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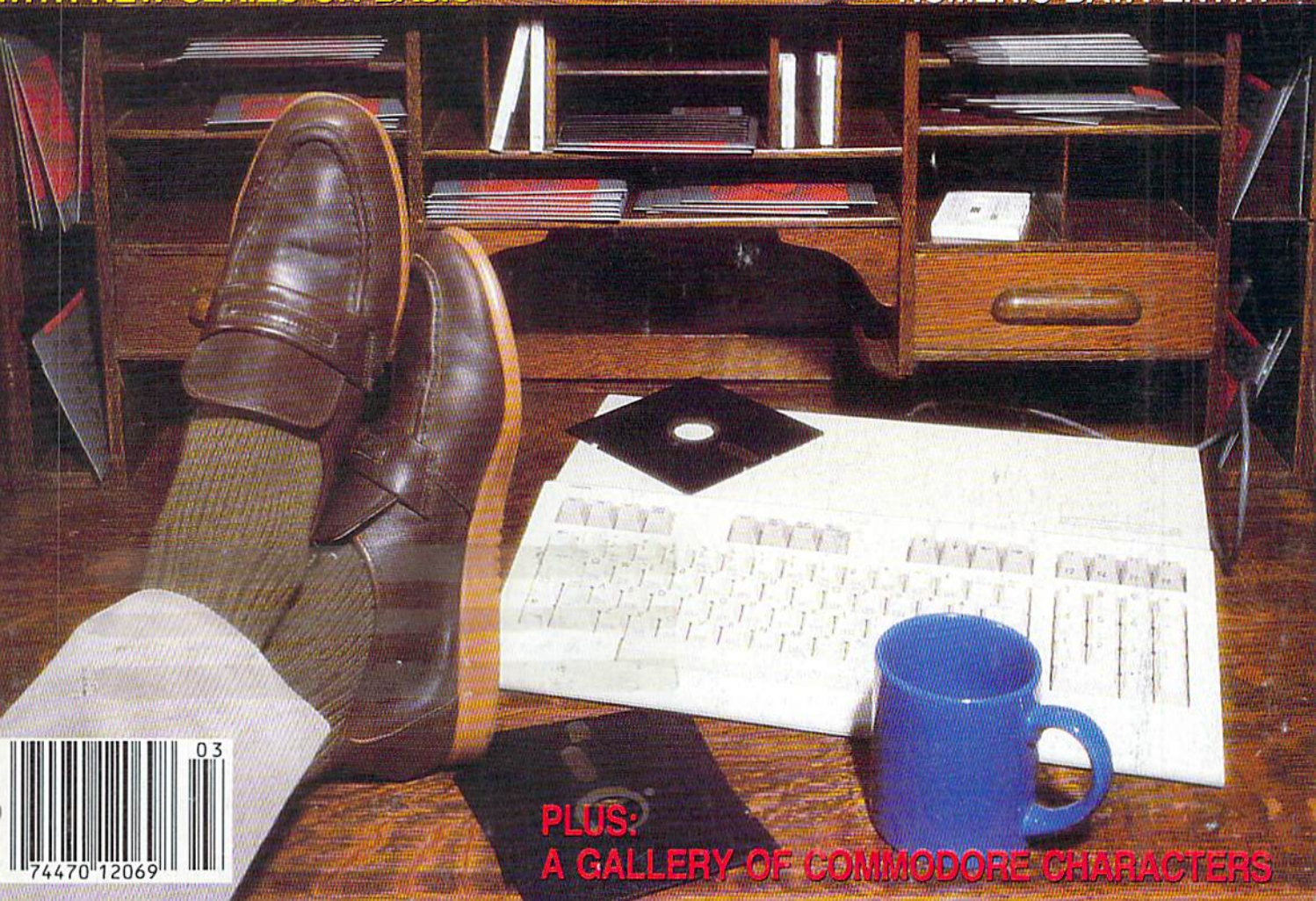
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Music Shop (BRODERBUND)	?	105 sec	105 sec*	105 sec*	21 sec
Hitchhiker's Guide to the Galaxy (INFOCOM)	?	70 sec	70 sec*	**	68 sec*
On-field Football (GAMESTAR)	?	159 sec	66 sec	63 sec	56 sec
EASY FINANCE I (COMMODORE)	?	58 sec	13 sec	13 sec	11 sec

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

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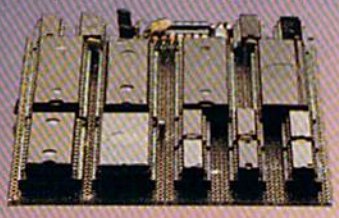
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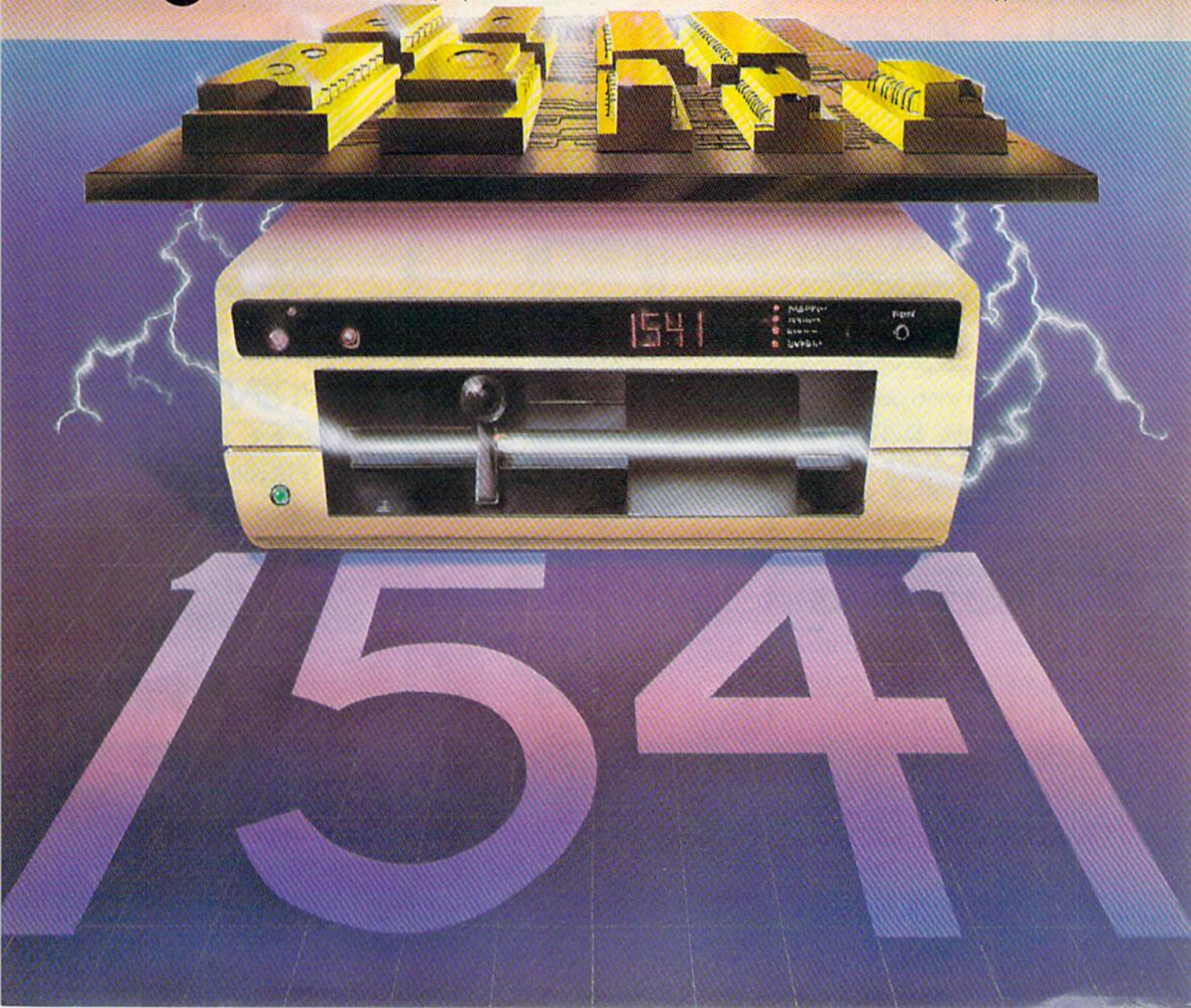
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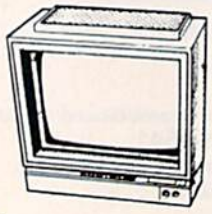
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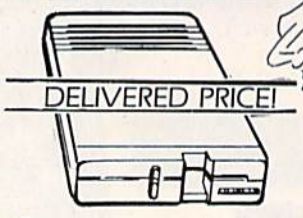


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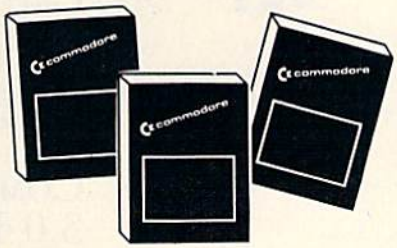
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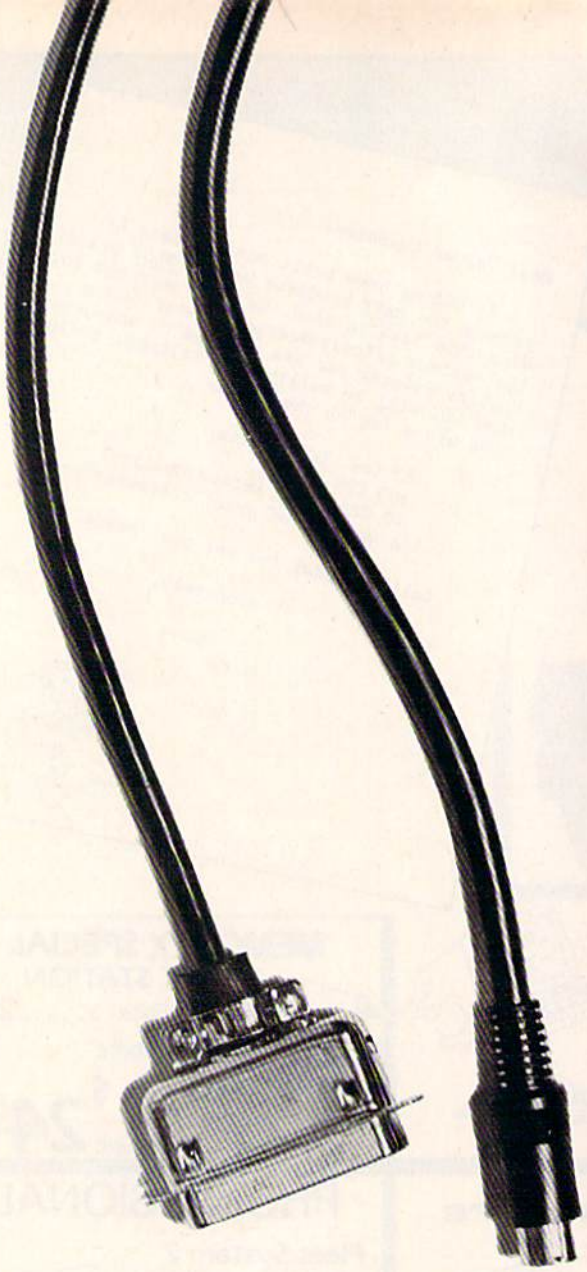
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MPA

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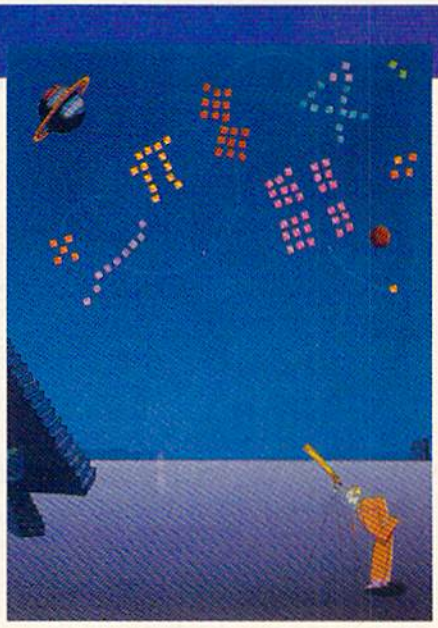
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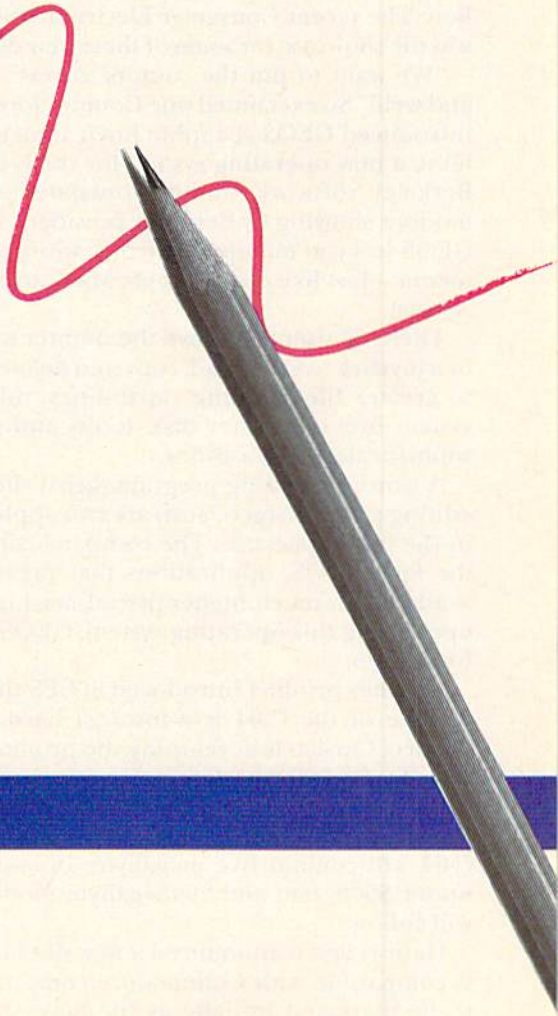
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CES Highlights

To borrow from noted American humorist Mark Twain: "The reports of the Commodore 64's death have been greatly exaggerated."

With the introduction of the C-128, industry critics were quick to forecast the demise of the C-64. Fortunately, developers weren't listening to these dire predictions and are continuing to bring out new products for this popular computer, which has an installed user base of several million. The recent Consumer Electronics Show in Las Vegas was the showcase for some of these new developments.

"We want to put the rumors to rest: The C-64 is alive and well!" So exclaimed one Commodore spokesman who introduced GEOS (Graphic Environment Operating System), a new operating system for the C-64. Developed by Berkeley Softworks and demonstrated at a private Commodore showing by Berkeley president Brian Dougherty, GEOS lets you manipulate icons, windows and pull-down menus—just like on the Apple MacIntosh or Commodore Amiga!

The C-64 user can move the pointer icon with a mouse or a joystick to view, load, copy and delete files. In addition to greater file-handling capabilities, this new operating system provides faster disk access and the potential for sophisticated applications.

A word processing program (geoWrite) and a graphics editing program (geoPaint) are two applications included in the initial package. The company is hopeful that with the faster DOS, applications that previously were only available on much higher-priced machines will be developed using this operating system. GEOS will be available for $59.95.

Another product introduced at CES that should extend the life of the C-64 is a low-cost hard disk drive from Cardco. Cardco is developing the product in conjunction with Fiscal Information, a Florida-based company that currently markets a ten- and 20-megabyte hard disk drive for the Commodore computer. The initial model for the C-64 will contain five megabytes of storage and sell for under $600; ten- and 20-megabyte models for the C-128 will follow.

Hattori Seiko announced a new dot-matrix printer that is compatible with Commodore computers. The printer, to be marketed initially as the Seikosha SP-1000VC, is bidirectional, has a serial interface, prints at 100 cps and features near-letter-quality print. Officials at the company have formulated an aggressive marketing plan with dealers and mass-merchandisers, so it should possess a low price tag. With its easy-to-use system features and manual, it promises to be popular among Commodore owners.

Notable software applications also announced at the show included:

—CP/M programs developed by Cardco for the C-128. This software (Personal Accountant, Personal Inventory and Personal Time Manager) greatly enhances the capabilities of the machine for personal productivity and business use.

—Transparent technology for the Commodore. For those of you who are not familiar with this genre, transparent utilities let you call upon a program without interrupting or disturbing the execution of the initial program. Two examples shown at CES were Cardco's Stealthtec and Timeworks' Partner. These plug-in cartridges let you access such business/productivity applications as personal appointment calendar, phone list, calculator, note pad and other functions.

—On the education scene, Spinnaker has introduced an interesting product entitled Homeworker Helper, for students in junior and senior high school. The program is aimed at helping these students with their math and writing assignments. By responding to a series of computer questions and prompts, the student can eventually solve a math equation or express and organize his thoughts for a book report or essay.

This is just a random peek at some of the notable products introduced at CES. In future issues of *RUN*, we will supplement this cursory look with in-depth reviews of these and other new products.

New Bulletin Board Number

The *RUN* technical and editorial offices have recently changed locations, necessitating new phone lines and a new phone number for the RUNning Board. We invite you to give us a call at the new number, 603-924-9704, to find out the latest information about *RUN* magazine and the Commodore industry.

db

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NEW NEW

VIZASTAR for the C128

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

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

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

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

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

"I use an IBM PC at work with Lotus 123. I feel Vizastar is just as good and in 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.

PROGRAM SPECIFICATIONS

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

RISK-FREE OFFER

Vizastar 128 is priced at **$119.97**. Vizawrite's price is **$89.97**. Vizastar 64 XL8 is now available for **$119.97**. We are so positive you will be satisfied with our programs that we offer a 15-day money-back guarantee. Try it Risk-Free. Call us today or send a check or money order. VISA/MC accepted.

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MAGIC



Compiled by LOUIS F. SANDER

Once again, through this column, wand-wrought works will waken you and wizardly words will waft you to a wondrous world of computing.

Month after winning month, your Magic continues to amaze that world. You conjure up great tricks, in ever greater abundance, with each iteration more stunning than the last. And selecting those to publish is like picking at the Gordian knot. So if you send in a trick, or if you write for any reason, remember to say what sorts of tricks you like. You never know—your wishes may come true!

In the meantime, though, there's work to be done, and the Magic of March awaits us. Ladies and gentlemen, start your computers...

$2BB March Hare—His live appearances are legendary. Since Alice in Wonderland, his name has been a household word. But until this very moment, the March Hare has never appeared on a monitor screen. Now Magic has lured him there, where his wonders await you.

Run the following program on your C-64 or C-128 (in C-64 mode). To see Hare's classic role, press and release the space bar.

```
10 REM MARCH HARE - BOB & DAVID SNADER
20 PRINT"{SHFT CLR}":V=53248:L=170:S=2040
30 FORN=832TO959:READQ:POKEN,Q:NEXT
40 POKEV+21,3:POKEV+33,6:POKEV+39,0
50 POKEV+40,1:POKEV,L:POKEV+1,L
60 POKEV+2,L:POKES,13:POKES+1,14
70 IFPEEK(197)<>64THENL=140
80 POKEV+3,L:L=170:GOTO70
81 DATA 000,000,000,000,000,000,000,000
82 DATA 000,031,128,252,120,000,015,031
83 DATA 255,252,007,255,240,007,255,240
84 DATA 003,255,224,003,255,224,003,255
85 DATA 224,007,255,240,007,255,240,007
86 DATA 255,240,015,255,248,015,255,248
87 DATA 015,255,248,031,255,252,000,255
88 DATA 128,000,000,000,000,000,000,000
91 DATA 001,128,192,001,193,192,000,193
92 DATA 128,000,099,000,000,062,000,000
93 DATA 107,000,000,054,000,000,156,128
94 DATA 000,193,128,000,255,128,000,255
95 DATA 128,001,099,064,001,107,064,001
96 DATA 136,192,001,255,192,000,255,128
97 DATA 012,127,024,015,221,248,000,000
98 DATA 000,000,000,000,000,000,000,000
```

Bob Snader and David Snader
Baltimore, MD

$2BC Ultimate program backup—Even if you back up religiously, your valuable programs might be lost. For instance, when you don't use a program for a while, you lose track of its name and importance. Once that happens, it's easy to erase it while weeding out the junk. Another example: If the wrong disk is in the drive when you issue a format command, then goodbye, good software!

The ultimate, perfect, impossible-to-erase backup system exists, and it's as close as CMD4. When a program absolutely, positively must stay in your hands forever, just list it on your printer, then file it away in a drawer. Hard-copy listings are remarkably durable and remarkably resistant to trashing. If magnetic disaster strikes, no matter how long the program, you can always retype from the listing.

Louis F. Sander
Pittsburgh, PA

$2BD Backing up while typing—We all know the merits of making disk or tape backups of all important programs. On a smaller scale, when you are working on a program and are making changes to a line, try listing the line twice on the screen. One listing is for you to edit; the other is your backup. If you ruin the line you're editing, you can move your cursor up to the untouched one and start all over again.

Bertram Schulman
Valley Stream, NY

Circle 2 on Reader Service card.

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Run Magazine

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New York Post

SIDEWAYS

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New York Times

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Ahoy Magazine

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$2BE Line numbers for debugging—When debugging, it's common to insert statements that will later be deleted. It's useful to give them unusual numbers, not otherwise used in your program. Numbers 13, 113 and 273 are useful examples. They are easy to find when you're ready to delete them, and you stand little chance of deleting a wanted number by mistake.

A. D. Entwistle
Kingston, Ontario
Canada

$2BF Non-random RND—Beware of generating random numbers using RND(0)!

