, and I'm sure it's going to live up to yours. *(MicroProse Software, 10616 Beaver Dam Road, Hunt Valley, MD 21030. C-64/$34.95 tape, disk.)*

Peter Paplaskas
***HOT CoCo* magazine staff**

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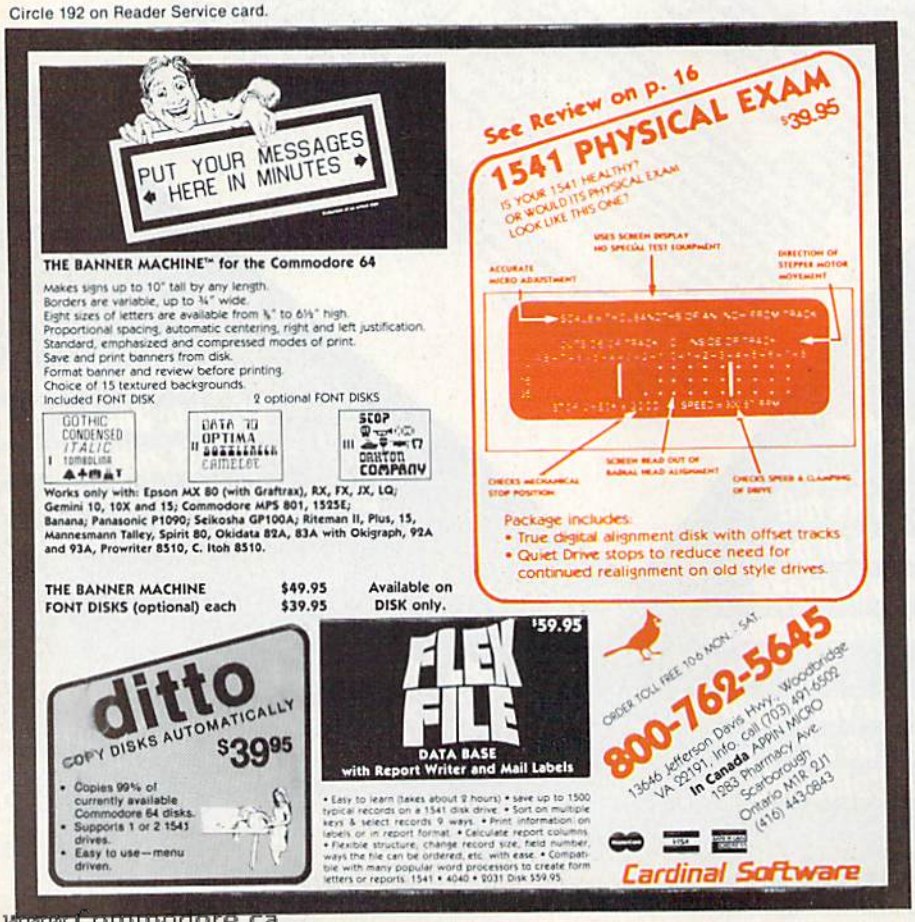

Fast Load

Here's a Utility To Speed Up Your Disk-Drive Operations

Fast Load is a cartridge-based disk utility that speeds up many disk-drive operations. Advertisements for the cartridge claim that it "can load, save and copy your disks five times faster than normal." While this statement isn't totally true, Fast Load will speed up many drive activities.

I found that the majority of commercial software falls into one of several categories when used in conjunction with Fast Load. Programs that use a conventional loading or saving procedure will operate at a faster rate of speed. A large number of these programs are games and educational software.

Some programs, however, will not load any faster with Fast Load, due to the structure of the software itself. These programs are not affected either positively or negatively by the presence of the cartridge.

Other pieces of software will not load at all with Fast Load in use. Many of these programs have exotic protection schemes and special loaders that Fast Load does not recognize. Should you encounter such a situation, you can easily turn off the cartridge and return to normal disk-drive operations.

A copy program is included that

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Commodore-64 Screen Picture

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allows you to copy your own programs at a faster rate of speed. As a bonus, a powerful monitor program on the cartridge can be used to debug assembly-language programs.

The Fast Load package is a wonderful collection of utilities offering many valuable features. I would estimate that the fast-load option of the package works effectively with 75–80% of C-64 software. I especially recommend it for use with games and education software.

One particularly useful feature of Fast Load is the option to turn off the cartridge without having to remove it from the computer's port. This saves a lot of wear and tear on the cartridge port.

Another plus is that the program is in the form of a cartridge, thus making Fast Load a durable and potentially long-lasting addition to your library.

Although it will not work with every program on the market, I feel that the Fast Load package is one of the best bargains available today. I recommend it to anyone who works extensively with the disk drive, because it will make life with your 1541 much easier. *(Epyx, Inc., 1043 Kiel Court, Sunnyvale, CA 94089. C-64/$39.95 cartridge.)*

John Jermaine
Taylorville, IL

Vizastar 64

A

Watch Out, Lotus 1-2-3. Here Comes Vizastar!

Vizastar 64 is an integrated software package that offers spreadsheet, database and graphics programs. You can transfer data automatically from the spreadsheet to the graphics routines, and it only requires a few keystrokes to move data between a database file and a spreadsheet.

Features of the package include the ability to merge or split files, both within the spreadsheet and database functions and between them. Visastar 64 also provides a function that allows you to segment a display screen into as many as nine different windows.

Inside the Vizastar 64 package, you'll find a ROM pack that plugs into the cartridge port. This provides extra memory and alleviates to a certain degree the problem of the C-64's limited memory capacity.

Vizastar's spreadsheet is the strongest feature of the package. It is easy to use and quite complete. There are 64,000 cells (64 columns × 1000 rows) available to you on the spreadsheet, but because of the C-64's memory restrictions, only about 10K bytes are free after the program is loaded. As a result, not all the cells can be used in any one spreadsheet.

The advantage to having more cells than you can use is that you can create spreadsheets that are very wide (few rows, but lots of columns), or very long (few columns, but lots of rows). This wouldn't be possible with a program that limited you to a spreadsheet of perhaps 500 cells.

In addition to entering text or data, you can also use the cells to enter equations, where a cell's value is calculated from the values of other cells in the spreadsheet. Printer-control commands are also utilized by entering them as data in cells.

Vizastar has available all of the usual cell data formats (text, integer, floating point, currency, date and scientific) and the standard functions for calculations. In addition, Vizastar offers some functions that are not found in many other spreadsheets: date calculations, trig functions, natural logs, an error function and a table look-up function.

The database included in the Vizastar package is a bare-bones program that allows you to set up datafiles that are similar to mailing-list programs. It does not allow you to search, calculate or sort. These functions, however, are included in the spreadsheet program. To sort a database file with Vizastar, you must go through the few extra steps necessary to transfer the data to a spreadsheet. The process is actually quite simple and is necessary to keep down the program's size and memory requirements.

Producing graphs with Vizastar is quite easy. With a spreadsheet active, you simply select the type of graph you need, the range of cells to graph, and a scale factor, and the graph will appear on the screen within a few seconds. Bar and line graphs are overlaid on the spreadsheet, and though this doesn't interfere, it does produce an unreadable jumble. You can avoid this by going to an unused portion of the spreadsheet.

Vizastar provides a high-quality and easy-to-use spreadsheet program with very solid database and graphics routines. I would recommend it for small-business use, as well as for anyone with a need for this kind of multifunctional program.

Vizastar is an exceptional package that rivals the features of programs such as Lotus 1-2-3, and offers C-64 owners the kind of integrated software previously only available for higher-priced systems. *(Solid State Software, 1125 E. Hillsdale Blvd., Suite 104, Foster City, CA 94404. C-64/$120.)*

James Steffen
Germantown, TN

HomePak

B

An Integrated Package Especially For the Home User

HomePak offers the Commodore 64 owner a package containing three impressive and powerful programs for one affordable price. HomeText is a very friendly word processor, HomeFind is a database that uses very simple language, and HomeTerm is a telecommunications program that offers you access to other computers via your telephone lines.

HomeText turns your C-64 and printer into a kind of smart typewriter. This program was designed to be both easy to learn and use. So that you don't constantly have to refer to the manual, the program provides friendly help-window prompts that aid you in using most of HomeText's features. You must simply familiarize yourself with a few special codes.

This is an ideal product for those who only need to use a word processor occasionally. After you've read

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the small manual once, you will most likely be able to work with HomeText using only the window prompts.

The second program in this package, HomeFind, is a very easy-to-use database. With it, you can easily store such information as telephone and mailing lists, friends' birthdays, receipts and credit-card information.

This is by far the least-complicated database I've ever worked with. The program provides friendly prompts similar to those used in HomeText.

One strong feature of this database is that it understands and accepts simple English commands. For example, you can type in questions such as, "Who's John?" or "When is John's birthday?" Most databases depend on a rigid framework of entry lines (called fields) that, once established, are difficult to change. HomeFind is much more friendly and forgiving. It was designed to be used and understood by people who are more interested in getting a job done than in learning to talk to their computer.

When using HomeTerm, the telecommunications program, you will have two screens to work with. The first is for the Interactive mode, which you use when you are actually conversing on-line. The other is the Functions menu, which displays the status of your system.

Function keys are implemented well in HomeTerm, making it simple and quick to move from Terminal mode to Function mode. You won't lose your on-line connection when you move between modes.

HomeTerm accommodates both 300- and 1200-baud modems. It supports manual as well as auto-dial (specifically, the 1600 VicModem, the 1650 AutoModem and the Hayes Smartmodem with an RS-232 interface).

The manual accompanying HomeTerm is quite thorough. You will find this helpful whether you are a novice or an expert. It includes a quick-reference guide, as well as an in-depth discussion about using CompuServe. And it gets right to the heart of telecommunicating for Commodore owners by giving detailed information about the Commodore Information Network.

For the occasional user, HomePak is a great buy. It is targeted for home use, but some small businesses might also find the programs helpful. I found the package easy to use, error-free and very affordable. *(Batteries Included, 30 Mural St., Richmond Hill, Ontario, Canada L4B 1B5. C-64/$49.95 disk.)*

Gary V. Fields
Asheville, NC

Print Shop

A

This Personalized Printing Press Offers Endless Possibilities

Print Shop promises to turn your personal computer into a personal print shop. And it does exactly that. This has to be the most impressive and easiest-to-use program that I've tried in several years!

The menu that accesses the features of Print Shop is so clear that within the first ten minutes of working with it, I succeeded in creating my first greeting card. After only two hours, I had created six personal greeting cards, ten different letterheads and an equal number of signs. *Then* I decided it was time to read the instructions.

Print Shop has four main printing options: Greeting Cards, Letterheads, Signs and Banners. However, with a little imagination, you can use one or more of these modes to create advertising flyers, note cards, report covers, bookplates, certificates and so on.

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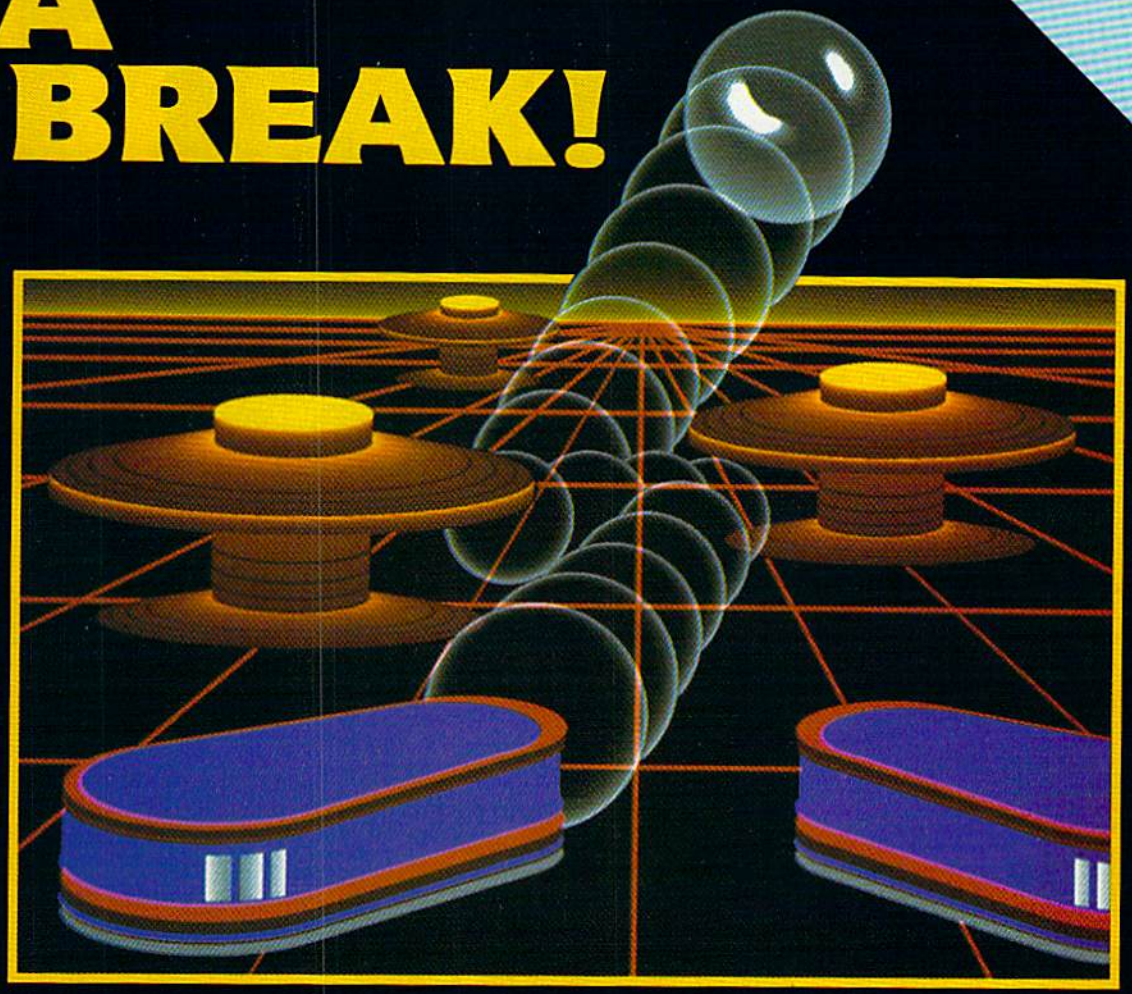
For Commodore 64



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Another mode allows you to create, edit and save graphics of your own design. This mode is compatible with the Koala-Pad, although you can also use a joystick. I found the pad much easier to work with.

If you are not artistically inclined, 60 graphics designs are provided with the program to help you along. When these are combined with eight type styles, nine borders and the option to print out the graphics in three different sizes, the possibilities become virtually endless.

Designs can be "tiled" for a pleasing background effect and lettering can be solid, in outline form or three-dimensional. There's even an option, called Screen Magic, that allows you to create and save one-of-a-kind geometric patterns for signs and posters.

The Print Shop program should quickly become the friend of any newsletter editor, boy-scout leader, businessperson or school-activity coordinator.

The manufacturer has made an effort to keep Print Shop compatible with many printers. The manual does indicate that the VIC 1525 printer does not work as well with the program as some other printers, but I tested it and was quite pleased with the results.

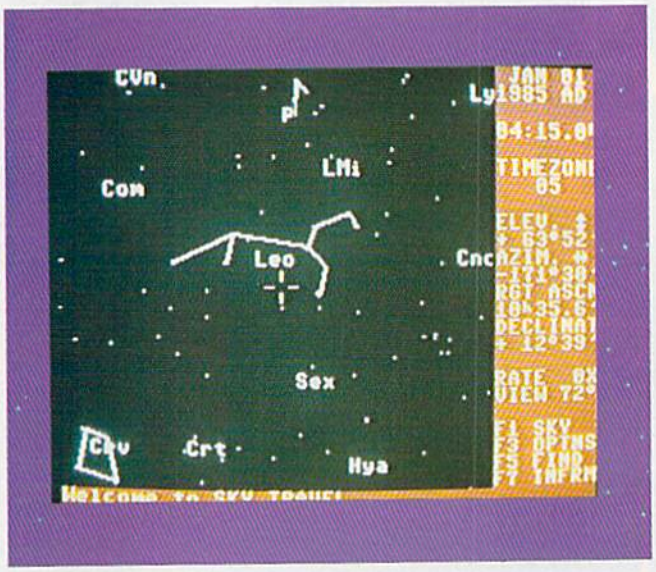
The reference guide is 28 pages of clear, concise information that further augments the clarity of the option menus. All in all, Print Shop's documentation is among the best I have ever worked with.

I have only two more words to say about Print Shop. Buy it! *(Broderbund Software, 17 Paul Drive, San Rafael, CA 94903-2101. C-64/$49.95 disk.)*

Jim Grubbs
Springfield, IL

Sky Travel

All the Wonder Of the Stars At Your Fingertips



Subtitled "A Window to the Sky," Sky Travel is just that. It allows you to scan the sky—day by day, minute by minute, from any point on the earth, and from any time within a span of 20,000 years.

After you load the disk, the program will default to January 1, 1985. You are placed at the latitude and longitude of Washington, D.C., and the time is 4:15 AM. These time and space coordinates, as well as other data concerning your position, are displayed on the screen. The bulk of the screen is a black background for the stars and planets within your 72-degree field of vision. Lines connect the stars of the various constellations, which are identified by their three-letter astronomical abbreviations.

The Map option displays the earth as it appears on a flat map, and you can move the cursor to almost any point on the globe. The manual lists the coordinates of major points in the world, allowing you to zero in on your own backyard with amazing accuracy.

Using the Set mode, you can enter the correct date and time, and the screen will display exactly what you will see in the sky from your position on the earth.

The No-Deep option shows major bodies in space as you would see them with the naked eye. The Deep option superimposes deep-space galaxies onto the foreground, as an aid in locating more distant objects by their relationship to nearer bodies.

The Find option allows you to locate any object in our solar system—including Halley's Comet. (No, it isn't here yet.) If you are searching for something on an inappropriate date, Sky Travel will tell you during what time frame it will be visible.

The Inform option will identify, as well as provide a brief description of, any object in the sky. It will also allow you to narrow your viewing angle, thus bringing the object closer so that you can better identify it. In this way, the option works in much the same way as a fairly good-quality telescope.

The documentation accompanying Sky Travel is both clear and complete. There are more than 120 pages, but you can begin enjoying the program after reading the first ten. However, if you put the book away at that point, you'll miss much of the value of the program.

The manual is actually a tutorial on such subjects as geography, astronomy, chronology, history, archeology, navigation and space exploration. It provides a wealth of fascinating information that greatly complements the program itself.

Even relatively experienced astronomy buffs will enjoy Sky Travel, and for the beginner, there is no substitute. I must thank the people at Commodore. I opened the Sky Travel box expecting to find a disk and a pamphlet. Instead, I discovered a sense of wonder. *(Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380. C-64/$29.95 disk.)*

Ervin Bobo
St. Peters, MO

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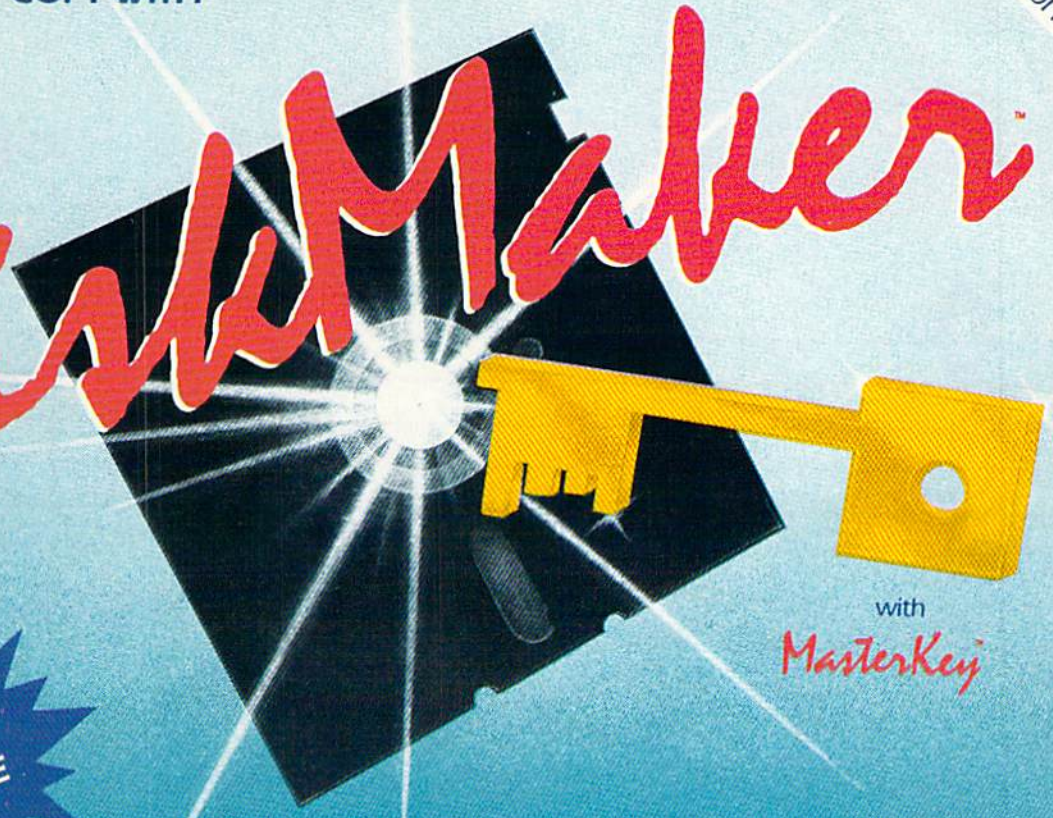

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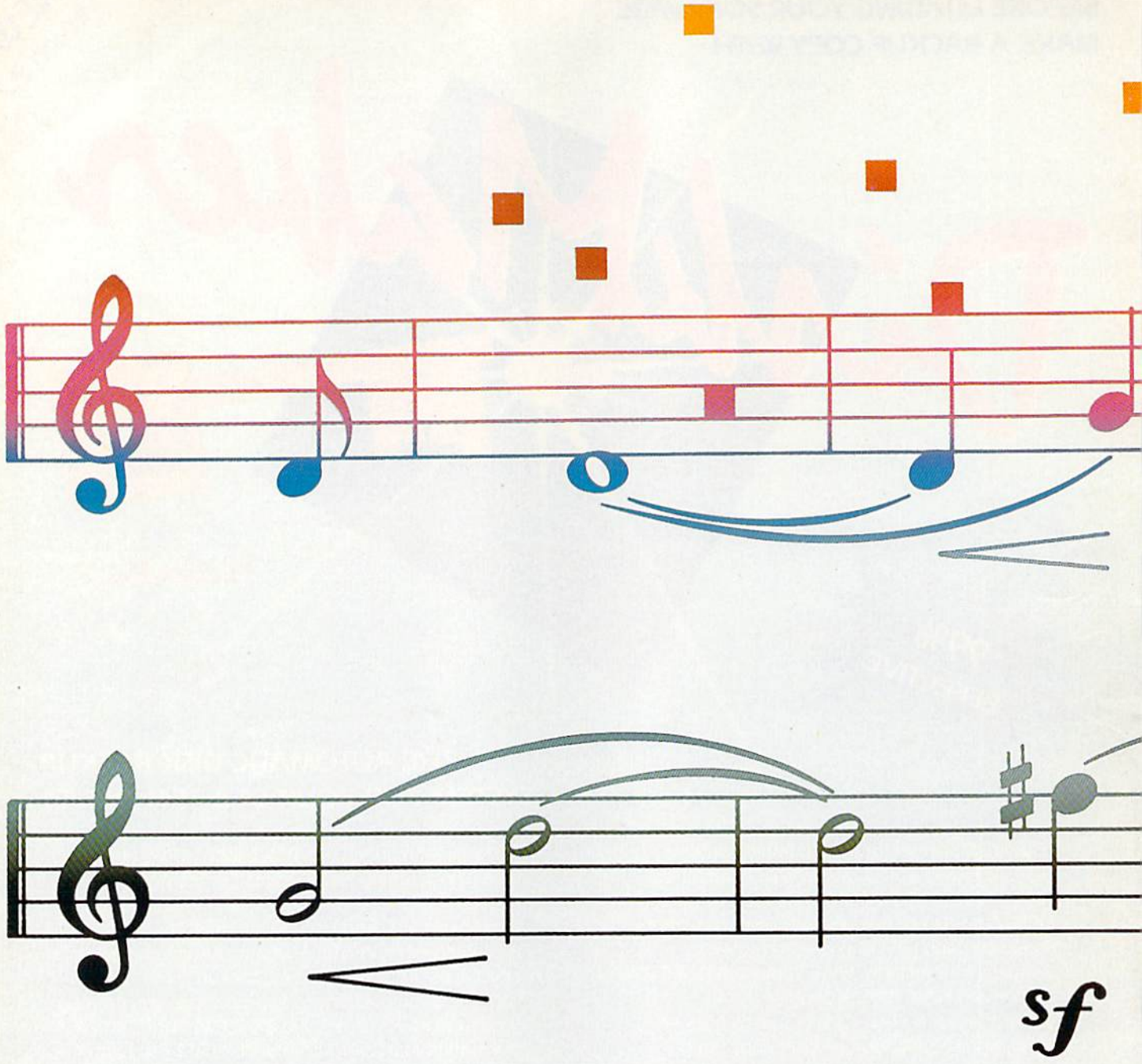

MAKING MUSIC ON THE C-64

By TOM BENFORD

Music Port review by Guy Wright

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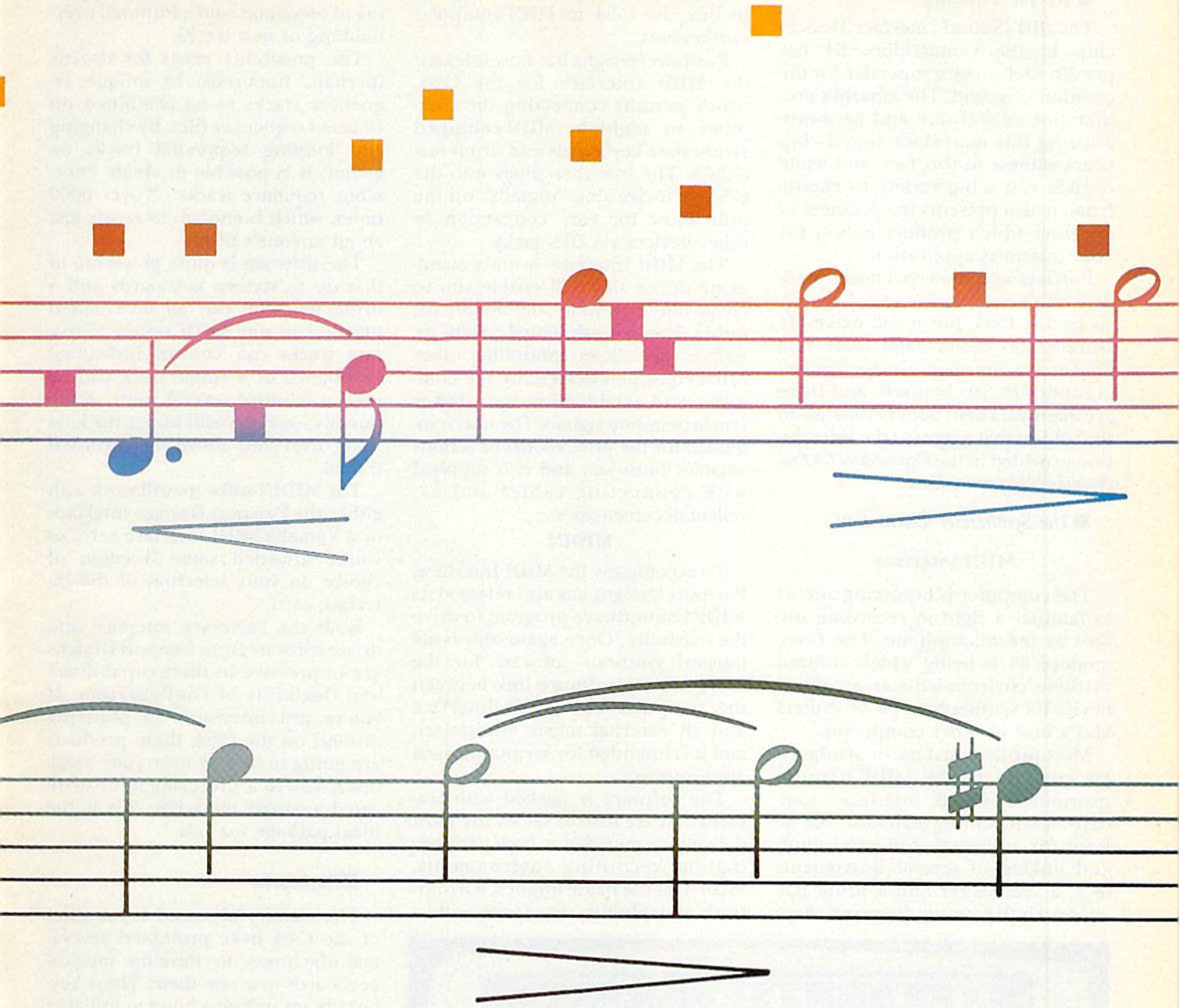

It's been over a year since our first music feature ("Tune Up Your Commodore," RUN, April 1984), and many exciting programs and products have been released since then. From keyboard synthesizers and MIDI interfaces to music tutorials, the computer music business is booming!

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■ *SID the Superstar*

The SID (Sound Interface Device) chip in the Commodore 64 has proven itself to be a superstar for the creation of sound. The amazing proliferation of software and hardware utilizing this marvelous sound chip bears witness to this fact, and while it gives you a big variety to choose from, it also presents the problem of deciding which product is best for your intended application.

Purchasing commercial music products isn't necessary for sound synthesis on the C-64, but it *will* make life considerably easier—and more fun! Of course, you can always "poke" around with SID yourself, and there are many excellent books available on the subject that augment the information provided in the *Commodore 64 Programmer's Reference Guide.*

■ *The Synthesizer Connection*

MIDI Interface

The computer is becoming almost as familiar a sight in recording studios as the microphone. The Commodore 64 is being widely utilized in these environments as a control device for synthesizers, phase shifters and a host of other equipment.

Most professional music synthesizers conform to the MIDI (musical instrument digital interface) standard, a sync/timing standard that allows for universal communication and linking of several instruments (e.g., a synthesizer and a drum machine). Until recently, however, there was no suitable interface available to link the C-64 to MIDI-equipped synthesizers.

Passport Designs has now released the MIDI Interface for the C-64, which permits connecting the computer to multiple MIDI-equipped synthesizer keyboards and drum machines. The interface plugs into the C-64 cartridge slot; "pigtails" on the unit allow for easy connection to other devices via DIN jacks.

The MIDI Interface is not a standalone device that will enable you to create music on your Commodore 64; rather, it is a professional-quality interface that allows controlling other MIDI-equipped devices by the computer and establishing the proper synchronization signals. The unit is intended for the professional or serious amateur musician, and it is supplied with connecting cables and excellent documentation.

MIDI/4

To accompany the MIDI Interface, Passport Designs has also released its MIDI/4 Soundware program to drive the hardware. Once again, this is *not* musical synthesis software for the C-64; it is the software link between the computer with MIDI Interface and an external music synthesizer, and it is intended for serious musical applications.

The software is packed with features that are sure to satisfy the most demanding musician in both performing and recording environments. MIDI/4, as the name implies, is a four-track polyphonic sequencer with a mix feature that allows the combining of sequences and additional overdubbing of new tracks.

The possibility exists for dozens (perhaps hundreds) of unique sequencer tracks to be combined on finished sequencer files. By changing and looping sequential tracks together, it is possible to create enormous sequence tracks of over 6000 notes, which is enough to satisfy just about anyone's needs!

The software is quite powerful, in that up to sixteen keyboards and a drum machine can all be chained together in one MIDI system. Separate tracks can control individual keyboards, or a single track can be used to control several units. Additionally, you may still finger the keys "live" over and above the recorded tracks!

The MIDI/4 software will work with either the Passport Designs interface or a Yamaha MIDI interface card, so you're afforded some freedom of choice on your selection of the interface card.

Both the hardware interface and driver software from Passport Designs are impressive in their capabilities and flexibility of configuration. If you're just interested in plunking around on the C-64, these products are going to be way over your head, but if you're a professional or dedicated amateur musician, this is the ideal package for you.

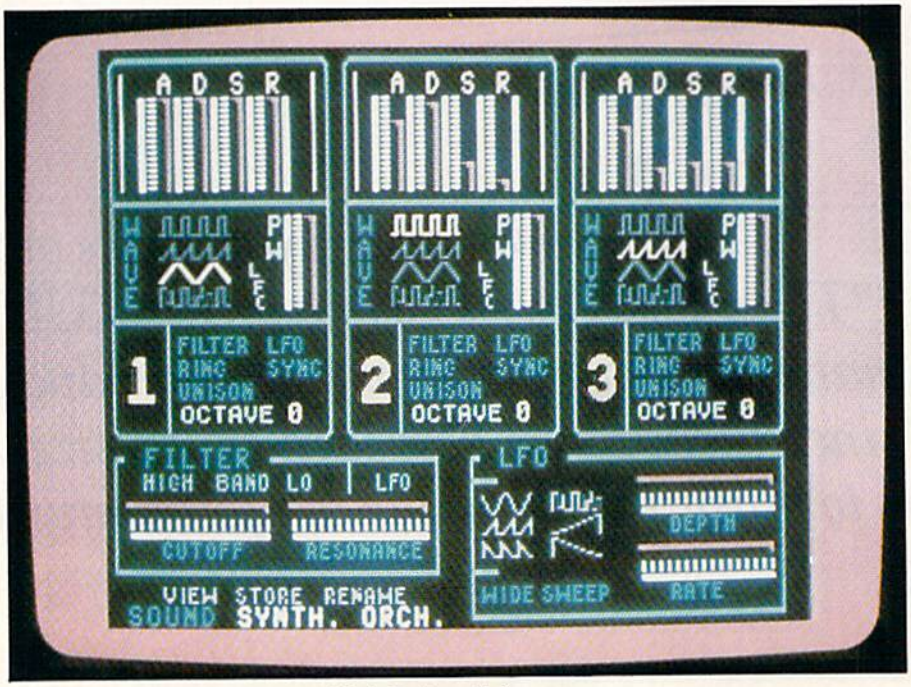
■ *Keyboards*

The wonderful sound capabilities of the C-64 have prompted several manufacturers to develop musical keyboards to access them. These keyboards are indeed a boon to utilizing the computer as a serious synthesizer. While SID can produce a multitude of sounds, using the "qwerty" keyboard to access them can be cumbersome and frustrating.

Each of the keyboards covered here is an achievement in its own right, and your selection will depend largely on your intended use. If you're simply interested in plunking on the keys and experimenting with music, any of these keyboards will do nicely. If your applications are more serious, I advise using one of the full-stroke keyboards, since they simulate the feel of a true organ keyboard.

Music Port

If you are beyond trying to "type" music on your Commodore keyboard and aren't interested in overlays or



Music Port's synthesizer menu.

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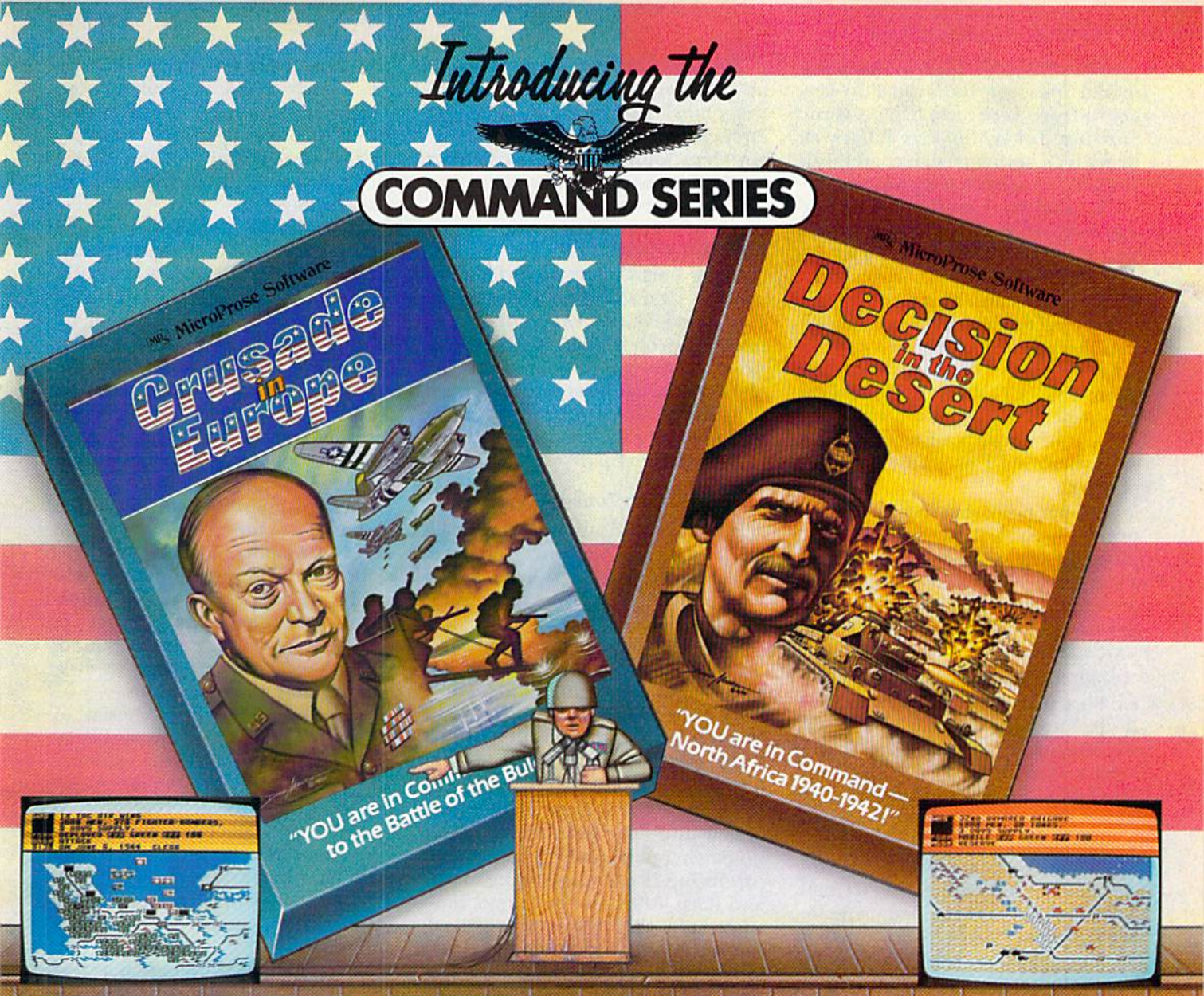

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pseudo-keyboards, then perhaps you should investigate the Music Port keyboard from Tech-Sketch. The Music Port is a 32-key, full-size, full-travel, piano-type keyboard that comes with some fairly remarkable software.

The keyboard itself is well made and has a solid feel. The keys have a smooth action, making almost no strike noise to detract from play. They are, perhaps, a bit more spongy than a concert piano, but not enough to make a difference for the vast majority of users. Its dimensions are about 18½″ × 7″ × 2¼″, and although it is made of sturdy plastic with a fair amount of circuitry inside, it is light enough to hold on your lap while playing.

Another point that should be mentioned here is that the keyboard plugs into the user port (not the joystick port), which allows the C-64 to read multiple and continuous key pressings (no more one-note-at-a-time music!).

Software. The other half of the Music Port package is the software (on disk). The program that comes with the keyboard is much more than a vehicle for reading the keys and translating them into sounds. Its list of features includes the options you might expect, plus many others.

All the options (except entering the name of a file for saving or loading from disk) are selected using the Music Port keyboard. This means you no longer have to keep reaching for the computer keys when you want to move from option to option. This also simplifies the operation of the Music Port dramatically.

It takes only a few minutes to get the feel of selecting options or moving through menus. Prompts are numerous, simple, and so easy to follow that you should be playing in minutes. To aid in keyboard control of the program, there is an enter button mounted at the top of the keyboard.

You can record your performances one voice at a time or all three voices at once. You can select different instruments for each voice from an impressive assortment. On the disk that comes with Music Port there are eight sound files, each containing 15 different instruments, noises, sound effects and a pre-recorded melody. With 120 different sounds and instruments (most with six different octave choices), it is probable that you will spend your first few hours with Music Port just listening to the various sounds it offers.

The selection and range of sounds and instruments far surpasses any other music program. But if that isn't enough, you can create your own instrument sounds on the Music Port synthesizer panel menu, where you can alter every aspect of C-64 sounds, from ADSR to pulse width, waveform, filters, etc.

Music Port's many other features, such as transposition, sequencing and tempo control, make this one of the most professional, complete music packages on the market. The above average software and keyboard combine to make this an attractive peripheral for the musically-inclined C-64 owner.

The ColorTone Keyboard

Instant gratification is the hallmark of the ColorTone Keyboard, from Waveform Corp. Even if you have a tin ear, you can make beautiful music with this innovative product!

The ColorTone Keyboard is packaged with a software driver disk and a user's manual. It plugs into joystick port #1 on the C-64. Connecting it and loading the software is a simple affair, even for the youngest of computer musicians.

The keyboard itself is a monoplanar unit—the surface is flat, with no moving parts, and it is capable of producing 25 notes (including sharps and flats). Illustrations of keys, both white and black, are provided, although there are no actual keys per se. The surfaces of the keys are touch-sensitive, requiring only slight pressure to produce sounds.

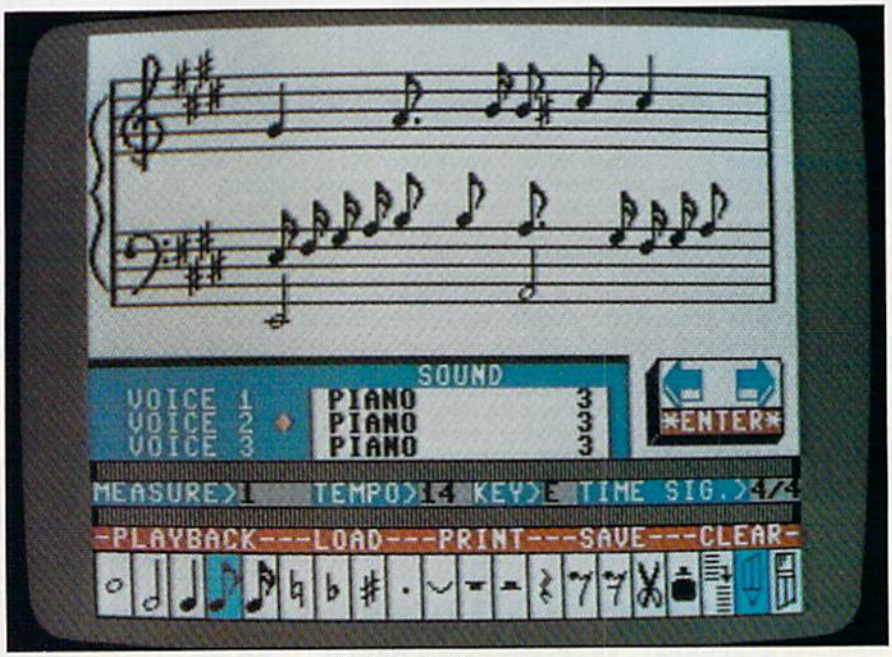
A novel feature of this keyboard is the Touch Harp, a multicolored panel above the keys. Music is produced via the Touch Harp by simply gliding your finger up and down; with this feature, there's no need to play the keys.

The software included with the unit provides several pre-recorded tunes that you can play along with. The Touch Harp section effectively locks out sour notes so that your resulting play-along melody sounds musically correct. Additionally, the video display shows which notes on the keyboard won't "fit" with the pre-recorded music. With this musical package, you can't help but sound like an accomplished pro.

On the uppermost portion of the keyboard are the ColorTone keys (a series of numbered panels that correspond to the icons on the video display). These keys are also touch-sensitive, and they allow you to select the tune, scale, instrument sound, recording, playback, saving to disk, pausing and other functions.

Waveform has wisely chosen to make the ColorTone Keyboard compatible with its MusiCalc software, and this combination works nicely for creating more involved musical scores. The ColorTone software is used interactively with other software packages in the MusiCalc line. The manual is well-written, making these custom applications easy to configure.

