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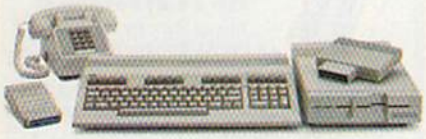


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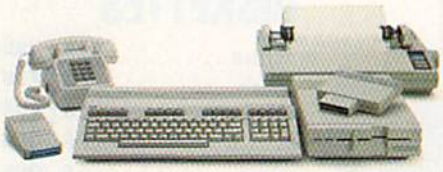
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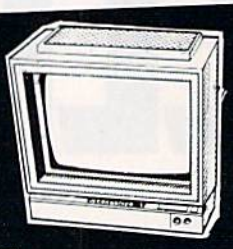
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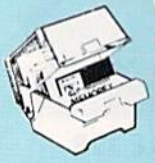


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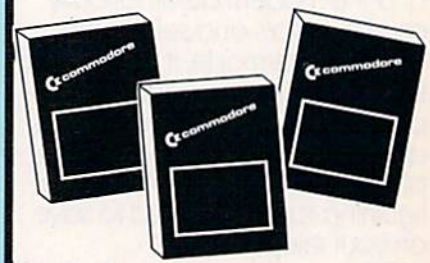
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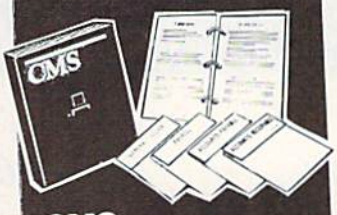
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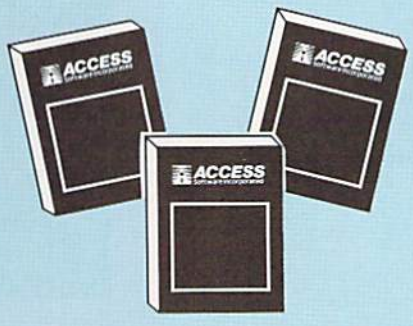
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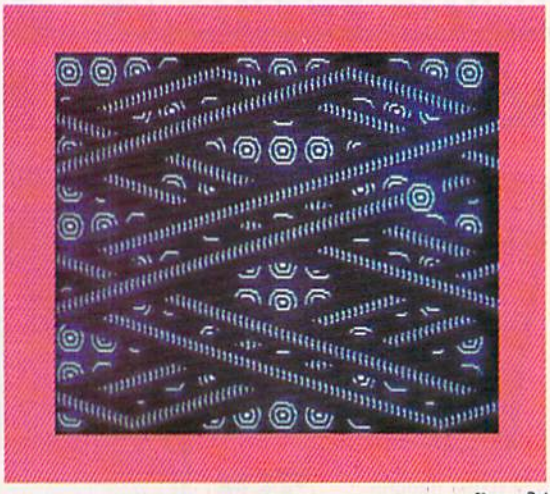
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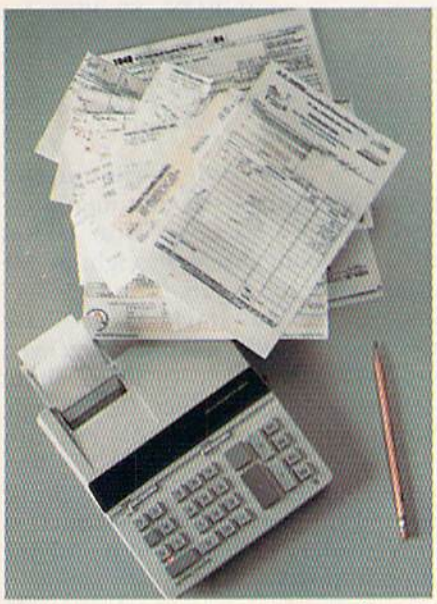
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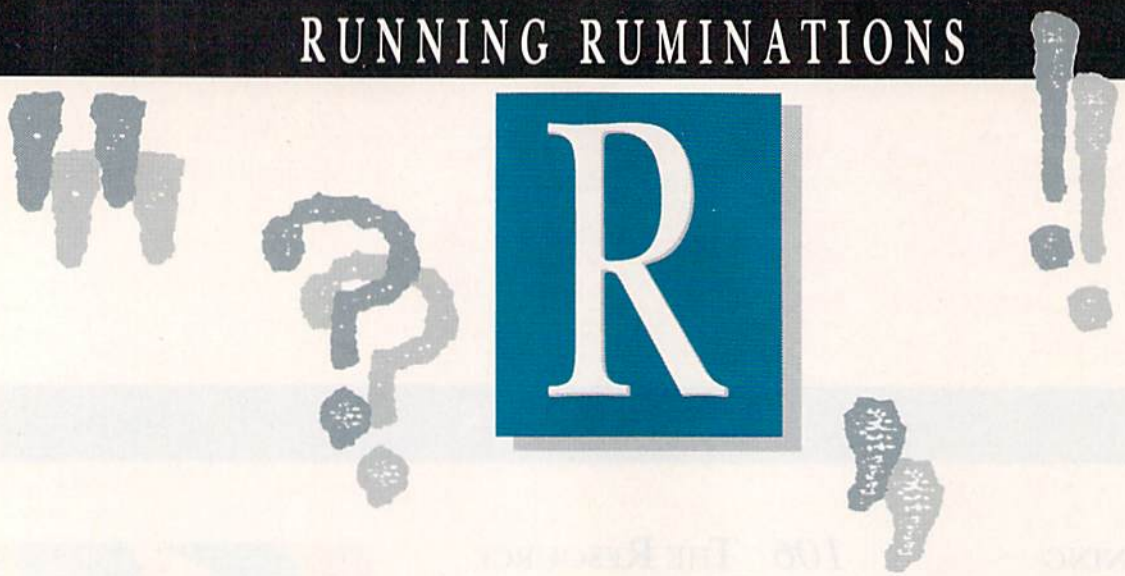


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ReRUN promises to be bigger and better than ever in 1986...and, you'll see it more often!

Since its inception in 1984, ReRUN has been a vital support product for *RUN* magazine. It eliminates the tedium of entering program listings from the magazine, along with any risk of entry error.

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—ReRUN users want to see more programs.

—respondees would like to see ReRUN offered more frequently.

—respondees consider the accompanying booklet helpful and want to see the documentation continue to be offered in the booklet, as opposed to relying on articles in the magazine.

—ReRUN users would like to have ReRUN offered on a subscription basis.

—most respondees would like to be offered never-before-published programs, in addition to those offered in the magazine.

In response to the concerns and interests of our readers, ReRUN 1986 will be offered on a bimonthly, instead of a quarterly, basis. *All* of the programs published in *RUN* will be made available on ReRUN, and each bimonthly ReRUN will contain two months' worth of programs published from *RUN*.

So, for example, the February 1986 version of ReRUN will contain every program published in the January and February issues of *RUN*. The next ReRUN—in April—will contain March and April's *RUN* programs, and so on.

This format allows you to receive *all* of *RUN*'s programs; you will no longer be limited to selected programs. And, ReRUN users will not have to wait as long from the time programs appear in *RUN* to the time they become available on ReRUN.

Here's a sampling of some of the kinds of programs you can expect on ReRUN this year:

—Productivity. ReRUN will cover this topic in a big way in 1986, with C-64 and C-128 programs that increase your word processing, spreadsheet, database and telecommunications skills.

—Utilities. Disk utilities, music utilities, graphics utilities, programming utilities and more. These programs will let you take full advantage of your system's capabilities and make your computer easier to use.

—Applications. Whether you use your Commodore computer in the home, office or at school, you'll find interesting applications in each and every issue of ReRUN.

—C-128 mode. ReRUN 1986 is committed to providing C-128 owners with programs to use in 128 mode, as well as in 64 mode.

—Bonus programs. In addition, each ReRUN issue will contain a never-before-published program.

If you're interested in receiving more great Commodore programs six times a year, see the ReRUN ad elsewhere in this issue, or write to ReRUN, 80 Pine St., Peterborough, NH 03458.

Trailblazers

That pioneering spirit—so vital to the beginnings of the computer industry and essential to its continuation—is alive and well in this issue of *RUN*. "Ultra Hi-Res Graphics" represents a dramatic breakthrough in 80-column graphics capability on the C-128.

The authors, Louis Wallace and David Darus, have uncovered capabilities of the C-128 no one—not even Commodore engineers—knew existed. To learn about their programming efforts, which produce C-128 high-resolution comparable to that found on an IBM PC, turn to p. 34.

RUN is pleased to be able to bring you this exciting, heretofore undocumented information. Articles such as this help to keep *RUN* readers riding the wave of the Commodore computing industry.

db

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"The only other comparable product would be Lotus 1-2-3 for the IBM PC; nothing in the C64 world comes even close to the features of Vizastar."
AHOY July 85

"I found Vizastar would do anything Lotus 1-2-3 could, and then some. It's my Commodore choice to become the standard against which the others will be judged."
INFO 64 Magazine, Issue #7

"Vizastar is an exceptional package that rivals the features of programs such as Lotus 1-2-3 and offers C64 owners the kind of integrated software previously only available for higher-priced systems."
RUN Magazine, June 1985

"I scrutinized, tested and experimented with Vizastar extensively, but could find no weaknesses whatsoever. It is the most comprehensive, most flexible, most powerful and easiest to use integrated software package I've worked with."
Commodore Microcomputer, Sept/Oct 1985

"I use an IBM PC at work with Lotus 123. I feel Vizastar is just as good and in someways better than 1-2-3."
Steven Roberson, NC. End User

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

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

VIZAWRITE CLASSIC for C128

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

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

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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). RUN *will pay up to $50 for each trick accepted. Send your tricks to:*

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This season always brings a wave of new readers to Magic and to *RUN*. If you are one of them, we welcome you and invite you to become a regular. You're sure to find, as thousands have found, that Magic is a vital source of instruction, ideas and inspiration. In bringing these treasures to light, we never forget the newcomers, who need such guidance.

Nor do we forget the seasoned veterans, since they give us our best items and always appreciate a better way of doing things. They tell us, in fact, that many advances in computing are first presented in Magic. What all this means, of course, is that in the world of Commodore computing, the best ideas show up in Magic. And what that means, of course, is that if you have or need a great idea, the place to come is Magic.

$2A5 Funny Valentine—Can a computer program make you cry? Depending on your mood, it might. This one, for the C-64 or the C-128 in 64 mode, plays a bell-like rendition of this well-known bittersweet song.

```
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60 POKES+4,17:FORDL=1TOD*250:NEXT
70 POKES+4,0:FORDL=1TO45:NEXT:GOTO40
71 DATA 59,3,67,1,71,1,67,1,71,1,67,5
72 DATA 59,2,67,1,71,1,67,1,71,1,67,6
73 DATA 59,2,67,1,71,1,106,3,94,1,89,1
74 DATA 79,7,71,1,67,1,106,3,71,1,71,2
75 DATA 67,1,71,5,71,1,67,1,119,3,71,1
76 DATA 71,2,67,1,71,5,71,1,67,1,134,3
77 DATA 71,1,71,2,67,1,71,3,79,1,89,1
78 DATA 119,5,71,2,79,1,89,1,79,1,89,1
79 DATA 79,3,71,5,59,2,67,1,71,1,106,3
80 DATA 94,1,89,1,79,7,59,2,67,1,71,1
81 DATA 67,1,71,1,67,3,71,2,79,1,89,1
82 DATA 79,1,89,1,79,3,71,2,79,1,89,1
83 DATA 79,1,89,1,79,3,71,10,0,255
```

Joseph R. Charnetski
Dallas, PA

$2A6 Better video display—Don't forget your monitor's video controls, since their proper adjustment can make an amazing difference in your picture. When using my word processor, I turn the color control all the way down; by removing the color fringe around the letters, it makes things much easier on the eyes.

Lucy S. Terrier
Alton, IL

$2A7 Colorful Print Shop—Output from the popular Print Shop program can be brightened up by using colored marker pens. It's easy to color The Print Shop text and designs, and with the range of colors available in

Circle 2 on Reader Service card.

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Ahoy Magazine

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markers today, your creativity can be virtually unlimited. Give this idea a try the next time you do something with The Print Shop. It's extremely easy to do, and the results must be seen to be believed.

Roger Baillie
Kensington, PEI
Canada

$2A8 Modem buyer's guide—Unless you've used both of them at length, it's hard to know whether to buy a 300-baud modem or a more expensive 1200-baud unit. I worked at 300 baud for over a year, then upgraded to 1200. In my opinion, the speed and convenience of 1200 baud make the faster modem a significantly better investment for most people.

Although 300-baud units are tantalizingly inexpensive, they are s-l-o-w, and their slowness diminishes the value of the on-line experience. In many cases, operations that are great at 1200 baud are tedious and unpleasant at 300. If you start out at 300 baud, you might wrongly decide that on-line work is not your cup of tea.

Some on-line services (QuantumLink, for example) have uniform rates, regardless of the speed of your modem. In those cases, your connect-time savings can quickly offset the additional purchase cost of a 1200-baud modem. (Let's say you're downloading an interesting program. What takes ten minutes at 1200 baud takes 40 minutes at 300. Compare the savings in money and personal time, and you'll start to get the picture.) Also, if one day you want to sell your modem, you'll find more buyers and better prices if you're offering a 1200-baud unit.

When choosing your modem, you should also consider how it connects to the telephone system. Most modems connect directly to the phone line via a modular connector; modular cables and connectors are readily available at Radio Shack and elsewhere. Some modems connect, not to the phone line, but to the handset, via a smaller modular connector. If your telephone doesn't use such a connector (and many don't), you can't use these modems with it at all. Also, handset connectors and cables can be hard or impossible to find in stores.

The final means of connection, seldom seen these days, is acoustic coupling. Here, there's no wiring at all between the modem and the phone line. Instead, the telephone handset is placed in a cradle with rubber cups, and the tones are coupled acoustically. This is the least desirable method of connecting your modem.

The bottom line is this: Unless you can't afford it, start off with a 1200-baud modem. And regardless of which speed you choose, look for a modem that connects directly to the phone line, rather than to the handset.

Louis F. Sander
Pittsburgh, PA

$2A9 QuantumLink scrolling—Whenever text scrolls off the screen in QuantumLink, you can recall up to 85 lines of it at the press of a key. Just press the cursor-up key and watch the previous text scroll down from the top of the screen.

This feature is particularly useful when you're in an ongoing dialogue with other users, such as in the Conference Centers and in People Connection.

Al G. Bell
Boston, MA

$2AA C-128 slow listing—When you want to slow down a C-128 listing or other printout, just press the Commodore logo key. This performs the same function as pressing the CTRL key on the Commodore 64.

Robert B. Cook
Braintree, MA

$2AB C-128 bytes free—At power-up, the f8 function key activates the machine language monitor, which is a feature that most of us seldom use. I redefine that key to give me something more valuable—an instantaneous reading of the amount of remaining memory. Doing the magic is simple:

```
KEY 8, "?FRE(0)" + CHR$(13)
```

Gerhard Schilling
Hemet, CA

$2AC C-128 ESC key—There are several errors in the C-128 system guide's description of the escape sequences. On my machine, for example, ESC A activates Automatic Insert mode, while ESC C cancels it. ESC C does *not* cancel Quote mode, as stated in the manual.

ESC O is a powerful sequence that cancels Quote mode, RVS mode and the 80-column Flash (CTRL O) and Underline (CTRL B) modes. Contrary to the manual's description, ESC O does *not* cancel the Automatic Insert mode.

Be sure you use the proper technique with all escape sequences—first you press and release the ESC key, and then you press the others. It's totally different from using shift or CTRL, where the keys must be pressed at the same time.

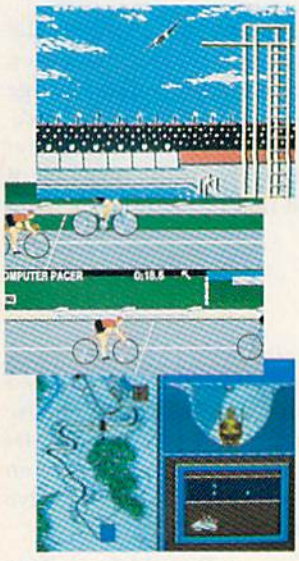
Jim Borden
Carlisle, PA

$2AD C-128 40/80 display key sense—This key's status can be detected by Peeking location 54533, then ANDing the result with 128. If the final result is zero, the key is depressed, or in the 80-column position. If the final result is 128, the key is released, or in the 40-column position.

Remember that the computer uses this key to set the display *only* when it is reset or when the stop/restore combination is pressed. Since ESC X can be used at any time to switch displays, the status of the 40/80 key cannot be used to tell which display is in use. With the Peek given above, it *can* be used as a handy push-on, push-off controller.

Ken Garber
Windsor, Ontario
Canada

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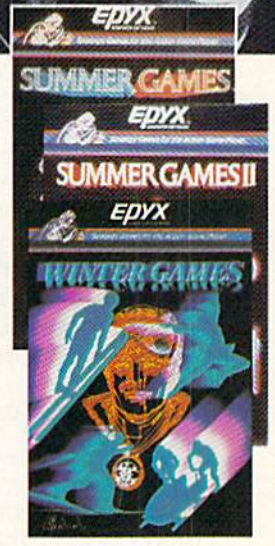
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$2AE C-128 tab stops—The manual doesn't give the whole story on setting and clearing tab stops. You can clear all tab stops by pressing and releasing the ESC key, then pressing and releasing Z. You can restore the default tab stops by using ESC Y in the way described above. You can set or clear a tab stop by moving your cursor to the desired position and pressing [SHIFT TAB] or [CTRL X].

Jerry W. Jarvis
Spokane, WA

$2AF Spritebusters—This sprightly sprite is out of sight! In white and red on any suitable background, he's *very* much worth seeing. Lines 10–90 are a multicolor version of the Sprite Demo program we've printed in our 1986 Special Issue. If you already have that program, just change line 60 to read as shown, add the sprite and watch that you don't get slimed.

```
10 REM MULTICOLOR SPRITEDEMO C-64 - LFS
20 POKE53281,16:PRINT"{SHFT CLR}{COMD 7}{4
   CRSR DNs}"
30 FORS=832TO894:READT:POKES,T:NEXT
40 V=53248:POKE2040,13:REM SPRITE AREA
50 POKEV+21,1:REM DISPLAY SPRITE
60 POKEV+28,1:POKEV+37,1:POKEV+38,2:POKEV+3
   9,2:REM MULTICOLOR SETUP
70 POKEV+1,60:REM Y POSITION
80 FORJ=1TO255:POKEV,J:NEXTJ:REM X POS
90 LIST
91 REM SPRITEBUSTERS - TIM WHITECOTTON
92 DATA 000,001,064,000,021,080,000,085
93 DATA 064,003,085,064,005,153,240,005
94 DATA 085,240,053,085,124,245,153,127
95 DATA 065,101,255,213,087,255,197,095
96 DATA 195,085,127,065,193,253,087,195
97 DATA 253,087,255,213,085,255,085,067
98 DATA 253,085,079,061,085,124,015,215
99 DATA 240,015,255,240,003,255,192,000
```

Tim Whitecotton
Manson, IA

$2B0 Racehorse—This program packs so much into a short space that we've waived Magic's usual limit of one screenful for the listing. Usable on the C-64 or on the C-128 in 64 mode, it shows an animated galloping racehorse, complete with jockey and sound effects. If you want to use the sprites elsewhere, they're presented in our normal form; each sprite corresponds to one position of the galloping horse.

```
10 PRINT"{SHFT CLR}{COMD 7}RACEHORSE - BOB/
   DAVE SNADER"
20 POKE53281,1:FORJ=832TO959:READK:POKEJ,K:
   NEXT:B=13:S=54296:V=53248
30 POKE2040,B:FORJ=0TO100:NEXT:POKEV+21,1:P
   OKEV+39,9:POKEV+1,150:POKEV,X:X=X+5
40 FORJ=5TO15STEP5:POKES,J:POKES,0:FORK=0TO
   50:NEXT:NEXT:IFX=255THENEND
50 B=14+(B=14):GOTO30
51 DATA 000,000,000,000,000,000,000,000
52 DATA 000,000,000,000,000,000,000,000
53 DATA 001,000,000,003,192,000,003,128
54 DATA 000,030,016,048,063,188,121,190
55 DATA 127,135,255,255,015,255,240,015
56 DATA 255,224,007,255,192,007,255,192
57 DATA 015,057,224,018,000,176,011,128
58 DATA 144,004,069,096,002,002,000,000
59 REM
60 DATA 000,000,000,000,000,000,000,000
61 DATA 000,000,000,000,000,000,000,000
62 DATA 002,000,000,007,128,000,007,000
63 DATA 000,030,016,048,063,188,249,190
64 DATA 127,007,255,255,015,255,240,015
65 DATA 255,224,007,255,192,007,255,192
66 DATA 015,057,224,028,000,216,054,001
67 DATA 160,065,000,016,128,000,008,000
```

Bob and David Snader
Baltimore, MD

$2B1 Easy SEQ file viewing—When I am writing programs that create sequential files, I often want to examine the files to find if they're being properly put together. I just use my Easy Script word processor and load the files as though they were regular Easy Script documents.

If I need to edit the file, I use Easy Script; then I save the file as I would any document.

Tom Kinsel
Sandusky, OH

$2B2 Reading the status variable—When working with disk files, it's useful to check ST, the computer's status variable, to determine when the end of file has been reached. If you're also checking for disk errors by reading channel 15, you must always make the error check after the status check. Disk error checking sets ST to 64, which is also the end-of-file value.

Keith W. Marshall
San Juan, Trinidad

$2B3 Disk drive speed adjustment—I adjusted the speed of my 1540 with the drive upside down. However, when I put it right-side up, there was a noticeable change in speed. Cure: While the drive was right-side up, I removed the necessary covers, then used a mirror to reflect the light onto the stroboscope pattern. In the absence of a fluorescent light source, I used the all-white light from my monitor screen.

Erkki I. Suikki
Vaasa, Finland

$2B4 Fast Load flakiness—This popular cartridge is a wonderful help in disk operations, but it tends to cause programming problems. If something unusual occurs with my Fast Load-equipped computer, especially when working with files or the printer, I can usually resolve the problem by disabling my Fast Load cartridge.

Donald E. Griffey
Hopkinsville, KY

Continued on p. 86.

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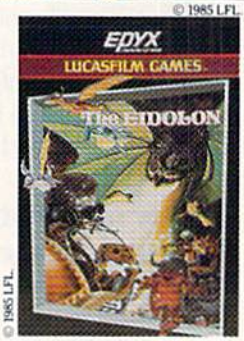
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	C64/128	ATARI	APPLE
The Eidolon	✓	✓	✓



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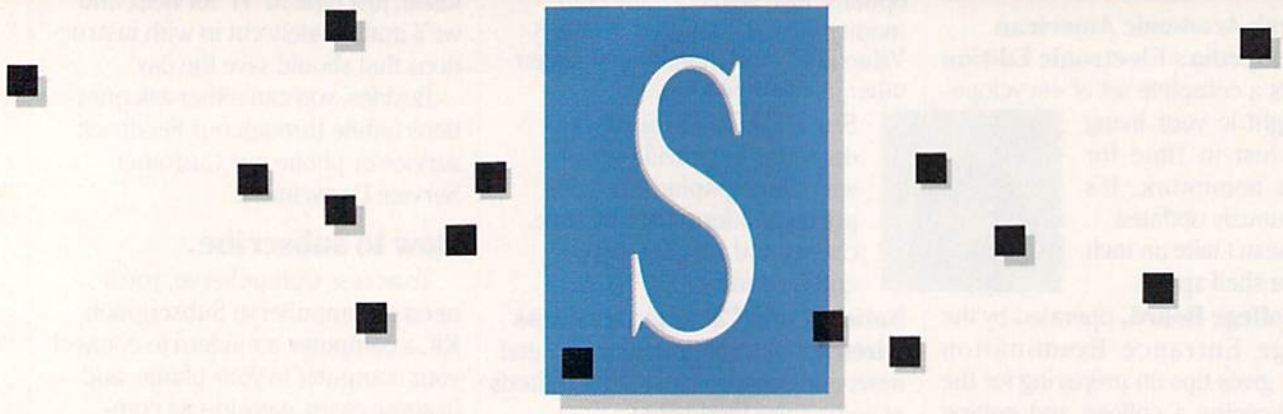
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Compiled by SUSAN TANONA

CalKit

A

A High-Powered Spreadsheet for the Novice and Expert Alike

CalKit is a spreadsheet package designed to solve problems. It goes beyond the average spreadsheet program by offering 20 ready-made applications worksheets, each supported by a sample version filled with data. Unlike so many other programs that leave you wondering what to do next, CalKit quickly gets you up and running.

This is a full-featured spreadsheet with superb documentation. It offers help screens, simple commands, a quick-reference card and complete editing capabilities. Moving around the spreadsheet is easy to accomplish with the cursor keys.

You can integrate information from your spreadsheet into Batteries Included's PaperClip word processor, and you can create an 80-column viewing screen with the company's BI-80 plug-in module.

Included on the disk is a useful single-drive backup program that lets you make copies of your system disk and any data disks you create with the program. The software is not copy-protected, because CalKit can only run with a special key (dongle) inserted into control port 1. So, any copies that you make of the program are truly for backup purposes only.

CalKit is compatible with any printer that connects through the serial port of your C-64 or that connects to the computer with an IEEE interface. Owners of non-Commodore printers must go through a setup routine to select the appropriate secondary address and the control characters you'd like sent to your printer. This may require some experimentation for your printer and interface combination, but this program is definitely worth the time involved.

Other features of this spreadsheet include insertion and deletion of columns and rows; global and block formatting of values into decimal, scientific or graphic modes; variable column widths; and the option to copy cell contents, either by the individual cell or by blocks of cells.

What really makes this program stand out are the ready-to-use, predesigned forms. Each form has a sample version and a blank version. There are forms for such uses as home budgeting, installment loans, starting a business, balancing your checkbook and monitoring your personal stock portfolio.

You simply use the sample form to get an idea of how it might be used, then switch to the blank form and start working. Or, you can change the blank form to suit your own particular application.

CalKit will probably encourage such users as homeowners, landscapers, teachers and students to enter the world of electronic spreadsheets, as the program offers example after example of how a spreadsheet can solve all kinds of problems.

CalKit is a high-powered program from a company that continues to demonstrate its commitment to bringing quality software to the Commodore market. *(Batteries Included, 30 Mural St., Richmond Hill, Ontario, Canada L4B 1B5. C-64/$49.95 disk.)*

Ken Silverstein
Raymond, NH

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!

Fast Tracks

A

Get Your Slot Cars Up Off the Floor And Onto the Computer

Is there really room for another computer construction program? By now there are enough of them

Circle 79 on Reader Service card.

A Printer For All Reasons

Search For The Best High Quality Graphic Printer

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

Our Objective Was Simple

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

The Results Are In

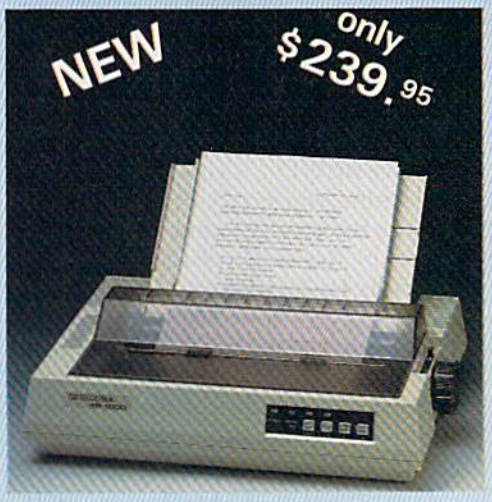
The search is over. We have reduced the field to a single printer that meets all our goals (and more). The printer is the SP-1000 from Seikosha, a division of Seiko (one of the foremost manufacturers in the world). We ran this printer through our battery of tests and it came out shining. This printer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

"NLQ" Mode

One of our highest concerns was about print quality and readability. The SP-1000 has a print mode termed Near Letter Quality printing (NLQ mode). This is where the SP-1000 outshines all the competition. Hands down! The character matrix in NLQ mode is a very dense 24 (horizontal) by 18 (vertical). This equates to 41,472 addressable dots per square inch. Now we're talking ***quality*** printing. It looks like it was done on a typewriter. You can even print graphics using the standard graphics symbols built into your computer. The results are the best we've ever seen. The only other printers currently available having resolution this high go for hundreds more.

Features That Won't Quit

With the SP-1000 your computer can now print 40, 48, 68, 80, 96, or 136 characters per line. You can print in ANY of 35 character styles including 13 double width and 3 reversed (white on black) styles. You not only have the standard Pica, Elite, Condensed and Italics, but also true Superscripts and Subscripts. Never again will you have to worry about how to print H_2O or X^2. This fantastic machine will do it automatically, through easy commands right from your keyboard. Do you sometimes want to emphasize a word? It's easy, just use **bold** (double strike) or use *italics* to make the words stand out. Or, if you wish to be even more emphatic, underline the words. You can combine many of these modes and styles to make the variation almost endless. Do you want to express something that you can't do with words? Use graphics with your text — even on the same line. You have variable line spacing of 1 line per inch to infinity (no space at all) and 143 other software selectable settings in between. You can control line spacing on a dot-by-dot basis. If you've ever had a letter or other document that was just a few lines too long to fit a page, you can see how handy this feature is. Simply reduce the line spacing slightly and ... VOILA! The letter now fits on one page.



Forms? Yes! Your Letterhead? Of Course!

Do you print forms? No problem. This unit will do them all. Any form up to 10 inches wide. The tractors are adjustable from 4 to 10 inches. Yes, you can also use single sheets. Plain typing paper, your letterhead, short memo forms, labels, anything you choose. Any size to 10" in width. In fact this unit is so advanced, it will load your paper automatically. Multiple copies? Absolutely! Use forms (up to 3 thick). Do you want to use spread sheets with many columns? Of course! Just go to condensed mode printing and print a full 136 columns wide. Forget expensive wide-carriage printers and changing to wide carriage paper. You can now do it all on a standard 8½" wide page, and you can do it quietly. The SP-1000 is rated at only 55 dB. This is quieter than any other impact dot matrix printer that we know of and is quieter than the average office background noise level.

Consistent Print Quality

Most printers have a ribbon cartridge or a single spool ribbon which gives nice dark printing when new, but quickly starts to fade. To keep the printers output looking consistently dark, the ribbons must be changed quite often. The SP-1000 solves this problem by using a wide (½") ribbon cartridge that will print thousands of pages before needing replacement. (When you finally do wear out your ribbon, replacement cost is only $11.00. Order *#2001.)*

The Best Part

When shopping for a printer with this quality and these features, you could expect to pay much more. *Not now!* We sell this fantastic printer for **only $239.95! You need absolutely nothing else to start printing — just add paper (single sheet or fanfold tractor).**

No Risk Offer

We give you a 2-week satisfaction guarantee. If you are not completely satisfied for any reason we will promptly refund your purchase. The warranty has now been extended to 2 years. The warranty repair policy is to repair or replace and reship to the buyer within 72 hours of receipt.

The Bottom Line

Be sure to specify the order # for the correct version printer designed for your computer.

Commodore C-64 & C-128, Order #2200, graphics interface & cable built in.

IBM-PC and compatibles, Order #2100, plus 8' shielded cable #1103, $26.00

Standard Parallel with 36 pin Centronics connector, Order #2400, no cable

Standard Serial with RS-232 (DB-25) Connector, Order #2500, no cable

We also have interfaces and cables for many other computers not listed. Call Customer Service at 805/987-2454 for details.

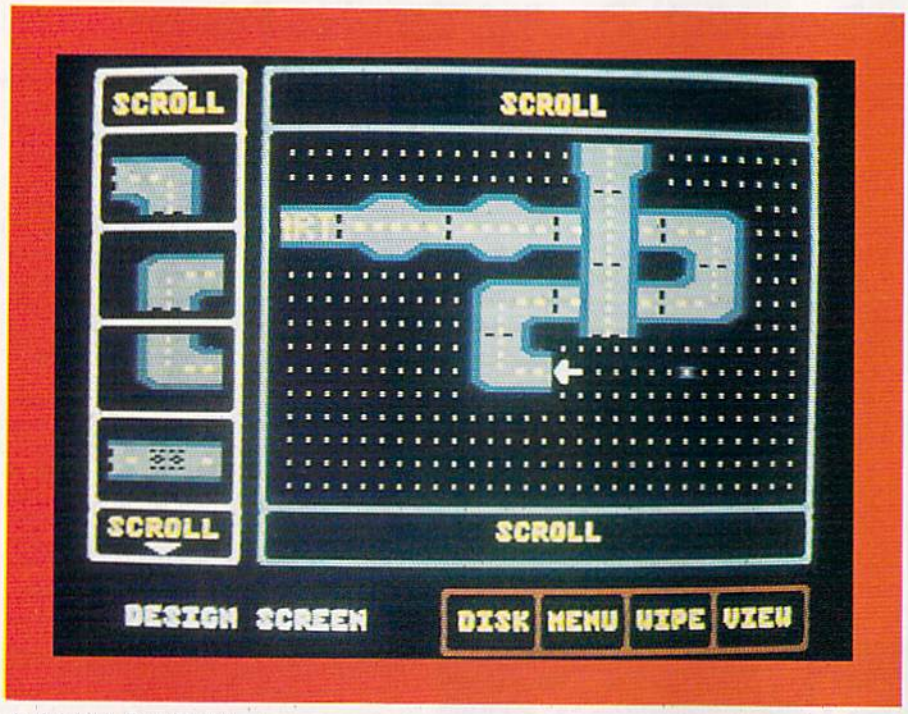
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Activision's Fast Tracks.

that they can be considered a category unto themselves.

Fast Tracks brings the construction syndrome to slot-car racing and is thus one of the most logical translations from real life to computers. (I mean, really, wouldn't you love to hit a turn at full speed and not have to chase your slot car halfway across the room?)

Fast Tracks first presents you with a selection of such track pieces as straightaways, curves and crossovers. If you can name it, it's probably here. The menu board runs down the left one-third of the screen, and scrolling action allows you to scan the sections until you find the one most likely to do you harm.

Obvious impossibilities, such as constructing 90-degree turns by placing two crossovers at right angles, are disallowed. Those of you who are really hell-bent upon slot-car suicide, take note.

Since you construct tracks that are much larger than the screen, the View option will show you your track in its entirety at any phase of the construction. Other options allow you to stretch a section to make longer straightaways or to erase sections that may seem too tame.

Now you're ready to race. You may choose to race on your track or on one of the six others included on the master disk. Once you've made your selection, you may take an overview of the track to get your bearings.

As in the construction phase, the track is larger than your monitor's screen. A very smooth and quick scrolling action keeps your car in view at all times, while other cars that you have passed (or that have passed you) will disappear now and then as they move to sections outside your view.

As with real slot-car racing, there is no need to steer your car. It does so by itself, leaving observers to believe you have incredible reflexes. Your real control comes in keeping to the center of the track, bumping other cars off the track and slowing down as you come to an oil slick or a particularly bad turn. Really bad turns will send your car skittering off the track (but, thankfully, not across the floor), costing you time.

Beating your own or someone else's time is the challenge. The difference is in hundredths of a second, measured by the real-time clock at the bottom of the screen.

Fast Tracks strives to be different and succeeds. Graphics, animation and sound are great and the play value is high. I recommend it for any age group—especially for those who have worn out the knees of their jeans chasing real slot cars across the carpet.

So, I'll have to say yes, there is room for another computer construction set, as long as the theme is original and as long as the quality of execution remains as high as in Fast Tracks. *(Activision, 2350 Bayshore Frontage Road, Mountain View, CA 94043. C-64/$29.95 disk.)*

Ervin Bobo
St. Peters, MO

Snowdrifts and Sunny Skies

Learn How Fronts and Barometric Pressure Affect the Weather

Snowdrifts and Sunny Skies is a charming way to learn about the weather. It is an arcade-style game that scores points based on how well you decipher weather clues to make accurate weather predictions. You use a joystick to dodge people, animals and other creatures as you search for data to guess tomorrow's weather.

You begin by grabbing keys from weather balloons without touching the balloons. You have to avoid dust devils, lightning and snowmen. A collision makes you drop a key. You need keys to gain entrance to rooms that contain essential weather information.

The doors of these rooms face a busy street full of moving objects. Getting through them without falling and losing all your keys is quite a challenge. As you move up the levels of difficulty, the sprite people move more quickly, and the time you're allowed on each screen decreases.

In the main hall, there are four doors that you can enter without a key: Window (today's weather picture); Predict (make your prediction); Exit (from the screen and round of play); and End (stop or restart). All the other doors need a key to be opened and offer such information as today's weather, pressure areas and fronts affecting today's weather, historical weather data for a partic-

Circle 3 on Reader Service card.

(No I.D. required for half-elves.)

When the Going Gets Tough, the Bard Goes Drinking.



And the going is tough in Skara Brae town. The evil wizard Mangar has cast an eternal winter spell. Monsters control the streets and dungeons beneath. Good citizens fear for their lives. What's worse, there's only one tavern left that serves wine.

But the Bard knows no fear. With his trusty harp and a few rowdy minstrel songs he claims are magic, the Bard is ready to boogie. All he needs is a band of loyal followers: a light-fingered rogue to find secret doors, a couple of fighters to bash heads, a conjurer to create weird allies, a magician for magic armor.

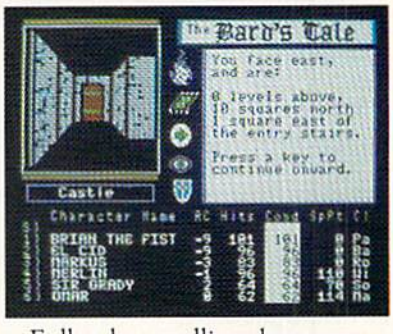
Then it's off to combat, as soon as the Bard finishes one more verse. Now what's a word that rhymes with "dead ogre?"



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Radarsoft's Maps 64 USA.

ular city and month, and weather folklore.

If you lose your keys in a collision before you can gather all the information you need, you simply make the best prediction you can and exit the hall. You predict the state of the weather—hurricane, snow, thunderstorm, rain, clouds or sun—and the temperature highs and lows. You earn points based on how close you come to an actual weather pattern in the city and month you chose.

Snowdrifts and Sunny Skies has several nice features. Your character can be male or female, light or dark colored. When several players compete, the program alternates the player who is first in each round, so position is not an advantage in the 12-round game.

This program is fun simply as a game, although it is not as action-packed as an arcade game. Its slower pace is easier for young children to handle. As educational software, it is effective and well-designed. You can learn a surprising amount about the weather as you play. With nine cities and 12 months to cover, the game has plenty of variety.

The scoring is based on actual weather history. While hurricanes and snow occur more frequently in the game than in nature, you nonetheless learn real relationships between the weather map and barometric pressure and how the weather behaves. These relationships easily transfer to understanding the evening weather report. Snowdrifts and Sunny Skies is a positive educational experience that's well worth buying for children 8 and older. *(Tri Micro, 14072 Stratton Way, Santa Ana, CA 92705. C-64/$14.95 disk.)*

Annette Hinshaw
Tulsa, OK

Maps 64 USA

B

Polish Your Geography Skills as You Explore The United States

Radarsoft's Maps 64 USA is an educational game designed to help you practice your geography skills. You locate American states, capitals, cities and geographical landmarks on accurately drawn high-resolution maps. One map shows the entire United States, and five other maps magnify various regions across the country.

The program gives you several ways to practice your knowledge. A helicopter game allows you to cruise around the country and look for different towns; and a search section lets you select cities for the program to hunt down.

The helicopter game combines the excitement of an arcade game with the repetition necessary to remember place names. You have to locate towns within a given time period. You can choose the skill level and time limit.

In the first level, you look for state capitals and large cities. In the higher rounds, the towns you must find are smaller and less well-known. State names can even be removed from the screen to make the game more challenging. Some cities will repeat during a round; this helps you remember where they are.

The quizzes in the program are like the familiar geography tests you probably had in school. You are shown a state, state capital, city or topographic feature, and you have to identify it. Your answers must be exact, or they'll be counted as wrong. If you answer incorrectly, the program will show you the right answer. At the end of the quiz, you get a score based on the percentage of questions you answered correctly.

The quizzes have a few bothersome features. The names of the geographical landmarks are inconsistent. For example, you must answer "St. Lawrence" for St. Lawrence River, but don't answer "Galveston" for Galveston Bay, or you'll be incorrect. Also, you are not able to set the skill level for these quizzes.

I found the city search quiz a little too difficult for younger children. It includes many small towns along with the large ones, and despite the detailed maps, it is sometimes difficult to distinguish between the towns.

The search section lets you look up the locations of more than 5000 places. My brother (a traveler and map collector) turned this section into a stump-the-software game. We were amazed by all the locations the program has on file. It found over a dozen small communities around Los Angeles alone!

Maps 64 USA, particularly the helicopter segment of the program, will provide you with a fun way to practice your geography skills. The program's flexibility and large library of place names make it ideal for students in grades four and up. Adults will also find Maps 64 USA a unique and challenging game.

Once you have found your way through America, Radarsoft has two

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Circle 93 on Reader Service card.

other map programs—Maps 64 Europe and Maps 64 World—so you can continue your explorations. *(Radarsoft, 655 John Muir Drive, E411, San Francisco, CA 94132. C-64/$39.50 disk.)*

Matthew Stern
Reseda, CA

Real Estate 64 C

Here's the Computer Version of a Classic Board Game

Why mess around with a good thing?

There are some things even modern technology can't improve upon. Game lovers—even those who fancy the computer variety—need only try Handic Software's Real Estate 64 to realize it is no substitute for Monopoly, the board game on which it's based. While the program does offer a few interesting variations on the original theme, I don't foresee it turning on gamers the way the Parker Brothers classic has.

If you've ever played the original board game, you know the basic rules and objectives of Handic's computerized version. The idea is to travel around a city, buying up pieces of property and developing them. The winner is the player who bankrupts all of his opponents, or the one who has the most cash and property when everyone decides to end the game.

Handic has adapted that premise for the C-64 program. Push a button and the computer rolls a couple of "video dice" for you, then moves your on-screen car through the streets of the city. Push another button to buy a piece of property. If it's already owned by an opponent, the computer automatically deducts the rent from your account. The computer keeps the players' turns in order.

The computer also keeps track of each player's net worth and possessions. Features of the original game, such as going to jail and drawing Community Chest or Chance cards, are also included in this version.

Pressing a key here and a key there allows you to mortgage a property, list one for auction, build on a property or see how much money and property has been accumulated.

Since Real Estate 64 is played using a computer, it offers some features the original board game does not. For example, you can instantly find out what you're worth and don't have to worry about being short-changed when making a transaction.

Another interesting feature is that you can play solitaire against as many as three computerized foes. (The game can be played by up to four human or computer players in any combination.)

An option that may appeal to some gamers is the opportunity to play Real Estate 64 in one of five languages (English, Swedish, Finnish, German or French). Instructions and property names appear in the language of your choice, except when there is a glitch in the program. In the English version, for example, a few property names appear in German.

By far the most intriguing option is the one that allows you to play your game on the streets of Stockholm, London, Atlantic City, Paris, Rome, Amsterdam, Helsinki or any other city you select. That's right, there's a provision that lets you create your own city with your choice of two utilities, four railroads and 22 streets. You can even save it for future games!

Unfortunately, computerization of this game brings with it some insurmountable problems. One is that everything operates from the C-64's keyboard. It's downright annoying having to switch places with the other players on every turn. Also, since all financial data appears on the screen, it's not possible to use old Monopoly ploys such as secretly amassing a fortune before moving in for the kill.

But perhaps Real Estate 64's biggest disadvantage in comparison to the board game is an aesthetic one. Monopoly is about capitalism and materialism, and those concepts manifest themselves in one's possessions.

In other words, having piles of money—even if it's play money—and a stack of property cards in your hands is at least half the fun of Monopoly. Real Estate 64 deprives you of the joy of flaunting a pile of deeds or fanning a thick wad of bills in an opponent's face.

If those things don't mean anything to you, or if you've never played the real thing (is there anyone who hasn't?), you may find playing Real Estate 64 richly rewarding. But if you're a materialistic, money-hungry slumlord at heart—as I am when it comes to Monopoly—then this game will probably leave your coffers empty. *(Handic Software, 400 Patterson Plank Road, Carlstadt, NJ 07072. C-64/$39.95 disk.)*

Scott Wasser
Wilkes-Barre, PA

The Whole Bit B

This Simple Yet Powerful Word Processor Offers a Lot Of Value for Your Money

The first thing you'll notice about The Whole Bit is that its plain plastic package contains no user's manual. Don't let that put you off. This newly released version of a long-overlooked word processor from Applied Technologies is part of a new approach to software marketing. Eliminating the manual has allowed the company to bring this software onto the market at a price reduction of almost 40 percent.

At first encounter, the program appears to be just another menu-driven word processor designed for ease of use.

If you're anxious to start writing immediately, you can jump right into this program. Even without instructions, The Whole Bit is very simple to use. In fact, it almost doesn't need a manual. You can enter, edit and print out text simply by relying on the easy-to-follow menus and four help screens. The program's default settings and simple commands allow short letters or notes to be composed and printed almost immediately.

If you find you do need the manual, you must simply put your new word processor to work printing the 36 pages of documentation that are included on the program disk. (Instructions for printing the manual are provided in a tiny six-page booklet that comes with the program.)

The Whole Bit's capabilities make it useful for small-business as well as home applications. It allows you to

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chain files without embedding special instructions at the end of each file, insert non-printing remarks within the text, create indented paragraphs and automatically align columns. The last two features are almost mandatory for creating reports or lists of numbers. A small but useful convenience is the ability to assign one or two frequently needed words or phrases to individual function keys.

The Whole Bit supports most of the popular printers and can be programmed with custom commands and initialization routines. Commands to call such printer options as subscripts and enhanced fonts are logical and easy to remember. The same command is used both to begin and terminate an option, cutting in half the number of commands you have to remember. The program also offers the welcome feature that allows you to print or preview any portion of the text held in the 20K RAM buffer.

While printer commands and remarks are embedded within your text, format instructions, such as margins, tabs, headers, footers and page numbering, are not. You enter these via the Print Options menu, and they need not be saved as part of the text file. This allows you a good deal of flexibility in recalling files for use in other documentation.

When text is written to a disk file, you have the option to save it with or without special format instructions. Files that include these instructions are designated master files, and a special symbol identifies them in the disk directory. (Unfortunately, there is no way of easily determining what special instructions are stored with a document.)

The black and gray display screen has a somewhat unusual appearance. Blank and forced spaces are displayed with a horizontal line between words or to the edge of the screen. Once you become used to these lines, the screen display seems logical and easy to use.

Text would be easier to proofread, however, if word wrap were built into the program. I also missed being able to switch from single to double spacing within a document. Instead of embedding a command within the text to set spacing, you must change a value in the Print Options menu.

Text is stored on your disk as a program file. While this is not uncommon, The Whole Bit also allows you to load any program file that is on the disk. This can lead to trouble, as accidentally loading a non-text file can crash the program.

Previewing the formatted output on an 80-column screen is accomplished with a slick scrolling system that even allows you to return to the top of a page that has already scrolled off of your 40-column screen.

Overall, this is an excellent word processor. Don't let the low price fool you. The Whole Bit is a high-powered package that's easy to begin using and hard to outgrow. *(Applied Technologies, Lyndon Way, Kittery, ME 03904. C-64/$24.95 disk.)*

John Premack
Lexington, MA

The Halley Project



Journey to Distant Planets, Orbiting Satellites and Your Local Library

Subtitled, "A Mission In Our Solar System," The Halley Project is actually ten missions that will take you to the outer reaches of our solar system and back. As you successfully complete each mission, you are advanced from an unranked pilot up to the level of Starbird. Only then do you receive your secret code number and become eligible to participate in the ultimate mission—The Halley Project.

You begin each mission by reading your flight instructions and blasting off from a secret installation on the comet Halley. Using the stars as your guide, you must pilot your spaceship to distant locations within the solar system. Sometimes your destination will be a specified, although little-known, moon, while other missions will send you to "any outer planet," or "a planet warmer than Earth."

Unless you are already an astronomy buff or don't mind spending hours cruising the solar system for a heavenly body that happens to fit the description, this is where you will have to do a little outside research. Fortunately, the program's "top secret" dossier, which also serves as your technical reference guide, includes several excellent sources of information on the solar system.

Once you determine exactly where a particular moon or planet is located, you will need your radar, star map and keen scrutiny through the ship's viewing screen to plot a course to your destination. The radar displays the location of the sun and all nine planets in relation to your ship, as well as the 12 constellations that are listed around the radar screen. By zooming in until the appropriate planet appears on the edge of the radar screen, you'll learn which direction to fly and your approximate distance from the planet.

Though the names of the 12 constellations will sound familiar to anyone who's ever read a horoscope, you'll probably have to check the star map to see exactly what the constellation looks like.

Perhaps even more difficult than finding a specific moon or planet is landing on its surface once you arrive. To land, you must pass within 100,000 kilometers of the surface while flying over an unmarked landing site. Like real planets, the celestial orbs in The Halley Project have both a light and dark side and are in constant motion, making a successful voyage and landing somewhat like hitting a moving target that's occasionally invisible.

Although both planets and moons are simply drawn as solid-colored spheres, the view from space is often surprisingly realistic. Against a backdrop of stars, planets smoothly evolve from tiny dots to huge globes, and individual moons slowly swing into view.