To see why, try running this little program. As you can see, it *should* randomly fill the C-64 screen with white uppercase A's. Run it, and you'll see that this is far from the case.

```
10 X=INT(RND(0)*1024) : POKE 1024+X,1 : POKE 55296+X,1 :
   GOTO 10
```

When you've seen how it works with zero as an argument for RND, run it again with other values, and observe the striking difference.

Davie Cooley
Dothan, AL

$2C0 C-64 screen-line erasing—It is known that line L can be deleted from the C-64 screen by:

```
POKE 781,L : SYS 59903
```

You may not know, however, that the first N + 1 characters of a line can be deleted by:

```
POKE 781,L : POKE 782,N : SYS 59905
```

Of course, L must be between 0 and 25, and N must be between 0 and 39.

Samir S. Chebli
Beirut, Lebanon

$2C1 C-128 boxed spirals—Here's a simple but interesting graphics one-liner. Try changing the value of A.

```
10 A=11:GRAPHIC1,1:FORJ=ØTO36ØSTEPA:BOX1,Ø,
   Ø,319,199,J,Ø:NEXT:REM CHANGE A!
```

Matt Woodring
Cordell, OK

$2C2 C-128 Magic Boot—This program modifies any disk so that the 128, when turned on or reset in 128 mode, will automatically run the first Basic program in its directory. Here is how to cast the spell:

1. Select the Basic program you'd like to load and run automatically. We'll call this the Target Program.
2. Format a disk, then save the Target Program as the first program on it. This becomes the Target Disk. (If you'd like, you can save other programs on the Target Disk as well. Just be sure the Target Program is the first one you save.)
3. Remove the Target Disk and replace it with one containing the Magic Boot program.
4. Load Magic Boot, but do *not* run it at this time.
5. Put the Target Disk back into your drive; then run Magic Boot. The drive will spin, and your Target Disk will be converted.
6. Test the conversion by pressing the reset button. If all is well, the Target Program will automatically load and run.

Magic Boot should work on any Commodore disk drive when used with the C-128 in 128 mode. If the Target Disk gets close to being filled, or if it contains some large relative files, there's a chance that Magic Boot's magic will be undone.

The program works because, when the computer is turned on or reset in 128 mode, it checks the disk for the letters "CBM" at the start of track 1, sector 0. If it finds them, it loads and executes whatever machine language program follows them on that sector. Our program puts the letters there, followed by a machine language program to load and run the first Basic program on the disk.

```
1Ø PRINT"{SHFT CLR}128 MAGIC BOOT - HARV HA
   RRIS"
2Ø DIMK(67)
3Ø FORJ=1TO67:READK(J):CK=CK+K(J):NEXT
4Ø IFCK<>6318THENPRINT"DATA ERROR":STOP
5Ø OPEN15,8,15:OPEN8,8,8,"#"
6Ø FORJ=1TO67:PRINT#8,CHR$(K(J));:NEXT
7Ø PRINT#15,"B-W:"8;Ø;1;Ø
8Ø CLOSE8:CLOSE15
81 DATA Ø66,Ø77,ØØØ,ØØØ,ØØØ,ØØØ,ØØØ,Ø42
82 DATA ØØØ,234,234,234,234,165,174,141
83 DATA Ø16,Ø18,165,175,141,Ø17,Ø18,Ø76
84 DATA Ø27,Ø11,169,ØØ7,133,2Ø8,169,147
85 DATA 141,Ø74,ØØ3,169,151,141,Ø75,ØØ3
86 DATA 169,Ø82,141,Ø76,ØØ3,169,Ø85,141
87 DATA Ø77,ØØ3,169,Ø78,141,Ø78,ØØ3,169
88 DATA 153,141,Ø79,ØØ3,169,Ø13,141,Ø8Ø
89 DATA ØØ3,Ø96,ØØ1
```

Harv Harris
Wichita, KS

$2C3 C-128 Unnew program—This works in 128 mode only. Type the accompanying program and save it as UNNEW128 MAKER. Then run it. If you've made no typing errors, it will create a program called UNNEW128 on the disk you have in the drive. (If you've made errors, correct them, scratch the old version and save the correct one.)

Now, if you press the reset button or use the New command by accident, just enter:

```
BLOAD "UNNEW128"
```

then type

```
SYS2850
```

When you press the return key, your program will be resurrected.

```
1Ø PRINT"{SHFT CLR}UNNEW128 MAKER - HARV HA
   RRIS"
2Ø FORJ=285ØTO2923:READK:CS=CS+K:POKEJ,K:NE
   XT
3Ø IFCS<>8443THENPRINT"DATA ERROR":STOP
```

Continued on p. 88. →

Circle 25 on Reader Service card.

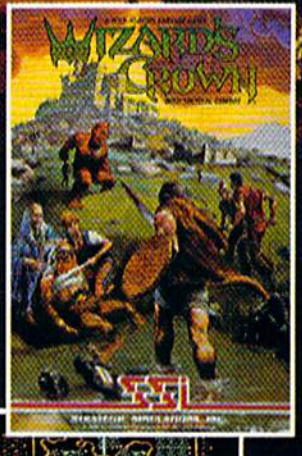
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Compiled by SUSAN TANONA

Spy vs. Spy II

A

The Two Nosy Spies Return in This Entertaining Sequel

Spy vs. Spy II: The Island Caper is the sequel to First Star Software's original Spy vs. Spy comedy/adventure game. Like the original, it is based on the characters created by Antonio Prohias for *Mad Magazine*. Also like the original, it is true to the spirit and character of Prohias' masters of "messpionage."

If you've ever followed these agents of absurdity in *Mad Magazine* or in Prohias' paperbacks, you know what's in store. The two protagonists, known only as Black Spy and White Spy, spend as much time trying to dupe each other as carry out their missions.

In The Island Caper, the mission begins with both spies parachuting onto the same tropical island. Buried somewhere on the island are the three parts of a top secret missile. The goal is to unearth the missile parts, assemble them and escape via submarine before the island's volcano erupts.

The spies have between six and 27 minutes to accomplish that mission, depending on which of seven play options you choose. You must also choose whether the opposing spy will be controlled by a human foe or the computer.

When the foe is computer-controlled, you give him one of five I.Q. levels. Until you've played this game a few times, you'd be wise not to endow your computer-guided spy guy with too much intelligence. Stick with I.Q. level 1 or the computer will make your spy look like a buffoon.

But the things that make The Island Caper difficult to learn are also what make it so enjoyable once the fundamentals are mastered. One of those things is "Simulplay." That's the word First Star uses to describe the way The Island Caper enables two opponents to go about their missions at the same time. Each opponent can see what the other spy is up to via "Simulvision," which turns the game screen into two different windows.

As the two spies move about the island, each remains within his own window as it scrolls east and west or north and south on the island. If one of the spies happens to move within the area occupied by the other, both appear within the same window.

Until that happens, each spy is free to go about his mission. The wide range of options available to you also makes this game difficult to learn. To find the three missile parts, you must dig into various holes around the island. Most of the holes contain items that can be used as weapons. Others contain booby traps planted by your foe. Thanks to Simulvision, a shrewd spymaster can keep track of where those booby traps were buried. The items used in the traps can come from the inventory that you brought with you to the island or from the items you uncovered while looking for missile parts.

In addition to beginning each mission with an inventory of weapons and tools, each spy begins at full strength. Things such as booby traps, quicksand, swimming in shark-infested waters and hand-to-hand combat sap a spy's strength. You must keep a wary eye on your strength-level meter, for if it gets too low, you will perish even before the volcano erupts or the mission is completed.

Since there are two spies vying for one missile, it's unlikely that one will find and assemble all the missile parts before the other gets his hands on any of them. In order to snatch a missile part from your foe, you must make him drop it by luring him into quicksand, surprising him with a booby trap or by moving into his territory and trying to defeat him in hand-to-hand combat.

In addition to the intriguing game

Report Card

A ***Superb!*** An exceptional program that outshines all others.

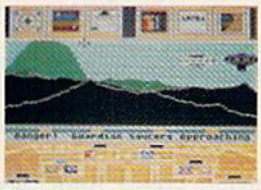
B ***Very Good.*** One of the better programs available in its category. A worthy addition to your software library.

C ***Good.*** Lives up to its billing. No hassles, headaches or disappointments here.

D ***Mediocre.*** There are some problems with this program. There are better on the market.

E ***Poor.*** Substandard, with many problems. Should be deepsixed!





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It takes all kinds to make a galaxy interesting. Like you, a *techno-scavenger.* Your kind are out to get rich scavenging Ancient technology. And now you've found the fabled Koronis Rift—the weapons testing grounds of the Ancients. The chance of a lifetime awaits you.

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

But it won't be easy. The Guardians—genetically engineered mutants—stand watch over their creators' technology. And they deal swiftly and ruthlessly with characters like techno-scavengers.

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

	C64/128	ATARI	APPLE
Koronis Rift	✓	✓	✓

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RUN

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play I've just described, First Star uses some clever graphics to make The Island Caper even more enjoyable. When a spy is knocked out of commission by a booby trap, he temporarily turns into a pile of ashes. When he gets knocked off for good, a tombstone pops up where he once stood. If a spy succeeds in his mission and reaches the waiting submarine, he also finds a woman waiting on the sub to give him a kiss. As the two sail off into the sunset, the lucky spy chuckles at his foe's demise.

Little touches like that are true to the characters created by Prohias and add sparkle to an already wonderful game. It will take time for novices to keep track of everything that's going on and to master all of the joystick jockeying you'll need to carry out this mission. But it's time worth spending, because even failure in Spy vs. Spy II: The Island Caper will leave you with a smile on your face. *(First Star Software, 18 East 41st St., New York, NY 10017. C-64/$29.95 disk.)*

Scott Wasser
Wilkes-Barre, PA

Inventory Management And Accounts Receivable Management

B

Two Packages That Will Help You Run Your Small Business

I run my business on a Commodore 64. I count on my computer for extensive word processing, spreadsheet analysis and database management. B.E.S.T. (Business, Electronics, Software & Technology) offers two packages—Inventory Management and Accounts Receivable Management—to help you maintain your records on suppliers, inventory and customer accounts.

Both packages are very well organized and fully menu-driven. A system menu branches to all primary options, which are essentially database functions dedicated to specific business purposes. The screens are clearly formatted, making data entry easy and understandable.

The manuals offer concise descriptions of all program operations. Using example screen displays, they take you step by step through each menu selection.

The Inventory Management package begins with an editor, which allows you to enter item, supplier and customer information. In the Daily Activities section, you can keep track of up to 1500 inventory items with a maximum of 999 units for each item.

Sales invoices and purchase orders are written within this program, with forms supplied by B.E.S.T. at a reasonable price.

If you sell a television, one television will be subtracted from your inventory. If you place a purchase order for five more televisions, this order will also show up in your inventory as being on order.

Finally, the program's Report Writer option includes five predesigned report formats and also allows for customized reports involving any combination and calculation of fields. As an example, a report might tell you where you are buying your televisions, at what price and in what quantities.

In the Accounts Receivable Management program, you begin by setting up new customer accounts. You write monthly billing statements, using forms purchased from B.E.S.T. You cannot write sales invoices in this program.

The software tracks the date and amount of each statement. Turning to the report section for analysis, you find reports on account aging, account summaries, credit limits and customer lists. In short—who owes how much and for how long? These kinds of reports are invaluable to almost any business.

Finally, a separate section calculates interest on aging accounts. These calculations will show up in your billing statements and credit reports. All information is internally integrated.

While operation of both programs

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

Rescue on Fractalus! is a rescue and space action game with realistic 3-D flight simulation. You pilot your Valkyrie Fighter through the canyons and around the mountain peaks of the planet Fractalus to rescue fellow pilots, do battle with enemy saucers and destroy enemy gun emplacements.

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

	C64/128	ATARI	APPLE
Rescue on Fractalus!	✔	✔	✔



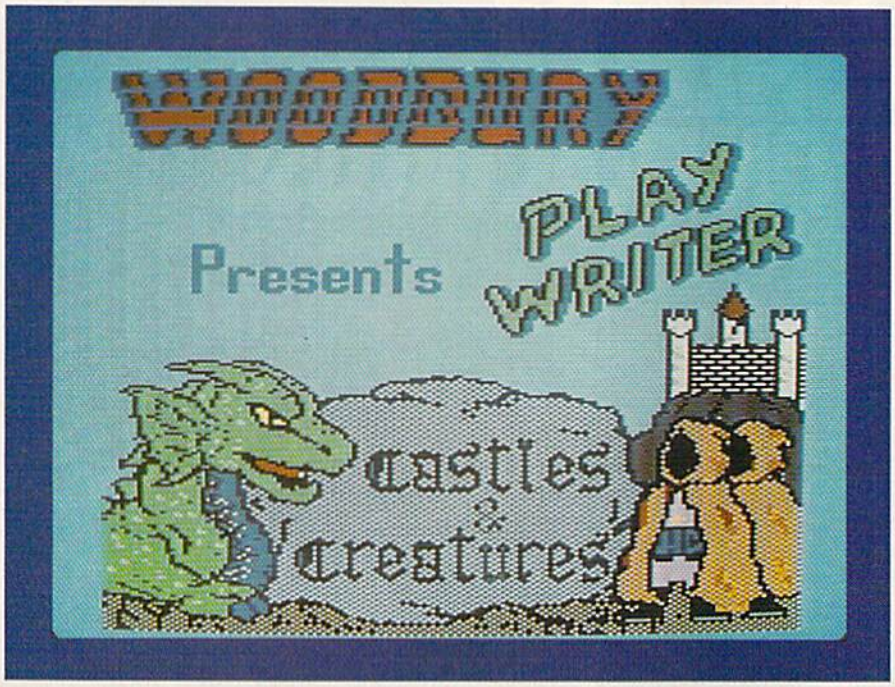
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Circle 12 on Reader Service card.



Woodbury's Playwriter/Castles and Creatures

is fast, these packages do have several limitations. The size of some input fields is small, requiring awkward abbreviations. Only 50 customers may be invoiced through the Inventory Management program, while only 100 customers can be sent monthly statements through the Accounts Receivable program. It is also unfortunate that these small customer lists do not coincide.

The major flaw is that data does not transfer between these packages. A sales invoice written in the inventory program does not affect the monthly statement in the Accounts Receivable program. In fact, you use two totally separate data disks. Therefore, after invoicing a customer for a television at the beginning of the month, you must reenter all data to bill him at the end of the month.

Despite these drawbacks, if the limits on the customer base do not place these two products below your needs, I am confident that they will serve you well. And if inventory management is your primary objective, you definitely cannot go wrong.

With these two programs (and if these aren't enough, B.E.S.T. also has several other business packages for the C-64), you, too, will find it not only possible, but also efficient to run your business on a Commodore 64. *(Business, Electronics, Software & Technology, PO Box 852, McMinnville, OR 97128. C-64/Inventory Management, $69.95; Accounts Receivable Management, $59.95 disk.)*

Arjan Khalsa
Berkeley, CA

PlayWriter/ Castles And Creatures

A

This Program Encourages A Child's Creativity And Imagination

You begin with a kingdom so cursed that its name is mentioned only in the light of a full moon; a kingdom of darkness, shrouded in magical mist, beset by political intrigue, slipping slowly away from the rest of the world.

Your hero must try to reverse the order of things by finding the talisman that will restore warmth and light, while the Queen and her consort, Duke Luke, lie abed, lost in sorrow and whiling away the time by playing Monopoly.

That's how my story goes. Yours may be different, for the PlayWriter series by Woodbury allows enough choices that no one needs to write the same story.

Castles and Creatures is a recent entry in the PlayWriter series, and it doesn't matter if your child (or you) may already have written a book under these auspices. They are the same only in that the underlying framework of the story is there, ready to be filled in by a new author.

From the main menu, you may choose to edit an old story, write a new one or print a book. If you are writing your first book, you will be prompted for your name and a dedication.

PlayWriter sets the stage while you select heroes and villains, name them and choose courses of action for them. Much of this is done through multiple choice lists, but you always have the option of using your own ideas. At the end of the chapter, PlayWriter digests your material, arranges it within the resident story outline and produces a chapter that has a beginning, a middle and an end that leads naturally into the next chapter.

In other choices, the PlayWriter parser (which leads you gently through all the writing) will ask whether you wish to write something or have the computer do it. This usually occurs when a lengthy passage is called for, and it is a sure hedge against writer's block.

All the drudgery of writing is done for you and you are left with the good part—exercising your imagination.

You may choose to work on one chapter at a time, editing and polishing before going on to the next; or you may rush on with your draft, writing the entire book before editing.

When you are done, and know you've done the best you can, you're ready to go to print. You may print a draft, just to see how it reads in hard copy, or you may print the final book. A supply of tractor-feed, 5- × 7-inch paper is included, which is enough to print one book. As it is printing, PlayWriter inserts generous spaces in the text for later illustration with the colorful stickers provided.

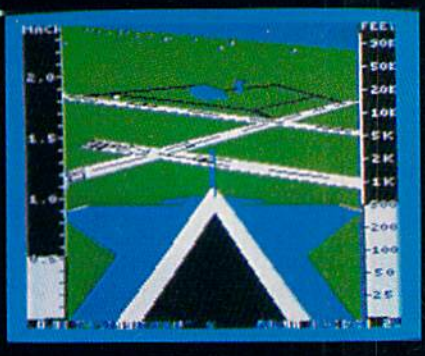
Circle 40 on Reader Service card.



F-16 Dogfight with Enemy MiG-23 Fighters



F-18 on the Deck of a Nimitz-Class Aircraft Carrier (Control Tower View)



F-16 High-G Pullout over Detailed Wargame Scenery (Rear View)

Jet

From the author of Flight Simulator II comes a new dimension in realism. Jet simulates two fast and maneuverable supersonic jet fighters, a land-based F-16 or a carrier-based F-18. The simulator includes modern electronic flight instrumentation and the most advanced weaponry available. Jet's simulation sophistication, combined with excellent visual attitude references, makes it truly enjoyable to fly.

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Finally, you bind the pages within the hard covers that are included in the kit and you have a finished book that should last for years.

And, if you find yourself to be prolific, additional kits of paper, stickers and covers are available from Woodbury.

The educational value of Castles and Creatures lies in allowing the child to have fun by exercising his imagination. But even more, it is a project that can involve the entire family. If you let your child go it alone, you'll miss a lot of laughter, agonizing over choices, and anticipation of how it will all turn out.

One warning: When my children worked on their first books, every choice from every list was a major decision. I soon realized they were conditioned by school to regard multiple choices as a test, and they were concerned with selecting the "correct" answer.

You'll want to watch for this and be ready to explain that there are no correct answers. There are different answers, leading you onto different paths; and different paths produce different stories.

Then be sure to watch the wonder in their eyes when they first read what they and the computer have written. *(Woodbury Software, 127 White Oak Lane, Old Bridge, NJ 08857. C-64/ $39.95 disk.)*

Ervin Bobo
St. Peters, MO

S'More



Give Your C-64 Some More Power with This Memory Expansion Cartridge

S'More, from Cardco, may be an unusual name for a piece of software, but it accurately reflects this product's capabilities. This memory expander will give you some more memory, some more programming power and could very easily enable you to have some more fun with your computer.

Those are the claims Cardco makes in its advertising, and spending a few hours with S'More will convince you they're true.

You can start using S'More as soon as you take it out of the box. You simply plug it into the cartridge slot in the back of the C-64 and power up. You're immediately greeted by a monitor screen that tells you there are 61,183 bytes of RAM at your disposal. That's 57 percent more than you had before you plugged in S'More.

S'More works its magic by reconfiguring the internal RAM of the C-64. But how S'More works isn't nearly as important as what it does for programmers.

The increased RAM means that programmers no longer have to worry about running out of capacity to store long, complicated Basic programs. The extra memory, by the way, is unrestricted.

However, you shouldn't get the idea that S'More is only a memory expansion device, as it also provides the Basic programmer with some powerful tools that can be used to get the most out of every bit of available RAM.

S'More Basic provides you with more than 60 new and enhanced commands and functions. It eliminates the need for Peeks and Pokes, allowing you to use one or two keywords to do what would normally take 50 precious program lines. And S'More does a lot more.

It provides a full-screen editor that gives you the ability to scroll up and down through your program listings.

It provides error trapping and automatically tells you the location of any errors that may exist in your program statements.

S'More automatically defaults to device 8 whenever you turn on your computer.

It allows you to load and run your programs in one step.

S'More enables you to choose screen, typeface and border colors, as well as either upper- or lowercase letters.

This device also provides a bridge to the C-128, since S'More's command structure is similar to that of the 128's Basic 7.0.

These are not simply claims that Cardco makes. They're things that S'More will do.

Actually, many serious programmers might get more use out of S'More's other features than the increased RAM it provides.

One reason for this is that, as far as I know, there are no commercial programs currently available that enable you to take advantage of the extra memory.

Also, C-64 Basic programmers may already be in the habit of doing things a certain way, and might not want to change. Will they be willing to modify old programs or learn how to write new ones to take advantage of all the extra RAM that S'More puts at their fingertips?

Commodore 64 owners who prefer machine language to Basic programming might find the extra RAM even less inviting. Since the S'More cartridge essentially reconfigures all machine language pointers and storage areas within the computer, it won't work with programs that have already been written. And those who wish to write new programs to take advantage of the extra RAM will have to relearn the locations for machine language call routines.

Nevertheless, many programmers will probably find the added memory worth the extra effort required to learn the new call routines. And S'More's terrific instruction manual will make it easy for them to do so.

The manual, which prominently displays Cardco's customer service number on every page, does a fine job of explaining the features and operation of S'More Basic. If that isn't enough, S'More comes packed with a bonus disk that contains some handy utilities, as well as a few demonstrations and explanations of this impressive product.