The ColorTone Keyboard is a good product for anyone wishing to make computer music immediately, since



Music Port's editing screen.

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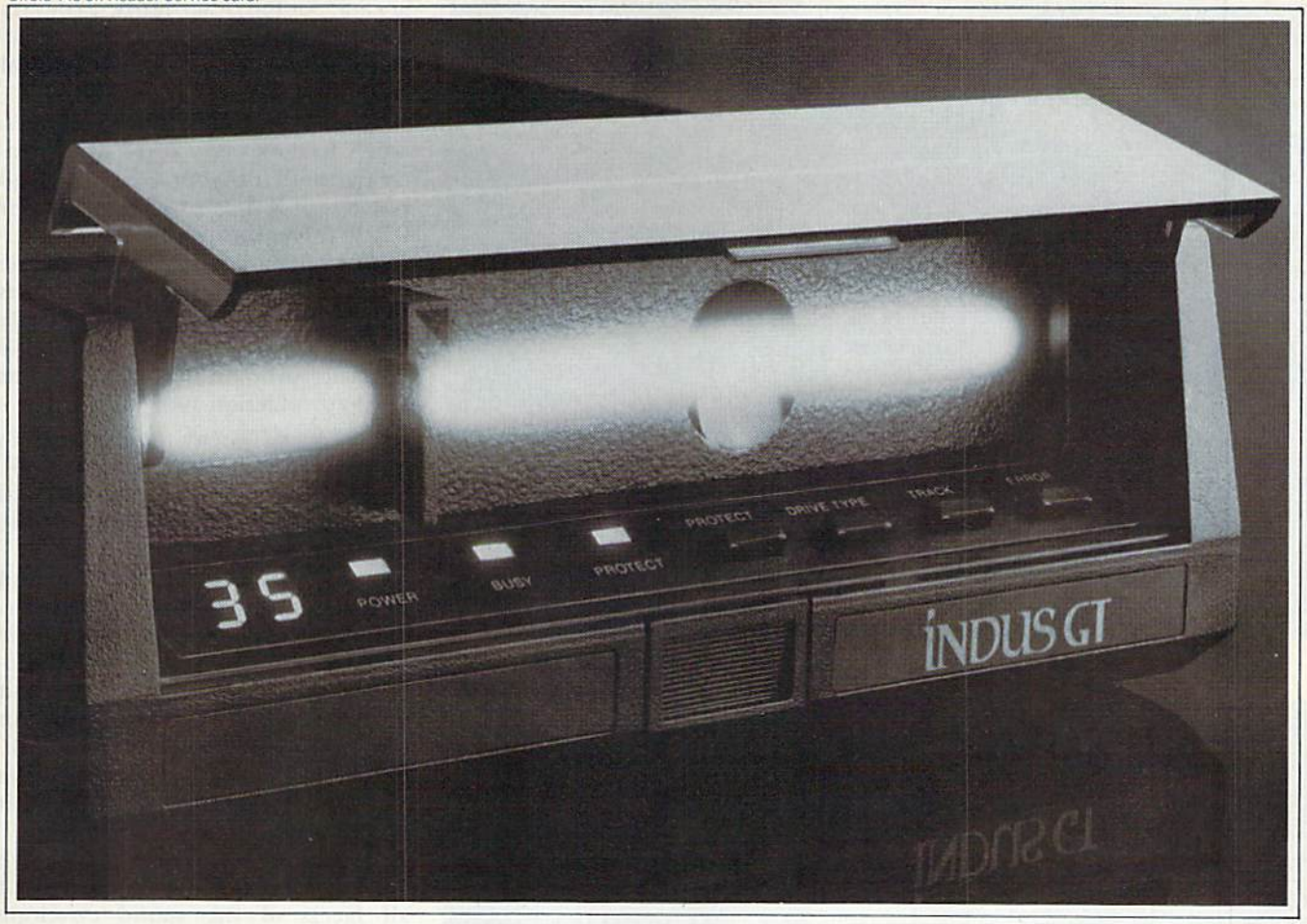

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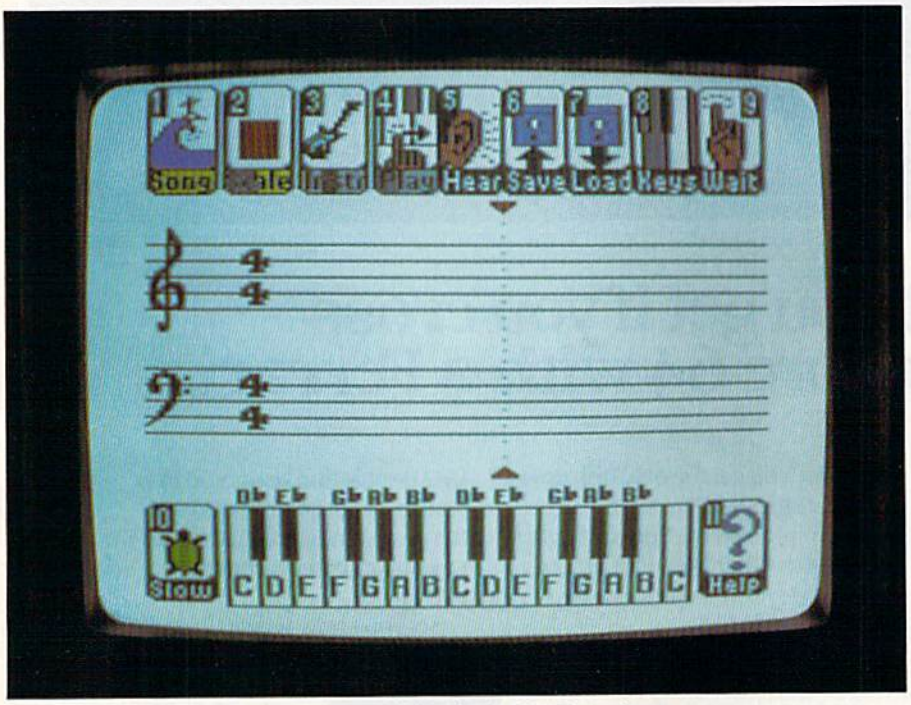
Music Port plays back your music in real time, showing voices.



Icon-based menu of Waveform's ColorTone software.

no previous musical knowledge is required. It's not for everyone, though, since the serious music student or professional musician will look for a keyboard that provides a more realistic feel. Very impressive scores and sequencing are possible, however, when the ColorTone Keyboard is used in conjunction with MusiCalc software.

The Incredible Musical Keyboard

Sight & Sound Music Software has come out with a unique new product—the Incredible Musical Keyboard for the C-64. The novel feature of this unit is that it fits *on top* of the C-64 keyboard, providing you with 24 miniature, piano-style keys. No external cable connections are required; you simply place it on the C-64 keys, and once the software is loaded, you're ready to start making music!

The options on the accompanying driver disk are sparse; however, they are sufficient to allow you to start making music right away. For more advanced applications and features, you'll have to purchase other programs in the Sight & Sound music library. All the other music program titles in this line will work interactively with the Incredible Musical Keyboard.

This keyboard is a functional alternative to the qwerty keyboard for entering music on your C-64, although in truth, it simply provides an easier way to finger the qwerty keys.

When coupled with some of the more heavy-duty software packages (described below) that are available from Sight & Sound, the Incredible Musical Keyboard becomes a serious music production tool.

3001 Sound Odyssey. Sight & Sound's line of music software includes 3001 Sound Odyssey, a synthesizer tutorial that can be used with the Incredible Musical Keyboard.

The program is menu-driven and provides you with three main selections: Microsynth (the synthesizer section), a demonstration of Microsynth and a tutorial. The tutorial, it should be noted, teaches you about music synthesis and the various filters, waveforms and controls of the SID's sound-synthesis capabilities; it is *not* a music tutorial.

Microsynth is a comprehensive synthesizer that allows adjustment of all facets of the sound envelope (ADSR), selection of filters, waveforms, frequency cutoffs, ring modulation, sync, pitch, resonance and a host of other settings. The program also allows you to save your presets to disk after creation. You accomplish input for all settings through the joystick and keyboard.

The Demo mode takes you on a detailed tour of what Microsynth does and how altering various settings changes the resulting sound. The Tutorial mode is, perhaps, the most comprehensive tutorial on C-64 sound synthesis available. This is an outstanding synthesis tutorial and music/sound synthesizer package. If you want to use the SID's many sound features, this program is definitely worth investigating.

Music Processor. You can also use the Music Processor program from Sight & Sound with the Incredible Musical Keyboard, although the keyboard isn't mandatory. You can input directly from the C-64 keyboard.

The program allows for extensive tailoring of the sound envelope and for saving settings and compositions to disk. A particularly useful feature of the Music Processor is its ability to merge different files together. This is a handy feature when you're cre-

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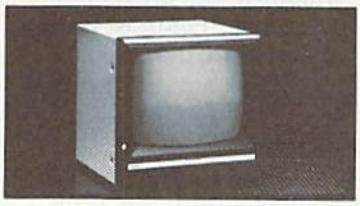

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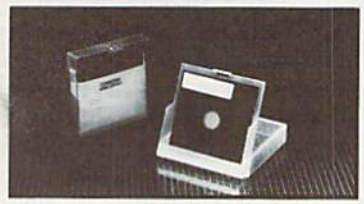

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ating multiple-voice pieces, since you can merge all three parts into a complete arrangement.

The software utilizes a joystick and the keyboard for input. You use the function keys to select various modes as well as to call forth the explanation screens. These are very similar to help screens, but they not only tell you how to access certain features, they also explain how these features affect the tonal qualities of the music.

Kawasaki Synthesizer. Sight & Sound has joined forces with Ryo Kawasaki, a composer and recording artist, to bring us a vastly improved version of the Kawasaki Synthesizer. This program, as with the others in the Sight & Sound line, will work with the Incredible Musical Keyboard. (For those who don't have the keyboard, the program works equally well without it, utilizing the C-64 keyboard for input.)

The package is a two-disk set that comes with a comprehensive 64-page instruction manual. Both the software and the manual contain lots of illustrations and graphics that complement the text. To keep the material entertaining, Kawasaki uses on-screen characters as tour guides on a musical journey, with the chief guide being Mr. Micro Jackson.

The Kawasaki Synthesizer has both monophonic and polyphonic modes. Extensive tonal modification to the sound envelope is possible: ADSR, filters, pulse, waveform—virtually every setting imaginable—can all be accessed through the software, which takes full advantage of the SID's capabilities.

Other notable features of the program include sequencing, overdubbing and editing capabilities. Unfortunately, the software doesn't allow printing out completed scores to a line printer. The program retains the most impressive features of the original version, but links them together in a more palatable and easily-understood format.

Computer Song Albums. Sight & Sound has also released two computer song albums: Music Video Hits (a compilation of eight contemporary tunes, including *Thriller* and *Let's Hear it for the Boy*) and On Stage (containing eight selections, including *On the Road Again, Dueling Banjos* and other popular tunes).

The programs allow you to alter the instrument sounds, special effects and tempo of the selections using the keyboard or a joystick. They will also work in conjunction with the Music Processor to allow even further modification of the sounds. You can also play along with the tunes, using either the computer keys or the Incredible Musical Keyboard. Other projected releases include Rock Concert and Solid Gold.

The Sequential MusicMate

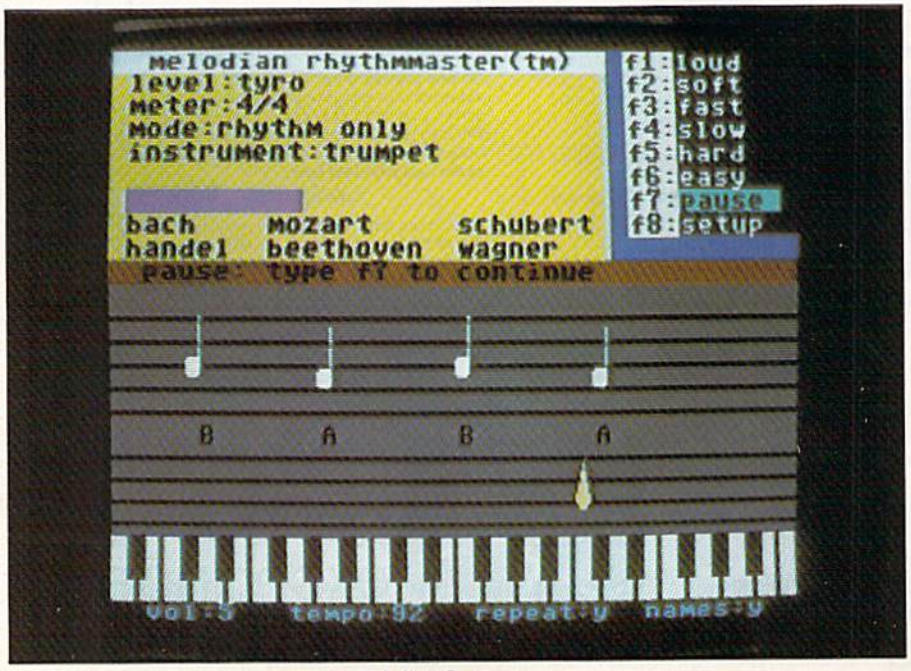
Sequential, Inc. has done a masterful job of producing a low-cost, piano-style keyboard for the C-64. The keyboard plugs into control port #1 of the computer, and comes with disk-based MusicWare driver software. The MusicMate package is sure to appeal to a large number of computer musicians, owing to the professional feel of the keyboard, easy-to-use software and affordable price.

The unit is constructed of sturdy plastic, featuring 32 keys (2½ octaves). It is lightweight and easily transportable. The driver software is polyphonic and allows recording your compositions into the computer's memory and playing them back. Unfortunately, no provision has been made to permanently record your melodies to disk with the driver software. However, Sequential offers additional software packages for the MusicMate keyboard that do have this capability.

Another drawback of the basic MusicWare is the lack of an overdub feature. Any compositions you wish to record must be played in their entirety, rather than "laying down" tracks one at a time and building on them. (Other Sequential MusicWare programs *will* support overdubbing.)

The feel of the keys is very comfortable and should find favor with seasoned musicians, as well as musical novices. The software/keyboard combination offers a selection of eight preset sounds: piano, organ, electric piano, bass, trumpet, clarinet, banjo and violin. Also, you can alter the tonal characteristics of the sound envelope to modify these preset sounds.

A nice plus is the inclusion of *Keyboard Basics—An Introduction to Playing Keyboard Instruments*, a compilation of easy-to-understand articles reprinted from *Keyboard* magazine. This material, combined with the keyboard and MusicWare, provides an excellent introduction to the basics of music.



Melodian Concertmaster.

The Melodian Concertmaster

Whenever a selection of products of the same genre is available, one among the bunch rises head and shoulders above the rest. Such is the case with the Melodian Concertmaster keyboard and software.

The Melodian is by far the most impressive of the four keyboards reviewed here, from the unique pop-out carrying handle built into the keyboard, to the many impressive features of the driver software.

The hardware consists of the Melodian keyboard, a 40-note unit with a detachable cover that doubles as a music holder when you're using the keyboard. The keyboard uses a unique two-connector scheme for communicating with the C-64. A large connector plugs into the user port, while a smaller D-9 connector

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Other Popular Features

VICTREE has 15 commands that permit the greatest program writing and fixing ease. For writing, the toolkit of commands includes: AUTO, DELETE, RENUMBER, MERGE, LCOPY, LMOVE, PRINT USING, FIND, CHANGE, PAGE, HELP, DUMP, TRACE, KILL, KILL SAVE.

The **VICTREE** allows most BASIC 4.0 programs, especially those for the older PET machines, to work on your **Commodore 64** or **VIC-20**. And for only $20 extra, **VICTREE** comes with a cable that roots you into almost any of the popular Centronics/parallel standard printers on the market today.

The VICTREE Keeps Growing

This carefully protected cartridge even has a very simple text editor that allows brief documents to be entered and printed out. We recently grafted a "Print Using" BASIC command onto it. The 1984 **VICTREE** features a new switch, too, that turns the cartridge off and restores all the memory.

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BUSIDATA 64	see page 5
BUSICALC 1, or 2, or 3	see pages 6, 7
Omniwriter	see page 11
Superbase 64	see page 11
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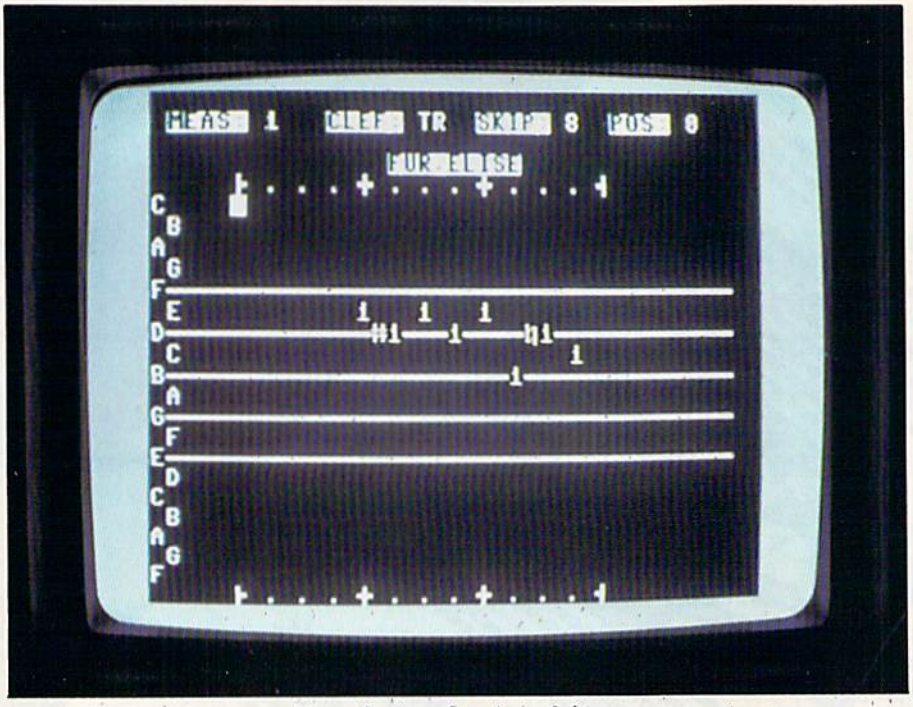

Master Composer from Access Software.

is inserted into control port #2. The documentation supplied with the Melodian Concertmaster is superb, providing comprehensive information on using the various features of the software as well as a thorough music-tutorial section.

The software allows full tailoring of the sound envelope in every respect. Waveform type, ADSR settings, sync, ring modulation, high-, low- and band-pass filtering, cutoff frequency, override, pulsewidth, resonance and other settings may be adjusted and retained in memory or saved to disk. All functions and selections of the software are menu-driven, and even though it offers particularly strong capabilities, it remains very easy to use and learn. The keyboard can also be used with Melodian's RhythmMaster software.

The keyboard is polyphonic, and the preset sounds (19 of them) are authentic-sounding synthetic versions of actual instruments. Any or all of these presets may be further modified by using the ADSR envelope controls. A sampling of 35 melodies, ranging from classical to contemporary tunes, is also provided on the disk, which does an impressive job of demonstrating the virtually limitless sonic possibilities of the keyboard and software.

Also, the Concertmaster driver software may be used *without* the Melodian keyboard. In this case, the qwerty keys on the C-64 are used to input music.

RhythmMaster. Melodian's RhythmMaster deals specifically with developing your musical rhythm skills. It can be used with the Melodian keyboard, or by itself, using the C-64's keyboard for input.

RhythmMaster is unique in that it concentrates on timing and rhythm, rather than melody or sound. As any professional musician knows, playing the right notes is not enough—they must be played in the proper duration and cadence for the composition to sound right. This program develops these crucial skills and does it in a fun way: in the form of a video game!

When using RhythmMaster, the program performs and displays a measure of music and then shows you how to play it back correctly. It highlights your mistakes and guides your performance until every note is correct. The level of difficulty and the tempo of the piece is controlled by the user, so as your rhythm skills develop, you can increase the difficulty.

The documentation supplied with RhythmMaster is outstanding in its tutorial content. It covers virtually everything you need to know about timing, note duration, rests, tempo signatures and other important points. Additionally, a comprehensive music tutorial is presented. The combined features of RhythmMaster and ConcertMaster give you a complete music tutorial.

■ *Music/Sound Synthesis Software*

Master Composer

Access Software, Inc. brings you Master Composer, a full-featured synthesizer and music-composition program for the C-64. The inclusion of a help screen and the provision to dump your compositions to a line printer are two of the more notable features of the software.

The print-dump feature is one of dubious value, however. It doesn't produce true musical notation; the staff is represented, but instead of notes, numbers representing the duration of the note appear instead. It takes a bit of getting used to, but it is a readable representation of your composition.

The 54-page user's manual is divided into two major sections: Using Master Composer and Using Music Files. Each of these sections covers in fine detail the nuances of the software and its capabilities. A comprehensive appendix is also included, which further explains information given in the text.

All note entry, voice selection, filter settings, waveform selection, etc. are input through the keyboard. An Audition mode allows you to hear your composition before committing it to disk for posterity. All sound settings can be modified ad infinitum for a virtually limitless selection of sounds.

While not the easiest of music programs to use, the power of Master Composer is impressive. While the video and printer displays of the program do permit reading your scores in a comprehensible manner, adherence to the conventions of music notation would have been preferable.

All in all, Master Composer is a serious music and sound-synthesis tool with an impressive list of features.

Songwriter

Songwriter from Scarborough Systems is a comprehensive music package that allows even the youngest of musicans to utilize the C-64 for composing and playing songs.

One of the most novel features of Songwriter is the way that music is displayed on the video screen. Rather than the traditional notes-and-staves representation, Songwriter uses a piano-roll display that looks much like the perforated paper rolls used by old-time player pianos.

A graphics display of a keyboard

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in the center of the screen is used for selecting the notes. Note selection can be done through either the keyboard or a joystick.

Although Songwriter is a good tool for creating melodies, it does have three serious drawbacks that limit its use as a creative tool. The first, and probably most notable, is the lack of a polyphonic mode. What this means, quite simply, is that you can only play one note at a time. Consequently, chords are not possible, nor can you overdub separate voice tracks to form a complete composition with accompaniment.

The second shortcoming is the lack of a provision for printing out your compositions on a line printer. This is somewhat understandable, though, since the piano-roll format is used for note entry.

Lastly, while the program allows you to do some sonic tailoring, it is rather limited in this area. Provisions are made for changing the sound and tonal quality somewhat, but the SID chip is capable of producing some incredible sounds, and Songwriter barely scratches the surface.

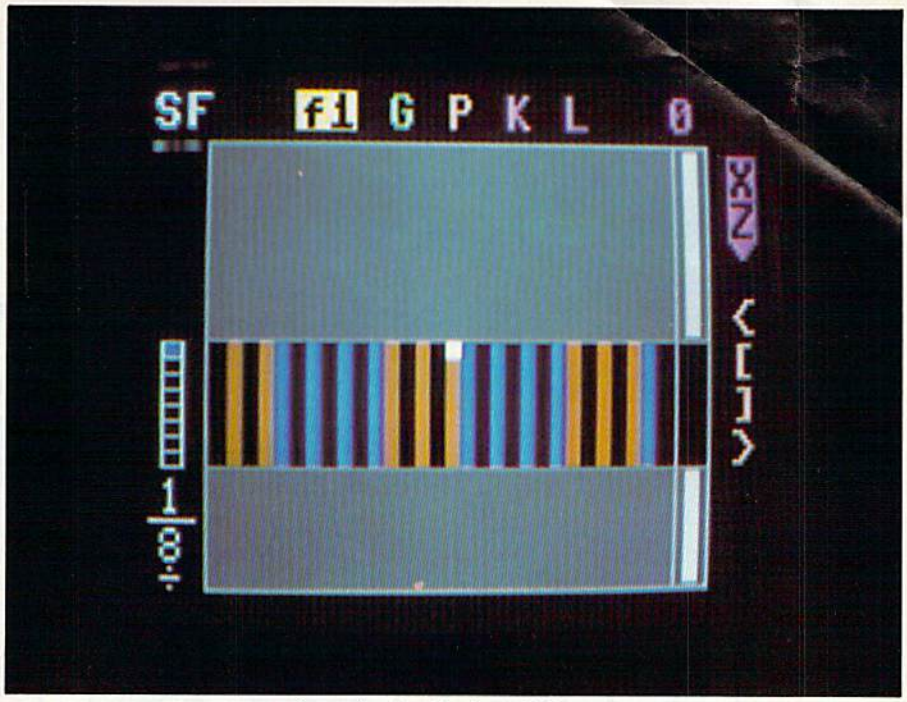
You can save your compositions to disk (a format disk utility is included in the program). There is also a disk-directory function. The disk includes a generous sampling of pre-programmed compositions that demonstrate the video and audio features of the program.

Songwriter is an entertaining program of limited application that's very easy to use, can be implemented immediately, offers instant aural gratification and provides a means of accessing many, but by no means all, of the SID chip's capabilities. What Songwriter does, it does adequately, but it's not an outstanding program.

CodePro-64

CodePro-64 from Systems Management Associates is a two-disk set with a comprehensive manual that provides advanced programming instructions for the C-64, including tutorials in Basic, a sprite generator and demonstrator and a music generator and demonstrator. Though the entire package is excellent, we'll concentrate here on the musical aspects of the program.

There are three menu selections pertaining to music: Introduction to Music, Music Generator and Music Demonstrator. The Introduction to Music segment is sub-divided into six modules that take you on a concise tour of the SID and its various controls and features.



Songwriter from Scarborough Systems.

This is an excellent section for those who are interested in playing with SID directly, and a lucid visual display of the parts of a sound wave make the concepts easy to digest. Explanations of the various parts of the ADSR envelope and the corresponding Pokes for these parts provide you with an excellent foundation for creating your own sounds on the C-64 by direct programming.

The Music Demonstrator performs a sample composition and allows you to change ADSR settings to hear the effect they have on the resultant sounds. The Music Generator is where actual composing can be done. In this mode, you place your notes on the staff using the cursor keys, decide on their duration values, choose the voice(s) they'll be played in and save or load your compositions. Standard staff and note representation is used, and the composing and editing procedures are direct, logical and easy.

The software doesn't teach music; it teaches you how to create and play music on the C-64. It's important to note that CodePro-64 is *not* a music tutorial or synthesizer, and if that's what you're looking for, this is not the software for you. CodePro-64 is a programming tutorial package that teaches Basic language programming, including graphics and music. As a music programming package, it's excellent.

■ *Updates*

In addition to all the new software and hardware available for sound production on the C-64, some of the products covered in last year's music feature have since been modified or enhanced.

Studio 64 from Entech Software is now available in a more refined version. The quirk of representing sharp notes as flats of the full tone above them has been corrected. Now when you key-in a G#, it is expressed that way (instead of an A-flat, as in the earlier version). The opening title screen and the graphics in general have been spruced up to make this one of the better music synthesis programs available for the C-64.

Add Mus'In is a separate utility available from Entech that allows you to combine your musical compositions created with Studio 64 with your own programs. This handy utility is disk-based and easy to use, and it allows merging any Studio 64 music file with other programs of your own creation.

■ *Other Music Products*

The Music Studio

The Music Studio (Activision) is a music and lyric composition and audio-synthesis program for the C-64. The program's Paintbox mode allows beginners to compose music. In more advanced modes, you can input com-

Continued on p. 92.

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C-64 Big Letters

By JIMMIE W. BERNARD

DAN COLLINS

Here are three utility programs that let you type onto your screen 48 colorful letters, numbers and other symbols, four times their normal size.

Listing 1, C-64 Big Letter Editor, lets you design your own big-letter screen right from the keyboard, with nearly complete editor functions and the capability to mix standard-size characters with big ones. If you have a VCR, this is an excellent way to create your own titles one page at a time.

Using a machine language subroutine to expand the normal character data, the program actually composes each giant letter of four reconfigured standard characters Poked together. In Listings 1 and 2, you may use the first 64 standard characters along with 48 big characters—A through Z, numbers 1–9, plus # $ % & ' + − , . ? * and the heart character. You can use the letter O to represent a 0, and the remaining character is the space, which is needed to print a blank or to overprint or erase an error.

Most of the instructions can be found on the title page. There are 12 screen lines in the program, with a possible 20 characters on each line. Unfortunately, there is no cursor, so you will have to pay attention. But the home/clear key, the cursor keys and the space bar all operate normally, with one exception: cursor up or cursor down will get you to the beginning of the line you move to.

The delete/insert key does not function, and the cursor-left key will only move you left to the beginning of the line you are on. Print, border and background colors can be changed instantly by tapping the left-arrow, up-arrow or pound keys, respectively.

Listing 2, Videotape Titlemaker, is similar to the first program, except, rather than being operated from the keyboard, it is totally preprogrammed through data entries derived from the ASCII appendix, including the editor and color-changing functions.

For example, the program as listed contains a test message that uses big letters, small letters, editor controls and color changes. Since the program scrolls, there is virtually no limit to the length of the titles you can make.

If you look at the portion of the listing beginning with data line 710, you can see what will happen by look-

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ing at the data in terms of ASCII. The 17s are cursor downs, so the video title presentation begins with a scroll from the bottom of the screen; the 32s are spaces to center text on a line. Then comes the text ASCII: 61 is a built-in, one-and-a-half-second timer delay you can use anytime and as often as you wish; 92, 94 and 95 are the color changers—the color is bumped up by 1 each time.

In line 760, the number 200 is a code by which the program does a Gosub to line 1000, which adjusts the actual cursor to the desired location and then prints a message in regular small letters. You will have to work at getting the small letters exactly where you want them.

Finally, use code 255 as the last data entry and there will be no Out-of-Data message. Just hit the shift key when you have finished videotaping your creation.

The third program is a little different. You can use all 64 characters, up to 3200 of them, to create a self-repeating big-letter banner right in the middle of the screen. As the program begins, you enter your message in regular two-line segments, up to 40 inputs.

Then, when you press the shift key, your message will stream from right to left at a very readable speed, in big orange letters against a black background. (Other colors produce flaws or flashes in the scrolling chip!)

You could use the program to leave an attention-getting message for someone else right on your monitor or TV screen. You could also make a terrific window display for a business or social function. R

Address all author correspondence to Jimmie W. Bernard, 8018 Sunset Path Court, Springfield, VA 22153.

Listing 1. *C-64 Big Letter Editor program.*

```
10 REM: C-64 BIG LETTER EDITOR
20 REM: WRITTEN BY JIM BERNARD
30 FORX=28643TO28842:READA:POKEX,A:TT=TT+A:
   NEXT
40 IFTT<>20528THENPRINT"CHECK DATA FOR ERRO
   R(S)":END
50 GOSUB410
60 POKE52,48:POKE56,48:POKE56334,PEEK(56334
   )AND254:POKE1,PEEK(1)AND251
70 FORI=0TO511:POKEI+12288,PEEK(I+53247):NE
   XT
75 FORI=0TO207:POKEI+10000,PEEK(I+53255):NE
   XT
80 FORI=0TO71:POKEI+10208,PEEK(I+53639):NEX
   T
85 FORI=0TO39:POKEI+10280,PEEK(I+53527):NEX
   T
90 FORI=0TO31:POKEI+10320,PEEK(I+53584):NEX
   T
95 FORI=0TO7:POKEI+10352,PEEK(I+53615):NEXT
100 FORI=0TO7:POKEI+10360,PEEK(I+53503):NEX
   T
105 FORI=0TO7:POKEI+10368,PEEK(I+53751):NEX
   T
110 FORI=0TO7:POKEI+10376,PEEK(I+53911):NEX
   T
115 SYS28672
120 POKE1,PEEK(1)OR4
130 POKE56334,PEEK(56334)OR1
140 POKE53272,28:PRINTCHR$(147):T=0:GOTO160
150 POKE53272,21:END
160 LW=1024:LY=LW+1:LX=LW+40:LZ=LW+41:T=1024
170 GETP$:IFP$=""THEN170
171 IFASC(P$)=64THENGOSUB290:GOTO170
172 IFASC(P$)>48ANDASC(P$)<58THEN193
173 IFASC(P$)>64ANDASC(P$)<91THEN192
174 IFASC(P$)>34ANDASC(P$)<40THEN195
175 IFASC(P$)>41ANDASC(P$)<47THEN200
176 IFASC(P$)=32THEN205
177 IFASC(P$)=63THEN210
178 IFASC(P$)=211THEN215
179 IFASC(P$)=145THENGOSUB270
180 IFASC(P$)=157THENLW=LW-2:LX=LX-2:LY=LY-
   2:LZ=LZ-2
181 IFLW<TTHEN230
182 IFASC(P$)=17THENGOSUB260
183 IFASC(P$)=29THEN230
184 IFASC(P$)=147THEN140
185 IFASC(P$)=19THENT=0:GOTO160
186 IFASC(P$)=92THENSYS28651
187 IFASC(P$)=94THENSYS28647
188 IFASC(P$)=95THENSYS28643
189 IFASC(P$)=61THENGOSUB280
190 IFASC(P$)=186THEN250
191 GOTO170
192 Q=ASC(P$):W=((Q-65)*2)+64:GOTO220
193 Q=ASC(P$):W=((Q-48)*2)+114:GOTO220
195 Q=ASC(P$):W=((Q-35)*2)+134:GOTO220
200 Q=ASC(P$):W=((Q-42)*2)+144:GOTO220
205 W=154:GOTO220
210 W=156:GOTO220
215 W=158:GOTO220
220 X=W+1:Y=W+96:Z=W+97
222 CL=PEEK(646):SC=54272:POKELW+SC,CL:POKE
   LX+SC,CL:POKELY+SC,CL:POKELZ+SC,CL
225 POKELW,W:POKELY,Y:POKELX,X:POKELZ,Z
230 LW=LW+2:LX=LX+2:LY=LY+2:LZ=LZ+2
235 IFLY>T+39THENGOSUB260
240 GOTO170
250 POKE214,22:END
260 T=T+80:LW=T:LX=LW+40:LY=LW+1:LZ=LW+41
262 IFT>1945THENPOKE214,24:T=T-160:PRINTCHR
   $(17):GOTO260
265 RETURN
270 T=T-80:LW=T:LX=LW+40:LY=LW+1:LZ=LW+41:I
   FT<1024THENT=1104:GOTO270
275 RETURN
280 FORK=1TO1500:NEXT:RETURN
290 OPEN1,0:INPUT#1,P$:CLOSE1:RETURN
300 REM - DATA FOR MACHINE LANGUAGE
310 DATA 238,134,2,96,238,32,208,96,238,33,
   208,96,0,24,173,3,112,105,8,141
320 DATA 3,112,201,0,208,3,238,4,112,162,0,
   189,16,39,72,74,74,74,74,168
330 DATA 185,155,112,157,0,50,157,1,50, 104
   ,41,15,168,185,155,112,157,0,53,157
340 DATA 1,53,232,238,15,112,238,18,112,238
   ,28,112,238,31,112,224,8,208,208,24
350 DATA 173,15,112,105,8,141,15,112,24,173
   ,18,112,105,8,141,18,112,24,173,28
360 DATA 112,105,8,141,28,112,24,173,31,112
   ,105,8,141,31,112,201,1,208,12,238
370 DATA16,112,238,19,112,238,29,112,238,32
   ,112,173,32,112,201,56,240,3,76,240
380 DATA 111,169,0,141,15,112,141,28,112,16
   9,1,141,18,112,141,31,112,169,50,141
390 DATA 16,112,141,19,112,169,53,141,29,11
   2,141,32,112,169,16,141,3,112,169,39
400 DATA 141,4,112,96,0,3,12,15,48,51,60,63
   ,192,195,204,207,240,243,252,255
410 PRINTCHR$(147):POKE53280,7:POKE53281,7:
   POKE646,9
420 PRINTSPC(14)"{CRSR UP}INSTRUCTIONS"
430 PRINT"{CRSR DN}{LEFT ARROW}{7 SPACEs}CH
   ANGES PRINT COLOR."
440 PRINT"{CRSR DN}{LB.}{7 SPACEs}CHANGES S
   CREEN COLOR."
```

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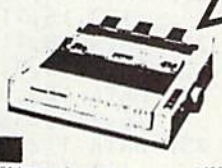

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Listing 1 continued.

```
45Ø PRINT"{CRSR DN}{UP ARROW}{7 SPACEs}CHAN
    GES BORDER COLOR."
46Ø PRINT"{CRSR DN}CURSOR OR SHIFT/CURSOR M
    OVES DOWN OR UP ONE LINE, TO COLUMN 1."
47Ø PRINT"{CRSR DN}CURSOR LEFT OR RIGHT MOV
    ES ONE SPACE."
48Ø PRINT"{CRSR DN}HOME OR SHIFT/CLEAR OPER
    ATES AS USUAL."
49Ø PRINT"{CRSR DN}USE THE ALPHABET, NUMBER
    S 1-9 OR # $ % & ' + - , . ? * {SHFT S}
    "
495 PRINT"{CRSR DN}USE '@' + RETURN FOR SMA
    LL LETTERS."
5ØØ PRINT"{CRSR DN}USE SHIFT/@ TO END ON BO
    TTOM LINE."
51Ø PRINT"{CRSR DN}TO PROCEED, PRESS 'SHIFT
    ' KEY THEN WAIT 15 SEC. UNTIL SCREEN CL
    EARS"
52Ø WAIT653,1,Ø
53Ø RETURN
```

Listing 2. *C-64 Videotape Titlemaker program.*

```
17Ø READP:P$=CHR$(P):IFP=255THENWAIT653,1,Ø
    :POKE53272,21:END
171 IFP=2ØØTHENGOSUB1ØØØ
7ØØ REM - DATA FOR VIDEO TAPE MESSAGE FROM
    ASC II APPENDIX
71Ø DATA 17,17,17,17,17,17,17,17,17,17,17,1
    7
72Ø DATA 32,32,32,32,32,32,32,72,69,76,76,7
    9,46,17,17
73Ø DATA 32,32,32,84,72,73,83,32,73,83,32,6
    5,32,84,69,83,84,46,17,17,32,32,32
74Ø DATA 92,94,61,92,94,61,92,94,61,92,94,6
    1,92,94,61,92,94,61,92,94,61,92,94
75Ø DATA 61,95,83,95,84,95,73,95,76,95,76,3
    2,95,95,95,95,84,95,69,95,83,95,84
76Ø DATA 95,73,95,78,95,71,46,17,17,66,32,3
    2,32,32,32,32,32,32,32,32,32,77,2ØØ
77Ø DATA 17,17,17,17,17,17,32,32,78,79,87,3
    2,8Ø,82,69,83,83,32,83,72,73,7Ø,84
78Ø DATA 46,255
1ØØØ PRINTCHR$(19):FORQ=1TO11:PRINTCHR$(17)
    :NEXT
1Ø1Ø PRINTCHR$(29)CHR$(29)"IG OR LITTLE LET
    TERS,";
1Ø2Ø PRINTCHR$(29)CHR$(29)CHR$(29)"IX THEM
    UP."
1Ø3Ø RETURN
```

Listing 3. *C-64 Big Letter Message program.*

```
1Ø REM: C-64 BIG LETTER MESSAGER
2Ø REM: WRITTEN BY JIM BERNARD
3Ø FORX=28656TO28883:READA:POKEX,A:CK=CK+A:
   NEXT
35 FORX=49152TO49231:READA:POKEX,A:CK=CK+A:
   NEXT
4Ø IFCK<>3575ØTHENPRINT"DATA ERROR":END
45 PRINTCHR$(147)
6Ø POKE52,48:POKE56,48:POKE56334,PEEK(56334
   )AND254:POKE1,PEEK(1)AND251
7Ø FORI=ØTO511:POKEI+1ØØØØ,PEEK(I+53248):NE
   XT
8Ø POKE1,PEEK(1)OR4:POKE56334,PEEK(56334)OR
   1
9Ø SYS28672
1ØØ GOSUB1ØØØ:POKE53272,28:POKE5327Ø,2Ø7
1Ø5 SYS49152
11Ø LW=15Ø2:LY=15Ø3:LX=1542:LZ=1543
12Ø CW=55774:CY=55775:CX=55814:CZ=55815
14Ø R=8:Q=PEEK(M):M=M+1:IFQ>95THENM=5ØØØ1:G
   OTO14Ø
15Ø IFQ>63THENQ=Q-64
16Ø W=Q*2:X=Q*2+1:Y=Q*2+128:Z=Q*2+129
165 IFT>1THEN18Ø
17Ø IFPEEK(253)=>NN+2THEN18Ø
172 IFPEEK(253)<NNTHENNN=-2
175 GOTO17Ø
18Ø POKELW,W:POKELY,Y:POKELX,X:POKELZ,Z
19Ø POKECL,R:POKECY,R:POKECX,R:POKECZ,R
195 POKE781,Ø:POKE78Ø,Ø:POKE782,Ø:SYS65499
196 NN=PEEK(253):GOTO14Ø
2ØØ REM - MACHINE LANGUAGE DATA
2Ø5 DATA 24,173,3,112,1Ø5,8,141,3,112,2Ø1,Ø
    ,2Ø8,3,238,4,112
21Ø DATA 162,Ø,189,16,39,72,74,74,74,74,168
    ,185,155,112,157,Ø,48,157,1,48,1Ø4
215 DATA 41,15,168,185,155,112,157,Ø,52,157
    ,1,52,232,238,15,112,238,18,112,238
22Ø DATA 28,112,238,31,112,224,8,2Ø8,2Ø8,24
    ,173,15,112,1Ø5,8,141,15,112,24,173
23Ø DATA 18,112,1Ø5,8,141,18,112,24,173,28,
    112,1Ø5,8,141,28,112,24,173,31,112
24Ø DATA 1Ø5,8,141,31,112,2Ø1,1,2Ø8,12,238,
    16,112,238,19,112,238,29,112,238,32
25Ø DATA 112,173,32,112,2Ø1,56,24Ø,3,76,24Ø
    ,111,169,Ø,141,15,112,141,28,112,169
26Ø DATA 1,141,18,112,141,31,112,169,48,141
    ,16,112,141,19,112,169,52,141
27Ø DATA 29,112,141,32,112,169,16,141,3,112
    ,169,39,141,4,112,96,Ø,3,12,15,48
28Ø DATA 51,6Ø,63,192,195,2Ø4,2Ø7,24Ø,243,2
    52,255,Ø,162,Ø,16Ø,1,185,112,7,157
29Ø DATA 112,7,185,152,7,157,152,7,185,112,
    219,157,112,219,185,152,219,157,152
3ØØ DATA 219,232,2ØØ,192,4Ø,2Ø8,226,169,7,1
    41,22,2Ø8,96
31Ø DATA 12Ø,169,17,141,2Ø,3,169,192,141,21
    ,3,88,169,8,133,251,96,166,251,2Ø2
32Ø DATA 142,22,2Ø8,224,255,24Ø,5,134,251,7
    6,49,234,169,7,133,251,162,Ø,16Ø,1
33Ø DATA 185,184,5,157,184,5,185,224,5,157,
    224,5,185,184,217,157,184,217,185
34Ø DATA 224,217,157,224,217,232,2ØØ,192,4Ø
    ,2Ø8,226,169,7,141,22,2Ø8,23Ø,253
35Ø DATA 76,49,234
1ØØØ REM: COLLECT UP TO 32ØØ CHARACTERS FOR
     DISPLAY
1ØØ5 PRINT:PRINT"INSTRUCTIONS - ENTER UP TO
     2 FULL LINES AT EACH '?' PROMPT, ";
1Ø1Ø PRINT"THEN PRESS 'RETURN'.":PRINT"ENTE
    R '*' AT A PROMPT WHEN FINISHED."
1Ø2Ø PRINT:PRINT"THERE WILL BE UP TO 4Ø PRO
    MPTS BY WHICH TO ENTER TEXT.":PRINT
1Ø25 DIMM$(4Ø):M=5ØØØ1:FORX=1TO4Ø
1Ø3Ø INPUTM$(X):IFM$(X)="*"THENGOTO1Ø55
1Ø4Ø IFM$(X)=""THEN1Ø3Ø
1Ø45 FORY=1TOLEN(M$(X)):AS=ASC(MID$(M$(X),Y
    ,1))
1Ø46 IFAS<32ORAS>95THENNEXT
1Ø47 IFAS=64THENAS=Ø
1Ø48 IFAS>9ØANDAS<96THENAS=AS-64
1Ø49 POKEM,AS:M=M+1:NEXT
1Ø5Ø POKEM,32:M=M+1:NEXT
1Ø55 PRINT:PRINT"MESSAGE IN MEMORY WITH";:Z
    N=M-5ØØØØ
1Ø6Ø PRINTZN;"CHARACTERS."
1Ø65 FORX=1TO3:POKEM,46:M=M+1:NEXT:POKEM,32
    :M=M+1:POKEM,96
1Ø7Ø PRINT:PRINT"PRESS 'SHIFT' TO BEGIN"
1Ø8Ø WAIT 653,1,Ø
1Ø9Ø POKE5328Ø,Ø:POKE53281,Ø
1Ø95 PRINTCHR$(147)
1Ø99 M=5ØØØ1:RETURN
```

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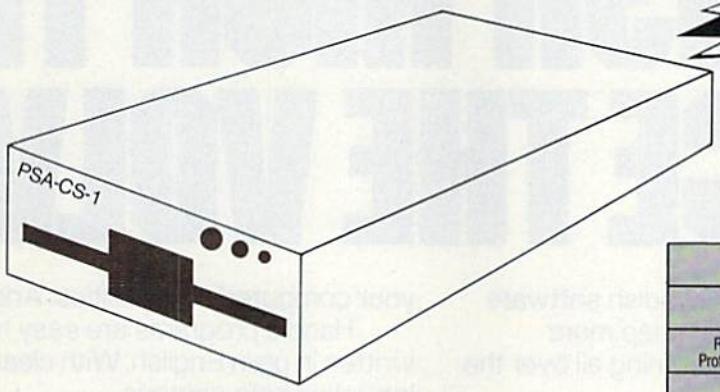

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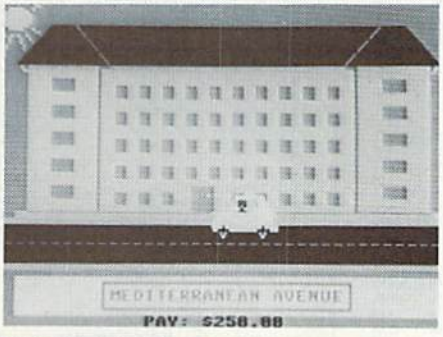

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This article looks closely at the C-128 in relation to its two main competitors, the Apple IIc and IBM PCjr.