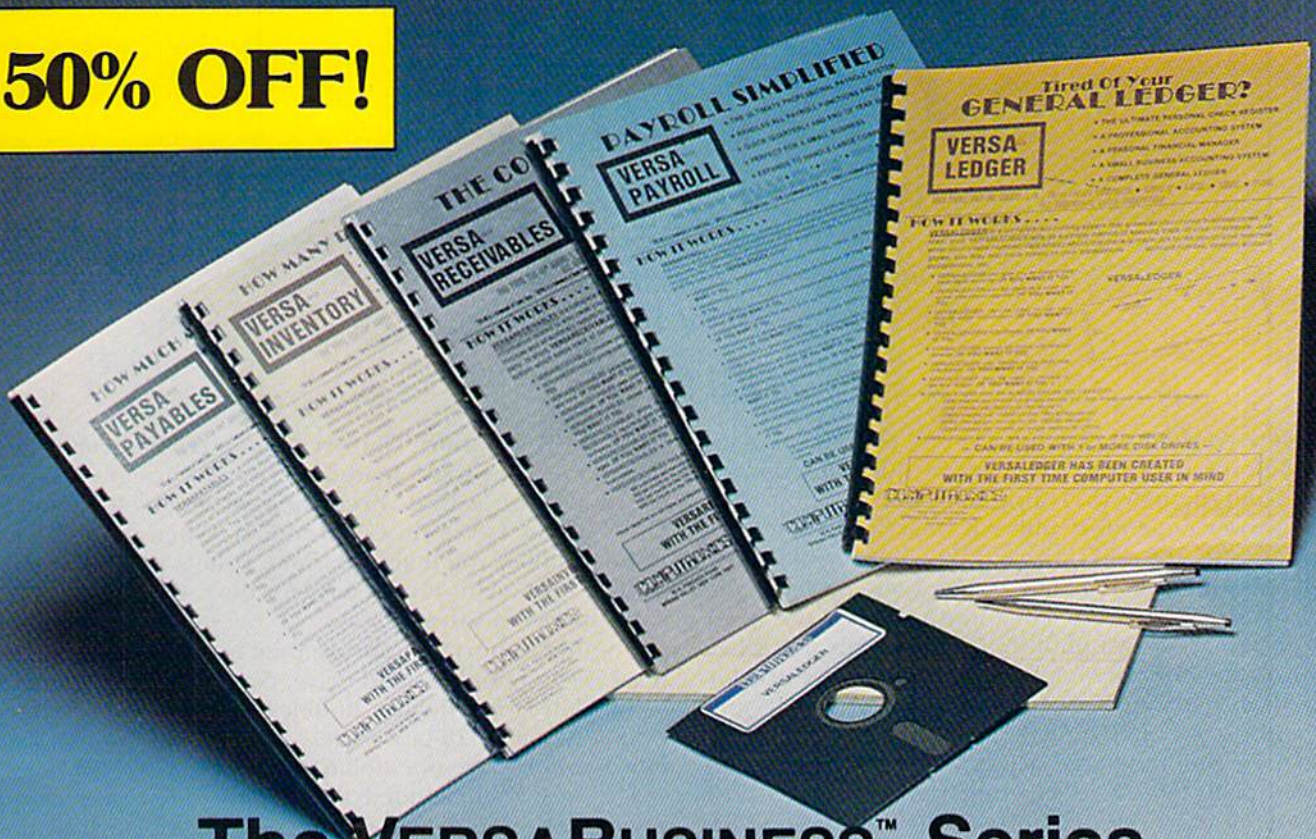
It is this beauty and realism that make all the research necessary to complete Halley's missions seem worthwhile. The Halley Project is an enjoyable tour of the solar system and the kind of software that could spark an interest in astronomy that will linger long after you've completed all ten missions. *(Mindscape, 3444 Dundee Road, Northbrook, IL 60062. C-64/$39.95 disk.)*

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Commodore's New Disk Drive

Meet the 1571. C-128 owners will find that Commodore's new disk drive offers some vast improvements—especially in speed and capacity—over the 1541. Here's an overview of what you can expect.

By JIM BORDEN

If you're considering buying a C-128, or simply buying a new disk drive for your Commodore, just what can you expect from the new 1571 disk drive?

The answer depends mainly on what computer you'll be using with the 1571 drive. With any Commodore computer, you'll immediately notice how much quieter this drive is. Gone is the solid stop to locate the head. It's been replaced by a photocell. This means that when copy-protected software is loaded, you won't have to listen to the head banging into the stop and worry that your drive will go out of alignment.

The drive's motor starts each time a disk is inserted or removed. (This takes a little getting used to.) The purpose of this is to allow the disk to better center itself as the drive shaft is moved into the center hole. The result is less wear and tear on the center hole and longer disk life. Another possible result is more reliable disk read/write operations. If the center hole were to become slightly elongated, you might begin to experience problems with the disk.

It is safe to remove the disk any time the *green* light is off, even if the motor is running. And no, I don't know why Commodore decided to change the color of the power and busy lights. Red is now the power light and green is the busy light.

Another nice feature is the DIP switch that's located on the back of the 1571; it allows you to set the drive's device number from 8 to 11. This is far better than changing the device number via software, which lasts only until the drive is turned off, or via hardware, which involved cutting the pad in the 1541.

Some Improvements

Unless you'll be using a C-128, those are the only changes you can expect from the 1571. If you have, or plan to buy, a C-128, however, you'll find the 1571 to be a great improvement over the 1541.

The major improvement involves speed. Table 1 compares the time required for various operations on the 1541 with a C-64, and the 1571 with a C-128 in C-128 mode. (The C-64/1571 combination performed nearly the same as the 1541.) These times were found using a 54-block Basic program. The last column (1541 format) surprised me. This was a load or verify of a program saved by a C-64 with a 1541. Even these programs load much faster on the C-128 (in C-128 mode). When the C-128 is in C-64 mode, you'll get the same results as if you were using a 1541. (This is necessary for the C-64 mode to load copy-protected software.)

Another important improvement in C-128 mode is that the 1571 is a double-sided drive. For this reason, I advise using only good quality double-sided disks. A double-sided disk has 1328 blocks free—do you want to risk that much data to save one dollar per disk?

The terms single-sided and double-sided may cause some confusion. A true double-sided drive (such as the 1571) has two heads to allow reading/writing on both sides of the disk without flipping it. The 1541 is a single-sided drive, since it can only write to one side of a disk. If you do use the other side of a disk by flipping it, you should be very careful with the 1571. Although it cannot read the flip side, it will, when in C-128 mode, format both sides of *any* disk. For this reason, you might want to copy any data on the flip side of your disks onto double-sided 1571 disks. Then store the original disk as a backup. (You cannot read the second side of a 1571 disk with a 1541 or a C-64.)

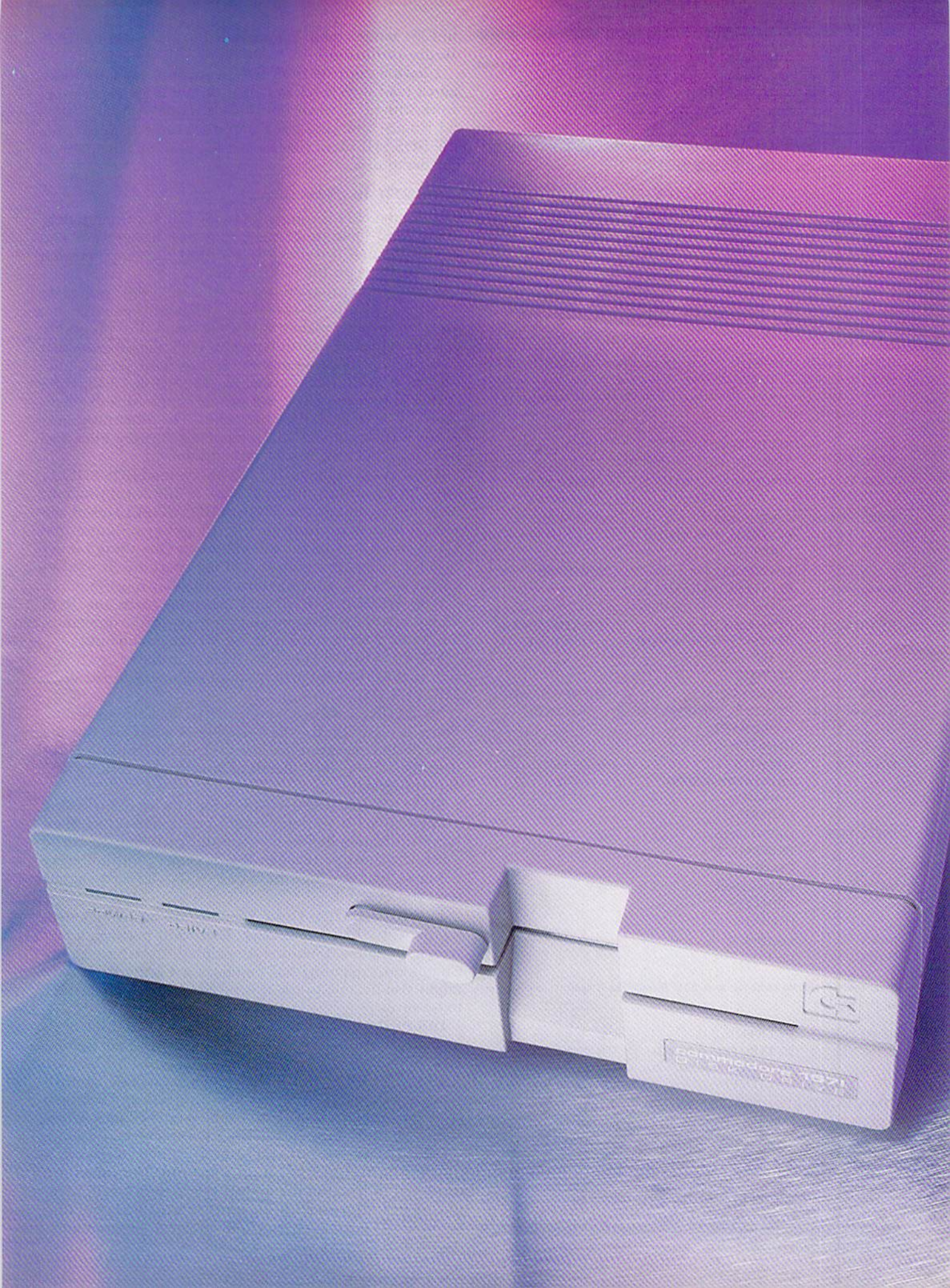
The 1571 User's Guide

The *Commodore 1571 Disk Drive User's Guide* is an improvement over the 1541's manual. It is well organized and in a logical order. You are told how (and why) to format a disk as soon as you've connected the drive to your computer.

There are, however, two additions I'd like to see to the manual. First, an index would be handy, especially for the beginner.

The second oversight by Commodore is the lack of reference to the C-64 Wedge. Maybe Commodore doesn't expect you to use Basic 2.0 for disk commands. The only useful reference made to the wedge is in the "How to Use" file on the demo disk. This file only explains how to read the directory and how to load a program, and even these aren't covered very well. In case you're working

Photograph by Ed Judice



Command	1541/C-64	1571/C-128	1541 Format
Save	41 sec.	33 sec.	(n/a)
Load	37 sec.	4.5 sec.	8.5 sec.
Verify	37 sec.	4.5 sec.	8.5 sec.

Table 1. *Comparisons of time requirements for various operations on the C-64 with the 1541 and on the C-128 with the 1571.*

COMMAND	WITH BASIC	WITH DOS WEDGE
LOAD (Basic Programs)	LOAD"PROG. NAME",8	/PROG. NAME
LOAD (ML Programs)	LOAD"PROG. NAME",8,1	%PROG. NAME
LOAD & RUN (Basic)	LOAD"PROG. NAME",8 RUN	↑PROG. NAME

NOTE: The above commands can be used with the directory by listing the directory (@$) and typing the correct character in the first column (over the blocks number). You do not have to delete any of the quotes, etc. Just hit the return key after typing the proper character.

SAVE	SAVE"PROG. NAME",8	←PROG. NAME
REPLACE	SAVE"@0:PROG. NAME",8	←@0:PROG. NAME
VERIFY	VERIFY"PROG. NAME",8	VERIFY"PROG. NAME",8
FORMAT (new)	OPEN15,8,15 PRINT#15,"N0:NAME,ID" CLOSE15	@N0:NAME,ID
FORMAT (Clear Dir)	OPEN15,8,15 PRINT#15,"N0:NAME" CLOSE15	@N0:NAME
RENAME	OPEN#15,8,15 PRINT#15,"R0:NEWNAME=OLDNAME" CLOSE15	@R:NEWNAME=OLDNAME
COPY (On same disk)	OPEN#15,8,15 PRINT#15,"C0:NEWNAME=OLDNAME" CLOSE15	@C:NEWNAME=OLDNAME
SCRATCH	OPEN15,8,15 PRINT#15,"S0:PROG. NAME" CLOSE15	@S0:PROG. NAME
INITIALIZE	OPEN15,8,15 PRINT#15,"I" CLOSE15	@I
VALIDATE	OPEN15,8,15 PRINT#15,"V" CLOSE15	@V
READ DIRECTORY	LOAD"$",8 LIST	@$

Note: You may tap the space bar to stop the listing. Tap it again to continue (or hit the stop key).

READ ERROR CHANNEL	10 OPEN15,8,15 20 INPUT#15,A,B$,C,D 30 PRINTA;B$;C;D 40 CLOSE15	@ @#9 (for drive #9)

CHANGE DEFAULT DRIVE FOR WEDGE.

NOTE: You can use a DOS Wedge command within a Basic program by typing the '@' and enclosing the command within quotes. Example: 10 @"I0:":REM INITIALIZE DRIVE

Table 2. *64 mode DOS Wedge commands.*

in C-64 mode, Table 2 is included to show you the DOS Wedge commands.

I have a copy of DOS 5.1 on each of my C-64 disks, and I load it as soon as I turn on my C-64. I still won't work without it when I'm in C-64 mode! Although DOS 5.1 is a machine language program, it can be copied using the DOS SHELL or SD.COPY.C64, both of which are on the demo disk.

The 1571 Test/Demo Disk

Since the 1571 is compatible with so many Commodore computers, some programs on the disk have several versions. The first two files ("HOW TO USE") explain what the programs on the disk can do.

Some of the programs are very useful, while others do nothing that one or two Basic commands couldn't do. Here are brief explanations of the demo disk programs.

DOS SHELL (C-128 only)—This is a large program that contains ten subprograms. Several of these seem a little silly, such as Run a Program, Format a Disk, Clean Up a Disk and Rename Files, and can be replaced with single Basic 7.0 or DOS Wedge commands. The other programs (Copy a Disk, Copy Files, Delete Files, Restore Files and Reorder Directory) can be quite useful.

The manual suggests that you always load DOS SHELL, but I don't bother unless I want to use a subprogram from the second group. To load DOS SHELL, insert the disk in your drive (with the drive's power on), reset the C-128 and the program will autoboot. One thing I don't care for in this program is that the space bar is used to enter your selection; the return key is much more familiar.

C-64 WEDGE (C-64)—This program loads the DOS Wedge (DOS 5.1) into memory for easy disk commands. See Table 2 for a full list of the Wedge commands.

VIC-20 WEDGE (VIC-20)—This is a scaled-down version of the C-64 Wedge (a result of the unexpanded VIC's 3.5K of RAM).

SD.BACKUP.##—A single drive backup program. There is a version for the C-16, Plus/4 and C-64. Use the DOS SHELL program for the C-128. Always put a cover over the write-protect notch of your source disk for any copy program!

SD.COPY.C64 (C-64)—Copy a file or a list of files using a single drive. If you only want to copy one or two files, know the names before you run this program. To create a list, you must go through the directory and find every filename that matches the name (with wild-card characters) you entered.

PRINT.##.UTIL—Three versions are again included, for the C-16, Plus/4 and C-64. These will perform a text screen dump to a Commodore printer. If you have a non-Commodore printer that emulates a Commodore, you might also be able to use this program. Try your printer to be sure.

DIR PRINT (all)—This is a program to print directories of disks. It would not print anything on my Star Gemini 10X printer.

DIR SQUEEZE (all)—This program will remove scratched filenames from the disk directory and will then close up any blank spaces left by the scratched files. There is also an option to alphabetize the directory.

DISK-DUMP (all)—If you've ever wanted to look at a file byte by byte, this program is for you. The values are displayed in hex, but the addresses are in decimal. I feel that all hex would have been easier to work with, but that could be because I'm a machine language programmer.

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Tournament Golf (D)	19	Seven Cities Gold (D)	24	Perfect Score SAT (D)	49
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Stealth (D)	21	Sargon 3 (D)	33	**SUBLOGIC**	
DATASOFT		**INFOCOM**		Flight Simulator 2 (D)	36
Alternate Reality (D)	28	Enchanter (D)	23	**TIMEWORKS**	
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Conan Barbarian (D)	19	Infidel (D)	23	Swiftcalc/ Sideways (D)	
Elevator Action (D)	19	Planetfall (D)	23	Wordwriter/Speller (D)	33
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UNSCRATCH—You just scratched a file and realized it was the only copy you had. That's no problem if you just set that disk aside and load this program. Put the other disk back in and run the UNSCRATCH program. For it to work, you must know what kind of file was scratched. This can be a real life saver!

LOAD ADDRESS (all)—This program allows you to change the load address of a program or find the SYS address for a machine language program. The address must be entered in decimal.

FILE.DEMO (all)—These two programs demonstrate the basic ideas of relative and sequential files. Both programs contain REM statements to guide you through them. Remember to save these programs to a disk without the write-protect notch covered; otherwise, a disk error will result.

SEQ LISTER (all)—You can use this program to read word processing or any other sequential files from disk. One problem you might find is that control characters are also printed on the screen. This may cause color changes or other strange things to happen. The program simply dumps the data to the screen, so if a word is too long, it continues on the next line (there's no word-wrap feature). This is still easier than loading a word processor in order to look at a file or two.

DATAMAKER.## (C-64, C-16 and Plus/4)—If you need to convert a machine language program into Data statements, first load your machine language program and then run the DATAMAKER program for your computer.

HEADER CHANGE (all)—Perhaps you have a disk that you named long ago and now realize that another name would describe it better. With this program, you are able to rename the disk without changing anything else on the disk.

64.AUTOSTART (C-64)—Create a new program that will automatically run the original program. This will be handy for machine language programs. By converting the original ML program to an auto-start program, you'll never forget the SYS address required for the original ML program, as it runs automatically. (This is not the same as the AUTOBOOT MAKER for the C-128; that program boots a program, while this one requires you to specify the program to load.)

PRINTER TEST (all)—Test your Commodore printer with this program to see if all the characters are printed properly.

FORMAT DISK (all)—If you are a beginner and don't know how to format a disk, this program will do the job for you. (Read your user's guide to find how to format on your computer.)

AUTOBOOT MAKER (C-128)—You can have one autoboot program on any disk you use with the C-128. This program will set up an autoboot function for the program you specify.

Well, there you have it. If you have a C-128, I think you'll enjoy the 1571's added features and speed. R

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



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Hitchhiker's Guide to the Galaxy (INFOCOM)	?	70 sec	70 sec*	**	68 sec*
On-field Football (GAMESTAR)	?	159 sec	66 sec	63 sec	56 sec
EASY FINANCE I (COMMODORE)	?	58 sec	13 sec	13 sec	11 sec

* = Will not fast load — defaulted back to regular load
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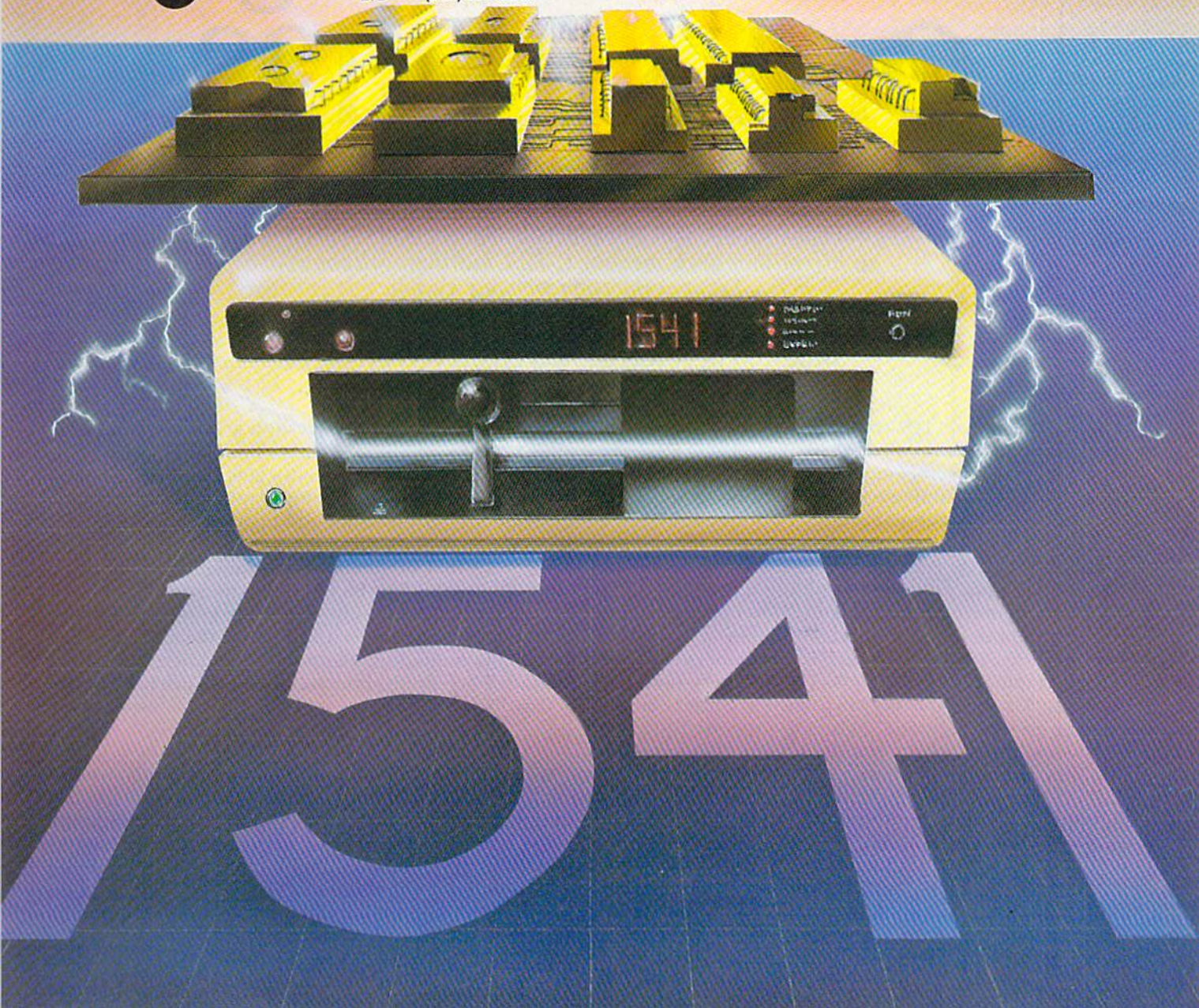
*Requires Shadow



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Ultra Hi-Res Graphics— A Breakthrough On Your C-128

They said it couldn't be done. But this article proves them wrong. Not only can you generate high-resolution graphics in 80-column mode on your C-128, but these graphics rival that of the IBM PC and Amiga.

By LOUIS R. WALLACE and DAVID P. DARUS

The Commodore 128 computer is a remarkable machine. It contains one of the best Basic languages ever included with a microcomputer, has 128K of RAM and is expandable. It supports high-resolution graphics in Composite mode. It contains both a working C-64 and a Z-80 CP/M computer, has a great keyboard and a beautiful 80-column display. Perhaps best of all, it's inexpensive. What more could you want?

The 80-column screen on the C-128 is also a welcome blessing to those of us who find 40 columns a limitation. This new 80-column capability is made possible by a second graphics chip, the 8563. This is a very powerful device, making possible the crisp, clear, color text on the C-128 in 80-column mode. This chip provides 640 × 200 resolution instead of the standard 320 × 200 resolution that is available in 40-column mode.

There's a lot of mystery surrounding the C-128's graphics capabilities, and many of you must have a lot of questions. This article is meant to dispel them.

First and foremost, the question arises about bit-mapping, or hi-res graphics. Since the 80-column text is made possible by a resolution of 640 × 200, many of us hoped that we'd be able to use that for graphics. However, Basic 7.0 contains no provision for high-resolution graphics using the 80-column display.

We were told originally that we might be able to do some elementary graphics via custom characters on the 80-column screen, but not true hi-res graphics.

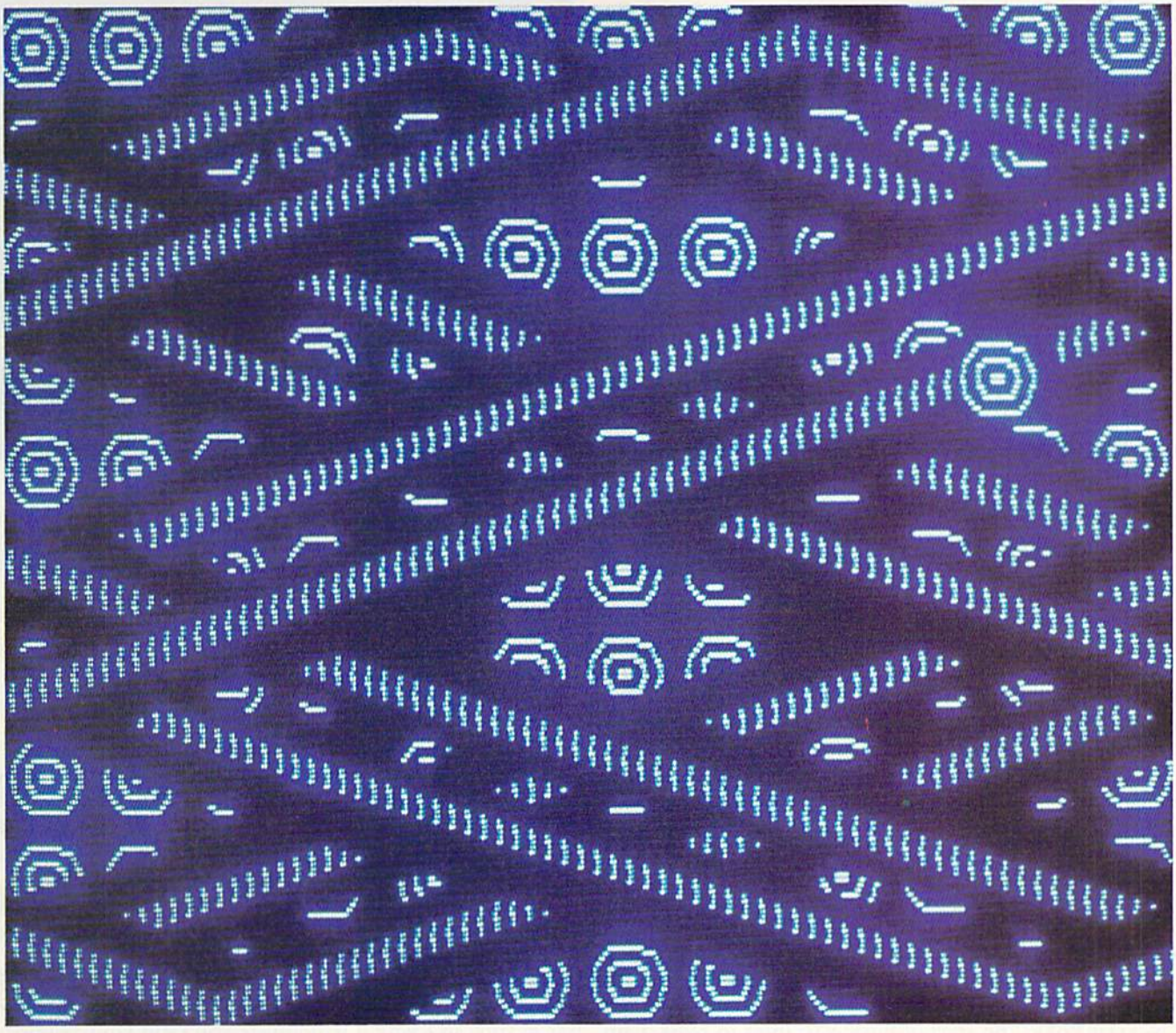
Also, the technical specifications for the 8563 state that it has only limited bit-mapping capabilities. This, more than anything, fired our interest in seeing just how limited it actually is.

Good News

We are pleased to announce that our research has led to the discovery that *yes*, it is possible to use the 640 × 200 screen in Bit Map mode! This means that in Composite mode, you can have twice the resolution of the C-64 or

RUN It Right

C-128 (in 80-column mode); disk drive



C-128. And since it is an RGB display, the graphics are crisper and cleaner than ever. In case you're interested, 640 × 200 is equivalent to the resolution available on the IBM PC and the Amiga (in Non-Interlaced mode).

The 8563 has a special 16K RAM area completely separated from the normal system RAM, so no user RAM is needed for the display. However, because of this, trying to communicate with the chip is very difficult. In fact, there are only two addresses in the whole C-128 memory map that have any effect on the chip at all. These registers, $D600 (54784) and $D601 (54785), serve as a window from which you may address the chip registers and its 16K RAM bank.

The first address, $D600, is the 8563 register-select byte; the second, $D601, is the 8563 data I/O byte. To access the chip, you must put into $D600 the chip register number you want to read or write to, wait until the chip is ready, and then Peek or Poke into $D601 the value you want. It is quite a bottleneck, effectively precluding any usable hi-res graphics using Peeks or Pokes from Basic. But from machine language it's a different story.

We have created a set of machine language commands that are wedged into the C-128 to take advantage of its 640 × 200 graphics power. These will give you a very powerful command set that works with Basic 7.0 and allows you to use these new graphics freely.

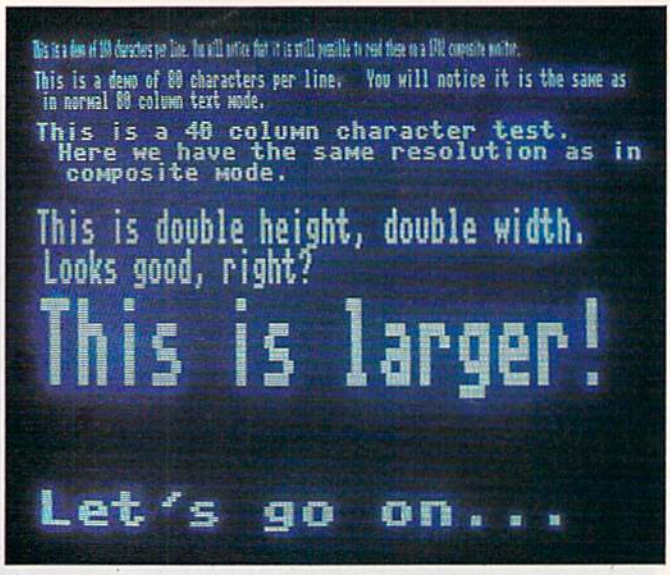
There are 14 new commands (see Table 1), most of which are used to work with the 640 × 200 display. One, @FONT, is a special command—for 80-column Text mode only—that allows you to download new character sets from system RAM to the 80-column chip RAM. Since the 80-column text screen allows for two complete character fonts at once, you can use @FONT for some very interesting text displays.

Accompanying Programs

Included with this article are several programs. The first is called C-128 Ultra Hi-Res. It is a Basic loader

```
@FONT,Char Set #,RAM Address
@TEXT
@GRAPHIC,BC,FC
@CLR,Value
@DOT,X,Y,Mode
@DRAW,X1,Y1,X2,Y2,Mode
@BOX,X1,Y1,X2,Y2,Mode
@BAR,X,Y,dX,dY,Ht,Mode
@SAVE,Type,"filename"
@LOAD,Type,"filename"
@CHAR,Charset Address,X,Y,Ht,Width,"string"
@COPY,SX,SY,dX,dY,Destination X,Destination Y
@STASH,Buffer Address,X,Y,dX,dY
@FETCH,Buffer Address,X,Y
```

Table 1. *C-128 Ultra Hi-Res command set.*



program that will Poke the machine language into memory for you and save the program as a small machine language module called Ultra Hi-Res, which you can easily load into memory.

The second program is called Ultra Hi-Res Boot and should be used to load the Ultra Hi-Res machine language module and set up the computer for its use. You should run it only once, as Ultra Hi-Res creates some tables that cannot be written over. The best method is to use the C-128's autoboot feature and create an autoboot disk that loads and runs Ultra Hi-Res Boot for you. This boot performs several functions. First, it issues a

```
GRAPHIC 1,1:GRAPHIC 5
```

command. This is the only time you should use the normal Graphic command. It allocates a 9K area in the computer to be used for composite hi-res graphics. Since you're going to be using the new Ultra Hi-Res mode, this area can now be used to hold the machine language commands in the wedge.

Next, it Pokes the start-of-Basic variables in bank 1 up 16K, giving you a 16K RAM buffer for the @STASH command.

It then loads the Ultra Hi-Res machine language module and activates it with SYS 8448. At this point, you now have the wedge active.

The third program is called Program Setup and is intended as a base from which you can start writing your own programs.

It begins by going into Fast mode. One of the nice features about the 80-column chip is that you can use the Fast command to allow the computer to run at 2 MHz instead of 1 MHz, and the screen display is always visible. (In Composite mode, the screen goes blank during Fast mode.)

Next, it issues the Poke to set up the 16K buffer for @Stash (see @Stash later in this article for information about increasing or decreasing the buffer). The new @Graphic command is issued next, going to Ultra Hi-Res mode and setting up background and foreground colors.

Line 50 issues the @CLR command with a value of 0, which will clear the 640 × 200 bit-map display, and line 60 sets up the Basic 7.0 Trap command. This is very important because, in case of a Syntax error or program crashing, it will instruct the computer to go to the line following the Trap instruction. Here it goes to line 10010, which gets you out of Ultra Hi-Res mode, prints the line that has the problem (with the Help command) and ends the program. Even pressing the stop key is handled by the Trap statement. It is highly recommended that you include the Trap statement in your programs.

The Demo Programs

Next are five short demo programs that use various forms of the new command set. The first is an example of the versatility of the @CHAR command, which allows many different sizes of text (and many different styles) all at once. It even has a special form that will give you 160 columns on one line! Imagine the possibilities!

The second demo program is a simple line-drawing demo that creates a very interesting graphics effect called a *moire* pattern. It looks very good in 640 × 200.

The third demo is one that uses the 3-D Bar command. This command allows you to create three-dimensional bar graphs so easily it will amaze you (and your friends)!

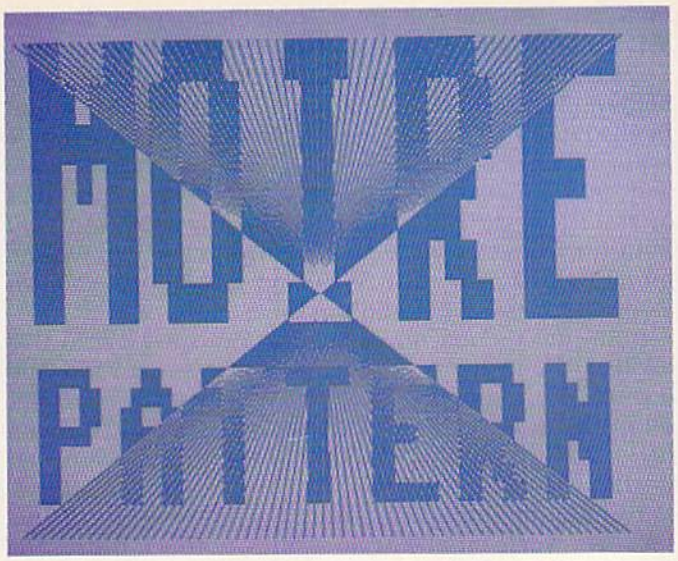
The fourth demo uses Basic to create circles, and the circle routine could very easily be modified for use as a general-purpose subroutine. After the circles are drawn it uses the @Copy command to duplicate them, and then uses the @Stash and @Fetch commands to create a form of animation called *Blitters*. That's right, the C-128 now has blitter graphics capabilities. (Blitters are a form of high-speed bit-map transfers, often mentioned in reference to Commodore's new Amiga computer.)

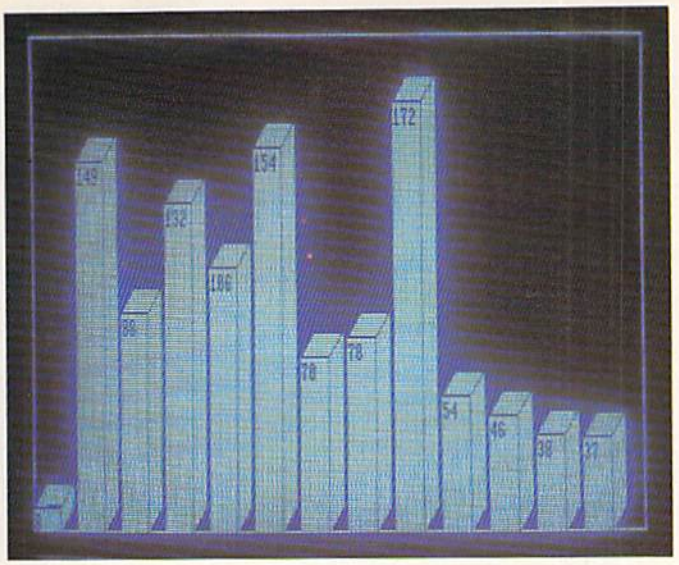
The last demo is an impressive demonstration of the power of the new commands. It creates a fully animated demonstration of a three-dimensional cube rotating and changing size in real time. It uses the @Stash and @Fetch commands (and a 32K @Stash buffer) to create a small movie. After seeing this, you'll probably be highly motivated to begin using these new Basic commands on your C-128.

The C-128's Memory

The memory organization of the C-128 is a very complex subject, and we cannot go into it in detail in this article. However, you need some information to use the Ultra Hi-Res command set effectively.

In an unexpanded C-128 there are two banks of RAM,





bank 0 and bank 1. Bank 0 is where your Basic program resides, and bank 1 is where your variables are stored. When you enable the normal composite bit-map graphics display with the

```
GRAPHIC 1,1
```

statement, the C-128 moves your program in bank 0 up 9K to make room for the graphics screen and its color memory. That's why the Ultra Hi-Res Boot program issues it as its first statement.

This area can now be used to store the machine language program that gives you Ultra Hi-Res mode. If you were to use that area again in a program while in Ultra Hi-Res mode, it would erase the whole program and crash the computer.

This is also true of graphic multicolor composite Bit Map mode, which you should never use in your programs while Ultra Hi-Res is enabled. The same thing is true of the Graphic CLR command, which de-allocates the 9K, making it available for Basic. And the SCNCLR command should never be used, for the same reasons as the Graphic command.

Bank 1 contains about 64K to be used for variables. Registers 47 and 48 contain the address for the start-of-Basic variables. The normal value for 47 is 0; for 48, it's 4 (this is the address $0400 in hex and 1024 in decimal). Everything above that is used for variables. But by Poking a larger value in register 48, followed by the Basic CLR command, you can trick the C-128 into giving you some extra RAM that you can use in your programs. The Ultra Hi-Res Boot program, for example, automatically sets up an extra 16K buffer in line 20 with

```
POKE47,0:POKE48,68:CLR
```

You can increase or decrease this buffer by changing the contents of register 48. (Be careful not to make it less than 4!) If your program will be using a lot of variables and won't be using the @Stash and @Fetch commands, you won't need a buffer area. In this case, you might want that RAM to be used strictly for variables, so start off your program base with the line:

```
POKE47,0:POKE48,4:CLR
```

However, some programs (such as the 3-D cube demo) require even more RAM in their buffer, so you will have to increase the size by Poking to register 47 and 48.

```
POKE47,0:POKE48,132:CLR
```

This provides you with a 32K buffer in which to store graphics. However, you've now cut your variable RAM in half. You will have to decide if you need to change it. In most cases, the default of 16K will be sufficient.

One more point. The screen resolution (640 × 200) calculates to 128,000 bits, or 16K of RAM. That's exactly the amount of RAM available to the 8563 chip, and does not leave any RAM for 80-column Text mode. If you need to use the Text mode and have an important screen in Hi-Res mode, you will have to save that screen (to disk, using the @Save command, or in the @Stash buffer), go to Text mode with the @Text command, perform your needed function, return to Ultra Hi-Res mode with the @Graphic command and restore your screen from the buffer or disk.

When would you need to do this? One time might be when you need to input some value from the keyboard while the program is running. The Input command prints a question mark on the text screen. In Ultra Hi-Res mode, however, there's no RAM left for the 80-column text screen, so the operating system would corrupt your Ultra Hi-Res program with the question mark. Therefore, use the GETKEY in place of the Input command, unless you toggle back to Text mode.

C-128 Ultra Hi-Res Commands

After you have successfully activated the C-128 Ultra Hi-Res program, the following commands are available to you in addition to all of Basic 7.0 (except those graphics previously mentioned).

@FONT,character set #,RAM Address. This command allows you to display (in 80-column Text mode) character fonts other than those offered by the default character set. There is room in the 8563 RAM for two sets, and they are normally the uppercase/graphics and the lowercase/uppercase sets. If you have access to other fonts that you wish to use, simply load them using the BLoad command, to some area of RAM in bank 0 (in Direct or Program mode) and issue the @Font command. There is 3K available for this, from 12992 to 16383. The Char Set # is either 0 or 1, and the RAM address is where BLoad placed the character set. You can change character fonts by pressing the shift key with the Commodore key or by printing CHR$(14) or CHR$(142).

@GRAPHIC,BC,FC. This turns on the 640 × 200 Bit Map mode. BC is background color and FC is foreground



color. When you're in Ultra Hi-Res mode, you are limited to two colors, and this command lets you choose them.

@TEXT. This turns off the Ultra Hi-Res mode and returns you to the normal 80-column text screen. You also return to the standard character font, so you'll have to issue the @Font command to re-enable any extra text fonts you want.

@CLR,value. This is used to clear the Ultra Hi-Res screen. Use a value of 0 to clear it and a value of 255 to fill it. Others can be used for special effects.

@DOT,X,Y,mode. This is used to plot a dot on the 640 × 200 screen. X is from 0–639; Y is from 0–199. Mode is either 0 (for erase) or 1 (for draw).

@DRAW,X1,Y1,X2,Y2,mode. This is the line-drawing command. X is 0–639; Y is 0–199. Mode is the same as in @DOT.

@BOX,X1,Y1,X2,Y2,mode. This will draw a box on the 640 × 200 screen. X1,Y1 are the coordinates of the upper-left corner; X2,Y2 are those of the lower-right corner. X is 0–639 and Y is 0–199. Mode is as in @DOT.

@BAR,X,Y,dX,dY,Ht,mode. @BAR draws a 3-D bar of a given height. X and Y are the coordinates of the lower-left side of the bar; dX and dY are the depth and width you wish; Ht is the height; mode is as in @DOT; X is 0–639; Y is 0–199; dX is 1–255; dY is 1–199; Ht is 1–199. The sum of Ht and dY cannot exceed 199; if it does, no bar will be drawn.

@SAVE,type,"filename". This will save to disk your hi-res screen display (not your program listing) called "filename." There are two types of saves. Type 0 is a normal 16K screen dump, which will give a disk file of 65 blocks. Type 1 is a special compressed form of save, where an intelligent data-compression process will shrink your screen to its smallest possible size. In some cases, it can cut the 65 disk blocks down to only a couple of blocks; but in other cases, it can cut more than 50% off the size of your file! The actual amount of reduction will depend on what is being displayed. It will never be bigger than 65 blocks. In most cases, this Compressed mode will be the best way to save your screens. Use the regular Basic 7.0 Save and Load commands for saving and retrieving your Ultra Hi-Res program listings.

@LOAD,type,"filename". This loads a screen called "filename" from disk. Type is either 0 or 1, depending on how it was saved. Be sure to load your file under the same type, or you will get a scrambled screen. Use the @Load and @Save commands in Program mode.

@CHAR,charset address,X,Y,Ht,Wd,"string". This is the high-resolution character driver. It allows you to print on the 640 × 200 bit-map screen in many sizes and styles. X is any number 0–639; Y is 0–199; Ht is 1–16; Wd is 0–16; and string is what you want it to print, either in quotes or as a string variable. The address is where in RAM you want the character set to be taken from. You can use the built-in sets at 53248 and 55296, or, with BLoad, you can load others into RAM and use them.

Built into the machine language is a special font that allows 160 characters per line. Its address is at 7168, and it requires a width of 0. You can use almost any character set made for the C-64 or C-128, as long as they are binary files. Check your user's group library for extra fonts, as it will probably have many.

You may also use special control codes inside the string, such as reverse-on and reverse-off. Control E causes the text to erase anything under it, while Control X performs an XOR on the screen, leaving anything already on your screen still visible. You can also underline your text with Control U and turn off underlining with Control N. Color codes have no effect.

@COPY,SX,SY,dX,dY,destination X,destination Y. This will allow you to duplicate any rectangular area of the screen in any other area. SX,SY are the starting coordinates of the upper-left corner you wish to duplicate. The dX and dY are the lengths (in pixels) you want to copy from SX,SY; dX is from 1–640, and dY is from 1–200. Destinations X and Y are the coordinates of the upper-left corner of the new position.

@STASH,buffer address,X,Y,dX,dY. This command allows you to store to the buffer a section of the screen and then recall it when needed. X and Y are the upper-left coordinates of the screen you want to save, and dX and dY are the lengths. The section of screen you store may be as small as a byte or as large as a screen. The buffer address is the location in the buffer where the piece of screen is to be stored. The buffer starts at 0, so the first section of screen you store should go to that address. You will need to know where the first stash of data ends in the buffer so you can store other screen data after it. You can find the next available buffer address with:

```
AD = PEEK(250) + PEEK(251)*256 + 1
```

You must do this immediately after issuing the Stash command. AD now contains the next available buffer address. You must keep these addresses stored so that you can recall them later with the @Fetch command.

@FETCH,buffer address,X,Y. This will recall the stored area at the buffer address and put it at X,Y. No other information is needed, as the @Stash command saves the length and depth of the area. The @Stash and @Fetch commands are very rapid, fast enough for some types of animation. See the circle demo and 3-D cube demo programs. You can use a simple For. . .Next loop with @Fetch to accomplish some pretty impressive blitter animation.

Room for Expansion

The 8563 chip can perform many unsuspected functions. It can scroll and handle light pens, double-pixel modes, interlaced modes and more. We've only begun to explore it, and the wedge is written to make it easily expandable to handle new commands (perhaps a Hard

Copy command or a Fill). There's 9K of RAM set aside for growth; also, the program only goes from 7168 to 12992. That leaves room for you to add even more commands in the area from 12992 to 16383. For now, you could use that free RAM for character-set storage, but be careful and don't disturb the RAM from 7168 to 12992.