Cardco has built a reputation for producing fine computer software and hardware. S'More enhances the company's reputation as much as it enhances the C-64. About the only thing missing are some commercial programs that will interface with S'More and take advantage of the increased power it brings to the C-64. That would really be something to smack our lips over. *(Cardco, 300 S. Topeka, Wichita, KS 67201. C-64/ $69.95 cartridge.)*

Scott Wasser
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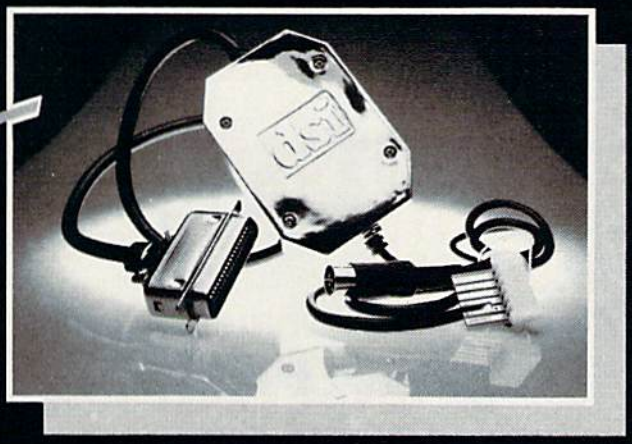
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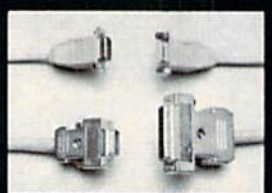
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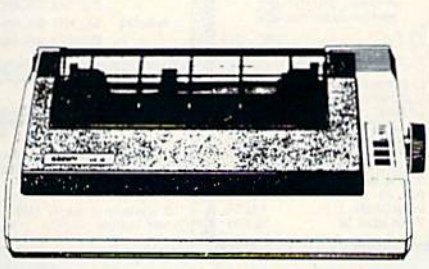
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Productivity Plus for The C-128

Put your C-128 to work with these packages that take advantage of the computer's increased speed and enhanced hardware features.

By BOB GUERRA

With the arrival of the C-128, several companies have released enhanced versions of their popular C-64 productivity programs. These new versions take advantage of the 128's larger memory and more "businesslike" features, such as its numeric keypad, 80-column display, individual cursor keys and special function keys (for example, ESC, TAB and ALT).

If you've already used programs such as Fleet System 2, The Consultant and SwiftCalc for the C-64, you'll be happy to know that the enhanced versions for the 128 function almost identically to their older counterparts. This means you can upgrade without having to learn about the program from scratch, and, in many cases, files created with the original programs can still be used.

Word Processing

Someday, when the only real typewriters left are in museums and antique shops, we'll probably take word processing for granted the way we do the automobile and electric light. For now, though, I'm still amazed every time I perform a Search and Replace or have my 128 check the spelling in 15 pages of text in the time it takes me to look up one word in the dictionary.

These are only a couple of the ways the word processors currently available for the C-128 let you manipulate text. Other standard features of these programs include automatic page numbering; the ability to easily insert, delete, copy, and move words, sentences and blocks of text; automatic headers and footers; numeric tabs and calculation functions that let you effectively use numeric data in your documents; variable pitch and line spacing; and special printing commands. The real differences among these packages, therefore, lie in their documentation, ease of use and special features.

Fleet System 2

Fleet System 2 (Professional Software, 51 Fremont St., Needham, MA 02194) for the C-128 is a full-featured word processing system with a built-in 90,000-word spelling checker. When used with an RGB monitor, such as Commodore's 1902, Fleet System 2 allows you to enter and edit text in either 80 or 120 columns. If you select the latter, however, you must scroll horizontally to view all the columns. Although this program doesn't feature automatic word-wrap in the Edit mode, a press of the f7 key provides you with instant video output of your text, allowing you to see exactly how the document will appear when it is printed.

Other function keys can be used from the editing screen to access other modes. You enter the Shift mode with f5, for example, which allows you to type entirely in upper-case. Unlike the shift lock on the computer, the Shift mode only shifts letter keys, so you can still use numbers. Pressing f3 puts you in the Insert mode, and f1 is used to access many special editing commands.

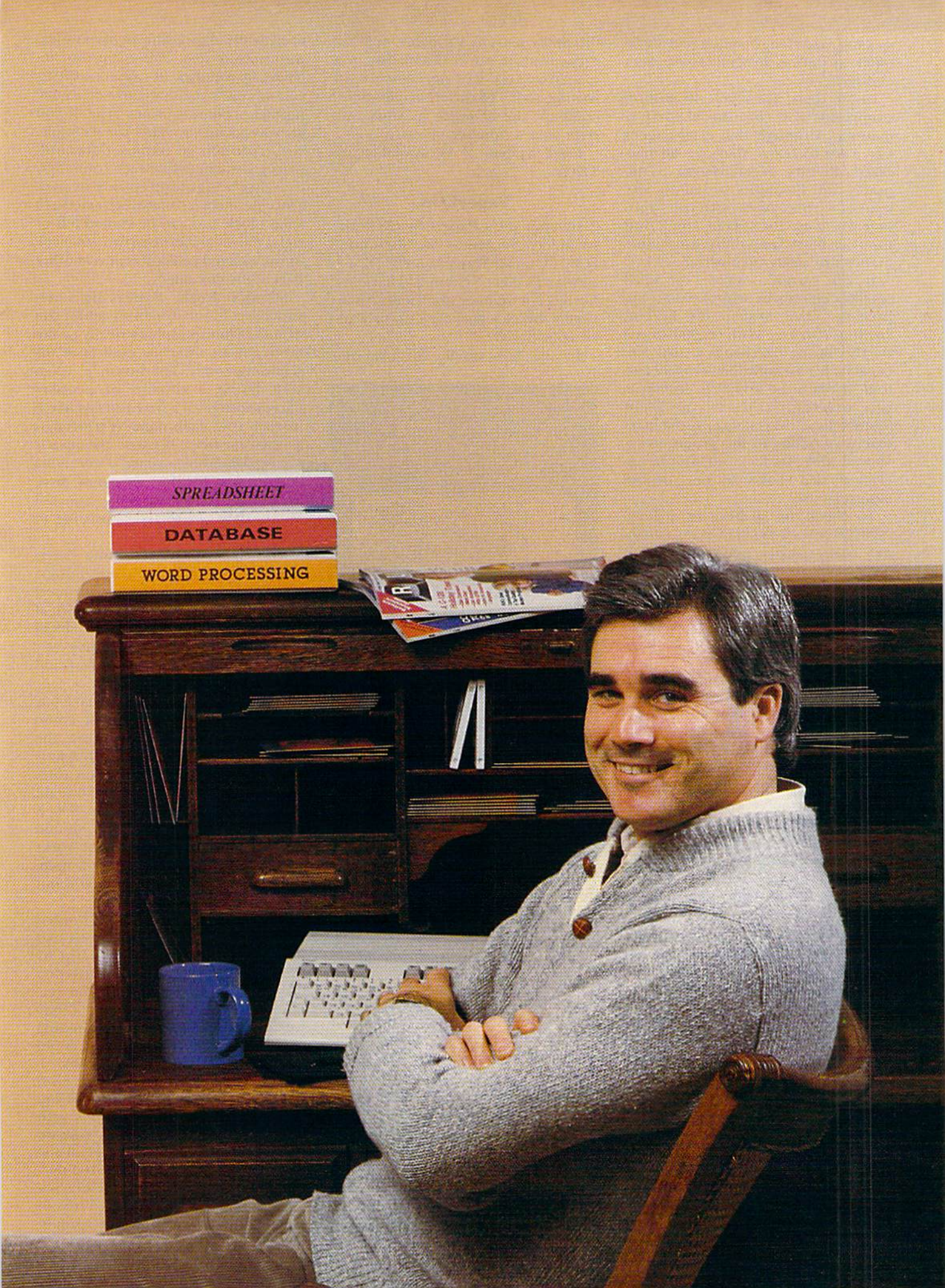
If you press f1 followed by R, for example, you can define a range of text by using the cursor keys to highlight any number of lines. Once you select the range, you can then transfer it to another part of the document, duplicate it or simply delete it.

Other f1 editing commands let you delete single words or entire sentences, erase part or all of the text, split or concatenate paragraphs, and search for specific words, strings or phrases within the document. You can also view the smaller "extra" text area, get an instant word count on your entire document, and toggle on and off printer functions.

Most notably missing from Fleet System 2's editing functions, however, is the ability to go forward or backward within a document one word, sentence, paragraph or page at a time. There is also no way to automatically advance to the bottom of the text, though you can jump to any part of the document if you happen to remember the line number you want to go to.

When shifted, the f1 key produces a check mark on the screen that lets you embed within the text formatting commands for controlling margins,

Photograph by Ed Judice


SPREADSHEET
DATABASE
WORD PROCESSING

spacing, page length, pitch and alignment, as well as designating headers and footers.

In all, there are about 40 editing commands and close to 30 for formatting. Although that might seem like a lot to learn, they are all necessary to give Fleet System 2 the power and flexibility to handle any kind of writing. Also, once you begin to learn to use the system, you'll find that the most frequently used commands are easily memorized.

If you weren't exactly the class spelling champ in school, you'll appreciate Fleet System 2's built-in spelling checker. With 90,000 words in the main dictionary and the capacity for an additional 15,000 custom words to be added to the separate user's dictionary, the Fleet System 2 spelling checker is the most extensive of any of the programs reviewed here. Its fast and simple operation also makes it one of the easiest to use.

To check the spelling in a document after it's been loaded into memory, you simply press f1(S) and answer yes to the prompt. The program then checks all the words in the document against the words in the main dictionary and then against the user dictionary, which can be kept right on the same disk.

Once the checking is complete, any words that weren't found in the dictionaries are highlighted, and you are given a chance to correct misspellings. If a word such as a proper name is spelled correctly but not found in the dictionary, you can ignore it and go on to the next word. Also, correctly spelled words that aren't found in either dictionary can be added to the user dictionary with a single keystroke.

Perhaps the most unusual feature of Fleet System 2 is the Frequency and Statistics Reports option, available through the included Options program. The first report lists all of the words in your document alphabetically in either ascending or descending order, along with the number of times each word is used. You are then shown how many words of each length were used.

The second report tells you the number of different words your document contains, the number of sentences and paragraphs in the document, the average word length, and the average number of words per sentence, words per paragraph and sentences per paragraph.

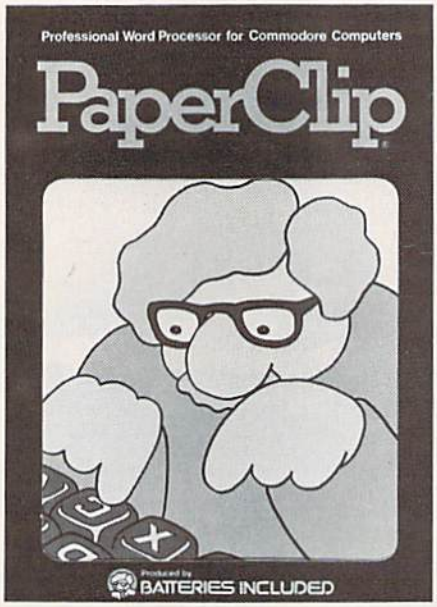
Do you really need to know all of this information? Probably not, but these reports are a fascinating way to analyze your writing, compare the writing styles of different people or compare the changes in your own style over a number of years.

Fleet System 2 is available for $79.95.

PaperClip

In many ways, PaperClip (Batteries Included, 30 Mural St., Richmond Hill, Ontario, Canada L4B 1B5) is similar to Fleet System 2. There are, however, a number of differences between the two packages that should be considered.

In the Edit mode, for example,



PaperClip, from Batteries Included.

PaperClip lets you select any line length, from 80 to 250 characters, with long lines employing horizontal scrolling to allow you to view all of the text. This is useful for preparing extra-wide documents, such as charts that wouldn't fit into 120 columns. The extra width may be useless, however, if your printer isn't capable of handling over 120 columns.

Text can be output to your monitor in 80, 160 or 320 characters, so you can see what those extra-long documents will look like on the printed page. At 320 characters, words are represented only as solid white lines that, while unreadable, do give you some sense of the overall look of the finished document. While working on a document, you can even switch the line length of video output without having to restart the system.

While both PaperClip and Fleet System 2 let you use numeric tabs to automatically align columns of numbers within your text, PaperClip also includes a number of column-editing commands that allow you to easily manipulate columns of any type. If you are preparing a chart, for example, with columns of names, dates and prices, you can define each column by drawing a highlighted box over it. Once defined, a column is treated as a solid block and can be shifted left or right, moved in between two other columns, deleted or copied into another part of the document.

What's more, PaperClip's advanced column functions allow you to sort columns alphabetically or numerically in either ascending or descending order. For instance, when you define a column of people's names with both a first and last name in each row, each name is treated as a separate field, because the names are separated by a space. This allows you to sort by the last name first; then, if two people have the same last name, they are sorted according to the first name.

The charts produced using PaperClip's advanced column-editing features could also be made with most other word processors. However, if you prepare a lot of charts, the ability to manipulate columns in this way could increase your productivity and generally make life a lot easier.

Unfortunately, there are also a few things about PaperClip that could make life more difficult. First, the spelling checker (called SpellPack) is not included on the program disk. Rather, it is an option—$30 if bought with PaperClip and close to $50 if purchased separately. You should also be aware that, although it works similarly to the Fleet System 2 spelling checker, it contains only about one-sixth as many words.

The problem with such a limited spelling checker is not so much that it will let misspelled words slip by unnoticed. Rather, a lot of words that are spelled correctly won't be recognized by the checker and, therefore, will be identified as needing attention. As a result, SpellPack could cost you more time than it saves.

Another potential problem with PaperClip is that, while it allows you to call up predefined phrases with only a couple of keystrokes, you are forced to store these phrases in the same text area as the rest of the document you're working on. (Fleet System 2 lets you store strings of text in a separate area, which can contain almost eight pages of text.)

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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).**

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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

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These minor problems aside, PaperClip is one of the most powerful word processors available for the C-128 and may be the best choice for preparing business reports.

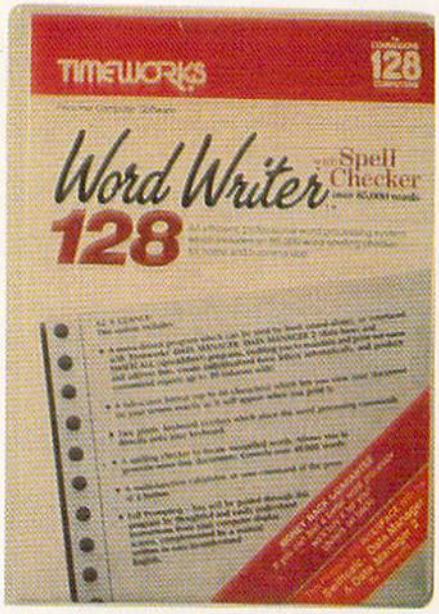
PaperClip for the C-128 is available for $89.95.

Word Writer 128

When you first load Word Writer 128 (Timeworks, 444 Lake Cook Road, Deerfield, IL 60615), it looks pretty much like most other word processing systems. At the top of the screen is a status, or prompt, line, with a large text area below.

When you begin typing you'll notice that as you reach the end of a line, words that are too long to fit are automatically wrapped to the line below, rather than being arbitrarily split wherever the line happens to end. Although Word Writer defaults to a 60-character line, you may select any line length from 10 to 250 characters.

Again, lines more than 80 characters long scroll horizontally to allow you to view all of the text. Unlike the



Word Writer 128, from Timeworks.

smooth scrolling featured in the previous two programs, however, Word Writer's text screen instantly shifts about ten spaces to the left each time the cursor reaches the right side of the screen.

Although automatic word-wrap in the Text Entry mode is a nice feature, I would much rather have the ability to output formatted text to the screen. To be fair, I must add that Word Writer 128 does have a Format command that arranges text to conform to the line length you specify for editing. However, unless this is the same line-length indicated by the margins you set, you'll still have no idea what the finished product will look like.

Also, while the effects of formatting commands such as centering and right alignment are seen immediately, justified text always appears as ragged-right, and double- or triple-spaced text remains single-spaced on the screen.

On the positive side, Word Writer 128 is by far the easiest C-128 word processor to learn and use. While both Fleet System 2 and PaperClip require that you learn numerous editing and formatting commands, Word Writer 128 gives you instant help in the form of pull-down menus that let you perform complicated editing and formatting functions without learning a single command.

The main menu, which appears across the prompt area when you press the ESC key, is made up of seven selections—Help, Functions, Delete, Tab, Print, Disk Commands and Quit.

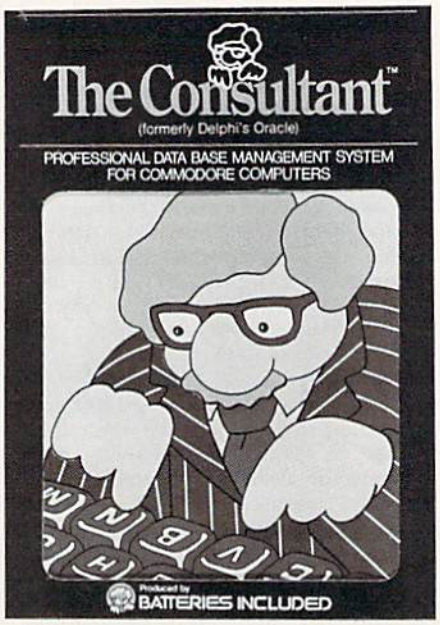
In addition to cursor movement and changing display colors, the scrolling help window also lists the uses of the eight function keys, as well as the inst/del and clr/home keys. The Functions menu lets you format text according to the line length you select, move and copy text, search your document for specific strings, check the amount of memory remaining or check your spelling.

Choosing the Delete option from the main menu lets you define and delete a specific block of text, or simply delete all text from the cursor position to the end of the document. Tabs are set and cleared via the Tab menu.

Many of the formatting commands can be selected from Word Writer's Print menu. These include selecting page and line length as well as line spacing, setting top and bottom margins, justifying text, and page numbering. The Print menu is also used for specifying the printer codes that will allow you to access your printer's special features, such as sub- and superscripts, emphasized or bold print and italics.

The Disk Command menu is used to save, load, merge, erase and rename files, and to view the directory of either the program disk or a document disk. To load a file from the directory, you simply use a cursor key for highlighting the appropriate filename and then press the return key.

Besides Word Writer's pull-down menus, the program also features an on-screen calculator that you can access at any point while working with the program. While this calculator doesn't take the place of numeric tabs, it will let you use the C-128's keypad to add, subtract, multiply, divide and raise numbers to a power. It even has memory and recall buttons just like a real calculator. Once you've finished your calculations, you can return to your document and instantly recall the final result with the press of two keys.



The Consultant, from Batteries Included.

Another feature that sets Word Writer 128 apart from other word processors is the way its 85,000-word spelling checker works. While most spelling checkers identify suspect words and then leave it up to you to find the correct spelling, Word Writer lets you look up the misspelled word in its built-in dictionary.

When the word is highlighted, a press of the f5 key will load into the prompt area the dictionary word that's closest in spelling to the suspect word. The cursor keys may then be used to flip quickly through about 200 words from that section of the dictionary disk. When you spot the correct spelling, just press the return key and the correct version automatically replaces the misspelled word in your text.

Word Writer 128 is available for $69.95.

Data Management

Another way your C-128 can increase your productivity is by letting you organize all kinds of information with a database system. Both The

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Up till now, you'd have to spend a minimum of about $70 to get a good word processor for your Commodore 64™/128™. And if you added a small, *separate* spell checking program, you'd be out well over $100!

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Consultant, by Batteries Included, and Timeworks' Data Manager 128 are multi-featured database management systems that allow you to easily store, search, update, sort and print information. While some typical uses for database systems include recipe files, electronic address books and the ever-popular home inventory file, there are really as many different uses for database systems as there are people to use them.

Whatever your data management needs, you'll be happy to learn that with the C-128, you'll be able to create larger files, store more data and sort and retrieve information with more speed than was ever possible with the C-64.

The Consultant

The C-128 adaptation of this powerful data-management package from Batteries Included operates exactly like its C-64 counterpart. In fact, the two programs are so much alike that the same documentation is used for both, with a one-page insert added to explain the 128 enhancements.

Besides using the 128's individual cursor keys, caps lock and numeric keypad, the enhanced version of The Consultant takes advantage of the 128's 80-column display. This allows you to create much better-looking on-screen data formats and to fit more information onto a single screen page. However, the maximum record length is nine screen pages and 99 fields for both versions.

Perhaps the most important difference is that the C-128 version lets you store more records on your data disk. If you want to create a datafile with a cumulative record length of 194 characters, The Consultant for the C-64 lets you store only 512 records on a single data disk, while the C-128 version can handle more than 800 records using the same format. In many cases, this increased file size will save you from having to split lengthy database files among two or more disks.

Despite The Consultant's power and flexibility, its logical system of menus and well-organized user's guide make it simple to operate. After brief introductory discussions that deal with backup disks, user conventions and loading the program, the guide presents you with 17 lessons. These take you step by step through such basics as formatting your work disk and creating a file, to more advanced features, such as special sorting, Consultant math functions, and the printing of forms and labels.

The user's guide also has a comprehensive chapter on system management that includes sections on disk utilities, creating sequential files to use with other programs, restructuring existing record formats, and using data from Consultant files with PaperClip to create form letters, complex reports and special documents.

The system-management chapter includes a section about Consultant security, which lets you establish three security levels to limit database access to holders of specific passwords. Here's how it works.