The C-128: *How Does It Stack Up?*

By MARGARET MORABITO

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Commodore 64 owners are already chomping at the bit to get the Commodore 128 computer, but they won't be the only ones when the details of this new computer are known. At about $250, the C-128 will be the lowest-priced computer to bridge the gap between home and office use.

If you already have a library of C-64 software and have been considering moving to a more sophisticated machine, then this is the one for you. If you do not already have a C-64, this is a good chance to buy a personal computer that offers a wide range of business, educational and entertainment applications.

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	IBM PCjr	Apple IIc	Commodore 128
Microprocessor	Intel 8088	65C02	Z80A: CP/M mode 8502: 128 and 64 mode
Speed	4.77 MHz	1.02 MHz	4 MHz: CP/M mode 1 or 2 MHz: 128 mode 1.02 MHz: 64 mode
Memory	128K RAM Expandable to 512K	128K RAM Not expandable	128K RAM Expandable to 512K
Disk Storage	360K (built-in)	143K (built-in)	350–410K: 128/CP/M 170K: 64 mode (external)
Cassette	Yes	No	Yes
Cartridge	Yes	No	Yes
Software Compatibility	Partly compatible IBM PC	Mostly compatible Apple IIe	Fully compatible C-64 and CP/M Plus 3.0
Music	3 voices/white noise	1 voice	3 voices/white noise
Hi-Res Color	Yes	Yes	Yes (plus sprites)
Display	20/40/80 TV/monochrome/ color RGB monitor	40/80 TV/monochrome/ color RGB/LCD monitor	40/80 TV/monochrome/ color RGBI monitor
Keyboard	62 keys (no keypad) 10 function keys	63 keys (no keypad) 2 Apple keys	92 keys 14-key numeric keypad 8 function keys
Ports	13	6	9
System	CPU unit Built-in disk drive External keyboard Minimal Microsoft Basic	CPU unit Built-in disk drive Built-in keyboard Applesoft Basic	CPU unit Separate disk drive Built-in keyboard Basic 7.0 and 2.0
Dimensions	14 inches wide 11.5 inches deep 4 inches high 8 pounds (without keyboard)	11.5 inches wide 12 inches deep 2.5 inches high 7.5 pounds	19 inches wide 13 inches deep 2.25 inches high 6 pounds 12 oz.

Table 1. *A comparative look at the features of the IBM PCjr, Apple IIc and Commodore 128.*

	IBM PCjr	Apple IIc	Commodore 128
Base Unit with Disk Drive	$1000	$1100	$550
Monochrome Monitor	$100	$100	$100
RGB Color Monitor	$400	$600	$350
Additional Necessities	DOS $50 Basic $75	RGB interface board $200	None
Total Setup Monochrome	$1225	$1200	$650
Total Setup RGB Color	$1525	$1900	$900

Table 2. *A price comparison of the IBM PCjr, Apple IIc and Commodore 128 systems.*

Note: The prices above are estimates based on the best information available in April, before Commodore announced final prices.

This is Commodore's first step into the personal computer market, directly squaring off against Apple and IBM. The C-128 very nicely fills a need for a realistically priced personal computer that offers the high quality and versatility of systems costing over $1000.

Just because the C-128 costs less than the Apple and IBM personal computers in no way means the 128 lacks quality or features. Commodore advertisements have targeted the Apple IIc and the IBM PCjr as the 128's prime competitors, so my reaction was to look closely at these computers to see exactly what the 128 is up against. Can it really do everything that Apple and IBM claim for *their* personal computers? More?

Microprocessors

The microprocessor, the brain of a computer system, dictates how fast and effectively the computer can perform a task. The C-128 is extraordinary in that it has three operating systems powered by two microprocessors. Each of these commands its own separate computer system; so, in effect, you are really getting three computers in one.

First, it holds a Z80 microprocessor, one of the most powerful 8-bit processors on the market. Found in many personal and professional computer systems, the Z80 allows the C-128 to run CP/M software. Other computer manufacturers, such as Digital Equipment Corporation, NEC, Kaypro and Texas Instruments, offer versions of the CP/M operating system. People familiar with these companies will realize the great value of CP/M capability.

Secondly, the C-128 has a new, custom 8502 microprocessor (fully duplicating the 6510A chip), which runs its C-64 mode. This 8-bit chip has proven itself to be flexible and a real workhorse in the C-64. All software for the 64 will run on the C-128 because of this chip, thereby making it very easy to step up to a more powerful and versatile system.

The 8502 also controls the 128 mode of operation, giving you 123K of usable RAM, advanced Basic 7.0 for programming and superior color and sound capabilities. This microprocessor has already attracted software programmers, as it provides a wonderful opportunity for highly developed software.

The Apple IIc is based on the 65C02 chip, another proven micro-

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processor almost identical to the one in the Apple IIe. This 8-bit microprocessor handles the IIc's 128K by bank-switching 64K sections of memory, similar to the way the Commodore handles its 128K.

The IBM PCjr runs from the Intel 8088. This 16-bit microprocessor handles all of its 128K at one time, rather than in 64K banks. (This article is addressing the enhanced configuration of the PCjr with 128K, not its original configuration, with only 64K.)

For some highly complex arithmetic computations, the PCjr will perform faster than the 8-bit computers. However, for most personal computer applications, the speed of the 16-bit processor won't make a noticeable difference.

All three of these computers have highly capable microprocessors, but, of course, the two processors in the C-128 allow for far greater versatility.

Software

The C-128 easily matches the Apple IIc in the area of software compatibility, with both having a huge base of programs from which to choose. The Apple IIc's compatibility with existing Apple IIe educational and entertainment software has been one of its few marketing strengths.

Apple boasts that 10,000 programs written for the smaller-memory Apple IIs are available to Apple IIc owners. This sounds impressive, but how many educational and game programs does the average person, or even a school, for that matter, really need? Certainly not 10,000.

Of course, Commodore can make the same overwhelming boast. When you buy your C-128, you will have about 6000 programs that can run on your computer in 64 mode. Most of these have been developed within the past two years, rather than as long as six years ago, as is the case for some of the Apple II family.

There are two major differences between the IIc and the C-128 when it comes to software compatibility and potential software development in the future. First, the C-128 will have a huge amount of existing CP/M software from which to choose. It can read eight CP/M formats including those for Osborne, Kaypro, Epson and IBM CP/M 86.

Thus it can use thousands of commercially available CP/M programs, most of which are designed for business, not education. Thousands more are available from public-domain sources, such as CP/M user's groups.

Second, the C-128 is memory-expandable; the IIc is not. The C-128's ability to expand up to 512K opens up even more applications and should motivate lots of software development. The IIc, unfortunately, relies heavily on existing software developed for the 64K Apple IIe and, without memory expansion, will not attract as much new software development.

The PCjr is targeted toward a different audience than the IIc, and this is reflected in its software offerings. Unlike the IIc's attachment to a student clientele, the PCjr attracts the business user working at home. With its enhanced 128K configuration, the PCjr can run up to 1000 IBM PC programs; with even more memory added on, it could run 2000 of the existing programs.

The PCjr has been weak in the educational and entertainment fields; it shines, however, in the area of serious business applications, which it inherits from the higher-end IBM PC. Furthermore, like the C-128, it is memory expandable up to 512K.

In order to tap the high-end software market of the IBM PC for your PCjr, you must buy 128K add-on modules (over $300 each) plus a power supply ($170) for every two add-on modules. And, of course, you have to

Continued on p. 90.

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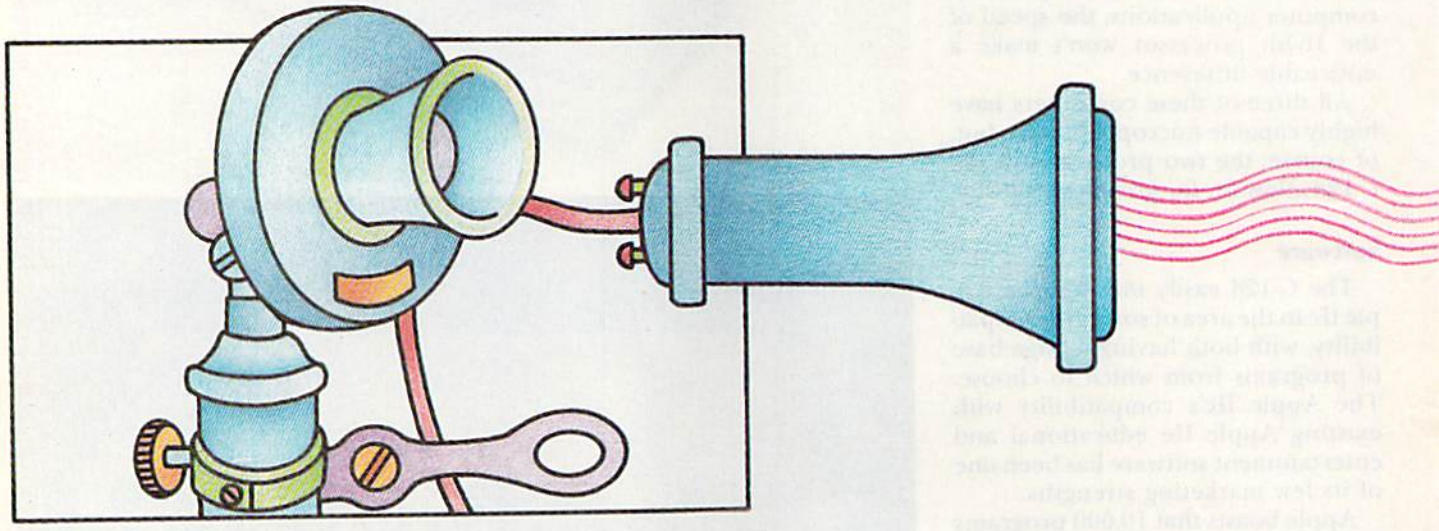

This disk utility has a remedy for just about all your disk problems and is a valuable tool for regular disk checkups.

Oops! You have just scratched, or erased, an important program from your disk. Now, what are you going to do? Before you leap out that window, call the doctor—Disk Doctor, that is.

Disk Doctor will restore your senses by restoring those programs or files you've scratched. And that's not all. Disk Doctor is a disk-utility program with many useful functions.

Program Restoration

When you run Disk Doctor, the following menu will appear on the screen.

RUN It Right

C-64; C-128 (in C-64 mode); VIC-20; disk drive

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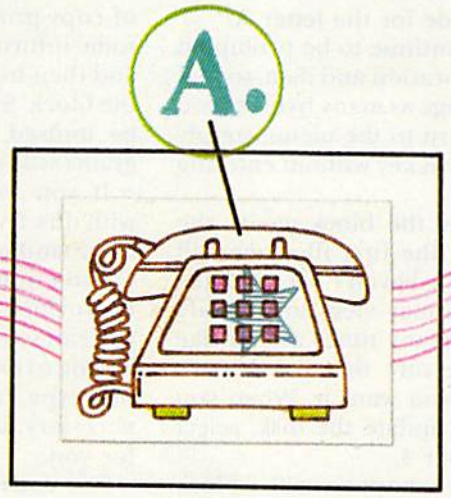

Call the Doctor

By JOHN TANZINI

select a number
1. list directory
2. restore a file
3. pack directory
4. list used blocks
5. view or modify block
6. format disk
7. send disk command
press E to end

To select an option from the menu, simply press its corresponding number key.

Most of you will be interested in the ability to restore programs that have been scratched. When a program is scratched, nothing is actually erased. The directory slot is merely reserved until a new program is saved. At that time, the new program replaces the scratched program in the directory.

If many programs are scratched at one time, it will be a while before they are all written over by new programs. Sometimes a very old program can be recovered.

The first selection in the menu is provided to aid you in restoring programs. The listing will appear different from the usual directory listing. All items in the directory will be displayed, including scratched files, which will be displayed in reverse video.

If a file no longer remains in the directory, it will be impossible to restore. If a file still appears (in reverse video) when the directory is listed, you may attempt to bring it back.

Even though a program name remains in the directory, the program itself may have been overwritten. There is, however, no harm in trying to restore a program. You will be informed whether or not the attempt was successful.

As the directory is listed, items will scroll off the top of the screen. To freeze the screen, press any key. To resume the listing, press any key again.

Press the E key if you wish to end the listing, and the menu will reappear on the screen. This technique for ending an option or freezing the screen is the same in other parts of this program where items scroll off the screen.

When you want to try restoring a program, select number 2 in the menu. You will be asked for the filename. After you enter it and press the return key, a new menu will appear:

Is the file a
1. program
2. sequential file

Program files and sequential files are the only types of files that can be successfully restored. Make the appropriate selection and wait for the program to do its work. When it is finished, you will be given one of three possible messages: Cannot Restore, Successful Restore or Partial Restore.

It is possible that part of the file is recoverable while the rest of the program has been written over. Even when the Successful Restore message appears, you should verify that the file is the one you expected. Though very rare, it is possible that a new file has overwritten the old one and then been scratched. Disk Doctor has no way of knowing that it has latched onto the wrong file.

Modify a Block

A very powerful capability provided by Disk Doctor is the ability to modify data stored anywhere on the

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disk. That's how this program is able to restore a file that's been scratched. The appropriate bytes in the disk directory are modified to indicate that the program still exists.

Of course, if you wish to modify the directory, you must understand the format and conventions used by the disk operating system. If you do not, you risk corrupting the entire disk.

Don't be afraid to fool around with a practice disk, since you cannot physically damage the disk in any way. Plenty of directories were rendered unreadable while debugging Disk Doctor.

You can use Disk Doctor to help you learn about the format of the directory. It provides you with a way to examine the data contained on any block. Try selecting item number 5 (view or modify block) from the main menu, and you will be presented with a new menu:

```
1. read block
2. view block
3. modify block
4. write block back
press E to exit
```

Let's read a block from the directory. Select item number 1 (read block). When the screen prompts you for the track and sector, type in 18,1 and press the return key.

The disk directory is stored entirely on track 18. Sector 0 is the first sector in the directory; however, sector 1 is the first sector containing filenames.

A few seconds after reading in a block, the menu shown above will reappear on the screen. Select item number 2 to view the contents of the block.

Since the screen is not large enough to display the entire block at once, only the first 64 of the 256 bytes in a block will appear. The bytes are numbered from 0 to 255. This number is shown in the left-hand column.

The next four columns are data from the block, shown in decimal. The four columns after that are the ASCII characters represented by the data.

If you have any programs stored on the disk, you will see their names on the screen. To view the next 64 elements, simply press any key. As usual, pressing E will end the display and return you to the menu from which you came.

If you feel daring, try changing one of the letters in a program name stored on this block. View the block again and note the location of the letter you want to change. Return to the menu and select item number 3.

You will be prompted for the location of the byte and the data you would like to put into that location. The location is the number from 0 to 255, shown in the first column when the block is viewed; it is not the track or sector. You are always modifying the track and sector that you last read in.

For example, enter 5 as the location and 65 as the data. 5 is the location of the first letter of the first filename in the directory, and 65 is the ASCII code for the letter A.

You will continue to be prompted for another location and data, so that you may change as many bytes as you wish. To return to the menu, simply press the return key without entering any numbers.

If you view the block again, the first letter of the first filename will be A. But you haven't yet changed the disk. You may view and modify the block as many times as you like until you are sure that you have it just the way you want it. When you are ready to update the disk, select option number 4.

When you attempt to write a block back to the disk, you will be asked for the track and sector of the block. Notice, though, that the track and sector of the last block read in already appear under the cursor. If you want to write back to the same block, then simply press the return key. If, instead, you wish to write back to a different block, overstrike the old track and sector with the new numbers and press the return key.

You will be asked one final question before the block is written back to the disk—"Are you sure? (Y/N)." This gives you a way out if you selected option number 4 by mistake. Pressing Y will result in permanently changing the disk. Any other key will return you to the menu.

And There's More

You have probably noticed that each program you save on a new disk appears at the end of the directory. After you scratch a number of programs, however, successive program entries are no longer placed at the end. Rather, they replace scratched files, thus acquiring random locations. This makes it difficult to find the latest version of a program.

Selecting item 3 in the main menu will compress the directory, filling in any holes left by scratched programs. From then on, programs will be added to the end of the directory. (This, however, decreases the chances of being able to restore a scratched program.)

Selecting option number 4 in the main menu will list the track and sector of all used blocks on the disk. It does this by examining the block allocation map (BAM) stored on track 18, sector 0.

As files are stored on a disk, the disk operating system keeps track of which blocks it uses by marking those blocks in the BAM. One simple way of copy-protecting a disk is to store some information on a specific block and then to alter the BAM by freeing the block. Since the block appears to be unused, most disk-copying programs will not copy that block.

If you would like to experiment with this, try sending a Block Allocate command or a Block Free command. Option number 7 in the main menu is provided as a convenience, so that you can send disk commands without having to exit the program. You need only type in the actual command. All necessary files are opened and closed for you.

For example, to send a Block Allocate command that will allocate track 1, sector 2, first select the Send Disk command option. The proper format for the Block Allocate command is:

```
B-A:0,1,2
```

The format for the corresponding Block Free command is:

```
B-F:0,1,2
```

Files can be scratched using the Send Disk command option. To scratch a program named Disk Doctor, you would send the following command:

```
S:DISK DOCTOR
```

Any valid disk command can be sent in this way, but remember that Save and Load are not disk commands; they are Basic commands.

Option number 6 is a simple subroutine, again provided for convenience. It is used to format a disk. Since the New command is used infrequently, most people forget the exact syntax and must consult the disk manual. Disk Doctor will send the command for you, merely asking you for the disk name and ID.

Entering the Program

Disk Doctor is a fairly lengthy program. It requires approximately 11K of memory to run. This will be no problem for those of you with Com-

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modore 64s, but owners of VIC-20s will need at least an 8K memory expander to run the entire program.

While developing this program, I realized that some of you would not possess the required memory or might not be interested in all the functions of Disk Doctor. I therefore designed Disk Doctor so that you could omit parts of the program.

A glance at Listing 1 shows that there are seven separate parts to this program. The main program (lines 1070–1200) and the disk-error subroutine (lines 1260–1310) should always be typed in. After that, parts 1–7 are clearly marked by REM statements.

Suppose, for example, that you have no interest in packing the directory. From the listing, you can see that the Pack-Directory subroutine starts at line 2610. You can leave out the entire subroutine (lines 2610–3680), but you must add one extra statement:

```
2610 RETURN
```

Make sure that you replace the first statement, not the REM statement, with a Return instruction.

Modifying the program as shown above prevents any errors from occurring as a result of the omitted subroutine. The main menu will still show packing the directory as an option, but nothing will happen when that option is selected.

Those of you with a little programming skill will find it easy to sort through the main program and remove unused options from the menu. Line 1190 is the statement that controls the branch to a subroutine based on input from the keyboard.

Some of you may be interested in only one part of Disk Doctor. Each one of the seven parts of this program can be used as an individual program, provided that you include the Disk Error subroutine with it.

Suppose you are only interested in part 5—view or modify block. First type in the Disk Error subroutine (lines 1260–1310). Next, type in all of part 5 (lines 3810–4700). You then must add one more statement:

```
10 GOSUB 3810: END
```

This statement merely branches to the desired subroutine—in this case, line 3810. If you enter a different part of the program, you must GOSUB to the first line in that part.

Regardless of whether you enter the entire program or only parts of it, I advise that you first check it out on a practice disk (that is, a disk with no important programs). A typing error in this program can result in an unreadable disk.

I would like to stress once again that you cannot physically damage the disk, but you can lose data stored on the disk. Reformatting the disk will always make the disk usable again.

If you would like to save yourself the trouble of entering this program by hand, I will mail you a copy if you send me $4, a blank disk and a self-addressed stamped envelope. Address your request to "Disk Doctor" instead of my name.

Final Words

Disk Doctor is a fairly easy program to use. It may seem as though there's a lot to remember, but the program prompts you for any information that it needs.

Usually, when an option is selected, the program will open a disk file, then close the file when you return to the main menu. Since you should not change disks without closing all the files, I suggest you only change disks when in the main menu.

Extensive error checking is performed by reading the disk-error channel each time a disk operation is performed. Disk Doctor automatically prints out a message informing you of the error, should one occur. Reading the error channel clears the error so that you may proceed without exiting the program.

I am certain that you will find Disk Doctor a valuable addition to your utility programs. Even if you never need any of these functions to doctor your disks, you can use this program to learn how data is kept track of and stored on the disk.

You can also use the listing of this program to learn how disk operations are performed, clearly a help in writing your own programs. And since the examples given in your disk-drive manual usually do not work, you can check this program to determine the correct syntax of many disk commands.

So don't be afraid to "play" with your disk drive. It is a valuable piece of equipment, and the more you know about it, the more your computer can do for you. R

Address all author correspondence to John Tanzini, 7 Dogwood Lane, Hamilton Square, NJ 08690.

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Listing 1. *Disk Doctor program.*

```
1000 REM-----------------------
1010 REM-{21 SPACEs}-
1020 REM-{5 SPACEs}DISK DOCTOR{5 SPACEs}-
1030 REM-{21 SPACEs}-
1040 REM-{3 SPACEs}BY JOHN TANZINI{3 SPACEs
     }-
1050 REM-{21 SPACEs}-
1060 REM-----------------------
1070 PRINT "{SHFT CLR}{CTRL 9}SELECT A NUMB
     ER.": PRINT
1080 PRINT "{CRSR RT}1. LIST DIRECTORY": PR
     INT
1090 PRINT "{CRSR RT}2. RESTORE A FILE": PR
     INT
1100 PRINT "{CRSR RT}3. PACK DIRECTORY": PR
     INT
1110 PRINT "{CRSR RT}4. LIST USED BLOCKS":
     PRINT
1120 PRINT "{CRSR RT}5. VIEW OR MODIFY": PR
     INT "{4 CRSR RTs}BLOCK": PRINT
1130 PRINT "{CRSR RT}6. FORMAT DISK": PRINT
1140 PRINT "{CRSR RT}7. SEND DISK COMMAND":
      PRINT
1150 PRINT: PRINT: PRINT "{CTRL 9}PRESS E T
     O END."
1160 GET KK$: IF KK$="" THEN 1160
1170 IF KK$="E" THEN PRINT "{SHFT CLR}";: E
     ND
1180 KK = VAL(KK$)
1190 ON KK GOSUB 1380, 1720, 2610, 3350, 38
     10, 4770, 4950
1200 GOTO 1070
1210 REM----------------------------
1220 REM-{27 SPACEs}-
1230 REM-{3 SPACEs}DISK ERROR SUBROUTINE{3
     SPACEs}-
1240 REM-{27 SPACEs}-
1250 REM----------------------------
1260 PRINT: PRINT: PRINT "**** DISK ERROR *
     ***"
1270 PRINT: PRINT E1$;" ";E2$;" ";E3$;" ";E
     4$
1280 PRINT: PRINT "PRESS ANY KEY TO"
1290 PRINT "RETURN TO MENU"
1300 GET K$: IF K$="" THEN 1300
1310 RETURN
1320 REM----------------------------
1330 REM-{27 SPACEs}-
1340 REM-{9 SPACEs}PART 1{12 SPACEs}-
1350 REM-{3 SPACEs}LIST ENTIRE DIRECTORY{3
     SPACEs}-
1360 REM-{27 SPACEs}-
1370 REM----------------------------
1380 OPEN 15,8,15
1390 OPEN 2,8,2,"#2"
1400 T = 18: S = 1: PRINT "{SHFT CLR}"
1410 PRINT#15,"U1:";2;8;T;S
1420 INPUT#15, E1$, E2$, E3$, E4$
1430 IF E1$<>"00" THEN GOSUB 1260: GOTO 164
     0
1440 PRINT#15,"B-P:";2;0
1450 GET#2,T$: GET#2, S$
1460 FOR I = 2 TO 226 STEP 32
1470 PRINT#15,"B-P:";2;I
1480 GET#2, A$: IF A$="" THEN PRINT "{CTRL
     9}";
1490 GET#2, A$: GET#2, A$
1500 PRINT "{2 CRSR RTs}";
1510 FOR J = 1 TO 16
1520 GET#2, A$: PRINT A$;
1530 NEXT
1540 IF S = 1 THEN PRINT: PRINT
1550 GET K$: IF K$="" THEN 1590
1560 IF K$="E" THEN 1640
1570 GET K$: IF K$="" THEN GOTO 1570
1580 IF K$="E" THEN 1640
1590 NEXT
1600 T = ASC(T$+CHR$(0)): S = ASC(S$+CHR$(0
     ))
1610 IF T>0 AND T<36 THEN GOTO 1410
1620 PRINT: PRINT "PRESS ANY KEY TO": PRINT
      "RETURN TO MENU"
1630 GET K$: IF K$="" THEN 1630
1640 CLOSE 2: CLOSE 15
1650 RETURN
1660 REM----------------------------
1670 REM-{26 SPACEs}-
1680 REM-{9 SPACEs}PART 2
1690 REM-{2 SPACEs}RESTORE SCRATCHED FILE{2
      SPACEs}-
1700 REM-{26 SPACEs}-
1710 REM----------------------------
1720 PRINT "{SHFT CLR}{CRSR DN}ENTER NAME O
     F FILE{CRSR DN}"
1730 INPUT N1$
1740 PRINT: PRINT: PRINT "IS THE FILE A"
1750 PRINT: PRINT "{CRSR RT}1. PROGRAM"
1760 PRINT: PRINT "{CRSR RT}2. SEQUENTIAL F
     ILE"
1770 GET K$: IF K$="1" THEN FT = 130: GOTO
     1800
1780 IF K$="2" THEN FT = 129: GOTO 1800
1790 GOTO 1770
1800 PRINT: PRINT: PRINT "RESTORING{CRSR RT
     }"; N1$
1810 OPEN 15,8,15
1820 OPEN 2,8,2,"#0"
1830 OPEN 3,8,3,"#1"
1840 GOSUB 2350: REM FIND FILE IN DIRECTORY
1850 IF PT=0 THEN 2040; REM CANNOT RESTORE
1860 PRINT#15,"B-A:";0;PT;PS
1870 INPUT#15,E1$,E2$,E3$,E4$
1880 IF E1$<>"00" AND E1$<>"65" THEN GOSUB
     1260: RETURN
1890 IF E1$="65" THEN 2040: REM CANNOT REST
     ORE
1900 PRINT#15,"U1:";3;0;PT;PS
1910 LT = PT: LS = PS
1920 PRINT#15,"B-P:";3;0
1930 GET#3,PT$: GET#3,PS$
1940 PT = ASC(PT$+CHR$(0)): PS = ASC(PS$+CH
     R$(0))
1950 IF PT=0 THEN GOTO 2100: REM SUCCESSFUL
      RESTORE
1960 PRINT#15,"B-A:";0;PT;PS
1970 INPUT#15,E1$,E2$,E3$,E4$
1980 IF E1$<>"65" AND E1$<>"00" THEN GOSUB
     1260: RETURN
1990 IF E1$="65" THEN 2180: REM PARTIAL RES
     TORE
2000 GOTO 1900: REM READ ANOTHER BLOCK
2010 REM
2020 REM ----- CANNOT RESTORE -----
2030 REM
2040 PRINT: PRINT: PRINT "*** CANNOT{2 SPAC
     Es}***"
2050 PRINT "*** RESTORE ***"
2060 GOTO 2280
2070 REM
2080 REM ----- SUCCESSFUL RESTORE -----
2090 REM
2100 PRINT#15,"B-P:";2;DP
2110 PRINT#2,CHR$(FT);
2120 PRINT#15,"U2:";2;0;T;S
2130 PRINT: PRINT: PRINT "*** SUCCESSFUL **
     *": PRINT "***{2 SPACEs}RESTORE{3 SPAC
     Es}***"
```

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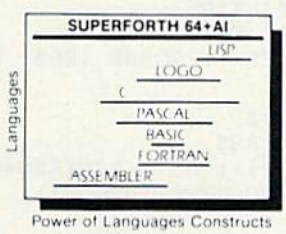

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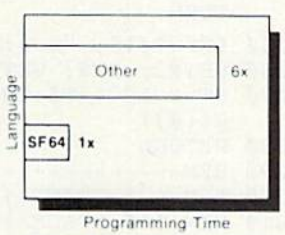

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Listing 1 continued.

```
214Ø GOTO 228Ø
215Ø REM
216Ø REM ----- PARTIAL RESTORE -----
217Ø REM
218Ø PRINT#15,"B-P:";2;DP
219Ø PRINT#2,CHR$(FT);
22ØØ PRINT#15,"U2:";2;Ø;T;S
221Ø PRINT#15,"B-P:";3;Ø
222Ø PRINT#3,CHR$(Ø);
223Ø PRINT#15,"B-P:";3;248
224Ø FOR Z = 1 TO 8: PRINT#3,CHR$(Ø);: NEXT
225Ø PRINT#15,"U2:";3;Ø;LT;LS
226Ø PRINT: PRINT: PRINT "*** PARTIAL ***"
227Ø PRINT "*** RESTORE ***"
228Ø PRINT: PRINT "PRESS ANY KEY TO": PRINT
     "RETURN TO MENU"
229Ø GET K$: IF K$="" THEN GOTO 229Ø
23ØØ CLOSE 2: CLOSE 3: CLOSE 15
231Ø RETURN
232Ø REM
233Ø REM ---- FIND TRACK AND SECTOR OF FILE
     ----
234Ø REM
235Ø T = 18: S = 1
236Ø PRINT#15,"U1:";2;8;T;S
237Ø INPUT#15, E1$, E2$, E3$, E4$
238Ø IF E1$<>"ØØ" THEN GOSUB 126Ø: PT = Ø:
     GOTO 254Ø
239Ø PRINT#15,"B-P:";2;Ø
24ØØ GET#2,T$: GET#2, S$
241Ø FOR I = 2 TO 226 STEP 32
242Ø PRINT#15,"B-P:";2;I
243Ø GET#2, A$: IF A$<>"" THEN 25ØØ
244Ø GET#2, PT$: GET#2, PS$
245Ø N2$ = ""
246Ø FOR J = 1 TO 16
247Ø GET#2, A$: IF A$<>CHR$(16Ø) THEN N2$=N
     2$+A$
248Ø NEXT
249Ø IF N1$=N2$ THEN PT=ASC(PT$+CHR$(Ø)):PS
     =ASC(PS$+CHR$(Ø)): DP = I:RETURN
25ØØ NEXT
251Ø T = ASC(T$+CHR$(Ø)): S = ASC(S$+CHR$(Ø
     ))
252Ø IF T>Ø AND T<36 THEN GOTO 236Ø
253Ø PT = Ø
254Ø RETURN
255Ø REM----------------------
256Ø REM-{2Ø SPACEs}-
257Ø REM-{7 SPACEs}PART 3{7 SPACEs}-
258Ø REM-{3 SPACEs}PACK DIRECTORY{3 SPACEs}
259Ø REM-{2Ø SPACEs}-
26ØØ REM----------------------
261Ø PRINT "{SHFT CLR}{2 CRSR DNs}IS CORREC
     T DISK IN": PRINT "DRIVE? (Y/N)
262Ø GET K$: IF K$="" THEN 262Ø
263Ø IF K$<>"Y" THEN RETURN
264Ø PRINT: PRINT: PRINT
265Ø PRINT "{3 CRSR RTs}*************"
266Ø PRINT "{3 CRSR RTs}*{2 SPACEs}PACKING{
     2 SPACEs}*
267Ø PRINT "{3 CRSR RTs}*************"
268Ø OPEN 15,8,15
269Ø OPEN 2,8,2,"#Ø"
27ØØ OPEN 3,8,3,"#1"
271Ø RT = 18: RS = 1
272Ø WT = 18: WS = 1
273Ø LT = Ø
274Ø DF = Ø
275Ø EF = Ø
276Ø GOSUB 3Ø6Ø: REM NEXT-WRITE-BLOCK
277Ø IF EF=1 THEN 3Ø1Ø
278Ø GOSUB 322Ø: REM NEXT-READ-BLOCK
279Ø IF EF=1 THEN 3Ø1Ø
28ØØ FOR RI = 2 TO 226{2 SPACEs}STEP 32
281Ø PRINT#15, "B-P:";3;RI
282Ø GET#3, FT$
283Ø IF FT$="" THEN 292Ø
284Ø IF WI>255 THEN GOSUB 3Ø6Ø: REM NEXT-WR
     ITE-BLOCK
285Ø IF EF=1 THEN 3Ø1Ø
286Ø PRINT#15, "B-P:";2;WI
287Ø PRINT#2, FT$;
288Ø FOR I = 1 TO 29
289Ø GET#3, A$: PRINT#2, LEFT$(A$+CHR$(Ø),1
     );
29ØØ NEXT I
291Ø WI = WI + 32
292Ø NEXT RI
293Ø IF RT<>Ø THEN 278Ø
294Ø IF WI<255 THEN GOTO 297Ø
295Ø GOSUB 3Ø6Ø: REM NEXT-WRITE-BLOCK
296Ø IF DF = 1 THEN 3Ø1Ø
297Ø PRINT#15, "B-P:";2;WI
298Ø PRINT#2,CHR$(Ø);
299Ø WI = WI + 32
3ØØØ GOTO 294Ø
3Ø1Ø CLOSE 2: CLOSE 3: CLOSE 15
3Ø2Ø RETURN
3Ø3Ø REM
3Ø4Ø REM ---- NEXT-WRITE-BLOCK ----
3Ø5Ø REM
3Ø6Ø IF LT<>Ø THEN PRINT#15, "U2:";2;Ø;LT;L
     S
3Ø7Ø INPUT#15, E1$, E2$, E3$, E4$
3Ø8Ø IF E1$<>"ØØ" THEN EF=1: GOSUB 126Ø: RE
     TURN
3Ø9Ø LT = WT: LS = WS
31ØØ IF WT=Ø THEN DF = 1: RETURN
311Ø PRINT#15, "U1:";2;Ø;WT;WS
312Ø INPUT#15, E1$, E2$, E3$, E4$
313Ø IF E1$<>"ØØ" THEN EF=1: GOSUB 126Ø: RE
     TURN
314Ø PRINT#15, "B-P:";2;Ø
315Ø GET#2, WT$: GET#2, WS$
316Ø WT = ASC(WT$+CHR$(Ø)): WS = ASC(WS$+CH
     R$(Ø))
317Ø WI = 2
318Ø RETURN
319Ø REM
32ØØ REM ---- NEXT-READ-BLOCK ----
321Ø REM
322Ø PRINT#15,"U1:";3;Ø;RT;RS
323Ø INPUT#15, E1$, E2$, E3$, E4$
324Ø IF E1$<>"ØØ" THEN EF=1: GOSUB 126Ø: RE
     TURN
325Ø PRINT#15, "B=P:";3;Ø
326Ø GET#3, RT$: GET#3, RS$
327Ø RT = ASC(RT$+CHR$(Ø)): RS = ASC(RS$+CH
     R$(Ø))
328Ø RETURN
329Ø REM--------------------------
33ØØ REM-{25 SPACEs}-
331Ø REM-{1Ø SPACEs}PART 4{9 SPACEs}-
332Ø REM-{2 SPACEs}LIST ALLOCATED BLOCKS{2
     SPACEs}-
333Ø REM-{25 SPACEs}-
334Ø REM--------------------------
335Ø IF LF=Ø THEN DIM BM%(35,4): LF = 1
336Ø PRINT "{SHFT CLR}"; TAB(4); "TRACK"; T
     AB(1Ø); "SECTOR": PRINT
337Ø OPEN 15,8,15
338Ø OPEN 2,8,2,"#Ø"
339Ø PRINT#15, "U1:";2;Ø;18;Ø
34ØØ INPUT#15, E1$, E2$, E3$, E4$
341Ø IF E1$<>"ØØ" THEN GOSUB 126Ø: GOTO 372
     Ø
342Ø PRINT#15, "B-P:";2;4
343Ø FOR T = 1 TO 35
344Ø FOR J = Ø TO 3
```

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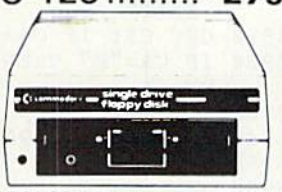

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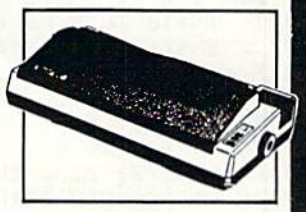

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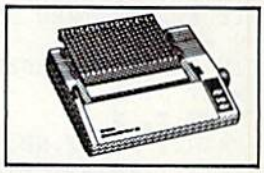

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Listing 1 continued.

```
345Ø GET#2, A$
346Ø BM%(T,J) = ASC(A$+CHR$(Ø))
347Ø NEXT J, T
348Ø RESTORE
349Ø NB = Ø
35ØØ FOR N = 1 TO 4
351Ø READ T1, T2, NS
352Ø FOR T = T1 TO T2
353Ø IF T<>18 THEN NB = NB + BM%(T,Ø)
354Ø IF BM%(T,Ø)=NS THEN 368Ø
355Ø S = Ø
356Ø FOR I = 1 TO 3
357Ø B2 = BM%(T,I)
358Ø FOR J = 1 TO 8
359Ø B1 = B2/2: B2 = INT(B1)
36ØØ IF B1=B2 THEN PRINT TAB(4); T; TAB(11)
     ; S
361Ø GET K$: IF K$="" THEN 365Ø
362Ø IF K$="E" THEN 372Ø
363Ø GET K$: IF K$="" THEN 363Ø
364Ø IF K$="E" THEN 372Ø
365Ø S = S + 1
366Ø IF S=NS THEN 368Ø
367Ø NEXT J, I
368Ø NEXT T, N
369Ø PRINT: PRINT NB; "BLOCKS FREE.": PRINT
37ØØ PRINT: PRINT "PRESS ANY KEY TO": PRINT
      "RETURN TO MENU"
371Ø GET K$: IF K$="" THEN 371Ø
372Ø CLOSE 2: CLOSE 15
373Ø RETURN
374Ø DATA 1,17,21,18,24,19,25,3Ø,18,31,35,1
     7
375Ø REM-------------------------
376Ø REM-{24 SPACEs}-
377Ø REM-{8 SPACEs}PART 5{1Ø SPACEs}-
378Ø REM-{2 SPACEs}VIEW OR MODIFY BLOCK{2 S
     PACEs}-
379Ø REM-{24 SPACEs}-
38ØØ REM-------------------------
381Ø IF VF=Ø THEN DIM B%(255): VF = 1
382Ø OPEN 15,8,15
383Ø OPEN 2,8,2,"#Ø"
384Ø PRINT "{SHFT CLR} ALL NUMBERS DECIMAL"
385Ø PRINT "---------------------": PRINT:
     PRINT
386Ø PRINT " 1. READ BLOCK": PRINT
387Ø PRINT " 2. VIEW BLOCK": PRINT
388Ø PRINT " 3. MODIFY BLOCK": PRINT
389Ø PRINT " 4. WRITE BLOCK BACK"
39ØØ PRINT: PRINT: PRINT: PRINT "PRESS E TO
     EXIT"
391Ø GET C$: IF C$="" THEN 391Ø
392Ø IF C$="E" THEN CLOSE 2: CLOSE 15: RETU
     RN
393Ø C = VAL(C$)
394Ø ON C GOSUB 399Ø, 413Ø, 44ØØ, 453Ø
395Ø GOTO 384Ø
396Ø REM
397Ø REM---- BLOCK READ ----
398Ø REM
399Ø PRINT "{SHFT CLR}{4 CRSR DNs}ENTER TRA
     CK, SECTOR"
4ØØØ INPUT TT, SS
4Ø1Ø PRINT#15, "U1:";2;Ø;TT;SS
4Ø2Ø INPUT#15, E1$, E2$, E3$, E4$
4Ø3Ø IF E1$<>"ØØ" THEN GOSUB 126Ø: RETURN
4Ø4Ø PRINT#15,"B-P:";2;Ø
4Ø5Ø FOR I = Ø TO 255
4Ø6Ø GET#2, A$
4Ø7Ø B%(I) = ASC(A$ + CHR$(Ø))
4Ø8Ø NEXT
4Ø9Ø RETURN
41ØØ REM
411Ø REM---- VIEW BLOCK ----
412Ø REM
413Ø FOR I = Ø TO 3
414Ø PRINT "{SHFT CLR}TRACK ="; TT; "{CRSR
     RT}SECT ="; SS: PRINT
415Ø FOR J = Ø TO 15
416Ø N = 4*J + 64*I
417Ø S2$ = ""
418Ø S1$ = RIGHT$("{3 SPACEs}"+STR$(N),3) +
      CHR$(125)
419Ø FOR K = Ø TO 1
42ØØ M = N + 2*K
421Ø S1$=S1$+RIGHT$("{3 SPACEs}"+STR$(B%(M)
     ),3)+"{CTRL 9}"+RIGHT$("{3 SPACEs}"+ST
     R$(B%(M+1)),3)+"{CTRL Ø}"
422Ø A$ = CHR$(32)
423Ø IF B%(M)>31 THEN IF B%(M)<123 THEN A$
     = CHR$(B%(M))
424Ø S2$ = S2$ + A$
425Ø A$ = CHR$(32)
426Ø IF B%(M+1)>31 THEN IF B%(M+1)<123 THEN
      A$ = CHR$(B%(M+1))
427Ø S2$ = S2$ + A$
428Ø NEXT K
429Ø PRINT S1$; CHR$(125); S2$
43ØØ NEXT J
431Ø PRINT: PRINT: PRINT "PRESS ANY KEY TO
     CONT"
432Ø PRINT TAB(12); "E TO END"
433Ø GET K$: IF K$="" THEN 433Ø
434Ø IF K$="E" THEN RETURN
435Ø NEXT I
436Ø RETURN
437Ø REM
438Ø REM---- CHANGE BLK ----
439Ø REM
44ØØ PRINT "{SHFT CLR}PRESS {CTRL 9}RETURN{
     CTRL Ø} TO"
```