Listing 1. *C-128 Ultra Hi-Res Basic loader.*

```
10 GRAPHIC1,1:GRAPHIC5                    :REM*44
20 FORZ=7168TO12992:READY:POKEZ,Y:TT=TT+Y:N
   EXT                                    :REM*28
30 IF TT<>48147ØTHENPRINT"YOU HAVE AN ERROR
   .":END                                 :REM*192
40 BSAVE"ULTRA HIRES",BØ,P7168 TO P12992
                                          :REM*134
50 PRINT"ULTRA HIRES ML HAS BEEN SAVED!"
                                          :REM*106
60 END                                    :REM*62
70 DATA4,10,10,10,8,8,6,Ø                 :REM*72
80 DATAØ,Ø,12,2,14,10,14,Ø                :REM*244
90 DATA8,8,12,10,10,10,12,Ø               :REM*244
100 DATAØ,Ø,6,8,8,8,6,Ø                   :REM*112
110 DATA2,2,6,10,10,10,6,Ø                :REM*114
120 DATAØ,Ø,4,10,14,8,6,Ø                 :REM*50
130 DATA2,4,4,14,4,4,4,Ø                  :REM*138
140 DATAØ,Ø,4,10,10,6,2,4                 :REM*222
150 DATA8,8,12,10,10,10,10,Ø              :REM*16
160 DATAØ,4,Ø,4,4,4,4,Ø                   :REM*124
170 DATAØ,2,Ø,2,2,2,10,4                  :REM*60
180 DATA8,8,10,10,12,10,10,Ø              :REM*172
190 DATA12,4,4,4,4,4,14,Ø                 :REM*156
200 DATAØ,Ø,10,14,14,10,10,Ø              :REM*32
210 DATAØ,Ø,12,10,10,10,10,Ø              :REM*10
220 DATAØ,Ø,4,10,10,10,4,Ø                :REM*134
230 DATAØ,Ø,12,10,10,12,8,8               :REM*142
240 DATAØ,Ø,6,10,10,6,2,2                 :REM*52
250 DATAØ,Ø,12,10,8,8,8,Ø                 :REM*134
260 DATAØ,Ø,14,8,14,2,14,Ø                :REM*83
270 DATAØ,4,14,4,4,4,4,Ø                  :REM*131
280 DATAØ,Ø,10,10,10,10,14,Ø              :REM*143
290 DATAØ,Ø,10,10,10,10,4,Ø               :REM*163
300 DATAØ,Ø,10,10,14,14,10,Ø              :REM*109
310 DATAØ,Ø,10,10,4,10,10,Ø               :REM*131
320 DATAØ,Ø,10,10,6,2,2,12                :REM*167
330 DATAØ,Ø,14,2,4,8,14,Ø                 :REM*183
340 DATA6,4,4,4,4,4,6,Ø                   :REM*101
350 DATA4,10,8,12,8,8,14,Ø                :REM*181
360 DATA6,2,2,2,2,2,6,Ø                   :REM*229
370 DATA2,7,2,2,2,2,2,2                   :REM*113
380 DATAØ,2,4,15,4,2,Ø,Ø                  :REM*179
390 DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø                   :REM*57
400 DATA4,4,4,4,4,Ø,4,Ø                   :REM*15
410 DATA10,10,Ø,Ø,Ø,Ø,Ø,Ø                :REM*137
420 DATAØ,10,14,10,14,10,Ø,Ø              :REM*73
430 DATA4,14,8,14,2,14,4,Ø                :REM*207
440 DATA10,2,4,4,4,8,10,Ø                 :REM*237
450 DATA4,10,10,4,10,10,6,1               :REM*71
460 DATA2,2,4,Ø,Ø,Ø,Ø,Ø                   :REM*209
470 DATA2,4,8,8,8,4,2,Ø                   :REM*239
480 DATA8,4,2,2,2,4,8,Ø                   :REM*237
490 DATAØ,10,4,14,4,10,Ø,Ø                :REM*17
500 DATAØ,Ø,4,14,4,Ø,Ø,Ø                  :REM*103
510 DATAØ,Ø,Ø,Ø,Ø,6,2,4                   :REM*123
520 DATAØ,Ø,Ø,14,Ø,Ø,Ø,Ø                  :REM*58
530 DATAØ,Ø,Ø,Ø,Ø,Ø,4,Ø                  :REM*200
540 DATA1,1,2,6,4,8,8,Ø                   :REM*44
550 DATA4,10,10,10,10,10,4,Ø              :REM*34
560 DATA4,12,4,4,4,4,14,Ø                 :REM*228
570 DATA4,10,2,4,8,8,14,Ø                 :REM*172
580 DATA14,2,4,2,2,10,4,Ø                 :REM*212
590 DATA10,10,14,2,2,2,2,Ø                :REM*154
600 DATA14,8,14,2,2,10,6,Ø                :REM*46
610 DATA4,10,8,12,10,10,4,Ø               :REM*186
620 DATA14,2,2,4,4,8,8,Ø                  :REM*108
630 DATA4,10,10,4,10,10,4,Ø               :REM*204
640 DATA4,10,10,6,2,4,8,Ø                 :REM*44
650 DATAØ,Ø,4,Ø,Ø,4,Ø,Ø                   :REM*192
660 DATAØ,Ø,4,Ø,Ø,4,4,8                   :REM*220
670 DATA1,2,4,8,4,2,1,Ø                   :REM*140
680 DATAØ,Ø,14,Ø,14,Ø,Ø,Ø                 :REM*208
690 DATA8,4,2,1,2,4,8,Ø                   :REM*190
700 DATA4,10,2,4,4,Ø,4,Ø                  :REM*108
710 DATAØ,Ø,Ø,15,Ø,Ø,Ø,Ø                  :REM*252
720 DATA4,10,10,14,10,10,10,Ø             :REM*116
730 DATA12,10,10,12,10,10,12,Ø            :REM*184
740 DATA4,10,8,8,8,10,4,Ø                 :REM*166
750 DATA12,10,10,10,10,10,12,Ø            :REM*140
760 DATA14,8,8,14,8,8,14,Ø                :REM*44
770 DATA14,8,8,14,8,8,8,Ø                 :REM*65
780 DATA4,10,8,10,10,10,4,Ø               :REM*85
790 DATA10,10,10,14,10,10,10,Ø            :REM*149
800 DATA14,4,4,4,4,4,14,Ø                 :REM*33
810 DATA14,2,2,2,2,10,4,Ø                 :REM*185
820 DATA10,10,10,12,10,10,10,Ø            :REM*115
830 DATA8,8,8,8,8,8,14,Ø                  :REM*203
840 DATA10,14,14,10,10,10,10,Ø            :REM*89
850 DATA12,10,10,10,10,10,10,Ø            :REM*113
860 DATA14,10,10,10,10,10,14,Ø            :REM*157
870 DATA12,10,10,12,8,8,8,Ø               :REM*23
880 DATA4,10,10,10,10,10,4,2              :REM*237
890 DATA12,10,10,12,10,10,10,Ø            :REM*217
900 DATA6,8,8,4,2,2,12,Ø                  :REM*5
910 DATA14,4,4,4,4,4,4,Ø                  :REM*15
920 DATA10,10,10,10,10,10,14,Ø            :REM*153
930 DATA10,10,10,10,10,10,4,Ø             :REM*211
940 DATA10,10,10,10,14,14,10,Ø            :REM*207
950 DATA10,10,4,4,4,10,10,Ø               :REM*167
960 DATA10,10,10,4,4,4,4,Ø                :REM*169
970 DATA14,2,4,4,4,8,14,Ø                 :REM*73
980 DATA2,2,2,15,2,2,2,2                  :REM*7
990 DATA4,8,4,8,4,8,4,8                   :REM*251
1000 DATA2,2,2,2,2,2,2,2                  :REM*73
1010 DATA5,10,5,10,5,10,5,10              :REM*111
1020 DATA2,9,4,2,9,4,2,9                  :REM*197
1030 DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø                  :REM*188
1040 DATA12,12,12,12,12,12,12,12          :REM*114
1050 DATAØ,Ø,Ø,Ø,15,15,15,15              :REM*158
1060 DATA15,Ø,Ø,Ø,Ø,Ø,Ø,Ø                 :REM*90
1070 DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,15                :REM*186
1080 DATA8,8,8,8,8,8,8,8                  :REM*154
1090 DATA10,5,10,5,10,5,10,5              :REM*254
1100 DATA1,1,1,1,1,1,1,1                  :REM*86
1110 DATAØ,Ø,Ø,Ø,10,5,10,5                :REM*118
1120 DATA4,9,2,4,9,2,4,9                  :REM*254
1130 DATA3,3,3,3,3,3,3,3                  :REM*32
1140 DATA2,2,2,3,2,2,2,2                  :REM*216
1150 DATAØ,Ø,Ø,Ø,3,3,3,3                  :REM*52
1160 DATA2,2,2,3,Ø,Ø,Ø,Ø                  :REM*150
1170 DATAØ,Ø,Ø,14,2,2,2,2                 :REM*112
1180 DATAØ,Ø,Ø,Ø,Ø,Ø,15,15                :REM*66
1190 DATAØ,Ø,Ø,3,2,2,2,2                  :REM*184
1200 DATA2,2,2,15,Ø,Ø,Ø,Ø                 :REM*58
1210 DATAØ,Ø,Ø,15,2,2,2,2                 :REM*156
1220 DATA2,2,2,14,2,2,2,2                 :REM*244
1230 DATA8,8,8,8,8,8,8,8                  :REM*48
1240 DATA12,12,12,12,12,12,12,12          :REM*58
1250 DATA3,3,3,3,3,3,3,3                  :REM*152
1260 DATA15,15,Ø,Ø,Ø,Ø,Ø,Ø                :REM*176
1270 DATA15,15,15,Ø,Ø,Ø,Ø,Ø               :REM*112
```

I'd like to thank Andy Finkle and Carolyn Sheppner of Commodore for their kind assistance on the 8563's technical aspects. R

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Continued on p. 90.

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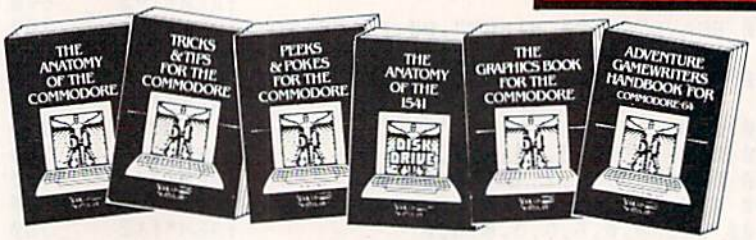
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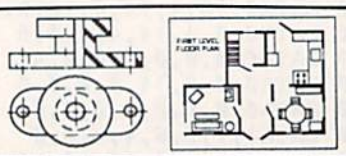
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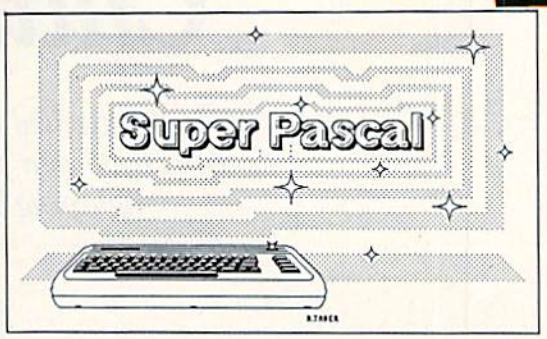
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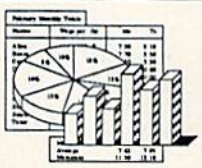
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C-128 Custom Character Sets

You're not limited to the C-128's standard characters when you can create your own—from a foreign language symbol to a lightning bolt. This article shows you how.

By ISAAC MALITZ

Have you ever wanted your C-128 to produce characters from the keyboard that are not part of the standard character set? Perhaps you've wanted Greek or Hebrew characters displayed, or maybe special symbols, such as a double arrow or a lightning bolt.

This article will show you how to program the C-128 to do just that—generate character sets of your own design. (You may be familiar with how to do this on the C-64, but the technique is somewhat different on the C-128. This article will show you clearly what the differences are.)

The Shape Table

First, you have to understand how the computer draws characters on the screen. For instance, when you press the Z key, the computer draws a Z on the screen. The letter Z possesses a certain shape, which the computer recognizes. But how?

Stored in ROM is a table of values that describes the shape of every letter in the alphabet and all other symbols used by the computer. This table is sometimes known as the "shape table." Whenever the computer wants to draw a symbol on the screen, it consults the shape table to find out that character's shape. Let's find out how the shape table works.

From the computer's point of view, every symbol is seen as a collection of dots in an 8 × 8 grid of dots, where each dot may be on or off. For example, a Z appears like this:

```
. * * * * * * *
. . . . . * * .
. . . . * * . .
. . . * * . . .
. . * * . . . .
. * * . . . . .
. * * * * * * *
. . . . . . . .
```

If you examine a Z on your screen, you may be able to see the individual dots that compose it. The pattern of dots is exactly like that depicted above.

The shape table describes for each character exactly which dots are on and which ones are off. Eight bytes are required to describe the entire grid. One byte is required to describe each row in the grid. In the above example, the eight bytes are as follows:

```
. * * * * * * *   127
. . . . . * * .     6
. . . . * * . .    12
. . . * * . . .    24
. . * * . . . .    48
. * * . . . . .    96
. * * * * * * *   127
. . . . . . . .     0
```

Each number represents the binary value of that row of dots. For instance, the binary value of

```
. * * * * * * *
```

is

0 + 64 + 32 + 16 + 8 + 4 + 2 + 1

which is equal to 127.

Illustration by Phil Geraci

RUN It Right

C-128 (in C-128 mode)



The binary value of

```
. . . . . * * .
```

is

```
0 + 0 + 0 + 0 + 0 + 4 + 2 + 0
```

which is equal to 6.

In summary, the shape table represents the shape of the letter Z as eight codes: 127, 6, 12, 24, 48, 96, 127 and 0. These eight codes are stored as eight bytes in the shape table.

If the information in the shape table could be changed, you could define new symbols that could be produced from the keyboard. For instance, you could modify the shape table so that when you pressed the A, B and C keys, the Greek letters alpha, beta and gamma would appear.

The bad news is that the shape table cannot actually be altered. It is stored in ROM (read-only memory) and cannot be erased or changed. (If you attempt to Poke new values into ROM, nothing will happen to ROM.)

The good news is that you can set up your own shape table in a different part of memory, and then tell the computer to use your table instead of the standard shape table. You can use your own shape tables to define your own symbols. The sample programs that follow will show you how to do this.

Creating Part of a Shape Table

Enter and run this first sample program. When you press the @ key, a lightning bolt symbol will be produced on the screen.

```
1 REM LIGHTNING
100 PRINT CHR$(147)
110 FOR I = 12288 TO 12799
120 POKE I,255
130 NEXT I
200 FOR I = 12288 TO 12295
210 READ C
220 POKE I,C
230 NEXT I
300 POKE 2604, 28
400 DATA 3,6,12,30,3,6,12,24
```

The program sets up a small portion of a custom shape table, starting at location 12288 in memory. It stores data in the area of the shape table that corresponds to the @ key on your keyboard. This data describes the shape of a lightning bolt. Let's go through the program line by line to see exactly how it works:

```
100 PRINT CHR$(147)
```

Line 100 clears the screen.

```
110 FOR I = 12288 TO 12799
120 POKE I,255
130 NEXT I
```

The next three lines are used for initializing the section of memory with which you'll be working. This ensures there is no garbage in this area of memory.

```
200 FOR I = 12288 TO 12295
210 READ C
220 POKE I,C
230 NEXT I
```

This section of the program Pokes data into memory locations 12288–12295. (The data to be Poked is stored in the Data statement at the end of the program.) These eight locations are the first eight bytes of what will be your new shape table. They correspond to the @ key on your keyboard, describing, each time the @ key is pressed, what shape the computer should draw on the screen. The data you Poke into locations 12288–12295 describes the shape of a lightning bolt:

```
. . . . . * * .    3
. . . . . * * .    6
. . . . * * . .   12
. . . * * * * .   30
. . . . . * * .    3
. . . . . * * .    6
. . . . * * . .   12
. . . * * . . .   24
```

```
300 POKE 2604, 28
```

Line 300 tells the computer that the location of the shape table now starts at 12288. The purpose of this command is to tell the computer to use your new custom shape table, rather than the computer's standard shape table. (By Poking a value other than 28 into location 2604, it's possible to place your shape table at a location other than 12288. However, this will usually trigger some difficult technical problems, which are beyond the scope of this article.)

The complete shape table in ROM is 4096 bytes long. With that many bytes, it's difficult work to set up a new shape table from scratch. There are two ways of dealing with this problem.

First, you could set up only part of a complete shape table, as you did with the sample program here. You set up a new shape table, where a shape is defined for only one key on the keyboard. The rest of the shape table was left undefined. (If you press any other keys, you'll get garbage characters on the screen.)

Second, you could copy into your new shape table location all or part of the ROM shape table, which you could then use as a basis for defining your new table. (Of course, this strategy makes sense only if at least part of your new character set is similar or identical to the standard character set.) The next program will show you how to do this.

Transferring the ROM Shape Table

The program below creates an upside-down character set. That is, each time you press a key, the usual character appears on the screen upside down!

```
1 REM UPSIDE DOWN
100 PRINT CHR$(147)
200 BANK 14
210 FOR I = 0 TO 511
220 P = PEEK(53248 + I)
230 POKE 12288 + I, P
240 NEXT I
300 BANK 15
310 POKE 2604, 28
400 PRINT "A COPY OF THE STANDARD
    SHAPE TABLE"
410 PRINT "IS NOW AT 12288."
420 PRINT "NOW, LET'S PLAY WITH IT."
500 FOR I = 12288 TO 12799 STEP 8
510 FOR J = 0 TO 3
520 A = PEEK(I + J)
530 B = PEEK(I + 7 - J)
540 POKE (I + J), B
550 POKE (I + 7 - J), A
560 NEXT J
570 NEXT I
```

Enter this program and run it. The screen will clear, the program will process for about 15 seconds, then a message will appear on the screen. The program will continue to process, and you'll gradually see all the letters in the message turn upside down. After the program is finished, try pressing some keys on the keyboard. The usual characters will appear, but they'll all be upside down.

This program has two parts. The first part (lines 100–410) sets up a new shape table starting at location 12288, which is identical to the first 512 bytes of the standard shape table. A message is then displayed on the screen.

The second part of the program (lines 500–570) makes some modifications to your new shape table, the effect of which is to turn each character shape upside down.

Now, let's go through the program in more detail.

```
200 BANK 14
210 FOR I = 0 TO 511
220 P = PEEK(53248 + I)
230 POKE 12288 + I, P
240 NEXT I
```

Lines 200–240 copy data from the standard shape table into the loca-

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tion that will hold your new shape table.

Normally, the standard shape table is inaccessible; it lies in an area of memory that cannot be reached by the Peek command. To access it, you need to use the Bank command, which allows you to reach portions of memory that are not ordinarily addressable.

BANK 14 makes the shape table accessible, starting at location 53248. Once it is made accessible, you use a For. . .Next loop to copy the table's first 512 bytes to a new location, which starts at 12288.

Following this, you issue a BANK 15 command to restore memory to its normal configuration (BANK 15 is the default memory configuration for the C-128). A POKE 2604, 28 tells the computer that you are now using the shape table starting at 12288.

The next part of the program (lines 500–570) modifies the shape table. If you study the code carefully, you'll see that it reverses the order of every group of eight bytes. That is, the first eight bytes of the table are initially:

60,102,110,110,96,98,60,0

(This represents the "at" character.) When the program is finished, these eight bytes are reversed:

0,60,98,96,110,110,102,60

The result is an upside-down "at" symbol. The following grids show you why:

```
. . * * * * . .   60
. * * . . * * .  102
. * * . * * * .  110
. * * . * * * .  110
. * * . . . . .   96
. * * . . . * .   98
. . * * * * . .   60
. . . . . . . .    0

. . . . . . . .    0
. . * * * * . .   60
. * * . . . * .   98
. * * . . . . .   96
. * * . * * * .  110
. * * . * * * .  110
. * * . . * * .  102
. . * * * * . .   60
```

This completes our discussion of custom character sets. Now, if you want to create your own character sets, the sample programs in this article should provide a reliable basis for your own programs. R

Address all author correspondence to Isaac Malitz, 1661 Roscomare Road, Los Angeles, CA 90077.



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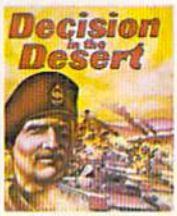
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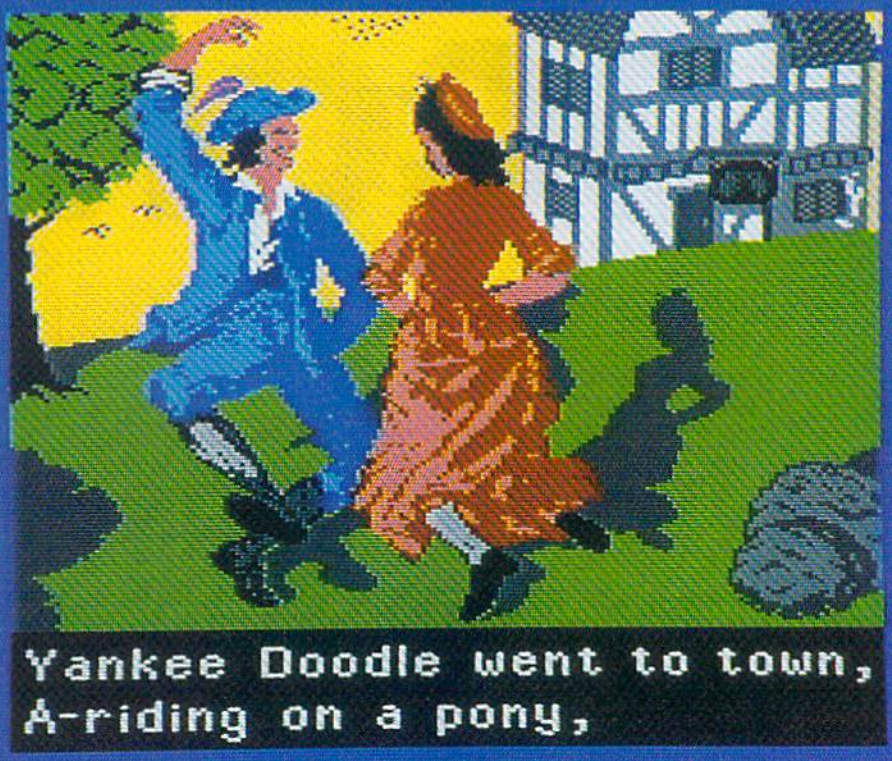
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Dozens of medical services and databases are offered on the major on-line utilities, such as Delphi, The Source, CompuServe, the Dow Jones News/Retrieval, BRS and the Knowledge Index. Most of them have at least one section devoted to health and medical information. The major networks are not a substitute for an actual visit with your personal doctor, of course, but they do provide a valuable source of information on a wide range of medical topics.

Who benefits from on-line medical information? The general public, for one. Anyone who has an interest in health and medical issues will find something of value on-line. You don't have to be in the medical profession to participate in these various medical groups. You can locate current information from medical databases and participate in forum discussions with medical experts and other interested people, and you can leave questions for the experts to answer on-line. Any questions that you pose will be answered by physicians in the appropriate specialty area.

These on-line medical services make instant house calls. They provide professional advice, extensive information and the opportunity to ask questions and share concerns about any health-related topic.

Students and researchers are also addressed by these services. Medical journals and reference materials are available for previewing and downloading into your computer. While on-line, you can gather lists of references to medical journals and, in some cases, read entire articles on medical topics. You can also download them or order hard copies to be mailed to you.

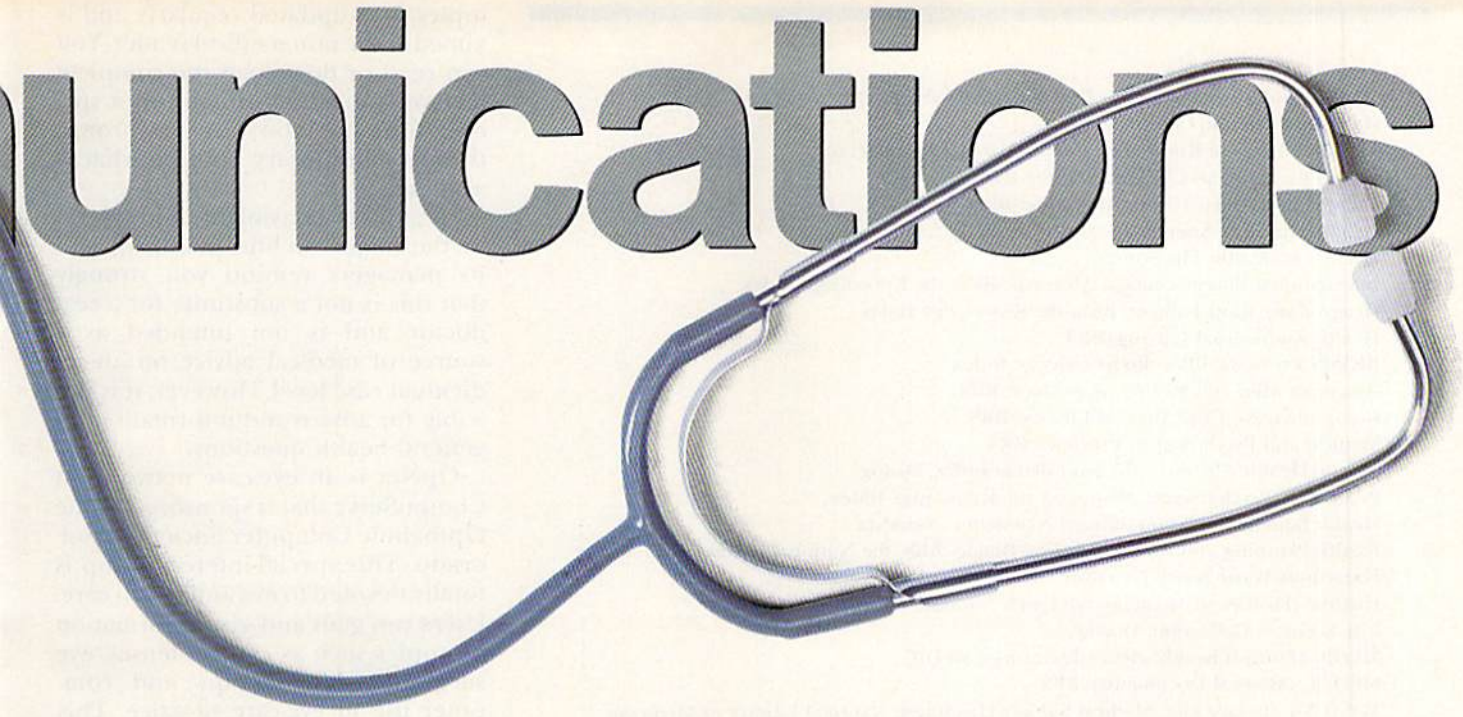
Professionals themselves are on-line. Doctors, nurses, pharmacists, counselors, therapists and others involved in the medical professions participate in setting up these services and in the discussions and question and answer sections. These professionals continually update the information in the various databases.

Administrative personnel can also benefit from on-line medical special-interest groups (SIGs). There is plenty of advice on how to most effectively computerize the medical office and hospital.

CompuServe is one general-interest network that is particularly rich in medical information, with ten sections devoted to physical and mental health issues. These provide a wide range of information for any kind of user, whether family, individual, health-care professional, computer consultant, programmer or medical administrator. When you log on to CompuServe, just type Go Medical, and you'll be given the menu of choices for the various medical services and databases.

Computers in Medicine

The American Association for Medical Systems and Informatics (AAMSI) Communications Network



is one of these medical services. It is open to anyone interested in computers in medicine. The *AAMSI Medical Network* is published quarterly, and members receive the network's monthly "Medicine and Computer" newsletter.

This newsletter contains medical journal abstracts, book reviews, vendor information and an index of current journals covering computers in medicine.

This network serves the medical profession and those who need information concerning the use of computers in hospitals and medical practices. Information about computer applications in medicine is available, new hardware and software are reviewed, and the Association holds two national meetings yearly.

AAMSI has a special-interest group, called MedSIG, which consists of volunteers—professionals and others from the general public—whose goal is to develop and share information in the area of medical computing. The SIG is composed of physicians, dentists, nurses, physical therapists, hospital administrators, medical research scientists and others.

Professional specialty groups are an important element of MedSIG. Through these specialty groups, people of similar interests within the broad field of medicine can gather and focus on particular needs and questions. Database topics include consumer health, professional topics, hardware and software interests and medical students' information.

Another active medical group on CompuServe is the Micro MD Network. This is similar to AAMSI in that it provides a focus on the utilization of microcomputers in the health-care professions. Micro MD serves not only health professionals, but also educators, corporate executives, programmers and computer consultants who are interested in computers in medicine.

Micro MD has a database filled with 300 software and hardware products for the medical and health-care field. Topics covered include medical accounting, health appraisal, hospital information systems, education, diet and nutrition, psychiatry and psychology.

Other areas addressed are word processing, database software, clinical and business applications, statistics, graphics, telecommunications, languages and laboratory applications. Here, you can see what is available and receive a description of the product and its intended application in the medical field. You can take advantage of the SIG's feedback feature for asking questions about any of the products that you see listed.

Consultant's Corner is a section of Micro MD that provides lists of computer consultants who can be contacted for advice on how to implement computerization in hospitals and private practices. Resumes form a key component of this list.

There is also a monthly newsletter that provides reviews of medical software, articles from contributors, user's group news, tips on using the on-line network, and more. Also, you can join the Medical Software Club and get discounts on medical software purchases.

Micro MD is planning to provide two new services. A resume service for health-care professionals is being created. This will provide job listings from major hospitals, clinics and agencies, and you will be able to send your resumes directly to the employers who have job openings. Also, there will be a Medical-Legal database. This will hold a list of resources for professionals who need expert witnesses and legal counsel.

Women's Health Care

The American College of Obstetricians and Gynecologists (ACOG) and its Nurses' Association (NAACOG) are two national health-care organizations whose combined membership consists of over 40,000 health-care professionals.

Medical and Drug Reference: Dow Jones News/Retrieval
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MEDIC (Finnish health/science literature): MEDIC
MEDOC (Medical Documents): BRS
MeSH Vocabulary File (Medical Subject Headings): National Library of Medicine
NISH (National Information Sources on the Handicapped): BRS
Nutrition Analysis System: Honeywell Datanetwork

Table 1. *Some of the many on-line medical services and databases available to personal computer owners. This is not a complete list of networks holding medical services; it is intended only as a sample of the offerings available on the networks mentioned.*

The ACOG Resource Center is an on-line group that is open to ACOG and NAACOG members, the general public and other interested health-care professionals. The Center's goal is to keep the public aware of ACOG's services, to promote continuing education for its members, to promote consumer-health information and to provide an arena for communication among professionals and the public on the topic of women's health care.

Features available on ACOG include obstetrical/gynecological national data, consumer health and medical practice guidelines; also, continuing medical education, women's health questions and answers, library resources and information on office computers. There is an on-line newsletter, as well.

General Health Care

HealthNet is another popular on-line health center for the general public. You can read current information on various health topics in the HealthNet Newsletter section. In HouseCalls, you can leave a question for a medical professional to answer. All answers are given by licensed and qualified specialist physicians.

There are two areas within HouseCalls. In Current Questions and Answers, you can read questions submitted by other HealthNet users and read the answers provided by the panels of specialty physicians. In Ask HealthNet, you can ask your own questions, which will be answered in the Current Q & A section. Not every question is answered; only those questions of broad interest, special relevance and other general appeal are selected.

HealthNet provides HealthQuiz, which tests your knowledge about general medical topics. The quizzes feature multiple-choice questions and show your score as well as provide a discussion of the answers. Questions are continually changed, thus making this section a good learning tool.

Furthermore, HealthNet has a reference library, which is open to all. The HealthNet Reference Library is a large collection of information on diseases, drugs, symptoms, first aid, sports medicine and other medical topics. It is updated regularly and is aimed at the non-medical reader. You can read or download the complete text version of all articles on a specific topic, or you can just browse through the library and see what is available.

HealthNet is available on several of the major on-line networks, and its managers remind you strongly that this is not a substitute for a real doctor and is not intended as a source of medical advice on an individual case level. However, it is valuable for advice and information on general health questions.

OpNet is an eye-care network on CompuServe that is sponsored by the Opthalmic Computer Society of Colorado. This special-interest group is totally devoted to eye and vision care. Users can gain and give information on topics such as contact lenses, eye surgery, vision therapy and computer use in eye-care practice. This SIG is open to the general public as well as interested eye-care specialists.

PaperChase offers Medline, the National Library of Medicine database provided by Beth Israel Hospital in Boston. Medline is updated monthly and has over 2,700,000 references from 3400 biomedical journals, ranging in date from January 1975 to the present. You use Medline to search for lists of medical references on a particular topic. These references hold the subject heading, subheadings, author's name, journal title and year and language of publication. Medline is available on several on-line networks.

The Health Forum is another section available to both the public and medical professionals. It is a gathering place for all interested parties to discuss health-related topics such as nutrition, mental health, child care and sexuality. The forum contains information about current topics of interest and has a Rare Disease database.

The Rare Disease database is sponsored by the National Organization for Rare Diseases, Inc. (NORD), which is a non-profit, voluntary health agency specifically aimed at helping people who suffer from rare diseases. In this database, you can search by keywords for references to your disease within the biomedical journals present in the forum.

Human Sexuality

On a different note, the Human Sexuality and Support Group Forum (HSX) on CompuServe provides ad-

vice and information on problems and questions concerning human sexuality. This is aimed primarily at families and individuals, rather than at medical professionals. This SIG features findings from a new branch of health care called sexual medicine, which draws its information from the areas of urology, gynecology, psychiatry, pharmacology, endocrinology and others.

HSX gives the public a direct line to authorities in the medical field who are dealing with a wide range of related topics. The publishers and editors of HSX are Howard and Martha Lewis, authors of several books and many magazine articles.

The forum is composed of transcripts of discussions responding to readers' questions about various topics of interest; transcripts of interviews with experts on a variety of subjects; reader comments; support groups and conferences; data libraries; on-line quizzes and interactive games; and personal mail to the managers.

Stay Informed

The subject of health care and medicine affects all of us on a daily basis. The on-line networks provide a huge amount of research information, as well as avenues for personal interaction with physicians and psychologists in all areas of medicine. This wealth of opportunity for research, study and advice is invaluable.

If you have a question that has been concerning you, but hasn't been serious enough for you to actually take to your doctor, you could very easily allay your concern by logging on and asking your question or performing your own research on the topic.

See the accompanying table, which lists a variety of on-line medical databases and the networks in which they are located.

RUN will continue its regular coverage of telecommunications next month under a new format. We will begin a new question-and-answer series, which will deal with your questions about modems, terminal software and other telecommunications topics. R

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

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Answering Attack Phone

Let's vanquish the problem of bulky complicated answering machines. And let's conquer the problem of lost beepers. Now when you're out, just the sound of your voice is all you need to retrieve your messages.

Stamp out beepers. Here's a microprocessor controlled answering machine that's so smart it will give you your messages without using a beeper.

But, before we explore just how easy it is to use and all of its sophisticated features, such as, toll saver, 2-way record, and remote saving or erasing of messages, let's take a look at the phone.

Like the answering machine, the phone has attacked wasted motion, complicated commands and uncomfortable fit with the latest in technology.

Here's a phone that will dial any of your 10 most frequently called numbers with the touch of a single button. Just touch another electronic button and the phone will operate in Tone or Pulse.

Another button gives you instant redial. And, as for comfort, well just wait till you cradle the great sounding Phone Company style handset on your shoulder.

This phone which can be desk or wall mounted, is no larger than a conventional feature phone. It's just 9" deep and 8½" wide. And, a standard instantly changeable audio cassette (included) is concealed just to the right of the handset.



VANQUISH THE REST

Easy to use. Forget cumbersome 'fixed time' outgoing announcements. Most machines make you fill a 20 second continuous loop cassette.

If you've ever tried to do this, you know just what a pain it is to make your message just the right length. With the Attack Answerer, just push 'Record Announcement' and talk into the built-in microphone from 2 seconds to 50 seconds.

After you've recorded your announcement, the machine will automatically play it back for your approval.

When you get your first call, it will be answered on the 4th ring. (Read on to see why.) If you're at home, you'll hear the message being left by the caller over the built-in speaker if you desire.

If you wish to talk to the person, just pick up the receiver and start talking. If you don't, you've just experienced the **privacy protection** called 'call screening', which lets you hear who's calling before you decide to answer.

This machine will let your caller leave any length message up to one minute long. If they hang up in 20 seconds, that's how long the message will be.

If they don't choose to leave a message, the machine will ignore the call. So, when you play back your messages, all you'll hear are messages, no dead space. And of course, you won't have to listen to your own announcement between each message you receive.



TOLL SAVER, OR THE 4TH RING

If you're across town or out of town, why invest a dime or pay for a toll call if you have no messages?

Each time you reset your machine, it will answer the first call on the 4th ring. After it's taken its first message, it automatically starts answering on the second ring. So, when you call in, just hang up if you get to the third ring. You'll automatically know that you have no messages.

If you do have messages, just give the machine a special signal with **your own voice**, and you'll receive your messages. Then you can have the machine save or erase the messages that you have heard.

MISSILE GUIDANCE

This machine is so smart that it electronically marks each message's location. It knows precisely where your outgoing announcement as well as each message that has been left is located.

The action is fascinating to watch. First, it plays your outgoing announcement. Then, it sounds a tone as it zips to the end of the last message it took.

It then beeps and starts taking the new message. Finally, it rewinds back to the precise start of your outgoing announcement, prepared to start again.



MORE SMARTS

If you want to record both sides of a call, just touch the 2-way record button and you'll have a record of the call.

Everything is automated. Just touch one of the full logic controlled buttons and this computer answers with a confirming beep and jumps into action.

To play back messages at home, just touch the 'Message Report' Button. A flashing message light even tells you at a glance if you've received any messages while you were out.

EASY INSTALLATION

Just plug in the modular phone jack and the included AC adaptor. Then, just record your announcement.

The Answerer Attack Phone is ready to take messages or act as your super automated office or home telephone. It's made by Unitech and backed by their standard limited warranty.

THE ANSWERER ATTACK PHONE RISK FREE

It's new. And, it will set you free. From its Phone Company feel handset to its electronic convenience extras to its state of the art answerer, you'll have incredible convenience and simply great sound.

If you're not 100% thrilled, simply return it to DAK within 30 days in its original box for a courteous refund.

To order your Unitech Answerer Attack Phone with totally automated telephone features and easy to use answering machine risk free with your credit card, call toll free or send your check for DAK's breakthrough price of just **$99** plus **$7** P&H. Order No. 4359. CA res add tax.

Wait till you hear the phone. Wait till you use the 1 touch dialing. And, wait till you hear the sound quality and enjoy the convenience of this answering machine.

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RN33

A Rose By Any Other Name

It's the sweetest phone that this writer has ever used. From its elegant good looks to its elegant sounding speakerphone, it's a class act. And, it remembers and dials up to 200 numbers by THE NAME of the person you want to call. Plus you can use it on 1 or 2 lines.

By Drew Kaplan

It's not red. And it has no aroma. But not only is it not just a rose amongst the thorns, Mura's all new name dialing 2-line conferencing speakerphone is the rose amongst roses.

As president of DAK, I've tested hundreds of phones. Some are very good and you will find them in DAK's catalog. **But, I've never used a better sounding, more useful phone, at home or at the office, than the phone pictured above.** Let me tell you some of the reasons why.



FIRST, IT DIALS BY NAME

I hate having to remember phone numbers. With this phone, all I do is push the 'H' button when I want to dial Home. The 'M' button dials Mura (this phone's manufacturer). And, the 'I' button dials my insurance broker. **It's really great at home.**

Where I have more than one name that begins with the same letter, I can scroll through the names before it dials, or enter just the first 3 letters. So, if I want to dial Howard instead of home, I push 'H', 'O', 'W'.



It's quick, it's easy and you'll never have to remember or look up and dial anyone's number again. Each memory location can hold up to 32 digits and you can store up to 200 different names. It has a memory capacity of 4096 digits.

You can store your Sprint and MCI codes with the person's name, in a separate location that the phone automatically accesses as it dials, or totally separately so that you can automatically access the service and then dial a number manually.



And speaking of manual dialing, you don't even have to push the speakerphone button to dial. When you touch the first number, the phone automatically seizes the line, turns on its speaker, and you have on-hook dialing.

So, you never have to lift the receiver or activate the speakerphone unless someone answers the line.

FORGOTTEN HANDSET

This phone has the latest K2 handset. It gives you traditional Phone Company fit and feel, yet, I find it even more comfortable to use.

But, you'll probably never use it. The speakerphone is so powerful, so clean, and so easy to use, you'll never pick up the handset unless you need privacy.

I've used good speakerphones before, but this speakerphone's sound quality rivals an in-person conversation, not a phone call. How's that for a description of a phone you can try on a 30 day risk free trial?



2-LINE MASTERPIECE

This is a two-line phone, but even if you only have one line, I'd plug it in and forget about its two-line capabilities.

You can select Line 1 or Line 2. And, you can push Conference to combine both lines for convenient business conferences or friendly group calls with friends. There are LEDs that show which line is 'In Use', 'On Hold', or which line is 'Ringing'. And, there are different rings for each line.

Installation is a breeze. It simply plugs into one standard modular 2 line jack or two modular 1 line jacks. Nothing could be simpler.

PAGES OF HELPFUL FEATURES

The list of features would have to be microfilmed to fit on this page. There's a large LCD display that shows you the name you want to call and the number.

An automatic timer tells you exactly how long you've been talking. And, a clock appears on the display whenever you hang up.

Every conceivable feature from Mute to Tone/Pulse switching, to Pause, to Flash, to battery backup (2 C batteries not included), to three direct Emergency Access Memory Keys and a lot more is included.

There's even Automatic Redial which will redial a busy number for you every 30 seconds.

YUPPIE POWER

I'm anything but a yuppie, even though I just turned 39, but when you look at the sleek, swept back, silver-blue HiTec appearance, and when you examine its complete computer keyboard, you'll understand why it would warm a yuppie's heart. My heart is warmed by what it does, but I must admit it is impressive.

It's made by Mura and here's one reason why the phone sounds so great. Mura is a division of TIE/communications, Inc., which just happens to be one of the largest inter-connect (big business phone systems) companies in the world. In fact, they're listed on the Stock Exchange.

The phone is about 9" wide, and it's backed by Mura's limited warranty.

PUT A ROSE ON YOUR LINE RISK FREE

It's the best sounding speakerphone I've ever heard. Dialing by names instead of numbers is a quantum leap in both technology and convenience.

If you are not 100% convinced, as I am, that this is the best sounding, most convenient phone you have ever used, simply return it in its original box within 30 days for a courteous refund.

To order your Mura Name Dialing 2-Line Speakerphone with God only knows how many features risk free with your credit card, call toll free or send your check for DAK's introductory price of just **$129** plus **$4** for postage and handling. Order No. 4335. CA res add tax.

Note: Order today for September delivery. We will ship on a first come first served basis. Your credit card won't be charged until shipment is made.

In DAK's electronic world, where a new best is achieved almost every day, this phone stands out as the 'best' best I've ever had the pleasure of introducing.

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RN25

BSR's Endangered Colossus

Prepare for bone jarring bass and dramatically clear highs from these newly developed 15" 3-way 5 speaker systems that nearly missed their chance to charm an audiophile's ear. BSR moved its dbx and ADC divisions into one facility and these speakers almost became orphans. So now, they're yours at a close-out price.

By Drew Kaplan

It's a shame. But, it's also a great opportunity to get a pair of 15" audiophile loudspeakers with the newest in stereo imaging at a market-breaking price.

Imagine a precisely matched mirror image pair of top-of-the-line BSR speakers that can effortlessly recreate the cataclysmic impact of a full orchestral crescendo at full volume and yet offer flawlessly subtle sound detail to 21,500hz.

You'll thrill to thunderous bass all the way down to 26hz. Incredibly rich, full, vibrant sound at low volume will explode with life as you increase the volume.

But before we examine the front speaker complement, the twin overlapping crossovers and **the top mounted sonic placement and ambiance speakers**, let's see why they were almost orphaned.

You see, BSR, the half billion dollar electronics giant, is the parent company of two of the best names in up-scale audio, dbx and ADC.

Last year dbx developed a new multi-thousand dollar speaker system called the Soundfield One which lets you sit virtually anywhere in your room and have full stereo imaging and terrific sound.

BSR decided to consolidate ADC and dbx into one building (still 2 companies) and put all its speaker efforts into dbx.

POOR JACK

Well, while dbx's engineers were off designing their multi-thousand dollar masterpieces, BSR's Senior Acoustical Engineer (he had been Fisher's Chief Engineer for 10 years during its top end component stereo days), was designing BSR's radically new speaker line.

The revolutionary top of the line 15" stereo imaging pair pictured above will let you enjoy superb stereo imaging without sitting directly in front of your speakers.

But unfortunately, in the consolidation move, BSR's speakers went by the wayside, and so did Jack.

Enter DAK. After a few fearful negotiations and considering the engineering costs BSR had already expended, they agreed to make the speakers just for DAK.

Because there's virtually no BSR overhead left on these speakers, and the R&D was all but complete, we've gotten these speakers for virtually the component costs plus a little BSR labor.

And don't worry about Jack. BSR had him finish the engineering (they really are great people) and they'll pay him a royalty on each speaker we sell. Besides, by the time you read this, Jack is sure to be snapped up as the Chief Engineer at another esoteric audio company.

WHAT'S STEREO IMAGING?

Stereo imagery is the logical separation and interaction between channels. It's the successful creation of a panoramic wall or stage of music rather than the confined, easily located 2 speaker sound.

IT'S WHAT'S INSIDE THAT COUNTS

Imagine the full thunder of a kettle drum, or the pluck of a string bass being explosively recreated in your living room. BSR's 15" sub-bass acoustic suspension driver will revolutionize your concept of low clean bass.



Its magnetic structure weighs a thundering 48 ounces. But that's not all. The magnetic field is developed by the rare earth metal Strontium for state of the art massive but flawlessly controlled bass.

A 38mm voice coil with a 200° centigrade temperature capacity, will handle the most demanding digital or analog recordings. And, a new super rigid cabinet design virtually eliminates coloration due to uncontrolled cabinet resonance.

At low volume, the bass will fill in and envelope you. At high volume, your room, your walls and your neighbors will shake. This is definitely not a speaker system for apartment dwellers.



MATCHED PAIRS

The mid-range and high end of BSR's speakers are truly unique. Front mounted 8" polypropylene mid-range drivers provide rich sound while top mounted 5" polypropylene mid-range drivers provide an open, lifelike ambiance.

Front mounted exponential horn tweeters provide awesome brilliance to 21,500 hz, while top mounted tweeters enhance separation because they are mounted to the outside edge of each speaker.

So, this system has a specific left and a specific right speaker. You'll find wide, but interactive separation that will vastly widen your ideal listening area.

The imagery will give the illusion of musicians actually playing in front of you. Your music will take on a three dimensional quality. You'll enjoy superb stereo imagery regardless of each speaker's specific placement in your room.

MORE SPECIFICS

The exponential horn tweeters, both in front and on the top of these systems, employ 25mm rigid phenol diaphragms for stability and accurate response.

Polyamid-imid binders and ferro-fluid coolant allow for a 300% increase in heat dissipation so you can drive the voice coils up to 200° centigrade.

Now, the mid-range. Both the 8" front firing and the 5" top firing polypropylene drivers reproduce the mid-range frequencies like no ordinary speakers.

It's amazing that so many speaker manufacturers simply slap in 5" paper mid-ranges to reproduce what's really the major portion of the sound spectrum.

BSR's 8" and 5" polypropylene mid-ranges are rigid, exacting drivers that deliver incredibly pure uncolored sound.

They have matched 25mm voice coils, also protected by ferro-fluid and polyamid-imid to 200° centigrade. They are driven by powerful barium ferrite magnetic fields.

NOT QUITE FINISHED YET

To prevent phase shift and cancellation, two totally separate crossover networks are employed in these speakers.

Next page please. . .

. . .BSR's Colossus Continued

All frequencies below 800 hz are directed to the 15" woofer. The front system routes frequencies above 800hz to the 8" mid-range to take full advantage of its superb reproduction capabilities. Frequencies above 3400hz are routed to the horn tweeter.

The top mounted system routes only frequencies above 1200hz to the 5" polypropylene ambiance mid-range driver, and frequencies above 3400hz are routed to the top sonic placement tweeter.

There are level controls for both the top and front mounted speakers so that you can voice the speakers to match your musical taste and environment.

Note: Only the top tweeters are mounted at the the edges. The front mounted tweeters are conventionally mounted for acoustical symmetry.

Each speaker is fuse protected for up to 200 watts peak, 150 watts continuous power. You can operate these super efficient speakers with as little as 20 watts.

AND OH WHAT A PRETTY FACE

The speaker systems are 30" tall, 19¼" wide and 10½" deep. Their lovely oak wood-grain appearance is enhanced by the dark removable grill cloths that beautifully contrast with the rich wood-grain tones. They're a statement of audio elegance when placed in any room. They're backed by BSR's 2 year limited warranty.

A COLOSSAL DREAM COMES TRUE RISK FREE

You'll hear depth of sound at low levels that was previously unobtainable. And yes, when you crank up the volume, your music will explode with realism and drama.

Try these speakers in your own system. Then compare them at any Hi-Fi Store with any pair of speakers up to $1000. If they don't beat all the competition hands down, simply return them to DAK in their original boxes within 30 days for a courteous refund.

To order your matched pair of BSR top-of-the-line 15" 3-way 5 speaker systems with unique stereo imaging risk free with your credit card, call toll free or send your check for DAK's market-breaking price of just **$298** for the **MATCHED PAIR** plus **$22** for Postage and Handling. Order No. 4352. CA res add tax.

It's a dream system for an audiophile. Sonically pure, thunderously powerful, these BSR speakers will make your future listening years an on-going fabulous, if not earthshaking experience.



So, your spouse or neighbors aren't into thunder and paint peeling audio. Don't worry, BSR has developed two smaller but still mighty versions of the colossus that use the same basic components, at incredible prices.

Don't despair. You won't be relegated to 'little sound' by these more sane versions of the Colossus. After all, a 15" 3-way system is usually a distant dream of only the most ardent audiophile.

10" 3-WAY SANE COLOSSUS

You will experience the same dramatic highs to 21,500hz produced by the identical exponential horn tweeters with the same rigid phenol diaphragms. There's even a variable brightness control.

And, don't look for any cheap paper mid-range speakers. You'll thrill to rich, full, incredibly pure music from a 5" rigid polypropylene mid-range driver.

The 10" woofers utilize a massive Strontium magnetic structure and can reproduce dramatically clean, massive bass down to 32hz. Unless you actually set these speakers next to the Colossus, you'd think the bass is incomparable.

The crossover points are at 1200hz and 3400hz. The speakers are rated for 90 watts peak and 45 watts continuous power and require at least 15 watts.

If you're a normal audio person, you'll be thrilled with these as main speaker systems for your stereo. But, if you're a slightly crazy DAK-type audiophile, the big Colossus Systems add a thrill to your music that goes far beyond printed specs.

These speakers are 23¾" tall, 13¾" wide, and 8¾" deep. Their rich oak wood-grain appearance which surrounds the contrasting dark grill cloth, will be an elegant addition to any room.

8" BOOKSHELF COLOSSUS

Where space is a consideration, your music need not suffer. BSR's newest 2-way 8" systems provide an astounding level of musical fullness.

BSR's exponential horn tweeter produces superb highs to 21,500hz. The 8" woofer/mid-range produces bass down to a very respectable 38hz and powerfully clean mid-range up to 2500hz.

On the floor or in a bookcase, these speakers will give you years of full rich beautiful sound. They are just 19¾" tall, 11¾" wide and 8¾" deep. Their rich oak wood-grain appearance which surrounds the contrasting grill will be a beautiful addition to any room.

All BSR speaker systems are fuse protected and backed by BSR's standard 2 year limited warranty.

TRY RICH DRAMATIC SOUND RISK FREE

These smaller versions of the Colossus may have a hard time competing with the awe inspiring sonic violence of their bigger brother. But, compared with traditional speakers, you'll find they've gained greatly by their genetic origin.

If you're not 100% satisfied, simply return them to DAK within 30 days in their original boxes for a refund.

To order the 10" 3-way Sane Colossus with its horn tweeter, polypropylene mid-range and 10" Strontium woofer risk free with your credit card, call toll free, or send your check for DAK's breakthrough price of just **$69** each plus **$9** P&H each. (2 required for stereo). Order No. 4348.

To order the 8" 2-way Bookshelf Colossus with its exponential horn tweeter and 8" Strontium woofer/mid-range risk free with your credit card, call toll free, or send your check for DAK's breakthrough price of just **$44** each plus **$6.50** P&H each. (2 required for stereo). Or. No. 4347.

These speakers have gained a great deal from their big brothers. They'll bring you years of superb musical sound and add truly elegant visual appeal to any room.

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RN31



Daddy's Pride And Joy

I had a meeting that I just couldn't miss. And, my son was giving his first speech. What's a father to do?

And Now, Much Much More

- *For Real Estate*
- *For Tennis*
- *For Golf*
- *For Sales Training*
- *For Actors*
- *For Parties*
- *For Copying Cassettes*
- *For Private Pilots*
- *For Factory Tours*
- *For Equipment Demonstrations*
- *For Family Memories*
- *For Video Christmas Cards*

SPECIAL NOTE By Drew Kaplan

It was amazing. Last summer, we offered a portable video system complete with color camera for just $689.

I, and actually my whole family, tested the equipment before I wrote the ad that follows. But, it was really only after I printed the catalog that I started using the system regularly.

And, as you'll see, use it I did. My older son, Chris, and I took it on a roller coaster. Wow, just turn the page (and maybe your stomach) to see the results.