The first security-level password allows users to view only certain "unprotected" fields. Holders of the level-2 password can view or print all fields, but aren't permitted to modify the records in any way. You keep the third-level password, or "master code," for yourself, giving you complete access to all data and system functions.

The Consultant also comes with seven support programs that let you

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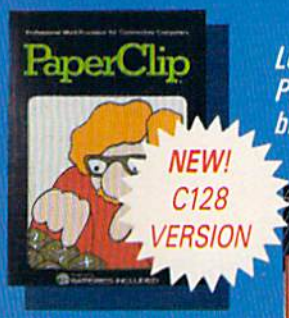
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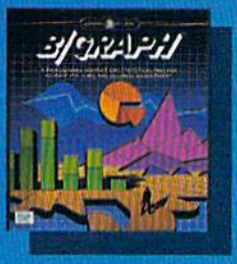








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UNDERWURLDE

Beware

All you need is there to take
Locate the weapons, then to make
A journey on if you would dare
To find the devil in his lair
The long dark palace, seek you will
The gems your pockets will not fill
Tho' energy they'll make you fast
And gargoyles then you will get past
Up and up, the journey's slow
So down is first the way to go.

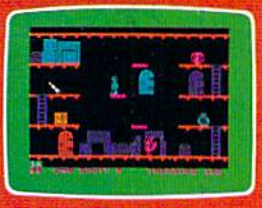
The old travellers' words still singing in my head.





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SABRE WULF

The Warning

Thy path is long so tread with care
Beware the wulf and pass his lair
Danger threatens all around
So take ye from this hidden mound
To free thee from this sunken gate
By way of cave or meet thy fate
An amulet to seek thy will
'Twas split by quad and hidden still
Pass the keeper wrought with hate
To gain an entrance to the gate
The pieces lost must thee amass
For if no charm then none shall pass





CHIMERA

Investigations have traced the source of erratic radio signals to a giant alien vessel, orbiting the Earth high in the exosphere. That the craft is hostile, there is no doubt; somebody will have to go aboard and find out how to eliminate the threat.



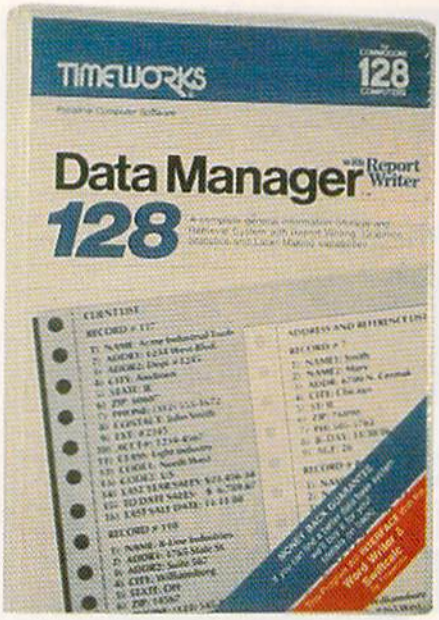
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COMMODORE 64/128K



Data Manager 128, from Timeworks.

inspect and sort data, back up data disks with a single disk drive, and repair any files damaged due to disk error. Unfortunately, these utilities must be used with your 128 in the 64 mode. While this isn't a major problem, it would be more convenient not to have to reset the entire system each time you want to back up your data disk. Until Batteries Included decides to translate these utilities for the 128, just be grateful that they're included at all. Many systems leave data backup entirely to the user.

The Consultant is available for $79.95.

Data Manager 128

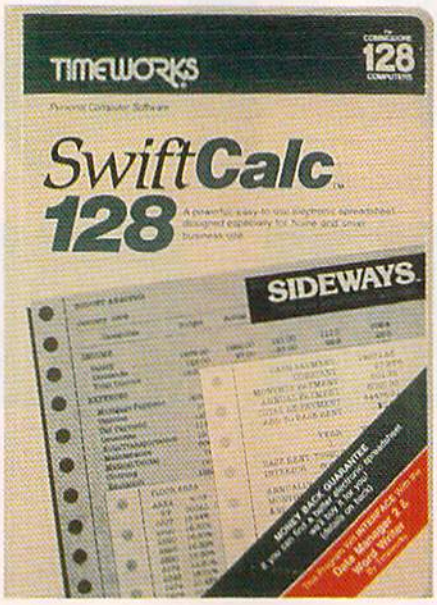
Like Timeworks' other programs in the 128 series, Data Manager 128's pull-down menus and excellent documentation make it an extremely easy program to use, even if it's your first data management system. At the same time, Data Manager's extensive calculation, statistics and graphics capabilities make it as useful for small-business purposes as it is for home applications.

By using the system's Functions menu, you can design record formats by entering fields anywhere on the 128's 80-column display. To set up a field, you simply move the cursor to the desired screen position, press the return key, enter the field name and the maximum number of characters it will contain, and specify the field type (alphanumeric, numeric, date, calculation or text).

Once the record format is created and saved to your data disk, individual records may be added, deleted or moved by selecting the appropriate choices from the Functions menu and following the prompts. The Search/Edit menu lets you search for records in your file by record number, amount range or date range. In addition, Data Manager's X-search feature will help you quickly find very specific records.

For example, let's say you have set up a recipe file, including fields for main ingredient, cooking time and the number of people the dish serves, as well as fields for other ingredients and cooking instructions. If your spouse calls you unexpectedly to announce that she's arriving in an hour with two dinner guests, and all you have for a main course is chicken, X-search can help you find an appropriate recipe.

All you have to do is select "By Field Element" from the Search/Edit menu and search the Main Ingredient field for chicken. Then use the "By Amount Range" option to find all chicken recipes with cooking times of an hour or less. Finally, narrow down your selection further by using "By Amount Range" again to weed out all those recipes that don't serve at least four people. Although it sounds a little complicated, the whole process is actually quick and simple.



Swift Calc 128, from Timeworks.

As mentioned previously, Data Manager 128 also features statistical and graphics capabilities not found in other data-management systems. By selecting the Stats/Graphics option from the main menu, you can get an instant statistical analysis of an entire file based on any numeric field; you can also generate bar graphs.

Data Manager's bar charts can be used to graphically represent the relationship between an alphanumeric or date field and a numeric field. When used with an expense file, for example, this would allow you to produce a bar graph comparing total monthly expenses.

Unfortunately, the program contains no provisions for saving or printing charts, so if you want to display them to others, you'll have to show them the computer screen itself or photograph the charts. Since most other data-management systems for the C-64 and 128 have no provision at all for producing these kinds of charts, you can probably live with this limitation.

Data Manager 128 is available for $69.95.

Financial Planning

Although many people believe spreadsheets are useful only for business, you can use them for several home applications as well. They can be used to create a budget, to determine the future value of annuities, or to compare various investments and tax strategies.

One reason why spreadsheets are so useful for financial planning is that they allow you to see the effect of changing one variable in a complex calculation.

For example, let's say you design a spreadsheet to determine the value of a 12% annuity every year for the next 30 years, based on a weekly payroll deduction of $25. All you have to do to see the effect of increasing your payroll deduction is to plug in a different amount, and the spreadsheet automatically adjusts the value for each of the next 30 years. Likewise, you can easily see how a change in the interest rate will affect your investment in the future.

SwiftCalc 128

The third package in the Timeworks C-128 productivity series, SwiftCalc, is a spreadsheet program designed to let you use mathematical functions and algebraic formulas for budgeting and financial planning.

The spreadsheets you design with SwiftCalc are made up of cells divided into rows and columns. There are 250 rows and 250 columns, for a total of 62,500 available cells, which can contain text or labels (to remind you what each row and column rep-

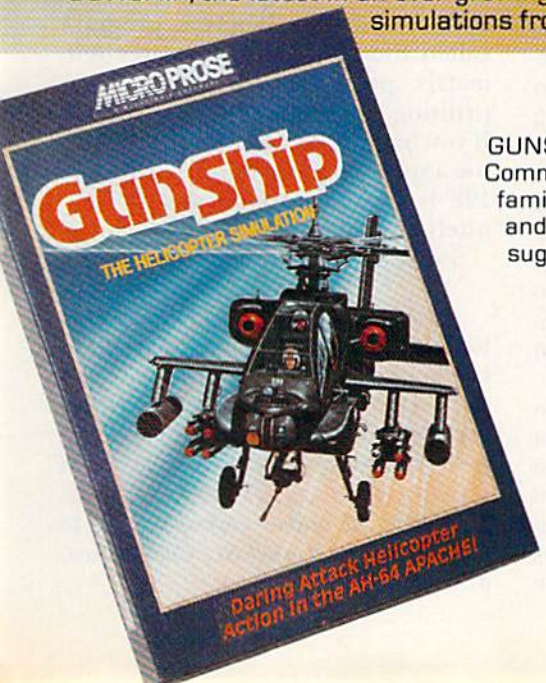
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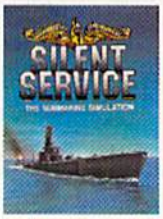
GUNSHIP is coming soon for Commodore 64/128, Apple II family, IBM PC/PC Jr., Atari and Amiga computers for a suggested retail of $39.95. Call or write for specific machine availability, and for MC/VISA orders.

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The following productivity packages, also for the C-128, were not available at the time of this review.

Wordpro 128—80-column word processor. $99.95. Pro-Line Software, 755 The Queensway East, Unit 8, Mississauga, Ontario, Canada L4Y 4C5.

Perfect Series—Perfect Writer, Perfect Calc, Perfect Filer. Integrable word processor, spreadsheet and database programs that work in CP/M mode and utilize an 80-column screen. Thorn EMI Computer Software, PO Box 10425, Costa Mesa, CA 92626.

Jane 2.0—This package is made up of Janewrite (word processor), Janecalc (spreadsheet) and Janelist (database). $49.95. Available from Commodore Business Machines, 1200 Wilson Drive, West Chester, PA 19380.

Vizastar 128—Integrated spreadsheet, database and graphics programs. All three programs utilize an 80-column screen. $119.97. Solid State Software, 1125 E. Hillsdale Blvd., Suite 104, Foster City, CA 94404.

VizaWrite—80-column word processor. $79.97. Solid State Software, 1125 E. Hillsdale Blvd., Suite 104, Foster City, CA 94404.

Fleet System 3—80-column word processor. About $90. Professional Software, 51 Fremont St., Needham, MA 02194.

Ghost Writer 128—80-column word processor that makes use of the C-128's enhanced hardware features. $39.95. Human Engineered Software, 390 Swift Ave. #14, South San Francisco, CA 94080.

Paperback Writer 128—Offers 80-column screen and utilizes the 128's enhanced capabilities. $49.95. Digital Solutions, PO Box 345, Station A, Willowdale, Ontario, Canada M2N 5S9.

Integrated productivity packages for the C-64.

HomePak
This package contains word processor, database and terminal programs. Batteries Included, 30 Mural St., Richmond Hill, Ontario, Canada L4B 1B5. $49.95.

Skiwriter II
Contains a word processor and a terminal program. Prentice-Hall Home Software, PO Box 819, Englewood Cliffs, NJ 07632. $69.95.

Team-Mate
Word processor, database, spreadsheet and business graphics programs. Tri Micro, 14072 Stratton Way, Santa Ana, CA 92705. $49.95.

Brown Bag
Contains word processor and database programs. Software Resource Group, 1095 Airport Road, Minden, NV 89423. $49.95.

Trio
This package offers word processor, spreadsheet and database programs. Softsync, 162 Madison Ave., New York, NY 10016. $69.95.

Vizastar 64
Spreadsheet, business graphics and database programs. Solid State Software, 1125 E. Hillsdale Blvd., Suite 104, Foster City, CA 94404. $119.97.

resents), and values and calculations based on the contents of other cells.

To enter labels, you move the cursor to the desired cell and just begin typing. As soon as you type anything other than a number, the program automatically designates the entry to be a label. If you want to use numbers as labels (perhaps to separate columns by year), you insert a quotation mark before the number you want to use. Otherwise, all numbers you enter will be accepted as values within the spreadsheet.

While entering a formula, you can use the function keys to help you avoid mistakes. By pressing f2, you can use the cursor keys and the inst/del key to move through the formula and make changes. The f7 key allows you to use the cursor keys to browse through the rest of the spreadsheet for particular cell addresses that you may have to use in the formula. Once you find the particular cell you want to include, just press the return key and you'll be returned to the formula cell with the new cell address in place.

This feature is especially useful when designing large spreadsheets with complex formulas, since it would be impossible to remember the exact addresses of every cell involved in a typical calculation. Finally, the help key can be used during formula entry to call up a scrolling help window that lists information on each of the available mathematical operations and functions.

In addition to basic mathematical operations, SwiftCalc 128 also lets you use exponentiation in your formulas, so you can raise numbers to specific powers or find square or cube roots.

There are also several specialized functions, actually ready-made formulas, that can be summoned instantly by their three-letter names. Some of these include MIN, MAX and AVG, which find the minimum, maximum and average values within a group of cells; SUM is used to find the sum of values in a range; and PCT converts an expression from a percentage figure to a decimal number.

Other advanced features include the ability to use logical statements. These can automatically change values in your formula if specific conditions are met.

Like the other programs in the Timeworks 128 series, SwiftCalc uses pull-down menus and a well-organized, spiral-bound user's manual to make designing and using your own spreadsheets a snap. Timeworks has even included a fantastic program called Sideways, which rotates dot-matrix print 90 degrees to make printing large spreadsheets simple. If you have a 128 and think you could use a spreadsheet program, SwiftCalc 128 is one choice you should definitely consider.

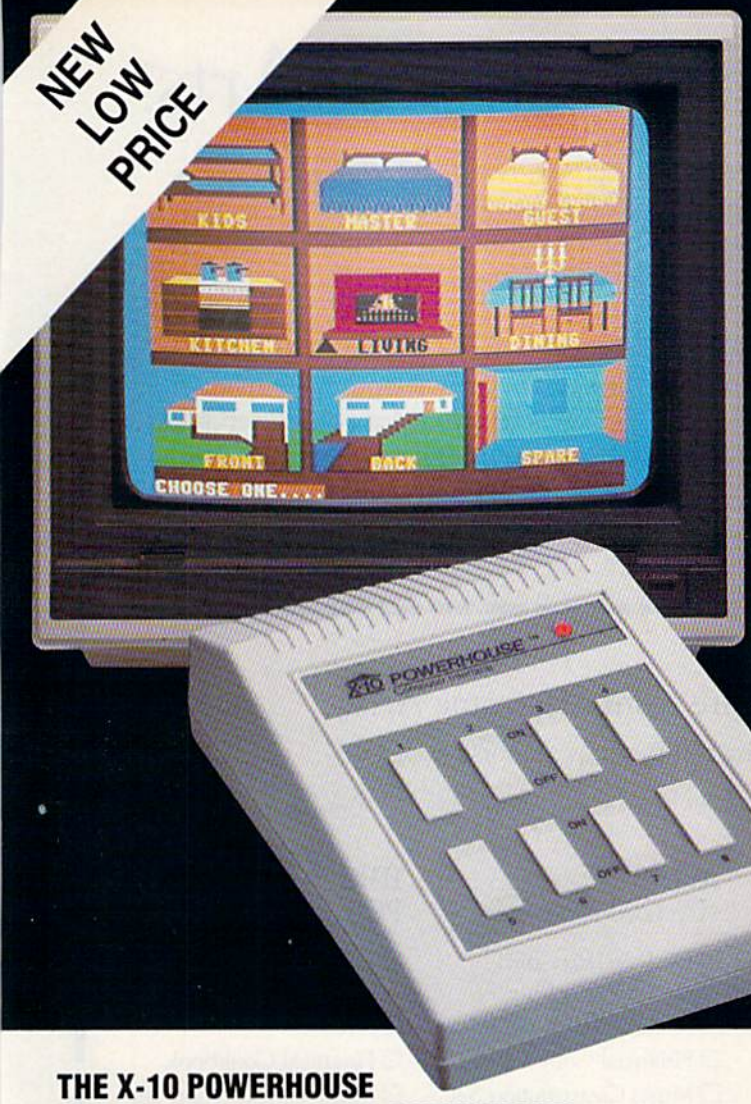
SwiftCalc 128 is available for $69.95.

As you can see, there's a lot in store for C-128 owners. Now that these kinds of packages are available for the C-128, with more on the horizon, there's no reason why you can't put your computer right to work. R

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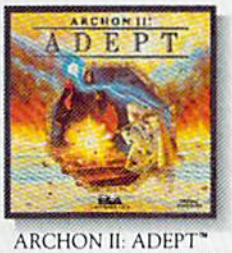
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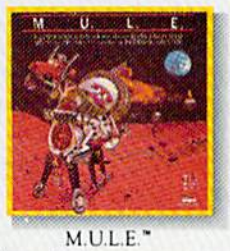
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RUN Script 64

Here's RUN Script 64, a top-notch Commodore word processing program. It offers you unmatched features and flexibility and was designed especially for you, our readers.

By ROBERT ROCKEFELLER

RUN Script 64 is a word processor designed specifically for the readers of *RUN* magazine. It's easy to use and, since it's written entirely in machine language, it is fast. Also, you can use this program with Runterm Plus (see the December 1985 and January 1986 issues) and other terminal programs.

RUN Script 64 offers about 70 functions, many of which you'll already know, and the rest of which I tried to keep as intuitive as possible. Learning to use the program is easy because most of the editing keys function almost exactly the way they do in Basic.

Reading your text is also easy, since RUN Script 64 contains a word-wrap feature, which works as follows. If a word is too long to fit into the remaining space on a screen line, the word will not be broken; instead, it will wrap around and be displayed in its entirety at the beginning of the next line.

RUN Script uses one line at the top of the screen to display prompts and operation and error messages. (For example, when RUN Script is in Insert mode, the *ins* message is displayed in this status line.)

This leaves 24 lines free for displaying text. About 40,000 bytes are available for storing text.

Aborting Operations

You may abort almost any operation, including saving and loading text, by pressing the CTRL key along with the Commodore key. About the only operation you can't stop is the replace-string function, once replacing has begun; but pressing the CTRL/Commodore combination during the input stage will abort this function.

In RUN Script, the restore key acts as a panic button, taking you out of whatever mode you're in and returning you to normal Text mode. You needn't press the run/stop key with the restore key.

Moving the Cursor

The cursor is restricted to the text area, which means it can only be moved around within text that has already been typed. Seven keys function as cursor controls. These include the four cursor keys, the home key, the CTRL/back-arrow key and the shift/return keys. To use the CTRL/back-arrow, press the CTRL and back-arrow keys together; likewise, press the shift and return keys simultaneously for shift/return.

Cursor keys—By pressing the cursor-down key and shifted cursor-up key, you can scroll up and down through the text area. These two keys function the same as in Basic, except that when you scroll up or down with RUN Script, you can only go up to the beginning or down to the bottom of the text; you can never scroll the text entirely off the screen.

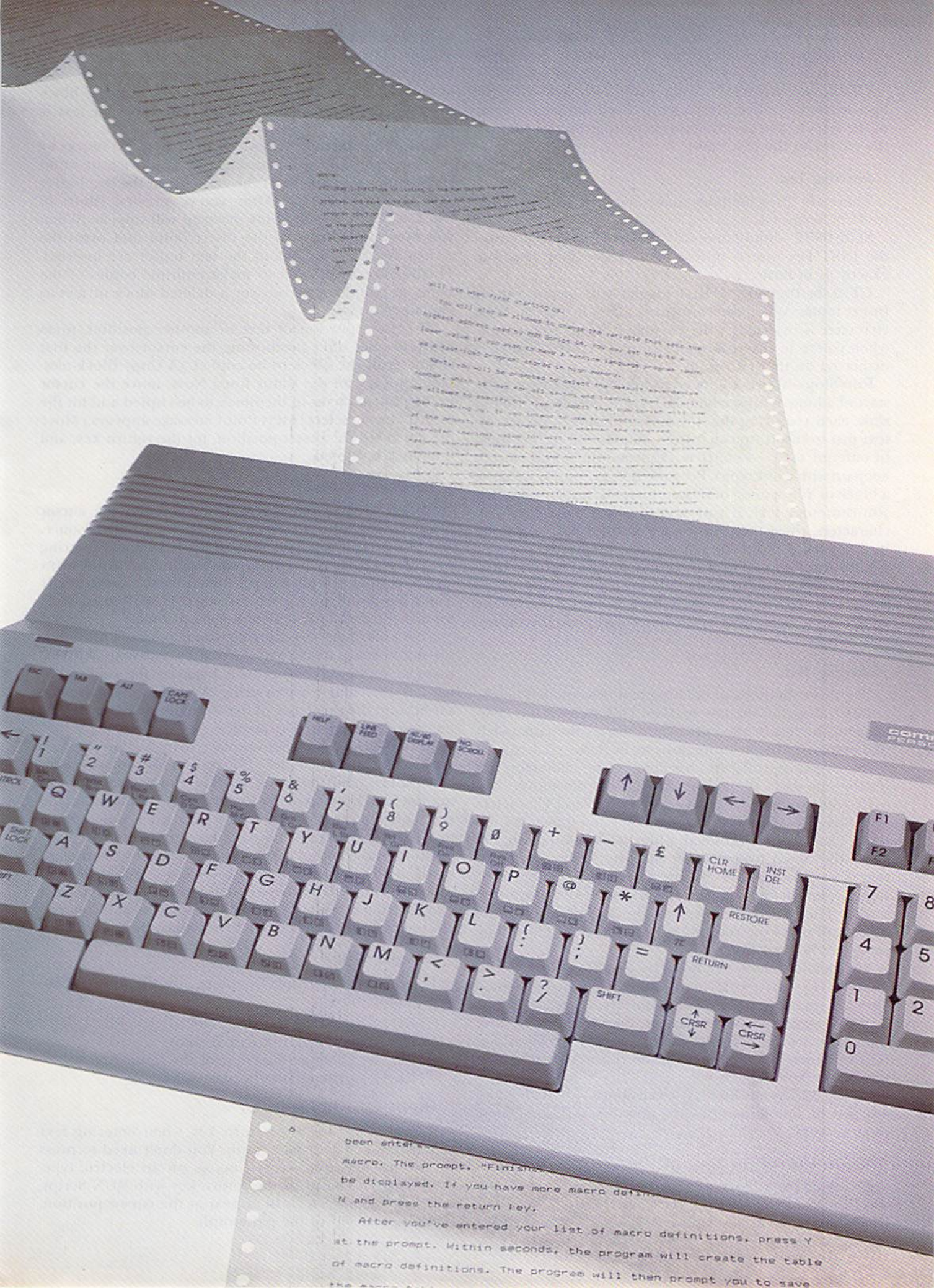
By pressing the cursor-right key or (shift) cursor-left key, you can move the cursor horizontally through the text area. Again with a slight difference, the two keys function as in Basic. The difference is due to RUN Script's word-wrap feature, where a given screen line may have anywhere from one to 39 spaces at the end of it. The extra spaces don't exist in the text area, but are printed to the screen to pad out the line. When moving the cursor horizontally, you'll find it will skip over these invisible spaces. It's impossible to overwrite them.