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```
441Ø PRINT "RETURN TO MENU.": PRINT: PRINT:
      PRINT
442Ø PRINT "ENTER LOCATION, DATA"
443Ø L = -1: D = -1
444Ø INPUT "(Ø-255)"; L, D
445Ø IF (L<Ø)OR(D<Ø) THEN RETURN
446Ø IF L>255 OR D>255 THEN PRINT "* NUMBER
      TOO LARGE *": PRINT: GOTO 442Ø
447Ø B%(L) = D
448Ø PRINT
449Ø GOTO 442Ø
45ØØ REM
451Ø REM---- BLOCK WRITE ----
452Ø REM
453Ø PRINT "{SHFT CLR}{7 CRSR DNs}"; TAB(1)
    ; TT; "{CRSR LF},"; SS
454Ø PRINT "{2 CRSR UPs}ENTER TRACK, SECTOR
    "
455Ø INPUT TT, SS
456Ø PRINT "{3 CRSR DNs}ARE YOU SURE? (Y/N)
457Ø GET A$: IF A$="" THEN GOTO 457Ø
458Ø IF A$<>"Y" THEN RETURN
459Ø PRINT
46ØØ PRINT "{CRSR RT}********************"
461Ø PRINT "{CRSR RT}*{2 SPACEs}WRITING BLO
    CK{2 SPACEs}*"
462Ø PRINT "{CRSR RT}********************"
463Ø PRINT#15,"B-P:";2;Ø
464Ø FOR L = Ø TO 255
465Ø PRINT#2, CHR$(B%(L));
466Ø NEXT L
467Ø PRINT#15, "U2:";2;Ø;TT;SS
468Ø INPUT#15, E1$, E2$, E3$, E4$
469Ø IF E1$<>"ØØ" THEN GOSUB 126Ø: RETURN
47ØØ RETURN
471Ø REM-----------------------
472Ø REM-{21 SPACEs}-
473Ø REM-{8 SPACEs}PART 6{7 SPACEs}-
474Ø REM-{4 SPACEs}FORMAT A DISK{4 SPACEs}-
475Ø REM-{21 SPACEs}-
476Ø REM-----------------------
477Ø PRINT "{SHFT CLR}{2 CRSR DNs}ENTER NAM
    E OF DISK"
478Ø INPUT NA$
479Ø PRINT "{CRSR DN}DISK I.D."
48ØØ INPUT ID$
481Ø PRINT "{2 CRSR DNs}IS CORRECT DISK IN"
    : PRINT "DRIVE? (Y/N)"
482Ø GET K$: IF K$="" THEN 482Ø
483Ø IF K$<>"Y" THEN RETURN
484Ø OPEN 15,8,15,"N:"+NA$+","+ID$
485Ø INPUT#15, E1$, E2$, E3$, E4$
486Ø IF E1$<>"ØØ" THEN GOSUB 126Ø
487Ø CLOSE 15
488Ø RETURN
489Ø REM-----------------------
49ØØ REM-{21 SPACEs}-
491Ø REM-{8 SPACEs}PART 7{7 SPACEs}-
492Ø REM-{2 SPACEs}SEND DISK COMMAND{2 SPAC
    Es}-
493Ø REM-{21 SPACEs}-
494Ø REM-----------------------
495Ø PRINT "{SHFT CLR}{2 CRSR DNs}ENTER DIS
    K COMMAND": PRINT: PRINT "?{CRSR RT}";
496Ø C$ = ""
497Ø SYS 65487
498Ø C = PEEK(78Ø)
499Ø IF C<>13 THEN C$ = C$ + CHR$(C): GOTO
    497Ø
5ØØØ OPEN 15,8,15: OPEN 2,8,2,"#"
5Ø1Ø PRINT#15, C$
5Ø2Ø INPUT#15, E1$, E2$, E3$, E4$
5Ø3Ø IF E1$<>"ØØ" AND E1$<>"Ø1" THEN GOSUB
    126Ø
5Ø4Ø CLOSE 2: CLOSE 15
5Ø5Ø RETURN
```

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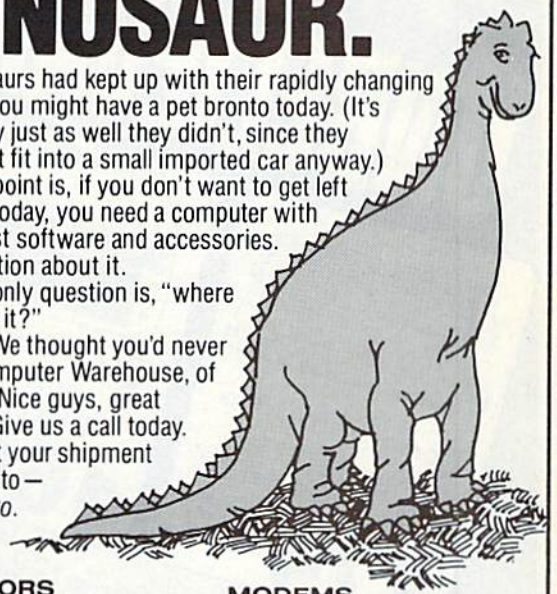

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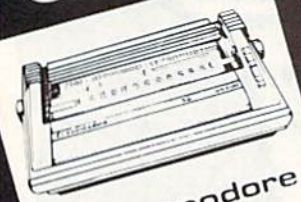

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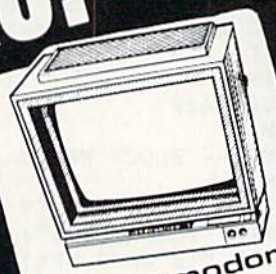

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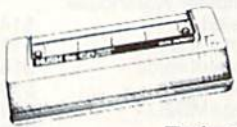

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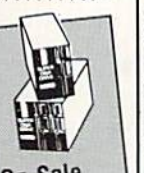

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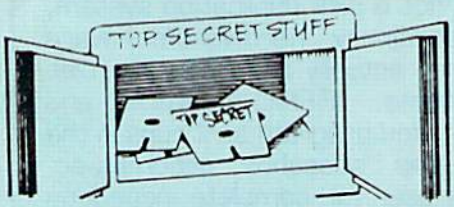

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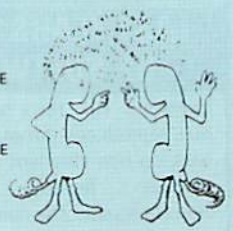

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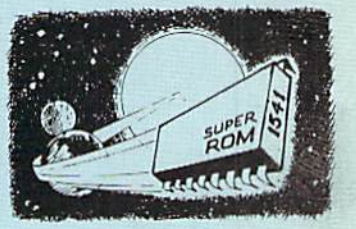

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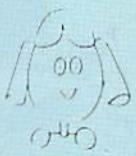

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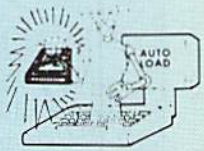

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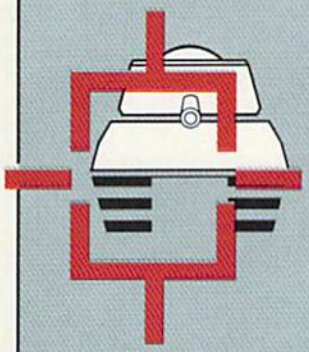

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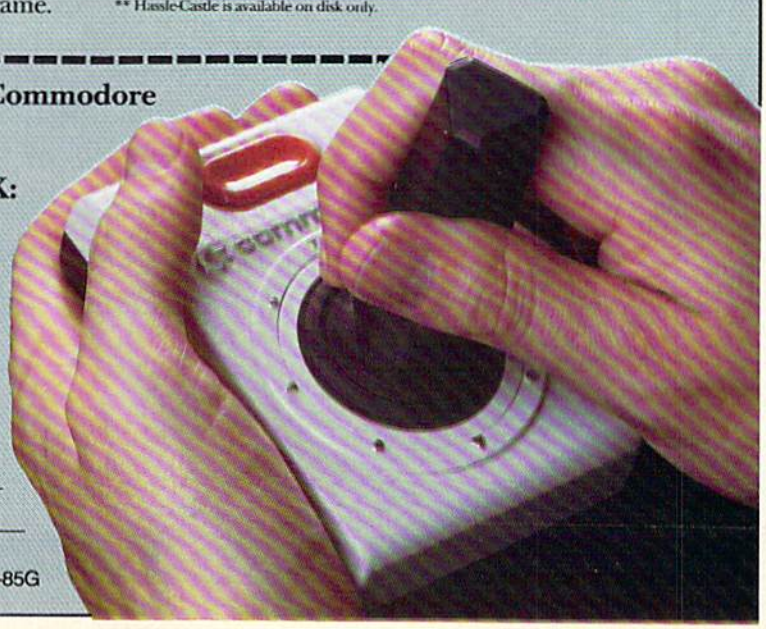

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Why aren't your programs loading? Is it your disk or your disk drive? This article helps you find the answer.

RUN It Right

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

Almost everybody who purchases a 1541 disk drive receives its handy test/demo disk, which is full of short disk-utility programs. One of those programs, called Check Disk, is designed to check every track and sector on your disk, looking for bad blocks. I sincerely doubt that anybody ever uses that program more than once.

The problems with the test/demo Check Disk program are its running time (it takes about an hour and 20 minutes per disk) and the fact that it allocates every block on the disk. You have to validate the disk when you are finished, thus freeing up both good and bad blocks, before you can use it again.

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Bad Blocks?

By JOSEPH J. SHAUGHNESSY

The Safe & Fast Disk Checker will check any disk in a matter of minutes, including those with programs already recorded on them.

You usually discover a disk is bad when you attempt to save a program and get a disk error (flashing red light on the drive). When you list the directory, you will see *PRG, *SEQ and so on after the name of the program or file.

Whenever you see the "*" in front of the file type in the directory listing, it means the file is bad. You should immediately scratch it from the disk and then run the S & F Disk Checker. This program will find the bad block and allocate it; then you can continue using that disk.

Note of caution: If you validate a disk that has had a bad block allocated through the S & F Disk Checker, the validation process will de-allocate the bad blocks (unless the bad block is within a program or file). Validating a disk that you know has bad blocks on it is always a bad move, since the validation process may try to write to that bad block while it is rearranging things, and you could end up with a "scrambled" disk, losing some of your programs.

I suggest you run the S & F Disk Checker on a disk prior to validating it. This ensures that there are no bad blocks on the disk that could cause the validation process to bomb out and leave you with a scrambled disk.

One other note about the Validate command: Never validate a disk containing relative or random-access files, since the Validate command will de-allocate all of these files, making them available to be written over by later saves.

The Program

Load in the S & F Disk Checker and type RUN. You will be asked to insert the disk you want checked and to hit the return key when you're ready. After you do that, the screen will show a display of the block availability map (BAM) and immediately begin checking each track and sector, starting at track 1, sector 0, and proceeding through to track 35, sector 16. As each block is checked, a mark will be placed at that block's position on the screen BAM.

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If a bad block is discovered, the program will first check to see if that block has been previously allocated. If it hasn't, it will allocate that block, sound a few bell tones and give you the message, "Bad Block Allocated." It will then place a small, red checkered flag on the screen BAM in the bad block's space.

If the bad block was previously allocated, the program will save the map screen (takes about 30 seconds) and display a new screen that tells you about the problem. It then gives you the option of either continuing with the S & F Disk Checker program, quitting, or seeing an ASCII display of the bad block before quitting.

If you just quit, that's the end of it. If you continue with the program, the original screen map is brought back; a checkered flag is put on the bad block's screen map position; and the checking process continues until all of the blocks are checked or another bad block is encountered. Then the bad-block sequence is repeated.

The ASCII display option is designed to aid you in discovering in which program or file the bad block occurs. If any of the bad block was readable before bombing out, this option will display the contents of that block in ASCII characters. If the block was part of a Basic program, the Basic keywords will be tokenized and therefore incomprehensible, but the parts between the Basic words may be recognizable to you. Or, it could be a word processing file, and you will recognize a portion of the text.

If none of the block was readable, the ASCII dump won't look like anything. This will also be the case if the bad block occurs in a machine language program.

Track 18 is a special case, since it contains the directory for the disk. If a bad block is discovered on track 18, the S & F Disk Checker will first check to see if the block has been used to record any of your directory (by checking previous allocation of that block).

If it hasn't, it will allocate that block so it can't be used and foul up the disk later. If it does contain part of your directory, it will stop the program and give you the bad news. It will also do this if it finds an error on track 18, sector 0 (the Directory Header block).

The bad news is that you should immediately try to salvage anything you can from the disk, by transferring any salvageable programs to another disk and then reformatting the bad disk. Run the S & F Disk Checker program on the bad disk after you reformat it.

Head Alignment

The S & F Disk Checker will not harm your disks unless your disk drive is out of alignment. If it is, you will, of course, have trouble loading programs. Your disk drive will make rackety sounds, its red light will blink during the load, and you will often get a File Not Found error.

The S & F Disk Checker is speedy and safe because it checks the blocks on the disk for Read errors only. Every byte of memory is checked to be sure that it can be read.

If your drive is out of alignment, the S & F Disk Checker may have trouble reading your disk. It will interpret the misalignment problems as bad blocks and attempt to allocate those blocks. You can erase these allocations by validating the disk. However, since your disk drive is out of alignment, when the drive attempts to write to track 18, sector 0, to record the block allocation, it could conceivably mess up track 18, sector 0, which is your BAM map and directory header, on the disk. Once that happens, you may not be able to recover anything from that disk.

To check your disk drive for proper head alignment, use the following procedure:

1. Insert any formatted disk into your disk drive, preferably one that has a lot of programs on it (so the directory is lengthy).
2. Type LOAD"$",8 and hit the return key.
3. Watch the red light on your disk drive during the load. It should come on and remain a steady red glow, without blinking during the load.
4. Type LIST and hit the return key, to make sure that your directory did load.
5. Type in the following instructions from the keyboard:

```
OPEN 15,8,5,"I":OPEN5,8,5,"#" (return) (red light will come on)
PRINT#15,"B-R:"5;0;1;1 (return)
```

6. Look to see if the red light on the disk drive is blinking.
7. Type in CLOSE 5:CLOSE 15 (return)

If the red light was blinking for step number 6, your disk drive is out of alignment and may need to be serviced. Another indication of misalignment is if the S & F Disk Checker runs slowly and with many pauses and blinking red lights for almost all of your disks (they can't *all* be bad). If head alignment is your problem, look for an article on how to realign your disk drive in *RUN*'s July 1985 issue.

Fast and Safe

The S & F Disk Checker gets its speed and safety by checking the blocks on the disk only for Read errors, through the USER1 function. The underlying assumption is that if you can't read a block, you usually can't write to it, either, and vice versa. The USER1 command will read all 256 bytes of any block.

By contrast, the Block Read command will read only the *contents* of the block—as specified by the buffer pointer—which may occupy less than 256 bytes. By using USER1, every single byte of memory on the disk is checked to be sure that it can be read.

If you do have a bad block in one of your programs, there is not really much you can do about it except keep trying for a successful load of the program. If you do succeed, immediately save the program to another disk. It is more common to discover a sick disk after attempting a save and getting a blinking red light. That situation has happened to me several times and was the motivation behind this program.

If you don't want to type in this program, I will provide you with a copy. Send me $8 and a return address, and I will supply the disk, the postage and mailer and my time. R

Address all author correspondence to Joseph J. Shaughnessy, 8438 Lynda Sue Lane West, Jacksonville, FL 32217.

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Listing 1. *Safe & Fast Disk Checker program.*

```
10 REM ********************************
20 REM *{30 SPACEs}*
30 REM * THE SAFE & FAST DISK CHECKER *
40 REM *{30 SPACEs}*
50 REM *{13 SPACEs}BY{15 SPACEs}*
60 REM *{30 SPACEs}*
70 REM *{4 SPACEs}JOSEPH J. SHAUGHNESSY{5 S
   PACEs}*
80 REM *{30 SPACEs}*
90 REM ********************************
100 GOTO 440
110 REM SUBROUTINES
120 REM WAIT FOR KEYSTROKE
130 POKE 198,0
140 GET A$:IF A$="" THEN 140
150 RETURN
160 REM CHECK THE ERROR CHANNEL
170 INPUT#15,EN,EM$,ET,ES
180 QN=EN:QM$=EM$:QT=ET:QS=ES
190 IF EN=0 THEN OK=1:RETURN
200 IF BG=0 THEN BG=1:RETURN
210 IF ET=18 AND ES=0 THEN1330:REM BAM TROU
   BLE
220 REM ALLOCATE THE BAD BLOCK
230 PRINT#15,"I"D$
240 PRINT#15,"B-A:0";ET;ES
250 INPUT#15,EN,EM$,ET,ES
260 IF EN=0 THEN 290
270 IF QT=18 THEN 1340:REM DIRECTORY TROUBL
   E
280 GOTO 1010:REM BAD BLOCK IN EXISTING FIL
   E
290 PRINT BP$C1$"{CTRL 9}{CTRL 3}{SHFT B}AD
    {SHFT B}LOCK {SHFT A}LLOCATED{CTRL 1}{
   CTRL 0}{HOME}":FOR X=1 TO 10:GOSUB 370:
   NEXT
300 CLOSE 5;CLOSE 15
310 CLOSE 15:OPEN 15,8,15:PRINT#15,"I"
320 CLOSE 5:OPEN 5,8,5,"#"
330 PRINT BP$C1$"{19 SPACEs}{HOME}"
340 POKE PL,BB:POKE CL,2
350 REM SOUND EFFECTS
360 RETURN
370 POKE S1,130:POKE S2,9:POKE S3,30:POKE V
   ,V0
380 POKE S4,21
390 MM=TI
400 IF TI<MM+10 THEN 400
410 POKE S4,20
420 FOR MM=S1 TO S3:POKE MM,0:NEXT:POKE V,0
   :RETURN
430 REM BEGIN MAIN PROGRAM & SETUP
440 POKE 53281,1:POKE 53280,5:PRINT "{CTRL
   1}":POKE 53272,23
450 Z$="{CTRL 9}1{CTRL 0}1":Y$="{CTRL 9}2{C
   TRL 0}2":X$="{CTRL 9}3{CTRL 0}3"
460 V=54296:S1=54273:S2=S1+4:S3=S2+10:S4=S1
   +3:V0=15
470 SS=49152:CS=50152:M1=1024:C1=55296
480 BP$="{HOME}{24 CRSR DNs}":W$="1{CTRL 9}
   2{CTRL 0}3{CTRL 9}4{CTRL 0}5{CTRL 9}6{C
   TRL 0}7{CTRL 9}8{CTRL 0}9{CTRL 9}0{CTRL
    0}"
490 C1$="{20 CRSR RTs}":C2$="{7 CRSR RTs}":
   B1$="{CRSR DN}{CTRL 9} {CTRL 0}{CRSR LF
   }"
500 PRINT "{SHFT CLR}{CTRL 9}{13 SPACEs}{SH
   FT D}{SHFT I}{SHFT S}{SHFT K} {SHFT C}{
   SHFT H}{SHFT E}{SHFT C}{SHFT K}{SHFT E}
   {SHFT R}{15 SPACEs}{7 CRSR DNs}"
510 PRINT "{8 SPACEs}{SHFT I}NSERT DISK TO
   BE CHECKED{CRSR DN}"
520 PRINT "{9 SPACEs}{SHFT H}IT ANY KEY TO
   {SHFT C}ONTINUE"
525 PRINT "{CRSR DN}{12 SPACEs}({SHFT R}{SH
   FT U}{SHFT N}/{SHFT S}{SHFT T}{SHFT O}{
   SHFT P} TO {SHFT Q}UIT)"
530 GOSUB 130
540 PRINT "{SHFT CLR}{8 CRSR DNs}{13 SPACEs
   }{SHFT I}NITIALIZING"
550 CLOSE 15:OPEN 15,8,15,"I":GOSUB 170:IF
   BG=1 THEN 920
560 BG=1
570 CLOSE 5:OPEN 5,8,5,"#"
580 GOSUB 170
590 REM SCREEN FORMATTING
600 PRINT "{SHFT CLR}{CTRL 9}{16 SPACEs}{SH
   FT T}{SHFT R}{SHFT A}{SHFT C}{SHFT K}{1
   8 SPACEs}{CTRL 0}"
610 PRINT "{CTRL 9} {CTRL 0}{COMD B}{10 SPA
   CEs}"Z$Z$Z$Z$Z$Y$Y$Y$Y$Y$X$X$X$
620 PRINT "{CTRL 9} {CTRL 0} {COMD B}"W$W$W
   $"1{CTRL 9}2{CTRL 0}3{CTRL 9}4{CTRL 0}5
   "
630 FOR X=0 TO 8:PRINT "{CTRL 9} {CTRL 0}"X
   :NEXT
640 PRINT "{CTRL 9}{SHFT S}{CTRL 0} 9":PRIN
   T "{CTRL 9}{SHFT E}{CTRL 0}10":PRINT "{
   CTRL 9}{SHFT C}{CTRL 0}11":PRINT "{CTRL
    9}{SHFT T}{CTRL 0}12":PRINT "{CTRL 9}{
   SHFT O}{CTRL 0}13"
650 PRINT "{CTRL 9}{SHFT R}{CTRL 0}14":PRIN
   T "{CTRL 9} {CTRL 0}15":PRINT "{CTRL 9}
    {CTRL 0}16":PRINT "{CTRL 9} {CTRL 0}17
   ":PRINT "{CTRL 9} {CTRL 0}18"
660 PRINT "{CTRL 9} {CTRL 0}19":PRINT "{CTR
   L 9} {CTRL 0}20"
670 PRINT BP$"{4 CRSR UPs}"C1$C2$"{6 SPACEs
   }{CTRL 9}{SHFT W}{SHFT A}{SHFT T}{SHFT
   C}{SHFT H}{CTRL 0}"
680 PRINT C1$C2$"{CTRL 9} {SHFT E}{SHFT A}{
   SHFT C}{SHFT H}{SHFT SPACE}{SHFT C}{SHF
   T H}{SHFT E}{SHFT C}{SHFT K}{CTRL 0}"
690 PRINT C1$"{CTRL 9} {SHFT C}64 {SHFT S}A
   FE & {SHFT F}AST{2 SPACEs}{CTRL 0}"
700 PRINT C1$"{CTRL 9} {SHFT D}ISKETTE {SHF
   T C}HECKER {CTRL 0}"
710 PRINT "{HOME}"C1$C1$"{2 CRSR LFs}";
720 FOR X=1 TO 23:PRINT B1$;:NEXT
730 SM=1103:CM=55375:CT=40:FOR X=CM TO 5625
   5 STEP CT:POKE X,0:NEXT
740 FOR X=SM TO 1983 STEP CT:READ NM:POKE X
   ,NM:NEXT
750 SM=1146:CM=55418:READ C,BB
760 REM MAIN CHECK LOOP
770 FOR T=1 TO 35:SM=SM+1:CM=CM+1
780 M=20
790 IF T>17 THEN M=18
800 IF T>24 THEN M=17
810 IF T>30 THEN M=16
820 FOR S=0 TO M
830 PL=SM+CT*S:CL=CM+CT*S
840 PRINT BP$C2$C2$"{CRSR RT}{4 SPACEs}";
850 PRINT BP$"{CTRL 9}{3 SPACEs}{CTRL 0} {S
   HFT C}HECKING"T;S;"{HOME}"
860 PRINT#15,"UA:";5;0;T;S
870 OK=0:GOSUB 170:IF OK THEN POKE PL,C:POK
   E CL,0
880 NEXT S,T:CLOSE 5:CLOSE 15
890 PRINT BP$" {SHFT H}IT A {SHFT K}EY TO {
   SHFT C}ONTINUE!{HOME}"
900 GOSUB 130:CLR:RESTORE:GOTO 450:REM READ
   Y TO CHECK NEXT DISK
910 REM ERROR MESSAGES
920 PRINT "{SHFT CLR}{3 CRSR DNs}{5 SPACEs}
   {CTRL 9} {SHFT H}AVING SOME PROBLEMS HE
   RE! {CTRL 0}"
```

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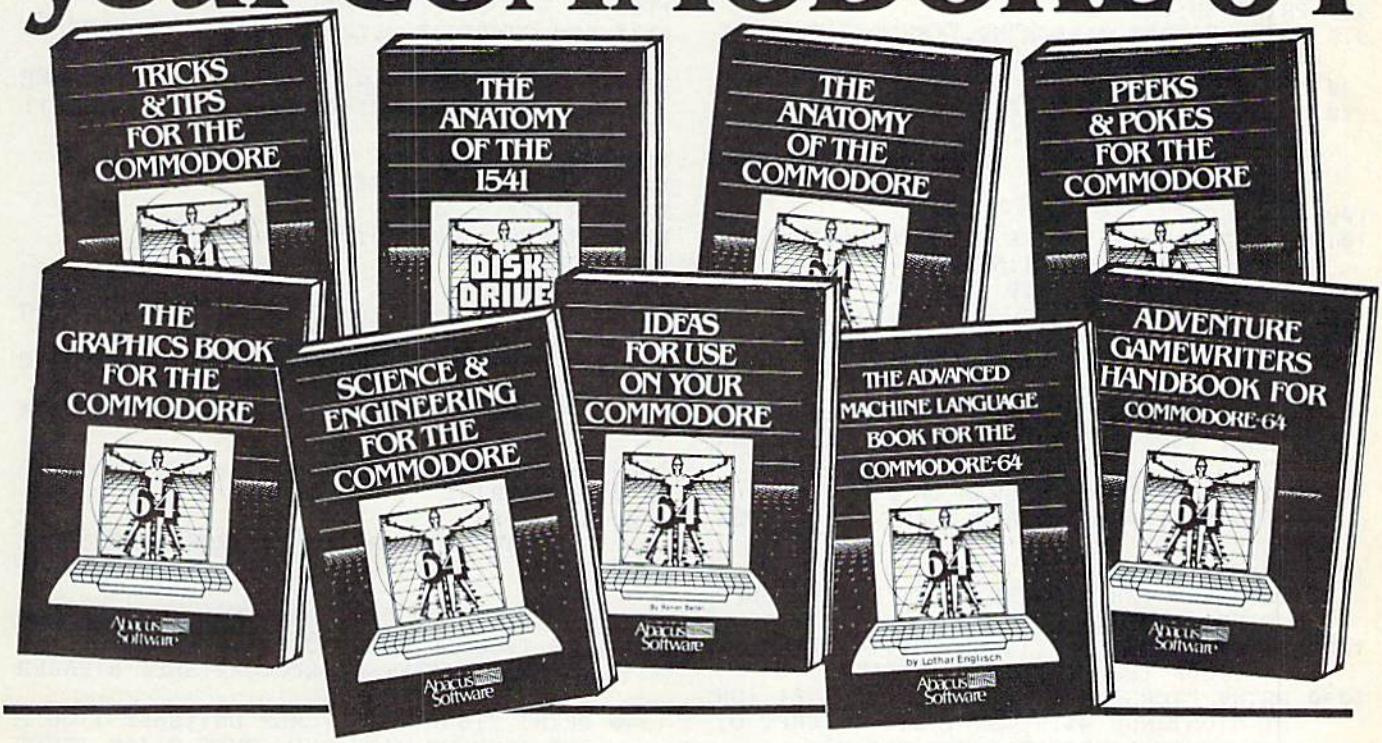

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Listing 1 continued.

```
93Ø PRINT "{CRSR DN}{2 SPACEs}{SHFT O}NLY F
    ORMATTED DISKS CAN BE CHECKED"
94Ø PRINT "{CRSR DN}{SHFT M}AKE SURE THAT D
    ISK DRIVE DOOR IS CLOSED"
95Ø PRINT "{CRSR DN}{13 SPACEs}{CTRL 9} {SH
    FT D}ISK {SHFT E}RROR {CRSR DN}"
96Ø PRINT EN;EM$
97Ø PRINT "{SHFT T}RACK"ET,"{SHFT S}ECTOR"E
    S
98Ø CLOSE 5:CLOSE 15
99Ø PRINT "{2 CRSR DNs}{1Ø SPACEs}{SHFT T}Y
    PE {CTRL 9}{SHFT R}{SHFT U}{SHFT N}{CTR
    L Ø} TO CONTINUE.{7 CRSR DNs}":END:REM
    EXIT PROGRAM
1ØØØ REM SCREEN SAVE
1Ø1Ø FOR X=Ø TO 999:POKE SS+X,PEEK(M1+X):PO
    KE CS+X,PEEK(C1+X):NEXT
1Ø2Ø IF EN<>65 THEN 132Ø
1Ø3Ø REM ERROR MESSAGES
1Ø4Ø PRINT "{SHFT CLR}{CRSR DN}{SHFT B}AD B
    LOCK AT {SHFT T}RACK";T;", {SHFT S}ECT
    OR";S
1Ø5Ø PRINT "HAS BEEN PREVIOUSLY ALLOCATED.
    {SHFT T}HIS MEANS THAT IT OCCURS IN AN
     ";
1Ø6Ø PRINT"EXISTING PROGRAM OR FILE.{SHFT Y
    }OUR BEST BET AT THIS POINT IS TO SCRA
    TCH";
1Ø7Ø PRINT"THAT FILE OR PROGRAM, AND THEN R
    ERUN THE {SHFT S}AFE {SHFT D}ISK {SHFT
     C}HECKER {SHFT P}ROGRAM."
1Ø8Ø PRINT "{CRSR DN}{14 SPACEs}{CTRL 9}{SH
    FT Y}OUR {SHFT O}PTIONS{CTRL Ø}"
1Ø9Ø PRINT "{CRSR DN} {CTRL 9}1{CTRL Ø} {SH
    FT C}ONTINUE WITH {SHFT S}AFE {SHFT D}
    ISK {SHFT C}HECKER {SHFT P}RGM"
11ØØ PRINT "{CRSR DN} {CTRL 9}2{CTRL Ø} {SH
    FT D}ISPLAY {SHFT A}{SHFT S}{SHFT C}{2
     SHFT Is} {SHFT D}UMP OF THE {SHFT B}A
    D {SHFT B}LOCK"
111Ø PRINT "{3 SPACEs}AS AN AID IN FINDING
    THE BAD FILE."
112Ø PRINT "{CRSR DN} {CTRL 9}3{CTRL Ø} {SH
    FT E}ND THIS RUN OF {SHFT S}AFE {SHFT
    D}ISK {SHFT C}HECKER"
113Ø PRINT "{CRSR DN}{11 SPACEs}{CTRL 9}{SH
    FT C}HOOSE A {SHFT N}UMBER!{CTRL Ø}{CR
    SR DN}"
114Ø GOSUB 13Ø:IF A$<CHR$(49) OR A$>CHR$(51
    ) THEN 114Ø
115Ø A=VAL(A$)
116Ø ON A GOTO 118Ø,121Ø,98Ø
117Ø REM CONTINUE WITH PROGRAM - REPLACE SC
    REEN
118Ø PRINT "{SHFT CLR}":FOR X=Ø TO 999:POKE
     M1+X,PEEK(SS+X):POKE C1+X,PEEK(CS+X):
    NEXT
119Ø GOTO 3ØØ
12ØØ REM DISPLAY ASCII DUMP
121Ø PRINT#15,"I"
122Ø PRINT#15,"UA:"5;Ø;T;S
123Ø FOR X=1 TO 256
124Ø GET#5,A$
125Ø IF A$=CHR$(19) OR A$=CHR$(147) OR A$=C
    HR$(17) THEN PRINT"*";:GOTO 129Ø
126Ø IF A$=CHR$(29) OR A$=CHR$(145) OR A$=C
    HR$(148) THEN PRINT"*";:GOTO 129Ø
127Ø IF A$=CHR$(157) OR A$=CHR$(2Ø) THEN PR
    INT"*";:GOTO 129Ø
128Ø PRINT "{CTRL 1}"A$;
129Ø NEXT:PRINT
13ØØ GOTO 98Ø
131Ø REM BAM AND DIRECTORY ERROR MESSAGES
132Ø PRINT "{SHFT CLR}{6 CRSR DNs}":GOTO 95
    Ø
133Ø PRINT "{SHFT CLR}{CRSR DN}{SHFT Y}OU H
    AVE TROUBLE WITH YOUR {SHFT B}{SHFT A}
    {SHFT M} {SHFT D}IRECTORY{SHFT H}EADER
    , ";:GOTO 135Ø
134Ø PRINT "{SHFT CLR}{CRSR DN}{SHFT Y}OU H
    AVE TROUBLE WITH THE {SHFT D}ISK {SHFT
     D}IRECTORY";
135Ø PRINT "SALVAGE WHAT YOU CAN FROM"
136Ø PRINT "THIS DISK, AND THEN RE-FORMAT I
    T."
137Ø EN=QN:EM$=QM$:ET=QT:ES=QS
138Ø GOTO 95Ø
139Ø DATA 74,15,19,5,16,8,32,83,8,1,21,7,8,
    14,5,19,19,25,32,49,57,56,52,122,94
```


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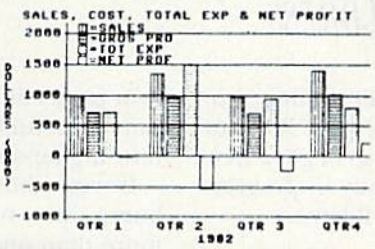

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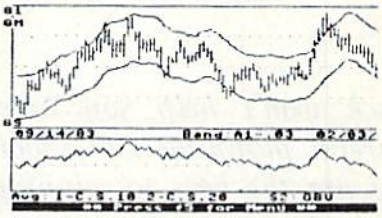

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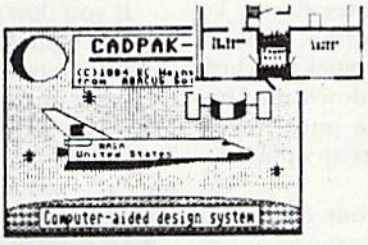

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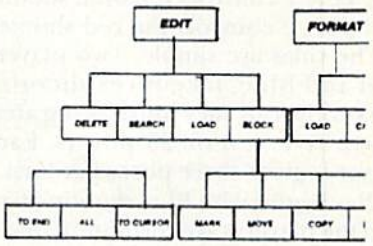

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64 Shuffle

By BUCK CHILDRESS

Luck won't help you here. Careful planning and shooting are the keys to winning this game.

One or two persons can play 64 Shuffle. For one player, a joystick plugged into port 1 will control both red and blue shooters. If two are playing, port 1 controls the blue shooter and port 2 controls the red shooter.

The rules are simple. Two players, Red and Blue, take turns shooting pucks down an alley into scoring areas worth five, ten or 25 points. Each player is given three pucks per turn.

Play begins with Blue shooting first, and the players take turns until one of them reaches 150 points. (The running scores are displayed on the screen.) If the players tie the game at 150 points, the game will continue until there is a winner. Press the R key to play again. (You can also begin a new game during one already in progress by simply pressing the R key.)

Joystick Control and Strategy

Pushing the joystick to the left moves your shooter towards the top of the screen, and pushing it to the right moves your shooter down. To shoot, press the fire-button, then release it and push the joystick forward. The longer you hold down the fire-button, the farther the puck travels and the "harder" it hits any pucks in its path.

If you shoot first, your opponent may knock one of your pucks out of the scoring area, causing you to lose points. Plan your strategy with this in mind. You may bump into your own pucks as often as you like. This can be useful for pushing your pucks into higher-scoring areas.

If you shoot second, try not to bump into your opponent's pucks more than once in any given turn. If you do, all your pucks will turn white, then disappear. Any points you have accumulated from pucks that are in scoring areas are then lost.

If you don't want to enter the program yourself, send me a self-addressed stamped envelope, a blank cassette and $3, and I'll send you back two verified and tested copies. R

Address all author correspondence to Buck Childress, PO Box 13575, Salem OR 97309.

Listing 1. *64 Shuffle program.*

```
5 REM 64 SHUFFLE *** BUCK CHILDRESS
1Ø REM P.O. BOX 2Ø72, WHITE CITY, OR{2 SPAC
   Es}975Ø3
15 PRINT"{SHFT CLR}{1Ø CRSR DNs}{7 CRSR RTs
   }SETTING UP...PLEASE WAIT"
2Ø PRINT"{CRSR DN}{7 CRSR RTs}APPROXIMATELY
    3Ø SECONDS"
25 POKE52,48:POKE56,48:CLR:GOSUB7ØØ
3Ø INPUT"{SHFT CLR}{1Ø CRSR DNs}{7 CRSR RTs
   }HOW MANY PLAYERS (1-2)";NP:PRINT"{SHFT
   CLR}"
4Ø IFNP<>1ANDNP<>2THEN3Ø
5Ø Y2=56321:IFNP=2THENY2=5632Ø
6Ø DIME(6):DIMJ(6):DIMP(6):DIMU(6):E=84:U=6
   :C=54272
7Ø SO=49152:PL=1464:A=1:Y1=56321:Y=Y1:POKE5
   328Ø,12
8Ø POKE53281,3:GOSUB8ØØ:GT=1:GOSUB47Ø:GT=Ø
1ØØ REM ************ HANDLING ROUTINE *****
    *******
11Ø M=Ø:F=Ø:POKEPL,85:POKEPL+C,U
115 GETA$:FB=PEEK(Y)AND16:IFFB=ØANDH=ØTHENH
    =1:TS=TI
12Ø IFA$="R"THENCLR:POKE198,Ø:GOTO3Ø
125 IFH1=ØTHENIFFB=16ANDH=1THENTF=TI:H1=1
13Ø R=PEEK(Y)AND8:IFR=ØTHENGOSUB23Ø
135 L=PEEK(Y)AND4:IFL=ØTHENGOSUB2ØØ
14Ø JS=PEEK(Y)AND1
145 IFJS=ØANDH=1ANDFB>ØTHENH=Ø:H1=Ø:D=D+1:P
    (D)=INT((TF-TS)/6):GOTO16Ø
15Ø GOTO115
16Ø X=X+1:POKEPL,86:POKEPL+C,U:IFP(D)>28THE
    NP(D)=38-D
17Ø B=PL+P(D):FORJ=PL+1TOB:M=M+1:F=F+1:POKE
    J,E:POKEJ+C,U
175 IFPEEK(J+1)=83ORPEEK(J+1)=84THENGOSUB65
    Ø:GOSUB3ØØ:GOTO1ØØ
18Ø FORJJ=1TO4Ø:NEXT:POKEJ,32:NEXT:POKEJ,E
185 POKEJ+C,U:P(D)=M-1:IFP(D)>28THENGOSUB6Ø
    Ø
19Ø GOSUB4ØØ:GOTO1ØØ
2ØØ REM ********** PLAYER MOVEMENT ********
    **
21Ø IFPL>13Ø5THENPOKEPL,32:PL=PL-4Ø:POKEPL,
    85:POKEPL+C,U
22Ø RETURN
```

→

RUN It Right

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

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Listing 1 continued.

```
23Ø IFPL<1585THENPOKEPL,32:PL=PL+4Ø:POKEPL,
    85:POKEPL+C,U
24Ø RETURN
3ØØ REM ********** PUCK COLLISIONS ********
    **
3Ø5 IFPEEK(J)<>PEEK(J+1)THENT=T+1:IFT>1THEN
    375
31Ø FORI=1TO6:IFJ(I)=J+1THEN32Ø
315 NEXT
32Ø FORJ1=J+1TOB:POKEJ1,E(I):POKEJ1+C,U(I)
325 IFPEEK(J1+1)=83ORPEEK(J1+1)=84THEN345
33Ø FORJJ=1TO6Ø:NEXT:POKEJ1,32:F=F+1:NEXT:P
    OKEJ1,E(I):POKEJ1+C,U(I)
335 P(I)=F-1:P(D)=M-2:J(I)=J1:IFP(I)>28THEN
    GOSUB6ØØ
34Ø GOSUB4ØØ:J1=B:J=B:I=6:RETURN
345 IFPEEK(J1)<>PEEK(J1+1)THENT=T+1:IFT>1TH
    ENGOSUB65Ø:POKEJ1+C,1:GOTO375
35Ø GOSUB65Ø:P(I)=F-1:J(I)=J1
355 FORI=1TO6:IFJ(I)=J1+1THEN365
36Ø NEXT
365 F=F+1:FORJ1=J1+1TOB:POKEJ1,E(I):POKEJ1+
    C,U(I):GOTO325
375 IFD<4THEND=3:G=1:G1=2
38Ø IFD>3THEND=6:G=4:G1=5
385 POKEJ+C,1:FORI=GTOG1:POKEJ(I)+C,1:NEXT:
    GOSUB67Ø:FORJJ=1TO125Ø:NEXT
39Ø POKEJ1,32:POKEJ,32:FORI=GTOG1:POKEJ(I),
    32:NEXT
395 GOSUB415:J1=B:J=B:RETURN
4ØØ REM ********** CHANGING SIDES *********
    *
4Ø5 J(D)=J:E(D)=E:U(D)=U:IFD=3ORD=6THEN415
41Ø RETURN
415 T=Ø:X=Ø:IFD=6THENGOSUB435:A=-A:IFA=-1TH
    ENU=6
42Ø IFD<>3ANDA=1THEN43Ø
425 IFU=6THENU=2:E=83:Y=Y2:RETURN
43Ø U=6:E=84:Y=Y1:RETURN
435 FORN=1TO15ØØ:NEXT:FORD=1TO6:GOSUB45Ø:PO
    KEJ(D),32:NEXT:D=Ø
44Ø LL=Ø:IFVS>=15ØORHS>=15ØTHENIFVS<>HSTHEN
    GOSUB9ØØ:GOTO49Ø
445 RETURN
45Ø REM ********** COUNTING THE SCORE *****
    *****
455 IFPEEK(J(D))=E(D)THENIFP(D)>25ANDP(D)=<
    28THENSC=25
46Ø IFPEEK(J(D))=E(D)THENIFP(D)>21ANDP(D)=<
    25THENSC=1Ø
465 IFPEEK(J(D))=E(D)THENIFP(D)>17ANDP(D)=<
    21THENSC=5
47Ø IFE(D)=84ORGT=1THENVS=VS+SC:PRINT"{HOME
    }{2 CRSR DNs}{4 CRSR RTs}{CTRL 7}";VS
475 IFE(D)=83ORGT=1THENHS=HS+SC:PRINT"{HOME
    }{2 CRSR DNs}{CTRL 3}"TAB(31)HS
48Ø IFSC>ØTHENSC=Ø:GOSUB5ØØ
485 RETURN
49Ø GETA$:IFA$<>"R"THEN49Ø
495 CLR:POKE198,Ø:GOTO3Ø
5ØØ REM ********** SCORING BELL **********
51Ø IFLL=1THEN53Ø
52Ø LL=1:FORN=ØTO24:POKEC+N,Ø:NEXT:POKEC+24
    ,15
53Ø FORN=1TO3:POKEC+1,35:POKEC+5,2Ø:POKEC+6
    ,9
54Ø POKEC+15,3Ø:POKEC+4,17:FORNN=1TO6Ø:NEXT
55Ø POKEC+4,16:FORNN=1TO15Ø:NEXT:NEXT:SYSSO
    :RETURN
6ØØ REM ******* SOUND OF PUCK GOING OUT ***
    *****
61Ø FORN=ØTO24:POKEC+N,Ø:NEXT:FORN=1TO1Ø:PO
    KEC+1,35
62Ø POKEC+5,2Ø:POKEC+6,9:POKEC+15,3Ø:POKEC+
    24,N:NEXT
63Ø SYSSO:RETURN
65Ø REM ********** SOUND OF PUCKS HITTING E
    ACH OTHER **********
655 FORN=ØTO24:POKEC+N,Ø:NEXT:POKEC+1,13Ø:P
    OKEC+5,7
66Ø POKEC+15,3Ø:POKEC+24,15:POKEC+4,21:FORN
    =1TO1ØØ:NEXT:POKES+4,2Ø
665 SYSSO:RETURN
67Ø REM ********** SOUND WHEN PUCKS DISAPPE
    AR **********
675 FORN=ØTO24:POKEC+N,Ø:NEXT:FORN=1TOX:POK
    EC+1,24Ø:POKEC+5,9
68Ø POKEC+15,13Ø:POKEC+24,15:POKEC+4,21:FOR
    NN=1TO2ØØ:NEXT
685 POKEC+4,2Ø:NEXT:SYSSO:RETURN
7ØØ REM *** CUSTOM CHARACTERS AND SYS COMMA
    ND (GENTLY TURN OFF SOUND) ***
71Ø FORN=1TO24:READA:NEXT
72Ø POKE56334,PEEK(56334)AND254:POKE1,PEEK(
    1)AND251
73Ø FORN=ØTO2Ø47:POKEN+12288,PEEK(N+53248):
    NEXT:POKE1,PEEK(1)OR4
74Ø POKE56334,PEEK(56334)OR1:POKE53272,(PEE
    K(53272)AND24Ø)OR12
75Ø FORN=12952TO12983:READA:POKEN,A:NEXT
76Ø FORN=49152TO4917Ø:READA:POKEN,A:NEXT:RE
    STORE:RETURN
8ØØ REM ********** PLAYING AREA **********
81Ø W=1:FORN=1264TO1283:GOSUB89Ø:NEXT:FORN=
    1664TO1683:GOSUB89Ø:NEXT
82Ø W=7:FORN=1284TO1287:GOSUB89Ø:NEXT:FORN=
    1684TO1687:GOSUB89Ø:NEXT
83Ø W=5:FORN=1288TO1291:GOSUB89Ø:NEXT:FORN=
    1688TO1691:GOSUB89Ø:NEXT
84Ø W=Ø:FORN=1292TO1294:GOSUB89Ø:NEXT:FORN=
    1692TO1694:GOSUB89Ø:NEXT
85Ø W=15:FORN=1295TO13Ø3:GOSUB89Ø:NEXT:FORN
    =1695TO17Ø3:GOSUB89Ø:NEXT
855 FORN=1343TO1663STEP4Ø:GOSUB89Ø:NEXT
86Ø PRINT"{HOME}{5 CRSR DNs}{CTRL 1}"TAB(21
    )"5{3 CRSR RTs}1Ø{2 CRSR RTs}25{2 CRSR
    RTs}OUT"
87Ø PRINT"{HOME}{17 CRSR DNs}"TAB(21)"5{3 C
    RSR RTs}1Ø{2 CRSR RTs}25{2 CRSR RTs}OUT
    "
88Ø RETURN
89Ø POKEN,16Ø:POKEN+C,W:RETURN
9ØØ REM ********** VICTORY **********
91Ø IFVS>HSTHENPRINT"{HOME}{2 CRSR DNs}{4 C
    RSR RTs}{CTRL 7}{CTRL 9}";VS
92Ø IFHS>VSTHENPRINT"{HOME}{2 CRSR DNs}{CTR
    L 3}{CTRL 9}"TAB(31)HS
93Ø FORN=CTOC+24:POKEN,Ø:NEXT:FORN=1TO3:POK
    EC+5,85
94Ø POKEC+6,85:POKEC+12,85:POKEC+13,85:POKE
    C+24,15:POKEC+4,33
95Ø POKEC+11,17:FORW=1TO6:READA1,A2,A3,A4:P
    OKEC+1,A1:POKEC,A2
96Ø POKEC+8,A3:POKEC+7,A4
97Ø IFA1=5ØTHENFORJ=1TO2ØØ:NEXT
98Ø FORJ=1TO1ØØ:NEXT
99Ø NEXT:POKEC+4,32:POKEC+11,16:FORJ=1TO5ØØ
    :NEXT
995 RESTORE:SYSSO:NEXT:RETURN
1ØØØ DATA25,3Ø,18,2Ø9,33,135,25,3Ø,42,62,31
     ,165,5Ø,6Ø,37,162
1Ø1Ø DATA42,62,31,165,5Ø,6Ø,37,162,Ø,6Ø,126
     ,255,255,126,6Ø
1Ø2Ø DATAØ,Ø,6Ø,126,255,255,126,6Ø,Ø,16,16,
     248,184,184,1Ø4
1Ø3Ø DATA4Ø,46,64,64,224,224,24Ø,168,164,16
     3,169,Ø,133,253,169
1Ø4Ø DATA212,133,254,16Ø,Ø,152,145,253,2ØØ,
     192,24,2Ø8,249,96
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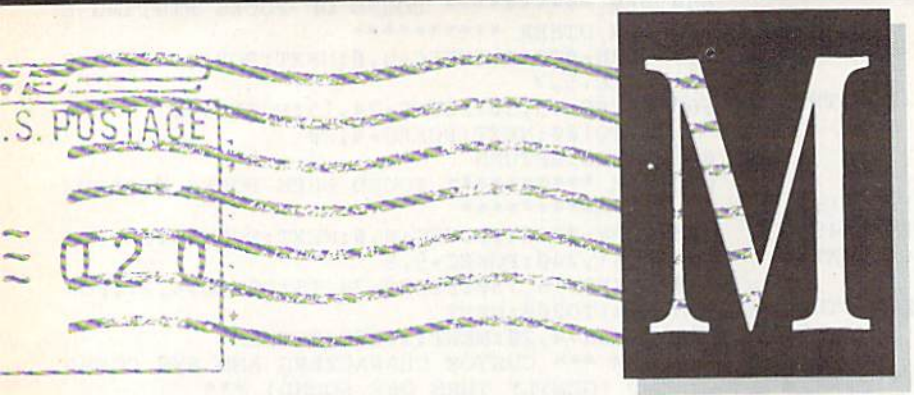

Word Processing Update

I feel that Timeworks' Word Writer was unfairly treated in Bill Gates' word processing article ("One Little Word After Another," March 1985).