You'll see the tennis and golf swings of two DAK pros. (I still don't have time to play myself.) What's really interesting, is what Chris said when I asked him (he takes tennis lessons), what he thought of my neat tennis pictures.

He said, "The guy's feet shouldn't have left the ground and he shouldn't crouch so much." I wanted him to critique my neat pictures, not the swing. But, it does prove the value of using video to analyze any games you play.

And the best thing about this system, besides the new $599 price, is that it is so incredibly easy to use. Just turn it on and record. There are no fancy complicated controls.

There's virtually nothing to learn. You'll be recording 15 minutes from the time that you open the box.

Below you'll find an expanded version of my original story. I've added pictures as well as lots of new uses, some suggested by DAK customers.

You can be sure that I would never have thought that plastic surgeons would use a video system. Or, that bull riders at a rodeo would want to record their feats.

By the way, I unfortunately can't reproduce moving video pictures in this catalog, so I had to use conventional cameras along side the video camera for the pictures in this ad.

The video is much more exciting, but you'll have to see that for yourself. Here's my expanded ad.

Daddy's Pride And Joy Expanded

By Drew Kaplan

"Where's the Unicorn?", was the title of my son's speech. And, I was going to miss it.

I had also missed the trip to Knotts Berry Farm where he had won the Unicorn. He was especially proud because neither his older brother nor any of the adults had been able to win anything.

POSSIBLE DIVORCE?

Everyone in the family thought I should skip the meeting, and they were probably right. **But I had an idea.**

I called Emerson and asked to borrow one of their portable video machines with a camera that would 1) be light enough for my wife to easily carry, and 2) wouldn't require any training.



The next day we received the system you see above. I didn't plan to sell it (I told Emerson that at $999 it was too expensive), but I really needed it for that day.

Well, not only did this system save my marriage, but we've had a heck of a lot of fun. Yes, I've seen the Unicorn Speech many times, as have all the grandparents. But that was just the beginning.

The very first night we unpacked the recorder, the kids turned into 'hams'. And by the way, the speech was probably much better because we used the video recorder over and over again to practice.

So, whether you're a movie star, a model, an extra or simply giving a speech at school or at work, you can practice and evaluate your presentation as often as you like.

If you're like me, speaking in public is awesome. I want to know what I look like, what I sound like and how I make my points **before** I go live.

SUPER EASY TO USE

Inside and out, (yes it came right out of the box with everything, including an AC power supply and a rechargeable battery) we really put this thing to use.

Just plug the camera into the recorder. Then insert the rechargeable battery or the AC power supply. Finally insert a standard VHS cassette and away you go.

Cables are included to connect this recorder to any TV inputs from 75 ohm cable to 300 ohm flat wire to direct video for a monitor or another recorder.



Next page please. . .

Daddy's Pride And Joy Continued. . . Everything you need is included.

LOTS OF USES

My older son is taking tennis lessons. Making recordings of your swing out on the court is an ideal way to improve. He can really study his wrist and arm action.

Here are some pictures of our resident DAK tennis pro doing his thing for my cameras. Do you think his swing is good? (See previous page.)Of course, you can freeze the action at any point to really study your swing.



It's also terrific out on the golf course for improving your golf swing. In fact, it's such a powerful method of game improvement that they sell video cassettes showing you how to improve your game.

Here's our resident DAK golf pro demonstrating his skill for my cameras. On the video tape you could freeze the action frame by frame. (He asked me to tell you that he only looks fat in the picture because of the effect of the number of exposures I needed to show his full swing.)





With this system you can really refine your game. I can't personally attest to improving your tennis or golf games, because I'm too busy writing catalogs to take time off to play.

And anyway, when I was growing up, playing ping pong seemed to be an extravagant sport to me.

GOOD FOR WORK TOO

It's easy to see how many pleasurable uses it has. But, wait till you see what it can do for you at work.Here are just a few of the many types of work that can be enhanced by using this video system.

For Communication. I've already mentioned public speaking, but look at this. If you have salesmen in the field, wouldn't it be great to be able to send out a personal video description.

It can be of your newest products, automated equipment, or a message from the president about what the sales force should know about the company's future plans. It's great for morale.

With over 30% of households in the U.S. already having video recorders, you probably won't even have to supply a recorder. And, think how powerful the presentations of your sales force will be when they can show live videos of your products **IN ACTION** instead of boring price list pictures.

For Real Estate. It's already happening. Just imagine walking in to a prospective buyer's home with tours of 5 or 6 homes ready to show on their TV. All you have to do is walk though a home to show the view, amenities, and give a true feeling of the home.

You'll save hours. Your clients will appreciate the time you save them and you'll only take them to see the homes they'll be likely to buy.

Some agencies even have the 'sign planters' tape the houses so all the brokers in the office can get an easy look.

And, no matter what, you should have a stock tape showing the schools, the churches, the stores and any other assets of the community that are likely to help with the sale.

For The Factory. Why teach each new employee how to run the same machine. Sit them down in front of a TV and let the video tape do the work. You'll always know for sure exactly what the new employee has been told and they can watch the tape several times if they wish.



When you do bring them out 'on the line', you'll find the fine tuning is really easy and you'll have saved hours of repetitive teaching. Making the tapes is easy and it can really pay off.

There's Lots More. The power of a plant tour or equipment demonstration on tape shown to a prospective out of town customer is awesome. It can make the ultimate difference.

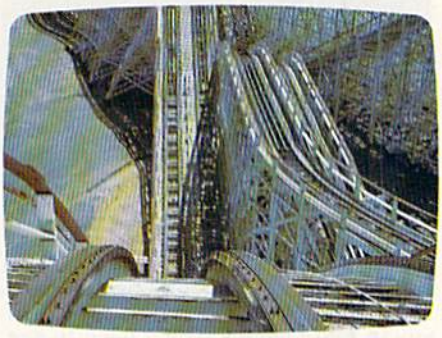
Why not have an introduction to your company in the personnel office for all new employees. And, providing live, up to the minute information for your sales force is simply priceless.

LIVING CHRISTMAS CARDS

With video cassettes costing as little as $5, why not send one to an old friend who lives across the country. Wow, what a great way to revive old friendships.

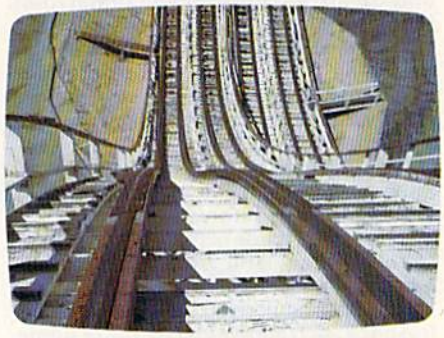
As many as 30% of all households are estimated to have VHS recorders. So, there's a good chance your old friends already have recorders.

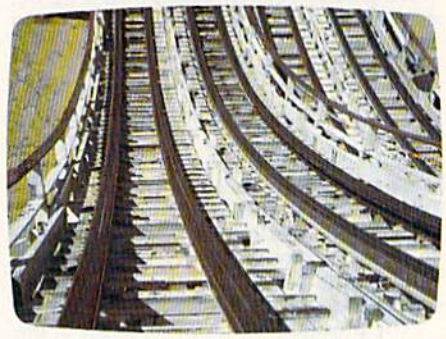
My wife is planning to send out about 6 copies of a tape about us to her old 'best' friends in Akron, Ohio and Denver, Colorado and Phoenix, Arizona.











Here's the view from a twin engine island hopper we took to visit DAK's retired controller while we were in Hawaii. Unfortunately I'm not a private pilot, but just think of all the great moments you've had in the air that you can show on the ground.



If you look at the picture below, you'll see my son heading for a soccer ball. If you're into comedy, you'd have to see the video to see him not only miss the ball, but end up flat on the ground. (He was fine as usual.)



REALLY EASY

Touch the trigger on the camera. The tape will start. Touch the trigger again and the tape will stop.

You'll have easy TTL (through the lens) viewing. There's a focus control **and a 3X zoom lens**. A green LED shows you that you're recording and a red LED shows you if there's not enough light.

But don't worry about light. You need only 35 lux, which is about normal room light for perfect recordings.

A 4-position switch lets you optimize the camera for standard incandescent light bulbs, fluorescent bulbs, full sun, or cloudy days. It's easy; it's quick, and you'll be amazed at the results.

A unidirectional electret condenser mike mounted on the camera picks up the sound with astonishing clarity.

You'll have loads of features, including speed search, still frame, audio dubbing, and automatic fine editing.

You'll particularly like the remote control because it allows you to freeze frame, advance frame by frame, and activate fast forward or reverse visual scan.

A FRANK COMPARISON OF CAMCORDERS AND SEPARATES

There are two types of video systems on the market, and a dizzying array of formats. Let's look at formats first.

Camcorders use 8 millimeter cassettes, mini VHS, Beta or full size VHS. Obviously, standard VHS cassettes with their 100% compatibility with all VHS home units and their 6 hour recording capability are our choice.

The problem is that while a few of the smaller format cameras with 20 minute recording capability can weigh somewhat less than 5 pounds, VHS camcorders can weigh over 8 pounds

Emerson's system has a camera that only weighs 1.54 pounds. Holding up 8 pounds to your eye can be a real pain.



Of course, when you add Emerson's recorder at 10.6 pounds, it weighs more overall. But, the 10.6 pound recorder is supported by a comfortable shoulder strap. So, you only hold the 1.54 pound camera up to your eye.

And, with separates, you can take the recorder without the camera for dubbing or playing tapes.

It's impossible to say which format will eventually win the contest. But, whether it's separates like the Emerson, or full size VHS camcorders, your tapes will be 100% compatible.

AT HOME TOO

You'll get a TV tuner that turns this recorder into a standard home video recorder. You can record off the air VHF 2-13 and UHF 14-83.

The recorder has both VHF channel 3 and 4 output capability, so you can connect the recorder to any TV.

It also has 'video' inputs and outputs, so you can connect it directly to a TV monitor or to any other video recorder.

Just use normal 'audio' type RCA patch cords for really clean copies of cassettes. **So, it's a portable dubbing machine.**

There's an adjustable shoulder strap. And, it's backed by a limited warranty.

CAPTURE YOUR FAMILY OR BUSINESS RISK FREE

It's not like using expensive film that has to be processed. With six hours costing about $5, you'll have a ball.

If you're not 100% satisfied, or even if you don't like to watch your family on TV, simply return the system in its original box within 30 days for a courteous refund.

To order your Emerson Video System (Emerson's camera is by Konica), risk free with your credit card, call toll free, or send your check for ~~only $689~~ plus **$11** P&H. Order No. 4313. CA res add tax.

You've got to try this! Take the camera in the car and drive around your block or to your office with someone holding the camera out of the window. Wait till you see the results. It's like a roller coaster.

In fact, we rode a roller coaster 4 times to get the pictures on the previous page. It's really hard holding on for your life while you try to shoot pictures. But, the tape sure is a blast to watch.

UNNECESSARY OPTIONS

Basically the system comes with everything you need. But, here are a few extras.

You can order extra rechargeable batteries. Each charge (2½ to 4 hours) gives you about an hour of recording. So, if you want to record more than an hour without recharging, an extra battery is just **$24.95** ($2 P&H) Order No. 4363.

You can operate this system from your car, boat or plane's 12V cigarette lighter. The cable is just **$9.95** ($1 P&H) Order No. 4364.

What if you're alone and you want to record yourself. We have a tripod for the camera. (Yes, there's a standard tripod mount on the camera.) You absolutely do not need this to hold the camera steady when you're recording on the move. But, if you're working alone, it's just **$39** ($4 P&H). Order No. 4365.

Finally, if you're out in the bushes where you don't have access to a TV and you'd like to show off your tapes, we've got an AC/DC black and white (D cells not included) 5" TV for just **$69** ($5 P&H) Order No. 4366.

Or, you can go in style with an AC/DC 5" color set (D cells not included) for just **$199** ($7 P&H). Order No.4367.

Of course, any TV anywhere will work perfectly with this system, so chances are you don't need any of the optional accessories. This is not just a 'starter system'. This is a complete video system just the way it comes out of the box.

PRICE SLASHED

List price was $999
DAK sold it for $689

NOW JUST $599

Use Order No. 4313 plus ($11 P&H)

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TOLL-FREE ORDER LINE
For credit card orders call 24 hours a day 7 days a week
CALL TOLL-FREE. . .1-800-325-0800
8200 Remmet Ave., Canoga Park, CA 91304

RN16

Cable Controller Plus

Get all the cable channels on any TV or video recorder with this all new wireless infrared remote control cable tuning system. And at just $88, we're sure to break the cable market wide open.

If you've got cable, we've got it all. Now you can tune in up to 60 cable channels from your easy chair.

The Universal Cable Controller receives all VHF Low Band channels 2-13 and VHF Midband 14(A)-22(I).

Plus it tunes the Super Band VHF channels 23(J)-36(W) and Hyper Band channels from 37-60. You'll get a lot of stations for our breakthrough price.

MOVIE CHANNELS

If there are movie channels on your cable and they're not scrambled, the Controller is all you need. If they're scrambled, you'll need the cable company's box.

Note: Check with your cable company before viewing anything at all, to see if they require you to pay a fee.

SPORTS PLUS

There are lots of 'Super Channels' broadcast on cable. On the all sports channel you'll watch 'World Class Sports' whenever you wish. All Movie Channels give you entertainment at all hours.

And 'Super Stations' from New York and Atlanta give you major city TV for cities other than your own. Plus, there's Cable News Network for a world wide perspective on the news and much more. Why not see what's on your cable?

ONLY FOR CABLE

If you don't have cable, the Cable Controller isn't for you. It only finds you extra channels when you are connected to a cable. And, it doesn't tune in UHF.

But, if you're on cable, your cable company is rebroadcasting UHF over unused VHF channels. So with the Cable Controller tuner, you'll get it all.

TOTAL RANDOM ACCESS TUNING

The wireless infrared remote hand controller does it all. It switches both the TV and the Controller on and off and selects your channels. **And, look at this.** You can select your favorite channels (up to 6) and store them in a special section.

Then just touch the special 'RCL' Recall Button and you'll be able to sequence through only your favorite channels. This is especially convenient if you like to flip through movie channels during commercials on regular TV.

For the other channels, you'll enjoy total random access tuning. You can go directly from channel 2 to 28. Or you can step tune one channel at a time.

Once you've set your own TV to channel 3, you can just forget it. Any fine tuning is handled from the wireless infrared remote handset. And you'll have crystal controlled frequency phase lock loop synthesizer tuning for the finest picture.

You'll see the number of the station that you have selected displayed on the command base. And, you can tune channels either from the remote or the base.

Color tints, volume, brightness and contrast are all controlled by whatever method you now use.

INSTALLATION

Nothing to it. All cable systems use 75 ohm round cable. Simply unscrew the end from your TV and screw it into the Controller base input.



Then screw in an identical cable (included) between the Cable Controller and your TV. Finally, plug your TV's AC plug into the Controller and the Controller's AC plug into the wall.

WHAT IT IS

The Cable Controller is actually a very sophisticated, all electronic VHF TV tuner/receiver. It's really like a TV set without a picture tube.

Since it's all electronic, you won't be getting snow from dirty tuning contacts and loss of fine tuning as the set ages.

The Controller tunes all the possible stations that your cable can broadcast, something that would be very expensive to build into standard TVs, because not all TVs are going to be used on cable.



GREAT FOR VIDEO RECORDERS

Now you can record off cable. With the Cable Controller hooked to your video recorder you can open the world of cable to your video recorder too.

Cable ready video recorders that don't even tune in 60 channels can cost hundreds of dollars extra. You can feed both your TV and video recorder. Or, you can separate them so that you can easily watch one thing and record another.

WHAT IT ISN'T

It isn't one of the infamous 'black boxes' you might have read about that illegally decode various 'Pay TV' channels. On cable, most of the programming isn't scrambled, it's just found outside the tuning range of the average TV.

So, if there is a Pay TV channel that is scrambled, or is only unscrambled on one TV in your house, the Controller is not made and should not be used to tune it in without paying.

Actually 'Cable Ready' TVs and video recorders do basically the same thing as the Cable Controller, but cable tuning is usually an added on feature that often doesn't cover as many channels.

The Cable Controller is made and backed by a standard limited warranty from Universal Security Instruments Inc.

TRY THE WORLD OF CABLE RISK FREE

Relax up to 20 feet away. Change channels, adjust the fine tuning or turn your set on or off. Explore the vast number of cable channels available to you.

Try it risk free. If you aren't 100% satisfied, simply return it in its original box within 30 days for a refund.

To order your Universal 60 Channel Cable Controller with Wireless Infrared Remote Control, risk free with your credit card, call toll free or send your check for DAK's market breaking price of just **$88** plus **$5** for postage and handling. Order Number 4147. CA res add tax.

There's a whole new world of entertainment waiting for you just off your normal TV tuning range. With the Cable Controller, you can sit back in your favorite easy chair and tune in the world.

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RN04

The $4 Energizers for Commodore 64 & 128

Yes, it's a trap. You can't buy Super Huey, the top rated helicopter flight simulator for $4, Swift Calc's 6600 cell spreadsheet program, or TextPro/DataPro Word Processing and Data Base programs for $4 each. Or, can you?.

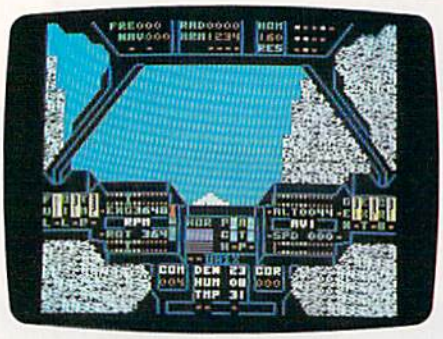
By Drew Kaplan

Life is tough. And then, you die. And that little idiom of life has certainly been proven true in the computer industry.

Well, I've been personally depressed by the fall in the computer market. It's not a fad. It's really a human triumph. So, just when nobody wanted my 'trap', I jumped in and bought over 10,000 units.

Then Commodore, in its infinite wisdom, brought out their new 128 computer (it's really neat, I've been using it) and my 'outdated, dead product', has its very own slot. So read on, and I'll tell you why I believed in this product. And remember, even though it's a trap, you're going to get a mind boggling deal.

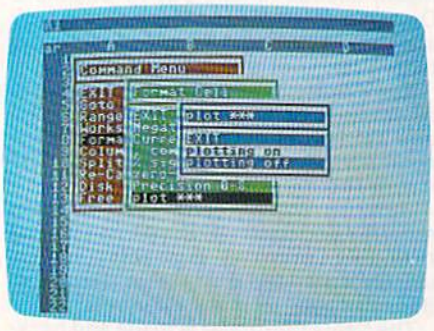
Of course, if you don't have a Commodore 64 or a 128, and you're not going to buy one, you'll just feel left out if you read on, so you better stop here.



SUPER HUEY

This is a true flight simulator. You're in the cockpit as you lift off and guide your copter through treacherous mountain passes, and over desert bases.

It will take you hours to master the 'collective' and control the 12 types of movements as you go on rescue, exploration and combat missions. The list price is $19.95, but it's yours for $4 as bait.



SWIFT-CALC SPREADSHEET

You can have sophisticated spreadsheet capabilities on the Commodore. Just imagine, with over 6600 cells, you can do loan analysis, expense reports and much more. If you invest or budget, Swift-Calc is ideal. It has pop-up menus and it's yours for just $4 as bait.



TEXTPRO/DATAPRO

Imagine a word processing program that is so easy to use that you don't even have to read the instructions. Just type your letters, term papers, or memos.

Then add a data base program that will let you create, organize and search up to 200 files, each with 8 sections.



And you can create as many different data bases as you wish, each with up to 200 files. You can keep the information in your computer or print it out.

The data base program can arrange it for you numerically or alphabetically, Or, use 'Greater Than' or 'Less Than' commands. For example, you could have the computer list all your stocks that are worth more or less than a certain value.

These 2 programs list for $39.95. But, they're both yours for just $4 as bait.



RICHARD PETTY'S TALADEGA

Take your seat and try to qualify. There are 18 drivers on the track, each with their own style of driving. It lists for $19.95, but it's yours for $4 as bait.

SLINKY (Picture Next Column)

Guide Slinky from square to square. You have to change the color of each square to finish a level. Finish a perfect level and you'll get an instant replay of your moves. Its list is $19.95, but, it's yours for just $4 as bait.

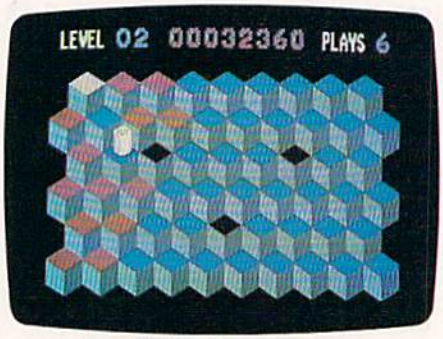
MORE

Not pictured is Forbidden Forest, picked as one of the 50 best games of all time. You'll be attacked by savage beasts as you try to shoot them with arrows. It's almost 3D and it's tough. $19.95 is list, but it's yours for $4 as bait.

Finally, there's Monster Trivia with over 2000 trivia questions. 1 to 4 people can play. Good luck! It lists for $19.95, but it's yours for $4 as bait.

IT'S COME BACK TO LIFE

So, what did Commodore put into its new 128 computer? They put in a cassette port. And, I think they recognized that aside from the $150 odd dollars you save on a disk drive, that cassettes are a very safe, reliable and easy way to save and retrieve data.



So, we've taken these wonderful productivity programs and thrilling games, had them manufactured on cassettes (the list prices are for disks) and you may choose 1 or all of them **only** when you buy the data cassette recorder.

If you now have disk, you'll be amazed at the speed and accuracy of cassette storage. If you have a data drive already, here's a great spare and oh, the software.

It just plugs into the cassette port of either your Commodore 64 or 128. It's



reliable. It's easy. Cassettes are cheap and protect your data. And everything is backed by a standard limited warranty.

$4 SOFTWARE BONANZA RISK FREE

Order any or all of the above programs. Try out the data cassette recorder. If you're not 100% delighted, simply return the recorder and all programs you purchased in their original boxes within 30 days for a courteous refund. Note: You may not return the recorder without all the programs you purchased.

To order your Fortronics Data Recorder for your Commodore 64 or 128 and any programs you desire, risk free with your credit card, call toll free, or send your check for DAK's close-out price of just **$29** ($4 P&H) Order No. 4143.

You may order one copy each of any **or all** of the cassette programs for **$4** ($1 P&H) each. Use the following Order Nos.: For Super Huey, No. 4368. For Swift-Calc, No. 4369. For TextPro/DataPro, No. 4370. For Taladega, No. 4371. For Slinky, No. 4372. For Forbidden Forest, No. 4373. For Monster Trivia, No. 4374.

Imagine all this productivity and challenge for just $4 each. DAK originally offered the recorder for $49. Now, at $29, and with this software. Wow!

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RN33



No Button Chess

Just follow the blinking lights for the most challenging game of your life. There are 8 levels. It's fully automated. And, wait till you see the price.

It's you against the computer. Chess comes alive with the latest breakthrough in computer technology.

There are no more bothersome buttons to push and complicated calculator displays to decipher. This computer uses 'sensor technology' to interpret what you have done, and simply lights 2 LEDs to tell you what it wants to do.

It's the newest version of 'follow the bouncing ball'. Now it's follow the blinking light. So, let the war begin!

It's smart. It has 8 levels of difficulty and its brain is an 80C50 Processor running at 6 megahertz with a memory capability of 32,000 bits, so you better come out fighting.

SIMPLE TO USE

Notice that I said, "simple to use", not simple to beat. Using this computer is incredibly easy. Just move your man. The computer will know exactly what you've done.

Then it's the computer's turn. Two LEDs will light to show you the man the computer wants to move. Then two more light show you where to move the man.

It's simple. It's easy. And, there are no buttons to push. You can concentrate on the game, not on the computer.

BUT, THERE ARE BUTTONS

The only buttons you really need are the on/off switch and the new game button. But, look at this.

There's help. Just touch a button, and the computer will join your team. It will pick your best possible move. A second button touch will send its brain back to pick its best response.

You can cheat. Let's say you make a really dumb move. After you see what the computer is going to do to you (horrors, you've lost your Queen), you make the computer take back its last move and then you can take back yours.

And that's not all. If you're the type of person who says, "If I only had my Queen back, I could beat this thing," no problem. You can add back in any piece anywhere, with the push of a button.

But there are limits. This computer won't let you make an illegal move. And if you move its man to the wrong location, it emits an unpleasant sound and flashes the lights re-showing you where it wants to go. So, what could be easier?

There's more. You can do a lot with the powerful brain of this computer. Not only can you add back in a piece you lost, you can take one of the computer's away. Plus, you can set up a classic game in mid-play to see how you would do.

This computer does everything a chess master would do. It castles, it has pawn promotion and en passant. So brush up, you'll have to play your best.

Even level one is a challenge. I can't beat this computer at level 4. And, I don't even want to talk about levels 5, 6, 7 and 8. And here's a nice extra.

You won't have to wait for the computer. With its super fast 6 megahertz speed, it thinks while you're playing (I think it knows what you're going to do).

It reacts in 5 seconds on level 1, 30 seconds on level 4 and so on. See if your brain can keep up with this computer.

WOW, IT'S REAL CHESS

But, when all is said and done, playing chess is what it's all about. And this game is very smart, very tough, but incredibly easy to use. Every move is even audibly confirmed.

It is only 10½" X 11" X 2½". The combatants are magnetic and the King stands 2" tall. Using the newest IC technology, this computer operates for more than 500 hours on 4 C batteries.

So, this chess player goes where you go. And, with more than 500 hours of battery life, you don't even need to buy an AC adaptor.

It's made in the United States (isn't that a change) by Fidelity Electronics. They are the largest and best known of the chess computer manufacturers. And, it's backed by their limited warranty.

TRY NO BUTTON CHESS RISK FREE

If you like a challenge and your ego is strong enough to withstand losing to a computer, why not play just one game.

If you aren't 100% satisfied, even if you just lose too often, you can return this computer within 30 days in its original box for a courteous refund.

To order your Fidelity No Button Chess Computer risk free with your credit card, call toll free, or send your check for DAK's breakthrough price of just **$69** plus **$4** for P&H. Order No. 4306. CA res add 6% sales tax.

Whether you're a novice or a master, one of the 8 levels is sure to keep you humble. Chess taxes intelligence, not reflexes, which is why it's always been a game of Kings and Diplomats.

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RN24

NEW FOR '86!

ReRUN QUARTERLY BI-MONTHLY

Get Every Program In RUN

It's the best software news of 1986! Now you can get all of your favorite ready-to-run programs—not just selected programs—from RUN Magazine. Introducing ReRUN Bi-Monthly. . . one super disk containing two months' worth of *every* outstanding Commodore program listed in RUN. We've increased our frequency to serve you better. Each disk is packed with applications, utilities, and games programs—you can use in a ready-to-run format.

FREE Bonus Program!

And as a special bonus, each ReRUN Bi-Monthly features a previously-unpublished *bonus* program. You'll get a FREE high-quality program that will be a perfect complement to your Commodore software library.

Available In February

It all begins in February with the first 1986 edition. Enjoy every program published in the January and February issues of RUN, without enduring time-consuming keyboarding and debugging. Each issue comes with a four-color documentation booklet so you can boot up your favorite programs in just minutes!

Subscribe Now—SAVE 30%

And if you subscribe to ReRUN *now*, you'll *save 30%* off the single copy price! You get all six issues for just $89.97. Or, order individually and pay $21.47 for each bi-monthly disk.

Get more great Commodore programs more often in 1986, plus six *free* bonus programs, and a 30% savings with a one-year subscription.

You'll get it all in the new ReRUN Bi-Monthly!



YES! **I WANT MORE ReRUN IN '86. PLEASE SEND ME:**

☐ 1 yr. (6 issues) for $89.97. I save 30% off the individual price.

☐ The January/February ReRUN disk for $21.47.

☐ Payment Enclosed ☐ Visa ☐ AE ☐ MC

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Signature

Name

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City State Zip

ReRUN • 80 PINE STREET • PETERBOROUGH, NH 03458 **2-86**

NEW LOW PRICE

THE X-10 POWERHOUSE DOES EVERYTHING BUT PUT OUT THE CAT.





Model CP290

THE X-10 POWERHOUSE INTERFACES WITH YOUR COMMODORE TO CONTROL YOUR HOME...FOR SECURITY, COMFORT AND ENERGY SAVINGS.

This remarkable Interface lets you run your home through your Commodore 64 or 128 and a keyboard or joystick.

When you're away, it makes your home look and sound lived in. When you're home, it can turn off the TV at night and wake you up to stereo and fresh brewed coffee in the morning. It can even turn on your air conditioner and control your heating.

SPECIAL COLOR GRAPHICS MAKE PROGRAMMING A SNAP. You simply pick a room from the display screen. Use your keyboard or joystick to position graphics of lights or appliances. Then follow on-screen instructions to program any light or appliance to go on or off whenever you choose. You can even control thermostats, light intensity and more.



THE WAY IT WORKS. The X-10 Powerhouse Interface is cable-connected to the Commodore "User" port and plugged into a standard 110V outlet. After it is programmed, the Interface sends digitally encoded signals through your home wiring to special X-10 Modules. To control a lamp or appliance, you simply plug the electrical device into a Module



and then plug the Module into an outlet. The Interface can control up to 256 Modules throughout your home and won't interfere with normal use of lights and appliances.

There are plug-in Appliance Modules, Lamp Modules, Wall Switch Replacement Modules and Special 220V Modules for heavy duty appliances such as water heaters and room air conditioners. Plus Thermostat Controllers for central heating and air conditioning, Telephone Responders to control your home from any phone, and much more.

IT WON'T TIE UP YOUR COMPUTER. Use your computer only for programming. When you're finished, disconnect the Interface from the "User" or RS-232 port and keep it plugged into any convenient power outlet in your home. It will operate as a stand-alone controller with battery back-up and will run your home automatically.

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Circle 77 on Reader Service card.

Tax Deductor's Delight

This program lets you file, sort, total, print and save all records that pertain to Schedule A of Form 1040.

By BARBARA SCHULAK

Itemized Tax Deductions will keep a file of all your itemized deductions. The fields for each record are category, date, check number, description and amount. The categories are—as on Schedule A—medical and dental expenses, taxes, interest expense, contributions, casualty and theft and miscellaneous.

Records may be added, changed or deleted. They may also be displayed on the screen or outputted to the printer, either in toto or by category. The latter option provides a sort of all the records by category and includes a statement of each category's total expenditures. The data may then be saved to either disk or tape. The program allows for the filing of 200 individual records. If more are required, the DIM statements in line 5 should be changed.

The program first presents a main menu. The options are as follows:

1. Load data
2. Add a record
3. Find a record
4. Change a record
5. Delete a record
6. Display file
7. Print file
8. Save data
9. End program

When running the program for the first time, choose Option 2, add a record. After the first session and once data has been saved, you must start with Option 1, load data.

The program will then ask for a filename. I would suggest using something like TAX-1985. If you're using a disk, the program will display a message that gives the status of the load. Then the program returns you to the main menu.

To add data, choose Option 2. The prompts are category, date, check number, description and amount of check. The category designation is entered numerically (1–6) from the displayed list. To enter the date, you may use any of the following types of formats: AUG 01, AUG 1, 08/01 or 8/1. Mainly, you should be consistent and not use more than six characters (including spaces).

The check number is entered as a string, so you may enter other strings of four characters or less (such as CASH) if the expense was not in the form of a check. The description can be anything, as long as it's 20 characters or less. Do not use dollar signs ($) when entering the amount. Enter 100 or 100.00, but *not* $100. Again, consistency will provide you with neater outputs.

In addition to adding records to the file, you may also change or delete an entry. To find which entry to change, you may use Option 3, find a record, which will sort through the records by any category or field. Or you may use Option 6, display file. Know your check number, because it is the key field for deleting or changing an entry. Then, just follow the prompts on the screen, using the same guidelines for data input as outlined above.

To see your file, choose Option 6. A submenu will then ask if you want to see all the records, or records sorted by field. You may then choose the field that you want. Any of these options results in the output of all necessary information to the screen, including a total of the amount spent.

Option 7, printing the file, works in the exact same manner. Examples of printouts may be seen in Table 3, which shows a sample printout for all records in a file, and in Table 4, which shows a printout of all records for the contributions category.

Option 8 is the Save File routine and is exactly like the Load routine. Don't forget to save the data before ending the program (Option 9)!

For those interested in programming or in making modifications to the program, I have included a list of the variables used in the program (Table 1) as well as a list of the program structure (Table 2).

This program might not do everything for you in Schedule A, but it is an excellent way to collect, store and sort your records for tax purposes and should also save you some time. R

Note: The program will work on the Plus/4 with these two changes:

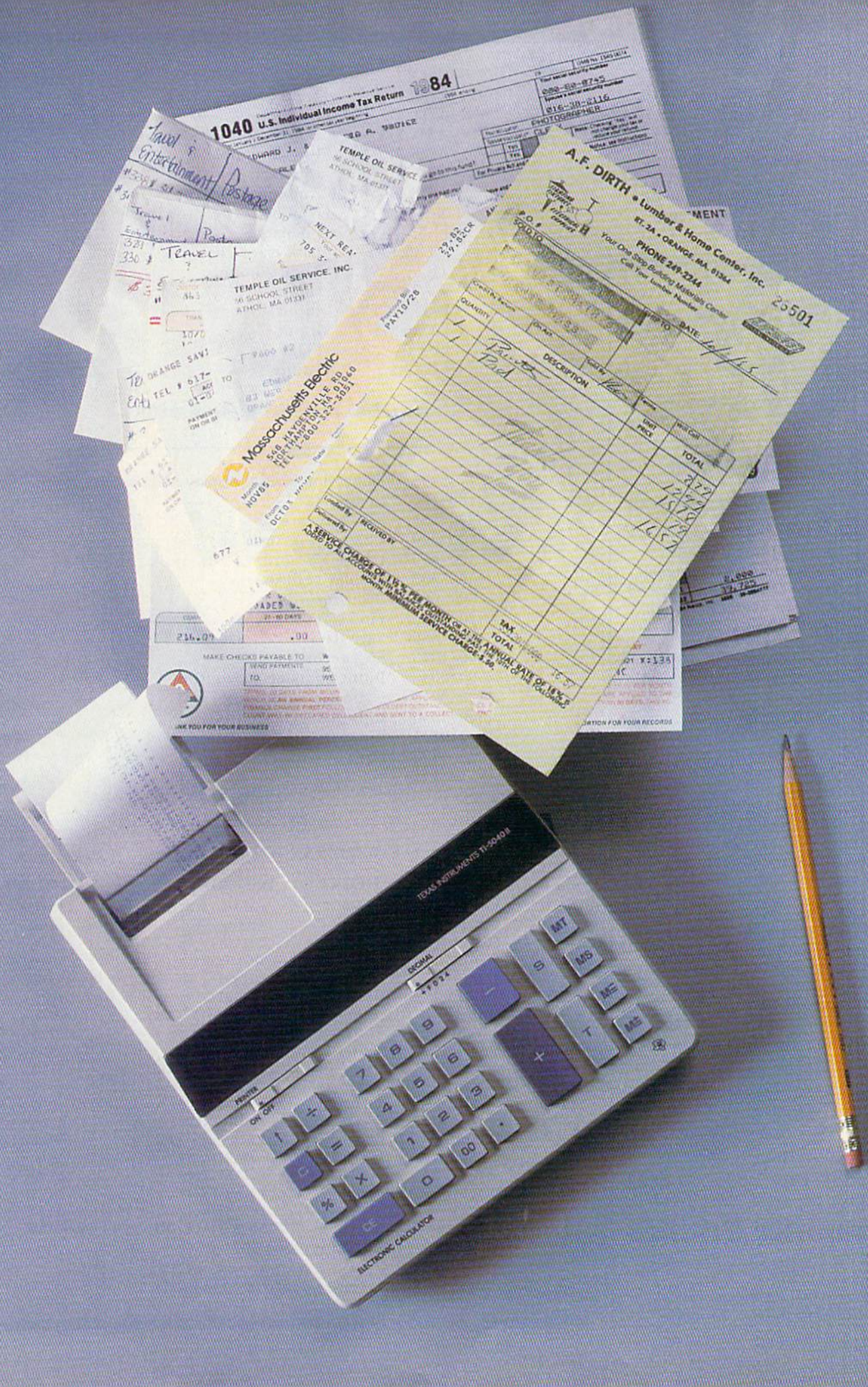
Line 15REM
Line 85IF K = 9THENEND

Address all author correspondence to Barbara H. Schulak, 2 Forest Glen, Iowa City, IA 52240.

RUN It Right

C-64; C-128 (in C-64 mode)
Plus/4 (with modifications)

Photograph by Ed Jaffe


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But like of each thing that in season grows
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C$( )	Category names
CA$( )	Field names
A$(X,1)	Category
A$(X,2)	Date
A$(X,3)	Check number
A$(X,4)	Description
A$(X,5)	Amount of check
N	Number of records in file
FL$	Filename
E,E$,E1,E2	Disk error checking
TL	Total amounts
K,K$,I$,N$	Input
R,R$,C,C$	Input
F,F$,G,G$	Input
FL,F1	Flags
I,J,X,A$	Utility

Table 1. *Itemized Tax Deductions program variables.*

5–95.	Dimension arrays, display main menu
100–180.	Load data
200–250.	Add a record
300–320.	Change a record
400–470.	Delete a record
500–585.	Display records
600–685.	Print records
700–720.	Find a record
800–880.	Save data
1000–1035.	Sort records
2000–2040.	Input filename subroutine
3000–3010.	Get a key subroutine
4000–4050.	Input data subroutine
5000–5175.	Input field subroutine
6000–6020.	Data statements

Table 2. *Line-by-line program structure.*

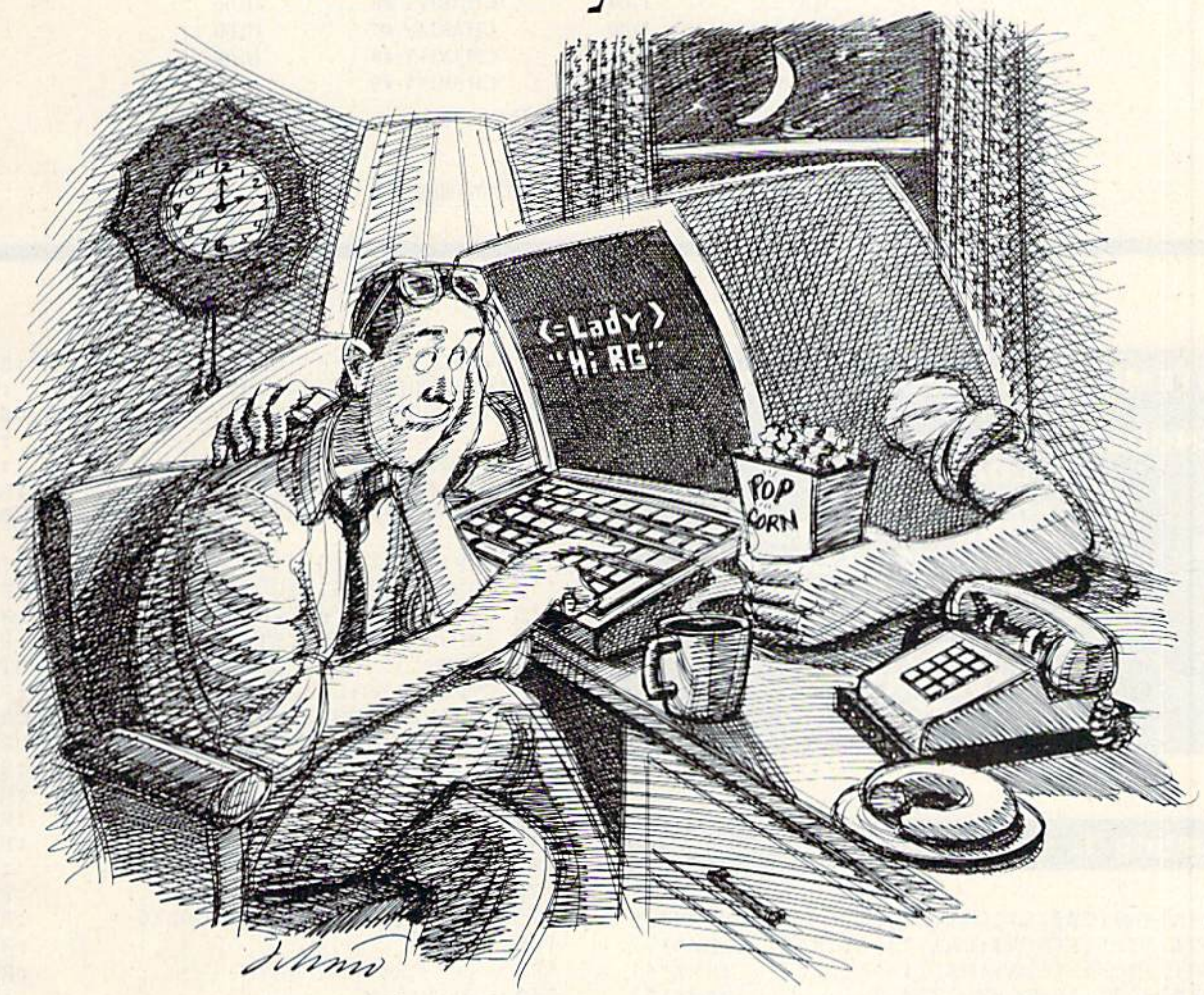
ITEMIZED TAX DEDUCTIONS

CAT	DATE	CHECK#	DESCRIPTION	AMOUNT
CON	JAN 2	900	CHARITY #1	10.00
MED	JAN 10	910	MEDICINE	10.98
CON	FEB 10	950	CHARITY #2	25.00
MED	FEB 15	960	DOCTOR	78.00
CON	MAR 10	980	CHARITY #3	15.00
CON	MAR 15	1000	CHARITY #4	10.00
TAX	MAR 30	1010	PROPERTY TAX	1000.00
MED	APR 10	1020	DENTIST	57.25
MED	MAY 5	1040	MEDICINE	15.44
INT	JUN 15	VISA	FINANCE CHARGE	11.33
CON	JUL 11	1083	CHARITY #5	25.00
CON	AUG 13	1100	CHARITY #6	10.00
MED	SEP 3	1115	MEDICINE	19.99
TAX	SEP 30	1125	PROPERTY TAX	1000.00
CON	OCT 15	1140	CHARITY #7	10.00
CON	NOV 3	1155	CHARITY #8	15.00
CON	DEC 5	1165	CHARITY #9	13.75
MED	DEC 10	1170	DOCTOR	55.00
INT	DEC 31	MORT	MORTGAGE INT	10000.00

TOTAL: 12381.74

Table 3. *Sample printout of all a file's records.*

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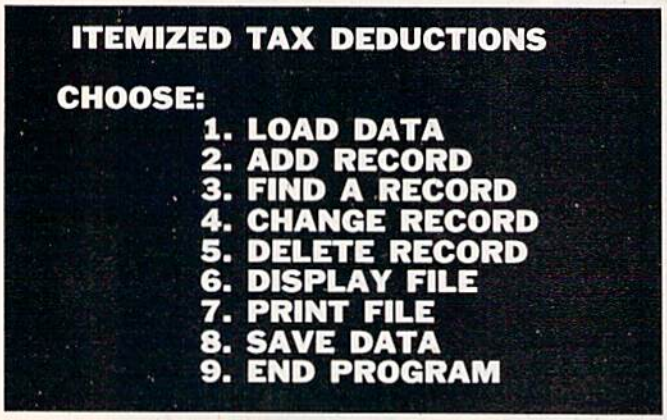
*Rate applies to 300 or 1200 baud, Mon.-Fri., 6PM to 8AM, local time, all day Sat., Sun. and nat'l holidays. Subject to service availability. **Additional hourly surcharge applies to 2400 baud service.

ITEMIZED TAX DEDUCTIONS
CONTRIBUTIONS

CAT	DATE	CHECK#	DESCRIPTION	AMOUNT
CON	JAN 2	900	CHARITY #1	10.00
CON	FEB 10	950	CHARITY #2	25.00
CON	MAR 10	980	CHARITY #3	15.00
CON	MAR 15	1000	CHARITY #4	10.00
CON	JUL 11	1083	CHARITY #5	25.00
CON	AUG 13	1100	CHARITY #6	10.00
CON	OCT 15	1140	CHARITY #7	10.00
CON	NOV 3	1155	CHARITY #8	15.00
CON	DEC 5	1165	CHARITY #9	13.75

TOTAL: 133.75

Table 4. *Sample printout of a file by category.*

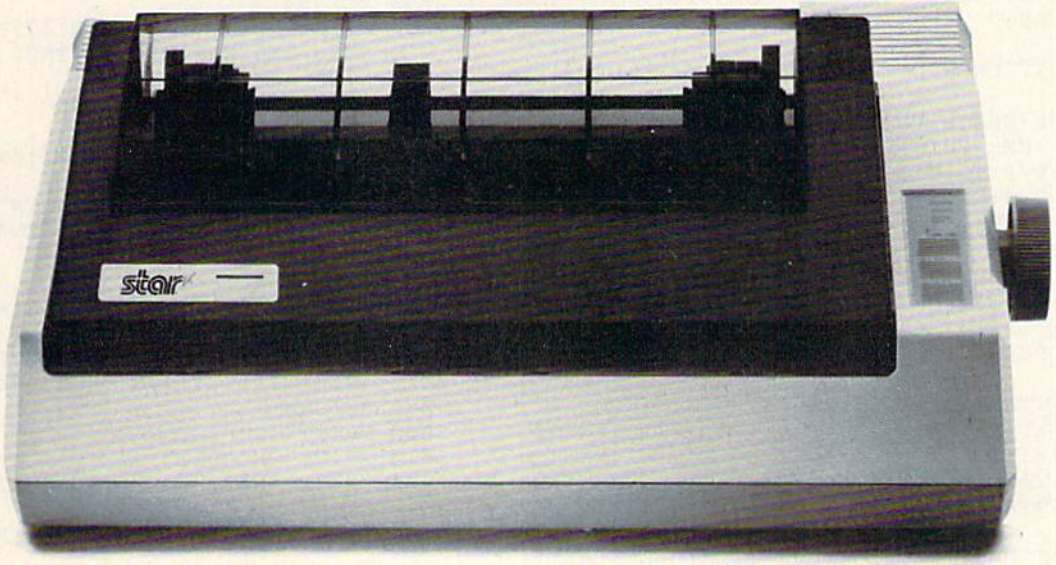


Listing 1. *Itemized Tax Deductions program for the C-64.*

```
5 N=Ø:DIMA$(2ØØ,5),CA$(5),C$(6)       :REM*95
1Ø FORI=1TO5:READA$:CA$(I)=A$:NEXT :REM*172
11 FORI=1TO6:READA$:C$(I)=A$:NEXT    :REM*41
15 POKE53281,15:POKE5328Ø,12         :REM*1Ø3
2Ø PRINT"{SHFT CLR}{CTRL 1}"TAB(9)"{CTRL 9}
   ITEMIZED TAX DEDUCTIONS"          :REM*2Ø6
25 PRINT"{2 CRSR DNs}CHOOSE:{2 CRSR DNs}"
                                     :REM*59
3Ø PRINTTAB(5)"1.{2 SPACEs}LOAD DATA
                                     :REM*236
35 PRINTTAB(5)"2.{2 SPACEs}ADD RECORD
                                     :REM*153
36 PRINTTAB(5)"3.{2 SPACEs}FIND A RECORD
                                     :REM*174
4Ø PRINTTAB(5)"4.{2 SPACEs}CHANGE RECORD
                                     :REM*13Ø
45 PRINTTAB(5)"5.{2 SPACEs}DELETE RECORD
                                     :REM*133
5Ø PRINTTAB(5)"6.{2 SPACEs}DISPLAY FILE
                                     :REM*5Ø
55 PRINTTAB(5)"7.{2 SPACEs}PRINT FILE
                                     :REM*95
6Ø PRINTTAB(5)"8.{2 SPACEs}SAVE DATA
                                     :REM*2ØØ
65 PRINTTAB(5)"9.{2 SPACEs}END PROGRAM
                                     :REM*117
75 GETK$:IFK$=""THEN75               :REM*15
8Ø K=VAL(K$):IFK<1ORK>9THEN75        :REM*132
85 IFK=9THENSYS2Ø48:END               :REM*67
9Ø ONKGOSUB1ØØ,2ØØ,7ØØ,3ØØ,4ØØ,5ØØ,6ØØ,8ØØ
                                     :REM*92
95 GOTO2Ø                            :REM*27
99 -----REM LOAD DATA-----           :REM*253
1ØØ PRINT"{SHFT CLR}LOAD-":F1=Ø:GOSUB2ØØØ
                                      :REM*4
1Ø5 IFF1THENOPEN2,1,Ø,FL$:GOTO135    :REM*67
11Ø OPEN15,8,15,"IO"                 :REM*216
115 OPEN2,8,2,"Ø:"+FL$+",S,R"        :REM*1Ø7
12Ø INPUT#15,E,E$,E1,E2              :REM*196
125 PRINT"{2 CRSR DNs}{CTRL 9}DISK STATUS:{
    CTRL Ø}"E;E$;E1;E2               :REM*253
13Ø IFETHENCLOSE2:CLOSE15:PRINT"{2 CRSR DNs
    }FILE NOT LOADED":GOSUB3ØØØ:RETURN
                                     :REM*246
135 INPUT#2,N                        :REM*183
14Ø FORI=1TON                        :REM*128
145 FORJ=1TO5                        :REM*255
15Ø INPUT#2,A$(I,J)                   :REM*88
17Ø NEXT:NEXT                        :REM*174
175 CLOSE2:IFF1=ØTHENCLOSE15         :REM*115
18Ø RETURN                           :REM*238
199 -----REM ADD DATA-----           :REM*221
2ØØ N=N+1:X=N                         :REM*52
21Ø PRINT"{SHFT CLR}"                :REM*2ØØ
22Ø GOSUB4ØØØ                        :REM*2Ø2
23Ø INPUT"ANY MORE ENTRIES";I$       :REM*156
24Ø IFLEFT$(I$,1)="Y"THEN2ØØ         :REM*254
25Ø RETURN                            :REM*52
299 -----REM CHANGE RECORD-----      :REM*142
3ØØ PRINT"{SHFT CLR}":FL=Ø:F=3       :REM*159
31Ø INPUT"CHECK# TO BE CHANGED";N$   :REM*117
315 GOSUB1ØØØ:IFFL=1THENRETURN       :REM*188
32Ø GOSUB4ØØØ:RETURN                 :REM*219
399 -----REM DELETE-----             :REM*18Ø
4ØØ PRINT"{SHFT CLR}":FL=Ø:F=3        :REM*3
41Ø INPUT"CHECK# TO BE DELETED";N$    :REM*57
415 GOSUB1ØØØ:IFFL=1THENRETURN        :REM*32
42Ø N=N-1                            :REM*27
425 FORI=XTON                        :REM*132
43Ø FORJ=1TO5                         :REM*29
435 A$(I,J)=A$(I+1,J)                :REM*196
455 NEXT:NEXT                        :REM*2Ø4
46Ø PRINT"{CRSR DN}RECORD DELETED.":REM*195
47Ø GOSUB3ØØØ:RETURN                 :REM*1Ø5
```

→

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Circle 92 on Reader Service card.