Shift-Return—This key combination moves the cursor to the start of the next line, just as in Basic.

RUN It Right

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

Ed Judice


been entered
macro. The prompt, "Finish
be displayed. If you have more macro defin
N and press the return key.
After you've entered your list of macro definitions, press Y
at the prompt. Within seconds, the program will create the table
of macro definitions. The progress will then prompt you to save
HELP
LINE FEED
NO SCROLL
CLR HOME
INST DEL
RESTORE
RETURN
SHIFT
CRSR
F1
F2

Home key—Pressing the home key once moves the cursor to the upper-left corner of the screen. Pressing it twice moves the cursor to the start of the manuscript.

CTRL/back-arrow—Pressing the CTRL key with the back-arrow key moves the cursor to the bottom-left corner of the screen, and pressing this combination twice moves the cursor to the text's end.

Inserting Text

There are three methods that you can use to insert text in RUN Script 64.

Shift-INST—Simultaneously pressing the shift key and the INST key inserts one space at the cursor position, exactly as in Basic.

CTRL-I—Pressing CTRL-I toggles you in and out of Insert mode. Whenever you press a key in this mode, a character is inserted at the cursor position. You'll know when you're in Insert mode because an *ins* message is displayed on the status line.

Run/Stop—When you need to insert a lot of text at the start of a long manuscript, CTRL-I and shift-INST are too slow, each requiring the movement of almost the entire text just to insert one character. When a lot of text must be entered, the C-64's 6510 microprocessor simply cannot keep up with a fast typist. Pressing the run/stop key inserts a block of 200 spaces, indicated by solid lines, over which you can enter text. If you wish to insert more than 200 characters, press the run/stop key continuously until the insert block is large enough to suit your needs.

Shift-Run/Stop—This key combination is the functional opposite of the run/stop key, deleting a block of unwanted solid lines. To eliminate these lines, simply position the cursor at the beginning of the block and press the shifted run/stop key.

Deleting Text

The three methods of deleting text are detailed below.

DEL—Pressing the key marked DEL deletes the character to the left of the cursor and moves the cursor left one column. This key functions as in Basic.

f8—Pressing (shift) f8 also deletes one character, but it's the one *under* the cursor, which does not move.

f7—Sometimes you want to delete several characters or sentences. Doing this one character at a time takes too long. That's when you need a block-delete function. Position the cursor over the first character of the section of text you wish to delete and press f7. A delete-block message is then printed on the status line at the top of the screen. Then move the cursor to the *last* character of the block and press the return key. The block of text will be removed, but not lost.

The deleted block is copied to a buffer at the top of memory. If you decide it shouldn't have been deleted after all, press (shift) f6 twice, quickly. (A Select Insert Point message will be printed on the status line.) Move the cursor to the point where the text was deleted and hit the return key. The text will be restored exactly as it was before you deleted it.

If you accidentally hit f7, you can abort without deleting any text by simultaneously pressing the CTRL and Commodore keys.

Moving and Copying Text

f5—To move a block of text, position the cursor over the first character of the block and press f5. (A Move Block message will be displayed.) Then move the cursor to the last character of the block and hit the return key. The text is deleted and copied to the same buffer the f7 function uses. (A Select Insert Point message will now appear.) Position the cursor where you want the block inserted, press the return key and the block of text is moved.

Shift-f6—There are two ways of copying text blocks by pressing (shift) f6. By pressing this key twice in rapid succession, you may insert the contents of the text buffer into your manuscript. After you've pressed (shift) f6 twice, a Select Insert Point message will appear. When you move the cursor to the insert point and press the return key, the contents of the text buffer are inserted. This feature allows you to make multiple copies of the same text block or to recover a deleted block of text as explained above.

To copy a portion of text to another position, press (shift) f6 once after positioning the cursor over the first character of the block to be copied. (A Copy Block message appears on the status line.) Next, move the cursor to the last character of the block to be copied and hit the return key. (A Select Insert Point message appears.) Move the cursor to the insert position, hit the return key, and the block is copied.

Search and Replace

Shift-f2—To search for a string between the cursor position and the end of the text, press (shift) f2 once, and a "search string?" prompt appears. Type in the string you're searching for, beginning and ending it with any extra character (for example, :color:); then press the return key. If a match is found, the cursor appears over it. If no match is found, a String Not Found message is printed.

After entering a search string, you may search for multiple occurrences of the same string by pressing (shift) f2 twice in rapid succession. This bypasses the subroutine used to select a new search string. (You must move the cursor beyond the first letter of the string found in order that the next occurrence be located.)

Shift-f4—Use (shift) f4 to replace strings within the text area. There are two modes of operation for replacing text. If you press (shift) f4 twice, quickly, you will be asked to input a search string and a replace string. Remember, the first and last characters are ignored. After you've done this, all occurrences of the search string from the cursor position to the end of text will be replaced by the replace string. If you press (shift) f4 only once, a search string and replace string will be requested as above; but before each search string is replaced, it will be displayed, and you may elect to replace this occurrence or bypass it.

Changing Colors

To change your display's colors, use the appropriate key combination.

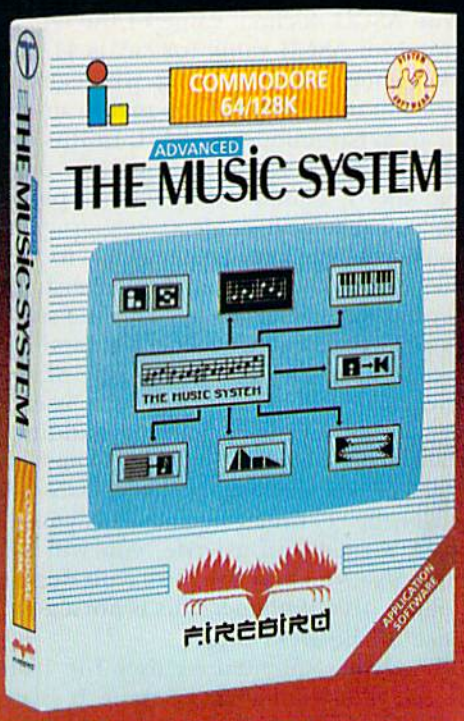
CTRL-1—to change the text color.
CTRL-2—to change the screen color.
CTRL-3—to change the color of the status line.
CTRL-4—to change the border color.

Miscellaneous Edit Functions

Return—Pressing the return key when entering text signals the end of a paragraph. You don't need to press the return key after every line, as on an electric typewriter. When you press the return key with RUN Script, a left-arrow character will appear at the cursor position, marking the end of the paragraph.

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CTRL-X—This keystroke interchanges the two characters to the left of the cursor—a fast method of correcting transposed letters.

CTRL-↑—This key toggles RUN Script 64 in and out of Caps Lock mode. When the *cap* message is displayed on the status line, all alphabetic characters typed will be capitalized, regardless of the position of the shift key. This allows entry of capital letters and numbers at the same time, without having to touch the shift key.

CTRL-=—Because RUN Script 64 uses word-wrap, it is often hard to tell exactly how many real spaces follow a word that appears at the end of a screen line. To remedy this, it's possible to select some character other than the space character to fill out screen lines when a word must be moved to the next line to avoid splitting. Press the CTRL and equals-sign key. (A *chr* message will appear on the status line.) Then type the character to be used as the filler character. The screen will then be redisplayed with your filler character in place of spaces. Personally, I favor the graphics character obtained by simultaneously pressing the Commodore and + keys.

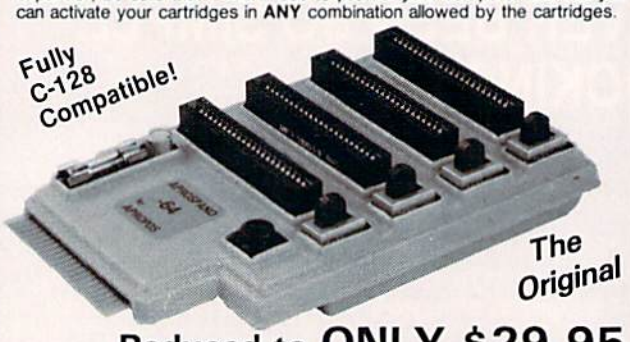
The f1 Key

The f1 key acts as a command key to access various functions, such as saving, loading text, and so on. Press f1 once, and a "command ?" prompt will appear. Enter a letter corresponding to the function you wish to execute, as listed below.

d—Selects the device with which all saving and loading takes place. This may be device 8 or 9, the disk. The default device is number 8, the disk drive.

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@—Saves with replace. (The old file is automatically scratched before the new file is saved. This totally bypasses the DOS bug built into the 1541.)

s—Saves text to device.

l—Loads a text file from the device.

a—Loads the text starting at the cursor position rather than at the start-of-the-text area, as in "l." (This append function is not intended for use with sequential files.)

t—Selects whether characters will be output and input as true ASCII or as Commodore ASCII. Some non-Commodore printers use different ASCII values for some characters than the ones Commodore uses. For example, the true ASCII decimal value of the letter "a" is 97. The Commodore ASCII value for "a" is 41.

Also, when telecomputing with some distant mainframes, you may find that the mainframe uses true ASCII rather than Commodore ASCII. In this case, RUN Script can do conversions between the two types of ASCII using the "w" and "r" commands. (RUN Script uses Commodore ASCII as the default mode.)

w—Writes the text in memory to disk as either a sequential or a user file. If you wish text saved as a sequential file, you must append the string ",s,w" to the filename when entering the filename at the prompt. (The quotation marks are not part of the string.)

If you wish the text saved as a user file, you must append ",u,w" to the filename. In addition, the text can be written to disk using either Commodore ASCII or true ASCII, depending on how RUN Script is configured. See the "t" function, above. (If you change filetypes between a read and a write, you will need to rename the file. Also, you may use Save with Replace by inserting @0: before the filename. This is not a good idea, though, because of the DOS bug.)

r—Loads a sequential or user file from disk. Simply enter the filename at the prompt. It is not necessary to append anything to the filename. If RUN Script 64 is in true ASCII mode, the file loaded must be a true ASCII file; otherwise, upper- and lowercase letters will be reversed. If RUN Script is in Commodore ASCII (normal) mode, the file must be a Commodore ASCII file.

The "r" and "w" functions are included mainly to allow RUN Script to write and read files from other word processors.

$—Lists the disk directory. You can pause the directory listing by pressing the Commodore key and stop the listing by pressing the run/stop key. In order to return to Edit mode, press the CTRL and Commodore keys simultaneously.

>—Issues a disk command.

<—Reads the disk error channel.

f—Reports the number of free bytes remaining.

x—Exits to Basic.

p—Prints text. After selecting the Print function, you'll be asked how many copies to make. (Up to 99 copies are allowed.) Next, you'll be asked to select the output device. Output may be directed to device 3, the screen; device 4 or 5, the printer; or device 8 or 9, the disk drive.

If you choose the disk, output begins immediately and continues until all text has been output. If you don't have a printer, you might want to output your text to disk and then borrow a friend's printer to print out your text.

If you select the printer or screen as the output device, a special output mode is possible. A "continuous (y/n) ?" prompt will appear. If you answer "n" for no, a "next output (c/p/s) ?" prompt will appear before each page is

output. This gives you the option of feeding single sheets to your printer.

If you enter "c" (continuous) in response to the prompt, output from that point on will be continuous, and the "next output (c/p/s) ?" prompt will no longer be displayed before each page is output. If you enter "s" for screen, the next page will be printed to the screen. If "p" for printer is entered, the next page will be sent to your printer. This allows you greater control and flexibility in printing.

When text is being printed to the screen, you may pause the output by pressing the Commodore key. You may terminate the output at any time, regardless of the output device, by simultaneously pressing the CTRL and Commodore keys. Output to the screen allows you to see where the page breaks occur. It is recommended that you perform this operation before printing your text.

Dot Commands

RUN Script is a post-formatted word processor. This means that your screen display will vary somewhat from your printout. The text is not formatted until it is printed. To specify output format, RUN Script has 21 dot commands, so called because each command must be preceded by a dot (i.e., a period). These commands are embedded in the text to specify margin widths, define headers and footers, and so on.

A dot command is executed only when text is being printed, and only text following the dot command is affected. For example, if margins aren't set until half a page of text has been entered, the margins in the first half will probably be incorrect in width.

For dot commands to be interpreted correctly, certain procedures must be followed. First, the line immediately preceding a line of one or more dot commands must end with a carriage return. Second, the line of dot commands must start at the extreme left of the screen in the first screen column. Dot commands cannot be preceded by spaces or any other character.

Third, there may be more than one dot command per line, but commands must not be separated by spaces. Fourth, each string of dot commands must be terminated by a carriage return. Here is an example.

```
.pw80.pl66.lm6.rm6.tm4.bm4.lj
```

Each dot command is discussed below.

.lj—Specifies that text will be left-justified when printed.

.rj—Indicates that printed text is to be right-justified.

.cn—Specifies that text is to be centered between the left and right margins. Your text must be entered on the next line below the cn command.

.pl—Sets the page length. It must be followed by a number from 1–240, indicating how many lines must be output to print one full page. For standard-size paper (8½ × 11) with a printer that prints six lines per inch, the setting would be 66. Therefore, you would enter .pl66.

.pw—Sets the page width, defined as the maximum number of characters that may be printed on one line. Most printers print ten characters per inch, which, using standard-size paper, gives 80 characters per line. If your printer has multiple character sets, with different character densities, you'll have to adjust page width accordingly in order to use one of the alternate character sets. Example—.pw80.

.lm—Sets the left-margin width. The .lm directive must be followed by a number from 1–240 that indicates the width. Example—.lm8.

.rm—Sets the right-margin width. The .rm directive must be followed by a number from 1–240. Example—.rm8.

If the sum of the left and right margins is greater than the page width, a margin error will occur.

.tm—Sets the top-margin depth. The .tm directive must be followed by a number from 1–240. Example—.tm6.

.bm—Sets the bottom-margin depth. The .bm directive must be followed by a number from 1–240. Example—.bm6.

The top-margin depth plus the bottom-margin depth must be less than the page length.

.hd—Defines a header to be printed at the top of every page. It may be followed by up to 255 characters and must be terminated with a carriage return. This means that the carriage-return character cannot be part of the header string and that no dot commands can follow the .hd directive, since they would be interpreted as being part of the header string.

For this reason, and to enhance readability, I recommend that the .hd and .ft (see below) dot commands appear on lines by themselves. One character is given special significance when the header or footer is being printed. When the # character is encountered, the current page number will be printed.

The .lj, .rj, .cn, .pw, .lm and .rm dot commands have no effect on the header when it is printed. The header string is printed exactly as defined, starting at the first column on the page and continuing until it has been printed in its entirety. If, for example, you wish to center a title, the title must be preceded by the correct number of spaces to cause it to be printed at the center of the page.

Macro characters (see below) may be embedded in the header string if desired. The header will be printed at the line position equal to the .tm setting plus 1. If the top margin is set to six, the header, if defined, will be printed on the seventh line. Example—.hd RUN Script 64.

.ft—Defines a footer to be printed at the bottom of every page. The .ft directive works exactly like the .hd directive. The footer, if defined, will be printed at the line position equal to the .pl setting minus the .bm setting minus 1. Example—.ft page number.

.hs—Defines the number of lines to be left between the header and the main body of text. It must be followed by a number. Example—.hs2.

.fs—Defines the number of lines to be left between the footer and the main body of text. Example—.fs2.

.ls—Sets the line spacing. One or more blank lines may be printed between each line of text. If .ls is set to 1, one blank line will be printed after each line of text. Example—.ls1.

.l+—This command causes text to be indented from the current left-margin setting. For example, if the left margin is set to .lm8, and you then execute .l+3, text will henceforth be indented as though .lm11 had been executed. To cancel an indent, simply use .l+0 or .l−0.

.l−—Allows you to have certain text, such as a subheading, print to the left of the left margin. This is accomplished with .l− and is called an outdent. For example, if the left margin setting is .lm8 and .l−3 is executed, text will begin printing at the sixth column, just as though .lm5 had been executed. Outdents are cancelled by executing .l−0 or .l+0.

.fp—Forces a new page. When this command is exe-

cuted, no more text will be output to the current page. If a footer was defined, the footer will be printed, then the bottom margin and a new page will be started. Example—.fp.

.fl—This command lets you link files to be printed. The command must be followed by a device number and a filename, separated by a comma. When the .fl directive is executed, the file will be loaded from the specified device and begin printing. The permissible device numbers are 1 for cassette, and 8 or 9 for disk. If two disk drives are used, one manuscript can be over 340,000 characters long. Example—.fl8,next file.

.p#—Sets the page number of the next page to be output. Example—.p#45.

.lf—Indicates that a line-feed character is to be printed after every carriage return. Some non-Commodore printers require this. Example—.lf.

.cm—This is a do-nothing dot command. Its only purpose is to let you leave a comment for yourself that will not be printed when text is output. If you are in the habit of keeping all your old letters on disk or cassette, you can leave a comment to yourself with the date and other information. Example—.cm July 19, 1985 RUN Script 64 article.

Error Messages

Macro Not Defined—This error message will be displayed during output if an undefined macro character was encountered. This usually means that you made a typing error when entering the macro character. The cursor will be displayed on top of the incorrect character.

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Macro characters are a means of customizing RUN Script 64 to take advantage of special features of non-Commodore printers. It is not necessary to understand macro characters to use RUN Script 64. They will be explained next month when I describe how to customize this word processor to your own liking.

Illegal Quantity—This message will be displayed if a dot command's numeric argument is too large or too small. The cursor will appear near the illegal number.

Output error—This error is displayed when a hardware error occurs during printing. If output is to the printer, the error could result from the printer being out of paper or not turned on.

Syntax error—This error occurs if RUN Script 64 isn't able to recognize a dot command. The cursor will be near the offending command.

Margin error—This error results when the margins have been set to illegal values. Check the dot commands preceding the cursor position.

Text Area Full—This message lets you know that the text area is full. At this point, you must save your text and erase what is on the screen to continue.

Device Not Present—This is caused when the device referenced in input/output operation did not respond. Check to see if the correct device number was used and make sure the device is turned on.

File Not Found—This signifies that an attempt was made to load a file that was not found on the load device.

String Not Found—A match was not found when searching for the search string.

Save error—This means that a status error occurred while the program was attempting to save the manuscript.

Load error—This means that a status error occurred while the program was attempting to load a text file.

The Boot Program

A boot program is one that loads other programs. In RUN Script 64's case, a boot program (Listing 1) is required because the machine language program (Listing 2) must be loaded, as well as a character-set program (Listing 3); thus, two programs must be loaded by the boot program. You have the option of using alternate character sets.

If the boot program is loaded from disk, all the necessary files must be on the same disk with the boot program; the programs can be saved on disk in any order.

Step one: First of all, type in the boot program as listed.

Line 100 sets the device number from which all programs will be loaded. Now save the boot program.

Step two: Next, you will type in the RUN Script machine language program. You must use the ML Perfect Typist to enter this hexadecimal listing! You will find this checksum program, with instructions for use, on p. 97 of this issue.

After you've typed in all of Listing 2, save it as a completed file under the name of RUNSCRIPT. Save one copy of the machine language program on the same disk on which the boot program is stored.

Step three: Finally, type in the character-set program (Listing 3) and run it. It will automatically make a copy on disk of the C-64 upper- and lowercase character set.

RUN Script is set up to expect a Commodore printer connected to the serial bus. A non-Commodore printer with a printer interface that emulates a Commodore printer will also work. However, you cannot use an RS-232 printer with it. If you have an RS-232 printer, you

can output text to disk and later use a Basic program to print it.

If you don't have a Commodore-compatible printer or interface, you can still use RUN Script by putting your printer interface into Lock mode and using the RUN Script f1-t function to output true ASCII.