Word Writer has been my word processor of choice since its introduction, and I believe it to be a very easy-to-use and exceptional product. What attracted me to the program was the willingness of Timeworks to put its money where its mouth is. In full-page ads, Timeworks offers to buy its consumers *any* word processor they want if they are not happy with Word Writer. For the consumer, this is a no-lose proposition. I know of no other software house that is willing to take that chance.

An updated version is on the market; old glitches were corrected and new features were added, including a 40,000-word spelling checker with room for 3000 user-added words. A windowed calculator can be called to the screen without affecting the document. The list goes on.

Lastly, as to Gates' statement, "Only the basic printing features are found in Word Writer," please note that I use Word Writer with a Star SG-10 printer and seem to be able to use more than just basic printing features.

You may have guessed by now that Timeworks didn't have to spend the money to buy me any other program.

Gary R. Circe
Schenectady, NY

As a co-author of Bliztext, which you reviewed (and, by the way, misspelled) in your March 1985 word processing article, I would like to add the following information.

I use several word processing programs—Quickwriter III, Supertext, Easy Script, Paper Clip and Ski-Writer—which all have their peculiarities. Bliztext is not a perfect word processor program. It does lack many one or two key-punch entries, or "bells and whistles," which you look for in word processors. Below is a recap of features that were overlooked in the review article.

1. It will accept more than 40 characters on a line. The screen is used as a window—you can type up to 255 characters on a line. When you type the 75th character on a line, you'll hear a tone that lets you know you should be ending your word (word wrap) before pressing the return key. Those who have used a typewriter are particularly fond of this feature. To rapidly review and edit your material through the window, use control-O and control-P.

2. This program is entirely in machine language and is the fastest-loading word processing program I own. When you load and run the program, it is ready to go in the Edit mode—no long menu and questions to be answered. The "bells and whistles" take up memory space that should be utilized for text. It loads in 14 seconds.

3. At the same time you load Bliztext word processor, you also load a terminal program for up-loading and down-loading through a modem. This program also has a 4K buffer that can be utilized for modem up- and down-loading while you are using the word processor with text on the screen. This buffer can be used for storage and movement of blocks of text or form letters.

4. This program has the capability to handle addition and subtraction calculations within the text.

5. Based on 40 characters and spaces per line, it has a total line capacity of 748 lines—646 text and 102 in the buffer.

6. Repeat commands (including printing) are executed by pressing the f5 key.

7. It has the capability of previewing on the monitor the left and right portions of the text as it will be printed and will display the widow/orphan word or line.

8. It has the capability to handle hyphenation of words (see p. 59 of its manual).

9. It has the capability to handle headers and footers (see p. 33 of its manual).

10. To speed editing through the text, you can utilize control-Y and control-H to move from formatting command to formatting command or by paragraph.

It is obvious that you can't please everyone—that is why there is such a huge number of word processing programs on the market. I am still looking for the program that meets all of my requirements.

Edward S. Wozniak
Oceanside, CA

RUN Hits a High Note

I am writing to tell you how pleased I am with Gerald A. Caron's "Find the Word" program in your October 1984 issue. This challenging word

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puzzle produced excellent results on my Gemini 10X printer.

I have used "Find the Word" to create a puzzle of musical terms for the cover of *Choir Notes*, the monthly bulletin for the choirs of the First United Methodist Church of Springfield, Illinois. Many choir members complimented me, and some requested more such puzzles, which were valuable not only for entertainment, but especially for music education purposes.

Keep up the fine work on your outstanding publication!

Steve Beilstein
Springfield, IL

Police Alert

I am the owner and SYSOP of Police-Net, a bulletin-board system in the Houston area. The system is currently run by a Commodore 64 computer (I will upgrade to a C-128 when it is available) and a 20-megabyte hard-disk drive. There are ten databases on the system, with about 65 categories to select from and more added weekly.

The system is dedicated entirely to the working police officer and can be accessed only with a secondary password. Such a password is assigned after employment verification indicates that the user is in fact a licensed police officer. The Police-Net portion of the system allows for the police officer to access data pertaining to everyday police work and to leave and retrieve messages to other officers.

Some of the current items in Police-Net include: latest arrest techniques, latest court rulings, educational opportunities, humor, law enforcement jobs from across the nation and law enforcement publications that are available to police officers. The system is available 24 hours a day at 713-583-0403 at no cost to users.

I spent about seven months developing software. I have been a police officer in Texas since 1972 and hope to locate, across the country, officers who are interested in computers. This network will, I hope, provide the missing link to this type of officer-to-officer communication.

Alan Bragg
Houston, TX

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American People/Link	500.00	Custom Programming Group, Inc.	567.00	Melbourne House Software, Inc.	96.65	QR&D	579.60
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Avalon Hill Game Company	611.00	Electronic Schoolhouse	149.50	Microcomscribe	119.60	Quantum Software	149.75
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California Dreamers	149.75	Gamestar, Inc.	449.25	MTR International, Inc.	149.75	Sight & Sound Music Software, Inc.	250.00
Carbo Tech, Inc.	320.00	Glenco Engineering, Inc.	154.00	Navarone Industries, Inc.	199.75	Smoky Mountain Software	1000.00
Cardinal Software	449.50	Hartley Engineering Software	75.00	Olympus Educational Software, Inc.	159.80	Softlaw	119.85
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Christian Software	59.80	It's Tax Time	275.00	Penguin Software, Inc.	524.45	Strategic Simulations, Inc.	74.90
Comal Users Group, U.S.A., Limited	615.15	J.B. Horton Company	375.00	Phantom Software	259.65	Sunburst Communications, Inc.	639.20
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To enter The Great RUNaway, all you have to do is fill out the attached coupon or a facsimile, and send it in to arrive before August 31, 1985, and you are officially entered. That's it.

Enter as many times as you wish. Just send each entry in a separate envelope. Of course, there can be only one prize awarded per household and all entries must be received before August 31, 1985. The odds of winning a prize will depend on the number of entries received.

Taxes and duties on all prizes are the sole responsibility of the winners.

No substitutions will be made for any of the prizes.

All prizes will be awarded. In the event that all prizes are not claimed, random drawings will be held from all entries received to award unclaimed prizes.

All federal, state and local laws apply. Void wherever prohibited by law. Open to residents of U.S., its possessions, Canada and Mexico.

All winners will be notified by phone and mail. Anyone of any age may enter, but prizes won by a minor must be claimed by parent or legal guardian.

A complete list of winners will be published in *RUN* magazine.

Employees of CW Communications, Inc., its affiliates, subsidiaries, advertising and promotion agencies and the families of each are not eligible to enter.

Entry constitutes permission to use winners' names, photographs, or other likenesses for promotional purposes without further compensation to the winners.

Winners will be selected in a random drawing held on Tuesday, September 3, 1985.

RUN Magazine will not be responsible for lost, misdirected or late mail.

Synchronicity Software	32.80
Systeman Computers	124.75
Tab Books, Inc.	224.60
Tailored Solutions	397.50
Tenex Computer Express	69.25
Totl Software, Inc.	630.00
Touch Technologies	495.00
Uni-Kool	39.95
United States Commodore Users Group	250.00
Warriors and Warlocks	199.75
Weekly Reader Family Software	149.75
Welwyn-Currah	299.75
Wico	38.85
Woodbury Software	49.80
Xetec, Inc.	649.50

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unications

On-Line With Dow Jones News/Retrieval

By MARGARET MORABITO

RUN continues its series on telecommunications, with coverage of the Dow Jones News/Retrieval service—the best for financial and investment news. It also provides a wide array of general services, including shopping, airline scheduling, MCI Mail service and more.

The Dow Jones News/Retrieval service (DJN/R) is one of the most highly respected information services in the areas of business and finance. Traditionally, large businesses and stock investors have accessed DJN/R for current national and international news, stock quotes and business profiles.

With the increasing number of computers in the home, however, this information is now being accessed by individuals associated with much smaller businesses, or by those with perhaps less money to invest, but who want to be well-informed.

You can now gain quick and inexpensive access to information once privy to investment brokers, and you don't need an expensive computer system to do this. A low-priced home computer, such as the C-64, gives you on-line access to DJN/R and in no way diminishes the amount or quality of services obtained.

Aware of a constantly growing home-user base, DJN/R has broadened its appeal to service people who have interests in areas beyond the business and economic fields. Today, you can choose from a wide selection of general consumer, research and news services, as well as MCI mail. Thirty-five database services are available, of which a third are of general interest.

The research capabilities provided by DJN/R are in-depth and varied. Peterson's College Selection Service, the Medical and Drug Reference database, Academic American Encyclopedia, the Dow Jones Text-Search service and the highly sophisticated Standard & Poor's database reveal the broad spectrum of user targeting.

Students and parents alike can take advantage of quick reference information at almost any time of day or night, while professionals in the business world can perform in-depth research. On-line information services are not aimed at replacing library facilities, but they do offer a reliable option to those people who might be unable to travel, who are pressed for time or who need up-to-the-minute information for business decisions.

A research tool such as the Dow Jones Text-Search is intended for professional and private purposes. It allows you to search through all stories that have appeared in the Dow Jones News since 1979 or in *The Wall Street Journal* since January 1984.

You can search by words, phrases, date, headline and industry or government codes. If you've ever used LEXIS, the legal database service, you will see many similarities in usage to the Dow Jones Text-Search Service.

Standard & Poor's database provides professional investment information for the individual investor. It offers detailed corporate files on 4,600 companies, including all of those listed on the New York and American Stock Exchanges, plus over-the-counter companies.

Consumer Services

DJN/R, just as other on-line databases, also offers general consumer-oriented services, such as Comp-U-Store and the Official Airline Guide. The former is essentially a huge mail-order business, with many of the products discounted from the prices you might find in a local department store.

You can browse through Comp-U-Store and order some 60,000 general consumer products, the only drawback being that you don't have the benefit of lenient return policies. You pay for purchases with VISA, Mastercharge or automatic bank billing.

The Official Airline Guide (OAG) provides you with schedules for 650 airlines worldwide and rates for all North American flights. International fares should be available by the time you read this article. Schedules are updated each week and fares every day.

You type in the cities of departure and destination and the date and

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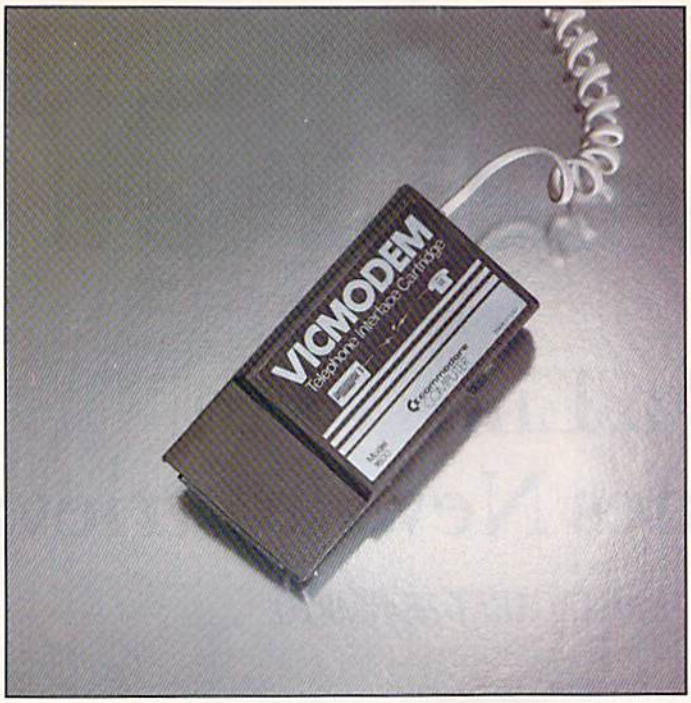

Prime time is substantially more expensive than non-prime time, as it is offered during business hours. You should use DJN/R during non-prime-time hours until you are familiar with its command system and what you want to locate.

Now that you know what the Dow Jones News/Retrieval service offers, here is a rundown of how to subscribe, what computer equipment you will need and how to log on.

How to Subscribe

You can subscribe to the DJN/R in two ways. First, you can join through a free subscription accompanying a modem or a software terminal package that you have bought. Dow Jones offers this deal with the purchase of a 1600 VIC-Modem, a 1650 Auto-Modem or the newest 1660 Modem/300. A personalized password and one free hour of on-line usage are yours just by

time of travel; the OAG will then display schedules of all airlines listed chronologically by departure time. After you select the best schedule, you can view the fares for that particular flight, listed from least to most expensive. The benefit here is that you personally can see the full range of prices and schedules and then decide which one you want to reserve. You cannot, however, make the actual reservation on-line.

A very popular service offered to businesses and the general public is MCI Mail, a leader among the proliferating computerized mailing services. Access to this on-line service is free to all DJN/R subscribers.

You can use your computer to send written mail to anyone anywhere in the U.S., whether or not he has a computer. You can also send electronic messages to any computerist who is also an MCI member. Telex Dispatching worldwide is also available. (See an upcoming issue of *RUN* for a detailed description of MCI Mail.)

Rounding out the general information services, DJN/R offers access to foreign and national news updates, sports reports, U.S. and international weather reports and movie reviews. For a brief rundown of all DJN/R services, see Table 1.

The DJN/R charges you for each minute of on-line time. You will notice in Table 1 that the rate per minute for a Standard membership is provided for both prime and non-prime time. (Three membership plans are offered: Blue Chip, Exec-

SERVICES	STANDARD RATE/MINUTE
DOW JONES BUSINESS AND ECONOMIC NEWS	Prime $1.20 Non $ .20
Dow Jones News: stories from *The Wall Street Journal*, *Barrons*, Dow Jones News Service over the past 90 days.	
The Wall Steet Journal Highlights Online: headlines and summaries of major features, columns and commentaries.	
Weekly Economic Update: reviews of week's top events and preview of month ahead.	
DOW JONES QUOTES	Prime $ .90 Non $ .15
Current Quotes: price quotes on stocks, bonds, mutual funds, Treasury issues and options.	
Enhanced Current Quotes: common and preferred stocks and bonds. Mutual funds, U.S. Treasury issues and options. News alert. Minimum 15-minute delay during market hours.	
Real Time Quotes: stock prices from the major exchanges, including composites. News alert.	
Historical Quotes: prices on daily volume, high, low and close for stock quotes; monthly and quarterly summaries; daily historical quotes.	
Historical Dow Jones Averages: industrials, transportation, utilities, and 65 stock composites.	
Dow Jones Tracking Service: create and track up to five profiles containing up to 25 companies each. Track current quotes, latest news stories and headlines on your profiled companies.	
DOW JONES TEXT-SEARCH SERVICE	Prime $1.20 Non $ .60
The Wall Street Journal: Full Text Version: all news articles since January 1984.	
Dow Jones News: selected stories since June 1979 from *The Wall Street Journal*, *Barrons*, Dow Jones News Service.	
FINANCIAL AND INVESTMENT SERVICES	Prime $1.20 Non $ .90
Corporate Earnings Estimator: earnings forecasts for 3,000 companies.	
Disclosure II: 10-K extracts, company profiles; data on over 9,400 publicly held companies. Corporate filings with U.S. Securities and Exchange Commission.	
Media General Financial Services: corporate financial information on 4,300 companies; 170 industries. Includes revenue, earnings, volume, ratio, shareholdings, price changes, dividends.	
Economic and Foreign Exchange Survey: weekly survey of U.S. money market and foreign exchange trends.	
Forbes Directory: median forecasts of monetary and economic indicators. U.S. corporations' ranking by sales, profits, assets and market value. Profitability and growth rankings for 46 industries.	
Japan Economic Daily: same-day coverage of major business, economic and political news from Japan's Kyodo News Int'l., Inc. Daily wrap-up of financial activity.	

Table 1. *Dow Jones News/Retrieval Information Services.*

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making a phone call to DJN/R Customer Service.

If you already have a modem and a terminal package, you can still subscribe by phone. Call 800-257-5114 and register with one of the customer service representatives, who will give you a password to use. The one-time registration fee is $75.

Dow Jones News/Retrieval provides excellent customer support service, and they offer several helpful user guides. When you join, you will get *The Dow Jones News/Retrieval Fact Finder* (an operating guide and directory of services), the *DJN/R User's Guide* for $10 (an in-depth manual containing detailed descriptions and practice sessions for all of the services) and a free subscription to *Dowline Magazine* (an excellent source of continuous updates and how-to's for using the DJN/R).

To use any computerized information service, you need only buy a modem. Both Commodore's 1600 VIC-Modem (about $60) and the 1650 Auto-Modem (about $100) come equipped with a free telecommunications terminal program. This program, though not highly sophisticated, will allow you to gain access to services like Dow Jones for viewing information.

In order to be able to print or save the data that you've seen, you'll need a smart terminal program. These cost from $40 to $80 as stand-alone software; less, if offered within an integrated software package. The 1660 Modem/300 (about $100), which will work on the VIC-20, C-64 and the Plus/4, comes with an excellent smart terminal program.

DJN/R has several access networks that link you to its mainframe computer. These communications networks are described in the *Dow Jones News/Retrieval Fact Finder* and the *DJN/R User's Guide*. Commodore owners will use Tymnet. Also available are Telenet, Uninet and, for Canadian users, Datapac. A new phone network has been set up by Dow Jones, called DowNet, which will offer a direct connection to DJN/R. Be sure that you have your local network phone number and your DJN/R password ready before going on-line.

Table 2. *Log-on procedure for the Dow Jones News/Retrieval.*

Please type your terminal identifier	A
Please log in:	DOW1;;
Host is now online	
What service please?????	DJNS + Return
Enter password	Type password + Return
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ENTER QUERY	

Official Airline Guide: schedules for 650 airlines worldwide. Rates for all North American flights; updates daily.

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GENERAL NEWS AND INFORMATION SERVICES Prime $ .60 Non $ .20

Master Menu: listing of information contained in DJNS. Instructions for use.

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News/Retrieval Weather Report: two-day forecasts updated twice daily for 50 U.S. and international cities. Monthly weather planner with 30-day forecasts.

Cineman Movie Reviews: reviews from current releases back to 1920s.

Wall $treet Week Online: transcripts of the four most recent broadcasts of *Wall $treet Week* television show.

Comp-U-Store: electronic shopping mall with over 60,000 products.

News/Retrieval Symbols Directory: listing of over 15,000 symbols for accessing News/Retrieval services.

Words of Wall Street: definitions of over 2,000 business and financial terms.

Peterson's College Selection Service: more than 3,000 two- and four-year colleges and universities profiled by size, entrance difficulty, location, cost, financial aid, majors and admissions requirements; search by college name.

Medical and Drug Reference: profiles symptoms, causes and treatment of more than 1,000 ailments. Guide to prescription drugs covering their side effects and interactions with other drugs, food and alcohol. Medical and drug news updated monthly.

MAIL SERVICE AND FREE CUSTOMER NEWSLETTER Free service

INTRO: free newsletter; new database announcements and information for subscribers of Dow Jones News/Retrieval.

MCI Mail: mail service for sending written and electronic mail.

Available 22 hours a day, 7 days a week, from 6 AM to 4 AM EST.
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For any updates on prices, see //INTRO, a free database in DJN/R.

Logging On

Actual logging on to DJN/R is not difficult, but you should be familiar with the offerings and the command structure before going on-line. (See *RUN*'s Special Issue 1985 for more detailed instructions on how to hook up your modem, how to prepare your computer for going on-line and the commands used for DJN/R.)

Once your modem is properly installed, you can use either a dumb or a smart terminal to access DJN/R. The following description assumes the use of a VIC-Modem with the VIC-Term software program for going on-line. This is the setup that many Commodore owners will have as beginners in telecommunications.

You place the VIC-Modem into the user port with power off. Once it's in place, push back the switch on the right of the modem for Originate mode. Power up the computer; then load and run your terminal program. A copyright message will flash, followed by Terminal Ready, which appears in the upper left of your screen.

You don't have to worry about changing any of the protocol settings on the menus available. These are preset for access to the major information systems, like Dow Jones News/Retrieval.

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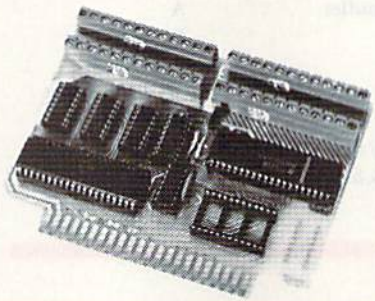

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Now unplug the wire from your telephone's handset and plug it into the back left side of the VIC-Modem. Do not hang up the receiver or you'll be disconnected. (Be sure that you have a phone with a removable handset plug before trying this.)

With the phone wire plugged in, the red light on the right of the modem will shine, informing you that your computer is ready to talk to another computer. This is where you begin the log-on procedure for DJN/R. You must be quick, as you'll be disconnected if you take too long to enter the correct information.

Once you have input the phone number and have been connected, you will be prompted as shown in Table 2 and you should respond as suggested.

You can get more information on the commands and about what to expect by phoning 800-257-5114 or by reading the publications I mentioned in the previous section. If you are a new subscriber and are anxious to get on-line, a phone call will put you on the right track.

Otherwise, in a week or two you'll receive excellent coverage of the services and how to access them in the DJN/R documentation. DJN/R also offers seminars nationwide for new users. The topics and times are given through the INTRO database.

While the Dow Jones News/Retrieval is broadening its services to provide more variety for its users, its continued strength lies in its business, financial and investment offerings. Nevertheless, the small-business person and low-end investor are more apt to subscribe to DJN/R today than in the past because of the addition of general information services—and they can use an inexpensive home computer like Commodore to get on-line.

In next month's issue, look for descriptions of The Source and Delphi as we continue with our series on telecommunicating. R

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

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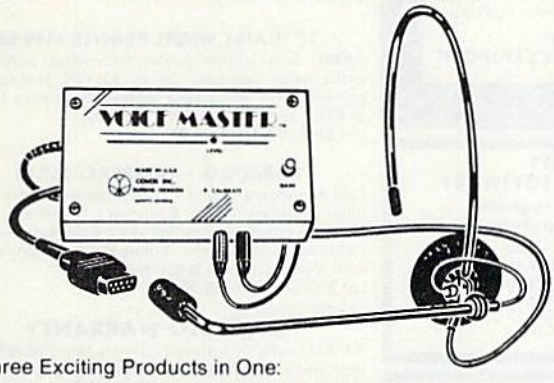

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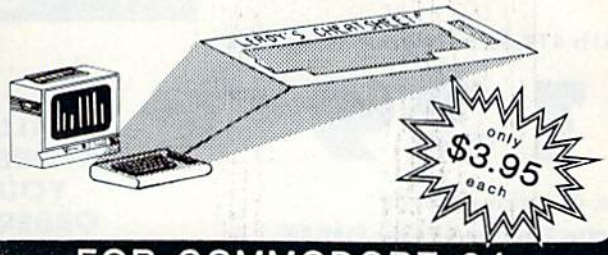

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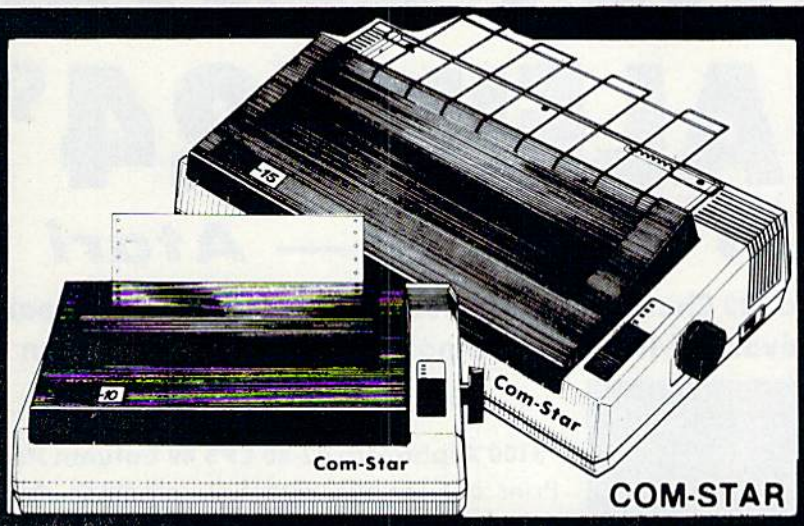

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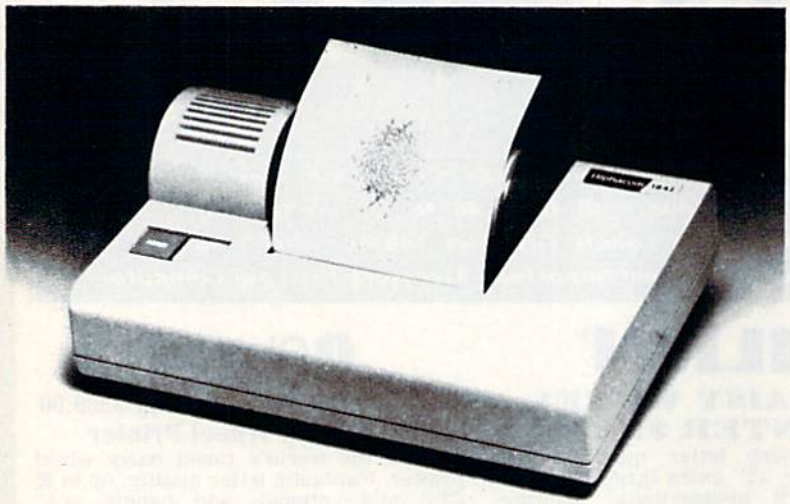

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Print out listings with full computer character sets (interface required, see below). Print in upper and lower case. Comes with a roll of paper and all power adapters needed. Perfect for a spare printer or program lister. List $99.00. **Sale $24.95.**

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3104 40 Meter Rolls Blue	$16.95	**$3.95**
3105 25 Meter Rolls Black (1 per pkg.)	$12.95	**$3.95**
3106 25 Meter Rolls Blue (2 per pkg.)	$19.95	**$5.95**
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3150 Alphacom 81-100 CPS 80 Column Printer

Now you can have a printer for the cost of a large box of paper. This printer prints in upper and lower case with true lower descenders. Comes with 1 roll of paper and power adapter. With the intelligent interfaces (sold below) you can do Ascii graphics as well as Atari or Commodore graphics. Plus you can do underlining and expanded modes. Print out pictures, program listings, word processing pages, etc. Perfect for the student or homeowner. List $199.00. **Sale $39.95.**

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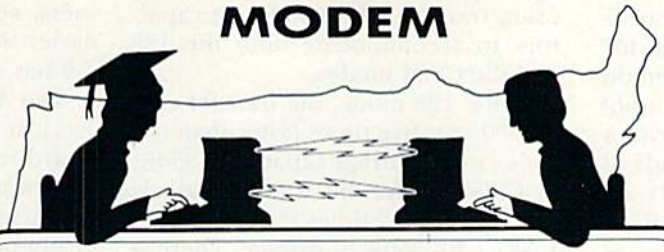

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From p. 49.

pay much more for your software than you would for comparable Commodore products. Why pay so much? The C-128 can do exactly the same for less. (No price has yet been given on Commodore's 128K expansion unit.)

As you can see, the C-128 provides strong applications for both ends of the user spectrum. It is as easily applied to education as the Apple IIc; it is as easily applied to business as the PCjr.

Software developers are being attracted to the C-128 because of its memory and unsurpassed Basic 7.0, which includes advanced graphics and sound capabilities. This is a computer with huge potential for upward mobility and application growth.

Built-in Basic

The C-128's built-in Basic 7.0 has already received coverage in articles written about this computer. You don't hear much about the built-in Basic interpreters of the IIc or the PCjr, probably because there isn't much to talk about.

The IIc has Applesoft Basic, which is almost the same as that in previous Apple II computers. It does have easy-to-use, low-resolution graphics commands, but you still have to rely on Poke commands to get any music or to tap its double high-resolution graphics.

The IBM PCjr uses Microsoft Basic, which does hold advanced commands for sound, graphics and programming, but you won't get all of these commands built-in. What you get with the PCjr is a Basic that only allows saves to cassette and that doesn't give you access to all of the graphics features. You have to get a separate Basic cartridge before you can take full advantage of its programming abilities. The C-128 comes with the capability to utilize its advanced features; you don't have to buy extras.

Data Storage

What good is a high-powered computer if you don't have the equipment to store and retrieve large amounts of data quickly. Commodore anticipated this concern when developing the C-128.

It's no secret that the 1541 disk drive, available for the C-64, is slow. Commodore now has a new, faster and smarter drive—the 1571—which can take advantage of all three operating systems in the C-128. In addition to C128 mode, which emulates the 1541 with 300 cps and 170K storage capacity, this new drive offers faster transfer rates and larger capacities to accommodate both the 128 and the CP/M modes.

In the 128 mode, the transfer rate is 1500 cps (five times faster than the 1541), with a storage capacity of 350K; in CP/M mode, the transfer rate is 3500 cps (10–12 times faster than the 1541), with 350K of storage. There is also a "burst" mode, for both the 128 and CP/M, in which up to 410K of data can be loaded at 4000 cps.

Compared to the Commodore drive, the Apple IIc's internal drive has a surprisingly small storage capacity—just 143K. This appears to be adequate for the software running on the IIc, but it is a definite limitation for more complex business applications.

With 128K RAM, Basic 7.0, advanced graphics and sound capabilities and about 6000 available software packages, the C-128 is a computer with great potential for a wide variety of applications.

The PCjr has an internal drive with a 360K storage capacity, almost the same as the 1571 in 128 mode, but that is less capacity than the 410K of the CP/M mode. Additionally, IBM did not provide the PCjr with its own option for a second drive. Both the IIc and the C-128 have easy options for adding their own second drives.

Sound

The C-128 has exquisite sound capabilities in each of its modes. The 6581 SID chip, with its three voices plus white noise, can be programmed, mixed and output through sophisticated stereo speakers or your television. A flood of sound synthesizers and music keyboards has been developed to take advantage of the SID chip, and even more will hit the market now that there is so much more memory to play with. For programmers, accessing this sound is much easier than it was on the C-64. Basic 7.0 has simple sound commands.

The Apple IIc, on the other hand, has just one voice, which can only be heard from a small internal speaker. It is also cumbersome to program, requiring Poke commands. There's really no comparison.

The PCjr is more on the level of the C-128, having three programmable voices, white noise and output through external speakers. The value of a computer's sound capabilities, however, lies not only in the number of voices and kind of output; it is also measured by the ease of control over these capabilities and by the presence of high-quality software and of hardware good enough to take full advantage of these features.

It is the latter point that pushes the value of the C-128 beyond that of the PCjr. There are more highly sophisticated software programs and peripherals already available for the C-128 than there are ever likely to be for the PCjr.

Graphics

As for graphics, all three of these computers have high-resolution color capabilities that are fairly equal. However, there are major differences among them when you look at the cost for accessing this color and the ease of controlling it in your own programs.

In its 40-column display, the C-128 offers three modes: 16 colors in Text mode; two colors in High-resolution mode, with 320 by 200 pixels; four colors in Low-resolution mode, with 160 by 200 pixels. In 80-column mode, it has an impressive 16 colors in Text mode and two colors in Bit-mapped mode, with 640 by 200 pixels (using about 16K of RAM).

The resolution and number of colors offered are abundant in comparison with other personal computers that do offer color options in 80-column mode. It has an advantage over many in that it also offers eight sprites.

The real strength of the C-128's graphics is seen when you look at the wealth of graphics commands built into Basic 7.0, which of course makes programming much easier. Basic 7.0 holds commands such as Circle, Box, Paint, Draw, Sprite and about 15 more. These ordinary English com-

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mands make the sophisticated graphics ability of this computer easily controllable.

The IIc has excellent graphics capabilities, with a Low-resolution mode of 40 by 48 with 16 colors, a High-resolution mode of 280 by 192 pixels with six colors and a Double High-resolution mode of 560 by 192 with 16 colors. There's just one problem, though: Applesoft Basic doesn't have any built-in commands for accessing its double high-resolution graphics. You can get to this feature, but you need to use machine language calls and Pokes. If you have ever worked with Commodore Basic 2.0, you know the hassle involved.

The IIc with an RGB color monitor plus adapter costs close to $1900. It's no wonder that most computer stores don't even want to stock the RGB monitors for the IIc. Most dealers sell the IIc with its monochrome monitor, which, of course, can't display color.

The IBM PCjr has graphics capabilities that are fairly comparable to the C-128, but with more memory taken up. In its Low-resolution mode, you get up to 16 colors with 160 by 200 pixels; in Medium-resolution mode, you get 16 colors with 320 by 200 pixels. In 80-column mode, you have only black and white available with 640 by 200 pixels. (This takes up 16K of RAM.) You may use four colors at this resolution, but only by sacrificing 32K of RAM.

The PCjr, like the C-128, does have extensive Basic commands for manipulating its high-resolution graphics, but you won't get all of them built in; you have to get a separate Basic cartridge to gain access to all of the advanced graphics commands. Unlike the IIc, the PCjr is often sold with an RGB color monitor to take full advantage of its color features.

Keyboard

The keyboard is probably the most personal part of any computer. You touch it, you look at it, and, through it, you control your computer—easily or with difficulty. The keyboards of these three competitors are significantly different.

The C-128 has 92 keys, including a 14-key numeric keypad. It has eight programmable function keys and six cursor keys.

The Apple IIc, on the other hand, has only 63 keys; the PCjr has only 62. Neither the IIc nor the PCjr has a numeric keypad to ease data entry on a large scale. The IIc doesn't have programmable function keys—just two Apple keys that are used like control keys in much of its software. The PCjr has ten function keys that are accessed through two key presses.

The C-128's keyboard clearly outshines its two competitors. When you use the C-128, it is quite evident that it has been designed to execute complex tasks with a minimum of effort. The numeric keypad and programmable function keys are just two illustrations of its intention to attract serious programmers as well as users with applications such as accounting, data management, financial planning and word processing.

Peripherals

As for options in peripherals, the C-128 has a parallel port, cassette port, RF/TV port, audio output, audio input, composite video, serial port, two game ports/mouse, expansion port and a digital RGBI video port.

The Apple IIc has six ports, including one joystick/mouse, a modem, a television, monitor, second disk drive and a printer/plotter.

The PCjr has ports for two joysticks, audio output, a serial printer, cassette recorder, keyboard cable, an RGB color monitor, composite monitor, an internal modem, light pen, TV and two cartridge slots.

All three computers have enough add-on ports to satisfy most of your needs. It's really only the price of adding on these peripherals that makes a difference. With the enormous number of computers Commodore sells, and with its high-volume and cost-efficient production, it can sell its peripherals for far less than its competitors. Moreover, all C-64 peripherals are compatible with the C-128.

What You Get

Lastly, let's look at what you get for a base price. For about $550, Commodore gives you a unit that houses the keyboard, the three operating systems and the built-in Basic 7.0. The price includes the separate 1571 disk drive.

For $1100, you can get the Apple IIc, which houses the keyboard, central processing unit, an internal disk drive and Applesoft Basic.

For $1125, you can get the enhanced 128K IBM PCjr, which includes a separate keyboard and the central processing unit with internal disk drive. (This includes the Basic cartridge and DOS, both needed to use the disk drive.)

For all three of these computers, you will have to buy either a monochrome or RGB color monitor to take advantage of their features. Table 1 gives you a quick reference comparison of the attributes of all three computers.

Table 2 shows prices for all three computers, starting with just the base unit, then a system with monochrome monitor and, finally, a system with full color capabilities.

These prices are an average between a nationwide computer chain and a local computer store. Prices, of course, will vary from store to store. When checking on prices for personal computers, be sure that you find out exactly what is included for a quoted price.

As you can see, the lower price of the C-128 certainly does not mean lower quality or fewer features. The C-128 offers much more than the Apple IIc, and even if Apple dropped its price on the IIc, it still would not match the C-128 feature for feature.

The IBM PCjr is more of a competitor for the C-128. A basic difference between these two computers is the fact that the PCjr has a 16-bit microprocessor, while the C-128's is an 8-bit unit. This difference is not easily defined as an advantage or disadvantage for either computer; it all depends on your intended applications.

When you look at the C-128, consider these factors: the wealth of existing software that is compatible with the C-128 system in the areas of business, education and entertainment; the amount of that software taking full advantage of the sound and graphics features; the quality and extensiveness of its built-in Basic; and the cost of peripherals and software. Considering all it has to offer, the C-128 is a personal computer that should make Apple cringe and IBM raise its eyebrows. R

Note: IBM did more than raise its eyebrows. Since this article was written, it announced the discontinuance of the PCjr. The only other competition for the C-128 now lies with the new Atari XE machines, and just what they offer remains to be seen.

Margaret Morabito (80 Pine St., Peterborough, NH 03458) is technical editor for RUN. *She is currently working on a book about the C-128 to be published this summer by Datamost.*

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From p. 35.

plete musical notation, write lyrics, change keys, octaves or playback speeds, duplicate chords and print out or save compositions.

The program's "control board" gives you control of the computer's sound synthesis capabilities. This mode allows you to use pre-programmed instruments to accompany your compositions or create instruments and sound effects of your own.

Allegro

Allegro (Artworx Software Co.) is a music and sound-synthesis program for the C-64. It allows you to create and modify music and incorporate it into your own programs.

Allegro comes with a library of over 50 pre-programmed instruments. It also features an Instrument Builder and a music-notation language, Forte, which permits rapid note entry and full-screen editing. You can use the C-64 keyboard to play notes and chords in real time or to accompany your own music or rhythm track.

The Music Shop

The Music Shop (Broderbund Software) lets you write, edit, play and print out original compositions. You can also play and rearrange dozens of pre-programmed music pieces included on the disk.

Music is displayed on the screen in a page-by-page format with no scrolling. You can move blocks of music or erase and start again. When you're satisfied with your composition, you can save it or print it in standard sheet music format.

Bank Street MusicWriter

Bank Street MusicWriter (Mindscape) allows beginners and experienced musicians to write compositions using multiple voices. The program displays and plays voices together or separately. You can hear and see each note as you enter it from your computer keyboard.

Playback and editing functions allow you to review and change your work. You can save your composition on disk or print out a score on paper.

New Releases from Passport MusicSoftware

MIDI/4 plus and *MIDI/8*. These disk-based programs for the C-64 are the newest additions to Passport's line of MIDI music software. Both the four- and eight-channel recording programs feature auto-correct, punch in/out, fast forward/rewind, sequence chaining and sync to tape, MIDI and drum machines. Both programs incorporate the original MIDI/4's multitrack tape recorder qualities.

Soundchaser 64 Keyboard. Soundchaser 64 is a four-octave music keyboard for the C-64. It comes with composing and synthesizer software that transposes the 49-note music system into a full nine-octave range.