Listing 1 continued.

```
499 -----REM VIEW DATA-----          :REM*52
500 R=0:F=0:J=0:TL=0:GOSUB5000      :REM*221
505 PRINT"{SHFT CLR}"                :REM*240
510 PRINT"CAT DATE{4 SPACEs}CK#{3 SPACEs}DE
    SCRIPTION{6 SPACEs}AMT"          :REM*175
515 FORI=1TO39:PRINT"{COMD Y}";:NEXT:PRINT
                                     :REM*153
520 FORI=1TON                        :REM*254
535 IFR=2THENIFN$<>A$(I,F)THEN575    :REM*85
540 J=J+1                            :REM*36
545 PRINTA$(I,1);                    :REM*179
550 PRINTTAB(4)A$(I,2);              :REM*110
555 PRINTTAB(12)A$(I,3);             :REM*25
560 PRINTTAB(18)LEFT$(A$(I,4),12);   :REM*12
561 PRINTTAB(39-LEN(A$(I,5)))A$(I,5)
                                     :REM*119
565 TL=TL+VAL(A$(I,5))               :REM*23
570 IFJ/15=INT(J/15)THENGOSUB3000:PRINT"{SH
    FT CLR}"                         :REM*172
575 NEXT                             :REM*75
580 PRINT"{CRSR DN}{CTRL 9}TOTAL:{CTRL 0}"T
    L                                :REM*84
585 GOSUB3000:RETURN                 :REM*221
599 -----REM PRINT DATA-----         :REM*77
600 R=0:F=0:TL=0:GOSUB5000           :REM*40
605 OPEN2,4:CMD2                     :REM*69
607 PRINTTAB(25)"ITEMIZED TAX DEDUCTIONS":P
    RINT                             :REM*233
608 IFR=2ANDF=1THENPRINTTAB(35-(LEN(C$(G)))
    /2);C$(G):PRINT                  :REM*100
610 PRINTTAB(5)"CAT"SPC(5)"DATE"SPC(7)"CHEC
    K#"SPC(7)"DESCRIPTION"SPC(15)"AMOUNT"
                                     :REM*38
615 PRINTTAB(5);:FORI=1TO64:PRINT"{COMD Y}"
    ;:NEXT:PRINT                     :REM*25
620 FORI=1TON                        :REM*98
625 IFR=2ANDN$<>A$(I,F)THEN675       :REM*199
645 PRINTTAB(5);A$(I,1);TAB(5)A$(I,2);
                                     :REM*235
650 PRINTCHR$(16)"25";:PRINTTAB(5-LEN(A$(I,
    3)))A$(I,3);                     :REM*132
655 PRINTCHR$(16)"37"A$(I,4);        :REM*205
660 PRINTCHR$(16)"60";:PRINTTAB(9-LEN(A$(I,
    5)))A$(I,5)                      :REM*222
665 TL=TL+VAL(A$(I,5))               :REM*123
675 NEXT                             :REM*175
680 PRINT:PRINTTAB(25)"TOTAL:"TL     :REM*236
685 PRINT#2:CLOSE2:RETURN            :REM*147
699 -----REM FIND A RECORD-----      :REM*251
700 GOSUB5070                        :REM*148
710 GOSUB1000                        :REM*158
720 RETURN                           :REM*12
799 -----REM SAVE DATA-----           :REM*4
800 PRINT"{SHFT CLR}SAVE-":F1=0:GOSUB2000
                                     :REM*173
805 IFF1THENOPEN2,1,1,FL$:GOTO835    :REM*38
810 OPEN15,8,15,"IO"                 :REM*151
815 OPEN2,8,2,"@0:"+FL$+",S,W"       :REM*50
820 INPUT#15,E,E$,E1,E2              :REM*131
825 PRINT"{2 CRSR DNs}{CTRL 9}DISK STATUS:{
    CTRL 0}"E;E$;E1;E2               :REM*188
830 IFETHENCLOSE2:CLOSE15:PRINT"{2 CRSR DNs
    }FILE NOT SAVED.":GOSUB3000:RETURN
                                     :REM*157
835 PRINT#2,N                        :REM*198
840 FORI=1TON                        :REM*63
845 FORJ=1TO5                        :REM*190
850 PRINT#2,A$(I,J)                  :REM*103
870 NEXT:NEXT                        :REM*109
875 CLOSE2:IFF1=0THENCLOSE15         :REM*50
880 RETURN                           :REM*173
999 *****REM SORT RECORDS*****       :REM*124
1000 FORX=1TON                       :REM*87
1010 IFN$<>A$(X,F)THEN1030           :REM*243
1015 PRINT:FORI=1TO5:PRINTA$(X,I):NEXT
                                     :REM*164
1020 INPUT"{CRSR DN}IS THIS THE RECORD";I$
                                     :REM*223
1025 IFLEFT$(I$,1)="Y"THENRETURN     :REM*177
1027 PRINT"{SHFT CLR}"               :REM*253
1030 NEXT                            :REM*20
1035 PRINT"{CRSR DN}RECORD NOT FOUND":GOSUB
    3000:FL=1:RETURN                 :REM*235
1999 -----REM FILENAME INPUT-----    :REM*34
2000 INPUT"{CRSR DN}{CTRL 9}FILENAME:{CTRL
    0}";FL$                          :REM*77
2010 INPUT"{CRSR DN}{CTRL 9}D{CTRL 0}ISK OR
     {CTRL 9}T{CTRL 0}APE:";K$       :REM*129
2020 IFK$<>"D"ANDK$<>"T"THEN2010     :REM*125
2030 IFK$="T"THENF1=1                :REM*47
2040 RETURN                          :REM*57
3000 PRINTTAB(5)"{CRSR DN}{CTRL 9}{COMD 4}P
    RESS ANY KEY TO CONTINUE.{CTRL 0}{CTRL
     1}"                             :REM*217
3005 GETK$:IFK$=""THEN3005           :REM*24
3010 RETURN                           :REM*7
4000 PRINT:FORI=1TO6:PRINTI;C$(I):NEXT
                                     :REM*103
4001 INPUT"{CRSR DN}CATEGORY#";C$    :REM*28
4002 C=VAL(C$):IFC<1ORC>6THEN4001    :REM*99
4003 A$(X,1)=LEFT$(C$(C),3)          :REM*254
4005 FORI=2TO5                       :REM*58
4010 PRINTCA$(I)":";:INPUTA$(X,I)    :REM*215
4020 NEXT                            :REM*205
4030 INPUT"{2 CRSR DNs}CORRECT";I$   :REM*231
4040 IFLEFT$(I$,1)="N"THEN4000       :REM*243
4050 RETURN                          :REM*27
5000 PRINT"{SHFT CLR}"               :REM*145
5010 PRINT"CHOOSE:"                  :REM*175
5020 PRINTTAB(5)"{CRSR DN}1.{2 SPACEs}ALL R
    ECORDS                           :REM*117
5030 PRINTTAB(5)"2.{2 SPACEs}BY FIELD
                                     :REM*25
5040 GETR$:IFR$=""THEN5040           :REM*11
5050 R=VAL(R$):IFR<1ORR>2THEN5000    :REM*63
5060 IFR=1THENRETURN                 :REM*27
5070 PRINT"{SHFT CLR}"               :REM*215
5080 PRINT"CHOOSE:{CRSR DN}"         :REM*141
5090 FORI=1TO5                       :REM*91
5100 PRINTTAB(5)I".{2 SPACEs}"CA$(I):NEXT
                                     :REM*115
5120 GETF$:IFF$=""THEN5120           :REM*54
5130 F=VAL(F$):IFF<1ORF>5THEN5070    :REM*222
5135 IFF=1THEN5155                   :REM*201
5140 PRINT"{CRSR DN}ENTER "CA$(F);:INPUTN$
                                     :REM*144
5150 RETURN                          :REM*108
5155 PRINT:FORI=1TO6:PRINTI;C$(I):NEXT
                                     :REM*239
5160 INPUT"{CRSR DN}CATEGORY#";G$    :REM*172
5165 G=VAL(G$):IFG<1ORG>6THEN5160    :REM*191
5170 N$=LEFT$(C$(G),3)               :REM*226
5175 RETURN                          :REM*133
6000 DATA CATEGORY, DATE, CHECK#, DESCRIPTI
    ON, AMOUNT                       :REM*23
6010 DATA MEDICAL, TAXES, INTEREST, CONTRIB
    UTIONS, CASUALTY/THEFT           :REM*143
6020 DATA MISCELLANEOUS              :REM*29
9000 OPEN15,8,15,"S0:TAX DED":CLOSE15:SAVE"
    @0:TAX DED",8                    :REM*25
```

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This disk program translates your slow BASIC programs into a much, much faster code. The ***BLITZ!*** compiler significantly improves the performance of your BASIC routines. It reads the entire program, reduces that program's size by deciding which operations need to only run once, interprets the operations, and then re-writes the program into its own special P-code.

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For more advanced programmers, the ***BLITZ!*** compiler offers another benefit besides speed. It provides an almost infinite number of ways to add protection to your programs, because a compiled program is not readable. So security is inherent in the re-writing!

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It's Popular
Reviewers and users have heaped the following praise on the ***BLITZ!***: "The ***BLITZ*** basic compiler is a dream come true for BASIC programmers." Compute!'s Gazette Jan 1985 "worth its weight in gold." TPUG Mar. 1985. "Wonderful" "Fantastic" "I can't imagine programming without it" User comments. It is even more popular with professional programmers. Many commercial programs now say "***BLITZ!***" when they are listed. The ultimate accolade for ***BLITZ!***.

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New Names for Old Disks

By ROBERT DICKOW

The 1541's disk operating system (DOS) provides a fairly comprehensive set of commands. However, it doesn't include a command for renaming a disk, at least not without destroying all the files on it.

Fortunately, the accompanying disk utility (Listing 1) remedies this problem, letting you rename your disks as often as you like without damaging them.

Type in the program; save and run it. It will wait for you to place a disk in the drive, then prompt you to enter the new disk name, which can be up to 16 characters long. After you've done this, you may press the return key to verify the change or insert another disk and repeat the process.

If at some point you decide not to make the change, hit the left-arrow key. The only way of editing your new name is via the INST/DEL key. In any case, all the necessary user information is displayed on the screen after you run the program. When testing this program and correcting any typing errors, I suggest you use an old scratch disk.

The 1541's disk operating system doesn't provide a command for renaming disks. But we do . . .

To see how the program works, study the commands in lines 230 and 410 to 440. You can find a description of these commands in your disk drive owner's manual in the section on random-access files. A number of these commands can be used to access any byte on the disk, and reading bytes is as easy as writing them.

Following is a description of how to read a byte from the disk. First, you must open the command channel with the statement:

```
OPEN 15,8,15
```

Command channel 15 is needed for locating the bytes you want later on and for reading the I/O errors. A buffer is then set up for a block of data. Open a channel to access the data:

```
OPEN fl, dv, ch, "#"
```

The fl is the file number; dv is the device number (8, usually); and ch is the channel number (any number from 2 to 14). Now, pull the block of data you want into the drive RAM buffer with:

```
PRINT#15, "UA:";dv;0;tr;bl
```

This last command works the same as the User1, or U1, command, and it's similar to the Block Read command. The tr and bl stand for the track and sector you want to access. The dv is, of course, the device number, normally 8.

Finally, point to the byte you want to retrieve with the Buffer Pointer command as follows:

```
PRINT#15, "B-P:";ch;x
```

The x is the number of the byte (1

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to 256) that will start the byte-retrieving process, and ch is the channel number used when the data channel is first opened. To recover the disk name, you need to look in track 18, sector 0. This block houses the block-availability map, or BAM. The disk name follows immediately after the BAM data.

There, starting with the 144th byte of track 18, sector 0, and for 16 bytes following, you can find the name. The lower locations in the BAM are important, as they indicate to the DOS where free blocks for saving files are located. Therefore, you must be careful not to write data there accidentally!

From this point on, just use the Get# command to retrieve each successive byte of data. You can then display the data on the screen, transfer it to another file or perform any number of operations.

The process of writing data to the disk is similar to the process of reading data from it. When reading, however, use the USER2 (or U2 or UB) command after outputting to the datafile via the Print# command. Finally, close the data channel and then the command channel.

The commands discussed in this article can open up a new world of disk exploration for you. Try writing a program that will access blocks of data from the disk drive and allow the user to edit any byte. You can also change the loading address of machine language programs, change sequential files to program files (and vice versa), and even change filenames. Enjoy. R

Address all author correspondence to Robert Dickow, 2095 Rambler Road, Lexington, KY 40503.

Listing 1. *Name Changer program.*

```
1 REM ********************          :REM*25
2 REM * DISK NAME CHANGER *         :REM*206
3 REM *{8 SPACEs}BY{9 SPACEs}*      :REM*109
4 REM *{4 SPACEs}BOB DICKOW{5 SPACEs}*
                                    :REM*136
5 REM ********************          :REM*29
6 :                                 :REM*238
7Ø REM --INITIALIZE & DISPLAY SCREEN--
                                    :REM*7Ø
8Ø Q$=CHR$(34): AR$=CHR$(95): BK$=CHR$(2Ø):
   DE$="{CRSR LF}-{CRSR LF}": CH$=CHR$(221
   )                                :REM*24Ø
9Ø BX$="{11 SPACEs}{SHFT U}{16 SHFT *s}{SHF
   T I}":BY$="{11 SPACEs}{SHFT J}{16 SHFT *
   s}{SHFT K}"                      :REM*214
1ØØ DH$=CHR$(166):FORX=1TO4Ø:LN$=LN$+DH$:NE
    XT:R$=CHR$(13): DISK=8          :REM*1Ø4
11Ø FORX=1TO16:SP$=SP$+CHR$(16Ø):BL$=BL$+"-
    ":NEXT                          :REM*2
12Ø PRINT"{SHFT CLR}{CRSR DN}{CTRL 8}{9 SPA
    CEs}***DISK NAME CHANGER***{CTRL 2}"
                                    :REM*18
13Ø PRINT:PRINT"{4 SPACEs}"Q$;AR$;Q$" = ABO
    RT THE CHANGE OR EXIT"          :REM*24
14Ø PRINT"{4 SPACEs}"Q$"INST/DEL"Q$" = DELE
    TE A CHARACTER"                 :REM*6
15Ø PRINT"{4 SPACEs}HIT "Q$"RETURN"Q$" KEY
    TO ENTER CHANGE.":PRINT         :REM*2Ø4
16Ø PRINTLN$                        :REM*2Ø8
17Ø PRINT" INSERT DISK & HIT ";Q$;"RETURN"Q
    $" WHEN READY"                  :REM*236
18Ø CU=Ø: GOSUB 52Ø                 :REM*76
19Ø IFA$=AR$ THEN PRINT"{SHFT CLR}":END
                                    :REM*64
2ØØ IFA$<>R$ THENPRINT"{CRSR UP}";:GOTO17Ø
                                    :REM*206
21Ø OPEN 15,8,15:PRINT#15,"IØ":GOSUB 57Ø
                                    :REM*96
22Ø REM --GET DISK NAME FROM BAM--  :REM*48
23Ø B$="": OPEN8,DI,8,"#":PRINT#15,"UA:";8;
    Ø;18;Ø:PRINT#15,"B-P:";8;144    :REM*12
24Ø FORX=1TO2Ø:GET#8,A$:B$=B$+A$:NEXT
                                    :REM*118
25Ø CLOSE8: CLOSE 15                :REM*22Ø
26Ø NM$=LEFT$(B$,16):ID$=RIGHT$(B$,2)
                                    :REM*25
27Ø PRINT"{CRSR UP} CURRENT DISK NAME: {CTR
    L 9}"NM$;",";ID$:B$=""          :REM*95
28Ø PRINT"{CTRL 9}{CRSR DN}{2 SPACEs}TYPE N
    EW DISK NAME (16 CHRS MAXIMUM): ":PRINT
     BX$                            :REM*245
29Ø PRINT SPC(11);CH$;BL$;CH$:PRINTBY$:PRIN
    T"{2 CRSR UPs}";SPC(12);        :REM*11
3ØØ CU=1:GOSUB52Ø                   :REM*229
31Ø IFA$=R$ AND PEEK(211)<>28THEN PRINT"-{C
    RSR LF}";:GOTO 41Ø              :REM*225
32Ø Z=LEN(B$):IFA$=R$ THEN 41Ø      :REM*143
33Ø IF A$=BK$ AND Z=Ø THEN3ØØ       :REM*225
34Ø IFA$=BK$ANDPEEK(211)=28THENPRINT CH$"{C
    RSR LF}";DE$;:B$=LEFT$(B$,Z-1):GOTO3ØØ
                                    :REM*155
35Ø IFA$=BK$THEN PRINT"-{CRSR LF}";DE$;:B$=
    LEFT$(B$,Z-1):GOTO3ØØ           :REM*193
36Ø IFA$=AR$ THEN B$="":PRINT:PRINT"{CRSR U
    P}{CTRL 9}ABORTED":GOTO 48Ø     :REM*1Ø7
37Ø IFA$="{CRSR UP}"ORA$="{CRSR DN}"ORA$="{
    HOME}"ORA$="{SHFT CLR}"ORA$="{CRSR RT}"
    ORA$="{CRSR LF}"THEN3ØØ         :REM*135
38Ø IFZ<16THENB$=B$+A$:CU=1;PRINTA$;:REM*73
39Ø Z=LEN(B$):GOTO3ØØ               :REM*211
4ØØ REM --WRITE TO DISK ROUTINE--   :REM*27
41Ø OPEN15,DI,15:OPEN 8,DI,8,"#":FORX=1TO2:
    PRINT#15,"B-P:"8;144            :REM*195
42Ø IFX=1THENPRINT#8,SP$;:NEXT      :REM*247
43Ø PRINT#8,B$;                     :REM*133
44Ø PRINT#15,"U2:"8;Ø;18;Ø:GOSUB 57Ø
                                    :REM*1Ø1
45Ø CLOSE8:CLOSE15                  :REM*165
46Ø PRINT:PRINTSPC(2Ø);"{6 CRSR UPs}{CTRL 9
    }";B$;                          :REM*2Ø9
47Ø PRINTRIGHT$(SP$,16-LEN(B$));","ID$;"{5
    CRSR DNs}"                      :REM*5
48Ø PRINT:PRINT SPC(12)"{CTRL 9}CONTINUE?{2
     SPACEs}(Y/N){4 CRSR LFs}";:CU=1:GOSUB5
    2Ø                              :REM*197
49Ø IFA$="Y" OR A$=R$ THEN POKE 2Ø4,1:PRINT
    :GOTO12Ø                        :REM*55
5ØØ PRINT:END                       :REM*53
51Ø REM --INPUT SUBROUTINE--        :REM*3
52Ø GETA$:IF CU THEN POKE 2Ø4,Ø:POKE 2Ø7,Ø
                                    :REM*166
53Ø IF CU AND A$="" AND PEEK(211)=28 THEN C
    U=Ø:POKE2Ø4,1:PRINT CH$"{CRSR LF}";
                                    :REM*78
54Ø IF A$=""THEN 52Ø                :REM*228
55Ø POKE2Ø4,1:RETURN                :REM*158
56Ø REM --ERROR CHECK SUBROUTINE--  :REM*218
57Ø INPUT#15,E,E$,T,S               :REM*38
58Ø IFE>=2ØTHENPRINT:PRINT"{CRSR DN}ERROR#"
    E;"{CTRL 9}"E$:CLOSE8:CLOSE 15:END
                                    :REM*36
59Ø RETURN                          :REM*138
```

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Header Reader (display disk header)
Sync Maker
Device Number Change (disk drive)
Electronic Arts Backup
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Smooth Scroll (messages up screen)
Koala Dump (koala pad screen dump)
Disk Manipulation System
Disk Eraser (20 second clean wipe)
Split Screen (TWO screen colors)
Disk Protection System (stops copies)
Write Protect (diskette)
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By GEORGE DECKER

Take two parts Basic, add in seven spicy machine language subroutines, throw in a tasty systems interrupt, mix with a dash of high-resolution and multicolor graphics, make into beefy patties and add your toppings and buns. You can prepare these culinary delights with a C-64 and devour them vicariously to your heart's content.

How to Play

Burgers is a game that will drive you a little crazy. In these days of mass production, fixing a burger shouldn't be at all difficult. Push a computer key and on squirts the catsup. Push another key and you've got the mustard. Still another finishes the burger by putting the top bun in place. Sound easy? Well, what if the keys you needed to push kept changing? And suppose the burgers kept coming faster and faster? You might get a little frazzled.

Burgers begins with the bottom bun moving down the screen. It will pause (the duration depends on the skill level you select) beside the catsup, mustard and top bun holder. Next to each item will be a letter that changes as the bottom bun moves. When the bun pauses, the letters will stop, and you must type in the three letters selected.

You must build each burger in a specific order: catsup first, mustard second and top bun last. If you miss putting on the catsup, then you can't add the mustard and top bun. To add the bun, you must top the burger with both catsup and mustard.

At the bottom of the screen is a red bar showing what fixings you must add to the burger. Under this is your score. Every unfinished burger causes the red bar to go down, and if this bar runs out, the game is over.

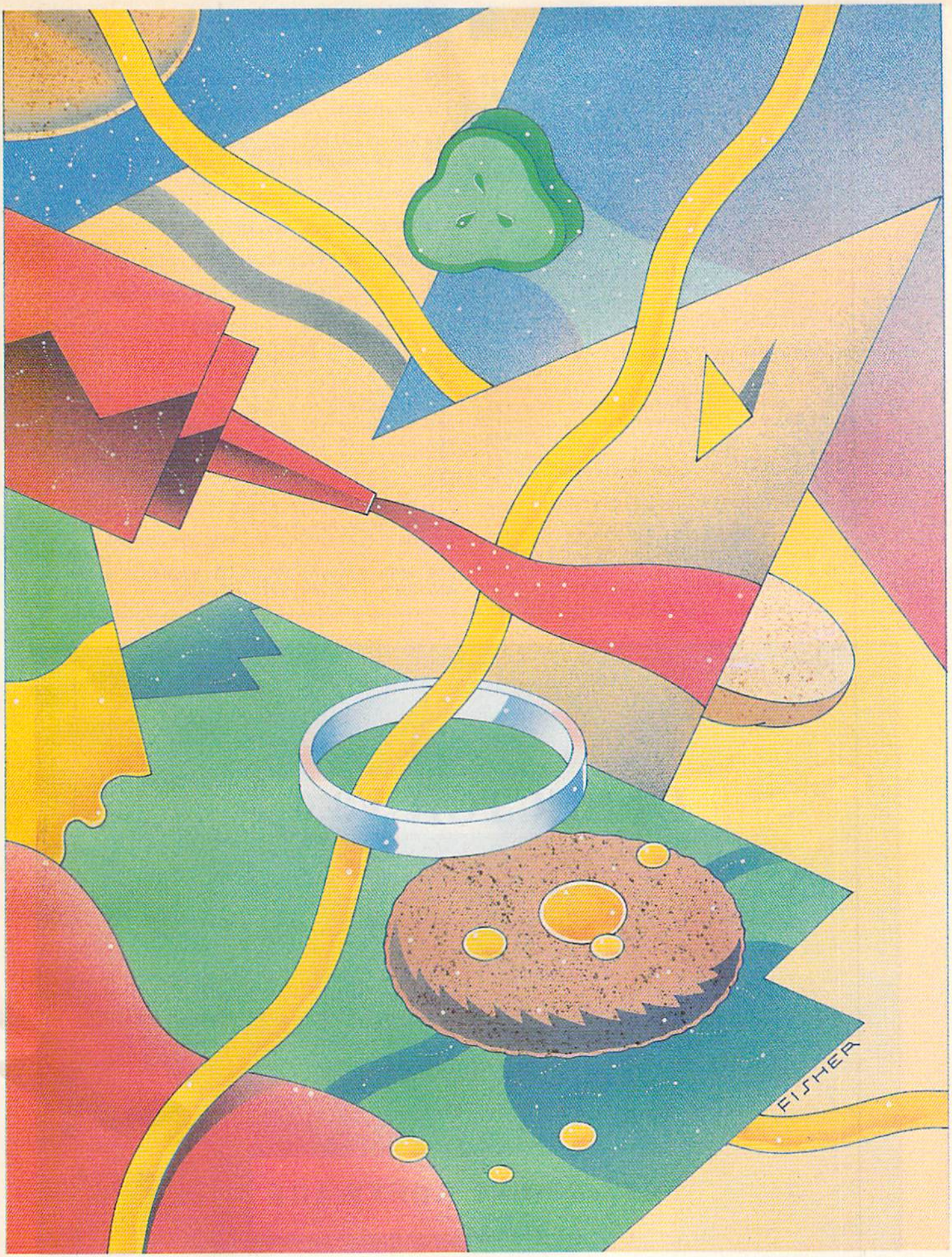
You receive 100 points for every finished burger. For every 1000 points you earn, the fixings bar will rise. High score is displayed at the top of the screen.

There are three skill levels: easy, normal and hard. Each level determines the length of the bun's pause. As you play, regardless of which level you select, the pauses will get shorter and shorter. R

Address all author correspondence to George Decker, 251 N. Luzerne Ave., Baltimore, MD 21224.

RUN It Right

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



Mark Fisher

Listing 1. *Burgers program for the C-64.*

```
1 REM BURGERS                                   :REM*93
2 REM 10/18/84                                  :REM*140
3 REM GEORGE DECKER                             :REM*223
4 REM 251 N. LUZERNE AVE.                       :REM*254
5 REM BALTO., MD. 21224                         :REM*183
6 REM**********************                     :REM*30
10 POKE52,48:POKE56,48:CLR                      :REM*230
15 DIMZ$(26):B=65:FORA=1TO26:Z$(A)=CHR$(B):
   B=B+1:NEXT                                   :REM*113
20 POKE53281,1:PRINT"{SHFT CLR}{CTRL 7}{15
   CRSR RTs}{CRSR DN}BURGERS                    :REM*202
22 PRINT"{17 CRSR RTs}BY":PRINT"{11 CRSR RT
   s}GEORGE R. DECKER"                          :REM*88
25 PRINT"{5 CRSR DNs}{CTRL 3}{10 CRSR RTs}S
   ELECT SKILL LEVEL":PRINT:PRINT               :REM*97
30 PRINT"{CTRL 1}F1 - EASY":PRINT"F3 - NORM
   AL":PRINT"F5 - HARD":PRINT"F7 - CHILDREN
   "                                            :REM*198
35 GETA$:IFA$="{FUNCT 1}"THENK=150:GOTO70
                                                :REM*247
40 IFA$="{FUNCT 3}"THENK=100:GOTO70:REM*246
45 IFA$="{FUNCT 5}"THENK=50:GOTO70 :REM*195
50 IFA$="{FUNCT 7}"THENK=200:GOTO70 :REM*16
60 GOTO35                                       :REM*80
63 REM GET SKILL LEVEL                          :REM*27
70 PRINT"{CRSR DN}{11 CRSR RTs}{CTRL 3}WAIT
    ONE MOMENT"                                 :REM*60
73 FORA=54272TO55295:POKEA,0:NEXT:REM CLEAR
    OUT SID                                     :REM*25
75 POKE54273,48:POKE54272,127:POKE54277,0:P
   OKE54278,128:POKE54296,15                    :REM*25
76 REM SET MUSIC                                :REM*244
80 POKE53265,PEEK(53265)AND239:REM BLANK SC
   REEN                                         :REM*126
100 POKE56334,PEEK(56334)AND254:POKE1,PEEK(
    1)AND251                                    :REM*138
110 FORA=0TO463:POKE14336+A,PEEK(53248+A):N
    EXT                                         :REM*28
120 POKE1,PEEK(1)OR4:POKE56334,PEEK(56334)O
    R1                                          :REM*30
130 POKE53272,(PEEK(53272)AND240)OR14
                                                :REM*242
140 REM****MOVE CHARACTER ROM****               :REM*116
150 FORA=14800TO14831:READB:POKEA,B:NEXT
                                                :REM*180
160 DATA3,3,15,15,63,63,255,255:REM 58
                                                :REM*216
170 DATA255,255,255,255,255,255,255,255:REM
     59                                         :REM*240
180 DATA192,192,240,240,252,252,255,255:REM
     60                                         :REM*26
190 DATA192,240,252,255,255,252,240,192:REM
     61                                         :REM*68
200 REM***CUSTOM CHARACTERS                     :REM*234
201 DATA0,0,0,0,0,0,0,0                         :REM*123
202 DATA0,0,0,0,0,0,0,0                         :REM*124
203 DATA0,0,0,0,0,0,0,0                         :REM*125
204 DATA0,0,0,0,0,0,0,0                         :REM*126
205 DATA0,0,0,0,0,0,0,85                        :REM*99
206 DATA85,85,85,85,85,21,85,84                 :REM*242
207 DATA21,85,84,5,85,80,5,85                   :REM*65
208 DATA80,1,85,64,1,85,64,0                    :REM*150
209 DATA0,0,0,0,0,0,0,0                         :REM*131
210 DATA0,0,0,0,0,0,0,0                         :REM*132
211 DATA0,0,0,0,0,0,0,0                         :REM*133
212 DATA0,0,0,0,0,0,0,0                         :REM*134
213 DATA0,255,255,255,255,255,255,85
                                                :REM*119
214 DATA85,85,85,85,85,21,85,84                 :REM*250
215 DATA21,85,84,5,85,80,5,85                   :REM*73
```

→

Circle 22 on Reader Service card.

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Listing 1 continued.

```
216 DATA8Ø,1,85,64,1,85,64,Ø          :REM*158
217 DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*139
218 DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*14Ø
219 DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*141
22Ø DATAØ,Ø,Ø,17Ø,17Ø,17Ø,17Ø,17Ø     :REM*184
221 DATA17Ø,255,255,255,255,255,255,85
                                      :REM*83
222 DATA85,85,85,85,85,21,85,84       :REM*2
223 DATA21,85,84,5,85,8Ø,5,85         :REM*81
224 DATA8Ø,1,85,64,1,85,64,Ø          :REM*166
225 DATAØ,Ø,Ø,1,85,64,1,85            :REM*51
226 DATA64,5,85,8Ø,5,85,8Ø,21         :REM*148
227 DATA85,84,21,85,84,85,85,85       :REM*163
228 DATA85,85,85,17Ø,17Ø,17Ø,17Ø,17Ø
                                      :REM*2Ø2
229 DATA17Ø,255,255,255,255,255,255,85
                                      :REM*91
23Ø DATA85,85,85,85,85,21,85,84       :REM*1Ø
231 DATA21,85,84,5,85,8Ø,5,85         :REM*89
232 DATA8Ø,1,85,64,1,85,64,Ø          :REM*174
235 FORA=12288TO12543:READB:POKEA,B:NEXT
                                      :REM*95
24Ø FORA=12544TO126Ø6:POKEA,Ø:NEXT    :REM*Ø
25Ø REM***SPRITE CHARACTERS***        :REM*36
31Ø POKE5328Ø,14:POKE53281,1          :REM*233
32Ø PRINT"{SHFT CLR}{2 SPACEs}{CTRL 1}SCORE
    {8 SPACEs}{CTRL 6};;;;;;;;;;{5 SPACEs}{C
    TRL 1}HIGH SCORE{6 CRSR LFs}{CRSR DN}"H
    S"{CRSR UP}"                      :REM*245
33Ø PRINTTAB(15)"{CTRL 6};{CTRL 5}BURGERS{C
    TRL 6};"                          :REM*125
34Ø PRINTTAB(15)"{CTRL 6};;;;;;;;;;"  :REM*11
35Ø FORA=1184TO1223:POKEA,59:POKEA+76Ø,59:P
    OKEA+8ØØ,59                       :REM*95
36Ø POKEA+54272,14:POKEA+55Ø32,14:POKEA+55Ø
    72,2:NEXT                         :REM*81
37Ø FORA=1224TO19Ø4STEP4Ø:POKEA,59:POKEA+39
    ,59                               :REM*215
38Ø POKEA+54272,14:POKEA+54311,14:NEXT:Z=2
                                      :REM*173
39Ø FORA=1356TO1916STEP4Ø:FORB=ØTO3:POKEA+B
    ,59:POKEA+B+54272,Z               :REM*223
4ØØ IFZ=2THENZ=7:GOTO43Ø              :REM*37
41Ø IFZ=7THENZ=12:GOTO43Ø             :REM*117
42Ø Z=2                               :REM*2Ø1
43Ø NEXTB:NEXTA                       :REM*15
44Ø FORA=136ØTO1372:POKEA,59:POKEA+2ØØ,59:P
    OKEA+4ØØ,59                       :REM*75
45Ø POKEA+54272,2:POKEA+54472,7:POKEA+54672
    ,12:NEXT                          :REM*43
46Ø POKE1372,61:POKE1572,61           :REM*171
47Ø PRINT"{HOME}{17 CRSR DNs}"TAB(16)"{COMD
     2}:;<:;<:;<:;<"                  :REM*57
48Ø FORA=1133TO1135:POKEA+54272,1:POKEA,59
                                      :REM*167
485 POKE1893,59:POKE1894,59:POKE1933,59:POK
    E1934,59:POKE1935,59              :REM*74
487 POKE56165,13:POKE56166,13:POKE562Ø5,13:
    POKE562Ø6,13                      :REM*2Ø8
488 POKE1895,59:POKE56167,13:POKE562Ø7,13
                                      :REM*231
49Ø POKEA+54312,1:POKEA+4Ø,59:NEXT    :REM*193
5ØØ REM***SCREEN SET UP***            :REM*131
5Ø5 POKE53275,15:REM SPRITE BEHIND BACKGROU
    ND                                :REM*11Ø
51Ø V=53248:POKEV+21,15:REM TURN ON FIRST 4
     SPRITES                          :REM*99
52Ø POKE2Ø4Ø,196:POKE2Ø41,196:POKE2Ø42,196:
    POKE2Ø43,196:REM SPRITES BLANK    :REM*158
53Ø POKEV+39,7:POKEV+4Ø,7:POKEV+41,7:POKEV+
    42,7:REM SET SPRITE COLOR         :REM*1Ø8
54Ø POKEV+28,15:POKEV+37,9:POKEV+38,1Ø:REM
    SET MULTI COLOR SPRITES           :REM*1Ø8
56Ø POKE2Ø4Ø,192:POKEV+Ø,Ø:POKEV+2,Ø:POKEV+
    4,Ø:POKEV+6,Ø                     :REM*184
57Ø POKEV+1,68:POKEV+3,1Ø7:POKEV+5,146:POKE
    V+7,185:POKEV+16,15               :REM*17Ø
575 REM*** SET SPRITE POSITIONS***    :REM*53
576 REM***START OF GAME FOLLOWS***    :REM*114
577 POKE53265,PEEK(53265)OR16:FORA=1TO6ØØ:N
    EXT                               :REM*2Ø5
578 SC=Ø:FB=39:UB=Ø                   :REM*54
58Ø FORA=1TO39:POKE54276,33           :REM*244
59Ø S=INT(RND(1)*26)+1                :REM*44
6ØØ T=INT(RND(1)*26)+1:IFT=STHEN6ØØ:REM*116
61Ø U=INT(RND(1)*26)+1:IFU=TTHEN61Ø   :REM*22
62Ø PRINT"{HOME}{8 CRSR DNs}{1Ø CRSR RTs}{C
    TRL 3}"Z$(S)                      :REM*22
63Ø PRINT"{4 CRSR DNs}{1Ø CRSR RTs}{CTRL 8}
    "Z$(T)                            :REM*92
64Ø PRINT"{4 CRSR DNs}{1Ø CRSR RTs}{COMD 2}
    "Z$(U)                            :REM*194
65Ø POKEV+1,A+68:POKEV+3,A+1Ø7:POKEV+5,A+14
    6:POKEV+7,A+185:POKE54276,32:NEXT
                                      :REM*238
655 POKE2Ø44,PEEK(2Ø43)               :REM*127
66Ø POKE2Ø43,PEEK(2Ø42):POKEV+7,185:REM*12Ø
67Ø POKE2Ø42,PEEK(2Ø41):POKEV+5,146:REM*148
68Ø POKE2Ø41,PEEK(2Ø4Ø):POKEV+3,1Ø7:REM*172
69Ø POKE2Ø4Ø,192:POKEV+1,68           :REM*14Ø
7ØØ FORB=1TOK                         :REM*248
71Ø GETA$                             :REM*154
72Ø IFA$=Z$(S)THENPOKE2Ø41,193        :REM*44
73Ø IFA$=Z$(T)ANDPEEK(2Ø42)=193THENPOKE2Ø42
    ,194                              :REM*238
74Ø IFA$=Z$(U)ANDPEEK(2Ø43)=194THENPOKE2Ø43
    ,195                              :REM*8Ø
75Ø NEXTB                             :REM*12
76Ø IFPEEK(2Ø44)=196THEN58Ø           :REM*124
77Ø IFPEEK(2Ø44)<>195THEN8ØØ          :REM*2Ø7
78Ø SC=SC+1ØØ:PRINT"{HOME}{CTRL 1}{7 CRSR R
    Ts}"SC                            :REM*159
79Ø UB=UB+1ØØ:IFUB=1ØØØTHEN82Ø        :REM*167
795 GOTO58Ø                           :REM*12Ø
796 REM UPDATE SCORE                  :REM*81
8ØØ POKE56256+FB,1:FB=FB-1:IFFB=ØTHEN86Ø
                                      :REM*245
81Ø GOTO58Ø                           :REM*135
815 REM DECREASE FIXINGS-SEE IF GAME IS OVE
    R                                 :REM*142
82Ø FB=FB+1:IFFB>39THENFB=39          :REM*53
83Ø POKE56256+FB,2:UB=Ø               :REM*245
84Ø K=K-5:IFK<25THENK=25              :REM*55
85Ø GOTO58Ø                           :REM*175
855 REM INCREASE FIXINGS-SPEED UP GAME
                                      :REM*166
86Ø POKEV+21,Ø                        :REM*241
863 IFSC=>HSTHENHS=SC                 :REM*1Ø
865 PRINT"{SHFT CLR}{CRSR DN}{13 CRSR RTs}{
    CTRL 1}GAME OVER!"                :REM*4
87Ø PRINT"{5 CRSR DNs}{8 CRSR RTs}FINAL SCO
    RE "SC                            :REM*121
88Ø PRINT"{3 CRSR DNs}{8 CRSR RTs}HIGH SCOR
    E "HS                             :REM*165
89Ø PRINT"{CTRL 7}{6 CRSR RTs}{4 CRSR DNs}T
    O PLAY AGAIN PUSH ANY KEY.":POKE198,Ø
                                      :REM*149
9ØØ WAIT198,1:RESTORE:GOTO2Ø          :REM*77
91Ø REM END GAME-SEE IF ANYONE WANTS TO PLA
    Y AGAIN                           :REM*41
```

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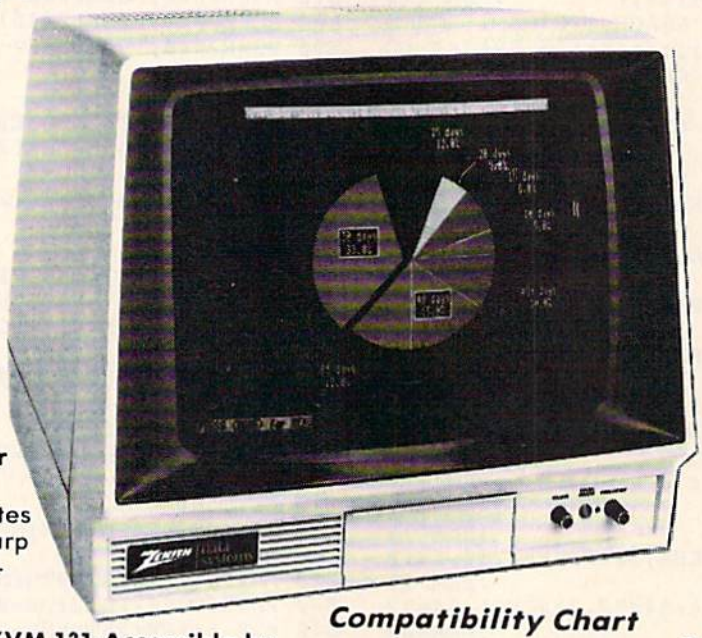
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Quality circuitry design generates crisp lines, pure colors, and sharp character definition for easy-to-read displays. DC-coupling permits the video display to retain its color balance from a single dot to a full screen of data.

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ZVM 131-Accessible by Many Popular Systems

The ZVM 131 is designed to interface with most personal computers, VCRs, video discs, video games and modular TV tuners that have either composite video or RGB direct drive outputs.

Compatibility Chart

Computer	Interfaces Via
Apple II	Composite
Aplus 3000	RGB
Apple III	RGB
IBM PC	RGB
Commodore 128	RGB/Composite
Commodore 64	Composite
Commodore Vic-20	Composite
TI 99/4	Composite
Atari 800	Composite
Atari 1200	Composite
Atari 1400	Composite

Connection Cables

RGB Cable — $19.95
C128, Aplus 3000 (Specify)

Composite — $9.95
Commodore, Aplus 3000, Atari (Specify)

The ZVM 131 Sound Of Quality

The output sound level is externally regulated by a user-adjustment volume control. Use the Zenith quality sound system to monitor the modern audio capabilities of the computer generation.

Easy-To-Reach Front Access Controls

ZVM 131's 13" diagonal display screen can exhibit impressive graphics and intensely clear copy. Easy-to-reach front access user controls (picture, black level, color level, tint, sharpness, audio volume, background noise control) make display adjustment simple and fast. An LED power on indicator notifies the user when the monitor is operable.

Multiple Monitors On A Single Computer

The composite video "loop-thru" feature permits a single composite video source to drive several monitors at the same time. This allows easy display possibilities for multiple viewers in business and educational applications. No more crowding around a single terminal. Everyone enjoys a clear, unobstructed view of important data.

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SPECIFICATIONS

(IBM — Commodore)

Size/Weight
Height 5.04" Width 16.7"
Depth 13.4" Weight 18.7 lbs.
Internal Char. Coding
ASCII Plus ISO
Print Buffer Size
120 CPS: 132 Bytes (1 line)
120/160 CPS Plus LQM: 2K
No. of Char. In Char. Set
96 ASCII Plus International
Graphics Capability
Standard 60, 72, 120 DPI
Horizontal 72 DPI Vertical
Pitch
10, 12, 16.7, 5, 6, 8.3, Proportional Spacing
Printing Method
Impact Dot Matrix

Char. Matrix Size
9H x 9V (Standard) to 10H x 9V
(Emphasized & Elongate)
Printing Features
Bi-directional, Short line seeking, Vertical Tabs, Horizontal Tabs
Forms Type
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(Apple — Atari — Etc.)

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11 x 7 International Char.
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Character Spacing
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Interfaces

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$2B5 Fast Load and drive 9—There's an easy way to make the popular Epyx Fast Load cartridge work with drive 9 (or any other drive) rather than the default drive 8. Just open a command channel to the drive in question, and Fast Load will adopt it as its default drive. Here's an example for drive 9:

```
OPEN 15,9,15
```

To return to drive 8, just do this:

```
CLOSE 15 : OPEN 15,8,15 : CLOSE 15
```

Donald E. Griffey
Hopkinsville, KY

$2B6 Probability function—Here's a neat little function that evaluates to logic true or logic false (−1 or 0), with the probability of "true" depending on a value assigned by you:

```
10 DEF FNP(X)=RND(1)<X
```

In this case, FNP(.2) will be true 20% of the time, FNP(.5) 50% of the time, and so forth.

One use of this is to cause certain lines to be executed or not, at random, but with a fixed probability. For example, consider this line:

```
100 IF FNP(.25) THEN GOSUB 1000
```

When the line is executed, the program may or may not jump to the subroutine at 1000, but the probability that it will go there is one in four (.25).

I've used this technique to add interesting highlights to games, and I hope you can use it as well.

Davie Cooley
Dothan, AL

$2B7 Input with variable default—Sometimes you may like to build a variable default value into an Input statement. That is, you want the default value to be based on conditions that vary from time to time when you're running the program. The way to do it is to print the prompting message and the variable, then use a Poke to place your cursor on the last character of your prompt. Here's an example:

```
PRINT "PROMPT";N; : POKE X,6 : INPUT N
```

The value of X is 211 for the C-64 and VIC; 202 for the Plus/4 and C-16; and 236 for the C-128.

The Input statement's question mark will appear directly after the prompt, followed by a space and the cursor flashing on the first digit of the number N. Just press the return key to make this your entry, or type another number to change it. The trick can also be used when the default is a string variable, but you must insert an extra space at the end of the prompt.

Joseph R. Charnetski
Dallas, PA

$2B8 Unprotector—Have you been frustrated by C-64 programs that use REM [SHIFT L] to protect them from being listed? Have you laboriously gone through those

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programs, deleting the offending lines by hand? Well, if you have, that drudgery is behind you. Type in the accompanying program, run it, then load a program containing some of those disturbing REMs. Enter SYS 49152, and, in a few seconds, all the shifted Ls will be removed. You can then list your program without encountering syntax errors.

```
10 PRINT"{SHFT CLR}UNPROTECTOR - RALPH NEAL
   "
20 FORJ=49152TO492ØØ:READK:POKEJ,K:CS=CS+K:
   NEXT:PRINT
30 IFCS<>822ØTHENPRINT"ERROR IN DATA STATEM
   ENTS":STOP
40 PRINT"SYS49152 REMOVES REM SHIFT L'S FRO
   M":PRINT
50 PRINT"THE BASIC PROGRAM IN MEMORY. MAGIC
   !"
61 DATA 169,ØØØ,133,251,169,Ø08,133,252
62 DATA 16Ø,ØØØ,177,251,2Ø1,143,2Ø8,Ø2Ø
63 DATA 192,255,2Ø8,ØØ2,23Ø,252,2ØØ,177
64 DATA 251,2Ø1,2Ø4,2Ø8,ØØ7,169,Ø32,145
65 DATA 251,Ø76,Ø1Ø,192,2ØØ,2Ø8,227,23Ø
66 DATA 252,165,252,197,174,2Ø8,219,Ø96
67 DATA 255
```

Ralph Neal
Nash, TX

$2B9 Magazine indexing—If you subscribe to *RUN* or any other publication, you know how hard it can be to search the back issues for a single memorable article. I've learned that most issues contain one or two articles that are more interesting to me than all the others combined. When each issue arrives, I identify those articles and write their names on the binding of the magazine. It is amazing how much search time that eliminates thereafter.

James Albrecht
Kalispell, MT

$2BA Cartridge repair—Don't discard faulty software cartridges until you've given them this CPR. First clean the metal contacts with a pencil eraser. If that doesn't help, disassemble the plastic case and use your fingers to apply even pressure to any socket-mounted components. Reassemble the case and try the cartridge again.

This procedure may or may not resuscitate your cartridge, but it works often enough to be worth a try.

Lee A. Seats
Mountville, PA

Circle 121 on Reader Service card.

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Take command of your software. End the spiral of buying copy-programs. *The Protection Revealed Handbook* unravels the puzzle of software protection. For authors and users – become a master of illusion. Learn how to protect or un-protect your software. Includes a large section on successful BASIC program security. Covers the latest evolution of copy protection techniques. Topics include:

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ALL C-64

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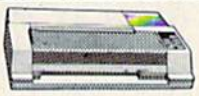
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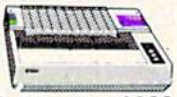
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From p. 39.