Next month, I will explain how to customize RUN Script so you can take full advantage of your printer's features. R

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

Listing 1. *RUN Script 64's Boot program.*

```
Ø REM BOOT PROGRAM FOR RUNSCRIPT WORDPROCE
   SSOR, MACRO TABLE, & CHARACTER SETS
                                    :REM*34
5Ø REM IF LOADING MACRO SET, DEFINE MAC$ WI
   TH NAME OF MACRO SET TO LOAD     :REM*24Ø
6Ø MAC$=""                          :REM*2Ø
8Ø CHAR$="C64 CHAR SET" : REM DEFINE CHAR$
   WITH NAME OF CHARACTER SET TO LOAD
                                    :REM*16
1ØØ DEV=8 : REM SET DEV=8 FOR DISK LOAD IF
    8 IS CORRECT DEVICE NUMBER      :REM*17Ø
14Ø GOSUB 64Ø: REM POKE MACHINE LANGUAGE RO
    UTINE TO CASSETTE BUFFER        :REM*4Ø
18Ø A=78Ø:X=781:Y=782: REM REGISTER SAVES F
    OR SYS                          :REM*96
21Ø FOR LOOP=65Ø24 TO 65535         :REM*232
22Ø POKE LOOP,Ø : REM CLEAR MEMORY USED FOR
     MACRO TABLE                    :REM*2Ø8
23Ø NEXT LOOP                       :REM*68
26Ø PROG$="RUNSCRIPT" : ADR=4681 : GOSUB 38
    Ø: REM LOAD RUNSCRIPT OBJECT CODE
                                    :REM*81
28Ø PROG$=MAC$                      :REM*45
29Ø IF MAC$<>"" THEN ADR=65Ø24 : GOSUB 38Ø:
     REM LOAD MACRO TABLE           :REM*47
31Ø PROG$=CHAR$ : GOSUB 47Ø: REM SETUP NAME
    , LOGICAL FILE FOR CHAR SET LOAD:REM*91
32Ø SYS 9ØØ: REM LOAD CHAR SET THEN JUMP TO
     RUNSCRIPT                      :REM*245
35Ø END                             :REM*97
38Ø GOSUB 47Ø: REM SETUP NAME & LOGICAL FIL
    E                               :REM*197
4ØØ POKE A,Ø: POKE X,(ADR/256-INT(ADR/256))
    *256 : POKE Y,ADR/256           :REM*91
41Ø SYS 65493: REM LOAD             :REM*43
43Ø RETURN                          :REM*233
47Ø REM USE THE KERNAL SETLFS       :REM*173
48Ø POKE A,Ø: POKE X,DEV : POKE Y,Ø :REM*35
49Ø SYS 65466                       :REM*155
51Ø REM SETUP FILENAME              :REM*1Ø5
52Ø FOR LOOP=1 TO LEN(PROG$)        :REM*2Ø2
53Ø POKE 849+LOOP,ASC(MID$(PROG$,LOOP,1))
                                    :REM*12
54Ø NEXT LOOP                       :REM*124
56Ø REM USE KERNAL SETNAM           :REM*186
57Ø POKE A,LEN(PROG$): POKE X,85ØAND255 : P
    OKE Y,85Ø/256                   :REM*248
58Ø SYS 65469                       :REM*118
6ØØ RETURN                          :REM*148
64Ø FOR LOOP=9ØØ TO 91Ø             :REM*124
65Ø READ BYTE: POKE LOOP,BYTE       :REM*218
66Ø NEXT LOOP                       :REM*244
68Ø RETURN                          :REM*228
71Ø DATA 169,Ø,17Ø,16Ø,8,32,213,255,76,99,2
    6                               :REM*2Ø6
```

Continued on p. 90.

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A Gallery of Commodore Characters

By LOUIS F. SANDER

Your Commodore computer is capable of exhibiting a variety of characters—both text and graphics. This article is your ticket to view and to learn how to access these character sets. Much of this C-64 information applies as well to the C-128.

If you own a Commodore computer, you've no doubt explored the exciting assortment of characters available on your keyboard.

This article describes this character set in specific detail and illustrates its relationship to the standard ASCII character set used by many other manufacturers. This information is useful to any Commodore owner wanting to know more about his or her machine, and has special value to those interested in communicating with non-Commodore printers and modems.

Where the C-128's 80-column character set is concerned, our descriptions only partially apply. The 80-column character set is somewhat different from its 40-column brothers, and the characters are handled in significantly different ways. Nevertheless, there is enough similarity in the 80- and 40-column modes that much of what's said here will apply to both of them. All of it, of course, will apply to the C-128 in 40-column mode.

Definitions

Many computer devices can display a group of symbols, or *characters*, on a printout or on a screen. The symbols, so displayed, are called printing characters: letters, numbers, punctuation marks, special graphics characters, and so on.

Each character is represented by a pattern of bits, which can be stored, manipulated and transmitted electrically. It's common to represent these bit patterns in binary notation, because they can then be expressed as numbers. The numbers corresponding to these bit patterns are called *character codes*.

Since character codes are numbers, we can express them in binary, hex or decimal form. For example, the code for a printed asterisk (*) is 00101010 binary, or 42 decimal. We use that form of the code when referring to the asterisk as CHR$(42). The same number could also be expressed in hexadecimal form as $2A. (The "$" is not part of the number itself; it indicates that the symbols to follow are hexadecimal digits.) Eight bits allow 256 different combinations, which can be represented as decimal numbers from 0–255 inclusive, or as hex numbers from $00–$FF.

A given code can represent different characters in different machines, or even within one machine, depending on context. In Commodore computers, for example, different codes are used to put a character on the screen by printing and by Poking. Also, it's not unusual for other manufacturers to use different character codes than the ones that were chosen by Commodore.

Some character codes do not represent a printed character at all. Instead, they instruct the hardware to take a certain non-printing action. These are called *control codes*, or *control characters*. Return, cursor up and RVS ON are some familiar control actions.

If you've ever cleared your screen by executing the statement

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

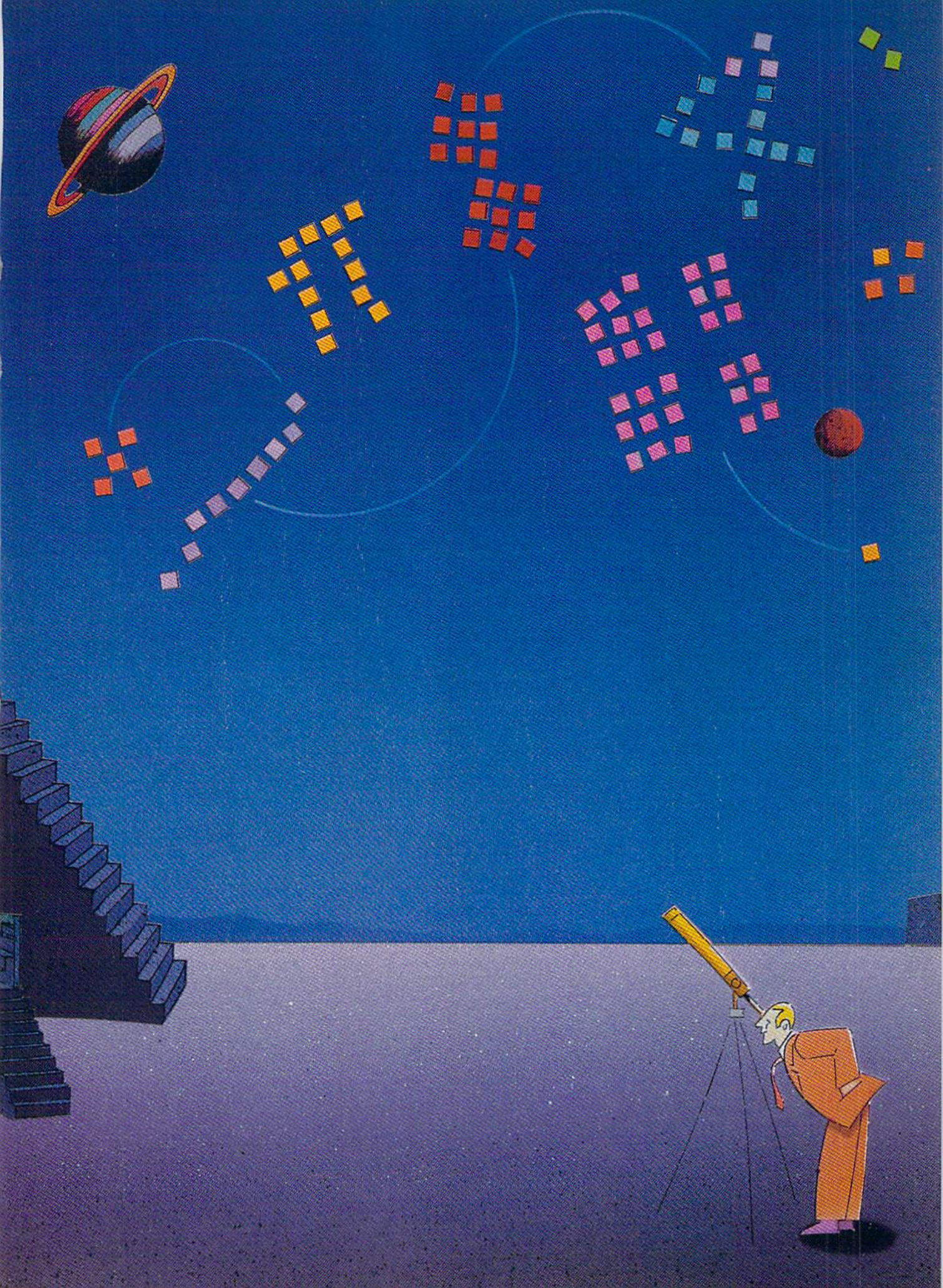
you have used a control code (147) to generate a control action (clearing the screen).

A device's *character set* is its complete set of printing and control characters, along with their associated codes. Many computer devices use a standard

RUN It Right

C-64; C-128 (in C-128 mode); Plus/4; C-16; VIC-20

Illustration by Phil Geraci



character set known as ASCII (pronounced "askey"), which stands for American Standard Code for Information Interchange.

ASCII and the Commodore character sets have much in common, but there are important differences between them that must be resolved when your Commodore communicates with an ASCII device. The information in this article will let you resolve these differences in your own programs.

Printer Characters

The character set demo programs (Listings 1, 2 and 3) will let you see the complete set of symbols that the computer can display on its screen. Type in the version for your machine and run it. Be patient, and, after a few seconds, you'll see 256 evenly spaced characters on the screen. (If you don't, go back and check your program against the listing.)

Press the shift and Commodore keys simultaneously and notice that some of the displayed characters will change. When you press these two keys, the computer makes some internal changes that cause a different group of characters to be displayed.

This is evidence of the fact that Commodore computers have two sets of printing characters. A given code will produce characters from one set or the other, depending on the internal state of the computer.

One of the character sets includes both upper- and lowercase alphabetic characters, which we'll call the text character set. The other character set has uppercase and graphics symbols, which we'll call the graphics character set.

You'll notice that there are 256 different characters. The first 128 are repeated in reverse field. (There appear to be two space characters, but there aren't—the second one is a shifted space, which your computer treats as a separate character.)

This is the complete set of printing characters from the currently activated set. In other words, you are looking at every character your computer can display at this moment.

Now press the shift and Commodore keys simultaneously and study the characters in the other set. Again, there are 256 symbols—128 regular and 128 in reverse field. Switch character sets several times and notice which characters change.

If you count them, you'll find that 112 characters change—56 regular and 56 reverse field. Note which ones they are, and note that certain combinations of characters (for example, the heart and lowercase s) can never be on screen at the same time. (The C-128's 80-column character set does not have this limitation.) Also observe that each character set includes uppercase alphabetic characters, although they appear in different places in the two sets.

You've now seen every character that your computer can display from its built-in character sets. Altogether, there are 316 different characters, 256 of which are available at any one time. By designing custom character sets (not covered here), advanced programmers can substitute whatever they want for some or all of the standard characters.

Character Codes

You can display a character on the screen in one of three ways: by pressing a key, by executing a Print statement or by Poking a number into a screen memory location. Characters can also be sent to, or received from, devices connected to the computer's user port, serial I/O port or cassette port. In every case, you are using character codes to specify which character is to be displayed, transmitted or recorded.

The demonstration program you typed in Poked characters to the screen, using the 256 character codes, from 0 to 255 inclusive, which produced 256 different printed symbols. Poking a 1 produces the letter A, 2 produces B, and so on. This particular set of codes and characters is valid *only* for screen Poking: We'll call it the Screen-Poke character set. See p. 376 of the *Commodore 64 Programmer's Reference Guide* for a list of screen codes. What this article refers to as graphics and text character sets, the list in the reference guide calls set 1 and set 2.

All other character manipulation uses a completely different group of codes to print these same characters. We'll call these code/character pairs the Commodore ASCII character set, or CASCII for short. The term is somewhat misleading—the Commodore character set has twice as many codes as "real" ASCII, and only about half of the 128 ASCII codes have the same meaning in the ASCII and CASCII character sets! However, the words "Commodore ASCII" are in such widespread use that it's futile to try to change them.

The CASCII graphics character set is shown on p. 379 of the programmer's reference guide. (The text character set exists, of course, but is not shown in the table.) All of the printing characters and control actions in the CASCII set can be activated directly from the keyboard or by using the CHR$ function. All keyboard and print operations use the CASCII character set, which is also used whenever characters are sent to or received from external devices such as printers, files and modems.

If you tell your computer to send an asterisk to your printer, it will actually send 00101010, or 42 in decimal notation. The printer will print whichever one of its characters corresponds to code 42 decimal. And whenever your computer receives a 42, whatever that code may have meant in the sending device's character set, your machine interprets it as an asterisk.

There are 256 Commodore ASCII codes, numbered from 0 to 255 inclusive, and the CASCII character set differs substantially from the Poke set, although both can be used to display the same symbols. Here are the essential differences:

- Very few characters have the same Poke and CHR$ codes.
- In many cases, one printed character has two different CHR$ codes.
- There are no CHR$ codes for reverse-field characters. Instead, the RVS ON and RVS OFF keys, or their corresponding CASCII codes, are used to produce them.
- The CASCII set has room for 64 control characters (many unused), in addition to its printing characters.

The control codes from 0–31 and 128–159 are particularly important. Referring to the CASCII character set in the programmer's reference guide, you'll see that most of the nonprinting keys on your computer are represented by control codes. The only exceptions are the shift, restore, CTRL and Commodore logo keys on all machines, plus the ALT, caps lock, help, 40/80 diplay and no-scroll keys on the C-128. There are several control actions with no corresponding keys, and the remaining control codes are undefined.

Control Codes

On the C-64 and VIC-20, Print CHR$(8) disables the ability of the shift and Commodore keys to change character sets. To restore the toggling power to these keys, enter Print CHR$(9). On the C-128, CHR$(12) and CHR$(11) will initiate these two actions.

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Print CHR$(14) and Print CHR$(142) let you toggle the character sets under program control, thus demonstrating the text and graphics control actions.

Eight of the control codes represent colors that are available on all machines except the VIC: orange, brown, light red, dark gray, medium gray, light green, light blue and light gray. They may or may not be marked on your keyboard, but they are available by simultaneously pressing the Commodore key and a number key from 1–8. (For the grays, I have used the terms dark, medium and light, rather than the less descriptive terms 1, 2 and 3, which may appear in your manual.)

You can produce every code and action from 1–31 by simultaneously pressing CTRL and another key or other keys or combinations. CTRL-A creates character code 1, CTRL-B creates code 2, and so on through CTRL-Z, which creates code 26. Code 27 is produced by CTRL-:, and codes 28–31 are created by pressing the keys for Red, CRSR RT, Green and Blue, respectively. Did you know that CTRL T does the same thing as the delete key? Try it.

The ability to generate control codes from the keyboard is especially important when communicating with non-Commodore printers and modems. These devices often use codes from 1–31, and instruction manuals often refer to these codes as CTRL C, CTRL H and the like. Now you know how to send them from your Commodore.

You can generate most of the codes from 128–159 from the keyboard, although the CTRL key does not often come into play. Pressing the Commodore (or CTRL) key and a number key will generate the codes for the colors, while most others require a shifted non-printing key.

All but one of the control actions can be initiated by placing CTRL and a letter within quotes in a Print statement. The code will appear on screen as a reverse-field character; when it's printed, the appropriate action will be produced. Most people have seen this with cursor-control characters and the like, but few seem to know how extensive the capability really is.

Want to go to Text mode? Put CTRL N inside quotes and see what you get when you print it. It works! The exception to the rule is CTRL M, which isn't easily placed within quotes unless you're skillful with Quote mode and the RVS keys.

ASCII

The standard ASCII character set is usually supplied with the documentation accompanying your non-Commodore printer or modem. If you study the ASCII and CASCII tables carefully, you'll see that CASCII has all but seven of the ASCII printed characters (94–96 and 123–126), but often with different character codes.

You'll notice that ASCII, being a seven-bit code, has no character codes above 127 and lacks many of the Commodore printing characters. Also, the definitions of the ASCII control codes, established with commercial message traffic in mind, bear little relation to the interests of home computerists.

No wonder it's tricky to use non-Commodore devices with your machine! But with the CASCII and ASCII character sets, you can write programs for perfect conversions between ASCII and Commodore character codes. If you have a printer interface such as a Cardco, you can understand the code conversions it is making for you. The CASCII table shows what code your machine sends when a given character is transmitted, and the ASCII table will show how an ASCII device will interpret that code.

Conversely, the ASCII table shows the intended character representation of every ASCII code your machine receives from outside, while the CASCII table shows the code to which it must be converted to have the same representation inside your Commodore machine.

Conversion Examples

Suppose that your Commodore 64, with the text character set enabled, is connected to an ASCII terminal and that you are sending messages back and forth. The ASCII terminal sends the lowercase letter "a." An ASCII table would show that the code actually transmitted is 97 decimal, or 01100001. When your machine receives that code and prints it onto the screen, the CASCII table shows that it will be displayed as an uppercase A!

So you need some software in your computer that converts received ASCII input to Commodore format before displaying it. In this case, whenever your C-64 receives a 97, the

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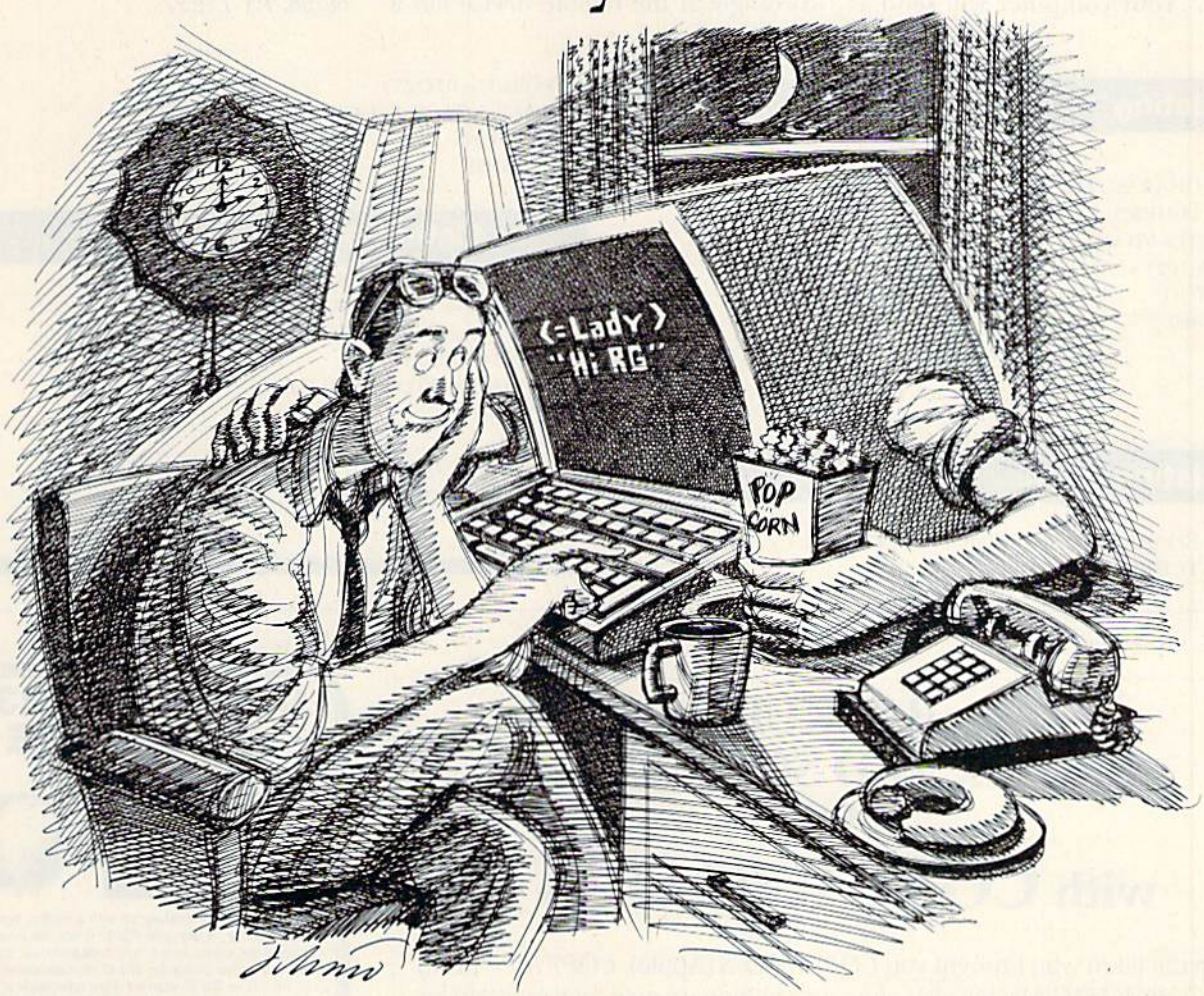
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program should convert it to a 65 before printing it. Of course, the program should also be smart enough to convert (or not convert) any of the other ASCII codes between 0 and 127 so that they give the proper display on your Commodore 64.

Going the other way, suppose that you press the unshifted "b" key on your machine and want the distant ASCII machine to see it as a lowercase "b." Your computer will send a 66, which the ASCII terminal will interpret as an uppercase "B," which is not what you want. So your program has to convert the 66 to a 98 before transmitting it, and to make conversions on any other transmitted characters where it's appropriate.