MacMusic. This music-composing program for the C-64 consists of a

Manufacturers' Addresses

ACCESS SOFTWARE
925 East 900 South
Salt Lake City, UT 84105
- Master Composer
  C-64 disk, $39.95

ACTIVISION, INC.
2350 Bayshore Frontage Road
Mountain View, CA 94043
- The Music Studio
  C-64 disk, $29.95

ARTWORX SOFTWARE CO., INC.
150 North Main St.
Fairport, NY 14450
- Allegro
  C-64 disk, $39.95

BRODERBUND SOFTWARE
17 Paul Drive
San Rafael, CA 94903
- The Music Shop
  C-64 disk, $44.95

ENTECH SOFTWARE
PO Box 881
Sun Valley, CA 91353
- Studio 64
  C-64 disk, $39.95
- Add Mus'In
  C-64 disk, $39.95

MELODIAN, INC.
115 Broadway
Suite 1202
New York, NY 10006
- Melodian Keyboard with ConcertMaster software on disk/C-64, $199.90
- RhythmMaster
  C-64 disk, $39.95

MINDSCAPE, INC.
3444 Dundee Road
Northbrook, IL 60062
- Bank Street MusicWriter
  C-64 disk, $49.95

PASSPORT MUSICSOFTWARE
625 Miramontes St.
Half Moon Bay, CA 94019
- MIDI Interface
  C-64, $195
- MIDI/4 Soundware
  C-64 disk, $99
- MIDI/4 plus
  C-64 disk, $99.95
  ($35 for current MIDI/4 owners)
- MIDI/8
  C-64 disk, $149.95
- Soundchaser 64 Keyboard with software on disk/C-64, $199
- MacMusic
  C-64 disk, $49.95
- Computer Hitware
  C-64 disk, $19.95 each

SCARBOROUGH SYSTEMS
25 N. Broadway
Tarrytown, NY 10591
- Songwriter
  C-64 disk, $39.95

SEQUENTIAL, INC.
3051 N. First St.
San Jose, CA 95134
- MusicMate Keyboard, $99; MusicWare software on disk/C-64, $39.95 each
- Max Keyboard
  C-64, $599

SIGHT & SOUND MUSIC SOFTWARE, INC.
3200 S. 166th St.
PO Box 27
New Berlin, WI 53151
- Incredible Musical Keyboard
  C-64, $49.95
- 3001 Sound Odyssey
  C-64 disk, $39.95
- Music Processor
  C-64 disk, $34.95
- Kawasaki Synthesizer
  C-64 disk, $49.95
- Computer Song Albums
  C-64 disk, $24.95 each
- Music Video Kit
  C-64 disk, $49.95
- Kawasaki Rhythm Rocker
  C-64 disk, $39.95

SYSTEMS MANAGEMENT ASSOCIATES
3700 Computer Drive
PO Box 20025
Raleigh, NC 27619
- CodePro-64
  C-64 disk, $59.95

TECH SKETCH, INC.
26 Just Road
Fairfield, NJ 07006
- Music Port Keyboard with software on disk/C-64, $149.95

VALHALA SOFTWARE
205 E. Hazelhurst
Ferndale, MI 48220
- Keyboard Chord/Scale Master
  C-64 disk, $39.95

WAVEFORM CORP.
1912 Bonita Way
Berkeley, CA 94704
- ColorTone Keyboard with software on disk/C-64, $39.95
- MIDI connector with software on disk/C-64, $49.95

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Macintosh-style user interface featuring menus and icons. Each melody is drawn on the monitor in different shapes using a joystick. You can modify pre-programmed tunes from the menu or create your own musical compositions. The program includes ten hit songs from Michael Jackson, Lionel Richie, The Police, Willie Nelson and other popular contemporary artists.

Computer Hitware. This is a series of C-64 software packages that combine popular music with color graphics. You can arrange graphics displays to accompany the music, creating your own music video. The first release features Duran Duran.

Max

Max (Sequential) is a multi-timbred, fully polyphonic keyboard synthesizer for the C-64. Max's features include on-board digital multi-track recorder (six tracks), six independent synthesizer voices, on-board analog drum sounds and keyboard split and voice assignment (when used with Sequential's 920 software package). Max sends and receives on all 16 MIDI channels, and it also responds to velocity information from other velocity-equipped MIDI keyboards.

More Sight & Sound Software

Music Video Kit. The Music Video Kit allows you to create and animate graphics scenes, objects and patterns to display in synchronization with music. You can create colors, patterns, motions and entire screens, or you can select any of the pre-programmed videos and modify them as you wish.

Kawasaki Rhythm Rocker. This program combines C-64 color graphics with electronic instrument sounds and pre-programmed bass rhythms. It features multi-track recording capability, and it offers a variety of electronic percussion and synthesizer sounds that can be laid down on top of different pre-programmed bass lines.

Keyboard Chord/ Scale Master

Keyboard Chord/Scale Master (Valhala Software) is an educational music software package designed to enhance your keyboard abilities through sight and sound recognition of chords and scales. The program contains Display, Review and Compare modes for both chords and scales. It is designed for use by those learning the piano, organ or electronic synthesizer.

Waveform MIDI

The Waveform MIDI lets you connect the C-64 to any MIDI synthesizer. It also allows MusiCalc users to connect two C-64s together, making the MusiCalc 1 Synthesizer and Sequencer a six-voice synthesizer. The package includes software on disk and the MIDI connector. The system requires MusiCalc 1, the C-64 with disk drive and the MIDI. R

Address all author correspondence to Tom Benford, PO Box 4125, Osborneville, NJ 08723.

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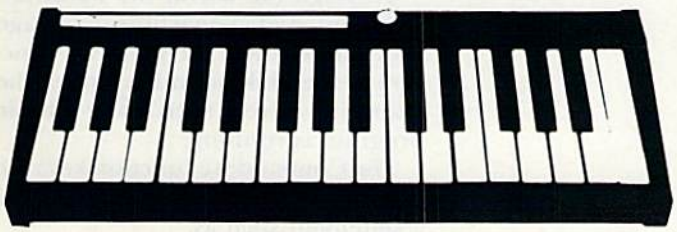

TECH SKETCH
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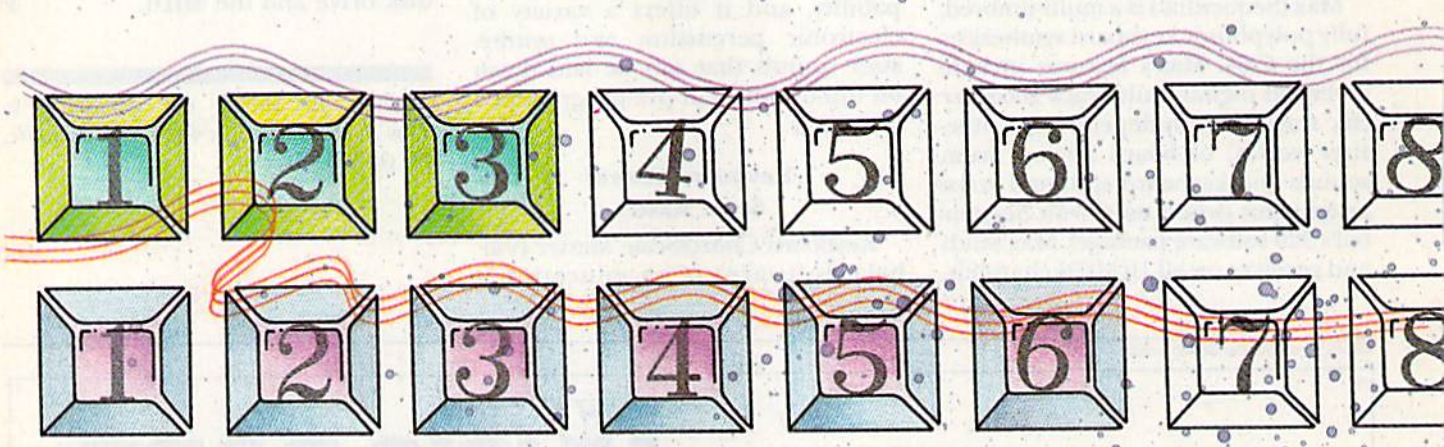

The C-64's eight function keys can become 12 by means of some programming magic.

With a little creative programming, you can turn your C-64's eight function keys into 12. This article shows you how to find those four extra function keys and how to apply them for Basic and machine language programming.

Through the use of the hardware interrupt and a machine language subroutine, these 12 keys can function in the background as part of the operating system even while a Basic program is running.

The Commodore function keys are typically used in Basic in response to a statement such as:

```
GET A$: IF A$ = "F1" THEN action
```

The "action" can be a Goto command, a Print statement, a mathe-

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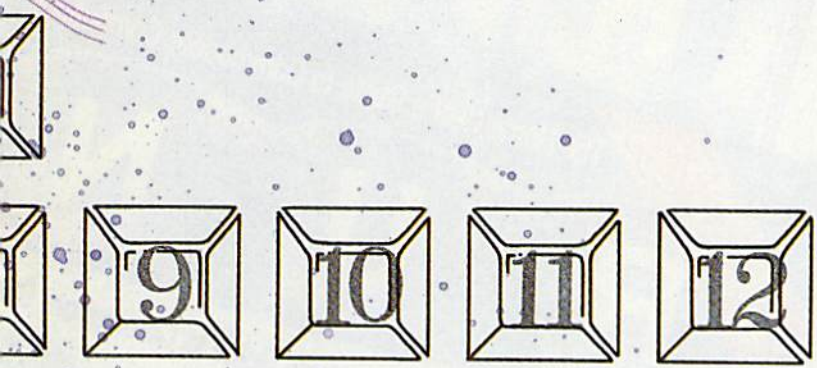

A Dozen Will Do It

By RONALD GREENBERG

matical expression or other command. The expression above can also be written using a numerical representation for a character rather than a character name. For example:

```
GET A$: IF A$ = CHR$(133) THEN action
```

The expression CHR$(133) is the computer's numerical representation of f1. The CHR$ values of all eight function keys are given on page 136 of the *Commodore 64 User's Guide.*

Four More Function Keys

The eight C-64 function keys are actually four physical keys, shifted or unshifted. For example, shifting the f1 key gives f2, which has a different CHR$ value. To gain access to four extra function keys, you use the Commodore key as a second type of shift key. However, this cannot be done in a straightforward manner, since shift f1 and Commodore f1 both give the same CHR$ value.

To differentiate between shift f1 and Commodore f1 within a program, you must examine how the computer handles input data from the keyboard. Whenever a key is pressed, memory location 197 ($00C5) registers a key number. This number is different from the CHR$ value, as it represents a keyboard key rather than a character or function.

The computer generates a CHR$ value by coupling the key number with the value of memory location 653 ($028D), which is the shift flag. This location shows a value of 0 if no shift-type keys are pressed, 1 if the shift key is pressed, 2 if the Commodore key is pressed and 4 if the control key is pressed.

While the computer cannot generate different CHR$ values for shift f1 and Commodore f1, you can differentiate between the two by examining memory locations 197 and 653.

The logic to expand the number of function keys then becomes:

```
GET A$
IF PEEK(197) = 4 AND PEEK(653) = 0 THEN
  action 1
IF PEEK(197) = 4 AND PEEK(653) = 1 THEN
  action 2
IF PEEK(197) = 4 AND PEEK(653) = 2 THEN
  action 3
```

In this example, hitting f1 will result in action 1, hitting shift f1 (f2)

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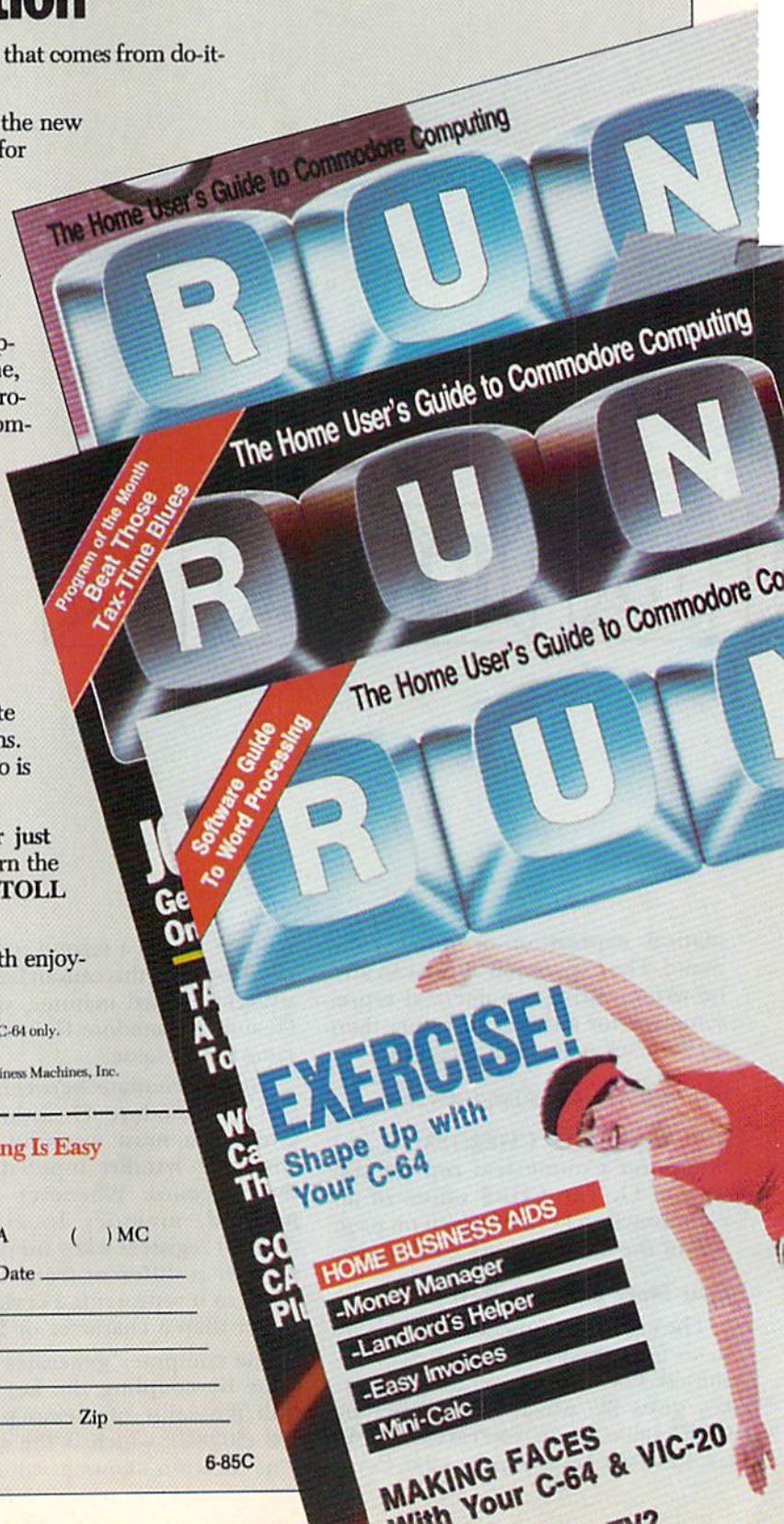

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will result in action 2 and hitting Commodore f1 (f1′) produces action 3. This logic can extend to the other function keys if you use values of 5, 6 and 3 in memory location 197 for f3, f5 and f7, respectively.

This results in a total of 12 user-defined function keys. One interesting point is that, in this type of logic, the control key cannot be used to try and pick up an additional four function keys.

Function Keys at Work

Listing 1, entitled Personal Calculator, demonstrates the various methods of accessing function keys in Basic. In this program, the function keys are used twice—first for setting up the screen colors and then for providing the choices of mathematical calculations.

Additionally, two techniques are used for highlighting the function key menus on the screen: Extended Color mode and reverse printing. Highlighting a menu makes for a neater-looking display as well as making the program easier to use.

In Personal Calculator, line 100 clears the screen and initiates Extended Color mode. Lines 110–160 print the menu. The highlighting box around the menu is produced in lines 170–200. Line 210 puts the computer on hold, waiting for the user to hit a key.

The three different methods to access the function keys are all demonstrated in lines 220–290. In this situation, when only the standard function keys are called for, the three logical approaches can be used indiscriminately. However, if all 12 function keys are required, mixing of logic can cause problems and is not recommended.

Line 300 will send control back to line 210 if a key other than the requested function key is pressed. The actions that will occur as a result of pressing a function key are in lines 310–340. These will change the screen, background and character colors. Line 350 turns off the Extended Color mode.

Lines 360–470 present a menu highlighted in Reverse Color mode to allow you to pick which mathematical function you wish to utilize. The computer waits for your response in line 490. Lines 500–1030 evaluate to see if a function key has been pressed and then give the desired response.

Two different programming techniques are used to elicit the desired response. In line 510, if f1 is pressed, then

```
PEEK(197) = 4 AND PEEK(653) = 0
```

is true, and the action described on the rest of line 510 will take place. If

```
PEEK(197) = 4 AND PEEK(653) = 0
```

is false, the program will proceed to line 520. This technique is useful if the action desired is short enough to fit on one line.

Line 590 uses a different programming approach. If

```
PEEK(197) <>5 OR PEEK(653) <>2
```

is true, then Commodore f3 (f3′) was *not* pressed, and the program jumps

Listing 1. *Personal Calculator program.*

```
100 PRINT "{SHFT CLR}{CRSR DN}":POKE53282,0
    :POKE53265,107:POKE646,1
110 PRINT "{10 CRSR RTs}{CTRL 9}PERSONAL CA
    LCULATOR{CTRL 0}{5 CRSR DNs}"
120 PRINTTAB(9);"TO SET SCREEN COLORS"
130 PRINTTAB(9);"HIT F1 FOR BLUE"
140 PRINTTAB(13);"F3 FOR WHITE"
150 PRINTTAB(13);"F5 FOR GREY"
160 PRINTTAB(13);"F7 FOR RED"
170 FOR J=0TO4
180 FOR I=1353 TO 1372
190 POKEI+J*40,PEEK(I+J*40)AND63OR64
200 NEXT:NEXT:POKE53265,91
210 GET A$:IF A$=""THEN210
220 REM F1 OPTION
230 IF A$="{FUNCT 1}"THEN 310
240 REM F3 OPTION
250 IF A$="{FUNCT 3}"THEN 320
260 REM F5 OPTION
270 IF A$=CHR$(135) THEN 330
280 REM F7 OPTION
290 IF PEEK(197)=3ANDPEEK(653)=0THEN 340
300 GOTO210
310 POKE53281,6:POKE53280,14:POKE646,14:GOT
    O350
320 POKE53281,1:POKE53280,6:POKE646,6:GOTO3
    50
330 POKE53281,15:POKE53280,11:POKE646,11:GO
    TO350
340 POKE53281,2:POKE53280,10:POKE646,10:
350 POKE53265,27
360 PRINT"{SHFT CLR}{5 CRSR DNs}{4 SPACEs}{
    CTRL 9}HIT F1{2 SPACEs}TO ADD A+B{16 SP
    ACEs}"
370 PRINTTAB(8);"{CTRL 9}F1' TO SUBTRACT A-
    B{11 SPACEs}"
380 PRINTTAB(8);"{CTRL 9}F2{2 SPACEs}TO MUL
    TIPLY A*B{11 SPACEs}"
390 PRINTTAB(8);"{CTRL 9}F3{2 SPACEs}TO DIV
    IDE A/B{13 SPACEs}"
400 PRINTTAB(8);"{CTRL 9}F3' TO GET LOG{16
    SPACEs}"
410 PRINTTAB(8);"{CTRL 9}F4{2 SPACEs}TO GET
     SINE (DEGREES){5 SPACEs}"
420 PRINTTAB(8);"{CTRL 9}F5{2 SPACEs}TO GET
     TANGENT (DEGREES){2 SPACEs}"
430 PRINTTAB(8);"{CTRL 9}F5' TO GET HEX FRO
    M DECIMAL{3 SPACEs}"
440 PRINTTAB(8);"{CTRL 9}F6{2 SPACEs}TO GET
     DECIMAL FROM HEX{3 SPACEs}"
450 PRINTTAB(8);"{CTRL 9}F7{2 SPACEs}TO GET
     BINARY FROM DECIMAL"
460 PRINTTAB(8);"{CTRL 9}F7' TO GET DECIMAL
     FROM BINARY"
470 PRINTTAB(8);"{CTRL 9}F8{2 SPACEs}TO QUI
    T{19 SPACEs}"
480 X$=""
490 GET A$:IFA$=""THEN490
500 REM F1 RESPONSE
510 IFPEEK(197)=4ANDPEEK(653)=0THENGOSUB108
    0:PRINTA;" + ";B;" = ";A+B:GOTO1050
520 REM F1' RESPONSE
530 IFPEEK(197)=4ANDPEEK(653)=2THENGOSUB108
    0:PRINTA;" - ";B;" = ";A-B:GOTO1050
540 REM F2 RESPONSE
550 IFPEEK(197)=4ANDPEEK(653)=1THENGOSUB108
    0:PRINTA;" X ";B;" = ";A*B:GOTO1050
560 REM F3 RESPONSE
570 IFPEEK(197)=5ANDPEEK(653)=0THENGOSUB108
    0:PRINTA;" / ";B;" = ";A/B:GOTO1050
580 REM F3' RESPONSE
590 IFPEEK(197)<>5ORPEEK(653)<>2THENGOTO640
600 GOSUB1100:C=LOG(A):D=LOG(A)/LOG(10)
610 PRINT"LOG(10) OF ";A;" = "D
620 PRINT"LOG(E) OF ";A;" = "C:GOTO1050
630 REM F4 RESPONSE
640 IFPEEK(197)<>5ORPEEK(653)<>1THENGOTO660
```

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to 640. If the answer is false, then Commodore f3 *was* pressed, and the actions in lines 600–620 will take place. This programming technique is most useful when the desired action requires more than one line of programming and when, for clarity, you want to limit confusing jumps.

Line 1040 sends control back to line 510 if the key pressed was not a function key. Lines 1050–1070 hold the mathematical results on the screen until the user hits a key. Lines 1080–1260 are subroutines used in the arithmetic routines.

Applying Function Keys in ML

The logic utilized to access 12 function keys in Basic can also be applied to machine language programming. In machine language, the values in registers 197 and 653 would be loaded into the accumulator and, by comparing their values with the function key numbers and shift flag, respectively, you can branch to various subroutines for desired responses.

A machine language program to access the function keys can be run in the background using the hardware interrupt. Memory locations 788 ($0314) and 789 ($0315) are the hardware interrupt vector.

The vector points to a memory location where a user-defined subroutine can be accessed every $^1/_{60}$ of a second. Therefore, a machine language program to define the function keys can be run in the background if its location is defined in the hardware interrupt vector.

Listing 2 is a Basic loader for a machine language program that utilizes the function keys in the background. The Basic loader was used to make the program more accessible to you. Type in the program and then save it prior to running it. The program will automatically clear the computer's memory, so if you don't save it, it will be lost.

This program defines eight function keys, while leaving the four unshifted keys available for Basic programming. The actions resulting from pressing the function keys are as follows:

Commodore f1 sets the screen colors to the Commodore blue.
Shift f1 sets the screen to black on grey, which is much easier to see than blue on blue.
Commodore f3 cycles through the background colors without having to Poke values into memory.
Shift f3 cycles through border colors.
Commodore f5 cycles through cursor colors.
Shift f5 loads the disk directory if the wedge is being used.
Commodore f7 lists your present Basic program.
Shift f7 runs your Basic program.

When you are cycling through the colors, you can continuously hold down the function key until the desired color is obtained. This program will keep running in the background until you hit the run/stop and restore keys. To resume this program, just type SYS 49152 (return). Ⓡ

Address all author correspondence to Ronald Greenberg, 1 Edgewood Drive, Lenox, MA 01240.

Listing 1 continued.

```
65Ø X$="IN DEGREES":GOSUB11ØØ:PRINT"SINE ";
    A;" = "SIN(A*{PI}/18Ø):GOTO1Ø5Ø
66Ø IFPEEK(197)<>6ORPEEK(653)<>ØTHENGOTO69Ø
67Ø X$="IN DEGREES":GOSUB11ØØ:PRINT"TANGENT
    ";A;" = "TAN(A*{PI}/18Ø):GOTO1Ø5Ø
68Ø REM F5' RESPONSE
69Ø IFPEEK(197)<>6ORPEEK(653)<>2THENGOTO75Ø
7ØØ X$="(65535 MAX)":GOSUB11ØØ:B=INT(A/16{U
    P ARROW}3):C=INT((A-B*16{UP ARROW}3)/25
    6)
71Ø D=INT((A-B*16{UP ARROW}3-C*256)/16):E=I
    NT(A-B*16{UP ARROW}3-C*256-D*16)
72Ø PRINT"HEX OF";A;;" IS $";
73Ø F=B:GOSUB111Ø:F=C:GOSUB111Ø:F=D:GOSUB11
    1Ø:F=E:GOSUB111Ø:GOTO1Ø5Ø
74Ø REM F6 RESPONSE
75Ø IFPEEK(197)<>6ORPEEK(653)<>1THENGOTO85Ø
76Ø PRINT"{SHFT CLR}{6 CRSR DNs}INPUT HEX N
    UMBER WITH LEADING ZEROS{5 SPACEs}($FFF
    F MAX)":INPUT A$
77Ø IF LEFT$(A$,1)="$"THEN A$=MID$(A$,2,8)
78Ø B$=LEFT$(A$,1):C$=MID$(A$,2,1):D$=MID$(
    A$,3,1):E$=RIGHT$(A$,1):G=Ø:Z=Ø
79Ø F$=B$:F=16{UP ARROW}3:GOSUB119Ø:Z=G*F
8ØØ F$=C$:F=16{UP ARROW}2:GOSUB119Ø:Z=G*F+Z
81Ø F$=D$:F=16:GOSUB119Ø:Z=G*F+Z
82Ø F$=E$:F=1:GOSUB119Ø:Z=G*F+Z
83Ø PRINT"THE DECIMAL VALUE OF $";A$;" IS "
    ;Z:GOTO1Ø5Ø
84Ø REM F7 RESPONSE
85Ø IFPEEK(197)<>3ORPEEK(653)<>ØTHENGOTO96Ø
86Ø X$="(255 MAX)":GOSUB11ØØ
87Ø B=INT(A/128):C=INT((A-B*128)/64):D=INT(
    (A-B*128-C*64)/32)
88Ø E=INT((A-B*128-C*64-D*32)/16):F=INT((A-
    B*128-C*64-D*32-E*16)/8)
89Ø G=INT((A-B*128-C*64-D*32-E*16-F*8)/4)
9ØØ H=INT((A-B*128-C*64-D*32-E*16-F*8-G*4)/
    2)
91Ø I=INT(A-B*128-C*64-D*32-E*16-F*8-G*4-H*
    2)
92Ø B$="%"+CHR$(B+48)+CHR$(C+48)+CHR$(D+48)
    +CHR$(E+48)+CHR$(F+48)+CHR$(G+48)
93Ø B$=B$+CHR$(H+48)+CHR$(I+48):PRINT"THE B
    INARY VALUE OF";A;"IS ";B$
94Ø GOTO1Ø5Ø
95Ø REM F7' RESPONSE
96Ø IFPEEK(197)<>3ORPEEK(653)<>2THENGOTO1Ø3
    Ø
97Ø PRINT"{SHFT CLR}{6 CRSR DNs}ENTER BINAR
    Y NUMBER (%11111111) MAX":INPUT A$
98Ø IF LEFT$(A$,1)="%"THEN A$=MID$(A$,2,8)
99Ø Q$=A$:X=Ø:FOR I=7TOØSTEP-1:B=VAL(LEFT$(
    A$,1))
1ØØØ X=X+B*2{UP ARROW}I:A$=MID$(A$,2):NEXT
1Ø1Ø PRINT"THE DECIMAL VALUE OF %";Q$;" IS
    ";X:GOTO1Ø5Ø
1Ø2Ø REM F8 RESPONSE
1Ø3Ø IFPEEK(197)=3ANDPEEK(653)=1THENPRINT"{
    SHFT CLR}{1Ø CRSR DNs}{17 CRSR RTs}BYE
    ":END
1Ø4Ø GOTO51Ø
1Ø5Ø PRINT"{HOME}{3 CRSR DNs}{CTRL 9}HIT AN
    Y KEY TO CONTINUE"
1Ø6Ø GET A$:IF A$=""THEN 1Ø6Ø
1Ø7Ø GOTO36Ø
1Ø8Ø PRINT"{SHFT CLR}{7 CRSR DNs}INPUT A":I
    NPUT A
1Ø9Ø PRINT"INPUT B":INPUTB:RETURN
11ØØ PRINT"{SHFT CLR}{7 CRSR DNs}INPUT A ";
    X$ :INPUT A:RETURN
111Ø IF F<1Ø THEN F$=CHR$(F+48)
112Ø IF F=1Ø THEN F$="A"
113Ø IF F=11 THEN F$="B"
114Ø IF F=12 THEN F$="C"
115Ø IF F=13 THEN F$="D"
116Ø IF F=14 THEN F$="E"
117Ø IF F=15 THEN F$="F"
118Ø PRINT F$;:RETURN
```


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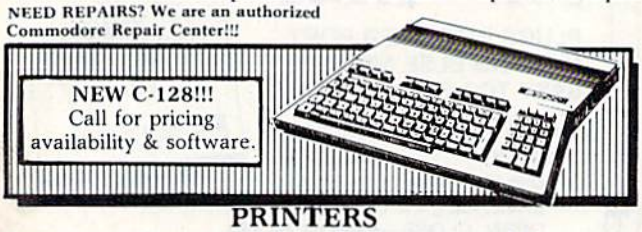

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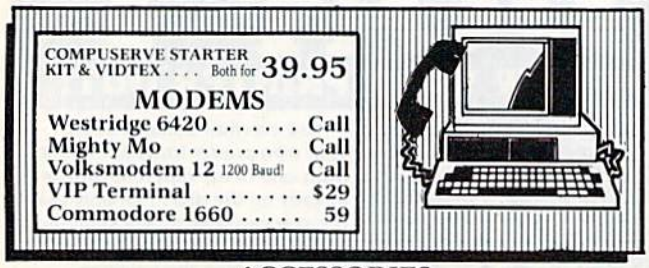

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Listing 1 continued.

```
119Ø IF VAL(F$)<1Ø THEN G=VAL(F$)
12ØØ IF F$="A" THEN G=1Ø
121Ø IF F$="B" THEN G=11
122Ø IF F$="C" THEN G=12
123Ø IF F$="D" THEN G=13
124Ø IF F$="E" THEN G=14
125Ø IF F$="F" THEN G=15
126Ø RETURN
```

Listing 2. *Basic loader for the machine language program.*

```
1Ø PRINT"{SHFT CLR}"
2Ø FOR I=49152 TO 49442:READA:POKEI,A:NEXT
3Ø POKE631,83:POKE632,89:POKE633,83:POKE634
   ,52:POKE635,57:POKE636,49
4Ø POKE637,53:POKE638,5Ø:POKE639,13:POKE198
   ,9
5Ø NEW
1ØØØ DATA 12Ø , 169 , 16 , 141 , 2Ø , 3{2 S
     PACEs}, 169 , 192 , 141 , 21 , 3 , 88
1Ø12 DATA 96 , 234 , 234 , 234 , 165 , 197
     , 2Ø1 , 5 , 2Ø8 , 62 , 173 , 141
1Ø24 DATA 2 , 24Ø , 57 , 238 , 255 , 2Ø7 ,
     173 , 255 , 2Ø7 , 2Ø1 , 26 , 48
1Ø36 DATA 47 , 169 , Ø , 141 , 255 , 2Ø7 ,
     173 , 141 , 2 , 2Ø1 , 2 , 2Ø8
1Ø48 DATA 2Ø , 234 , 234 , 173 , 33 , 2Ø8 ,
      24 , 1Ø5 , 1 , 2Ø1 , 15 , 48
1Ø6Ø DATA 2 , 169 , Ø , 141 , 33 , 2Ø8 , 76
     , 84 , 192 , 173 , 32 , 2Ø8
1Ø72 DATA 24 , 1Ø5 , 1 , 2Ø1 , 15 , 48 , 2
     , 169 , Ø , 141 , 32 , 2Ø8
1Ø84 DATA 234 , 165 , 197 , 2Ø1 , 4 , 2Ø8 ,
      39 , 173 , 141 , 2 , 24Ø , 34
1Ø96 DATA 2Ø1 , 1 , 24Ø , 16 , 169 , 6 , 14
     1 , 33 , 2Ø8 , 169 , 14 , 141
11Ø8 DATA 32 , 2Ø8 , 141 , 134 , 2 , 76{2 S
     PACEs}, 13Ø , 192 , 169 , 12 , 141 , 3
     3
112Ø DATA 2Ø8 , 169 , Ø , 141 , 32 , 2Ø8 ,
     141 , 134 , 2 , 234 , 165 , 197
1132 DATA 2Ø1 , 6 , 2Ø8 , 61 , 173 , 141 ,
     2 , 24Ø , 56 , 2Ø1 , 2 , 2Ø8
1144 DATA 33 , 238 , 255 , 2Ø7 , 173 , 255
     , 2Ø7 , 2Ø1 , 26 , 48 , 42 , 169
1156 DATA Ø , 141 , 255 , 2Ø7 , 173 , 134 ,
     2 , 24 , 1Ø5 , 1 , 2Ø1 , 15
1168 DATA 48 , 2 , 169 , Ø , 141 , 134{2 SP
     ACEs}, 2 , 76 , 194 , 192 , 169 , 64
118Ø DATA 141 , 119 , 2 , 169 , 36 , 141 ,
     12Ø , 2 , 169 , 3 , 133 , 198
1192 DATA 169 , 13 , 141 , 121 , 2 , 234 ,
     234 , 234 , 165 , 197 , 2Ø1 , 3
12Ø4 DATA 2Ø8 , 82 , 238 , 255 , 2Ø7 , 173
     , 255 , 2Ø7 , 2Ø1 , 1Ø , 48 , 72
1216 DATA 169 , Ø , 141 , 255 , 2Ø7 , 173 ,
      141 , 2 , 2Ø1 , Ø , 24Ø , 6Ø
1228 DATA 2Ø1 , 1 , 2Ø8 , 27 , 169 , 82 , 1
     41 , 119 , 2 , 169 , 85 , 141
124Ø DATA 12Ø , 2 , 169 , 78 , 141 , 121 ,
     2 , 169 , 13 , 141 , 122 , 2
1252 DATA 169 , 4 , 133 , 198 , 76 , 32 , 1
     93 , 169 , 76 , 141 , 119 , 2
1264 DATA 169 , 73 , 141 , 12Ø , 2 , 169 ,
     83 , 141 , 121 , 2 , 169 , 84
1276 DATA 141 , 122 , 2 , 169 , 13 , 141 ,
     123 , 2 , 169 , 5 , 133 , 198
1288 DATA 76 , 49 , 234
```

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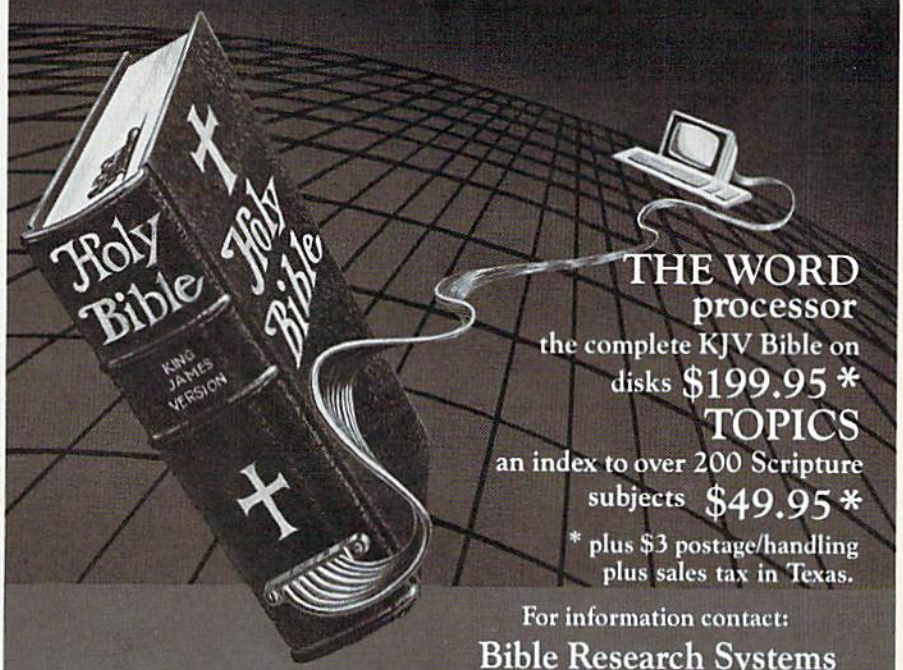

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Double Your Basic!

More Commands at Your Fingertips

By ROBERT ROCKEFELLER

Here's Basic 4.5, a professional-quality extended Basic that adds all the Basic 4.0 commands to your C-64's Basic, plus sprite graphics, music, windows and additional disk commands.

Commodore created a good computer when it designed the C-64. Unfortunately, the C-64 contains an outdated and inadequate Basic 2.0, which does not take advantage of the 64's many features. The result of this has been a plethora of extended Basics from third parties, none of which have become standard.

When the C-64 was introduced, Commodore had a more advanced version of Basic called Basic 4.0. This was standard on its PET/CBM computers, but was not used in the 64, probably because the less expensive 64 would then have become a too-attractive competitor for the PET.

I was one of the above-mentioned third parties working on an extended Basic for the C-64 until it no longer made economic sense to continue. The market had been flooded. My package was about three-quarters finished when I came to this realization.

I decided to tidy up the commands I had debugged and publish my program in a magazine. Sometimes one person's misfortune can be another's good luck. At least it is in this case.

Readers of this magazine are going to get an extended Basic for the price of the magazine. The package incorporates all the Basic 4.0 commands, allowing C-64 owners to run much of the software developed for the PET/CBM line, as well as some sprite graphics, music, windowing and additional disk commands. No hi-res graphics commands are present, but few programs need hi-res graphics anyway.

To do justice to all the commands requires three article installments. In this first installment, I'll give the object code of Basic 4.5, as I've named it, explain the sprite commands and give a very brief description of the remaining commands. This will allow readers who understand a little Basic to experiment without having to wait three months for all the new Basic commands to be covered.

Screen-related commands

REV left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—reverses everything within the defined window.

INV left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—inverses everything within the window. This can reverse the REV command.

RIGHTW left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—scrolls everything within the window one column to the right and inserts a column of spaces at the left-most column of the window.

LEFTW left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—scrolls everything within the window one column to the left.

UPW left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—scrolls up one row.

DOWNW left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—scrolls down one row.

FLASH #times (0–255), speed (0–255), left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—flashes the defined window.

FILL screen-code value (0–255), color (0–15), left-most column (0–39), top row (0–24), width (1–40), depth (1–25)—fills a window with a character of the specified color. It may be necessary to use Fill before REV or INV if the window has spaces that are the same color as the current screen color. In that case, a reversed space would not be seen.

BFLASH #times (0–255), speed (0–255), color 1 (0–15), color 2 (0–15)—flashes the border in the specified colors.

RUN It Right

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

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CENTRE <string expression>—centers the string on the screen row where the cursor is located. If LEN (string) >40, then the action is like the Print command. Any string parameter usable by the Print command is accepted.

LOCATE x-position (0–39), y-position (0–24)—moves the cursor to the specified x,y position; 0,0 is the upper-left corner. 39,24 is the bottom right.

Disk commands

All the disk commands, except Record, accept Basic 4.0-type parameter strings. This means the parameters following a command may be in any order. Example—DLOAD "basic program" (filename),D0(drive number),U9(device number) and DLOAD U9,D0,"basic program" are both valid commands. Several parameter types are allowed. Some parameters are always optional.

1. Some commands require that a filename be specified. A filename may be a literal string in quotes, or a string expression or string variable in brackets. Examples—(RIGHT$ (CC$,2)) or (A$).
2. A drive number—D, followed by 0 or 1. This is usually optional. The default is drive 0.
3. A device (unit) number—U, followed by 4–31. This is always optional. The default is unit 8.
4. A logical file number—#, followed by 1–255.
5. When opening a new file for writing, DOPEN requires that a file type be specified. This may be *one* of the following:

(a) W. A W in the parameter string indicates a sequential file is being opened for writing.

(b) L, followed by 1–254. An L indicates a relative file is being opened. The following number is the desired record length. If no file type is specified, a Read File is assumed.
6. @. If an @ is the first letter of the filename, a Save with Replace or an Open with Replace command will be executed. Examples—"@basic program" or ("@" + name$).
7. I, followed by any two letters. This is optional in the Header command. It indicates the desired I.D. for a disk being formatted. If I is omitted, only the directory will be erased.

APPEND #logical filenumber (1–255), filename—commands the disk to append to the end of the specified file any data sent to that disk.

CONCAT source-filename to destination-filename—concatenates one file to another file.

DOPEN #logical filenumber, filename, optional file-type specifier—opens a file.

DCLOSE #filenumber—closes the file specified.

DCLOSE—closes all open files.
DCLOSE unit number—closes all files open to the specified device.

RECORD #logical filenumber, record number (1–65535), optional byte within record (1–254)—sets the disk record pointer to the specified record.

HEADER filename, Ddrive number, optional I.D.—formats a disk.

COLLECT—validates a disk.

BACKUP Dsource-drive to Ddestination-drive—backs up a disk. This command requires a dual drive such as a Commodore 4040 or an MSD superdisk.

COPY source-filename to destination-filename—makes a copy of a sequential file.

DSAVE filename—saves a basic program to disk.

DLOAD filename—loads a Basic program.

CATALOG optional filename—lists the disk directory on the current output device.

RENAME old-filename to new-filename—renames a file.

SCRATCH filename—deletes a file from the disk.

DIRECTORY optional filename—performs the same function as does Catalog.

EXEC #logical filenumber, filename—executes a sequential file on disk. Any Basic program may be listed to a disk file and executed with EXEC. The exceptions are:

1. No files may be opened or closed from an exec file.
2. No GOTOs or GOSUBs are allowed.
3. May only be executed in the Direct mode.

MERGE #logical filenumber, filename—merges the file from disk with the program in memory. Files must be created with List. EXEC and Merge can use the same files.

BLOAD filename, P optional destination address. Example—BLOAD "M.L.", P$C000 loads to hex $C000. BLOAD"M.L." alone loads to the original address.

BSAVE filename, Pstart-address to Pend-address—saves a portion of memory. Example—BSAVE "BASIC 4.5.", P$8000 TO P$A000 will save a copy of Basic 4.5 to disk.

SEE #logical file, filename—views a sequential file on disk.

AFFIX filename—loads a Basic program at the end of a program that's in memory.

DCLEAR—initializes the drive.

Music commands

VTYPE voice# (1–3), pul (0–65535) or tri or saw or noi; optional sync or ring—sets voice type.

VOL (0–15)—sets volume.

ENV voice# (1–3), attack (0–15), decay (0–15), sustain (0–15), release (0–15)—sets envelope.

NOTE voice# (1–3), frequency (0–65535), duration (0–255)—plays one note.

PLAY voice# (1–3), buffer-start address, buffer length or OFF—IRQ-driven play command; plays while a program is running.

VIBRATO voice# (1–3) ON or OFF—turns vibrato on or off.

Miscellaneous

MON—breaks to monitor. The monitor is the public-domain Supermon by Jim Butterfield.

COLOR border (0–15), screen (0–15), extended color 1 (0–15), extended color 2 (0–15), extended color 3 (0–15)—sets the indicated color registers. All values after border are optional.

Sprite commands

SCOLR sprite# (1–8), sprite color (0–15), optional multicolor 1 (0–15), multicolor 2 (0–15)—sets the colors for the indicated sprite. Each sprite can have one color that is independently selectable for each sprite. The last two parameters demonstrated above are optional. They should be included only when it is necessary to set or change the Multicolor mode colors. These two colors are the same for all sprites and can be seen only when a sprite is put into Medium-resolution mode with the SMED command. Examples:

SCOLR 1, 7—changes sprite 1 to yellow without changing the two current Multicolor mode colors.

SMED 1 ON : SCOLR 1, 2, 4, 5—puts sprite 1 in Medium-resolution mode, then sets the three colors (red, cyan and purple) that can be displayed by sprite 1.

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SDUBL sprite# (1–8), x and/or y or OFF—causes the specified sprite to be doubled in size along the specified axes or will restore the sprite to normal size. Examples:

SDUBL 2, x—doubles the size of sprite 2 along the x-axis.

SDUBL 3, y—doubles sprite 3 along the y-axis.

SDUBL 4, x,y—doubles the size along both axes.

SDUBL 4 OFF—restores sprite 4 to normal size.

SBACK sprite# ON or OFF—causes either the sprite or the background to have display precedence. Examples:

SBACK 8 ON—causes sprite 8 to appear to pass behind objects on the screen. This can be any type of character, hi-res or med-res bitmap, and so on.

SBACK 8 OFF—causes sprite 8 to pass over characters on the screen.