Listing 1 continued.

```
128Ø DATAØ,Ø,Ø,Ø,Ø,15,15,15          :REM*181
129Ø DATA1,1,1,1,1,1,1,15            :REM*233
13ØØ DATAØ,Ø,Ø,Ø,12,12,12,12         :REM*125
131Ø DATA3,3,3,3,Ø,Ø,Ø,Ø             :REM*213
132Ø DATA2,2,2,14,Ø,Ø,Ø,Ø            :REM*175
133Ø DATA12,12,12,12,Ø,Ø,Ø,Ø         :REM*155
134Ø DATA12,12,12,12,3,3,3,3         :REM*165
135Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*253
136Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*7
137Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*17
138Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*27
139Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*37
14ØØ DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*47
141Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*57
142Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*67
143Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*77
144Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*87
145Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*97
146Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*1Ø7
147Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*117
148Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*127
149Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*137
15ØØ DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*147
151Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*157
152Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*167
153Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*177
154Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*188
155Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*198
156Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*2Ø8
157Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*218
158Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*228
159Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*238
16ØØ DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø            :REM*248
161Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*2
162Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*12
163Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*22
164Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*32
165Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*42
166Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*52
167Ø DATA173,Ø,3,2Ø1,228,24Ø,31,169:REM*174
168Ø DATA63,141,231,49,169,77,141,232
                                     :REM*56
169Ø DATA49,169,228,141,Ø,3,169,3    :REM*9Ø
17ØØ DATA141,1,3,162,7,189,39,33    :REM*2Ø4
171Ø DATA157,228,3,2Ø2,16,247,96,169
                                     :REM*136
172Ø DATA1,141,Ø,255,76,47,33,142   :REM*216
173Ø DATA229,49,224,11,2Ø8,16,32,134
                                     :REM*158
174Ø DATA3,2Ø5,233,49,2Ø8,8,1Ø4,1Ø4  :REM*34
175Ø DATA76,241,33,174,229,49,173,Ø:REM*148
176Ø DATA255,41,241,141,Ø,255,1Ø8,231
                                     :REM*3Ø
177Ø DATA49,162,1,32,128,3,221,97   :REM*13Ø
178Ø DATA33,2Ø8,232,2Ø2,16,245,76,33:REM*94
179Ø DATA38,82,65,32,128,3,2Ø1,84   :REM*2Ø6
18ØØ DATA2Ø8,217,76,249,37,162,1,32 :REM*31
181Ø DATA128,3,221,125,33,2Ø8,2Ø4,2Ø2
                                     :REM*251
182Ø DATA16,245,76,13,43,84,145,162:REM*149
183Ø DATA2,32,128,3,221,143,33,2Ø8  :REM*241
184Ø DATA186,2Ø2,16,245,76,159,34,84:REM*89
185Ø DATA88,69,32,128,3,2Ø1,244,2Ø8:REM*239
186Ø DATA17Ø,76,185,5Ø,162,4,32,128:REM*163
187Ø DATA3,221,172,33,2Ø8,157,2Ø2,16:REM*55
188Ø DATA245,76,185,5Ø,76,76,79,82  :REM*159
189Ø DATA67,162,4,32,128,3,221,193  :REM*137
19ØØ DATA33,2Ø8,136,2Ø2,16,245,76,2Ø3
                                     :REM*111
191Ø DATA47,83,85,82,76,65,32,128    :REM*99
192Ø DATA3,162,3,221,214,33,24Ø,1Ø   :REM*21
193Ø DATA2Ø2,16,248,76,67,33,6,7     :REM*61
194Ø DATA31,33,189,233,33,141,232,33 :REM*1
195Ø DATA189,237,33,141,231,33,76,Ø:REM*223
196Ø DATAØ,5Ø,5Ø,44,45,185,185,88    :REM*71
197Ø DATA1Ø6,32,128,3,2Ø1,254,24Ø,2Ø6
                                     :REM*167
198Ø DATA2Ø1,235,2Ø8,3,76,99,33,162:REM*161
199Ø DATA8,221,54,34,24Ø,57,2Ø2,16  :REM*253
2ØØØ DATA248,2Ø1,66,2Ø8,3,76,81,33  :REM*123
2Ø1Ø DATA2Ø1,7Ø,2Ø8,3,76,1Ø9,33,2Ø1:REM*171
2Ø2Ø DATA72,2Ø8,3,76,146,33,2Ø1,83  :REM*233
2Ø3Ø DATA2Ø8,3,76,156,33,2Ø1,84,2Ø8   :REM*1
2Ø4Ø DATA3,76,127,33,2Ø1,87,2Ø8,3   :REM*133
2Ø5Ø DATA76,177,33,76,67,33,229,224:REM*1ØØ
2Ø6Ø DATA225,156,244,222,147,148,223,189
                                     :REM*82
2Ø7Ø DATA78,34,141,77,34,189,87,34  :REM*242
2Ø8Ø DATA141,76,34,76,Ø,Ø,35,39     :REM*126
2Ø9Ø DATA37,34,43,34,46,46,5Ø,63    :REM*146
21ØØ DATA2Ø7,8Ø,218,155,96,96,24,185
                                     :REM*1Ø4
211Ø DATA32,128,3,32,9,136,138,41    :REM*18
212Ø DATA15,141,235,49,32,9,136,138:REM*196
213Ø DATA1Ø,1Ø,1Ø,1Ø,13,235,49,141 :REM*168
214Ø DATA235,49,168,173,Ø,255,41,254
                                     :REM*14Ø
215Ø DATA141,Ø,255,169,25,141,Ø,214:REM*148
216Ø DATA173,1,214,9,128,41,191,162:REM*172
217Ø DATA25,142,Ø,214,141,1,214,232 :REM*12
218Ø DATA142,Ø,214,14Ø,1,214,96,32  :REM*212
219Ø DATA128,3,162,Ø,32,224,34,173  :REM*254
22ØØ DATA235,49,41,24Ø,32,122,34,162
                                     :REM*146
221Ø DATA25,142,Ø,214,173,1,214,41   :REM*22
222Ø DATA127,9,64,142,Ø,214,141,1    :REM*92
223Ø DATA214,173,Ø,255,41,2Ø7,141,Ø:REM*232
224Ø DATA255,32,39,192,169,147,32,21Ø
                                     :REM*76
225Ø DATA255,173,Ø,255,9,48,141,Ø   :REM*122
226Ø DATA255,96,32,128,3,32,9,136   :REM*244
227Ø DATA142,221,49,173,Ø,255,41,254
                                     :REM*164
228Ø DATA141,Ø,255,169,Ø,16Ø,Ø,162 :REM*13Ø
229Ø DATA18,32,145,48,169,255,141,237
                                     :REM*32
23ØØ DATA49,162,Ø,32,6,35,232,224   :REM*222
231Ø DATA64,2Ø8,248,76,46,35,173,221
                                     :REM*161
232Ø DATA49,32,172,48,169,24,141,Ø   :REM*43
233Ø DATA214,173,1,214,41,127,72,169
                                     :REM*161
234Ø DATA24,141,Ø,214,1Ø4,141,1,214:REM*247
235Ø DATA169,3Ø,141,Ø,214,173,237,49
                                     :REM*143
236Ø DATA141,1,214,76,185,48,16Ø,24 :REM*13
237Ø DATA14Ø,Ø,214,173,1,214,9,128  :REM*193
238Ø DATA14Ø,Ø,214,141,1,214,96,32  :REM*221
239Ø DATA128,3,32,135,49,32,9,136   :REM*2Ø9
24ØØ DATA142,7,5Ø,173,Ø,255,41,254   :REM*71
241Ø DATA141,Ø,255,32,113,35,32,237 :REM*19
242Ø DATA36,173,21Ø,49,237,2Ø4,49,173
                                     :REM*237
243Ø DATA211,49,237,2Ø5,49,144,1,96:REM*189
244Ø DATA32,99,36,32,237,36,76,89   :REM*121
245Ø DATA35,56,173,2ØØ,49,237,196,49:REM*73
246Ø DATA141,2Ø4,49,173,2Ø1,49,237,197
                                     :REM*187
247Ø DATA49,141,2Ø5,49,56,173,2Ø2,49:REM*11
248Ø DATA237,198,49,141,2Ø6,49,173,2Ø3
                                     :REM*173
249Ø DATA49,237,199,49,141,2Ø7,49,162
                                     :REM*1Ø9
25ØØ DATAØ,142,212,49,142,218,49,142
                                     :REM*155
251Ø DATA213,49,142,215,49,142,217,49
                                     :REM*185
252Ø DATA142,219,49,232,142,214,49,142
                                      :REM*83
253Ø DATA216,49,173,2Ø5,49,16,27,24:REM*211
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254Ø DATA169,255,141,216,49,141,217,49
                                        :REM*153
255Ø DATA77,2Ø4,49,1Ø5,1,141,2Ø4,49:REM*239
256Ø DATA173,2Ø5,49,73,255,1Ø5,Ø,141
                                        :REM*22Ø
257Ø DATA2Ø5,49,173,2Ø7,49,16,27,24:REM*2Ø6
258Ø DATA169,255,141,214,49,141,215,49
                                        :REM*158
259Ø DATA77,2Ø6,49,1Ø5,1,141,2Ø6,49 :REM*3Ø
26ØØ DATA173,2Ø7,49,73,255,1Ø5,Ø,141 :REM*8
261Ø DATA2Ø7,49,56,173,2Ø4,49,237,2Ø6
                                        :REM*128
262Ø DATA49,173,2Ø5,49,237,2Ø7,49,176
                                        :REM*122
263Ø DATA74,173,2Ø5,49,141,211,49,173
                                        :REM*152
264Ø DATA2Ø4,49,141,21Ø,49,173,2Ø6,49
                                        :REM*1Ø6
265Ø DATA141,2Ø4,49,173,2Ø7,49,141,2Ø5
                                        :REM*136
266Ø DATA49,173,21Ø,49,141,2Ø6,49,173
                                        :REM*234
267Ø DATA211,49,141,2Ø7,49,173,216,49
                                        :REM*196
268Ø DATA141,212,49,173,217,49,141,213
                                        :REM*236
269Ø DATA49,162,Ø,142,216,49,142,217:REM*88
27ØØ DATA49,173,214,49,141,218,49,173
                                        :REM*146
271Ø DATA215,49,141,219,49,142,214,49
                                        :REM*158
272Ø DATA142,215,49,173,2Ø5,49,74,141
                                        :REM*238
273Ø DATA2Ø9,49,173,2Ø4,49,1Ø6,141,2Ø8
                                        :REM*98
274Ø DATA49,162,1,142,21Ø,49,2Ø2,142
                                        :REM*124
275Ø DATA211,49,96,24,173,196,49,1Ø9
                                        :REM*214
276Ø DATA216,49,141,196,49,173,197,49
                                        :REM*38
277Ø DATA1Ø9,217,49,141,197,49,24,173
                                        :REM*124
278Ø DATA198,49,1Ø9,218,49,141,198,49
                                        :REM*216
279Ø DATA173,199,49,1Ø9,219,49,141,199
                                        :REM*228
28ØØ DATA49,24,173,2Ø8,49,1Ø9,2Ø6,49:REM*46
281Ø DATA141,2Ø8,49,173,2Ø9,49,1Ø9,2Ø7
                                        :REM*13Ø
282Ø DATA49,141,2Ø9,49,238,21Ø,49,2Ø8
                                        :REM*115
283Ø DATA3,238,211,49,56,173,2Ø4,49:REM*149
284Ø DATA237,2Ø8,49,173,2Ø5,49,237,2Ø9
                                        :REM*23
285Ø DATA49,176,57,56,173,2Ø8,49,237:REM*37
286Ø DATA2Ø4,49,141,2Ø8,49,173,2Ø9,49
                                        :REM*231
287Ø DATA237,2Ø5,49,141,2Ø9,49,24,173
                                        :REM*173
288Ø DATA196,49,1Ø9,212,49,141,196,49
                                        :REM*229
289Ø DATA173,197,49,1Ø9,213,49,141,197
                                        :REM*229
29ØØ DATA49,24,173,198,49,1Ø9,214,49
                                        :REM*175
291Ø DATA141,198,49,173,199,49,1Ø9,215
                                        :REM*241
292Ø DATA49,141,199,49,96,173,196,49
                                        :REM*125
293Ø DATA133,252,173,198,49,133,254,173
                                          :REM*7
294Ø DATA197,49,133,253,32,2,37,76  :REM*69
295Ø DATA25,37,32,191,48,165,252,41:REM*219
296Ø DATA7,17Ø,189,72,37,141,223,49:REM*157
297Ø DATA162,18,165,251,164,25Ø,76,145
                                        :REM*39
298Ø DATA48,173,7,5Ø,24Ø,2,169,128 :REM*155
299Ø DATA141,224,49,32,2,37,32,161 :REM*119
3ØØØ DATA48,141,221,49,141,222,49,32
                                        :REM*245
3Ø1Ø DATA16,37,173,223,49,44,224,49 :REM*51
3Ø2Ø DATA48,8,73,255,45,221,49,76   :REM*83
3Ø3Ø DATA69,37,13,221,49,76,172,48 :REM*169
3Ø4Ø DATA128,64,32,16,8,4,2,1         :REM*5
3Ø5Ø DATA32,128,3,32,135,49,32,9    :REM*23
3Ø6Ø DATA136,142,7,5Ø,173,196,49,141
                                        :REM*185
3Ø7Ø DATA243,49,173,197,49,141,244,49
                                        :REM*123
3Ø8Ø DATA173,198,49,141,245,49,173,199
                                        :REM*244
3Ø9Ø DATA49,141,246,49,173,2ØØ,49,141
                                        :REM*198
31ØØ DATA247,49,173,2Ø1,49,141,248,49
                                        :REM*24Ø
311Ø DATA173,2Ø2,49,141,249,49,173,2Ø3
                                        :REM*154
312Ø DATA49,141,25Ø,49,173,247,49,141
                                         :REM*18
313Ø DATA2ØØ,49,173,248,49,141,2Ø1,49
                                        :REM*174
314Ø DATA173,245,49,141,2Ø2,49,173,246
                                        :REM*182
315Ø DATA49,141,2Ø3,49,32,75,35,173:REM*126
316Ø DATA247,49,141,2ØØ,49,173,248,49
                                        :REM*18Ø
317Ø DATA141,2Ø1,49,173,249,49,141,2Ø2
                                         :REM*76
318Ø DATA49,173,25Ø,49,141,2Ø3,49,32:REM*7Ø
319Ø DATA75,35,173,243,49,141,2ØØ,49:REM*52
32ØØ DATA173,244,49,141,2Ø1,49,173,249
                                        :REM*96
321Ø DATA49,141,2Ø2,49,173,25Ø,49,141
                                        :REM*32
322Ø DATA2Ø3,49,32,75,35,173,243,49 :REM*36
323Ø DATA141,2ØØ,49,173,244,49,141,2Ø1
                                        :REM*18Ø
324Ø DATA49,173,245,49,141,2Ø2,49,173
                                        :REM*15Ø
325Ø DATA246,49,141,2Ø3,49,32,75,35:REM*244
326Ø DATA96,32,128,3,32,161,49,32  :REM*244
327Ø DATA9,136,142,7,5Ø,173,2ØØ,49  :REM*62
328Ø DATA141,196,49,173,2Ø1,49,141,197
                                         :REM*8Ø
329Ø DATA49,173,2Ø2,49,141,198,49,173
                                        :REM*156
33ØØ DATA2Ø3,49,141,199,49,32,75,35:REM*2Ø8
331Ø DATA96,32,128,3,32,161,49,173 :REM*2Ø8
332Ø DATA2ØØ,49,141,196,49,173,2Ø1,49
                                        :REM*54
333Ø DATA141,197,49,173,2Ø2,49,141,198
                                        :REM*21
334Ø DATA49,32,9,136,142,2ØØ,49,138:REM*189
335Ø DATA74,141,251,49,32,9,136,142 :REM*47
336Ø DATA2Ø2,49,32,9,136,224,199,176:REM*11
337Ø DATA56,24Ø,54,142,252,49,32,9  :REM*65
338Ø DATA136,142,7,5Ø,142,8,5Ø,173  :REM*59
339Ø DATA196,49,141,253,49,173,197,49
                                        :REM*83
34ØØ DATA141,254,49,141,Ø,5Ø,141,2 :REM*111
341Ø DATA5Ø,141,4,5Ø,173,198,49,141:REM*1Ø3
342Ø DATA249,49,56,237,2Ø2,49,141,5:REM*197
343Ø DATA5Ø,56,237,252,49,2Ø1,199,144
                                        :REM*157
344Ø DATA1,96,173,196,49,24,1Ø9,251:REM*127
345Ø DATA49,141,255,49,144,6,238,Ø :REM*187
346Ø DATA5Ø,238,2,5Ø,24,173,255,49  :REM*69
347Ø DATA1Ø9,2ØØ,49,141,1,5Ø,144,3 :REM*123
348Ø DATA238,2,5Ø,173,2,5Ø,2Ø1,2    :REM*87
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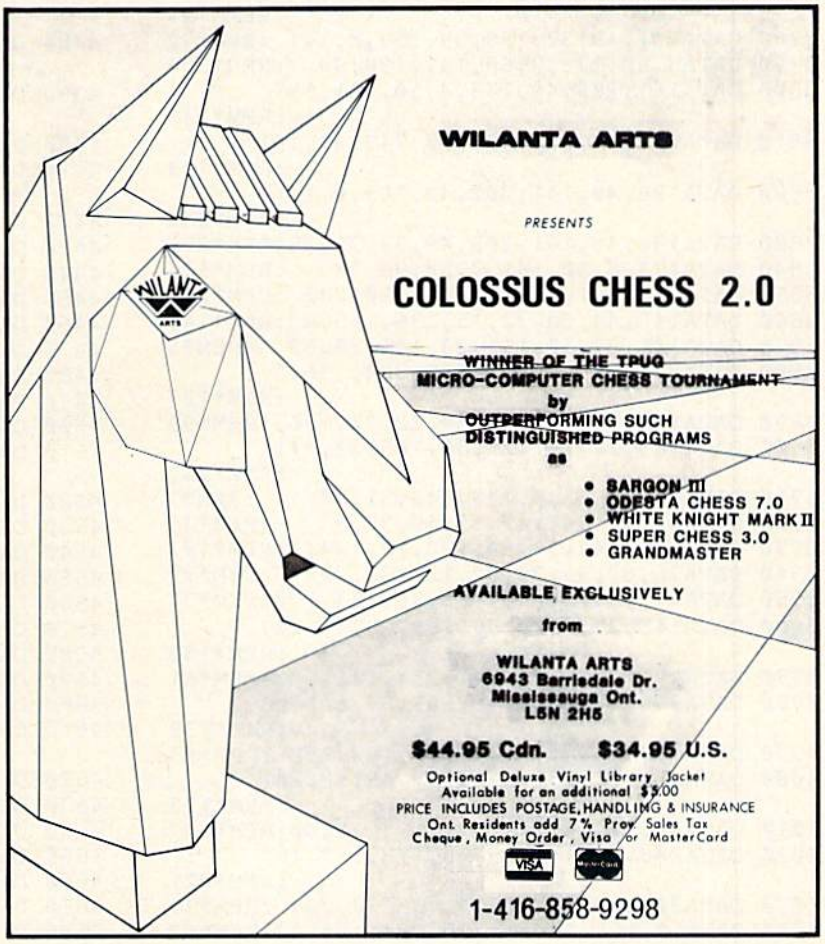
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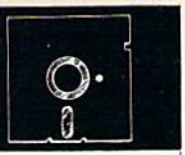
Listing 1 continued.

```
349Ø DATA144,11,2Ø1,3,176,211,173,1:REM*1Ø9
35ØØ DATA5Ø,2Ø1,127,176,2Ø4,24,173,253
                                    :REM*157
351Ø DATA49,1Ø9,2ØØ,49,141,3,5Ø,144:REM*233
352Ø DATA3,238,4,5Ø,169,1,141,6      :REM*47
353Ø DATA5Ø,173,6,5Ø,2Ø8,6,32,7      :REM*75
354Ø DATA39,24,144,3,32,79,39,2Ø6    :REM*61
355Ø DATA249,49,2Ø6,5,5Ø,2Ø6,252,49:REM*143
356Ø DATA173,252,49,2Ø5,2Ø2,49,176,5
                                    :REM*231
357Ø DATA169,Ø,141,6,5Ø,173,252,49 :REM*1Ø3
358Ø DATA2Ø1,199,144,213,169,Ø,141,7:REM*95
359Ø DATA5Ø,141,8,5Ø,76,79,39,173  :REM*182
36ØØ DATA253,49,141,196,49,174,254,49
                                    :REM*172
361Ø DATA142,197,49,172,249,49,14Ø,198
                                    :REM*212
362Ø DATA49,173,255,49,141,2ØØ,49,174
                                    :REM*92
363Ø DATAØ,5Ø,142,2Ø1,49,172,5,5Ø    :REM*6Ø
364Ø DATA14Ø,2Ø2,49,32,189,39,173,255
                                    :REM*222
365Ø DATA49,141,196,49,174,Ø,5Ø,142:REM*184
366Ø DATA197,49,172,5,5Ø,14Ø,198,49:REM*254
367Ø DATA173,1,5Ø,141,2ØØ,49,174,2 :REM*212
368Ø DATA5Ø,142,2Ø1,49,32,189,39,173:REM*36
369Ø DATA1,5Ø,141,196,49,174,2,5Ø  :REM*144
37ØØ DATA142,197,49,172,5,5Ø,192,2ØØ
                                    :REM*236
371Ø DATA144,2,16Ø,Ø,14Ø,198,49,173 :REM*6Ø
372Ø DATA3,5Ø,141,2ØØ,49,174,4,5Ø    :REM*42
373Ø DATA142,2Ø1,49,172,249,49,14Ø,2Ø2
                                    :REM*148
374Ø DATA49,32,189,39,173,3,5Ø,141  :REM*244
375Ø DATA196,49,174,4,5Ø,142,197,49 :REM*86
376Ø DATA172,249,49,14Ø,198,49,173,253
                                    :REM*1Ø8
377Ø DATA49,141,2ØØ,49,174,254,49,142
                                    :REM*124
378Ø DATA2Ø1,49,32,189,39,169,Ø,141 :REM*92
379Ø DATA7,5Ø,173,3,5Ø,141,196,49  :REM*2Ø6
38ØØ DATA141,2ØØ,49,173,4,5Ø,141,197
                                    :REM*248
381Ø DATA49,141,2Ø1,49,173,249,49,141
                                    :REM*174
382Ø DATA198,49,141,2Ø2,49,169,Ø,141
                                    :REM*24Ø
383Ø DATA199,49,141,2Ø3,49,32,75,35:REM*228
384Ø DATA173,8,5Ø,141,7,5Ø,96,32    :REM*1Ø5
385Ø DATA128,3,162,Ø,142,43,5Ø,232 :REM*223
386Ø DATA142,44,5Ø,32,15,136,165,22:REM*145
387Ø DATA141,27,5Ø,165,23,141,28,5Ø  :REM*5
388Ø DATA2Ø1,2Ø8,144,9,2Ø1,224,176,5
                                    :REM*127
389Ø DATA169,14,141,43,5Ø,32,15,136 :REM*99
39ØØ DATA165,22,141,29,5Ø,165,23,141
                                    :REM*247
391Ø DATA3Ø,5Ø,32,9,136,142,31,5Ø     :REM*1
392Ø DATA32,9,136,142,32,5Ø,32,9     :REM*35
393Ø DATA136,142,33,5Ø,224,17,144,3:REM*1Ø3
394Ø DATA76,67,33,32,92,121,32,2ØØ  :REM*99
395Ø DATA42,141,34,5Ø,165,36,133,158:REM*97
396Ø DATA165,37,133,159,169,Ø,141,237
                                    :REM*185
397Ø DATA49,173,Ø,255,41,254,141,Ø  :REM*61
398Ø DATA255,173,237,49,2Ø5,34,5Ø,2Ø8
                                    :REM*133
399Ø DATA1,96,168,174,44,5Ø,169,158 :REM*53
4ØØØ DATA32,116,255,238,237,49,32,2Ø1
                                    :REM*173
4Ø1Ø DATA41,224,Ø,2Ø8,228,174,33,5Ø:REM*147
4Ø2Ø DATA2Ø8,34,141,35,5Ø,173,237,49
                                    :REM*221
4Ø3Ø DATA2Ø5,34,5Ø,2Ø8,4,169,32,2Ø8 :REM*39
4Ø4Ø DATA19,168,174,44,5Ø,169,158,32:REM*63
4Ø5Ø DATA116,255,238,237,49,32,2Ø1,41
                                    :REM*31
4Ø6Ø DATA224,Ø,2Ø8,225,141,36,5Ø,32 :REM*81
4Ø7Ø DATA127,42,174,33,5Ø,2Ø8,51,169:REM*89
4Ø8Ø DATA255,141,38,5Ø,173,35,5Ø,32 :REM*33
4Ø9Ø DATA1Ø6,42,16Ø,7,32,254,42,1Ø :REM*169
41ØØ DATA1Ø,1Ø,1Ø,153,49,5Ø,136,16  :REM*9Ø
411Ø DATA243,173,36,5Ø,32,1Ø6,42,16Ø
                                    :REM*25Ø
412Ø DATA7,32,254,42,41,15,25,49     :REM*66
413Ø DATA5Ø,153,49,5Ø,136,16,242,76 :REM*66
414Ø DATA78,41,173,36,5Ø,32,1Ø6,42  :REM*98
415Ø DATA16Ø,7,32,254,42,153,49,5Ø  :REM*52
416Ø DATA136,16,247,169,Ø,17Ø,16Ø,127
                                    :REM*152
417Ø DATA153,57,5Ø,136,16,25Ø,16Ø,7:REM*24Ø
418Ø DATA173,33,5Ø,141,38,5Ø,185,188:REM*38
419Ø DATA49,61,49,5Ø,24Ø,2,169,255 :REM*174
42ØØ DATA141,47,5Ø,173,47,5Ø,1Ø,62 :REM*152
421Ø DATA57,5Ø,62,65,5Ø,62,73,5Ø     :REM*3Ø
422Ø DATA62,81,5Ø,62,89,5Ø,62,97    :REM*224
423Ø DATA5Ø,62,1Ø5,5Ø,62,113,5Ø,62 :REM*232
424Ø DATA121,5Ø,62,129,5Ø,62,137,5Ø :REM*48
425Ø DATA62,145,5Ø,62,153,5Ø,62,161:REM*232
426Ø DATA5Ø,62,169,5Ø,62,177,5Ø,24  :REM*3Ø
427Ø DATA2Ø6,38,5Ø,2Ø8,198,136,16,176
                                    :REM*56
428Ø DATA232,224,8,2Ø8,169,169,Ø,141
                                    :REM*182
429Ø DATA38,5Ø,172,33,5Ø,136,14Ø,39:REM*2Ø8
43ØØ DATA5Ø,162,Ø,172,39,5Ø,185,184 :REM*24
431Ø DATA42,168,185,57,5Ø,157,49,5Ø:REM*22Ø
432Ø DATA2ØØ,232,224,8,144,244,16Ø,Ø:REM*76
433Ø DATA173,32,5Ø,141,37,5Ø,185,49:REM*214
434Ø DATA5Ø,77,4Ø,5Ø,141,45,5Ø,174 :REM*152
435Ø DATA41,5Ø,24Ø,9,32,236,42,32  :REM*136
436Ø DATA161,48,77,45,5Ø,32,236,42 :REM*211
437Ø DATA32,172,48,24,165,25Ø,1Ø5,8Ø
                                    :REM*183
438Ø DATA133,25Ø,144,2,23Ø,251,173,45
                                    :REM*171
439Ø DATA5Ø,2Ø6,37,5Ø,2Ø8,214,2ØØ,192
                                    :REM*121
44ØØ DATA8,2Ø8,197,174,42,5Ø,24Ø,2Ø :REM*85
441Ø DATA56,165,25Ø,233,16Ø,133,25Ø,176
                                    :REM*29
442Ø DATA2,198,251,32,236,42,173,42 :REM*19
443Ø DATA5Ø,32,172,48,24,173,29,5Ø :REM*171
444Ø DATA1Ø5,8,141,29,5Ø,144,3,238 :REM*133
445Ø DATA3Ø,5Ø,32,127,42,2Ø6,39,5Ø  :REM*55
446Ø DATA238,38,5Ø,173,38,5Ø,2Ø5,33:REM*161
447Ø DATA5Ø,24Ø,3,76,57,41,76,57    :REM*223
448Ø DATA4Ø,162,Ø,2Ø1,32,144,25,2Ø1 :REM*25
449Ø DATA64,176,1,96,2Ø1,128,176,4 :REM*211
45ØØ DATA56,233,64,96,2Ø1,16Ø,144,8  :REM*5
451Ø DATA2Ø1,192,144,244,56,233,128,96
                                    :REM*65
452Ø DATA17Ø,169,Ø,224,21,2Ø8,6,169:REM*147
453Ø DATA255,141,42,5Ø,96,224,14,2Ø8:REM*71
454Ø DATA4,141,42,5Ø,96,224,5,2Ø8    :REM*83
455Ø DATA4,141,41,5Ø,96,224,24,2Ø8   :REM*59
456Ø DATA4,142,41,5Ø,96,224,18,2Ø8 :REM*137
457Ø DATA6,169,255,141,4Ø,5Ø,96,224 :REM*61
458Ø DATA146,2Ø8,4,141,4Ø,5Ø,96,224 :REM*33
459Ø DATA17,2Ø8,12,24,173,31,5Ø,1Ø5 :REM*55
46ØØ DATA8,141,31,5Ø,24,144,55,224  :REM*61
461Ø DATA145,2Ø8,12,56,173,31,5Ø,233
                                    :REM*17Ø
462Ø DATA8,141,31,5Ø,24,144,39,224 :REM*21Ø
463Ø DATA157,2Ø8,17,56,173,29,5Ø,233:REM*64
464Ø DATA8,141,29,5Ø,176,24,2Ø6,3Ø :REM*148
465Ø DATA5Ø,24,144,18,224,29,2Ø8,14:REM*136
466Ø DATA24,173,29,5Ø,1Ø5,8,141,29 :REM*148
467Ø DATA5Ø,144,3,238,3Ø,5Ø,32,127 :REM*2Ø6
468Ø DATA42,96,16Ø,Ø,162,8,32,28    :REM*234
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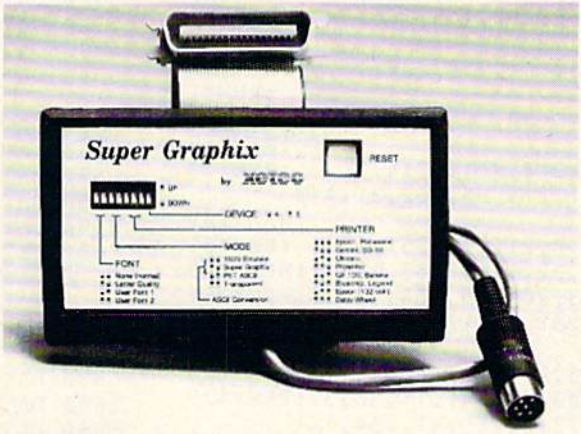
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469Ø DATA49,138,24,1Ø9,27,5Ø,133,174:REM*56
47ØØ DATA152,1Ø9,28,5Ø,133,175,96,173
                                    :REM*122
471Ø DATA29,5Ø,133,252,173,3Ø,5Ø,133
                                    :REM*18Ø
472Ø DATA253,173,31,5Ø,133,254,32,191
                                    :REM*16
473Ø DATA48,173,26,5Ø,2Ø1,79,144,31:REM*176
474Ø DATA162,Ø,172,32,5Ø,24,185,184 :REM*36
475Ø DATA42,1Ø9,31,5Ø,141,31,5Ø,2Ø1:REM*118
476Ø DATA198,144,3,142,31,5Ø,142,29:REM*156
477Ø DATA5Ø,142,3Ø,5Ø,76,127,42,96 :REM*236
478Ø DATAØ,8,16,24,32,4Ø,48,56      :REM*216
479Ø DATA64,72,8Ø,88,96,1Ø4,112,12Ø:REM*146
48ØØ DATA132,8,134,7,133,6,8,1Ø4    :REM*86
481Ø DATA133,5,169,15,16Ø,135,162,123
                                    :REM*188
482Ø DATA133,2,132,3,134,4,32,11Ø    :REM*2
483Ø DATA255,165,5,72,165,6,166,7    :REM*2
484Ø DATA164,8,4Ø,96,72,14Ø,46,5Ø   :REM*86
485Ø DATA162,18,165,251,164,25Ø,32,145
                                    :REM*86
486Ø DATA48,172,46,5Ø,1Ø4,96,142,48:REM*118
487Ø DATA5Ø,169,174,174,43,5Ø,32,116
                                    :REM*177
488Ø DATA255,174,48,5Ø,96,32,128,3 :REM*165
489Ø DATA32,9,136,142,19,5Ø,32,15  :REM*193
49ØØ DATA136,166,22,164,23,142,16,5Ø
                                    :REM*131
491Ø DATA134,166,14Ø,17,5Ø,132,167,2ØØ
                                     :REM*1
492Ø DATA2ØØ,2ØØ,2ØØ,14Ø,18,5Ø,173,Ø
                                    :REM*165
493Ø DATA255,41,254,141,Ø,255,162,18
                                    :REM*255
494Ø DATA173,19,5Ø,2Ø8,11,169,32,32:REM*133
495Ø DATA129,43,232,169,Ø,76,8Ø,43 :REM*123
496Ø DATA169,48,32,129,43,232,169,Ø:REM*145
497Ø DATA32,129,43,16Ø,Ø,162,Ø,169 :REM*131
498Ø DATA166,32,116,255,32,127,43,2ØØ
                                    :REM*2Ø3
499Ø DATA192,8,144,241,169,Ø,32,127:REM*2Ø3
5ØØØ DATA43,136,2Ø8,25Ø,165,166,24,1Ø5
                                    :REM*185
5Ø1Ø DATA8,133,166,144,224,23Ø,167,165
                                     :REM*1
5Ø2Ø DATA167,2Ø5,18,5Ø,2Ø8,215,96,162
                                    :REM*57
5Ø3Ø DATA31,142,Ø,214,44,Ø,214,16   :REM*29
5Ø4Ø DATA251,141,1,214,96,162,31,142
                                    :REM*1Ø9
5Ø5Ø DATAØ,214,44,Ø,214,16,251,173  :REM*51
5Ø6Ø DATA1,214,96,32,128,3,32,135  :REM*245
5Ø7Ø DATA49,24,173,2ØØ,49,1Ø5,7,133:REM*251
5Ø8Ø DATA252,173,2Ø1,49,1Ø5,Ø,133,253
                                    :REM*41
5Ø9Ø DATA32,255,48,173,225,49,141,9:REM*223
51ØØ DATA5Ø,173,2Ø2,49,141,11,5Ø,32:REM*137
511Ø DATA161,49,173,Ø,255,41,254,141
                                    :REM*225
512Ø DATAØ,255,173,2ØØ,49,133,252,173
                                    :REM*134
513Ø DATA2Ø1,49,133,253,173,2Ø2,49,133
                                    :REM*184
514Ø DATA254,32,191,48,165,25Ø,141,12
                                    :REM*254
515Ø DATA5Ø,165,251,141,13,5Ø,173,196
                                    :REM*23Ø
516Ø DATA49,133,252,173,197,49,133,253
                                    :REM*3Ø
517Ø DATA173,198,49,133,254,32,191,48
                                    :REM*88
518Ø DATA165,25Ø,141,14,5Ø,165,251,141
                                    :REM*1ØØ
519Ø DATA15,5Ø,162,18,173,13,5Ø,172 :REM*78
52ØØ DATA12,5Ø,32,145,48,162,24,142:REM*138
521Ø DATAØ,214,173,1,214,9,128,142  :REM*18
522Ø DATAØ,214,141,1,214,162,32,173:REM*2Ø4
523Ø DATA15,5Ø,172,14,5Ø,32,145,48 :REM*114
524Ø DATA162,3Ø,173,9,5Ø,142,Ø,214  :REM*12
525Ø DATA141,1,214,32,185,48,24,173:REM*132
526Ø DATA12,5Ø,1Ø5,8Ø,141,12,5Ø,144 :REM*3Ø
527Ø DATA3,238,13,5Ø,24,173,14,5Ø   :REM*254
528Ø DATA1Ø5,8Ø,141,14,5Ø,144,3,238:REM*244
529Ø DATA15,5Ø,2Ø6,11,5Ø,2Ø8,171,96:REM*226
53ØØ DATA32,128,3,169,Ø,141,2Ø,5Ø  :REM*254
531Ø DATA141,21,5Ø,32,15,136,24,165:REM*24Ø
532Ø DATA22,1Ø5,Ø,141,22,5Ø,166,48  :REM*56
533Ø DATA2Ø2,2Ø2,2Ø2,2Ø2,228,23,144,51
                                     :REM*6
534Ø DATA2Ø2,228,23,176,6,165,22,2Ø1
                                    :REM*142
535Ø DATA252,176,4Ø,24,165,23,1Ø5,4  :REM*4
536Ø DATA141,23,5Ø,32,135,49,24,173:REM*118
537Ø DATA2ØØ,49,1Ø5,7,133,252,173,2Ø1
                                    :REM*234
538Ø DATA49,1Ø5,Ø,133,253,32,255,48 :REM*51
539Ø DATA173,225,49,141,9,5Ø,141,1Ø:REM*2Ø3
54ØØ DATA5Ø,2Ø8,3,76,67,33,173,2Ø2  :REM*91
541Ø DATA49,141,11,5Ø,168,24Ø,244,24
                                    :REM*235
542Ø DATA173,2Ø,5Ø,1Ø9,9,5Ø,141,2Ø    :REM*3
543Ø DATA5Ø,144,3,238,21,5Ø,136,2Ø8 :REM*21
544Ø DATA238,24,173,23,5Ø,1Ø9,21,5Ø:REM*1Ø5
545Ø DATA197,48,176,215,173,Ø,255,41
                                    :REM*215
546Ø DATA254,141,Ø,255,173,196,49,133
                                    :REM*181
547Ø DATA252,173,197,49,133,253,173,198
                                    :REM*125
548Ø DATA49,133,254,32,191,48,165,25Ø
                                    :REM*237
549Ø DATA141,14,5Ø,165,251,141,15,5Ø
                                    :REM*185
55ØØ DATA173,22,5Ø,133,25Ø,173,23,5Ø
                                    :REM*165
551Ø DATA133,251,16Ø,1,173,11,5Ø,32 :REM*37
552Ø DATA95,45,136,173,9,5Ø,32,95   :REM*53
553Ø DATA45,24,165,25Ø,1Ø5,2,133,25Ø:REM*55
554Ø DATA144,2,23Ø,251,162,18,173,15
                                    :REM*153
555Ø DATA5Ø,172,14,5Ø,32,145,48,32  :REM*55
556Ø DATA161,48,16Ø,Ø,32,95,45,23Ø  :REM*57
557Ø DATA25Ø,2Ø8,2,23Ø,251,2Ø6,9,5Ø:REM*223
558Ø DATA2Ø8,237,173,1Ø,5Ø,141,9,5Ø:REM*117
559Ø DATA24,173,14,5Ø,1Ø5,8Ø,141,14:REM*195
56ØØ DATA5Ø,144,3,238,15,5Ø,2Ø6,11    :REM*5
561Ø DATA5Ø,2Ø8,2Ø1,56,165,251,233,4
                                    :REM*255
562Ø DATA133,251,165,25Ø,133,25Ø,96,162
                                    :REM*135
563Ø DATA25Ø,142,185,2,162,1,32,119:REM*197
564Ø DATA255,96,32,128,3,32,15,136  :REM*84
565Ø DATA24,165,22,1Ø5,Ø,141,22,5Ø :REM*166
566Ø DATA166,48,2Ø2,2Ø2,2Ø2,2Ø2,228,23
                                    :REM*12Ø
567Ø DATA176,3,76,67,33,24,165,23  :REM*218
568Ø DATA1Ø5,4,141,23,5Ø,32,161,49 :REM*15Ø
569Ø DATA173,2ØØ,49,133,252,173,2Ø1,49
                                    :REM*116
57ØØ DATA133,253,173,2Ø2,49,133,254,32
                                     :REM*28
571Ø DATA191,48,165,25Ø,141,14,5Ø,165
                                    :REM*176
572Ø DATA251,141,15,5Ø,173,22,5Ø,133:REM*84
573Ø DATA25Ø,173,23,5Ø,133,251,16Ø,1
                                    :REM*2ØØ
574Ø DATA32,16,46,141,11,5Ø,136,32  :REM*8Ø
575Ø DATA16,46,141,9,5Ø,173,Ø,255    :REM*2
576Ø DATA41,254,141,Ø,255,24,165,25Ø:REM*16
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```
577Ø DATA1Ø5,2,133,25Ø,144,2,23Ø,251
                                        :REM*232
578Ø DATA162,18,173,15,5Ø,172,14,5Ø:REM*138
579Ø DATA32,145,48,16Ø,Ø,32,16,46  :REM*11Ø
58ØØ DATA32,172,48,23Ø,25Ø,2Ø8,2,23Ø:REM*34
581Ø DATA251,2Ø6,9,5Ø,2Ø8,237,173,1Ø
                                        :REM*21Ø
582Ø DATA5Ø,141,9,5Ø,24,173,14,5Ø    :REM*74
583Ø DATA1Ø5,8Ø,141,14,5Ø,144,3,238 :REM*28
584Ø DATA15,5Ø,2Ø6,11,5Ø,2Ø8,2Ø1,96:REM*132
585Ø DATA169,25Ø,162,1,32,116,255,96:REM*3Ø
586Ø DATA32,128,3,32,9,136,142,48    :REM*34
587Ø DATA5Ø,16Ø,Ø,14Ø,241,49,14Ø,242:REM*68
588Ø DATA49,2ØØ,32,176,47,32,2Ø1,255
                                        :REM*116
589Ø DATA173,Ø,255,41,254,141,Ø,255:REM*127
59ØØ DATA162,18,169,Ø,168,32,145,48:REM*189
591Ø DATA173,48,5Ø,24Ø,3,76,146,46  :REM*53
592Ø DATA32,161,48,32,21Ø,255,238,241
                                        :REM*139
593Ø DATA49,2Ø8,245,238,242,49,173,242
                                        :REM*43
594Ø DATA49,2Ø1,64,144,235,76,123,47:REM*13
595Ø DATA32,128,3,32,9,136,142,48   :REM*125
596Ø DATA5Ø,16Ø,Ø,32,176,47,32,198 :REM*219
597Ø DATA255,173,Ø,255,41,254,141,Ø:REM*211
598Ø DATA255,162,18,169,Ø,168,32,145
                                        :REM*1Ø1
599Ø DATA48,173,48,5Ø,24Ø,3,76,47   :REM*151
6ØØØ DATA47,32,113,47,32,172,48,24 :REM*219
6Ø1Ø DATA144,247,16Ø,Ø,14Ø,236,49,14Ø
                                        :REM*211
6Ø2Ø DATA238,49,32,161,48,141,239,49
                                        :REM*183
6Ø3Ø DATA169,1,141,237,49,32,161,48 :REM*43
6Ø4Ø DATA141,221,49,238,241,49,2Ø8,3
                                        :REM*117
6Ø5Ø DATA238,242,49,173,242,49,2Ø1,64
                                        :REM*97
6Ø6Ø DATA144,3,76,123,47,173,221,49 :REM*49
6Ø7Ø DATA2Ø5,239,49,2Ø8,8,238,237,49
                                        :REM*181
6Ø8Ø DATA2Ø8,219,2Ø6,237,49,173,237,49
                                         :REM*7
6Ø9Ø DATA2Ø1,5,144,4Ø,173,24Ø,49,2Ø8:REM*73
61ØØ DATA14,169,1,141,24Ø,49,32,131 :REM*51
611Ø DATA47,141,236,49,32,21Ø,255,173
                                        :REM*69
612Ø DATA237,49,32,21Ø,255,173,239,49
                                        :REM*85
613Ø DATA32,21Ø,255,173,221,49,141,239
                                        :REM*189
614Ø DATA49,76,16Ø,46,173,24Ø,49,24Ø
                                        :REM*1Ø3
615Ø DATA5,169,Ø,141,24Ø,49,173,239:REM*168
616Ø DATA49,174,237,49,172,238,49,173
                                        :REM*248
617Ø DATA239,49,153,Ø,32,238,238,49:REM*246
618Ø DATA2Ø8,9,2Ø6,238,49,32,131,47:REM*214
619Ø DATA76,12,47,2Ø2,2Ø8,23Ø,173,221:REM*Ø
62ØØ DATA49,141,239,49,76,16Ø,46,169
                                        :REM*1Ø2
621Ø DATA1,141,24Ø,49,32,113,47,141:REM*138
622Ø DATA237,49,24Ø,23,172,24Ø,49,24Ø
                                        :REM*17Ø
623Ø DATA34,32,113,47,141,221,49,172 :REM*4
624Ø DATA237,49,32,172,48,136,2Ø8,25Ø
                                        :REM*182
625Ø DATA76,52,47,173,24Ø,49,24Ø,215:REM*4Ø
626Ø DATA169,Ø,141,24Ø,49,32,113,47 :REM*64
627Ø DATA141,237,49,32,113,47,32,172:REM*86
628Ø DATA48,2Ø6,237,49,2Ø8,245,76,52
                                        :REM*194
629Ø DATA47,164,144,2Ø8,4,32,2Ø7,255:REM*88
63ØØ DATA96,1Ø4,1Ø4,169,2,32,195,255
                                        :REM*152
631Ø DATA76,2Ø4,255,142,48,5Ø,173,236
                                        :REM*222
632Ø DATA49,2Ø8,8,16Ø,1,14Ø,236,49 :REM*2Ø4
633Ø DATA32,21Ø,255,173,238,49,32,21Ø
                                        :REM*184
634Ø DATA255,16Ø,Ø,185,Ø,32,32,21Ø :REM*174
635Ø DATA255,2ØØ,2Ø4,238,49,2Ø8,244,169
                                         :REM*66
636Ø DATAØ,141,238,49,174,48,5Ø,96 :REM*186
637Ø DATA32,2Ø4,255,169,2,162,8,32  :REM*86
638Ø DATA186,255,32,54,146,162,1,32:REM*164
639Ø DATA1Ø4,255,32,192,255,162,2,142
                                        :REM*234
64ØØ DATA24Ø,49,96,32,128,3,16Ø,5  :REM*113
641Ø DATA162,Ø,142,44,5Ø,169,14,141:REM*235
642Ø DATA43,5Ø,169,Ø,141,27,5Ø,169    :REM*1
643Ø DATA2Ø8,141,28,5Ø,189,47,48,141
                                        :REM*123
644Ø DATA29,5Ø,232,189,47,48,141,3Ø:REM*135
645Ø DATA5Ø,232,189,47,48,141,31,5Ø :REM*77
646Ø DATA232,189,47,48,141,32,5Ø,232:REM*55
647Ø DATA189,47,48,141,33,5Ø,232,189:REM*55
648Ø DATA47,48,141,34,5Ø,232,189,47:REM*215
649Ø DATA48,133,158,232,189,47,48,133
                                        :REM*45
65ØØ DATA159,142,45,48,14Ø,46,48,32  :REM*1
651Ø DATA44,4Ø,174,45,48,172,46,48 :REM*189
652Ø DATA232,136,2Ø8,184,96,Ø,Ø,8Ø :REM*241
653Ø DATAØ,Ø,8,1Ø,6,87,48,128       :REM*157
654Ø DATAØ,7Ø,4,6,8,93,48,Ø         :REM*145
655Ø DATA1,118,1,2,8,1Ø1,48,64      :REM*1Ø7
656Ø DATAØ,14Ø,5,4,16,1Ø9,48,24Ø    :REM*169
657Ø DATAØ,185,1,1,2Ø,125,48,87      :REM*77
658Ø DATA65,76,82,85,83,83,79,7Ø     :REM*19
659Ø DATA84,87,65,82,69,8Ø,82,69    :REM*227
66ØØ DATA83,69,78,84,83,67,49,5Ø      :REM*3
661Ø DATA56,32,85,76,84,82,65,32     :REM*41
662Ø DATA72,73,82,69,83,4Ø,67,41     :REM*41
663Ø DATA49,57,56,53,32,82,85,78    :REM*181
664Ø DATA32,77,65,71,65,9Ø,73,78    :REM*123
665Ø DATA69,142,Ø,214,141,1,214,232:REM*253
666Ø DATA142,Ø,214,14Ø,1,214,76,185:REM*226
667Ø DATA48,169,31,141,Ø,214,173,1 :REM*164
668Ø DATA214,76,185,48,72,169,31,141
                                        :REM*1Ø4
669Ø DATAØ,214,1Ø4,141,1,214,76,185 :REM*5Ø
67ØØ DATA48,44,Ø,214,16,251,96,32  :REM*146
671Ø DATA255,48,169,Ø,133,251,165,254
                                        :REM*24Ø
672Ø DATA1Ø,38,251,1Ø,38,251,1Ø,38 :REM*118
673Ø DATA251,1Ø,38,251,141,227,49,164:REM*Ø
674Ø DATA251,14Ø,228,49,1Ø,38,251,1Ø:REM*84
675Ø DATA38,251,24,1Ø9,227,49,133,25Ø
                                        :REM*46
676Ø DATA173,228,49,1Ø1,251,133,251,24
                                        :REM*7Ø
677Ø DATA165,25Ø,1Ø9,225,49,133,25Ø,165
                                        :REM*138
678Ø DATA251,1Ø9,226,49,133,251,96,165
                                        :REM*72
679Ø DATA252,141,225,49,165,253,74,11Ø
                                        :REM*164
68ØØ DATA225,49,74,11Ø,225,49,74,11Ø:REM*56
681Ø DATA225,49,141,226,49,173,225,49
                                        :REM*14Ø
682Ø DATA141,26,5Ø,96,141,131,49,142:REM*94
683Ø DATA133,49,14Ø,132,49,162,Ø,142
                                        :REM*14Ø
684Ø DATA129,49,142,13Ø,49,41,1,24Ø :REM*4Ø
685Ø DATA9,14Ø,13Ø,49,174,133,49,142
                                        :REM*226
686Ø DATA129,49,169,128,141,134,49,45
                                        :REM*17Ø
687Ø DATA131,49,24Ø,42,174,133,49,172
                                        :REM*112
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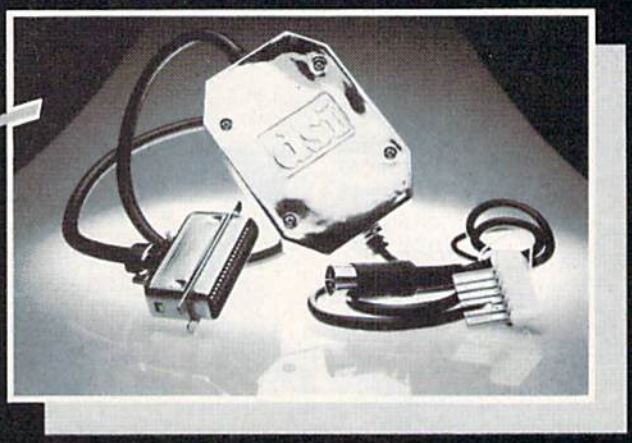
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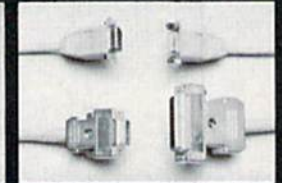
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Listing 1 continued.

```
688Ø DATA132,49,142,127,49,14Ø,128,49
                                        :REM*32
689Ø DATA14,127,49,46,128,49,74,2Ø1:REM*184
69ØØ DATA1,2Ø8,245,24,173,127,49,1Ø9:REM*36
691Ø DATA129,49,141,129,49,173,128,49
                                        :REM*68
692Ø DATA1Ø9,13Ø,49,141,13Ø,49,78,134
                                        :REM*113
693Ø DATA49,173,134,49,2Ø1,1,2Ø8,199
                                        :REM*187
694Ø DATA174,129,49,172,13Ø,49,96,Ø :REM*93
695Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,32          :REM*193
696Ø DATA15,136,165,22,141,196,49,165
                                        :REM*99
697Ø DATA23,141,197,49,32,15,136,165
                                        :REM*2Ø7
698Ø DATA22,141,198,49,165,23,141,199
                                        :REM*31
699Ø DATA49,32,15,136,165,22,141,2ØØ
                                        :REM*191
7ØØØ DATA49,165,23,141,2Ø1,49,32,15:REM*2Ø7
7Ø1Ø DATA136,165,22,141,2Ø2,49,165,23
                                        :REM*177
7Ø2Ø DATA141,2Ø3,49,96,1,2,4,8       :REM*91
7Ø3Ø DATA16,32,64,128,Ø,Ø,Ø,Ø       :REM*129
7Ø4Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*77
7Ø5Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*87
7Ø6Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*97
7Ø7Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*1Ø7
7Ø8Ø DATAØ,64,Ø,Ø,Ø,Ø,Ø,Ø            :REM*157
7Ø9Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*127
71ØØ DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*137
711Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*147
712Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*157
713Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*167
714Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*177
715Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*187
716Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*197
717Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*2Ø8
718Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*218
719Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*228
72ØØ DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*238
721Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*248
722Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø               :REM*2
723Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*12
724Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*22
725Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*32
726Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*42
727Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*52
728Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*62
729Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*72
73ØØ DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*82
731Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø              :REM*92
732Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*1Ø2
733Ø DATAØ,Ø,Ø,Ø,Ø,Ø,Ø,Ø             :REM*112
734Ø DATAØ,32,128,3,96,Ø,Ø,Ø         :REM*164
735Ø DATAØ                             :REM*98
```