If you study the ASCII and CASCII codes, you'll be able to determine every sending and receiving conversion and to write your program accordingly. If the remote device has a character set different from standard ASCII, which many of them do, just compare it to your CASCII table, and you'll be able to program the conversions. Most of the special functions on non-Commodore printers use unique control codes, so your biggest challenge will lie in that area. R

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

Listing 1. *Character set demo for the C-64 and C-128.*

```
10 REM CHARACTER SET DEMO, C-64 & C-128
20 PRINTCHR$(5);CHR$(147)
30 FORCH=0TO255
40 POKE(1024+2*CH+40*INT(CH/20)),CH
50 NEXTCH
60 GOTO60
```

Listing 2. *Character set demo for the Plus/4 and C-16.*

```
10 REM CHARACTER SET DEMO, PLUS4 & C-16
20 PRINTCHR$(31);CHR$(147)
30 FORCH=0TO255
40 POKE(3072+2*CH+40*INT(CH/20)),CH
50 NEXTCH
60 GOTO60
```

Listing 3. *Character set demo for the VIC-20.*

```
10 REM CHAR SET DEMO
20 REM VIC-20 VERSION
30 PRINTCHR$(147)
40 FORJ=38400TO38905
50 POKEJ,6
60 NEXT
70 FORCH=0TO255
80 POKE7790+CH,CH
90 NEXTCH
```

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Create Your Own Keypad

By JAMES E. BORDEN

Numeric data entry was never so fast and easy. This program provides you with a numeric keypad, which you can use with 64 Perfect Typist to make typing RUN*'s listings as easy as one, two, three.*

RUN's checksum program for the C-64, 64 Perfect Typist, was first published in *RUN*'s September 1985 issue. The checksum ensures accurate entry of *RUN*'s listings. This month, to complement 64 Perfect Typist, you have the Numeric Keypad program (Listing 1), which allows fast entry of numeric data. You may use this keypad with or without the Perfect Typist.

To append the Numeric Keypad program to 64 Perfect Typist, first load 64 Perfect Typist and, *before* running it, list line 101 and delete the ":NEW" from the end of that line.

After doing this, run 64 Perfect Typist. After seeing the usual start-up screen, type in the Numeric Keypad program (do *not* type NEW).

Once you've typed it in, save it, then turn the computer off and back on. Load and run the program you just entered. This will set up both 64 Perfect Typist and the Numeric Keypad program.

If you do not use 64 Perfect Typist, you can type in the Numeric Keypad program alone; it does not need 64 Perfect Typist in order to run.

Using the Numeric Keypad

When you run the Numeric Keypad program, the start-up screen will be displayed with a SYS address, which is used to wedge the keypad in place. Write down the Keypad address in case you need it.

To toggle the Keypad on, hold down the CTRL key and press the Commodore key (repeat this procedure when you wish to return to the normal keyboard). You should hear a click, and the cursor will blink about twice as fast as normally, signifying that you are in the Keypad mode. Press the M key, which is now used for 0—you'll hear a click, and a 0 will appear on the screen. (Toggling the keypad off and on will reset the volume for sound to zero.) Try pressing various keys—you'll find that only the keypad keys (see Photo 1) click. To return to the normal keyboard, press the CTRL and Commodore keys again (the cursor will resume its normal speed).

The keypad keys will be easier to find and remember if they're marked with small stick-on numbers (available at art supply stores), as shown in Photo 1. You could also print out small labels and cover them with clear glue to prevent the ink from being rubbed off.

Pressing the run/stop with the restore key will kill the Keypad wedge, and you'll have to use the SYS displayed on the start-up screen to wedge the Keypad back in. (Run/stop and restore will *not* affect 64 Perfect Typist.)

Bonus for 64 Perfect Typist Users

As previously mentioned, the Numeric Keypad is intended mainly for entering data. To help you do this, a very simple auto-numbering routine is provided for Data statements.

First, you must Poke the line number increment into memory location 2. For example, if you want the line numbers of your Data statements to increase by 5, use

```
POKE 2,5 {RETURN}
```

The default value is 10. The last line

RUN It Right

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



Photo 1. Keys that make up the Numeric Keypad.

number entered into the Basic interpreter is considered to be the old line number (this location is also used for Poke and other commands).

The increment is added to that value and the new line number, followed by the Data statement, is printed on the screen. For this reason, *always* check to see if the correct line number is printed on the screen before you enter the line. (You could accidentally press the return key twice, thus skipping a line number.) As long as you enter the lines one after the other, you shouldn't have any problems.

To use auto-data numbering, type in all lines up to the first group of Data statements. Next, enter

```
POKE 2,#
```

(where # is the increment you want) and press the return key.

The routine will only print a line number if the cursor is in the first column. Type in the first Data statement as usual. This will set up the proper line number. After pressing the return key and making sure that the checksum is correct, press the CTRL and shift keys. You'll see the next line number, followed by the word "Data" and a space. You can then type in the data for that line and hit the return key. If the checksum is correct, just press CTRL with the shift key again, for the next line number. Continue this process until the group of Data statements has been entered.

The Numeric Keypad and the auto-data line numbering should make typing *RUN* listings even easier. R

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

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Listing 1. *Numeric Keypad program.*

```
5ØØ POKE828,PEEK(65):POKE829,PEEK(66)
                                    :REM*115
51Ø POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
                                     :REM*43
52Ø IFPEEK(644)-PEEK(56)<2GOTO51Ø  :REM*116
53Ø POKE65,PEEK(828):POKE66,PEEK(829)
                                    :REM*114
54Ø PG=PEEK(56):ML=PG*256             :REM*4
55Ø FORX=MLTOML+152:READZ:POKEX,Z:NEXT
                                    :REM*254
56Ø FORX=ML+247TOML+312:READZ:POKEX,Z:NEXT
                                     :REM*14
57Ø FORX=1TO16:READZ:POKEML+Z,PG:NEXT
                                    :REM*174
58Ø POKEML+13,PG+1:POKEML+286,PG+1  :REM*16
59Ø PRINT" ";:FORX=1TO38:PRINT"*";:NEXT:PRI
    NT                              :REM*72
6ØØ PRINT" **{2 SPACEs}C-64 KEYPAD NOW READ
    Y FOR USE{3 SPACEs}**"          :REM*172
61Ø PRINT" **{2 SPACEs}USE SYS"ML+115"TO RE
    START WEDGE{2 SPACEs}**"        :REM*194
62Ø PRINT" ";:FORX=1TO38:PRINT"*";:NEXT:PRI
    NT                              :REM*1Ø2
63Ø SYSML+115:POKE2,1Ø:NEW          :REM*168
64Ø DATA173,141,2,2Ø1,6,24Ø,14,2Ø1  :REM*2Ø6
65Ø DATA5,2Ø8,3,76,,193,169,Ø       :REM*136
66Ø DATA141,1Ø3,192,24Ø,27,173,1Ø3,192
                                    :REM*1Ø6
67Ø DATA2Ø8,76,238,1Ø3,192,173,1Ø4,192
                                    :REM*18Ø
68Ø DATA73,1,141,1Ø4,192,173,179,192
                                    :REM*228
69Ø DATA73,28,141,179,192,76,77,192 :REM*34
7ØØ DATA164,198,24Ø,5Ø,185,118,2,162
                                    :REM*172
71Ø DATA9,221,1Ø5,192,24Ø,4,2Ø2,16 :REM*15Ø
72Ø DATA248,96,173,1Ø4,192,24Ø,31,138
                                    :REM*168
73Ø DATA9,48,153,118,2,169,15,141    :REM*48
74Ø DATA24,212,169,65,141,18,212,16Ø:REM*78
75Ø DATA32,136,2Ø8,253,169,64,141,18
                                    :REM*21Ø
76Ø DATA212,169,,141,24,212,96,Ø    :REM*122
77Ø DATAØ,77,74,75,76,85,73,79      :REM*125
78Ø DATA55,56,57,162,,142,1Ø4,192    :REM*93
79Ø DATA189,49,234,2Ø1,1Ø4,24Ø,6,157
                                    :REM*111
8ØØ DATA167,192,232,2Ø8,243,173,21,3
                                    :REM*159
81Ø DATA2Ø1,234,2Ø8,12,12Ø,169,192,141
                                    :REM*223
82Ø DATA21,3,169,167,141,2Ø,3,88,96:REM*189
83Ø DATA32,,192,1Ø4,168,1Ø4,17Ø,1Ø4,64
                                     :REM*3
84Ø DATA166,211,24Ø,1,96,174,1Ø3,192
                                    :REM*117
85Ø DATA2Ø8,25Ø,238,1Ø3,192,24,165,2Ø
                                    :REM*47
86Ø DATA1Ø1,2,17Ø,165,21,1Ø5,,32    :REM*2Ø9
87Ø DATA2Ø5,189,162,,189,53,193,32   :REM*91
88Ø DATA21Ø,255,224,3,24Ø,3,232,2Ø8:REM*155
89Ø DATA243,165,198,2Ø8,7,23Ø,198,169
                                    :REM*67
9ØØ DATA32,141,119,2,96,68,65,84,65:REM*229
91Ø DATA18,23,28,31,36,39,44,47      :REM*93
92Ø DATA59,68,119,129,142,249,263,268
                                    :REM*153
93Ø DATA38,17Ø,43,17Ø,8Ø,14,81,144  :REM*179
94Ø DATA83,2ØØ,85,13,86,144,87,96   :REM*175
95Ø DATA95,13,96,144,1ØØ,14,1Ø1,144:REM*111
96Ø DATA121,191,128,158,147,158,281,221
                                    :REM*233
97Ø DATA25,66,51,4Ø,7Ø,21           :REM*121
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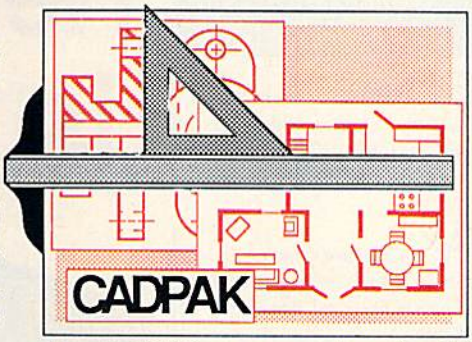
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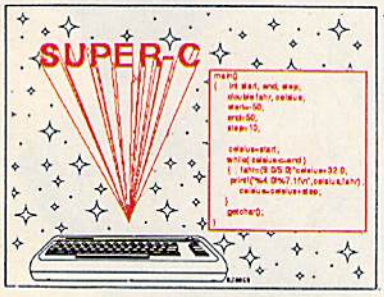
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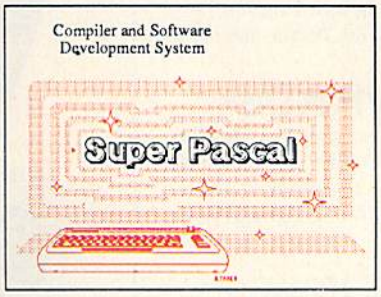
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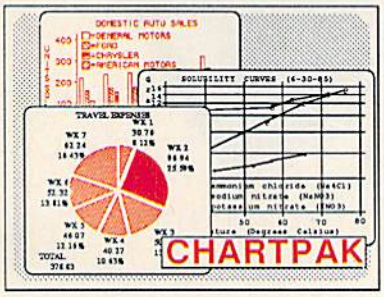
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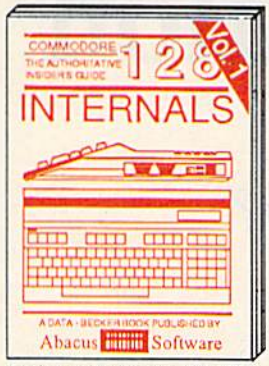
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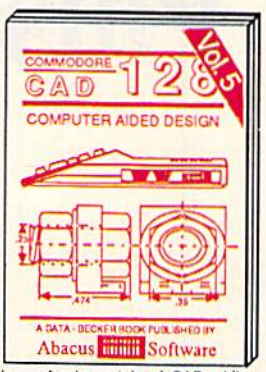
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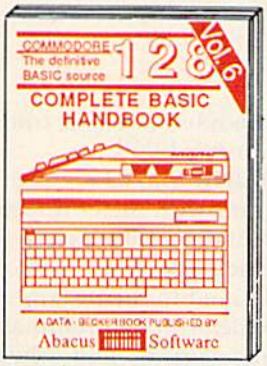
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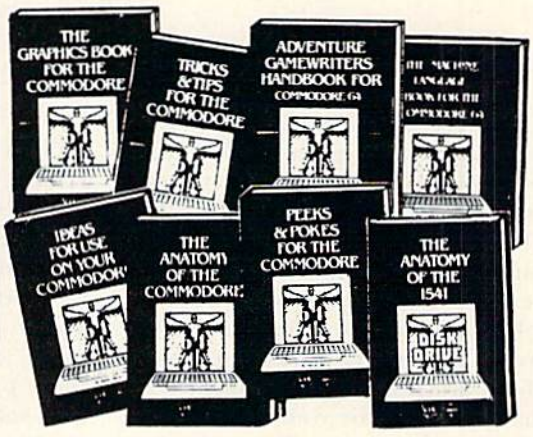
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Commodore's CP/M Plus 3.0 Documentation

Interested in learning more about your C-128's CP/M capabilities? This article will give you an idea of what kind of support Commodore offers you.

By ALEX LANE

If you're interested in expanding your CP/M horizons on the C-128, you may have considered tearing out the card from the middle of the C-128 system guide and sending it, along with $19.95, to Commodore for the CP/M documentation and utility disks. Some of you have probably already sent for the package; perhaps others are holding back, unsure of what you'll get for your money.

As an inveterate software hacker and CP/M fan, I was eager to get hold of this offering. So, with crossed fingers, I sent the card and my check. What follows is simply a brief report, not an in-depth review, on what I received from Commodore about six weeks later.

What You Get

When you unwrap the package, you'll find a thick, plastic spiral-bound book, two disks and a software license agreement. The book is a reprint of Digital Research's *CP/M Plus Version 3.0 Operating System User's Guide*, *Programmer's Guide* and *System Guide*, bound into one volume. One of the two disks contains additional CP/M utility software on one side only; the other disk has CP/M source code for the C-128 on both sides.

The additional utilities include COM files LIB, LINK, MAC, RMAC, HEXCOM, XREF and SID, as well as the TRACE and HIST utilities that are used in conjunction with SID. Virtually all of these programs are designed to aid the assembly language programmer. Veteran CP/M users will remember that some of these programs, such as RMAC and SID, sold for nearly $100 each a few years ago.

MAC and **RMAC**—Either MAC or RMAC may be used to assemble source-code files that have been written using a text editor (such as ED.COM, which is included in the CP/M Plus software that comes with the C-128).

MAC and RMAC are macro assemblers; macro is short for "macroinstruction" and refers to the generation of a number of instructions out of one. The value of using a macro is that it enables you to write concise assembly language programs, thus avoiding the size and slowness associated with high-level languages such as Pascal and Basic.

The difference between MAC and RMAC is that the latter produces object code that is relocatable. This means that you can compile individual program modules and later combine them all, using LINK.

HEXCOM, LINK and **LIB**—Compiling a program with MAC results in the creation of three files: a symbol (.SYM) file, which contains a list of the symbols defined in the program; a print (.PRT) file, which contains an annotated source listing; and a hex (.HEX) file, which represents absolute code and is used by the program HEXCOM to generate the executable .COM file.

LINK lets you combine relocatable object-code modules to produce executable .COM files. A number of options may be specified when this program is run, including the scanning of special files, called library files, which contain collections of object-code modules.

It is the LIB utility that creates and maintains these libraries. With LIB, you can create a library, display the names of the modules, display the contents in ASCII form, and delete, replace and select modules from within a library.

XREF and **SID**—XREF is a utility program that provides a cross reference for variables used in a program. This is a handy routine to have available if you follow the current

trend of assigning variable names to everything in sight.

If your programs are anything like mine, you are bound to encounter a bug or two. SID (Symbolic Instruction Debugger) is a program that lets you monitor and test programs written in 8080 assembly language.

The file HIST.UTL is a special program that is used with SID to create a histogram that essentially shows where the CPU is located in memory during execution. Another special program, TRACE.UTL, lets you backtrack the progress of a program from some current address.

Source files—The second disk to arrive with the documentation is loaded with CP/M assembly language source code. The files on side 1 of the disk can be used to generate a CP/M + .SYS to use on the C-128. Side 2 of the disk contains the source files for the C-128 BIOS (which is, apparently, ROM-based). I am still browsing through these listings, and don't know much more about them at present.

Documentation

Commodore's documentation is for generic CP/M Plus, which is to say there is nothing in the book specifically written about the C-128.

The *CP/M Plus Version 3.0 System User's Guide* begins with a brief introduction and, with examples, proceeds through the identification of files and disk drives to the directions for output to printers and the console. After a section on command concepts, the manual concentrates on a detailed exposition of the built-in and transient commands.

A separate section is devoted to ED.COM, the CP/M line editor. Appendices include a list of CP/M 3.0 error messages and a glossary. A 64-page CP/M Plus Operating System Command Summary and a 24-page SID Command Summary are also bound into the volume.

The *Programmer's Guide* describes the CP/M Plus 3.0 programming environment and is intended for experienced programmers. The first section introduces the CP/M operating system components and describes their operation. The second section describes how an applications program can use the BDOS (Basic disk operating system) to perform serial input/output and disk file management. This is followed by sections that provide detailed descriptions of all the operating system functions, as well as programming examples.

The *System Guide* describes the steps involved in creating and modifying a CP/M Plus 3.0 BIOS (Basic input/output system) for a specific piece of hardware. This section of the book would most likely appeal to readers who really like to get down to basics.

Is It Worth It?

As you may have already concluded from the above descriptions, the material in this package is aimed at CP/M users who intend to get involved with assembly language programming, from lofty applications to down-in-the-dirt systems programs. Certainly, if you intend never to delve into CP/M assembly language, you might be better off spending the $20 this package would cost you on a couple of boxes of disks. If you would like to learn more about CP/M Plus 3.0, however, you'll find this package to be a real bargain. R

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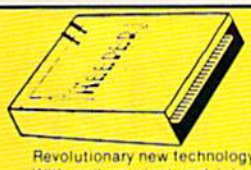
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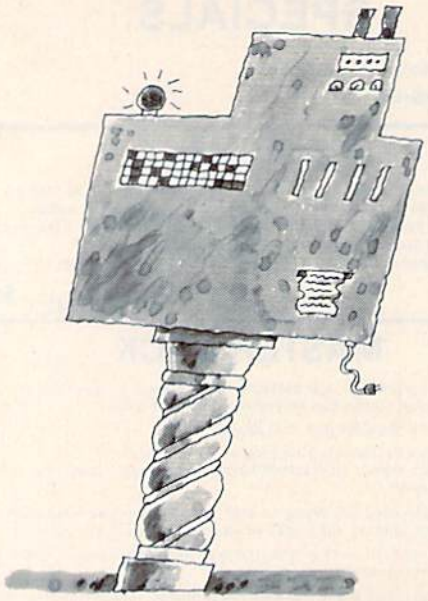
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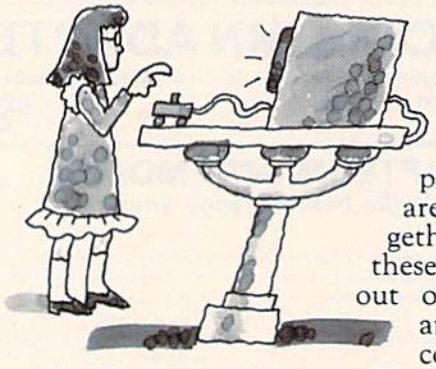
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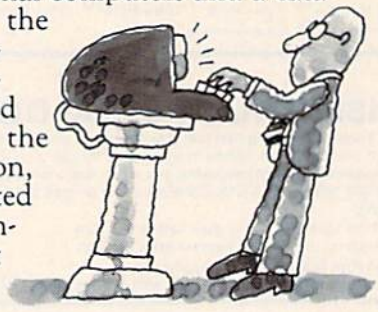


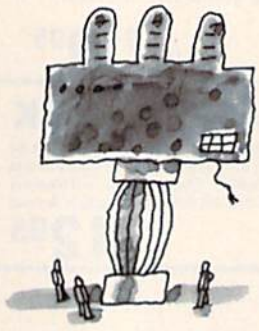
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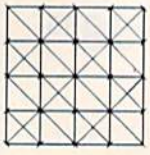




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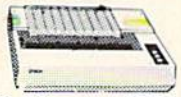
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Basically Speaking

By MICHAEL BROUSSARD

Welcome to *RUN*'s new series on Basic programming. Each month we'll examine commands and programming techniques and even divulge a few programming secrets that will help you sharpen your skills as a Basic programmer—whether you're beginning or intermediate. This series applies to Commodore Basic 2.0 and Basic 7.0, as well as all the versions in between. Before we begin in earnest next month, we'll ease into the series by providing the following quiz to measure your Basic IQ. Good luck!

So, you think you want to be a Basic programmer? Well, this month we are giving Basic programmers and would-be programmers a little quiz to let you find out how much you really know about the way Basic works.

The test is meant to be fun. Some of the questions are straightforward, and some are very tricky. The intent of this article is to exercise your brain a little and to teach you some useful things about Basic.

The questions are shown below. Some of them ask you to analyze short programs. These are two-step problems. First, you must decide whether the Basic is correct. If it is (if the program will run), you should then try to answer the question. For example, what gets printed by the following program fragment?

```
10 X = INT(2.4311) : PRINT X
```

The answer is 2. What gets printed by the next program fragment?