SMED sprite# (1–8), ON or OFF—sets Medium-resolution mode or unset. In sprite High-resolution mode, each sprite can display only one color. This is set with the second parameter of the SCOLR statement. In Med-res or Multicolor mode, two other colors can also be seen at the cost of decreased resolution (that is, the sprites appear coarser). Examples:

SMED 1 ON—sprite 1 will be in Med-res mode.

SMED 1 OFF—puts sprite 1 in Hi-res mode.

SPRITE sprite# (1–8), ON sprite-slot# (0–255) or OFF—turns a sprite on and selects the slot from which the video chip gets its sprite data, or turns a sprite off. The VIC-II chip in your C-64 can only access 16K (16384 bytes) at a time, and, for purposes of displaying sprites, it divides this 16K chunk of memory into 256 smaller chunks of 64 bytes each (64*256 = 16384). It is no coincidence that it requires exactly 63 bytes to define a sprite. Below are two examples:

SPRITE 1 ON 13—turns on sprite 1 and tells the video chip to get the data it needs to display the sprite from slot 13.

SPRITE 1 OFF—turns off sprite 1 so it won't be displayed.

SPIC sprite-slot# (0–255), string variable—allows sprite data to be stored in string arrays and stored into a specified sprite slot when needed. SPIC is a mnemonic for sprite-picture. Example:

SPIC 200, WALK$(7)—stores the first 63 bytes of the string WALK$(7) into sprite slot 200. If WALK$(7) is shorter than 63 bytes, only garbage will be stored in slot 200.

SPOS sprite# (1–8), x-position (0–511), y-position (0–255)—moves the specified sprite to the indicated x-, y-position. Location 0,0 is the upper-left corner; 511,255 is the bottom-right corner.

JOY 1 or 2—reads the specified joystick. After execution, three variables contain the information needed to manipulate objects such as sprites with a joystick. The variable JX contains the x-increment, and JY contains the y-increment; FB will be non-zero if the fire-button was pressed.

JOY replaces four or five lines of Basic code. The desired increment is set with a Poke. It would have been possible to set the increment at the time the joystick is read, but I thought this would unnecessarily slow things up (for example, JOY 1, increment (0–255)).

It may be hard to understand how JOY works from this explanation, so try plugging in a joystick and running the following program several times with different increments.

```
10 INPUT"INCREMENT";INC : POKE
   38819,INC
20 JOY 1 : ?"JX = "JX"JY = "JY"FB = "FB :
   GOTO20
```

Making Life Easy

In addition to added Basic commands, other features have been added to make your programming life easier. Some of the built-in Basic commands have been improved. For instance, Restore will now reset the

Note: Basic 4.5 is a useful extended Basic that expands the range of commands for the C-64. The secret to loading and running the program is as follows:

1. First, load and run the Overhead loader (Listing 1) before any of the other loader programs.

2. Next, load and run each loader program individually. Be sure to load and run the sprite miscellaneous loader (Listing 4) before loading any other sprite loader programs.

3. Before loading any demonstration programs, type in SYS 64738 to transfer program control to the address at which execution of the subsystem will begin. Use the following format to load demonstration programs:

LOAD "PROGRAM NAME",8

The text of the article provides guidelines for manipulating data in the loader programs to develop your own version of each program.

Listing 1. *Overhead loader. Must be loaded first.*

```
10 REM OVERHEAD LOADER FOR BASIC 4.5
15 REM THIS MUST BE LOADED FIRST BEFORE ANY
   OTHER LOADERS
20 :
30 FOR LOOP=32768 TO 34926
40 READ BYTE : POKE LOOP,BYTE
50 NEXT LOOP
60 :
70 FOR LOOP=38306 TO 38352
80 READ BYTE : POKE LOOP,BYTE
90 NEXT LOOP
100 :
32768 DATA 229,129,105,130,195,194,205,56,4
      8,67
32778 DATA 79,78,67,65,212,68,79,80,69,206
32788 DATA 68,67,76,79,83,197,82,69,67,79
32798 DATA 82,196,72,69,65,68,69,210,67,79
32808 DATA 76,76,69,67,212,66,65,67,75,85
32818 DATA 208,67,79,80,217,65,80,80,69,78
32828 DATA 196,68,83,65,86,197,68,76,79,65
32838 DATA 196,67,65,84,65,76,79,199,82,69
32848 DATA 78,65,77,197,83,67,82,65,84,67
32858 DATA 200,68,73,82,69,67,84,79,82,217
32868 DATA 68,67,76,69,65,210,66,76,79,65
32878 DATA 196,66,83,65,86,197,77,69,82,71
32888 DATA 197,69,88,69,195,65,70,70,73,216
32898 DATA 83,69,197,83,67,79,76,210,83,80
32908 DATA 82,73,84,197,83,80,73,195,83,80
32918 DATA 79,211,83,68,85,66,204,69,76,83
32928 DATA 197,83,66,65,67,203,83,77,69,196
32938 DATA 82,69,214,82,73,71,72,84,215,76
32948 DATA 69,70,84,215,85,80,215,68,79,87
32958 DATA 78,215,73,78,214,70,76,65,83,200
32968 DATA 70,73,76,204,66,70,76,65,83,200
32978 DATA 78,79,84,197,86,84,89,80,197,86
32988 DATA 79,204,69,78,214,67,79,76,79,210
32998 DATA 86,73,66,82,65,84,207,80,76,65
33008 DATA 217,67,69,78,84,82,197,77,79,206
```


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data pointer to any specified line number, instead of just to the start of the program. (See the demonstration program following this article.)

The List command has been slightly modified so that it does not print READY after execution. The single quote character (') may be substituted for REM, and it is now possible to enter hex numbers by preceding them with a $ character.

In addition, a method of adding even more commands to Basic has been implemented. Whenever Basic 4.5's execution routine encounters the & character as the first character of a Basic statement, it performs an indirect jump through a vector at $0334, address 820. By placing the address of your own routine at $0334, a whole new set of commands can be implemented.

Editing Functions

The C-64's built-in screen editor has also been enhanced with the following additional functions.

CTRL-B—erases from the curser position to the start of the cursor line.

CTRL-D—moves the cursor to the lower-left corner of the screen.

CTRL-L—erases to the end of the line.

CTRL-O—echoes screen output to the printer. Everything that is sent to the screen, including what is typed, will be sent to the printer. This allows the C-64 to be used like a typewriter.

If you are going to use your computer like a typewriter, it is best to disable the error-output routine. Otherwise, every time a carriage return is typed on a line with printing on it, the computer will give you a Syntax error. Disabling the error routine requires two Pokes:

```
POKE768,PEEK(770) : POKE769,PEEK(771)
```

Make sure you do this all on one line. Execute SYS 64738 to reset the computer when you are finished.

Another use for CTRL-O is to obtain program listings. Type CTRL-O LIST CTRL-O to get a listing on the printer. CTRL-O toggles Echo mode on and off.

CTRL-P—dumps whatever is on the screen to the printer.

CTRL-U—erases everything below and to the right of the cursor.

CTRL-W—erases the whole line.

CTRL-X—exits Quote or Insert mode.

Demonstration Programs

At the end of this article are several demonstration programs. One uses sprite graphics commands and another uses the new Restore command.

There is also a utility that moves graphics memory to $C000, or 49152. You can then use addresses $C400 to $CFFF and $E000 to $FFFF for character sets, sprite data, and so on. The screen is located at $C000.

Normally, graphics memory is set at $0000 to $3FFF. This is the same area used by Basic, leaving little space for graphics programming.

The other programs are Basic loaders for part of Basic 4.5. If you are typing in Basic 4.5, you must type in the OVERHEAD program first. This contains code essential to the execution of Basic 4.5. You may then enter the loaders that contain the sprite commands.

You may pick and choose among these as you wish; however, the loader that contains the code for miscellaneous sprite routines and SDUBL must be entered first of all, because it contains code used by *all* the sprite commands.

The reason for different loaders for various commands is that if you're interested, for instance, only in the sprite and music commands, you will not have to type in the loaders containing the code for the disk and windowing commands.

For those of you who don't wish to type in the listings, I'll provide copies at the end of this series. R

Address all author correspondence to Robert Rockefeller, RR#4, Langton, Ontario, Canada N0E 1G0.

Listing 1 continued.

```
33Ø18 DATA 76,79,67,65,84,197,79,7Ø,198,74
33Ø28 DATA 79,217,Ø,38,142,42,141,18,143,81
33Ø38 DATA 143,59,142,22,142,82,142,1Ø1,142
      ,92
33Ø48 DATA 141,235,14Ø,5,141,173,141,126,14
      2,147
33Ø58 DATA 142,173,141,166,142,147,139,93,1
      39,97
33Ø68 DATA 14Ø,216,139,1Ø5,14Ø,113,141,234,
      145,12
33Ø78 DATA 146,65,146,149,146,238,146,58,16
      9,82
33Ø88 DATA 147,1Ø9,147,17Ø,143,45,144,79,14
      4,114
33Ø98 DATA 144,18Ø,144,23,145,3Ø,145,68,145
      ,14Ø
331Ø8 DATA 145,118,147,199,147,52,148,73,14
      8,2Ø4
33118 DATA 145,8,149,196,148,246,144,158,14
      9,13Ø
33128 DATA 149,7,175,32,149,1Ø7,131,255,151
      ,1Ø5
33138 DATA 13Ø,74,243,145,242,14,242,8Ø,242
      ,51
33148 DATA 243,154,134,33,136,237,246,62,24
      1,47
33158 DATA 243,1Ø2,254,165,244,237,245,116,
      13Ø,124
33168 DATA 131,113,131,132,131,77,132,2Ø7,1
      32,6Ø
33178 DATA 133,14,147,32,32,32,32,32,18,32
33188 DATA 42,32,42,32,42,32,42,32,194
33198 DATA 193,211,2Ø1,195,32,52,46,53,32,1
      6Ø
332Ø8 DATA 42,32,42,32,42,32,42,32,13,32
33218 DATA 32,32,32,32,32,4Ø,67,41,32,49
33228 DATA 57,56,52,32,21Ø,79,66,69,82,84
33238 DATA 32,21Ø,79,67,75,69,7Ø,69,76,76
33248 DATA 69,82,13,13,Ø,142,22,2Ø8,32,33
33258 DATA 13Ø,32,163,253,32,8Ø,253,32,44,1
      3Ø
33268 DATA 32,14,13Ø,32,56,13Ø,32,191,227,1
      69
33278 DATA 128,133,56,133,52,32,68,13Ø,162,
      251
33288 DATA 154,162,128,76,55,164,32,91,255,
      169
33298 DATA 12,141,32,2Ø8,169,11,141,33,2Ø8,
      169
333Ø8 DATA 1,141,134,2,96,16Ø,73,169,Ø,153
33318 DATA 162,151,136,16,25Ø,96,162,33,189
      ,1Ø9
33328 DATA 129,157,2Ø,3,2Ø2,16,247,96,162,1
      1
33338 DATA 189,143,129,157,Ø,3,2Ø2,16,247,9
      6
33348 DATA 165,43,164,44,32,8,164,169,155,1
      6Ø
33358 DATA 129,32,3Ø,171,165,51,56,229,43,1
      7Ø
33368 DATA 165,52,229,44,32,2Ø5,189,169,96,
      16Ø
33378 DATA 228,32,3Ø,171,76,68,166,32,188,2
      46
```

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Listing 1 continued.

```
33388 DATA 32,225,255,240,3,76,114,254,32,4
      4
33398 DATA 130,32,163,253,32,24,229,32,14,1
      30
33408 DATA 32,204,255,169,0,133,19,32,122,1
      66
33418 DATA 32,33,130,88,162,128,76,55,164,3
      2
33428 DATA 138,173,76,247,183,162,3,202,16,
      1
33438 DATA 96,189,165,151,16,247,189,186,15
      1,16
33448 DATA 18,32,57,131,177,252,24,109,19,2
      12
33458 DATA 145,250,200,177,252,105,0,145,25
      0,222
33468 DATA 183,151,208,219,189,168,151,56,2
      33,3
33478 DATA 157,168,151,176,19,222,171,151,1
      6,14
33488 DATA 32,57,131,152,160,4,145,250,157,
      165
33498 DATA 151,76,155,130,189,174,151,133,2
      54,24
33508 DATA 105,3,157,174,151,189,177,151,13
      3,255
33518 DATA 105,0,157,177,151,32,57,131,177,
      254
33528 DATA 200,17,254,208,9,160,4,177,252,4
      1
33538 DATA 254,76,30,131,136,177,254,145,25
      2,145
33548 DATA 250,200,177,254,145,252,145,250,
      160,4
33558 DATA 177,252,41,254,145,252,9,1,145,2
      50
33568 DATA 189,180,151,41,3,170,160,2,169,0
33578 DATA 24,113,254,202,16,250,174,164,15
      1,157
33588 DATA 183,151,76,155,130,142,164,151,1
      38,162
33598 DATA 250,32,72,131,174,164,151,160,0,
      96
33608 DATA 41,3,201,3,208,2,169,2,168,169
33618 DATA 249,24,105,7,136,16,250,149,0,24
33628 DATA 105,189,149,2,169,151,105,0,149,
      3
33638 DATA 169,212,149,1,96,32,153,130,76,4
      9
33648 DATA 234,172,233,151,240,3,76,249,139
      ,76
33658 DATA 131,164,169,0,141,233,151,76,139
      ,227
33668 DATA 166,122,160,4,132,15,189,0,2,16
33678 DATA 7,201,255,240,63,232,208,244,201
      ,32
33688 DATA 240,56,133,8,201,34,240,90,36,15
33698 DATA 112,46,201,63,208,4,169,153,208,
      38
33708 DATA 201,48,144,4,201,60,144,30,132,1
      13
33718 DATA 160,76,132,11,160,255,134,122,20
      2,200
33728 DATA 232,189,0,2,56,249,9,128,240,245
33738 DATA 201,128,208,51,5,11,164,113,232,
      200
33748 DATA 153,251,1,185,251,1,208,3,76,67
33758 DATA 132,56,233,58,240,4,201,73,208,2
33768 DATA 133,15,56,233,85,208,155,133,8,1
      89
33778 DATA 0,2,240,220,197,8,240,216,200,15
      3
33788 DATA 251,1,232,208,240,166,122,230,11
      ,200
33798 DATA 185,8,128,16,250,185,9,128,208,1
      77
33808 DATA 160,0,132,11,136,166,122,202,200
      ,232
33818 DATA 189,0,2,56,249,158,160,240,245,2
      01
33828 DATA 128,208,5,5,11,76,208,131,166,12
      2
33838 DATA 230,11,200,185,157,160,16,250,18
      5,158
33848 DATA 160,208,223,189,0,2,48,3,76,208
33858 DATA 131,153,253,1,198,123,169,255,13
      3,122
33868 DATA 96,132,73,16,11,201,255,240,7,36
33878 DATA 15,48,3,32,95,132,76,63,134,201
33888 DATA 204,176,38,162,158,134,53,162,16
      0,134
33898 DATA 54,41,127,170,160,255,202,48,7,2
      00
33908 DATA 177,53,16,251,48,246,200,177,53,
      48
33918 DATA 5,32,71,171,208,246,164,73,41,12
      7
33928 DATA 96,162,9,134,53,162,128,134,54,5
      6
33938 DATA 233,76,208,213,32,225,255,208,8,
      169
33948 DATA 0,141,233,151,76,52,168,165,122,
      164
33958 DATA 123,192,2,240,4,133,61,132,62,16
      0
33968 DATA 0,177,122,240,3,76,7,168,160,2
33978 DATA 177,122,24,208,13,169,255,44,233
      ,151
33988 DATA 240,3,108,2,3,76,75,168,76,206
33998 DATA 167,32,115,0,32,216,132,76,150,1
      32
34008 DATA 240,97,201,38,208,3,108,52,3,56
34018 DATA 233,128,144,59,201,27,208,6,32,1
      15
34028 DATA 0,76,232,133,201,12,208,6,32,115
34038 DATA 0,76,105,134,201,11,208,6,32,115
34048 DATA 0,76,162,149,201,76,176,3,76,243
34058 DATA 167,201,127,144,3,76,8,175,233,7
      5
34068 DATA 10,168,185,8,129,72,185,7,129,72
34078 DATA 76,115,0,160,0,177,122,201,39,20
      8
34088 DATA 3,76,59,169,170,200,177,122,224,
      68
34098 DATA 208,4,201,83,240,215,76,165,169,
      96
34108 DATA 169,0,133,13,32,115,0,176,3,76
34118 DATA 243,188,201,36,208,3,76,47,136,3
      2
34128 DATA 19,177,176,3,76,154,174,201,68,2
      08
34138 DATA 6,160,1,177,122,201,83,208,7,200
34148 DATA 177,122,201,36,208,3,76,228,133,
      173
34158 DATA 215,151,201,8,176,2,169,8,32,180
34168 DATA 255,169,111,32,150,255,160,0,32,
      165
34178 DATA 255,153,160,3,200,201,13,208,245
      ,140
34188 DATA 159,3,32,171,255,160,0,185,160,3
34198 DATA 41,7,133,151,10,10,101,151,10,13
      3
34208 DATA 151,200,185,160,3,41,15,101,151,
      72
34218 DATA 169,68,133,69,169,83,133,70,169,
      0
34228 DATA 133,13,133,14,133,12,32,231,176,
      104
34238 DATA 32,60,188,166,71,164,72,32,212,1
      87
```

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Listing 1 continued.

```
34248 DATA 169,211,133,7Ø,169,255,133,13,32
      ,231
34258 DATA 176,16Ø,Ø,173,159,3,145,71,2ØØ,1
      69
34268 DATA 16Ø,145,71,2ØØ,169,3,145,71,76,4
      Ø
34278 DATA 175,96,144,6,24Ø,4,2Ø1,171,2Ø8,2
      47
34288 DATA 32,1Ø7,169,32,19,166,32,121,Ø,24
      Ø
34298 DATA 12,2Ø1,171,2Ø8,232,32,115,Ø,32,1
      Ø7
34308 DATA 169,2Ø8,224,1Ø4,1Ø4,165,2Ø,5,21,
      2Ø8
34318 DATA 6,169,255,133,2Ø,133,21,16Ø,1,13
      2
34328 DATA 15,177,95,24Ø,67,32,44,168,32,21
      5
34338 DATA 17Ø,2ØØ,177,95,17Ø,2ØØ,177,95,19
      7,21
34348 DATA 2Ø8,6,228,2Ø,24Ø,2,176,44,132,73
34358 DATA 32,2Ø5,189,169,32,164,73,41,127,
      32
34368 DATA 71,171,2Ø1,34,2Ø8,6,165,15,73,25
      5
34378 DATA 133,15,2ØØ,24Ø,17,177,95,2Ø8,19,
      168
34388 DATA 177,95,17Ø,2ØØ,177,95,134,95,133
      ,96
34398 DATA 2Ø8,181,32,215,17Ø,76,123,164,1Ø
      8,6

344Ø8 DATA 3,2Ø8,3,76,29,168,32,147,13Ø,32
34418 DATA 19,166,176,5,162,17,76,55,164,16
      5
34428 DATA 95,24,1Ø5,4,133,65,165,96,1Ø5,Ø
34438 DATA 133,66,165,2Ø,133,63,165,21,133,
      64
34448 DATA 96,68,2Ø4,34,42,34,13,82,213,13
34458 DATA 165,153,24Ø,3,76,87,241,165,211,
      133
34468 DATA 2Ø2,165,214,133,2Ø1,152,72,138,7
      2,165
34478 DATA 2Ø8,24Ø,6,76,58,23Ø,32,239,134,1
      65
34488 DATA 198,133,2Ø4,141,146,2,24Ø,247,12
      Ø,165
34498 DATA 2Ø7,24Ø,12,165,2Ø6,174,135,2,16Ø
      ,Ø
345Ø8 DATA 132,2Ø7,32,19,234,32,18Ø,229,2Ø1
      ,131
34518 DATA 2Ø8,16,162,9,12Ø,134,198,189,144
      ,134
34528 DATA 157,118,2,2Ø2,2Ø8,247,24Ø,2Ø7,2Ø
      1,13
34538 DATA 2Ø8,2ØØ,76,2,23Ø,72,133,215,138,
      72
34548 DATA 152,72,169,Ø,133,2Ø8,164,211,165
      ,215
34558 DATA 174,162,151,16,3,32,12,136,2Ø1,2
      3
34568 DATA 2Ø8,26,169,32,164,213,145,2Ø9,13
      6,16
34578 DATA 251,166,214,165,211,2Ø1,4Ø,144,1
      ,2Ø2
34588 DATA 16Ø,Ø,24,32,24Ø,255,169,Ø,2Ø1,21
34598 DATA 2Ø8,59,165,214,72,165,211,2Ø1,4Ø
      ,144
346Ø8 DATA 2,233,4Ø,72,173,136,2,9,128,168
34618 DATA 162,Ø,138,72,228,214,24Ø,9,144,7
34628 DATA 148,217,32,255,233,18Ø,217,24,1Ø
      4,1Ø5
34638 DATA 4Ø,72,144,1,2ØØ,232,224,25,144,2
      3Ø
34648 DATA 1Ø4,1Ø4,168,1Ø4,17Ø,24,32,24Ø,25
      5,169
34658 DATA 12,2Ø1,12,2Ø8,13,164,213,169,32,
      196
34668 DATA 211,24Ø,37,145,2Ø9,136,16,247,2Ø
      1,2
34678 DATA 2Ø8,18,16Ø,Ø,169,32,196,211,24Ø,
      2
34688 DATA 176,5,145,2Ø9,2ØØ,2Ø8,245,76,19,
      135
34698 DATA 2Ø1,24,2Ø8,9,162,Ø,134,216,134,2
      12
347Ø8 DATA 76,168,23Ø,2Ø1,4,2Ø8,1Ø,162,24,1
      6Ø
34718 DATA Ø,24,32,24Ø,255,169,Ø,2Ø1,16,2Ø8
34728 DATA 82,169,24,133,177,169,Ø,133,174,
      173
34738 DATA 136,2,133,175,16Ø,Ø,177,174,8,41
34748 DATA 63,2Ø1,64,144,2,9,128,2Ø1,32,176
34758 DATA 2,9,64,2Ø1,34,2Ø8,2,169,39,4Ø
34768 DATA 16,12,72,169,18,32,12,136,1Ø4,32
34778 DATA 12,136,169,146,32,12,136,2ØØ,192
      ,4Ø
34788 DATA 144,21Ø,169,13,32,12,136,152,24,
      1Ø1
34798 DATA 174,133,174,144,2,23Ø,175,198,17
      7,16
348Ø8 DATA 189,169,Ø,2Ø1,15,2Ø8,1Ø,169,255,
      77
34818 DATA 162,151,141,162,151,169,Ø,76,35,
      231
34828 DATA 72,169,4,32,177,255,169,1Ø3,32,1
      47
34838 DATA 255,1Ø4,72,32,168,255,32,174,255
      ,1Ø4
34848 DATA 96,72,165,154,2Ø1,3,2Ø8,4,1Ø4,76
34858 DATA 239,134,76,213,241,169,Ø,133,148
      ,133
34868 DATA 149,32,115,Ø,144,24,2Ø1,65,144,4
34878 DATA 2Ø1,71,144,14,165,148,133,99,165
      ,149
34888 DATA 133,98,162,144,56,76,73,188,233,
      6
34898 DATA 41,15,72,16Ø,4,6,148,38,149,144
349Ø8 DATA 3,76,72,178,136,2Ø8,244,1Ø4,1Ø1,
      148
34918 DATA 133,148,144,2Ø3,23Ø,149,2Ø8,199,
      96
383Ø6 DATA 32,158,173,32,121,Ø,2Ø1,137,24Ø,
      5
38316 DATA 169,167,32,255,174,165,97,2Ø8,17
      ,162
38326 DATA 231,32,11,169,32,251,168,32,121,
      Ø
38336 DATA 2Ø8,1,96,32,115,Ø,32,121,Ø,176
38346 DATA 3,76,16Ø,168,76,216,132
```

Listing 2. *Joy Loader, for joystick control.*

```
1Ø REM LOADER FOR JOY
2Ø :
3Ø FOR LOOP=38177 TO 38274
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
38177 DATA 144,3,76,8,175,174,Ø,22Ø,172,1
38187 DATA 22Ø,41,1,2Ø8,3,138,2Ø8,1,152,41
38197 DATA 31,9,32,133,187,169,74,16Ø,89,32
382Ø7 DATA 8Ø,149,16Ø,88,32,82,149,169,7Ø,1
      6Ø
38217 DATA 66,32,8Ø,149,76,115,Ø,133,69,132
38227 DATA 7Ø,169,Ø,133,13,133,14,133,12,32
38237 DATA 231,176,7Ø,187,144,1Ø,7Ø,187,144
      ,11
```

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Listing 2 continued.

```
38247 DATA 173,163,151,24,144,7,7Ø,187,169,
      255
38257 DATA 44,169,Ø,77,163,151,1Ø5,Ø,32,6Ø
38267 DATA 188,166,71,164,72,76,212,187
```

Listing 3. *Mon Loader. Breaks to the monitor used in Supermon, Jim Butterfield's public-domain program.*

```
1Ø REM LOADER FOR MON
2Ø :
3Ø FOR LOOP=383Ø3 TO 383Ø5
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
383Ø3 DATA Ø,234,96
```

Listing 4. *Sprite loader. Allows the sprite commands to load.*

```
1Ø REM LOADER FOR MISCELLANEOUS SPRITE SUPP
   ORT ROUTINES AND SDUBL
15 REM THIS MUST BE LOADED BEFORE ANY SPRIT
   E COMMANDS CAN BE LOADED
2Ø :
3Ø FOR LOOP=37579 TO 37714
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
37579 DATA 32,158,183,72,138,24Ø,4,2Ø1,9,14
      4
37589 DATA 3,76,72,178,134,1Ø,1Ø4,96,32,138
37599 DATA 173,32,27,188,32,191,177,165,1Ø1
      ,133
376Ø9 DATA 2Ø,165,1ØØ,133,21,96,32,2Ø3,146,
      2Ø1
37619 DATA 253,24Ø,57,32,253,174,2Ø1,88,2Ø8
      ,16
37629 DATA 16Ø,29,32,25,147,32,115,Ø,2Ø1,44
37639 DATA 24Ø,1,96,32,115,Ø,2Ø1,89,24Ø,3
37649 DATA 76,8,175,32,115,Ø,16Ø,23,166,1Ø
37659 DATA 2Ø2,32,38,147,25,Ø,2Ø8,153,Ø,2Ø8
37669 DATA 96,169,1,2Ø2,48,3,1Ø,2Ø8,25Ø,96
37679 DATA 32,115,Ø,16Ø,23,32,57,147,16Ø,29
37689 DATA 166,1Ø,2Ø2,32,38,147,73,255,57,Ø
37699 DATA 2Ø8,153,Ø,2Ø8,96,32,121,Ø,2Ø8,3
377Ø9 DATA 1Ø4,1Ø4,96,76,253,174
```

Listing 5. *SCOLR/SPRITE. Allows each sprite to have its own color, independent of other sprites.*

```
1Ø REM LOADER FOR SCOLR, SPRITE
2Ø :
3Ø FOR LOOP=37355 TO 37441
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
37355 DATA 32,2Ø3,146,32,253,174,32,158,183
      ,164
37365 DATA 1Ø,138,153,38,2Ø8,32,72,147,32,1
      58
37375 DATA 183,142,37,2Ø8,32,72,147,32,158,
      183
37385 DATA 142,38,2Ø8,96,32,2Ø3,146,2Ø2,16Ø
      ,21
37395 DATA 72,32,115,Ø,1Ø4,2Ø1,145,2Ø8,28,3
374Ø5 DATA 25,147,32,158,183,165,1Ø,24,1Ø5,
      247
37415 DATA 168,173,136,2,24,1Ø5,3,133,21,16
      9
37425 DATA Ø,133,2Ø,138,145,2Ø,96,2Ø1,253,2
      4Ø
37435 DATA 3,76,8,175,76,57,147
```

Listing 6. *SPIC loader. Allows sprite data to be stored in string arrays in a specified address.*

```
1Ø REM LOADER FOR SPIC
2Ø :
3Ø FOR LOOP=37442 TO 37525
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
37442 DATA 32,158,183,134,1Ø,32,253,174,32,
      139
37452 DATA 176,32,143,173,169,Ø,133,2Ø,162,
      8
37462 DATA 7Ø,1Ø,144,2,1Ø5,63,1Ø6,1Ø2,2Ø,2Ø
      2
37472 DATA 2Ø8,244,133,21,173,Ø,221,41,7,2Ø
      1
37482 DATA 7,24Ø,14,162,64,2Ø1,6,24Ø,8,162
37492 DATA 128,2Ø1,5,24Ø,2,162,192,138,24,1
      Ø1
375Ø2 DATA 21,133,21,16Ø,1,177,71,133,34,2Ø
      Ø
37512 DATA 177,71,133,35,16Ø,62,177,34,145,
      2Ø
37522 DATA 136,16,249,96
```

Listing 7. *SPOS loader. Moves specified sprite to an indicated x,y position.*

```
1Ø REM LOADER FOR SPOS
2Ø :
3Ø FOR LOOP=37526 TO 37578
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
37526 DATA 32,2Ø3,146,32,253,174,2Ø2,138,1Ø
      ,133
37536 DATA 151,32,221,146,32,253,174,164,15
      1,165
37546 DATA 2Ø,153,Ø,2Ø8,166,1Ø,16Ø,16,165,2
      1
37556 DATA 41,1,24Ø,5,32,25,147,2Ø8,3,32
37566 DATA 57,147,32,221,146,165,2Ø,164,151
      ,153
37576 DATA 1,2Ø8,96
```

Listing 8. *SBACK and SMED loader.*

```
1Ø REM LOADER FOR SBACK, SMED
2Ø :
3Ø FOR LOOP=37715 TO 3775Ø
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
37715 DATA 32,2Ø3,146,16Ø,27,72,32,115,Ø,1Ø
      4
37725 DATA 2Ø1,145,2Ø8,3,76,25,147,2Ø1,253,
      24Ø
37735 DATA 3,76,8,175,76,57,147,32,2Ø3,146
37745 DATA 2Ø2,16Ø,28,76,88,147
```

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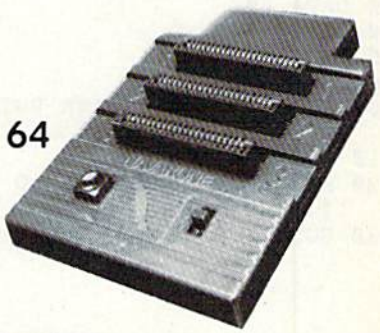

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Listing 9. *Color loader. Sets indicated color registers.*

```
1Ø REM LOADER FOR COLOR
2Ø :
3Ø FOR LOOP=37325 TO 37354
4Ø READ BYTE : POKE LOOP,BYTE
5Ø NEXT LOOP
6Ø :
37325 DATA 16Ø,Ø,24Ø,3,32,115,Ø,132,151,32
37335 DATA 158,183,72,138,164,151,153,32,2Ø
      8,1Ø4
37345 DATA 2ØØ,192,5,24Ø,4,2Ø1,44,24Ø,231,9
      6
```

Listing 10. *Restore Demo program. Demonstrates how the data pointer can be reset to any specified line number.*

```
1Ø '" THIS IS A DEMONSTRATION OF THE IMPROV
   ED RESTORE COMMAND
2Ø '" IN ORDER FOR READ TO WORK CORRECTLY{3
    SPACEs}YOU MUST
3Ø ' SET THE DATA POINTER ONLY TO LINES
4Ø '"WHICH START WITH A DATA STATEMENT.
5Ø '
6Ø DATA 6Ø
7Ø DATA 7Ø
8Ø DATA 8Ø
9Ø DATA 9Ø
1ØØ INPUT"SET THE DATA POINTER TO WHICH LIN
    E";LIN
11Ø RESTORE LIN
12Ø READ BYT : PRINT"READ FROM LINE"BYTCHR$
    (13)
13Ø GOTO 1ØØ
```

Listing 11. *Sprite Demo program. Demonstrates the use of Poke and Joystick commands.*

```
1Ø ' DEMONSTRATES USE OF POKE & JOYSTICK CO
   MMANDS
2Ø '
3Ø '
4Ø PRINT"INCREMENT FOR JOYSTICK READ" : INP
   UTJO
5Ø POKE38819,JO : ' SELECT DESIRED INCREMEN
   T FOR JOY READ
6Ø '
7Ø ' SET GET POKE DATA STRING, A BALLOON IN
    THIS CASE
8Ø FOR LOOP=1 TO 63 : READBYT : A$=A$+CHR$(
   BYT) : NEXT LOOP
9Ø PRINT# 13, A$ : ' PUT DATA IN SPRITE BLO
   CK
1ØØ '
11Ø POKE 1 ON 13 : ' TURN ON POKE, DATA TAK
    EN FROM BLOCK 13
12Ø DEF 1, 7 : ' SELECT POKE COLOR, YELLOW
    IN THIS CASE
13Ø CLR 1 ON : ' BACKGROUND HAS DISPLAY PRI
    ORITY
14Ø CONT 1,X,Y : ' DOUBLE POKE SIZE ALONG X
    -Y AXES
15Ø '
16Ø SX=17Ø : SY=125 : ' HOLDS CURRENT POKE
    POSITION
17Ø '
18Ø =2 : ' READ JOYSTICK TWO, LEAVE CALCULA
    TED VALUE IN JX, JY, FB
19Ø IF FB THEN COLR=(COLR+1)*-(COLR<15) : D
    EF 1, COLR : ' ADVANCE COLOR
2ØØ SX=SX+JX : SY=SY+JY : ' ADD INCREMENT T
    O CURRENT SPRITE POSITION
21Ø PRINT 1,SX,SY : ' MOVE POKE ONE TO ITS
    NEW POSITION
22Ø GOTO 18Ø: DO IT AGAIN
23Ø '
24Ø '
25Ø ' POKE DATA FOR A BALLOON
26Ø DATA Ø,127,Ø,1,255,192,3,255,224,3,231,
    224
27Ø DATA 7,217,24Ø,7,223,24Ø,7,217,24Ø,3,23
    1,224
28Ø DATA 3,255,224,3,255,224,2,255,16Ø,1,12
    7,64
29Ø DATA 1,62,64,Ø,156,128,Ø,156,128,Ø,73,Ø
    ,Ø,73,Ø
3ØØ DATA Ø,62,Ø,Ø,62,Ø,Ø,62,Ø,Ø,28,Ø
```

Listing 12. *Move Video RAM Demonstration program. Moves the video's RAM from one memory location to another.*

```
1Ø POKE$DDØØ,PEEK($DDØØ)AND$FC : ' SET GRAP
   HICS MEMORY TO $CØØØ-$FFFF
2Ø ' MOVE SCREEN TO $CØØØ, CHAR SET TO $DØØ
   Ø
3Ø POKE$DØ18,6 : ' TELL VIC CHIP WHERE THE
   SCREEN & CHARACTER SET IS
4Ø POKE 648,$CØ : ' TELL THE OPERATING SYST
   EM WHERE THE SCREEN IS
5Ø '
6Ø ' SET UP RAM CHAR SET FROM ROM
7Ø POKE$DCØD,$7F : ' TURN > IRQ
8Ø POKE1,PEEK(1)AND$FB : ' SWAP OUT CIAS, S
   WAP IN CHAR ROM
9Ø FOR LOOP=$DØØØ TO $DFFF
1ØØ POKELOOP,PEEK(LOOP) : ' READ FROM ROM,
    POKE TO RAM
11Ø NEXT LOOP
12Ø '
13Ø '
14Ø POKE1,PEEK(1)OR4 : ' SWAP OUT CHAR ROM,
    SWAP IN CIAS
15Ø POKE$DCØD,$81 : ' START IRQ
```

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From p. 10.

print a line from both ends converging toward the center. You can shorten the lines by adding to X in line 1220 or Y in line 1210. Each number added will shorten the line by two spaces.

```
1200 REM**JOSEPH R. CHARNETSKI**
1210 X=19 : Y=1 : Z=-1 : GOTO 1230 : REM FROM CENTER
1220 X=1 : Y=19 : Z=1 : REM FROM BOTH ENDS
1230 FOR J=X TO Y STEP Z : PRINT TAB(J)"{SHIFT C}";
1240 PRINT TAB(39-J)"{SHIFT C}{CRSR UP}"
1250 NEXT : PRINT : RETURN
```

Joseph R. Charnetski
Dallas, PA

$202 PRINT# to the screen—By using variables for device number and secondary address in your Open statement, you can easily send your output to the printer or to the screen. You need only change the values of the variables. Printer device numbers are usually 4 or 5, with various secondary addresses. The screen uses device number 3 and secondary address 1. (The C-64 *User's Guide* mistakenly shows it as device number 0.) Here is an example for the MPS-801 printer in Upper-/Lowercase mode:

```
100 INPUT "WANT PRINTED COPY (Y/N)";A$
110 DV=4 : SA=7 : IF A$="N" THEN DV=3 : SA=1
120 OPEN 1,DV,SA
130 PRINT#1,"THIS IS THE OUTPUT"
140 CLOSE 1
```

C.G. Sperling
Greenville, SC

$203 Word trick winner—Here's a different approach to using shifted characters in REM statements. The object is to guess a number between 1 and 10. The answer and some clues are hidden in the REM statements. First, type in the program and save it for future use. Then, to guess a number, remove the quotes from the line having the number you've guessed. When you list the program, you'll see whether you've guessed correctly. If not, you'll get a clue or some moral support.

```
0 LIST 1-
1 REM "H {COMD J}{SPACE}{COMD Q}{SPACE}{SHIFT Q}
  {SPACE} A {SPACE}{SHIFT E} UE {SPACE}{COMD E}
  {SHIFT -} E
2 REM "{COMD £}{SPACE}{SHIFT I}
3 REM "{COMD £}{SPACE}{COMD @} O {SPACE}{SHIFT
  SPACE}
4 REM "WR {SHIFT -} G
5 REM "{COMD £}{SPACE}{COMD @}{SPACE}{COMD U} T
6 REM "{COMD K} TING {SPACE}{SHIFT SPACE}
7 REM "{COMD D}{COMD D} $ {SHIFT I}{COMD D}{COMD D}
8 REM "H {COMD J}{SPACE}{COMD Q}{SPACE}{SHIFT B}
  {SPACE}{COMD S}
9 REM "DO {SPACE}{COMD £}{SPACE}{COMD -}{SPACE}
  {COMD Q}{SPACE}{SHIFT K}{SPACE}{SHIFT M}{SPACE} IT
10 REM "H {COMD J}{SPACE}{COMD Q}{SPACE}{SHIFT Q}
  {SPACE} A {SPACE}{SHIFT E} UE {SPACE}{COMD W}
  {SHIFT R} E
```

Randy Thompson
Eugene, OR

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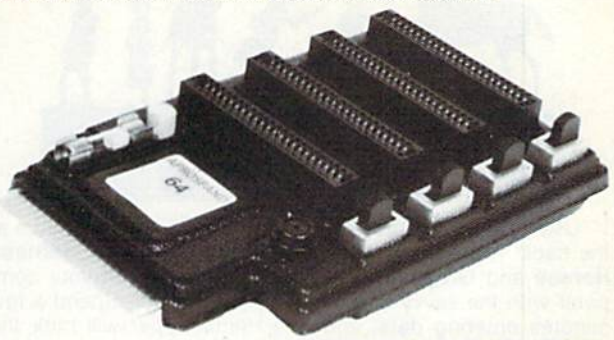

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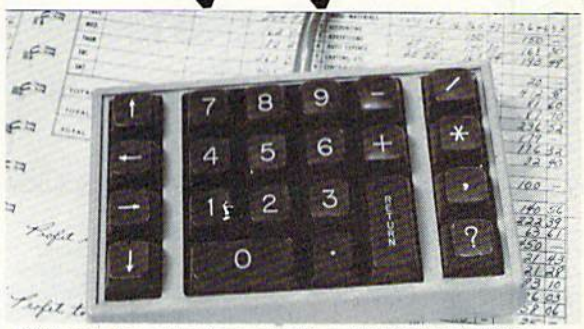

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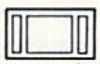 NKP Deluxe $79.95

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Scott Burg
Phoenix, AZ

$205 C-16 and Plus/4 screen titles—With this trick, you can print your program title at the top of the screen and forget about it. It will stay there until you remove it with a SYS 55432 or by pressing the ESC key followed by the N key.

```
10 SYS 55432 : REM CLEAR SCREEN & SET NORMAL WINDOW
20 PRINT "Your title goes here"
30 SYS 56926 : REM SET SCREEN WINDOW BELOW TITLE
```

Jerry W. Jarvis
Spokane, WA

$206 SX-64 disk tip—Since a shifted run/stop on the SX-64 loads the first program on disk, I start each disk with the Menu program from Commodore's Disk Bonus Pack. That way, a single keypress gives me a complete list of programs on the disk.

Tony Grice
Queensland, Australia

$207 1520 plotter supplies—Commodore's 1520 plotter has the same mechanism as Radio Shack's CGP-115 and uses the same supplies, which are available at any Radio Shack store. The paper is #26-1428. Black pens are #26-1480, and colored ones are #26-1481. As always, the price is right, and if your store doesn't stock these items, the manager can order them for you.

Richard Fader
Fort Lee, NJ

$208 Disk error light—If your 1541's red light starts blinking, some sort of disk error has occurred. If you have the wedge in memory, type @ {return} to find out what type of error occurred. Otherwise, enter and run the following line.

```
10 OPEN 15,8,15 : INPUT#15,A$,B$,C$,D$ : PRINT A$,B$,C$,D$ :
   CLOSE 15 : END
```

You cannot enter this in Direct mode, because the Input# statement is only valid in a program. You can use any line number you want, and there's no reason to destroy any program you already have in memory. Merely enter the line with an unused number XXX, then type RUN XXX {return}. Delete XXX after it's done its work.

The message you get will consist of an error code, error

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name and the track and sector on which the error occurred. Often the error name is enough to tell what happened, but the error code can be helpful, too. Your 1541 operator's manual includes a most informative listing of error codes.

Mark Blayney
Darwin, Northwest Territory
Australia

$209 Koala Pad buttons—By Peeking memory location 197, you can tell if the Koala Pad's buttons have been pressed. The result will be 59 when the right button is down and 50 when the left button is down. Other numbers mean no Koala button is down.

Randy Batt
Haysville, KS

$20A Okimate programs—If you use your Okimate 10 to print pictures made with the popular Doodle! program, the manual says you need a Learn To Print disk plus your Doodle! file. Since Learn To Print has only 21 blocks free, the Doodle! file has to be on a separate disk, and you waste a lot of time in swapping disks.

I've learned that you don't need all the Learn To Print files. The ones you need leave over 500 blocks free on the disk, and you can use those blocks to store picture data and printer routines. These are the files you need: COLOR, N, W, S, U, V, T and AA. Use a file copy program to put them onto a disk, then fill the remaining space with your artwork.

Colin Crawford
Grafton, OH

$20B Paper for the Okimate 10—This little printer will do wonderful black-on-white printing without a ribbon, *if* you use the right kind of thermal paper. The thermal paper for the IBM PC Junior is widely available and comes in rolls, fanfold and single sheets. It gives better print quality than you can get with a ribbon or with Okidata's special smooth paper.

William R. Alsing
St. Louis, MO

$20C Left-handed joysticks—The standard Atari joystick has its fire-button on the left side, making it inconvenient for left-handers to reach. By making some easy wiring changes, you can make the joystick suitable for lefties.

Remove the screws from the bottom of your joystick and observe the six wires attached to the unit by removable connectors. The original wiring follows the order: brown, white, black, blue, green, orange. To get the "lefty" modification, rearrange the order as follows: blue, brown, black, green, white, orange. Notice that the connectors are very easy to change and that you have to move only four wires.

When you've made the changes and screwed the joystick shut, just turn the lefty joystick so the fire-button is on the right side.

Al Degutis
Chicago, IL

$20D Call waiting—If you have the call-waiting feature on your telephone, incoming calls can disrupt communications over your modem. Here's a simple way to disable this feature while you're computing. Prior to going on-line, just dial a 9 on your telephone, push the tone button once, as you would if answering a call-waiting signal, then dial the number for your computer call. Anyone trying to call you will simply get a busy signal until you complete your computing session, and the phone will resume its normal status when you log off your system.