Listing 2. *Ultra Hi-Res boot program.*

```
1Ø GRAPHIC1,1:GRAPHIC5: REM SET UP 1ØK BUFF
   ER IN BANK Ø FOR ML                 :REM*76
2Ø POKE47,Ø:POKE48,68:CLR: REM SET UP 16K B
   UFFER IN BANK 1 FOR @STASH           :REM*6
3Ø BLOAD"ULTRA HIRES",BØ,P7168: REM LOAD MA
   CHINE LANGUAGE                      :REM*1Ø4
4Ø SYS8448: REM ACTIVATE C128 ULTRA HIRES
                                       :REM*1ØØ
5Ø PRINT"C128 ULTRA HIRES IS NOW ACTIVATED.
   "                                   :REM*218
6Ø PRINT"YOU HAVE 16K SET ASIDE FOR GRAPHIC
   "                                   :REM*17Ø
7Ø PRINT"STORAGE. MORE CAN BE GOTTEN BY"
                                       :REM*21Ø
8Ø PRINT"INCREASING THE AMOUNT POKED INTO"
                                       :REM*184
9Ø PRINT"REGISTER 48 IN LINE 2Ø. EACH NUMBE
   R"                                  :REM*146
1ØØ PRINT"OVER 68 WILL INCREASE THE BUFFER"
                                       :REM*116
11Ø PRINT"BY 256 BYTES. TO GAIN A 32K BUFFE
   R"                                   :REM*16
12Ø PRINT"CHANGE THE 68 TO 132."     :REM*174
13Ø PRINT"YOU CURRENTLY HAVE ";FRE(Ø);" BYT
   ES"                                 :REM*62
14Ø PRINT"AVAILABLE IN BANK Ø FOR PROGRAMS"
                                       :REM*144
15Ø PRINT"AND ";FRE(1);" IN BANK 1 FOR"
                                        :REM*82
16Ø PRINT"VARIABLES."                  :REM*132
```

Listing 3. *Program Setup.*

```
1Ø REM BASIC PROGRAM SETUP             :REM*74
2Ø FAST: REM ENABLE 2 MH MODE        :REM*224
3Ø POKE47,Ø:POKE48,68:CLR: REM SET UP 16K B
   UFFER FOR @STASH                    :REM*148
4Ø @GRAPHIC,Ø,2: REM GOTO ULTRA HIRES SCREE
   N (64Ø X 2ØØ) AND SET COLORS BG,FG
                                       :REM*78
5Ø @CLR,Ø: REM CLEAR ULTRA HIRES SCREEN
                                      :REM*216
6Ø TRAP 1ØØ1Ø:REM SET UP SYNTAX ERROR TRAP
   TO RETURN TO TEXT MODE AND LIST ERROR
                                       :REM*174
7Ø :                                    :REM*46
8Ø REM PROGRAM BEGINS HERE             :REM*78
9Ø :                                    :REM*66
1ØØØØ REM GOTO TEXT MODE, PRINT STATUS AND
      END PROGRAM                      :REM*75
1ØØ1Ø @TEXT:HELP:END                  :REM*217
```

Listing 4. *Hi-res text demo program.*

```
1Ø REM TEXT ON ULTRA HIRES SCREEN DEMO
                                        :REM*88
2Ø FAST: REM ENABLE 2 MH MODE        :REM*224
3Ø POKE47,Ø:POKE48,68:CLR: REM SET UP 16K B
   UFFER FOR @STASH                    :REM*148
4Ø @GRAPHIC,Ø,2: REM GOTO ULTRA HIRES SCREE
   N (64Ø X 2ØØ) AND SET COLORS BG,FG
                                       :REM*78
5Ø @CLR,Ø: REM CLEAR ULTRA HIRES SCREEN
                                      :REM*216
6Ø TRAP 1ØØ1Ø:REM SET UP SYNTAX ERROR TRAP
   TO RETURN TO TEXT MODE AND LIST ERROR
                                       :REM*174
7Ø :                                    :REM*46
8Ø REM PROGRAM BEGINS HERE             :REM*78
9Ø :                                    :REM*66
1ØØ @CHAR,7168,Ø,Ø,1,Ø,"{SHFT T}HIS IS A DE
   MO OF 16Ø CHARACTERS PER LINE. {SHFT Y}
   OU WILL NOTICE THAT IT IS STILL POSSIBL
   E TO READ THEM ON THIS 17Ø2 COMPOSITE M
   ONITOR."                            :REM*134
```

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Listing 4 continued.

```
11Ø @CHAR,55296,Ø,12,1,1,"{SHFT T}HIS IS A
    DEMO OF 8Ø CHARACTERS PER LINE.{3 SPACE
    s}{SHFT Y}OU WILL NOTICE IT IS THE SAME
     AS{3 SPACEs}IN NORMAL 8Ø COLUMN TEXT M
    ODE."                              :REM*2Ø8
12Ø @CHAR,55296,Ø,32,1,2,"{SHFT T}HIS IS A
    4Ø COLUMN CHARACTER TEST.{6 SPACEs}{SHF
    T H}ERE WE HAVE THE SAME RESOLUTION AS
    IN{2 SPACEs}COMPOSITE MODE."       :REM*222
13Ø @CHAR,55296,Ø,66,2,2,"{SHFT T}HIS IS DO
    UBLE HEIGHT, DOUBLE WIDTH.{4 SPACEs}{SH
    FT L}OOKS GOOD, RIGHT?"            :REM*114
14Ø @CHAR,55296,Ø,1Ø2,5,5,"{2 SPACEs}{SHFT
    W}E COULD DO{3 SPACEs}THIS ALL NIGHT!"
                                       :REM*6Ø
15Ø @CHAR,55296,Ø,18Ø,2,5,"{SHFT B}UT LET'S
     GO ON."                           :REM*176
16Ø SLEEP 1Ø                           :REM*14
1ØØØØ REM GOTO TEXT MODE, PRINT STATUS AND
      END PROGRAM                      :REM*75
1ØØ1Ø @TEXT:HELP:END                   :REM*217
```

Listing 5. *Line-drawing demo program.*

```
1Ø REM LINE DEMO WITH TEXT             :REM*246
2Ø FAST: REM ENABLE 2 MH MODE          :REM*224
3Ø POKE47,Ø:POKE48,68:CLR: REM SET UP 16K B
   UFFER FOR @STASH                    :REM*148
4Ø @GRAPHIC,Ø,2: REM GOTO ULTRA HIRES SCREE
   N (64Ø X 2ØØ) AND SET COLORS BG,FG
                                       :REM*78
5Ø @CLR,Ø: REM CLEAR ULTRA HIRES SCREEN
                                       :REM*216
6Ø TRAP 1ØØ1Ø:REM SET UP SYNTAX ERROR TRAP
   TO RETURN TO TEXT MODE AND LIST ERROR
                                       :REM*174
7Ø :                                    :REM*46
8Ø REM PROGRAM BEGINS HERE              :REM*78
9Ø :                                    :REM*66
1ØØ FORI=Ø TO 639 STEP 1Ø               :REM*6
11Ø @DRAW,32Ø,1ØØ,I,199,1              :REM*178
12Ø NEXT                               :REM*13Ø
13Ø FORI=Ø TO 639 STEP 1Ø               :REM*36
14Ø @DRAW,32Ø,1ØØ,I,Ø,1                :REM*248
15Ø NEXT                               :REM*16Ø
16Ø @CHAR,53248,Ø,Ø,16,16,"{CTRL X}MOIRE{CT
   RL 2}"                              :REM*218
17Ø @CHAR,53248,8,13Ø,8,11,"{CTRL X}PATTERN
   {CTRL 2}"                           :REM*132
18Ø SLEEP 6                            :REM*1Ø8
1ØØØØ REM GOTO TEXT MODE, PRINT STATUS AND
      END PROGRAM                      :REM*75
1ØØ1Ø @TEXT:HELP:END                   :REM*217
```

Listing 6. *3-D bar demo program.*

```
1Ø REM 3D BAR DEMO                     :REM*1Ø2
2Ø FAST: REM ENABLE 2 MH MODE          :REM*224
3Ø @GRAPHIC,Ø,2:@CLR,Ø: REM ENABLE ULTRA HI
   RES 64Ø X 2ØØ AND CLEAR SCREEN      :REM*66
4Ø TRAP 1Ø1Ø: REM SET UP SYNTAX ERROR TRAP
   TO RETURN TO TEXT MODE AND LIST ERROR
                                       :REM*21Ø
5Ø @CHAR,53248,Ø,Ø,1,1,"{CTRL X}"      :REM*226
6Ø @CHAR,53248,Ø,24,4,4," 3D BARS BY COMMAN
   D"                                  :REM*6Ø
7Ø :                                    :REM*46
8Ø REM PROGRAM STARTS HERE             :REM*76
9Ø :                                    :REM*66
1ØØ SLEEP 2                            :REM*22Ø
11Ø @GRAPHIC,Ø,2:@CLR,Ø                :REM*23Ø
12Ø @BOX,Ø,Ø,639,199,1                  :REM*4
13Ø FOR X=Ø TO 599 STEP 48             :REM*184
14Ø {5 SPACEs}HT=INT(RND(1)*179)+8     :REM*164
15Ø {5 SPACEs}@BAR,X,199,29,1Ø,HT,1:REM*132
16Ø {5 SPACEs}Z=199-HT+2               :REM*44
17Ø {5 SPACEs}IFHT<8 THEN 21Ø          :REM*12
18Ø {5 SPACEs}C$=STR$(HT)              :REM*124
19Ø {5 SPACEs}C$=RIGHT$(C$,LEN(C$)-1)
                                       :REM*42
2ØØ {5 SPACEs}@CHAR,53248,X,Z,1,1,C$
                                       :REM*13Ø
21Ø NEXT                               :REM*22Ø
22Ø SLEEP 6                            :REM*148
1ØØØ REM GOTO TEXT MODE, PRINT STATUS AND E
     ND                                :REM*231
1Ø1Ø @TEXT:HELP:END                    :REM*141
```

Listing 7. *Circle demo with @Copy, @Stash and @Fetch.*

```
1Ø REM CIRCLE DEMO WITH @COPY, @STASH AND @
   FETCH                               :REM*76
2Ø FAST: REM ENABLE 2 MH MODE          :REM*224
3Ø POKE47,Ø:POKE48,68:CLR: REM SET UP 16K B
   UFFER FOR @STASH                    :REM*148
4Ø @GRAPHIC,Ø,2:@CLR,Ø: REM ENABLE ULTRA HI
   RES 64Ø X 2ØØ AND CLEAR SCREEN      :REM*76
5Ø TRAP 1Ø1Ø: REM SET UP SYNTAX ERROR TRAP
   TO RETURN TO TEXT MODE AND LIST ERROR
                                       :REM*22Ø
6Ø CX=24:CY=8:SC=2.5:FL=Ø:R=1Ø         :REM*128
7Ø REM DRAW CIRCLE CENTER X=CX, CENTER Y=CY
   , RADIUS=R, SC CORRECTS ASPECT RATIO
                                       :REM*16Ø
8Ø FOR R=1 TO 9 STEP 3                  :REM*16
9Ø {5 SPACEs}FOR T=Ø TO 6.4 STEP .2    :REM*76
1ØØ {1Ø SPACEs}X=R*COS(T):Y=R*SIN(T):REM*42
11Ø {1Ø SPACEs}SX=SC*X+CX:SY=CY-Y      :REM*228
12Ø {1Ø SPACEs}IF FL=1 THEN 14Ø        :REM*1Ø8
13Ø {1Ø SPACEs}@DOT,SX,SY,1:FL=1:OX=SX:OY=S
   Y                                   :REM*23Ø
14Ø {1Ø SPACEs}@DRAW,OX,OY,SX,SY,1:OX=SX:OY
   =SY                                 :REM*112
15Ø {4 SPACEs}NEXT                     :REM*16Ø
16Ø {4 SPACEs}FL=Ø                      :REM*78
17Ø NEXT                               :REM*18Ø
18Ø SLEEP 3                             :REM*6Ø
19Ø REM DUPLICATE CIRCLE WITH @COPY COMMAND
                                       :REM*1ØØ
2ØØ FOR YC=Ø TO 183 STEP 2Ø            :REM*1Ø2
21Ø {7 SPACEs}FOR XC=Ø TO 59Ø STEP 5Ø
                                       :REM*146
22Ø {14 SPACEs}@COPY,Ø,Ø,48,2Ø,XC,YC
                                       :REM*198
23Ø {7 SPACEs}NEXT                     :REM*24Ø
24Ø NEXT                               :REM*25Ø
25Ø SLEEP 3                            :REM*13Ø
26Ø @STASH,Ø,Ø,Ø,48,16:REM SAVE ONE COPY OF
     CIRCLE                            :REM*189
27Ø REM ANIMATE WITH FETCH              :REM*95
28Ø TY=1:TX=8:X=INT(RND(1)*583)+7:Y=INT(RND
   (1)*1Ø)+2Ø                          :REM*83
29Ø FOR I=1 TO 1Ø24                    :REM*235
3ØØ {6 SPACEs}@FETCH,Ø,X,Y             :REM*247
31Ø {6 SPACEs}X=X+TX:IF X>59Ø THEN TX=TX*-1
                                       :REM*249
32Ø {6 SPACEs}IF X<8 THEN TX=TX*-1     :REM*231
33Ø {6 SPACEs}Y=Y+TY:IF Y>184 THEN TY=TY*-1
                                        :REM*89
34Ø {6 SPACEs}IF Y<1 THEN TY=TY*-1     :REM*43
```

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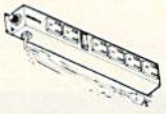


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Listing 7 continued.

```
35Ø NEXT                                    :REM*1Ø5
36Ø SLEEP 6                                 :REM*33
1ØØØ REM EXIT TO TEXT MODE AND PRINT ERRORS
      (IF ANY)                              :REM*2Ø9
1Ø1Ø @TEXT:HELP:END                         :REM*141
```

Listing 8. *3-D animation demo using @Stash and @Fetch.*

```
1Ø REM 3D CUBE DEMO USING @STASH AND @FETCH
                                            :REM*7Ø
2Ø FAST: REM ENABLE 2 MH MODE               :REM*224
3Ø POKE47,Ø:POKE48,132:CLR: REM SET UP 32K
   BUFFER FOR @STASH                        :REM*2Ø4
4Ø @GRAPHIC,Ø,2:@CLR,Ø: REM GOTO ULTRA HIRE
   S (64Ø X 2ØØ) AND CLEAR SCREEN           :REM*46
5Ø TRAP 47Ø:REM SET UP SYNTAX ERROR TRAP TO
    RETURN TO TEXT MODE AND LIST ERROR
                                            :REM*116
6Ø DIM X(19),Y(19),Z(19),A(65)              :REM*238
7Ø REM READ CUBE DATA INTO ARRAYS           :REM*232
8Ø @CHAR,53248,Ø,1ØØ,2,4,"{CTRL 2}FRAMES TO
    GO "                                    :REM*2Ø
9Ø FOR I=1 TO 18                            :REM*246
1ØØ {6 SPACEs}READ X(I),Y(I),Z(I)           :REM*8Ø
11Ø NEXT                                    :REM*12Ø
12Ø RH=1Ø:D=48:TH=-2*{PI}:P=1.4:CX=8Ø:CY=36
   :MC=Ø:SD=6.5                             :REM*232
13Ø REM LOOP TO DRAW 3D CUBE AND @STASH EAC
   H FRAME INTO BUFFER                      :REM*13Ø
14Ø FOR CT=1 TO 64                          :REM*132
15Ø {6 SPACEs}@CHAR,53248,424,1ØØ,2,4,STR$(
   65-CT)+" "                               :REM*2ØØ
16Ø {6 SPACEs}S1=SIN(TH):S2=SIN(P):C1=COS(T
   H):C2=COS(P)                             :REM*136
17Ø {6 SPACEs}X=X(1):Y=Y(1):Z=Z(1):GOSUB 49
   Ø:OX=SX:OY=SY                            :REM*23Ø
18Ø {6 SPACEs}FOR I=2 TO 5                  :REM*58
19Ø {12 SPACEs}X=X(I):Y=Y(I):Z=Z(I):GOSUB 4
   9Ø:@DRAW,OX,OY,SX,SY,1:OX=SX:OY=SY
                                            :REM*2
2ØØ {6 SPACEs}NEXT                          :REM*21Ø
21Ø {6 SPACEs}X=X(6):Y=Y(6):Z=Z(6):GOSUB 49
   Ø:OX=SX:OY=SY                            :REM*64
22Ø {6 SPACEs}FOR I=7 TO 1Ø                 :REM*48
23Ø {12 SPACEs}X=X(I):Y=Y(I):Z=Z(I):GOSUB 4
   9Ø:@DRAW,OX,OY,SX,SY,1:OX=SX:OY=SY
                                            :REM*42
24Ø {6 SPACEs}NEXT                          :REM*25Ø
25Ø {6 SPACEs}FOR I=11 TO 17 STEP 2         :REM*18
26Ø {12 SPACEs}X=X(I):Y=Y(I):Z=Z(I):GOSUB 4
   9Ø:OX=SX:OY=SY                           :REM*2Ø3
27Ø {12 SPACEs}X=X(I+1):Y=Y(I+1):Z=Z(I+1):G
   OSUB 49Ø:@DRAW,OX,OY,SX,SY,1             :REM*97
28Ø {12 SPACEs}OX=SX:OY=SY                  :REM*223
29Ø {6 SPACEs}NEXT                          :REM*45
3ØØ {6 SPACEs}@STASH,MC,45,1Ø,7Ø,55         :REM*39
31Ø {6 SPACEs}A(CT)=MC:MC=PEEK(25Ø)+PEEK(25
   1)*256+1:REM NEXT AVAILABLE ADDRESS
                                            :REM*79
32Ø {6 SPACEs}D=D+SD:IF D>249 THEN D=249
                                            :REM*223
33Ø {6 SPACEs}TH=TH+.2:@COPY,32Ø,Ø,3ØØ,75,Ø
   ,Ø                                       :REM*215
34Ø NEXT                                    :REM*95
35Ø @CLR,Ø: REM BEGINNING OF ANIMATION ROUT
   INE                                      :REM*237
36Ø @CHAR,53248,8Ø,Ø,2,3,"3D GRAPHICS ARE E
   ASY"                                     :REM*217
37Ø @CHAR,53248,56,24,2,3,"USING C128 ULTRA
    HIRES"                                  :REM*25
38Ø @CHAR,53248,56,146,2,3,"WITH @STASH AND
    @FETCH"                                 :REM*9
39Ø @CHAR,53248,56,17Ø,2,3,"IN YOUR BASIC P
   ROGRAMS"                                 :REM*197
4ØØ REM BLITTER ANIMATION USING THE @FETCH
   COMMAND                                  :REM*117
41Ø FOR K=1 TO 64:@FETCH,A(K),25Ø,65:NEXT
                                            :REM*71
42Ø FOR K=33 TO 64:@FETCH,A(K),25Ø,65:NEXT
                                            :REM*73
43Ø FOR K=64 TO 33 STEP-1:@FETCH,A(K),25Ø,6
   5:NEXT                                   :REM*225
44Ø FOR K=64 TO 1 STEP-1:@FETCH,A(K),25Ø,65
   :NEXT                                    :REM*9
45Ø GET A$:IF A$<>"*" THEN 41Ø              :REM*63
46Ø REM GOTO TEXT MODE, PRINT STATUS AND EN
   D                                        :REM*2Ø1
47Ø @TEXT:HELP:END                          :REM*111
48Ø REM CONVERT X,Y,Z TO SCREEN X,Y:REM*249
49Ø XT=-X*S1+Y*C1:YT=-X*C1*C2-Y*S1*C2+Z*S2:
   ZT=-X*S2*C1-Y*S2*S1-Z*C2+RH              :REM*121
5ØØ SX=D*XT/ZT+CX:SY=CY-D*YT/ZT:RETURN
                                            :REM*45
51Ø REM DATA THAT DESCRIBES 3D CUBE:REM*237
52Ø DATA -1,-.75,.5,1,-.75,.5,1,-.75,-.5,-1
   ,-.75,-.5,-1,-.75,.5                     :REM*162
53Ø DATA -1,.75,.5,-1,.75,-.5,1,.75,-.5,1,.
   75,.5,-1,.75,.5                          :REM*84
54Ø DATA -1,-.75,.5,-1,.75,.5,-1,-.75,-.5,-
   1,.75,-.5,1,-.75,.5                      :REM*162
55Ø DATA 1,.75,.5,1,-.75,-.5,1,.75,-.5
                                            :REM*24Ø
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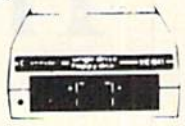
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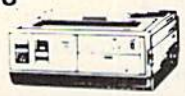
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The Resource Center

By MARGARET MORABITO

How do you solve the problem of giving students access time with a limited amount of equipment? Read how one small school system makes a little go a long way with networking. And the solution is not as expensive as you might think.

Computer networking is quickly becoming a valuable tool—and even a necessity—for increased productivity in both small businesses and schools. Although networking is usually associated with big business and big budgets, it does not have to be expensive. In fact, networking is catching on in budget-conscious school systems as an inexpensive way to share peripherals, thereby putting more students on computers more often.

Multi-User Computer Networking

The term multi-user networking has various meanings. In a broad sense, networking refers to the linking together of stand-alone personal computers or dumb terminals so they can communicate or share centralized information or peripherals.

Large companies and institutions often use dumb terminals. These are connected to a central mainframe computer that is usually housed somewhere on the premises, but that can be located in a separate building and be remotely controlled. The terminals can be connected by phone lines or directly by cables. All files and programs are held in the mainframe, ready to be called into individual terminals by the user.

In this setup, information can be shared, and communication between terminals is possible. When the mainframe is off, the terminals cannot function.

School systems that use computers for classroom instruction and administrative purposes often have personal computers (rather than dumb terminals) linked together in a network, primarily for sharing peripherals. The computers in this multi-user system are independent from a central mainframe, and the user has more direct control of the applications that he or she runs. Eight or more personal computers can be linked to a single disk drive and a printer by direct connection to a multi-user switch housed near the group of computers.

More Computers for the Money

For a school system with a limited budget, this second type of multi-user networking is the solution. It is cost-effective because, instead of having to invest in a disk drive for each computer, a school can buy just one drive to be shared by a group of eight computers. Furthermore, each group can also share a printer, thereby saving even more money. With the savings, a school can purchase more computers, multi-user switches or software.

Commodore personal computers are a good choice for school systems because they are so inexpensive—currently, the C-64 is selling for close to $100 and the C-128 for about $275. These low prices allow a school to buy five to ten times as many Commodores as it could the more expensive computers, such as Apple IIs and Tandy computers.

Considering the availability of Commodore multi-user networking links (many of which cost only about $150), the consistently low prices of peripherals and the large amount of software available, any school system would be wise to look into Commodore computers.

One School System's Experience

The Winchester Elementary School, in Winchester, New Hampshire, has been using computers for five years, according to the principal, Curt Cardine, who is the moving force behind this program.

Winchester now has 32 C-64s and VIC-20s in the classrooms and one C-64 for administrative purposes. The classroom computers are linked together with multi-user switches. They use a combination of 1702 monitors, black-and-white television sets and monochrome monitors.

Two fourth-grade classes use seven VICs and one C-64. Two fifth-grade classes are sharing six VICs and two C-64s, and two sixth-grade classes share 16 C-64s. Only four 1541 disk drives and four Commodore printers are needed to provide peripheral access for these 32 workstations.

When asked why he chose Commodores, Cardine replied, "Money. We are one of the poorest school systems in the entire state." Commodore computers were the obvious choice. Cardine decided that it makes more sense to let your money pay

for a group of C-64s than to buy just one Apple II.

The problem in many school systems is that they are trying to teach computer applications to a class of 20 to 30 students with just one expensive computer. Even a poor school district, however, can get computers into its schools if it takes the time to select cost-effective equipment.

When asked if he would prefer Apple IIs if his budget were bigger, Cardine said emphatically, "No."

The Commodore's easy-to-use screen-editing features, cursor controls and keyboard graphics are some of the reasons for his preference.

"My time on an Apple is double my time on a C-64 because of the Apple's crude screen editing," he said. Also, he finds that the VIC-20s are well-suited to younger elementary grade students because of the large, colorful, easy-to-read letters.

Another benefit of using Commodores in the school system is that students' parents can often afford to buy a C-64 for use at home. This provides an excellent means for doing homework and follow-up study of school training.

The Winchester school has been able to give most students an opportunity to work on a VIC-20 or a C-64 on a weekly, and in some cases, daily, basis. Although Cardine currently provides only one class session of formal instruction per week for the fourth through sixth grades, students work on the computers at recess time, during free time and after school. Without networking, this just would not be possible; there would be too many students waiting around to use the computers.

The VIC Switch

Cardine started off five years ago with two VIC-20s (then priced at $300 each), two monitors and two cassette recorders. He quickly saw that the school needed more computer stations. It was obvious, however, that it would be too expensive to buy the complete system for each station.

The following year, as a result of a federal grant (Title 4C), the school was able to buy a C-64, five more VIC-20s, one disk drive, a 1525 printer and, most important, a VIC Switch ($150) by Handic Software.

The VIC Switch is typical of the multi-user links on the market today for Commodore computers. It is a small unit, with nine serial ports—eight input ports for connecting directly to eight computers and one output port. The output port is for connecting a peripheral, such as a disk drive, that will be shared by all eight computers. A printer can then be daisy-chained from the disk drive and shared by the entire network of computers.

The VIC Switch has worked well over the years and has brought computer training to many students in this school. There has been one problem, however. When two computers would try to access a peripheral simultaneously, the VIC Switch would often lock up.

This condition can occur when one student forgets to close his or her channel to the disk drive or printer. When the next student tries to access the peripheral, the lockup occurs. You can avoid this problem by having the student make sure that the channel to a peripheral is properly closed and that the other students know when the peripheral is free for access.

The Microshare Multi-User Disk System

Although the Winchester school system does not regularly use the Microshare system (from Comspec Communications), Cardine has tested this networking device in his classrooms. Its price is $900, which is a prohibitive factor for this school's tight budget.

Despite the price, the Microshare system has strengths. Unlike the VIC Switch, it is designed to allow all users to load the same software simultaneously. But when Cardine tested this unit on various commercial software products, he discovered that the unit would not perform group loads of software that had automatic load routines built into them.

Some other features of this system include a built-in print buffer with a software-selectable device number, individual disk error status reports for each user, individually controllable channel switching delay and the ability to link eight IEEE or seven serial devices. An internal hardware change is required to accept eight computers, whereas both the VIC Switch and the CSI-64 Switch are initially set up to accommodate eight computers.

The CSI-64 Switch

Recently, the Winchester Elementary School purchased two CSI-64 Switches, which have proven to be most valuable. The price, performance and availability of the CSI-64

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Switch, from Computer Specialties, Inc., are the features that make it particularly attractive to the Winchester school.

With the CSI-64, which costs about $130, you can connect up to eight C-64s, VIC-20s, Plus/4s, C-16s or C-128s to a single disk drive and a printer. All Commodore serial printers will work with this, and you can use certain interfaces to allow the use of non-Commodore printers.

Cardine discovered that the CSI-64 Switch rarely locks up. It handles simultaneous requests for access by queuing up the computers. The system works on a first-come, first-serve basis and puts subsequent requesters on hold until the present user has finished. There is a light on the front of the unit that lets the users see which of the eight computers is accessing the drive or printer.

The Winchester school is planning to buy more CSI-64 switches to link together several more classrooms of C-64s and new 128s. The ultimate goal is to provide a computer for every student.

CSI has recently come out with an Instructor Monitor Prompter (IMP) device that lets a teacher monitor any of 16 computers. The IMP allows the master computer station to observe what each computer on-line is doing, communicate with any of the users and perform group loading of software at an incredibly fast speed. (This is a fairly new product and has yet to be tried at the Winchester school.)

Does It Work?

I asked Curt Cardine if he had been able to measure an improvement in learning in those students who had been using computers. He said, "Yes. Their thinking skills went way up." Cardine studied one group in his school and was excited about the trends that he saw. Twenty-four students, after spending one year learning about computers and actually working on them, increased an average of two years on their achievement tests.

"Children can actually push themselves through developmental stages. They definitely advance in their ability to reason things out," said Cardine.

The Winchester school is a prime example of how a non-affluent system is able to bring to its students computer training that is often available only in wealthier schools. Multi-user networking has proven to be the only way that this school has been able to provide computer education for its students.

I welcome comments about computer networking from those of you who are using this application. I also encourage you to contact me if you are using Commodore computers for any type of educational purpose, whether in a school, community activity or at home. R

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

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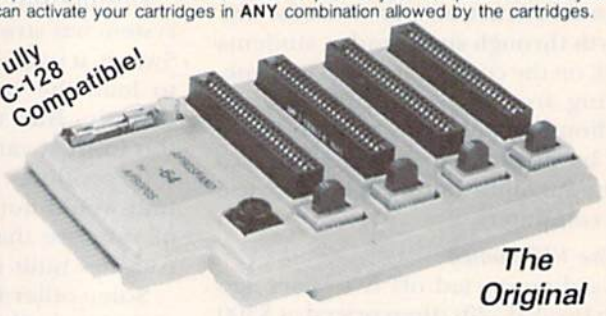
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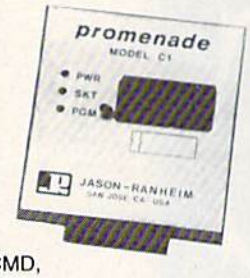
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C

By JIM STRASMA

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Queries are answered only through this column, and, due to the volume of mail, only questions likely to appeal to the majority of our readers can be published.

UPDATES

Update: In the September 1985 issue, Philip Jones asked about artificial intelligence (AI) programming. I'd like to send him and any other readers seriously interested in AI programming a copy of the AI Factsheet I've developed; they need only send me a self-addressed stamped #10 envelope with their request. I am not a vendor, but a 64 user who's serious about developing practical artificial intelligence applications.

Eloisa Yeargain
PO Box 241807
Los Angeles, CA 90024

A: Thanks for the offer and the fact sheet. It is helpful, and I'm sure you'll hear from many readers. AI enthusiasts may also want to investigate Abacus Software's new program, XPER, a serious attempt to squeeze an expert system into the 64. I haven't had it long, but am impressed by what it achieves in what is, by AI standards, a very small computer.

HARDWARE

Q: *My question concerns static discharge damage to MOS IC chips. Some sources warn of dire consequences if your grip changes by as much as a millimeter while moving chips. You and others talk casually of replacing ROM and processor chips and I/O switching. What amount of caution do you recommend?*

Bruce Fellows
Anaheim, CA

A: This time of year (with heating systems operating full force and indoor air very dry), take every precaution against letting static shocks affect your computer. Any shock you can feel is enough to fry an MOS IC chip. These chips are designed to operate at about five volts, and a typical static shock may reach several thousand volts.

To reduce static, remove nearby nylon rugs, humidify the area, and touch a grounded object, such as a radiator, before touching chips. Also, don't touch the legs of the chips directly, and keep the chips seated in a "bug rug" (pad of conductive foam) whenever they are out of the computer.

Although there is truth to the dire warnings about what could happen to a chip when it is handled, I've never actually lost a chip that way, not even an ultra-sensitive CMOS chip.

Q: *Is it all right to shut off your computer when the disk drive is booting up a program?*

Tim Brend
Auburn, IA

A: Usually, but not always. Disk drives are used for two main chores: reading and writing information. To safely shut off your computer during the start-up operations of a program, you must know which of the two chores the disk is performing when you shut it off. Turning off your computer while your drive is reading a disk harms nothing; turning it off while your drive is writing to a disk could result in a ruined file, which in turn could mean an unusable program. Fortunately, very few programs attempt to write information to the disk during their start-up operations.

Also, when you shut off the computer, do not shut off the disk unit until you have first removed the program disk from the drive. Turning off most Commodore disk drives with a disk inserted in the slot and the access door closed alters the data under the read/write head at that moment, often rendering the disk useless until it is reformatted.

Q: *I am planning to buy a C-128. However, color monitors and even TVs bother my eyes. I want to know what kinds of monochrome monitors can hold the C-128's 80-column screen.*

Antonio Gomez
Mexicali, Mexico

A: Only two kinds of monochrome monitors are commonly sold in the U.S. these days. One is usable only by IBM PC and PC-compatible computers with special monochrome adapter cards. This is recognizable by its video connector, which has eight pins, in two rows of four. The other

kind of monochrome monitor (sometimes called a B&W monitor) has an RCA phono connector (a single pin surrounded by a shield) and works fine on the VIC, C-64 and C-128, as well as on Apples, IBMs with color cards and most other computers.

To use this type of monitor with the C-128 in 80-column mode, you must obtain a suitable cable. Both Commodore and other suppliers have already announced special cables for this purpose; some contain an extra connector and switch, so you can use the cable in both 40- and 80-column modes without changing any plugs.

Q: I have a Plus/4 and a printer interface with a power connector that is supposed to plug into the cassette port on a 64. There's no way it will fit into the Plus/4's round cassette port. Can I cut this wire and replace plugs?

Pete Baron
APO NY

A: Yes, but that's not necessary. Just supply +5 volts to the interface another way. Most printers supply the proper voltage on pin 18 of the Centronics parallel connector, into which you plug a cable from the interface. Most likely, the corresponding wire in that cable already brings the necessary voltage into the interface and merely needs to be connected to the same point as the unusable power supply wire.

Q: Is it possible that Commodore has left an empty ROM socket in the 128 on purpose?

Tom Moore
Birmingham, AL

A: It's not only possible; that's just what happened. On both the Plus/4 and C-128, there is an application ROM socket on the main circuit board. On the Plus/4, the socket normally contains the factory-supplied "3+1" program, but other ROMs designed for use in Plus/4 cartridges can be put in that same socket. Although the socket is initially empty on the C-128, it is likewise addressed to the same part of memory as ROM cartridges, and it could easily hold a program ROM from a suitable C-128 cartridge.

PROGRAMMING

Q: I am writing a program in which I want to use the Get# command to retrieve both program files and datafiles from the Datassette. Datafiles come across fine, but the 64 doesn't like reading program files as if they were datafiles. After retrieving the first buffer full of information, it looks for the next file. Is there any way to force the 64 to continue reading the program file?

Will Johns
Deerfield, IL

A: Not with Basic's GET# command. The problem is that programs and data are stored very differently on tape. Datafiles are stored in neat 191-character blocks, separated by two-second inter-record gaps, which allow the tape to halt and restart without losing data. Program files, on the other hand, are stored as single blocks (recorded twice in succession) and loaded directly into Basic's program area, rather than into a buffer.

Your computer can read the first 191 characters of a program into the file buffer as though the program were a datafile. However, while that data is being processed, Basic halts the tape. When the tape restarts, Basic looks for another block of data to read, but does not find it until the start of the next program.

The solution is to rewrite your program in machine language and store it in an out-of-the-way part of memory, starting at $C000, for instance. You may then treat all of Basic's workspace as a huge buffer and read all of the program in at once, thanks to the greater speed of machine language.

Q: If a filename listed in a directory appears with an asterisk immediately following it, what is the proper procedure to take?

Charles Fisher
Lockport, IL

A: Any disk with a directory entry so marked has an improperly closed file and is in danger of losing information. If the marked file is not important, the disk should be immediately validated, with either the C-128's or the Plus/4's Collect command or the

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VIC-20's and C-64's Disk Validate (v0) command. If the file contains vital information, it may be read first, using the modify option (,s,m) of the disk file Open command.

In any case, do not write any new programs or files on that disk until you've successfully validated it. If the validation fails, or if the number of blocks shown as free at the end of the directory changes after the validation, the only safe procedure is to copy (not back up) all programs and files on the disk to another disk, and then to reformat the original.

REPAIRS

Q: I recently lost the color on my 64 and was told the color chip might be the cause. I would like your opinion as to whether or not I should send my computer to Commodore for repair.

Doug Counce
Tupelo, MS

A: A faulty VIC chip is only one of many possible reasons for loss of color. Others include a faulty cable, an unplugged chroma connector, slight mistuning of your channel on a color TV, and maladjusted color settings on a TV or monitor. Before seeking repair, try another TV or monitor and another video cable. If these work, your 64 is not at fault.

The next step is to take your 64 to an authorized Commodore service center. These centers should be well-equipped to adjust or replace parts that could affect color; some will do this while you wait.

SOFTWARE

Q: I use Nevada Fortran with my C-64 and a CP/M cartridge. To my surprise, the Fortran manual is geared to the experienced Fortran programmer already familiar with CP/M. Would you please assist me in obtaining a tutorial book on CP/M for the Commodore 64, with respect to Fortran applications?

Reynaldo Reyes, Sr.
South Gate, CA

A: First, CP/M and Fortran are entirely different from each other. Fortran is a very old, but still popular, programming language, of which Basic is a somewhat modified subset. CP/M, on the other hand, is an operating system, helping the computer run whatever language you like with equal ease. Thus, you aren't likely to find a single text that teaches both Fortran and CP/M. On the other hand, most bookstores carry books that deal with each subject separately.

Of the CP/M books, my personal favorite is still Thom Hogan's *Osborne CP/M User Guide*, from Osborne/McGraw-Hill. My favorite Fortran book is the *Fortran Coloring Book*, although nearly all textbook publishers offer good introductory Fortran texts for classroom use, available from the nearest university bookstore.

Q: Please advise how I can obtain the second edition of the 1541 manual.

Lewis Hegyi
Cinnaminson, NJ

A: It is available directly from Commodore as P/N 1540031-03 for $5 in the U.S. The address is Customer Support Department, Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

Q: In a recent column, you mentioned that the Script/Plus cartridge ROM could be placed inside the Plus/4. Since it makes me nervous to have the cartridge hanging out of the back of my machine, could you publish more specific instructions as to which ROMs in the Plus/4 have to be replaced by the cartridge ROMs?

By the way, I bought the Plus/4 and Script/Plus at a local discount store for less than $100. At that price, having a dedicated word processor that is compatible with my C-64 peripherals is definitely worth it! I hope RUN *will continue to support the Plus/4.*

Craig Ede
Minneapolis, MN

A: Unfortunately, my Plus/4 was a prototype, so yours may differ, but the ROM you want to swap will be the one containing the "3 + 1" application program. It may be labeled and may be the only ROM in a socket. If not, it should be at one end of a row of ROMs; removing it (with the power off, of course) should not af-

fect the operation of the computer (except that "3 + 1" will no longer be immediately available).

It may be wise to open your Script/Plus cartridge first, to make sure it contains a single ROM and to help you recognize the similar "3 + 1" chip. There may be a screw in the middle of the cartridge shell, under the label, and several flanges to loosen around the edges when opening the cartridge. Take your time, so as not to break the shell.

Use a small, flat, pointed non-metal object to pry out the "3 + 1" and to remove the Script/Plus ROM. If the Script/Plus ROM is soldered in, you will need a desoldering iron as well, and may wish to have your dealer handle the rest of the swap. When you make the swap, be sure the Script/Plus chip ends up facing the same direction as the "3 + 1" ROM did, and avoid all static shocks. You may also want to install the "3 + 1" ROM in the Script/Plus cartridge, so you can still use it if needed.

Q: I am thinking about buying a Fast Load cartridge from Epyx. I want to know if it would be all right for my 1541 drive. I am worried that my drive might overheat or break from all of the pressure on it.

John Bumstead
Upland, CA

A: In general, Fast Load and other similar speed-up cartridges work well and won't hurt your disk drive. However, there are two possible problems. One is that the power supply in some 64s is barely adequate, and the added power consumed by even a cartridge like Fast Load could send a marginal power supply over the edge to failure after extended use. If that happens, upgrade the power supply, and it won't happen again.

The other problem readers are reporting is that Fast Load is not entirely compatible with all programs that use the disk, particularly some commercial programs that write relative datafiles. If you attempt to use Fast Load with such programs, you may lose all the data on that disk without warning. Therefore, I suggest using Fast Load and similar speed-up programs to quickly load programs, but not to write programs or files back to the disk. R

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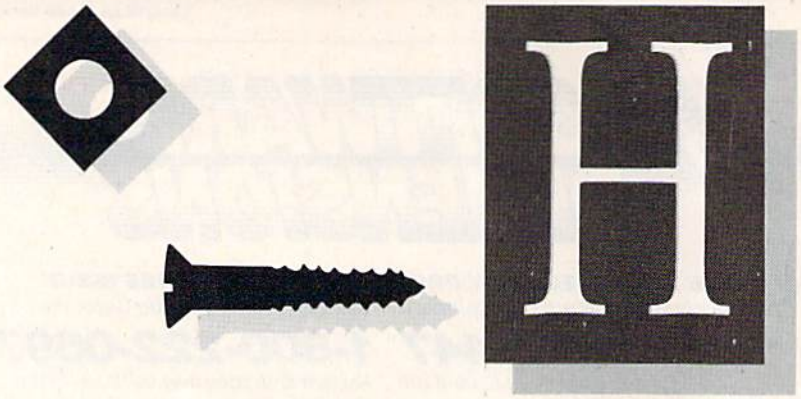
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Compiled by SUSAN TANONA

Okidata 120

A Commodore-Compatible Dot-Matrix Printer

Trying to select a printer for your Commodore computer can be difficult because of the variety of printers on the market. In many cases, the features, rather than the amount of money you are able to spend, play a large part in determining which printer you select. Okidata's new 120 printer will probably become very popular among Commodore owners, as it is reasonably priced and offers a variety of useful features.

The Okidata 120 is designed exclusively for the Commodore line of computers; a Commodore-compatible interface cable is included. The printer's compact size (14 × 11 × 3.25 inches) allows it to fit easily onto most desks. Three buttons for form control and a fourth button for on- or off-line selection are located on the front of the unit.

The platen has permanently built-in tractor sprockets at each end; this is a clever design, and helpful when using non-perforated forms in the printer. Poor designing, however, has placed the serial cable on the rear of the unit, where it has a tendency to interfere with the flow of the paper. The serial cable's port position encourages use of the bottom form-feed feature that this printer also offers.

The 120 in the printer's name represents the unit's printing speed in the Draft mode. Unfortunately, the printer does not have a near letter-quality capacity. Its three print modes are Standard, Enhanced and Emphasized, and they all produce print of very good quality. This is due in part to the printer's use of a small cartridge-type nylon ribbon, which offers greater longevity than film cartridge ribbons; however, nylon does fade over time.

The Okidata 120 offers three print sizes: pica (10 characters per inch); elite (12 cpi); and fine (17.1 cpi). Double-width characters and the three print modes are accessible when using any of the print sizes. Other useful print features include superscripts and subscripts (used in formulas and equations) and an underlining option that can be used with any print mode or character size.

The Okidata 120 is very software-friendly. However, I experimented with accessing the print features from several very different word processors and found the printer's "Programming Features" to be rather confusing, and quite possibly discouraging, to use. Fortunately, Okidata lists a programmer's guide in the manual, with decimal values for each print feature.

Programs designed for the Commodore 1525 printer will work well on the Okidata 120. Standard graphics programs and screen dump programs designed for the 1525 also perform flawlessly on this printer, so you can utilize all of your favorite 1525 print routines in programs you write for the 120.

Compared with other printers in its price range, the Okidata 120 is among the best. Its contemporary design, ease of use and overall quality are very impressive. I recommend the printer to anyone looking for a fast and reliable dot-matrix printer for his Commodore. *(Okidata, 532 Fellowship Road, Mt. Laurel, NJ 08054. $269.)*

Tim Walsh
***RUN* staff**

MIDI Interface

You and Your Computer Can Make Beautiful Music Together

The MIDI Interface, from Passport Designs, gives your C-64 and C-128 a communications link to MIDI-equipped synthesizers, keyboards and drum machines.

The interface plugs into the cartridge port of your computer and comes supplied with two 5-pin DIN cables that connect the interface to an external musical instrument.

The MIDI-out connector is attached to the MIDI-in port on the musical instrument, and the MIDI-in connector is attached to the MIDI-out port on the same instrument. There is also a Drum Sync connector on the interface, for which you have to purchase a separate MIDI Drum Sync Cable Kit. The Drum Sync allows you to attach an external drum machine, which will play the accompanying drum beat in time with the musical composition.

If you're a musician, the advantage of a MIDI interface is that you can

compose songs on one or more piano-like MIDI-equipped keyboards with synchronized percussion accompaniment. These MIDI keyboards offer far more versatility of sound production than single non-MIDI keyboards that are also sold for your computer. As you compose your music, it is fed into the computer, where it can be modified, stored on disk, played back and printed out. I used the CZ-101 synthesizer from Casio (15 Gardner Road, Fairfield, NJ 07006) to try out the MIDI Interface.

The sound interface device (SID) chip within your C-64 and C-128 is a musical voice synthesizer in itself. It can produce three separate, controllable musical voices. The voices can be modified to duplicate a multitude of sounds through a wide variety of software that does not necessarily require an external interface such as MIDI.

With MIDI, however, your control of the SID chip is greatly expanded, and you can more easily create subtle differences in the sounds you are producing. You can also play more than three voices simultaneously. This is accomplished with the external MIDI-equipped instrument, MIDI software and an appropriate external speaker (you can also use the one inside your video monitor).

For example, with the MIDI Music Shop software from Broderbund (17 Paul Drive, San Rafael, CA 94089), you can play up to eight musical parts simultaneously. These eight notes can be distributed over a maximum of four different external instruments. This means you could have four keyboards hooked up, with each one playing a different part. And, using this particular software, you can have each instrument change its voice in the course of one musical score. This provides the flexibility necessary to produce sophisticated musical compositions.

An important feature, available only with a MIDI interface, is the ability to play notes on the external keyboard and have them fed into the computer and displayed on-screen on a musical staff. This makes musical composition more natural for musicians, especially those who have learned to play the piano.

The MIDI Music Shop software lets you play a song on your MIDI keyboard while the program automatically reads your notes and places them onto a computerized staff. The limitation is that you have to set the timing and each note's duration manually.

You can also compose music without a MIDI interface, of course, using the computer's keyboard or a joystick. With this method, you have to place each note on the staff and designate its value and the music's timing.

Passport Designs states that any MIDI-equipped device can be addressed and controlled with the MIDI Interface, as long as you have the proper software. It has already been adopted by many music software companies, so you will not be limited in your software choices. Broderbund and QRS Music Rolls (1026 Niagara St., Buffalo, NY 14213) are two companies writing software for use with this interface.

MIDI is not, however, limited to use with commercial software. The manual that comes with the device describes how to get started in programming the interface on your own. This is not something for beginners in computer programming to try. Although you can program the interface in Basic, it is recommended that you do any serious programming in assembly language.

If you're a student, teacher or home user who is likewise interested in composing, playing, saving, editing and printing out multivoiced music—but with fewer voices and more manual labor—you would probably do better to invest in the $45 Music Shop (an excellent musical composition and editing program) and a $6 joystick.

However, if you're a serious musician, Passport's MIDI interface is probably one of your best choices for use with the C-64 and C-128. If you have the money to invest in one or more MIDI instruments (the Casio CZ-101 costs about $500) and in the MIDI software and interface, this application for your computer is definitely worthwhile. *(Passport Designs, 625 Miramontes St., Half Moon Bay, CA 94019. C-64, C-128/$149.)*

Margaret Morabito
***RUN* staff**

Circle 215 on Reader Service card.

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Super Graphix Printer Interface

A Feature-Packed Interface for Your Commodore

The printer interface in the Commodore environment must perform many tasks, such as emulating a Commodore printer and, at the same time, allowing you access to your printer's special features.

The Super Graphix Printer Interface, from Xetec, can successfully perform these and many other duties. When driving a suitable dot-matrix printer, the Super Graphix will provide total emulation of the 1525 printer, including reproduction of all the special Commodore graphics characters.

Finding a compatible printer should not be difficult. Three of the eight small switches on the front of the interface control printer selection. This gives you eight possible choices, covering all of the major printer brands. These switches also let you choose device number, operating mode and type font.

The Super Graphix goes several steps beyond simple emulation of the Commodore printers. Basic programmers will appreciate the Special Listing mode, which translates all of the Commodore embedded control codes into easy-to-read mnemonics. Even graphics characters, which are generated by holding down the Commodore or shift key, are listed by their respective keystroke sequences.

The most impressive features of the Super Graphix interface are its built-in 8K RAM buffer and the near letter-quality print font. As well as being a text storage area, the buffer enables the interface to print text in any of three high-density fonts. The first of these, the near letter-quality font, is built into the interface and is available by simply setting a pair of the switches on the interface. The remaining two fonts are downloaded to the interface from your computer.

A utility disk is supplied with Super Graphix. This contains 21 fonts that you can download, as well as a support program to help you create your own. Once downloaded, the fonts can be disconnected only by an instruction sent over the interface's command channel (similar to the disk drive command channel). In fact, turning off the computer or resetting the computer or the interface will not affect the fonts, as they can remain in RAM for up to 15 minutes without any source of external power.

Two of the fonts included on the disk—italic and script—require your printer to have very high dot densities. Not all dot-matrix printers are capable of the required density. Printers that support all of Super Graphix's features are the Epson, Gemini and Panasonic machines (and others that function like these).

The Super Graphix provides a simple way to do a screen dump (both character and bit-map) from your computer. Character dumps are supported for the VIC-20, C-64 and C-128. An 8K bit-map dump is available for the C-64 and C-128 graphics screens. Simply open a channel to the interface with the appropriate secondary address; Peek the data (1K or 8K) from the proper section of memory; and send it to the interface, one byte at a time. The Super Graphix will take care of the rest.

The interface is packaged in what appears to be a VIC-20 cartridge case. A reset button is provided to abort the printing of text that may be in the 8K buffer.

The Super Graphix Printer Interface is a high-quality device. If you are presently considering the purchase of a new printer, this interface definitely merits your consideration. *(Xetec, 3010 Arnold Road, Salina, KS 67401. VIC, C-64, C-128/$99.95.)*

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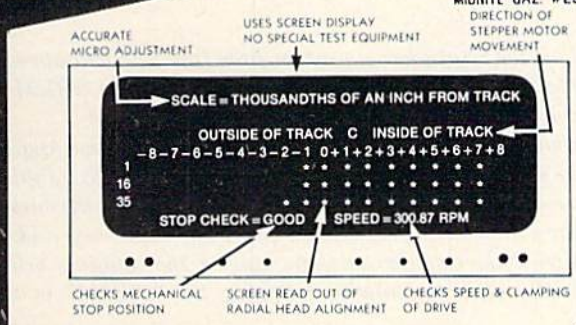
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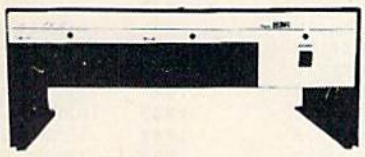
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Checksums for *RUN* 1985 Programs

64 Perfect Typist, RUN's *checksum program, has earned much praise and positive response from our readers since we first introduced the program in our September 1985 issue. Many readers have inquired to find out if we would list checksums for previously published programs. With this issue, we begin a series of listings that will eventually give you checksums for most of the lengthy C-64 programs published from January to August 1985.*

This issue features the listings from August. Try entering programs from the August issue and find out how well 64 Perfect Typist works. Simply load and run 64 Perfect Typist (see How to Type Listings, on page 126), get out your August issue and begin typing in any program you find in the listings below. Every time you hit the return key, a number from 0 to 255 will appear. If you enter a line correctly, the number following the ":REM" next to the line number will appear.*

If you have already entered one of the programs from August and desire to check it for accuracy, simply enter 64 Perfect Typist, list lines individually or in small groups and position the cursor on the line you want to check. Next, press the return key, and, if you've entered the line correctly, the number that appears below the line will match the number following the ":REM" in the listings.*

You can look forward to seeing more of these listings of 1985 programs in subsequent 1986 issues of RUN.

C-64 Screen Formatter, by James Cooper; August, p. 80.