W.L. Cochran
Green Cove Springs, FL

$20E Flip files—If you keep your reference data on 3 × 5 cards, try keeping your cards in a replacement leaf—the kind used in flip-type picture albums. These pages cost about $1.50 and can hold 20 cards. The cards fit into transparent sleeves that are staggered from top to bottom. This arrangement allows you to label the bottom of each card for easy reference.

Doug Curtis
Waukesha, WI

$20F Loading from tape—When your tape pauses after the Found message, you can end the pause by pressing the CTRL, Commodore or space keys. If you have a joystick plugged into port 1, you can do the same thing by pressing the fire-button.

Luis Daniel Martinez Calcano
Caracas, Venezuela

$210 Easy RUN—When typing RUN to start a program, you need not move your cursor to a blank line, and you need not clear your screen. Just type a colon after the RUN, then press the return key.

Robert Train
Patchogue, NY

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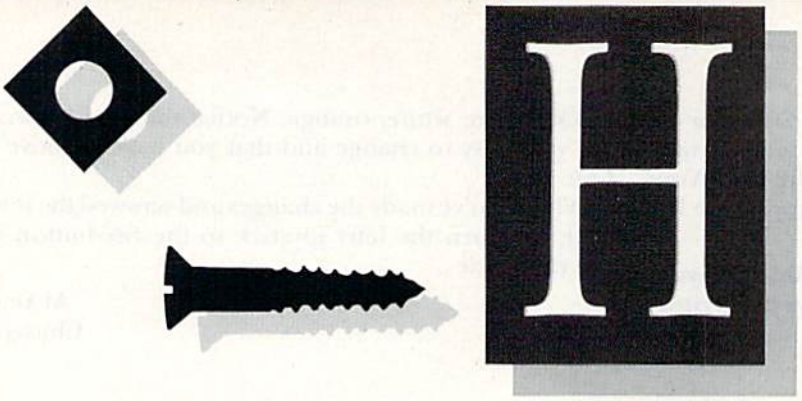

Compiled by SUSAN TANONA

SG-15 Printer

Improved Speed And a 16K Buffer From Star Micronics

The SG-15 is a 15-inch, dual-mode printer that is capable of both draft (at 120 cps) and near letter-quality (at 30 cps) printing. Star Micronics has increased the effective printing output on the SG-15 by 25%, allowing it to print five pages of text in the amount of time a conventional dot-matrix printer (with an identical cps rating) is able to print four pages.

The printer can handle nearly any kind of paper. It has a 15½-inch carriage, a 16K print buffer for spreadsheets, a removable tractor unit, 11 dual in-line package switches and a Centronics-compatible parallel interface. A parallel interface cable is not included. (I recommend the Cardco Card?/+G cable, as it will accommodate graphics printing.)

The character set of the SG-15 consists of 781 characters, plus 240 more that you can download. You can write formulas and footnotes using the printer's superscript and subscript characters. The four print pitches permit pica, elite, condensed and proportionally spaced print styles.

Other print features include expanded (double-width) print for all print pitches, double-strike and emphasized modes for darkening characters, and a command that allows you to change print styles simply by changing one ASCII code value in each print command.

The SG-15 possesses state-of-the-art graphics capabilities for a printer in this price range, allowing seven density settings. You can input the plotting and graphics commands with any Commodore computer (using Basic commands), provided that the parallel interface cable for the printer has graphics capability.

The SG-15 will work well with most of the off-the-shelf commercial software designed for Commodores. But be careful when considering spreadsheets and word processors for the printer. Make certain that the software you choose allows you to enter non-printing command codes. These are the codes that allow you to access the SG-15's advanced print features. Fortunately, nearly all of the word processors designed for the Commodore will accommodate non-printing codes.

Having a spreadsheet that allows access to non-printing codes or spreadsheet-configuration commands is important if you need to use condensed type or other print options that the SG-15 is capable of producing.

A good way to find out about programs that will complement the SG-15's capabilities is to ask your Star Micronics dealer when you purchase or lease the printer. Be sure to state any specific requirements that you're looking for in the software.

Star Micronics dealers are also the best source of information on interfacing the SG-15 to Commodore computers. The user's manual that accompanies the printer does not explain what connections you'll need for proper interfacing. Although very little troubleshooting is required with even the most complex interfaces to ensure access to the printer's full range of functions, I feel that a complete set of interfacing instructions should have been included in the manual.

Owners of Star Micronics printers can be assured that their printers have an excellent service support network. Star's own service network is augmented by a warranty and repair service contract with Honeywell's Customer Services Division, thus allowing you to utilize Honeywell service centers for repair work.

The SG-15 is a versatile printer for both home and business use. The many features that it offers are easily accessed by Commodore computers, creating an extraordinary printing system that will not disappoint even the most demanding of users. *(Star Micronics, 200 Park Ave., New York, NY 10166. $499.)*

Tim Walsh
***RUN* staff**

Cardkey-1

A Numeric Keypad To Simplify Many of Your Computing Tasks

The Cardkey-1 numeric keypad connects via a cable to joystick port 1 on the VIC or C-64, and is configured in the standard calculator-keyboard layout. Cassette and disk-based software is supplied with the Cardkey, allowing you to set the keys for particular numbers, special characters or command strings. This is a valuable feature, as it provides you with 16 additional user-definable keys! This is quite a time-saver for programmers, since each key can be assigned as a command or variable operator.

Software is provided (on both cassette and disk) to use with the unit. In-

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cluded are two programs: KBasic and Card/Calc. KBasic allows you to define the keys of the unit as Basic or Forth language statements. Card/Calc configures the unit to perform exactly like a 10-key calculator with memory, and allows you to print out the results on your line printer. This is a very handy program when you must tally up a long string of numbers.

A nice feature of the KBasic program is the ability to store key values or assignments on disk or cassette. This can save you a lot of time, as it allows you to load a stored set of assignments for the keypad keys, rather than redefine them by hand each time.

The keypad and driver software will work with most commercially available software. Cardco also sells a direct-connect adapter for the keypad, making it 100% transparent so that it will work with any software, including cartridges. This adapter sells for $14.95. During my tests, however, I didn't encounter any problems, so I'd hold off on ordering the adapter—you may not need it for your purposes.

While it may sound as though using the Card/Calc program to use the computer as a calculator is somewhat of an unnecessary project, this isn't always the case. I've come across a number of instances where I could have performed the calculations I needed on an electronic calculator faster than I could on the computer. By using Card/Calc I was able to turn my C-64 into a printing calculator with memory, complete my bookkeeping chores, then return instantly to Basic. I know it's going to be quite helpful at income tax time!

If, in the course of your normal computing, you often encounter the need for a calculator, the Cardkey-1 will be a welcome addition to your peripheral collection. And if you do a lot of Basic or Forth programming, having 16 additional assignable function keys will save you time and reduce typing errors that might occur in your programs or data. It's a well-built, reliable unit that delivers a lot of value for the price. *(Cardco, Inc., 300 S. Topeka, Wichita, KS 67202. C-64 and VIC-20/$49.95.)*

Tom Benford
Osborneville, NJ

Okimate 10

A Color Printer That Offers More For Your Money

The Okimate 10 personal color printer is an impressive device, offering many features at a relatively low price. It has both black-and-white and color print modes and is ideal for many home applications.

The printer is small, lightweight and very quiet. Its printing method is described as thermal transfer dot-

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matrix, which means that you can use either thermal or regular paper. The Okimate 10 has true lowercase descenders and offers four print pitches: wide, bold, text and fine.

The Okimate 10's print speed (unidirectional) won't win many races at 60 cps in the Text mode, and 18 cps in the Graphics mode, but considering the reasonable price and the many other built-in features, I think it's a fair trade.

Along with the printer itself, you must purchase the Plug 'n Print kit for your particular computer. The kit includes such essential items as the printer handbook, two printer cartridges (black and color), paper, a connecting cable, a disk containing two printing programs, and the operating module that allows you to connect the printer to your computer. With the well-written manual in hand, it should take you only a short time to hook up the printer.

The real reason that many people will buy the Okimate 10 is to make use of its color capabilities. It will print seven text colors, 16 screen colors and at least 40 graphics colors. The ribbon that is included in the package has three basic colors—yellow, magenta and cyan. The printer mixes these on the paper, producing a wide variety of colors. You can also interspace white dots, solid dots of one color, and dots of mixed colors, creating remarkable combinations.

The color-print program (included in the kit) allows you to print out your creative endeavors. The program is compatible with Doodle!, Koala, Supersketch and Edumate graphics programs, and Okidata will update you on other compatible programs as they appear on the market.

If you are planning to write your own color-graphics print programs, be aware that it won't be an easy task. The manual, although quite good, is not a full-length tutorial on the subtleties of dot-addressable graphics techniques. Combined with the unique way that the color ribbon creates colors, you'll definitely have your hands full. However, when I tested the printer with other screen-dump graphics programs in the black-and-white mode, it performed beautifully.

The Okimate 10 is an admirable printer in both the black-and-white and color modes. The features are extensive, offering capabilities well beyond those of others in the price range. However, the printer will not give you letter-quality print, and if you are not particularly interested in the color capabilities and would prefer a better-quality print, perhaps you should consider another printer.

If, however, you have a real need for a color printer, or will only be using it for simple home applications, the price and simplicity of the Okimate 10 are unbeatable. *(Okidata, 532 Fellowship Road, Mt. Laurel, NJ 08054. C-64/$230.)*

Guy Wright
***RUN* staff**

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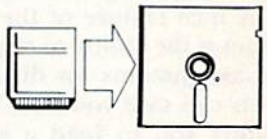

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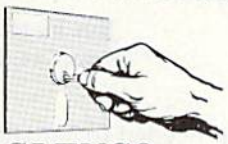

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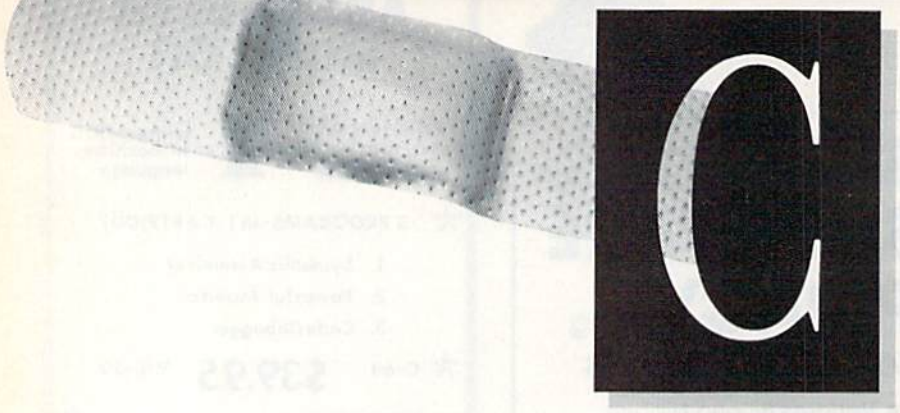

C

JIM STRASMA

Do you have a problem or question about your Commodore computer? Commodore Clinic can help. Just send your question on a postcard to:

Jim Strasma
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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.

UPDATE

Update: In the February 1985 Clinic, your answer about interfacing the SX-64 to a TV was almost correct. The SX's video port does not have the 5-volt pin that powers the VIC modulator. I used an adapter that fits in the joystick port and takes power from it to the correct wire inside the modulator box.

Richard Errico
Costa Mesa, CA

A: Thanks for the added information. I'll try it on my own new SX-64 as soon as I locate a VIC modulator.

HARDWARE

Q: **I am having problems following through in upgrading the memory in my VIC-1110 8K memory expansion cartridge as explained in *RUN*. I was unable to find the ICs used. Please help me find a distributor for these parts.**

Jim Fletcher
Prospect, PA

A: The chip needed to expand a VIC memory cartridge is Hitachi's 6116 static RAM. A quick scan of ads shows it is available in several versions, ranging in price from $5–$8. All should do well for your purpose. Those advertising it recently include two firms that have been in business for several years and treated me fairly—Jameco Electronics of Belmont, CA (414-592-8097), and Advanced Computer Products of Irvine, CA (800-854-8230). Give them a call to check on exact prices and which versions are in stock.

Q: **How can I connect the SX-64 to a C2N Datassette and watch the picture on a television?**

H. Ingolfsson
Varma, Iceland

A: You've essentially asked how to make the SX-64 do two things it isn't intended to do, but where there's a will, there's a way.

First, in answer to the TV part of your question, see the Update at the beginning of this column. As for the cassette, I've not tried it, so the following is just speculation.

As I study the innards of the SX, it appears that almost everything you need for a Datassette is there, except for the connector. Thus, following the schematic in the *Commodore 64 Programmer's Reference Guide*, you'd have to connect the Datassette's wires directly to the appropriate places inside the SX, and replace any missing parts. Second, you'd have to replace the Kernal EPROM (a TMS 2564, available from the two chip suppliers listed in the answer to the last question) and burn a copy of the regular 64's –03 Kernal ROM onto it.

Q: **I am currently running an SX-64 coupled to an MSD dual drive. I know a 1541 can be changed to device #9 through hardware. Can this also be done on an SX-64?**

Ross Cherednik
College of Ganado
Ganado, AZ 86505

A: I'm sure it can be done, but, in a brief search the last time I had my SX open, I was unable to locate the precise spot on its 1541 logic board. The SX doesn't appear to have been designed to make this change easily (no premade traces to cut), and that board would be difficult to remove and study. If any of you have done it, Ross and I both would like to hear from you.

Meanwhile, why not change the MSD to device #9? Its instructions tell how to do so, and you'll need only a screwdriver to get the case open. If you need to switch back and forth from device 8 to 9, you can wire a small single-pole, single-throw switch to the jumper used for this and have both. I've done that with my SX and MSD and find it meets all my needs without my having to dive further into the innards of the SX.

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Q: I have an application requiring fast data transfer from floppy disk to an I/O port. A number of ads for parallel-access disk drives have appeared recently. How many bytes per second should I expect from these?

Tom Helfrich
New Haven, CT

A: The only two parallel drives I have now are the MSD dual and Commodore's 8250. In Parallel mode, I measure 788 bytes per second from the MSD and 1036 from the 8250, compared to 377 bytes from a 1541. Though I haven't tested them personally, readers are reporting similar or better speeds from 1541s modified to use 1541 Flash from Skyles Electric Works (Mountain View, CA) and Fast Load from Epyx (Sunnyvale, CA).

However, the *real* speed demon is Commodore's new C-128 computer with its matching drives. In a special "Burst" mode, Commodore says they are capable of up to 4000 bytes per second.

Q: I have a VIC-20 and a C-64. I've tried loading programs saved on the VIC into the 64 with Commodore's 1530 Datassette, but haven't had any luck. They loaded all right with another, non-Commodore tape player. Commodore England and Commodore Germany say this is impossible, as the CPU on the 64 runs too fast to read a VIC-saved tape, and will produce an Out-of-Memory error, but I have no problems. Is there something wrong with my machines?

J. McCarroll
Augsburg, West Germany

A: Due to the differences in timing, there *can* be a problem loading programs directly from a VIC to a 64. There can even be a problem between 64s of different ages. However, I've never noticed them because my PET computer is able to read tapes from them all, and it acts as a universally compatible intermediary. If you have a tape you can't read on one machine, but can on the other, ask a friend with a PET to copy it for you on that machine. Doing so should cure the problem.

Q: I purchased a Sears TV/monitor (#57H4084C) to use with my C-64. I used the 5-pin, 2-plug monitor cable to connect the 64 to the monitor. This arrangement worked fine for games and made an excellent television.

A problem turned up, however, when I used a terminal emulator with an 80-column mode. It is extremely hard to decipher characters in the 80-column mode. Clarity was much better on a friend's Commodore monitor. The Sears monitor supports 80 columns in RGB mode, so

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is there any way to convert to an RGB signal?

Sean Flynn
West Simsbury, CT

A: The problem is partly in the way 80 columns are emulated in software by Commodore programs. Instead of the usual eight horizontal dots per character, most such programs use three, allowing two characters to fit in the space normally occupied by one.

However, the fundamental resolution is still 40 columns, so the Sears RGB mode probably wouldn't help even if you could use it (which you can't, as far as I know). The reason the Commodore monitor gives a better result is probably because it is connected via the rear chrominance and luminance connectors, which optimize the performance of the VIC-II color video chip.

For the moment, I can't suggest any way to improve your monitor's performance except to turn down the color and contrast slightly. However, Commodore's new C-128 model will be able to use your RGB connector, and it includes true 80-column color capability. That might be your best solution in the long run.

Q: **I just bought my C-64 after using a Radio Shack Color Computer. I have the LP VII and DWP-210 printers. Can these be used with the 64?**

Mike Fogel
Brooklyn, NY

A: The DWP-210 comes with a Centronics parallel interface that can be connected to most of the popular printer interfaces now being sold for the 64. Any inexpensive interface with a Centronics parallel connector on one end and a Commodore serial bus connector on the other should do. You will find them available most places Commodore computers are sold.

I couldn't find the LP VII in a current catalog, but if it has a parallel connector, it will hook up the same way. If not, it is possible to rig up a simple RS-232 connector to the port used by your CoCo, and then to attach that to Commodore's VIC 1011-A RS-232 interface.

Q: **The *VIC-20 Programmer's Reference Guide* refers to something called the serial bus. It says it is used to connect both a disk drive and a printer to the computer at one time. Could you please explain exactly what it is, where I can buy it and approximately how much it costs?**

Bruce Romney
Suffern, NY

A: Good news! The serial bus won't cost you a dime extra. The bus involves components built into every VIC and 64 computer. Another essential part of the bus is the six-wire cable that comes with Commodore printers and disk drives to connect them to the computer.

You see, the computer needs a way to communicate between the microprocessor chip, the interface adapter chips and external devices they control, such as the disk and printer. Running a full set of wires between the processor and each of the other chips would be very costly. Instead, the computer uses a system much like a telephone party line.

In both cases, only one set of wires serves several neighbors, and information carried on them is preceded by a code that tells which location is to receive that information. The phone company uses a special ring; the computer uses special addresses. In each case, however, the result is that only the intended recipient gets the information.

In the case of the serial bus, the wires start at an interface adapter chip, called a CIA on the 64 and VIA on the VIC. From there, they run to a connector jack on the back of the VIC. A cable goes from the jack to a disk drive, if you have one, or directly to a printer, if that's all you have. If you have both, another serial bus connector on the back of the disk drive extends the signals from the CIA or VIA chip in the computer to another cable, going this time to a second disk drive or to the printer.

With up to five different computer accessories sharing the same serial bus, it is essential to be sure each one has its own unique address (also called device number). This assures that only the correct device will listen to each command from the computer. You'll sometimes hear people refer to this sharing of the serial bus as daisy-chaining.

SOFTWARE

Q: **I recently bought a VIC-Modem for my VIC. When I call my computer club's bulletin board modem, it prints weird characters. Everything is set correctly (baud rate, duplex, stop bits, etc.). I thought it was my modem, so I exchanged it, but still had the same problem. I called another modem and it was the same. I thought it was my computer, so I bought a 64, and it is still the same. Can you give me any advice?**

David Cardoza
Clovis, CA

A: You didn't mention what terminal program you are using, but I would guess that your problem is either that the program is sending PET ASCII characters to a board that is expecting True ASCII, or that it is sending True ASCII characters to a board that is expecting PET ASCII. If uppercase letters are printed properly but lowercase letters are altered, this is your problem. Some terminal programs offer a choice of character sets. If yours does, try the other setting.

Another possibility is that your parity bit is set incorrectly. It must match the parity setting of the bulletin board you call. Try Ignore, None, Even, Odd, Mark and Space and see if that cures the weird characters. Similarly, your modem can be set for different character lengths, from 5 to 8 bits. It is important to match the length used by the remote system, usually 7, but sometimes 8. If your word lengths differ, that can alter the characters received.

I'd suggest having someone in your user's group who has used the club bulletin board come over and help you make your first call. That's what computer clubs are for.

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Q: **I am fairly skilled in Basic, but I have been unsuccessful at creating a musical chord with just one voice. Would you include a short example?**

Alan Leish
Los Angeles, CA

A: Although any note has overtones and harmonics of varying frequencies, you can't make one voice play harmony; you must program all three voices of the SID chip to create a musical chord.

Q: **Please inform me how to format a document in a Plus/4 word processor so that it will give a hard-copy on a 1526 printer with double-spaced lines.**

William Simmons
Nashville, TN

A: Several Plus/4 owners have asked the same question, but there doesn't appear to be any easy way to do this yet. If your primary use for the Plus/4 is in word processing, you might do well to buy Commodore's cartridge, Script Plus, for the Plus/4. It is based on the popular and powerful Easy Script for the 64.

If you'd like, you may even remove the word processing ROM from its cartridge and install it in place of the 3+1 ROM included with the Plus/4; this was done to one demonstration unit I tested last summer. (Wait, however, until your warranty expires before digging into your machine.)

Q: **I would like to put my wife's Avon business on my computer. She would like a list of the people she serves, with name, address, phone and Avon products they use. That way, if she ran a sale on a product, she could have the computer pull all the names of people who use that product. She would also like to write those people a note about the sale and have the printer type them. What program or programs will do this without costing an arm and a leg?**

John Dodge, Jr.
Waterloo, IA

A: Nearly any popular data-manager program can handle the name, address and phone number of customers for you, plus a short list of the product numbers purchased by that customer. Many will then allow you to search for the desired product number and print desired portions of matching records into a disk file, which many word processors can read to create the letters you want.

One example of a new program that combines both features in one is HomePak, from Batteries Included. This program has also attracted widespread attention for its low price and lack of protection against copying.

REPAIRS

Q: **Whenever I try to load a program from cassette on my VIC, I get a Load Error message. I have tried to service the Datassette at home, but it doesn't work. Can you help?**

Ryan Graham
Norcross, GA

A: Let me suggest several things to try. Perhaps one of them will help your Datassette.

First, be sure your Datassette and its cord are well away from your TV or monitor and the VIC's power supply. If they are too close, it won't work.

Second, clean the heads that read the tape and the idler roller and capstan that control its speed. Ninety-one percent isopropyl alcohol on a Q-Tip is good for this purpose. If you use the Datassette much, this should be done about monthly.

Third, demagnetize the heads, using an inexpensive demagnetizer

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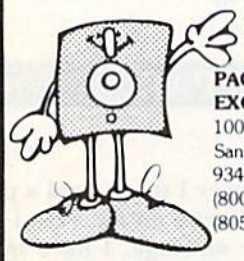

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from a stereo or electronics-supply store. (Be sure its tip is shaped properly to reach the heads.) This should be done after 50 or so hours of loading and saving programs (a few times a year).

Fourth, be sure you're using the proper tapes. Agfa PE-611 tape has been popular for use with Commodore Datassettes for several years now, but Radio Shack's cheapest tape also works well. Don't spend extra for extra length or premium-quality tapes—costly chrome, metal and extended-play cassette tapes don't work as well as standard short ones.

If these measures don't help, try to borrow another Datassette and try it on your system. If it works properly, you may need to adjust the azimuth of your recording head, using a jeweler's screwdriver through an access hole under the label on the Datassette. That may be a job better left to your dealer, if you can find one willing to work on the Datassette for less than the price of a new one.

If the other Datassette doesn't work either, the VIC itself is probably at fault. If so, swap the two 6522 chips in your VIC. If that makes a difference, the one that was in UDE7 probably needs replacing. Good luck in tracking this.

Q: When my disk drive motor is running, it makes a squeaking noise. It did not always do this. Does it need some kind of lubrication? If not, what does it need?

Phil Spicer
Houghton Lake, MI

A: If your disk is a 1541, more than a year or so old, and the noise began suddenly rather than gradually, your problem may be a loose flywheel. To be sure, you'll have to remove the drive from its case and look at the bottom of the drive. The flywheel has a strobe disk on it to assist in setting motor speed (if anyone could see it down there).

If it is held on by a screw and the screw is tight, that isn't your problem. But if there is no holding screw, you may need to gently tap the flywheel back onto its spindle with a small hammer (don't bend anything in the process) and seal it in position with superglue (cyanoacrylate) when you are done.

If the flywheel isn't your problem, be sure the head is clean and the load pad in good condition. The head may be cleaned with 91% isopropyl alcohol on a Q-Tip. If the load pad is missing, dirty or worn, replace it. If noise persists, try to notice whether it is constant or is heard only when the head moves.

If it is associated with head movement, you can, with high-quality lithium grease, lightly lubricate the rail on which the head moves, taking care to keep it off the rest of the drive. If the noise is constant, the washer that is atop the collet assembly and clamps the disk in place also may need a bit of grease. It can be replaced, but about now I'd begin thinking about letting a professional do the work.

Q: Recently, I have noticed a rather loud hum (loudness increases with volume setting) coming from the speaker of my 1702 monitor. This does not occur all the time, but seems to be happening with increasing frequency. I have tried turning off all my peripherals, leaving only the 64 and the monitor on. What might be causing the problem?

Dale Mullen
Yarmouth, N.S., Canada

A: To determine whether it is your computer or your monitor, swap one and see if the problem persists. Perhaps a nearby fellow owner or your dealer can let you try another monitor or keyboard unit. Try plugging it into an outlet other than the one you're using for your monitor. That alone may reduce the hum.

PROGRAMMING

Q: Is there a way to convert screen codes into PET ASCII character codes? I'm trying to create my own screen dump.

Joe McGuire
Mooresville, IN

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A: Yes, Commodore tells how in their Basic 4.0 user's reference manual. In Basic, it's done this way, using the variable A to hold both the character to be converted and the altered result:

```
100 B6 = A AND 64
110 A = A AND 63
120 IF A<32 THEN A = A OR 64
130 IF B6 = 64 THEN A = A OR 128
```

To do the same thing in machine language, Commodore suggests using the following relocatable code:

```
CALL    PHA             ;BIT
        ASL   A         ;6 TO
        ASL   A         ;CARRY
        PLA             ;THEN
        PHP             ;STACK
        AND   #%0011    1111
        CMP   #%0010    0000
        BCS   SKIP
        ORA   #%0100    0000
SKIP    PLP             ;RECALL
        BCC   DONE
        ORA   #%1000    0000
DONE    RTS
```

In machine language, the character to be converted starts and ends in the accumulator. In Basic, this character is stored as an ASCII code in variable A.

The above code works on all characters except those in reverse field. These can't be converted with a single character, but can with three. This, however, is too complicated to pursue here.

Q: **Between lines 57 and 58 of a program I typed, there is a line 32. It is out of sequence, and I cannot delete it. How can I get this line out of the program?**

Ruth Fox
Tonawanda, NY

A: No amount of deleting will remove this line, because it isn't really a separate line. Rather, it is part of the line before it in the listing. If you list the preceding line (57 in your case), your spurious line (32) will also appear. To get rid of it, edit or retype the preceding line (57). R

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Compiled by SUSAN TANONA

Writing Wizard

Scarborough Systems, Inc. (25 N. Broadway, Tarrytown, NY 10591) has released MasterType's Writing Wizard, a word processor for the C-64.

The program is designed for ages eight and up and offers such features as dual windows in which to write and multiple typefaces. The program is available on disk for $79.95.

Check Reader Service number 400.

Advanced Wargame

Kampfgruppe is a tactical-level wargame for advanced players that covers fighting between Russian and German forces from 1941–1945. The scenarios can be either historically accurate or player-created.

The game is available on disk for the C-64 and retails for $59.95. Strategic Simulations, Inc., 883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043.

Check Reader Service number 401.

The Music Improviser

Algo-Rhythm Software (176 Mineola Blvd., Mineola, NY 11501) has released Cantus, The Music Improviser, a music program for the C-64.

You enter your choices for tempo, harmony, and so on, and the program uses these to invent its own music in three-voice improvisations. The program is on disk and retails for $54.

Check Reader Service number 403.

Barbie Goes High-Tech

Epyx, Inc. (1043 Kiel Court, Sunnyvale, CA 94089) has released Barbie, a software package modeled after the popular children's toy.

On the C-64's screen, children can change Barbie's clothes, as well as the style and color of her hair. Available on disk; retail price is $39.95.

Check Reader Service number 402.

G Wiz

Cardco, Inc. (300 S. Topeka, Wichita, KS 67202) has released the G Wiz interface, which will connect your Commodore to any Centronics printer.

Features include increased print speed on many dot-matrix printers, open access to dip switches and a choice of two character sets.

Check Reader Service number 406.

On-Field Football

Gamestar, Inc. (1302 State St., Santa Barbara, CA 93101) has recently released On-Field Football for the Commodore 64.

The game places you in the middle of the action and allows you to create your own plays. It is available on disk for $29.95.

Check Reader Service number 407.

Heavenly Bodies

Constellations I is an astronomy tutorial designed to teach you about the stars. The program allows you to view and print out 12 of the constellations, and offers a chart of the ten brightest stars.

Available on tape or disk, Constellations I is compatible with the C-64 and VIC-20 (13K). Retail price is $14.95. Morcon the Wizard Software, PO Box 360, Sandwich, IL 60548.

Check Reader Service number 409.

Master of the Lamps

Activision, Inc. (2350 Bayshore Frontage Road, Mountain View, CA 94043) has released Master of the Lamps, a game for the C-64.

You must help the young prince recapture his kingdom from the evil genies who have taken over the land. Available on disk, retail price is $29.95.

Check Reader Service number 420.

C-64 Assembler/Monitor

Hughes Associates (45341 Harmony Lane, Belleville, MI 48111) has released the Freedom Assembler/Monitor for the C-64.

This cartridge-based assembler is written in 100% machine code. It can remain plugged into your computer even when not in use and can be quickly activated with one command. Retail price is $39.95.

Check Reader Service number 422.

Access More Memory

Access-M is a memory-expansion board that plugs into the C-64's ROM

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How to type listings from RUN

Typing in listings can be difficult enough without having to worry about strange graphics characters, charts or tables. That's why we decided to make it easy to enter listings from *RUN* by translating 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 at the same time.

{COMD J}—means hold down the Commodore key (it is on the lower left side of the keyboard) and press the J key at the same time.

{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).

Our translating program does not designate single spaces between characters. Within quotations, these spaces are often critical to the screen display. Be sure to read the listings closely and include these single spaces as you type in your program.

In some instances, when a large number of characters or spaces are repeated in a listing, we will represent them this way: {22 spaces} or {17 CRSR LFs}.

Print vs Print#

RUN readers should be aware of difficulties that may arise when entering listings that contain the PRINT and PRINT# commands.

These two commands may look very similar, but they are different. If, for example, you use a question mark (?) to abbreviate PRINT in a line such as 10 PRINT#4,A$, then you are signaling to the Commodore computer that you are trying to print the variable #4, which is not a legal variable name.

The command PRINT#4 actually means "print to file number 4." You can abbreviate PRINT# by hitting the P key and the shift and R keys at the same time and then entering the file number. But *do not* abbreviate PRINT# with a question mark.

If you think of PRINT as one command and PRINT# as an entirely different command, then you should have no problems.

■ ■ ■

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Item: There was an error in Listing 1 of Doug Smoak's Graph Maker program in the April 1985 issue (p. 110). Line 1320 should read as follows:

```
132Ø IFG$="{SHFT INST}"ORG
     $=""THENG$="{CRSR LF}
     "
```

■

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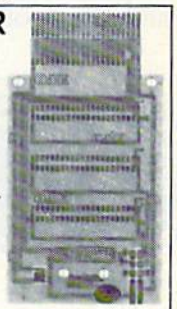

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expansion port. Included in the package is software that executes from the extended memory space.

Access-M allows memory expansion of up to one megabyte. Retail price is $199.95. Mosaic Electronics, Inc., PO Box 708, Oregon City, OR 97045.

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■

Graphics Development

Basic Lightning, Machine Lightning and White Lightning are a series of graphics-development programs for the C-64, from Oasis Software (377 Oyster Point Blvd., Unit 15 South, San Francisco, CA 94080).

The Lightning series is designed to aid in the development of professional-quality games. Available on disk, retail price is about $40 each.

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C-64 Character Editor

CHARED is a character editor that supports High-resolution and Multicolor modes. It allows you to create character sets for different alphabets, correspondence and so on.

It is available on tape for $19.95, on disk for $22.95, and is compatible with the C-64. APCAD Software, PO Box 2673, Ann Arbor, MI 48106.

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■

Sixth Sense

Microtechnic Solutions, Inc. (PO Box 2940, New Haven, CT 06515) has released Sixth Sense, a terminal program for the C-64.

The program can gather and dispense information automatically and can originate calls to, as well as answer calls from, remote computers. The disk retails for $89.95.

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Rainy Day Fun

Rainy Day Fun provides children between the ages of five and nine with activities that aim to be both entertaining and educational. The package includes two disks containing ten different games and puzzles.

Available for the C-64, retail price is $39.95. Thorn EMI Computer Software, Inc., 3187 C Airway Ave., Costa Mesa, CA 92626.

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■

VIP Terminal XL

The VIP Terminal XL has been released by Softlaw Corp. (132 Aero Camino, Goleta, CA 93117), as a replacement for the VIP Terminal.

The new program has added features such as the ability to transfer files to and from many information services, and it is compatible with Commodore's 300 and 1670 modems. It is available on disk for the C-64. Retail price is $39.95.

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Kennedy Approach

Kennedy Approach is a speech-simulation program that puts you in con-

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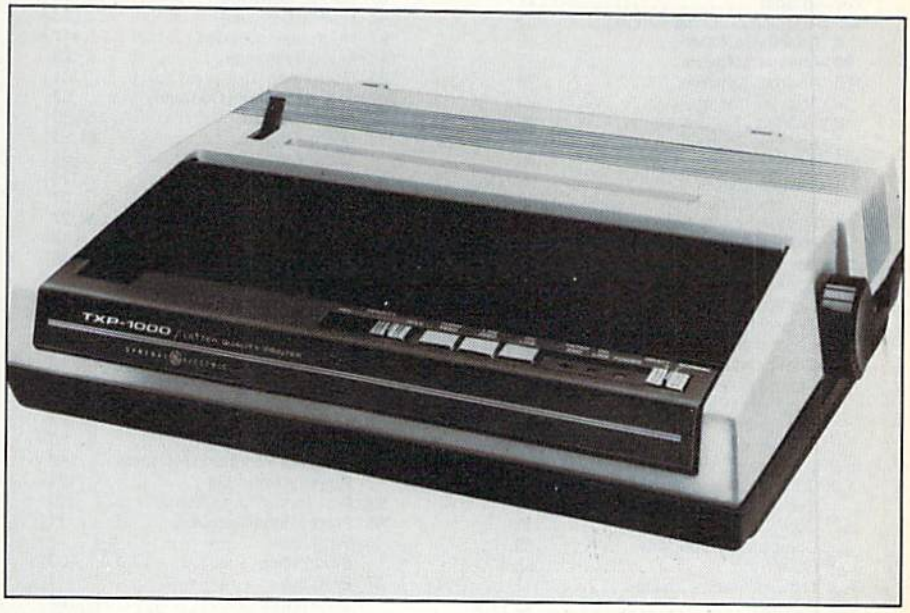

trol of the air-traffic systems at the nation's busiest airports. You will hear the radio calls of the aircraft, as well as your own messages.

The program is available on disk for the C-64 and retails for $34.95. MicroProse Software, 10616 Beaver Dam Road, Hunt Valley, MD 21030.

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■

Math Busters

Math Busters is an educational game that is designed to teach children between the ages of eight and 14 the four arithmetic processes in the framework of a fast-paced adventure game.

The program is available on disk for the C-64 and retails for $26.95. Spinnaker Software, One Kendall Square, Cambridge, MA 02139.

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■

Find the Word

CBS Software (One Fawcett Place, Greenwich, CT 06836) has introduced Wordfinder, an educational game for children aged 10 and up.

The program is designed to strengthen vocabulary and spelling skills. Wordfinder is available on disk for the C-64 and retails for $34.95.

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GE Printer

General Electric Co. (Electronics Park, Syracuse, NY 13221) has released the Model 3-8100 dot-matrix printer.

Features include automatic linefeed, full graphics capacity and a choice of either 25 or 50 cps print speed. The printer and the Model 3-8150 Commodore-compatible interface retail for about $390.

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■

C-64 Chords

Chord-Power for Guitar is a music program that displays and plays guitar chords on your C-64.

The program is accompanied by a tutorial that provides additional information on chord naming and structure. Available on disk, retail price is $39.95. NewArts Co., PO Box 2700, Huntington Beach, CA 92647.

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■

Learn Money Management

Gamco Industries, Inc. (Box 1911, Big Spring, TX 79721) has released Money, a program that introduces students to money management.

The program provides drills in various money-management skills and uses an arcade-style reward game to motivate students. Available on disk for the C-64, Money retails for $39.95.

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■

Alice in Videoland

Alice in Videoland is a graphics adventure game based on Lewis Carroll's satiric fantasy. You must help guide Alice through her travels as she meets up with White Rabbit and the Cheshire Cat.

The program is available on disk for the C-64 and retails for $19.95. Artworx Software Co., Inc., 150 North Main St., Fairport, NY 14450.

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Accounting Package

C-Tech (5720 W. Little York, Suite 178, Houston, TX 77091) has introduced ACZ General Ledger, a small-business accounting program for the C-64 that is designed to be both complete in its applications and easy to use.

Features include flexible report format and monthly income statements. The program is available on disk and retails for $45.

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List of Advertisers

Reader Service		Page
229	64 Gold	72
335	A.A. Computer Exchange	101
8	Abacus Software	69
89	Abacus Software	71
185	Abacus Software	73
39	Abby's Software	123
18	Academy Software	85
*	Apropos Technology	3,111
243	Aries Marketing	109
301	Basix Softworx	23
*	Batteries Included	CII
112	Bible Research Systems	101
193	Big Bytes Computer	100
232	Blackship Computer Supply	125
85	Cardco Inc.	CIII
192	Cardinal Software	16
81	Central Point Software	101
225	Cheatsheet Products	85
*	Comal Users Group	123
*	Commodore Business Machines	CIV
*	Computer Centers of America	60
325	Computer Ed. Software	117
62	Computer Peripheral Exchange	31
100	Computer Place	111
29	Computer Warehouse	59
300	Covox, Inc.	85
198	Crown Custom Covers	117
105	DSI, Inc.	45
318	E-Mart	122
12	Epyx Inc.	1
14	Eastcoast Software	44
205	Elek-Tek, Inc.	109
42	FS! Software	13
84	Federal Hill Software	112
162	Franklin Engineering	126
265	Full Circle Software	119
201	Glenco Engineering Inc.	117
9	H & E Computronics	2

Reader Service		Page
46	Handic Software	9
257	Handic Software	42,43
191	Hughes Associates	117
146	Indus-Systems	29
200	Interphase	101
202	Jason-Ranheim Company	99
189	Megasoft, Ltd.	62,63
172	Micro-WDI Inc.	61,99
177	Micro World Electronix, Inc.	84
169	Microcomscribe	126
91	Microlog Corporation	37
68	Microprose Software	17,27
155	Microsphere	19
98	Navarone Industries	109,125
345	Nibble Notch Computer Products	109
262	Nimbus Software	116
60	Omnitronix	37
195	Orange Micro	3
171	PC Gallery	57
70	Peripheral Systems of America	41
235	Pacific Exchanges	122
208	Parsec Research	55
199	Personal Peripheral Products	112
*	Pro-Line Software	121
74	Prof Jones/Frogg House	115
93	Professional Software	11
15	Protecto Enterprizes	86,88,89
37	Protecto Enterprizes	87
220	Quinsept Inc.	117
219	R. J. Brachman Assoc.	116
	RUN Magazine	
	Foreign Dealer	99
	Dealer Sell	99
	ReRUN	96
	RUN Gamepak	65
	RUN Subscription	64
	Subscription Problems	72
	Universal Micro	72,109

Reader Service		Page
*	Schnedler Systems	20
206	Schu Lace Enterprises	117
90	Skyles Electric Works	15,33
301	SMADA Software	61
254	Software Discounters of America	53
137	Solid State Software	7
63	Starpoint Software	61
40	SubLogic Corporation	21
*	Tailored Solutions	58
52	Tech Sketch	93
209	Tussey Computer Products	39
*	Ultrabyte Inc.	77
35	Universal Software	84
167	Valhala Software	122

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July

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  - **Watch Your Speed!**—Whether your disk drive is puttering along or breaking the speed limit, the two programs featured in this article act as traffic cops in helping you to check and adjust your drive's motor speed.
  - **Keep It Clean**—Here's a simple procedure for cleaning your disk drive head, thus preventing damage to your disks and drive.
  - **Realigning the 1541**—A do-it-yourself project that will save you costly repairs due to disk drive misalignment.
- **Datafile Fast Print**—No more long waits for database records to print out! DFPrint, another module to our popular Datafile program, will give Datafile users greater printing speed and efficiency.
- **Program Painter**—This short utility program for the C-64 lets you easily load your masterpieces (created with Koala or other graphics programs) into your own programs.
- **C-64 Databases**—These powerful productivity tools can simplify your life at home and in the office. We'll have reviews of the prominent database programs on the market, with the information you need to know before you buy.
- **Chopper Run**—You're trapped within enemy territory in your reconnaissance helicopter. You'll need fast reflexes to evade gound obstacles and lethal heat-seeking missiles. For C-64.

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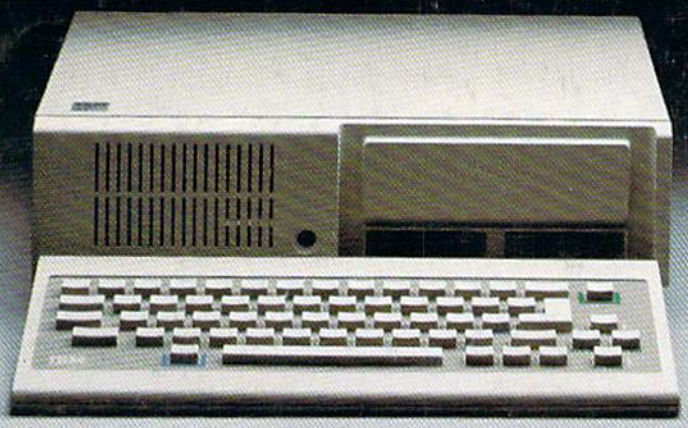

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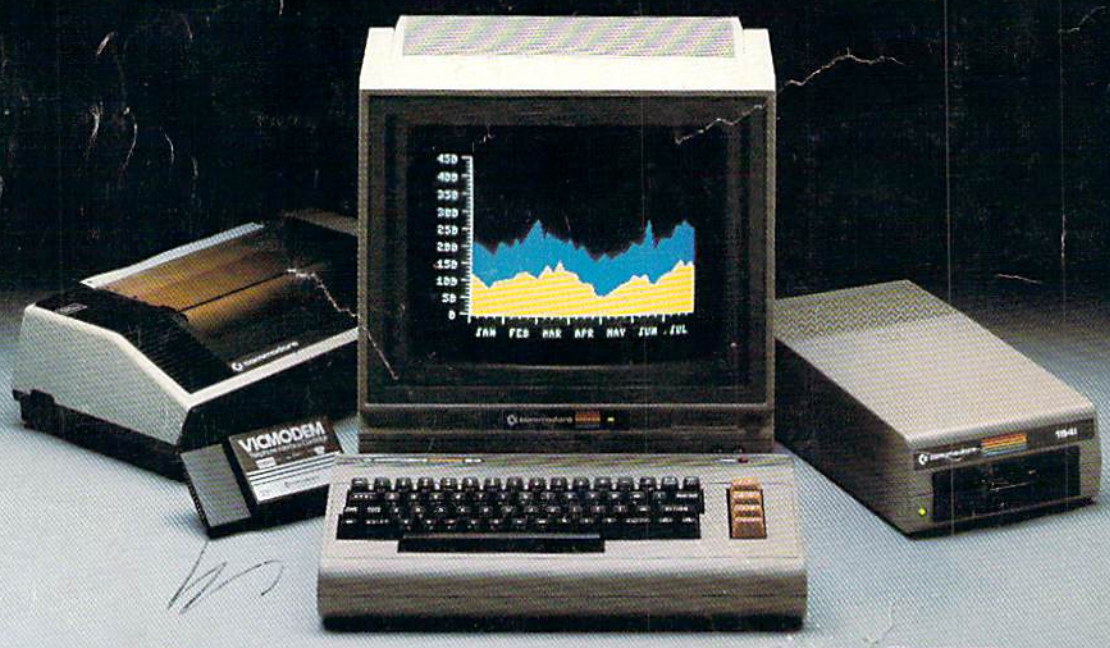

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