```
1    :REM*101     79   :REM*29     210  :REM*168    350  :REM*127    500  :REM*3
2     :REM*76     80  :REM*196     220   :REM*80    360  :REM*179    510 :REM*143
3    :REM*155     90   :REM*80     230 :REM*220    370  :REM*111    520 :REM*202
4     :REM*56    100  :REM*120     240   :REM*62    380   :REM*71    530  :REM*30
5    :REM*241    110  :REM*120     250    :REM*4    390  :REM*251    540 :REM*140
6     :REM*12    120   :REM*30     260  :REM*45    400  :REM*135    550 :REM*244
7    :REM*141    129   :REM*81     270  :REM*97    410  :REM*203    560  :REM*78
8    :REM*212    130  :REM*218     279 :REM*184    420  :REM*175    570  :REM*74
9    :REM*243    140    :REM*0     280 :REM*119    430   :REM*87    580  :REM*96
10   :REM*248    150  :REM*140     290 :REM*243    439   :REM*26    590   :REM*0
20   :REM*136    160   :REM*94     300 :REM*161    440   :REM*19    600  :REM*212
30    :REM*20    170  :REM*180     310  :REM*45    450  :REM*139    610   :REM*48
40   :REM*158    180  :REM*154     320 :REM*113    460  :REM*219    620  :REM*252
50    :REM*60    190  :REM*144     330  :REM*85    470  :REM*205    630  :REM*186
60   :REM*162    199   :REM*99     340 :REM*189    480  :REM*123    999  :REM*150
70   :REM*170    200  :REM*232     349  :REM*24    490  :REM*245
```

Trap Shoot, by Lee Fraley; August, p. 52.

```
1    :REM*129    110  :REM*178     414   :REM*97    800   :REM*29   1030   :REM*90
2    :REM*182    111  :REM*215     498  :REM*129    801   :REM*14   1031  :REM*149
3    :REM*225    200   :REM*28     499   :REM*10    810  :REM*197   1032   :REM*18
4    :REM*252    210  :REM*126     500  :REM*203    811  :REM*210   1040  :REM*102
5     :REM*87    211  :REM*253     501   :REM*94    890   :REM*63   1041   :REM*79
6    :REM*248    212   :REM*34     502   :REM*19    900   :REM*93   1042  :REM*116
10    :REM*78    299   :REM*10     510  :REM*253    901   :REM*12   1043   :REM*55
11    :REM*29    300   :REM*37     511   :REM*54    902   :REM*29   1999   :REM*16
12   :REM*102    302  :REM*179     512  :REM*230    903  :REM*196   2000   :REM*63
13    :REM*89    303  :REM*232     520   :REM*10    910  :REM*153   2001  :REM*240
14   :REM*158    397    :REM*4     521   :REM*19    911  :REM*160   2002  :REM*149
15   :REM*163    398  :REM*233     522  :REM*240    912  :REM*239   2003  :REM*134
16    :REM*64    399   :REM*74     530   :REM*20    913  :REM*180   2004  :REM*227
17   :REM*137    400  :REM*181     531  :REM*249   1000  :REM*225   2005  :REM*164
18    :REM*38    401  :REM*224     532  :REM*250   1001   :REM*54   2006  :REM*207
98    :REM*80    402  :REM*167     540   :REM*32   1002  :REM*127   2007  :REM*124
99    :REM*45    403  :REM*138     541  :REM*245   1003  :REM*182   2008  :REM*219
100  :REM*178    404   :REM*69     542   :REM*38   1004  :REM*171   2009  :REM*128
101  :REM*133    405  :REM*200     590  :REM*134   1010   :REM*65   2010  :REM*229
102  :REM*114    406  :REM*119     591  :REM*105   1011   :REM*88   2011  :REM*138
103   :REM*21    407  :REM*236     599  :REM*147   1012  :REM*209   2012  :REM*155
104  :REM*102    408  :REM*151     600   :REM*84   1013   :REM*24   2013   :REM*46
105  :REM*195    409   :REM*44     601   :REM*11   1020   :REM*77   2014  :REM*207
106  :REM*204    410   :REM*35     602  :REM*122   1021  :REM*108   2015   :REM*26
107   :REM*87    411   :REM*90     603  :REM*165   1022   :REM*15   2016   :REM*39
108  :REM*188    412  :REM*195     604   :REM*88   1023   :REM*40
109   :REM*79    413   :REM*12     605  :REM*129   1024   :REM*12
```

Byte-Size Compiler, by Victor Cortes; August, p. 62.

```
1Ø      :REM*2Ø4
15       :REM*63
2Ø     :REM*212
3Ø     :REM*122
4Ø     :REM*2ØØ
5Ø      :REM*24
6Ø     :REM*154
7Ø      :REM*14
8Ø     :REM*212
9Ø      :REM*36
1ØØ    :REM*1Ø6
11Ø     :REM*74
12Ø    :REM*134
13Ø     :REM*32
14Ø    :REM*116
15Ø     :REM*86
16Ø    :REM*242
17Ø    :REM*17Ø
18Ø    :REM*254
19Ø    :REM*174
2ØØ    :REM*164
21Ø      :REM*4
22Ø    :REM*12Ø
23Ø     :REM*2Ø
24Ø    :REM*254
25Ø     :REM*98
26Ø    :REM*223
27Ø     :REM*87
28Ø    :REM*135
29Ø     :REM*43
3ØØ    :REM*227
31Ø    :REM*213
32Ø     :REM*85
33Ø     :REM*71
34Ø    :REM*123
35Ø    :REM*215
36Ø    :REM*157
37Ø    :REM*229
38Ø    :REM*113
39Ø    :REM*159
4ØØ    :REM*223
41Ø    :REM*165
42Ø    :REM*217
43Ø     :REM*95
44Ø    :REM*153
45Ø    :REM*213
46Ø    :REM*163
47Ø     :REM*47
48Ø    :REM*111
49Ø     :REM*53
5ØØ    :REM*179
51Ø     :REM*51
52Ø     :REM*48
53Ø    :REM*218
54Ø     :REM*34
55Ø    :REM*242
56Ø    :REM*25Ø
57Ø    :REM*1Ø2
58Ø    :REM*198
59Ø     :REM*16
6ØØ    :REM*134
61Ø     :REM*92
62Ø     :REM*56
63Ø    :REM*2Ø8
64Ø    :REM*21Ø
65Ø    :REM*242
66Ø    :REM*134
67Ø     :REM*56
68Ø     :REM*38
69Ø     :REM*36
7ØØ     :REM*34
71Ø     :REM*6Ø
72Ø     :REM*52
73Ø     :REM*8Ø
74Ø     :REM*48
75Ø     :REM*34
76Ø    :REM*136
77Ø      :REM*3
78Ø    :REM*245
79Ø    :REM*145
8ØØ    :REM*199
81Ø    :REM*151
82Ø     :REM*61
83Ø     :REM*53
84Ø    :REM*113
85Ø     :REM*91
86Ø     :REM*95
87Ø     :REM*55
88Ø     :REM*31
89Ø     :REM*55
9ØØ    :REM*239
91Ø     :REM*85
92Ø    :REM*223
93Ø     :REM*53
94Ø    :REM*231
95Ø    :REM*139
96Ø    :REM*129
97Ø    :REM*113
98Ø    :REM*249
99Ø     :REM*43
1ØØØ   :REM*149
1Ø1Ø    :REM*123
1Ø2Ø     :REM*63
1Ø3Ø     :REM*92
1Ø4Ø    :REM*244
1Ø5Ø     :REM*22
1Ø6Ø     :REM*46
1Ø7Ø    :REM*1ØØ
1Ø8Ø     :REM*92
1Ø9Ø     :REM*92
11ØØ    :REM*166
111Ø    :REM*132
112Ø    :REM*212
113Ø     :REM*64
114Ø    :REM*1Ø4
115Ø    :REM*23Ø
116Ø     :REM*86
117Ø     :REM*78
118Ø    :REM*186
119Ø    :REM*164
12ØØ    :REM*126
121Ø     :REM*2Ø
122Ø    :REM*186
123Ø     :REM*42
124Ø    :REM*198
125Ø    :REM*174
126Ø    :REM*128
127Ø     :REM*14
128Ø    :REM*165
129Ø     :REM*11
13ØØ    :REM*255
131Ø    :REM*175
132Ø     :REM*65
133Ø     :REM*59
134Ø    :REM*157
135Ø    :REM*217
136Ø     :REM*81
137Ø     :REM*33
138Ø    :REM*149
139Ø    :REM*197
14ØØ     :REM*11
141Ø    :REM*187
142Ø     :REM*91
143Ø    :REM*1Ø3
144Ø     :REM*21
145Ø    :REM*197
146Ø     :REM*81
147Ø    :REM*221
148Ø    :REM*183
149Ø     :REM*29
15ØØ     :REM*57
151Ø     :REM*93
152Ø    :REM*167
153Ø    :REM*241
154Ø    :REM*224
155Ø    :REM*118
156Ø      :REM*4
157Ø    :REM*132
158Ø    :REM*156
159Ø     :REM*96
16ØØ    :REM*122
161Ø     :REM*54
162Ø     :REM*94
163Ø    :REM*186
164Ø    :REM*156
165Ø     :REM*22
166Ø     :REM*8Ø
167Ø    :REM*136
168Ø      :REM*6
169Ø    :REM*188
17ØØ     :REM*18
171Ø     :REM*16
172Ø    :REM*118
173Ø    :REM*248
174Ø    :REM*116
175Ø    :REM*172
176Ø    :REM*11Ø
177Ø     :REM*56
178Ø    :REM*242
179Ø    :REM*182
18ØØ    :REM*131
181Ø    :REM*185
182Ø    :REM*185
183Ø     :REM*73
184Ø      :REM*5
185Ø     :REM*75
186Ø     :REM*79
187Ø     :REM*27
188Ø    :REM*167
189Ø    :REM*171
19ØØ    :REM*159
191Ø     :REM*99
192Ø     :REM*57
193Ø    :REM*111
194Ø     :REM*57
195Ø     :REM*49
196Ø     :REM*89
197Ø     :REM*87
198Ø    :REM*183
199Ø    :REM*243
2ØØØ     :REM*29
2Ø1Ø     :REM*41
2Ø2Ø    :REM*185
2Ø3Ø    :REM*189
2Ø4Ø     :REM*73
2Ø5Ø    :REM*136
2Ø6Ø    :REM*21Ø
2Ø7Ø    :REM*122
2Ø8Ø    :REM*118
2Ø9Ø    :REM*1Ø6
21ØØ    :REM*1Ø2
211Ø    :REM*228
213Ø     :REM*42
214Ø    :REM*224
215Ø    :REM*148
216Ø     :REM*54
217Ø    :REM*152
218Ø     :REM*42
219Ø      :REM*6
22ØØ    :REM*25Ø
221Ø     :REM*9Ø
222Ø    :REM*222
223Ø     :REM*4Ø
224Ø    :REM*154
225Ø    :REM*128
226Ø     :REM*7Ø
227Ø    :REM*216
228Ø    :REM*236
229Ø    :REM*14Ø
23ØØ    :REM*218
231Ø    :REM*185
232Ø    :REM*137
233Ø     :REM*51
234Ø    :REM*193
235Ø    :REM*235
236Ø    :REM*225
```

Easy Assembly III, by William Sanders; August, p. 58.

```
42Ø     :REM*167
43Ø     :REM*167
44Ø     :REM*187
45Ø     :REM*161
46Ø     :REM*119
47Ø      :REM*41
48Ø     :REM*131
49Ø      :REM*45
5ØØ     :REM*137
51Ø      :REM*65
52Ø      :REM*3Ø
53Ø     :REM*192
54Ø     :REM*2Ø6
55Ø      :REM*1Ø
56Ø     :REM*1ØØ
57Ø     :REM*146
58Ø     :REM*12Ø
59Ø     :REM*216
6ØØ     :REM*1Ø6
61Ø     :REM*212
62Ø     :REM*152
63Ø      :REM*84
64Ø     :REM*192
65Ø     :REM*142
66Ø     :REM*212
67Ø       :REM*8
68Ø     :REM*24Ø
69Ø     :REM*238
7ØØ     :REM*214
71Ø     :REM*194
72Ø     :REM*234
73Ø     :REM*142
74Ø      :REM*94
75Ø      :REM*42
76Ø      :REM*6Ø
77Ø     :REM*2Ø5
78Ø      :REM*81
79Ø     :REM*229
8ØØ      :REM*67
81Ø     :REM*117
82Ø      :REM*15
83Ø      :REM*55
84Ø      :REM*35
85Ø     :REM*129
86Ø     :REM*189
87Ø      :REM*39
88Ø     :REM*119
89Ø      :REM*89
9ØØ      :REM*39
91Ø      :REM*21
92Ø     :REM*159
93Ø     :REM*235
94Ø      :REM*17
95Ø     :REM*155
96Ø     :REM*143
97Ø     :REM*225
98Ø     :REM*117
99Ø      :REM*51
1ØØØ    :REM*169
1Ø1Ø     :REM*63
1Ø2Ø    :REM*175
1Ø3Ø    :REM*198
1Ø4Ø     :REM*96
1Ø5Ø     :REM*8Ø
1Ø6Ø    :REM*16Ø
1Ø7Ø    :REM*216
1Ø8Ø    :REM*18Ø
1Ø9Ø      :REM*6
11ØØ     :REM*84
111Ø    :REM*21Ø
112Ø    :REM*186
113Ø    :REM*2Ø4
114Ø    :REM*17Ø
115Ø    :REM*114
116Ø     :REM*86
117Ø    :REM*242
118Ø     :REM*36
119Ø    :REM*168
12ØØ     :REM*42
121Ø      :REM*Ø
122Ø     :REM*2Ø
123Ø    :REM*1Ø8
124Ø    :REM*2Ø6
125Ø      :REM*4
126Ø    :REM*216
127Ø    :REM*21Ø
128Ø     :REM*43
129Ø    :REM*255
13ØØ     :REM*55
131Ø    :REM*161
132Ø     :REM*41
133Ø    :REM*187
134Ø     :REM*33
135Ø    :REM*135
136Ø    :REM*173
137Ø    :REM*217
138Ø    :REM*161
139Ø    :REM*155
14ØØ    :REM*243
141Ø    :REM*239
142Ø    :REM*191
143Ø     :REM*15
144Ø    :REM*1Ø5
145Ø     :REM*99
146Ø    :REM*187
147Ø    :REM*251
148Ø     :REM*45
149Ø     :REM*45
15ØØ    :REM*2Ø3
151Ø    :REM*197
152Ø    :REM*243
153Ø     :REM*51
154Ø     :REM*24
155Ø     :REM*68
156Ø     :REM*9Ø
157Ø    :REM*228
158Ø    :REM*198
159Ø    :REM*18Ø
16ØØ    :REM*142
161Ø    :REM*116
162Ø    :REM*138
163Ø     :REM*18
164Ø     :REM*98
165Ø    :REM*156
166Ø     :REM*36
167Ø    :REM*15Ø
168Ø    :REM*13Ø
169Ø    :REM*162
17ØØ    :REM*116
171Ø    :REM*1Ø8
172Ø     :REM*8Ø
173Ø     :REM*74
174Ø    :REM*124
175Ø     :REM*3Ø
176Ø     :REM*22
177Ø    :REM*1Ø2
178Ø    :REM*15Ø
179Ø     :REM*66
18ØØ    :REM*191
181Ø     :REM*87
182Ø    :REM*189
4ØØØ    :REM*241
4Ø1Ø    :REM*187
4Ø2Ø      :REM*5
4Ø3Ø    :REM*237
4Ø4Ø     :REM*59
4Ø5Ø    :REM*215
4Ø6Ø     :REM*37
```

The Longer, the Better, by Ronny Ong; August, p. 76.

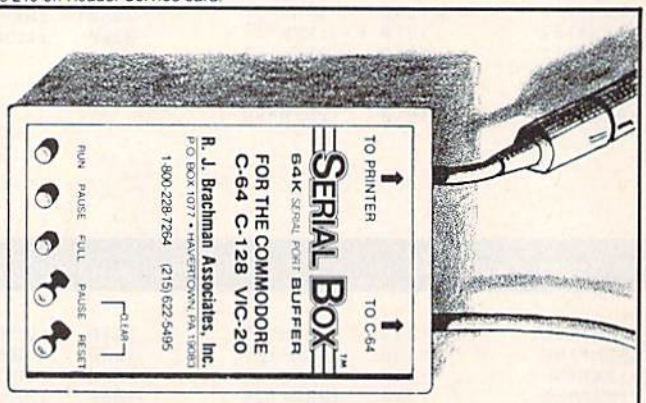
```
1    :REM*249      24   :REM*112      47   :REM*43       7Ø   :REM*224      93   :REM*81
2    :REM*246      25   :REM*169      48   :REM*136      71   :REM*81       94   :REM*176
3    :REM*15       26   :REM*156      49   :REM*149      72   :REM*14       95   :REM*53
4    :REM*52       27   :REM*217      5Ø   :REM*62       73   :REM*131      96   :REM*186
5    :REM*149      28   :REM*228      51   :REM*1Ø5      74   :REM*22Ø      97   :REM*155
6    :REM*2Ø6      29   :REM*125      52   :REM*78       75   :REM*25       98   :REM*162
7    :REM*111      3Ø   :REM*162      53   :REM*67       76   :REM*154      99   :REM*145
8    :REM*214      31   :REM*65       54   :REM*3Ø       77   :REM*23       1ØØ  :REM*168
9    :REM*61       32   :REM*146      55   :REM*179      78   :REM*226      1Ø1  :REM*67
1Ø   :REM*12       33   :REM*177      56   :REM*82       79   :REM*231      1Ø2  :REM*32
11   :REM*2Ø3      34   :REM*252      57   :REM*225      8Ø   :REM*56       1Ø3  :REM*241
12   :REM*13Ø      35   :REM*211      58   :REM*22       81   :REM*1Ø7      1Ø4  :REM*22Ø
13   :REM*2Ø5      36   :REM*154      59   :REM*169      82   :REM*214      1Ø5  :REM*251
14   :REM*42       37   :REM*219      6Ø   :REM*12Ø      83   :REM*141      1Ø6  :REM*1Ø6
15   :REM*175      38   :REM*58       61   :REM*51       84   :REM*38       1Ø7  :REM*217
16   :REM*154      39   :REM*113      62   :REM*13Ø      85   :REM*151      1Ø8  :REM*228
17   :REM*213      4Ø   :REM*16       63   :REM*85       86   :REM*146      1Ø9  :REM*123
18   :REM*158      41   :REM*55       64   :REM*132      87   :REM*55       11Ø  :REM*72
19   :REM*1Ø3      42   :REM*116      65   :REM*49       88   :REM*152      111  :REM*137
2Ø   :REM*17Ø      43   :REM*247      66   :REM*238      89   :REM*175
21   :REM*227      44   :REM*24       67   :REM*249      9Ø   :REM*156
22   :REM*228      45   :REM*1Ø7      68   :REM*224      91   :REM*57
23   :REM*177      46   :REM*1ØØ      69   :REM*155      92   :REM*8Ø
```

The Key to Your Disk Directory, by Robin Franzel; August, p. 70.

```
1Ø   :REM*242      15Ø  :REM*1Ø8      29Ø  :REM*253      43Ø  :REM*41       1Ø1Ø :REM*235
2Ø   :REM*56       16Ø  :REM*36       3ØØ  :REM*63       44Ø  :REM*67       1Ø2Ø :REM*141
3Ø   :REM*34       17Ø  :REM*152      31Ø  :REM*129      45Ø  :REM*141      1Ø3Ø :REM*64
4Ø   :REM*228      18Ø  :REM*96       32Ø  :REM*159      46Ø  :REM*243      1Ø4Ø :REM*14
5Ø   :REM*28       19Ø  :REM*38       33Ø  :REM*219      47Ø  :REM*3        1Ø5Ø :REM*11Ø
6Ø   :REM*5Ø       2ØØ  :REM*56       34Ø  :REM*211      48Ø  :REM*59       1Ø6Ø :REM*66
7Ø   :REM*186      21Ø  :REM*8        35Ø  :REM*187      49Ø  :REM*137      1Ø7Ø :REM*112
8Ø   :REM*124      22Ø  :REM*4Ø       36Ø  :REM*33       5ØØ  :REM*63       1Ø8Ø :REM*54
9Ø   :REM*18       23Ø  :REM*2Ø4      37Ø  :REM*2Ø7      51Ø  :REM*221      1Ø9Ø :REM*22
1ØØ  :REM*242      24Ø  :REM*178      38Ø  :REM*143      52Ø  :REM*194      11ØØ :REM*12Ø
11Ø  :REM*178      25Ø  :REM*98       39Ø  :REM*217      53Ø  :REM*94
12Ø  :REM*32       26Ø  :REM*77       4ØØ  :REM*197      54Ø  :REM*186
13Ø  :REM*142      27Ø  :REM*39       41Ø  :REM*97       55Ø  :REM*94
14Ø  :REM*186      28Ø  :REM*131      42Ø  :REM*231      1ØØØ :REM*49
```


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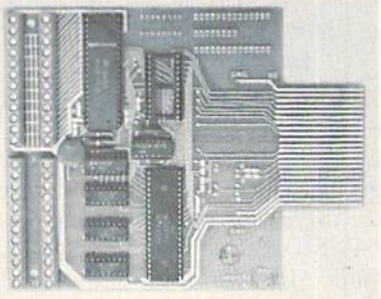
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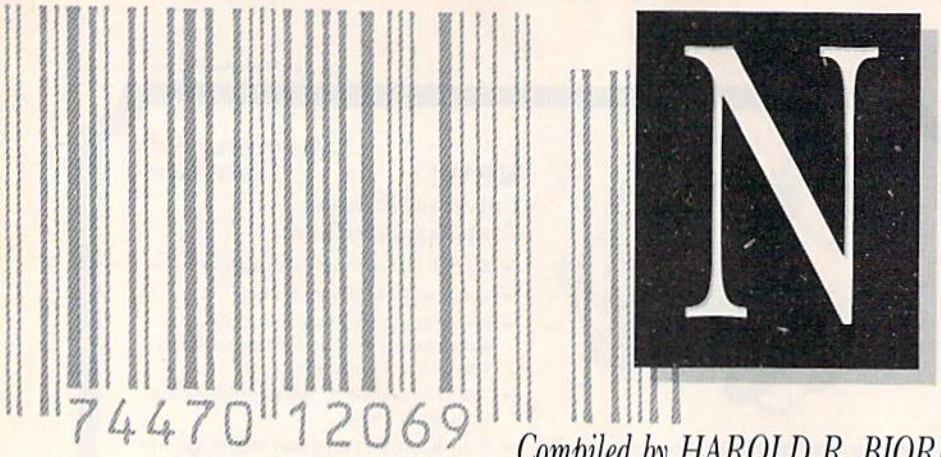
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Compiled by HAROLD R. BJORNSEN

Six-Part Harmony Music System

The Visible Music Monitor and the VT-6 cartridge provide an advanced music system for the C-64. The cartridge includes an extra sound chip to add three voices to the three that the 64's SID chip already includes.

Visible Music Monitor software allows you to create, edit, display and play your compositions, and store and retrieve your music on disk or tape.

Editing features include the ability to move or change notes, measures and segments, and to cut, paste and copy. They also provide full editing control over all chip sounds. The system is available from V-Tech (2223 Rebecca, Hatfield, PA 19440) for $89.

Check Reader Service number 413.

The Artworx Program Exchange

Artworx (150 North Main St., Fairport, NY 14450) has shipped a new line of software called The Artworx Program Exchange.

The Exchange consists of 11 programs for the C-64, ranging from traditional arcade games to mystery thrillers and family adventures. Each package is available on disk for $9.95.

Check Reader Service number 414.

Telecommunications Printer

Okidata (532 Fellowship Road, Mt. Laurel, NJ 08054) has introduced its dot-matrix printer for telecommunications use.

The Microline 182 TTY features utility-mode printing and bit-image graphics at 120 cps in the Utility mode and at 60 cps in the Emphasized and Enhanced modes.

In the Teletype mode, the printer responds only to carriage-return, line-feed and form-feed commands, thus preventing any extraneous commands from corrupting received data or delaying the printer.

In the CRT mode, page-formatting commands are added. In the Intelligent Printer mode, the printer operates exactly as the standard Microline 182. Available for the C-64 for $349.

Check Reader Service number 400.

Sesame Street Software

CBS Software (One Fawcett Place, Greenwich, CT 06836) releases three educational programs for children of ages 4–6.

Sesame Street Pals Around Town introduces your child to some of the physical and social characteristics that make up a community. With help from Sesame Street characters, your child explores five neighborhood locations: a classroom, a school yard, a busy downtown street, Bert and Ernie's apartment and Sesame Street.

Grover's Animal Adventures features graphics and music in presenting four different animal environments: the African grasslands, the Atlantic Ocean, a North American forest and a barnyard.

In Ernie's Big Splash, Ernie has lost his rubber duck. Your child helps Ernie find the toy by building a pathway that leads the rubber duck from his soap dish into Ernie's bathtub.

The programs are available on disks for the C-64 at $14.95 each.

Check Reader Service number 401.

Wargames

Strategic Simulations (883 Stierlin Road, Bldg. A-200, Mountain View, CA 94043) has released three wargames on disks for the C-64.

Battle of Antietam is a tactical Civil War game that takes place during the September 17, 1862, battle along the Antietam Creek at Sharpsburg, Pennsylvania. Three ability levels are included: introductory, intermediate



Three new educational software packages from CBS Software.

and advanced. The game retails for $49.95.

Norway 1985 deals with an imagined Soviet occupation of Norway and NATO's counterattack. In addition to the normal complement of fighting units, infantry and mortar infantry, ski troops are used. Retail price is $34.95.

U.S.A.A.F. (United States Army Air Force) is a strategic simulation of the daylight bombing of German industry from 1943–1945. The game retails for $59.95.

Check Reader Service number 405.

Commodore Carrier

Systems Go Carry-All is a carrying case designed to hold your C-64 keyboard, 1541 disk drive, joystick, cables, programs and documentation. It features hinged foam pads to secure and protect your equipment, and the panels can be removed to accommodate the C-128.

The carry-all's outer fabric is made of Cordura nylon, which is featherweight and washable and resists tearing, stains and mildew; moreover, its inner surface is coated with urethane to enhance waterproofing.

A waterproof, ½-inch-thick closed-cell polyethylene foam lining, with twice the impact strength of standard foams, insulates your equipment.

For carrying comfort, the carry-all features a padded hand grip and a padded, nonslip shoulder strap. Available for $49.95 from Systems Go, 234 Antiquera #6, Coral Gables, FL 33134.

Check Reader Service number 406.

For Computer Lovers Everywhere

King Chip is an action game of chance, strategy, risk and knowledge for two to six players. The object is to attain and keep the throne of King Chip. All other players attempt to dethrone the king by asking him questions of increasing difficulty until he answers incorrectly. A new king ascends the throne at this point.

The questions are based on high technology and the computer, and are grouped into five levels of difficulty. Each answer is accompanied by an explanation designed to inform and educate players. Different handicap levels allow computer novices to compete with more knowledgeable players.



Carry-All, from Systems Go.

The game is available for $39.95 from Directline, 110 Torbay Road, Markham, Ontario, Canada L3R 1G6.

Check Reader Service number 407.

C-128 Word Processor

Professional Software (51 Fremont St., Needham, MA 02194) has released Fleet System 3, a word processor for the C-128 and compatible printer.

Fleet System 3 features function windows that automatically appear on screen to guide you through the program's operations; it also gives you context-sensitive help windows that provide help with the function on which you are working.

Included are user-definable printer sequences that allow access to any printer feature, proportional spacing, a built-in thesaurus and the ability to include a high-resolution graphics picture within your text files. Available on disk for about $95.

Check Reader Service number 408.

Speakers for Your Computer

RoomMate, from Bose Corp. (100 The Mountain Road, Framingham, MA 01701), is a compact, lightweight stereo speaker system for your Commodore computer.

Each speaker contains its own power transformer, eliminating the need for a separate amplifier.

There are two versions of the product: the original RoomMate ($229) and the Video RoomMate ($279).

Check Reader Service number 409.

Whole Body Health Management

WHM Fitness Software (18653 Ventura Blvd., Suite 137, Tarzana, CA 91356) has released two fitness programs for the C-64.

Physical Fitness Evaluation utilizes tests to evaluate your strength, flexibility, endurance, foot type and body composition. The program includes on-screen directions and a graphics picture of the test. It is self-scoring, and it allows you to save and view data and record forms.

Rehab Fitness Evaluation is a special version of the Physical Fitness Evaluation program that assesses overall body fitness for sedentary persons.

Both programs (available on disk for $39.95 each) are for users aged 14 to adult.

Check Reader Service number 410.

Bilbo Lives

J.R.R. Tolkien's classic, *The Hobbit*, is now a software adventure game available for the C-64.

Eighty graphics screens illustrate the game, and over 50 different action commands are at your disposal.

The Hobbit's documentation includes a copy of Tolkien's fantasy novel as well as a hint booklet and a guide to Middle-earth. Available on

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New Products RUNdown

disk for $29.95 from Addison-Wesley, General Publishing Group, Reading, MA 01867.

Check Reader Service number 411.



Votrax's Votalker C-64.

Votalker C-64

Votrax (1394 Rankin, Troy, MI 48083) introduces the Votalker C-64, a new addition to the Votalker family of speech synthesizers.

Its capabilities include a screen echo that allows all words, numbers, punctuation marks and other symbols to be automatically spoken as they are printed to the terminal screen.

In addition, the unit speaks an unlimited vocabulary and has a Speak command that vocalizes text printed to the screen.

Votalker contains its own amplifier, speaker and external speaker jack. Available for $99.95.

Check Reader Service number 404.

Three New Games

Mindscape (3444 Dundee Road, Northbrook, IL 60062) has released three new graphics adventure games for the C-64.

In Quake Minus One, a terrorist group has sabotaged an undersea power station. Unless the four renegade robots roaming the power station are destroyed or captured within ten hours, they'll trigger an earthquake that will paralyze the western world.

Shadowfire is a space adventure in which six superheroes board an alien spacecraft, locate and rescue a kidnapped ambassador, apprehend the alien's leader and capture or destroy the alien spacecraft.

Lords of Midnight is a medieval adventure that can be played as a quest, a war or both. Characters must be moved by day across the forbidden terrain of the Land of Midnight in search of Doomark the Witchking. By night, the computer responds to your commands. More than 32,000 landscapes can appear during the course of play.

Each game is available on disk for $29.95.

Check Reader Service number 412.

Bottoms Up

The Bartender is a database program that can store over 400 drinks or recipes on one disk and allows you to list drinks alphabetically or by record number. Recipes for over 200 popular drinks are included on a starter disk.

The Bartender is available for the C-64 for $24.95 from Cursor Products, RR 71, Box 1858, Camdenton, MO 65020.

Check Reader Service number 402.



New Testament Concordance, from Midwest Software.

New Testament on Disk

Midwest Software (22500 Orchard Lake Road, Suite 1, Farmington, MI 48024) has released The New Testament Concordance, the King James version of the Bible on three disks.

The 6000 distinct words used in the New Testament can be scrolled on the screen, and all verses containing a particular word or phrase may be displayed or printed out. A context option allows you to display numerous verses before and after the target verse. Available for the C-64 for $49.50.

Check Reader Service number 403.

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Versions of the package are available for every Commodore computer having a minimum of 10k RAM (including the C-128 in 128 mode). All programs will support tape, disk, and printer. Price includes documentation; Calif. residents add 6%. Add $3 for credit card, COD, 8050 disk, or cassette orders (cassette not available for Plus4™ and 16™.) No personal checks from outside USA. This ad is the catalog; send $1 (deductible from order) for a sampling of program output.

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How to Type in C-64 and C-128 Listings from RUN

To simplify your typing of *RUN*'s C-64 and C-128 program listings, we include checksum numbers. These numbers follow a REM statement at the end of each line (e.g., :REM*123). These checksum numbers necessitate your using RUN's Perfect Typist programs, listed below. Use 64 Perfect Typist for C-64 programs and 128 Perfect Typist for 128 Mode programs on the C-128.

Type in 64 Perfect Typist (Listing 1) or 128 Perfect Typist (Listing 2) and save it to either tape or disk before running. When you want to type in a 64- or a 128-mode program, first load and run the appropriate Perfect Typist listing. Two SYS numbers will be displayed on your screen. Jot these down and keep them handy. They are the SYS numbers that you type in for deactivating and reactivating the checksum program.

After Perfect Typist has been loaded and run, start typing in the program listing from *RUN* as you normally do. The only difference is that now, after you press the return key to log in each line, a 1-, 2- or 3-digit number will appear below the line on the left margin. This is the checksum number, ranging from 0 to 255.

If this number matches the checksum number printed in the listing after the :REM*, then you know you have typed that line correctly. Then you type the next program line right over the previous line's checksum value. If the checksum numbers do not agree, analyze your line on screen for any typographic errors or omissions. Make the needed changes and press the return key again to log in those changes. A new checksum number will appear in place of the old one. Compare this to the magazine's number and then proceed to the next line.

When you've finished typing in your program, disable the Perfect Typist by typing in the appropriate SYS number for either 64 or 128 mode, and press the return key. Now you can save your program as usual, to disk or tape. (Before you attempt to run your new program, turn your computer off and back on to completely clear out the Perfect Typist program.)

You may save an incomplete program any time and continue it later. You will have to reload and run the Perfect Typist program, then load the incompleted program that you were working on, list it, and continue where you left off.

The 128 Perfect Typist will work in either 40 or 80 columns. Also, it lets you use the C-128's automatic line-numbering. If Auto is on, the checksum will be printed below the line you just entered, and the C-128 will place the next line number below the checksum.

All listings in *RUN* have been translated so that the graphics and control characters are designated as understandable key combinations. When you see instructions inside curly brackets, such as {SHIFT L}, you should hold down the shift key and press the L key. What you see on your screen will look quite different from what is designated inside the brackets. Another example is {22 SPACEs}, which instructs you to press the space bar 22 times.

Listing 1. *64 Perfect Typist program.*

```
1 REM 64 PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
2Ø PG=PEEK(56):ML=PG*256+6Ø
3Ø FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
   XT
4Ø IFT<>16251 THEN PRINT"ERROR IN DATA...":
   END
6Ø POKEML+4,PG:POKE ML+1Ø,PG:POKE ML+16,PG
7Ø POKE ML+2Ø,PG:POKE ML+32,PG:POKE ML+38,P
   G
8Ø POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   **********************"
9Ø SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
   IST IS NOW ACTIVE{2 SPACEs}**"
1ØØ PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs}
    SYS"ML+3Ø"=OFF **"
1Ø1 PRINT"{CRSR RT}**********************
    **************":NEW
11Ø DATA 173,ØØ5,ØØ3,2Ø1,ØØ3,2Ø8,ØØ1,Ø96
12Ø DATA 141,1Ø5,ØØ3,173,ØØ4,ØØ3,141,1Ø4
13Ø DATA ØØ3,162,1Ø3,16Ø,ØØ3,142,ØØ4,ØØ3
14Ø DATA 14Ø,ØØ5,ØØ3,Ø96,234,234,173,1Ø4
15Ø DATA ØØ3,141,ØØ4,ØØ3,173,1Ø5,ØØ3,141
16Ø DATA ØØ5,ØØ3,Ø96,Ø32,124,165,132,Ø11
17Ø DATA 162,ØØØ,142,24Ø,ØØ3,142,241,ØØ3
18Ø DATA 189,ØØØ,ØØ2,24Ø,Ø51,2Ø1,Ø32,2Ø8
19Ø DATA ØØ4,164,212,24Ø,Ø4Ø,2Ø1,Ø34,2Ø8
2ØØ DATA ØØ8,Ø72,165,212,Ø73,ØØ1,133,212
21Ø DATA 1Ø4,Ø72,238,241,ØØ3,173,241,ØØ3
22Ø DATA Ø41,ØØ7,168,1Ø4,Ø24,Ø72,Ø24,1Ø4
23Ø DATA Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1Ø9
24Ø DATA 24Ø,ØØ3,141,24Ø,ØØ3,232,2Ø8,2ØØ
25Ø DATA 173,24Ø,ØØ3,Ø24,1Ø1,Ø2Ø,Ø24,1Ø1
26Ø DATA Ø21,141,24Ø,ØØ3,169,Ø42,Ø32,21Ø
27Ø DATA 255,169,ØØØ,174,24Ø,ØØ3,Ø32,2Ø5
28Ø DATA 189,162,ØØ3,189,211,ØØ3,Ø32,21Ø
29Ø DATA 255,2Ø2,Ø16,247,164,Ø11,Ø96,145
3ØØ DATA Ø13,Ø32,Ø32
```

Listing 2. *128 Perfect Typist program.*

```
1 REM 4Ø/8Ø COL 128 MODE PERFECT TYPIST
2 REM
3 REM WRITTEN BY:
4 REM JAMES E. BORDEN
5 REM 641 ADAMS ROAD
6 REM CARLISLE, PA 17Ø13
7 REM
1Ø FORX=512ØTO5379:READD:T=T+D:POKEX,D:NEXT
2Ø IFT<>28312 THENPRINT"{2 CRSR DNs}ERROR I
   N DATA...":END
25 A$="":IFPEEK(215)=128THENA$="{2Ø SPACEs}
   "
3Ø PRINT"{SHFT CLR}"A$"{CRSR RT}**********
   **************************"
4Ø PRINTA$"{CRSR RT}** 128 PERFECT TYPIST I
   S NOW ACTIVE **"
5Ø PRINTA$"{CRSR RT}**{2 SPACEs}SYS 512Ø=ON
   {7 SPACEs}SYS 515Ø=OFF{2 SPACEs}**"
6Ø PRINTA$"{CRSR RT}**********************
   ***************":SYS512Ø:NEW
512Ø DATA 173,ØØ5,ØØ3,2Ø1,Ø2Ø,2Ø8,ØØ1,Ø96,1
     41,Ø45
513Ø DATA Ø2Ø,173,ØØ4,ØØ3,141,Ø44,Ø2Ø,162,Ø
     43,16Ø
514Ø DATA Ø2Ø,142,ØØ4,ØØ3,14Ø,ØØ5,ØØ3,Ø96,2
     34,234
515Ø DATA 173,Ø44,Ø2Ø,141,ØØ4,ØØ3,173,Ø45,Ø
     2Ø,141
516Ø DATA ØØ5,ØØ3,Ø96,Ø32,Ø13,Ø67,14Ø,255,Ø
     19,162
517Ø DATA ØØØ,142,252,Ø19,142,253,Ø19,142,2
     54,Ø19
518Ø DATA 189,ØØØ,ØØ2,2Ø1,Ø32,24Ø,ØØ8,2Ø1,Ø
     48,144
519Ø DATA ØØ7,2Ø1,Ø58,176,ØØ3,232,2Ø8,238,1
     89,ØØØ
52ØØ DATA ØØ2,24Ø,Ø54,2Ø1,Ø32,2Ø8,ØØ5,172,2
     54,Ø19
521Ø DATA 24Ø,Ø42,2Ø1,Ø34,2Ø8,Ø1Ø,Ø72,173,2
     54,Ø19
522Ø DATA Ø73,ØØ1,141,254,Ø19,1Ø4,Ø72,238,2
     53,Ø19
523Ø DATA 173,253,Ø19,Ø41,ØØ7,168,1Ø4,Ø24,Ø
     72,Ø24
524Ø DATA 1Ø4,Ø16,ØØ1,Ø56,Ø42,136,Ø16,246,1
     Ø9,252
525Ø DATA Ø19,141,252,Ø19,232,2Ø8,197,173,2
     52,Ø19
526Ø DATA Ø24,1Ø1,Ø22,Ø24,1Ø1,Ø23,141,252,Ø
     19,169
527Ø DATA Ø42,Ø32,241,Ø2Ø,Ø32,188,Ø2Ø,16Ø,Ø
     Ø2,185
```

```
528Ø DATA 185,Ø2Ø,Ø32,241,Ø2Ø,136,Ø16,247,1
     65,116
529Ø DATA 2Ø8,ØØ9,165,117,2Ø8,ØØ5,169,145,Ø
     32,241
53ØØ DATA Ø2Ø,172,255,Ø19,Ø96,Ø13,Ø32,Ø32,1
     62,ØØØ
531Ø DATA 173,252,Ø19,232,Ø56,233,1ØØ,176,2
     5Ø,1Ø5
532Ø DATA 1ØØ,2Ø2,24Ø,ØØ3,Ø32,232,Ø2Ø,2Ø1,Ø
     1Ø,176
533Ø DATA ØØ5,2Ø5,252,Ø19,24Ø,Ø15,162,ØØØ,2
     32,Ø56
534Ø DATA 233,Ø1Ø,Ø16,25Ø,Ø24,1Ø5,Ø1Ø,2Ø2,Ø
     32,232
535Ø DATA Ø2Ø,17Ø,Ø72,138,ØØ9,Ø48,Ø32,241,Ø
     2Ø,1Ø4
536Ø DATA Ø96,17Ø,173,ØØØ,255,Ø72,169,ØØØ,1
     41,ØØØ
537Ø DATA 255,138,Ø32,21Ø,255,1Ø4,141,ØØØ,2
     55,Ø96
```

The RUNning Board

RUN invites you to contact its bulletin board (RUNning Board). In addition to up-to-date information about *RUN* and the Commodore industry, the RUNning Board now presents useful computing hints and tips, corrections and updates to published articles, user's group information, an up-to-date list of selections for ReRUN and sneak previews of upcoming articles.

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RUN AMOK

Item: In the Hardware Buyer's Guide (November 1985), the address for Romco (PO Box 18359, Wichita, KS 67218-0359) was unintentionally omitted from the hardware manufacturers' address list.

Item: In the Software Buyer's Guide 1985, Part I (December 1985), the correct retail price for The Newsroom (Springboard Software, Inc., 7807 Creekridge Circle, Minneapolis, MN 55435) is $49.95.

Item: In Michael Reich's Credit-Card Keeper program (December 1985, p. 144), line 560 should be changed to read

```
IFC<>1THENIFN<Y1THENNEXTN
```

to avoid a possible Next-Without-For error.

Item: Editorial changes regrettably distorted the meaning of a section of Robin Franzel's article, 64 BasicAid (December 1985). The last paragraph of column 2 and the first paragraph of column 3 on page 132 should read as follows:

"If you wanted to find GOTO in the program line 100 PRINT"GOTO THE STREAM", the above command won't work. It would search only for the GOTO command or token. To prevent the Basic interpreter from tokenizing your search string, simply use the quote mark as your delimiter. For example, FIND"GOTO" will find all occurrences of the word GOTO that are not commands.

The screen will display each line containing the search string. To prevent the lines from scrolling off the screen, the search stops after the eighth line, and the following message is displayed: CONTINUE Y/N. Y will display. . ."

Also on page 132, further down column 3, the variable name COST$ should be changed to something else, perhaps COPY$, since COS (cosine) is a reserved word.

Finally, the last paragraph of the same article (p. 133) neglected to request a disk, as well as $3 and a mailer. If you have already asked Mr. Franzel for a copy, or intend to do so, please send him a disk, so he won't be out of pocket for that item.

Manuscripts: Contributions in the form of manuscripts with drawings and/or photographs are welcome and will be considered for possible publication. Article text and any accompanying programs should be submitted on disk as well as in hard-copy form. *RUN* assumes no responsibility for loss or damage to any material. Please enclose a self-addressed, stamped envelope with each submission. Unsolicited manuscripts that cannot be accepted will be returned only if accompanied by an appropriately sized, adequately stamped, self-addressed envelope. Payment for the use of any unsolicited material will be made upon acceptance. All contributions and editorial correspondence (typed and double-spaced, please) should be directed to *RUN* Editorial Offices, 80 Pine Street, Peterborough, NH 03458; telephone: 603-924-9471. **Advertising Inquiries** should be directed to Advertising Offices, CW Communications/Peterborough, Inc., Elm Street, Peterborough, NH 03458; telephone: 800-441-4403. **Subscription problems or address changes:** Call 1-800-645-9559 or write to *RUN*, Subscription Department, PO Box 954, Farmingdale, NY 11737. **Problems with advertisers:** Send a description of the problem and your current address to: *RUN*, Elm Street, Peterborough, NH 03458, ATTN.: Barbara Harris, Customer Service Manager, or call 1-800-441-4403.

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March

COMING ATTRACTIONS

- **RUN Word Processor**—In the March issue, we introduce RUN Script 64, a word processing program designed especially for *RUN* readers. RUN Script 64 is both flexible and easy to use and offers many features not found in other word processing programs.
- **Telecomputing Workshop**—This new telecommunications column will provide you with advice and answers to your questions on modems, terminal programs, on-line networks, bulletin board services and more.
- **C-128 Productivity Programs**—If you're looking to put your C-128 to work, these reviews of word processors, databases and spreadsheets can help you.
- **Basic Programming Series**—If you want to program in Basic on the C-64 or C-128, whether you're a beginner or intermediate, this column will examine commands and programming techniques, plus divulge a few programming secrets that will help you sharpen your skills.
- **Plus**—Reviews, new product announcements, answers to your questions and hints and tips that help you get the most out of your computing experience.

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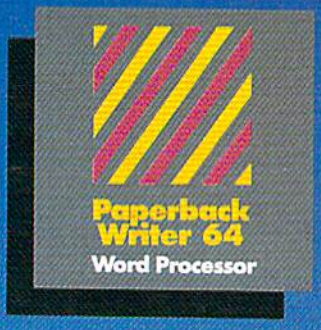
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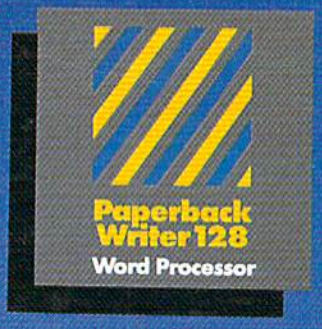
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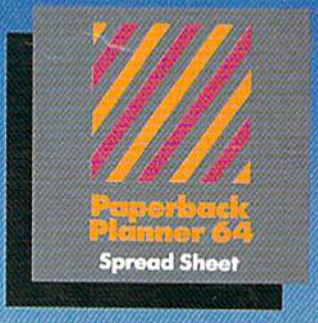
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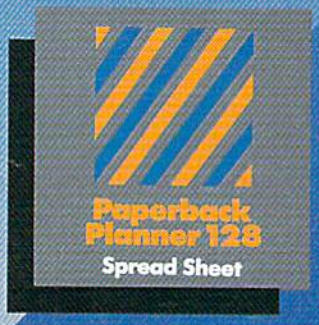
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