```
10 X$ = INT(2.4311) : PRINT X$
```

The answer is that the Basic is incorrect. If you try to run this fragment, the first assignment statement generates a Type Mismatch error, because a string cannot be defined as an arithmetic expression.

There is no time limit, but you can't use your Commodore to help you—that's cheating. Answers and scoring information appear at the end of the article. Do your best!

What gets printed by the following program lines?

1.)
```
10 B = 10 - 3 : C = 4 + 3 : A = B = C
20 PRINT A : END
```

2.)
```
10 N = . : N% = .
20 PRINT N, N% : END
```

3.)
```
10 N$ = . : PRINT N$ : END
```

4.)
```
10 FIRST = 10 : THIRD = 20 : FINAL = 30
20 N = FIRST + THIRD + FINAL
30 PRINT N : END
```

5.)
```
10 FIRST = 1 : FIFTH = 5 : TENTH = 10
20 N = TENTH - FIFTH - FIRST
30 PRINT N : END
```

6.)
```
10 X = 123 : N$ = STR$(X) : K = LEN(N$)
20 PRINT K : END
```

7.)
```
10 REMINDER$ = "GROCERY LIST" :
   STUFF$ = "EGGS, BREAD, MILK"
20 PRINT STUFF$ : END
```

8.)
```
10 X = 10 : Y = 15 : Z = 20
20 FOR K = X + Y TO Z STEP 1 : PRINT
   K : NEXT K
30 END
```

9.)
```
10 LIMIT = 20 : S = 1
20 FOR K = 1 TO LIMIT STEP S
30 PRINT K
40 LIMIT = LIMIT - 1 : S = S + 2
50 NEXT K : END
```

10.)
```
10 FOR J = 1 TO 4
20 PRINT "LOOP TEST ONE" : GOSUB 40
30 NEXT : END
40 FOR J = 4 TO 1 STEP -1
50 PRINT "LOOP TEST TWO"
60 NEXT : RETURN
```

11. Given any two numbers X and Y, can you write a Basic statement that will assign the remainder of X/Y to a variable N? For example, if X were 30 and Y were 7, the remainder would be 2, since 30 divided by 7 is 4, with a remainder of 2.

12. Look at the incomplete program below:

```
10 INPUT "PLEASE INPUT 2 NUMBERS"
   ;X,Y
20 PRINT "THE LARGER VALUE IS";
30 ?
40 END
```

Can you fill in line 30 so that the program prints the larger of the two values input when the program is run? Line 30 is the *only* line you can use—the entire program must be four lines long, and you must not change any other line.

Answers

1. The program prints −1, which is the value of A. The tricky part of the question is the assignment state-

RUN It Right

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

ment, A = B = C. Basic interprets the B = C as a logical expression. (You are probably more familiar with logical expressions used in If. . .Then statements, such as "IF B = C THEN . . ."). In Commodore Basic, the result of a logical expression is either false, represented by 0, or true, represented by −1. Since B and C are both set to 7 by line 10, B = C is true, and A is set to −1.

2. The program prints two zeroes. In Commodore Basic, the value 0 can be represented as simply a dot (".") and can be assigned (as in line 10) to either a real variable ("N") or an integer variable ("N%"). In fact, the interpreter recognizes a dot as a 0 faster than it recognizes a regular 0, so using a dot instead of a 0 will speed up your program.

3. The program doesn't print anything because it is in error. From the last question, you know that a dot represents a 0. Since N$ is a string variable, the program generates a Type Mismatch error. If you really want to assign a period to a string variable, you must enclose it in double quotation marks, like this:

```
10 N$="."
```

4. The value that gets printed is 80. If you answered "60," it's because you didn't realize that FIRST and FINAL are actually the same variable. Basic variable names can be as long as you like, but only the first two characters are significant. Since the last value set for a variable beginning with FI is 30,

```
FIRST+SECOND+FINAL
```

is equal to 30 + 20 + 30, or 80.

5. Nothing gets printed because the program is in error. Although variable names are not limited in length, they cannot contain Basic keywords. When you try to use a variable named FIFTH, Basic will display a syntax error. This variable contains the keyword IF, so Basic tries to interpret the variable name as:

```
F IF TH
```

Since an If statement doesn't make sense in such a context, you get the syntax error.

6. The program prints the number 4. Here is what happens. First, the variable X is set to 123. Then, the variable N$ is set to the string representation of X. Here is where the unexpected part comes in, because the STR$ representation of 123 is "123". When converting a number to a string, Commodore Basic always leaves an extra character place at the beginning. If the number is positive, this character position is blank. If the number is negative, however, this position is filled with a minus sign. Therefore, K is assigned the value of LEN(N$), which is 4 in this case.

7. The answer to this question is that the program prints a blank line. Line 10 begins with a variable named REMINDER$. Unfortunately, the first three characters of the variable name are REM, so Basic interprets the entire rest of the line as a remark. As a result, STUFF$ is never assigned a value, so its value in line 20 is the null string, and the Print statement simply prints a blank line.

8. The program prints the value 25 and then stops. Substituting the values of X, Y and Z into line 20 gives:

```
20 FOR K=25 TO 20 STEP 1 : PRINT K :
   NEXT K
```

If you guessed that the program doesn't print anything because the For loop is never executed, you made a very common mistake with respect to For loops. Here's how a For loop works.

First, the initial value of the control variable (K in this case) is computed. In my example, this initial value is X + Y, which is 10 + 15, or 25. Second, the limit value (Z, or 20) and the Step value (1) are stored in the stack, a special place in Basic's memory. Then all the instructions between the For and Next statements are executed.

In this case, the Print statement gets executed and the value of K (25) gets printed. When the Next statement is encountered, the control variable is changed by adding the Step value previously stored in the stack. In my example, K is incremented by 1. Only now does Basic check to see if the value of the control variable is greater than the loop limit (or less than the loop limit if the Step value is negative). If the value of the control variable is not past the loop limit, the loop is executed again. In this problem, the value of K is now 26, which is greater than the loop limit of 20, so the loop terminates.

The moral here is that a For loop will always be executed at least once, even when the control variable is initially greater than the limit value of the loop.

9. The program prints the numbers from 1 to 20. Substituting the values for LIMIT and S when the For statement is first executed, you get:

```
20 FOR K=1 TO 20 STEP 1
```

It is at this point that Basic stores the limit value (20) and the step value (1) in the stack. Line 40 changes the value of the variables LIMIT and S, but doesn't change the values Basic has already stored in its stack to control the loop.

10. The program prints

```
LOOP TEST ONE
LOOP TEST TWO
LOOP TEST TWO
LOOP TEST TWO
LOOP TEST TWO
```

and then prints the same lines again, continuously, until you press the stop key; it is caught in an infinite loop.

The problem is that both For loops use the same control variable (J). When the program issues a Gosub 40 on line 20, the loop starting on line 40 gets executed four times, with the value of J taking on the values 4, 3, 2 and 1. When J gets to 0, the loop terminates, and execution resumes at line 30. This loop (lines 10–30) adds 1 to J, but remember that the other loop finished with J = 0. Therefore, J is now 1, which is not greater than the loop limit of 4, so the program executes line 20 again, which prints "LOOP TEST ONE" and then issues another Gosub 40. Upon returning from the Gosub, J is 0 again, and the program is caught in an infinite loop—J will *never* be greater than the first loop's limit of 4.

Although subroutines (Gosubs) are very useful in programming, you should be careful not to use the same variable (J in this case) for two different functions at the same time in different sections of the program.

11. There are many correct answers to this question. The simplest one is probably:

```
N = X - INT(X/Y)*Y
```

If you didn't figure this one out, write a short program to verify that it works. If you came up with a different solution, write a short program to make sure yours works.

12. One possible solution is:

```
30 PRINT (X * -(X>=Y)) + (Y * -(X<Y))
```

(Again, there are other solutions. If you came up with something different, write a program to make sure your answer works. Try it for X > Y, X < Y, and X = Y.)

Why does the given solution work? Line 30 has two logical expressions in it:

```
(X >= Y)
(X < Y)
```

For any two values of X and Y, one of these expressions is true (−1), and the other one is false (0). (For any two values of X and Y, either X is greater than or equal to Y, or X is less than Y.) In the Print statement, each logical expression also has a negative sign in front of it. For a false expression, this reduces to −(0), or just 0; for a true expression, this reduces to −(−1), or just 1. If X is greater than or equal to Y, the first logical expression in the Print statement is true, and the second one is false. The Print statement reduces to:

```
PRINT (X * -(-1)) + (Y * -(0))
PRINT (X * 1) + (Y * 0)
PRINT X + 0
PRINT X
```

This is what we want, because X is the larger value! In the case where Y is larger, the second logical expression is true, and the first one is false. In this case, the Print statement reduces to:

```
PRINT (X * -(0)) + (Y * -(-1))
PRINT (X * 0) + (Y * 1)
PRINT 0 + Y
PRINT Y
```

and you still get the right answer. Notice that if X and Y are equal, the first case applies. This is all right, because if they are equal, it doesn't matter which one gets printed as the "largest."

Also notice that to handle this with a straightforward If statement would take two lines. The If statement can only test for one of the two general cases, and an additional line is needed to handle the other:

```
30 IF X>=Y THEN PRINT X : GOTO 40
40 PRINT Y
```

In most cases, using a two-line If statement is preferable to tricky code that is difficult to read and debug. However, there may be times when tricky coding is desirable, such as when the program is large and you are trying to conserve memory. But if memory and execution speed are not factors, do yourself a favor and write code that you'll be able to figure out if you have to debug it later.

Scoring

How well did you do? In order to gauge your performance on the test, give yourself five points for each question you answered correctly. Since there are twelve questions, the maximum possible score is 60. If you scored 51 or above, you really know Commodore Basic—congratulations! A score of 41 to 50 is very good, and a score of 31 to 40 is good. If you scored 30 or less, it only means that you need to learn more about Basic programming. If you have learned even one fact about Commodore Basic that will save you from a bug in a future programming effort, then this article has served its purpose (in addition, I hope, to being some fun).

Now, before you move on, here's one for the road.

Have you ever wondered how Data statements work? Well, try this little program and you will see.

```
10 FOR J=1 TO 9
20 READ X : PRINT CHR$(X);
30 NEXT : PRINT : END
40 DATA 72,65,86,69,32,70,85,78,33
```

R

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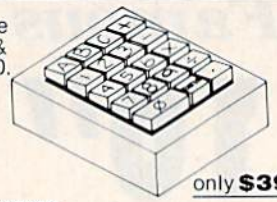
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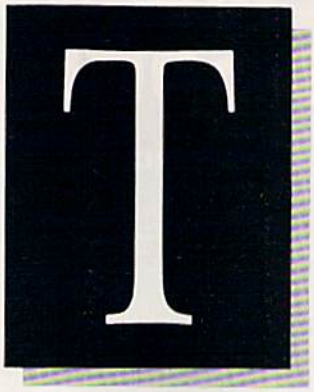
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By ROBERT SIMS

Welcome to Telecomputing Workshop, a new monthly column directed to the needs of our readers who are using, or intend to use, their Commodore computers for telecommunications. In this first installment, and throughout the coming months, you'll find advice and answers to your questions on modems, terminal programs, on-line networks, bulletin board services and more.

Which modem should I buy?

First, let's look at the differences between some popular modems, and then apply that information to your needs.

There are two general kinds of modems—acoustic and direct-connect. Acoustic modems are rarely used for personal telecommunications, so this discussion will not cover them.

Instead, we will concentrate on direct-connect modems, which, when used for personal telecommunications on Commodore computers, can be connected directly to the telephone line in one of the following ways:

—The modem has to be manually connected to the telephone line through a telephone (you unplug the cord from the handset and then plug it into the modem, as with the Commodore VIC-Modem 1600 and HESmodem).

—The modem works in conjunction with the telephone but makes its own connection to the line; the phone is plugged into the modem, which is plugged into the line (Commodore 1650, Westridge 6420, Mitey Mo, HESmodem II, Telelearning's Total Telecommunications Package and Commodore's 1660 Modem 300).

—The modem works independently of a telephone (Anchor Volksmodem, Hayes Smartmodems).

Modems also can be classified into two other groups—those that perform automatic dialing and answering (the modem dials or answers the phone for you) and those that do not. The VIC-Modem and HESmodem are examples of the latter and are called manual modems. The Westridge, Mitey Mo, HESmodem II, 1650, 1660, Telelearning, Volksmodem and Hayes modems are automatic modems.

Automatic modems can be further divided into those that work with either pulse-dial or tone-dial phone systems and those that work with only one or the other system.

Another feature of automatic modems is the capability to switch them manually between data and voice communication. These modems have a switch labeled V/D or T/D, which stands for voice (or telephone) and data. You move the switch to voice to talk and to data to use the computer. The 1650, Westridge, Telelearning, Mitey Mo and HESmodem II have this capability.

On the VIC-Modem and HESmodem, you must unplug the cord from the modem and plug it back into the handset. You cannot manually switch between voice and data on the 1660, Volksmodem or Hayes.

Modems also can be classified as to whether they are made for a specific computer or are generic (to be used with any computer). If you plan to buy another brand of computer (or the Commodore Amiga) in the near future, you may want to purchase a generic modem rather than one that will work only with your present machine.

If you do buy a generic modem, though, you will need a special cable and interface to make it compatible with your Commodore. All modems mentioned above are Commodore-specific, except the Hayes and Volksmodem. Anchor makes interface cables to connect its modem to different computers.

Finally, modems are also grouped according to their transmission speeds. (See the question below on baud rates.)

You can spend as little as $40 or as much as $4000 on a modem. Generally, you get what you pay for in terms of sophisticated features and flexibility.

If your requirements are minimal (that is, if you only want to call a friend and swap programs or word processor files), and if you want to spend the least amount possible ($40–$100), then you can get by with a VIC-Modem or HESmodem.

If you have one of these modems and spend a lot of time alternately talking on the phone and sending data back and forth with a friend, then you will quickly become tired of constantly switching the handset cord between the modem and the

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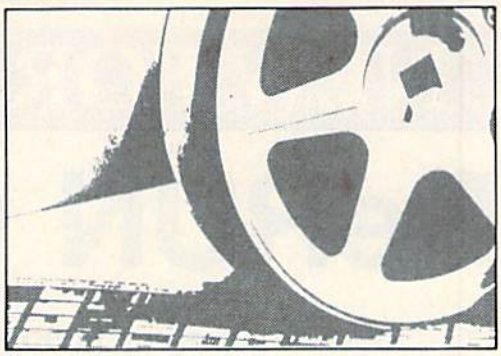
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phone. You'll find yourself wishing that you had paid a few extra dollars for a modem with the V/D switch.

If you plan to spend most of your telecommunications time calling a local electronic bulletin board, then you'll need one of the automatic modems that can dial the phone for you. Bulletin boards usually are very busy, and you will get several busy signals before you finally make a connection. Dialing the same number repeatedly by hand is boring, frustrating and hard on the fingers.

What kind of modem should I use if I'm running a BBS?

If you plan to operate a local BBS yourself, then you will have to have an automatic modem to answer any calls. Automatic modems such as the 1650, 1600, Westridge, Telelearning, Mitey Mo, HESmodem II and Volksmodem cost about $50 to $110. Hayes modems are more sophisticated and range from $300 to $1500, depending on where you buy and which model you want.

If you plan to call the national information services (CompuServe, QuantumLink, Delphi, Viewtron, etc.), then any of the above modems will do. You will hardly ever get a busy signal when calling a national service, so repeated dialing is not necessary. When dealing with these services, your terminal software is more important than the type of modem.

What is baud rate? What is the difference between 300, 1200 and 2400 baud?

The term baud rate refers to the speed at which a modem transfers data. Most modems used for home telecomputing are rated 300, 1200 or 2400 baud, meaning they transmit data at the rate of 300, 1200 or 2400 bits per second. This roughly translates to 30, 120 or 240 characters per second.

For reasons that concern only highly technical individuals, baud rate is considered an inaccurate term for describing home telecomputing; we will use the abbreviation bps (bits per second).

The higher the bps rate, the faster a given modem will transfer data. For example, to transmit 1000 characters (a full C-64 screen) to another modem-equipped computer would take about 33 seconds at 300 bps, 8 seconds at 1200 bps and 4 seconds at 2400 bps. As you could figure for yourself, the 1200 bps modem is four times as fast as the 300 bps modem, and the 2400 bps modem is twice as fast as the 1200 bps modem and eight times as fast as the 300 bps modem.

To compare the modems with human speeds, consider that the average trained typist can type about six characters per second (60 words per minute). This means it would take the average typist about 167 seconds to send 1000 characters. The 300 bps modem is five times as fast, the 1200 bps modem is 20 times as fast, and the 2400 bps modem is 40 times as fast as the average typist.

The current standard in home telecomputing is 300 bps. Chances are that your friends and local bulletin boards use modems that operate at this speed.

The national information services will accept transmissions at 300, 1200 and, sometimes, at 2400 bps, and the difference translates into money. You pay more for a faster modem, but it may be cheaper in the long run.

During the evening hours, you will pay about 10 cents a minute, or $6 per hour, to access a national service. Some services charge higher rates for faster transmission speeds. But as a rule of thumb, if you want to transmit enough data to fill 36 disk blocks, it will cost about 51 cents at 300 bps, 13 cents at 1200 bps and about 7 cents at 2400 bps.

If you spend much time on a national service, the faster modem will pay for itself by saving you on-line access charges. However, the higher speeds could give you problems. Some telephone systems have dirty lines, which means there is a lot of extraneous noise on the line. This noise can garble data at higher transmission rates.

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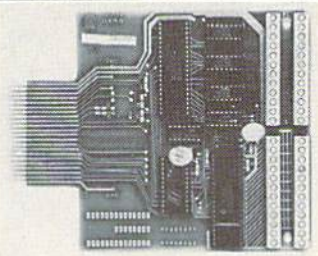
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Also, you may be wondering what to do if you need to call a local bulletin board at 300 bps and a national service at 1200 bps. The answer is a modem that will operate at both speeds. There are variable-speed modems available, but they cost much more ($300–$2000) than the popular modems for Commodore computers.

It may be cheaper to buy two modems—one 300 bps and one 1200 bps—than to purchase a variable-speed model. Also, if you stick with the more popular modems, you'll be more likely to find terminal software for them.

If I call a friend by modem, would the cost of that be the same as a regular phone call?

The answer is mostly yes; there is no difference in talking on the phone and transferring data over a modem. A couple of years ago, some local phone companies attempted to charge home modem owners higher rates for using modems on their home phones, citing some antiquated regulations about business data transmission. The problem seems to have gone away now. Anybody have an update on that?

If I buy a modem, what type of phone would I need?

Unless you have an old-style acoustic modem (you insert the phone handset into rubber cups on the modem), you will need a modular telephone; that is, one with a handset you can unplug from its cord and a telephone line you can unplug from the wall socket. Automatic modems come with a cord that connects to the wall plug.

If you have a VIC-Modem or a HES-modem, you must have a phone in which the handset is separate from the body of the phone. In other words, the dial or buttons cannot be in the handset. R

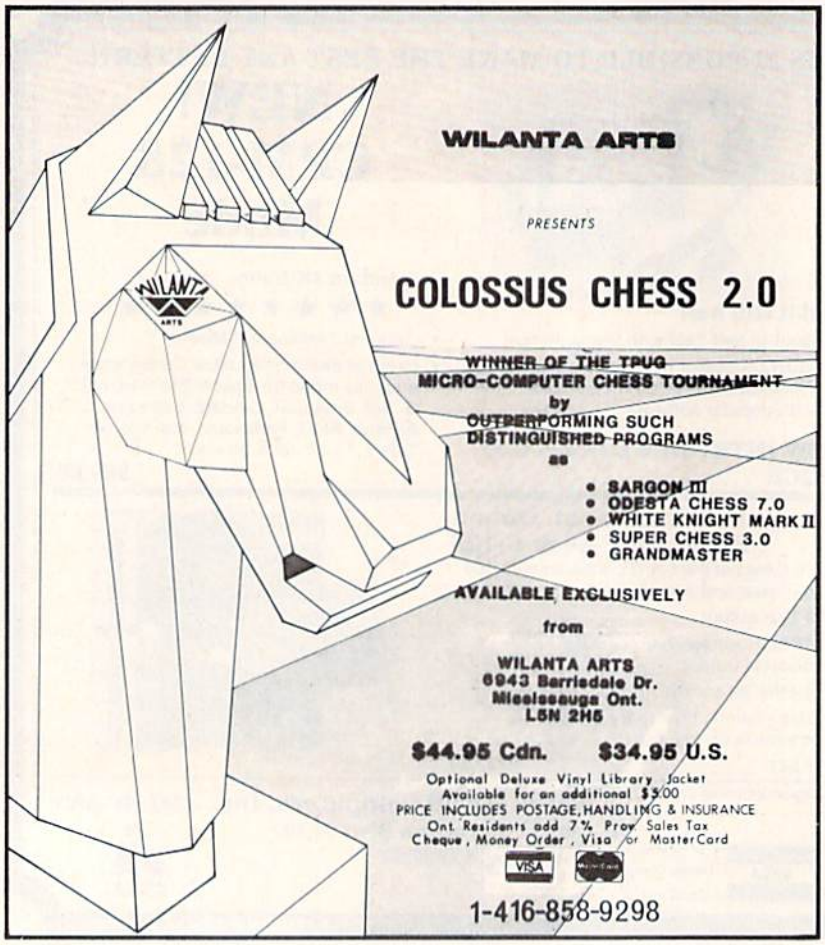
Do you have any questions about what equipment to buy or how to use it for telecommunications? Having problems getting on-line? Don't know what bulletin boards or national networks to access? Send these, or any other questions or comments you may have about telecommunications, to:

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EQUIPMENT REQUIRED: Commodore 64, TV or Monitor, 1541 Disk Drive, Printer (required for print dumps)

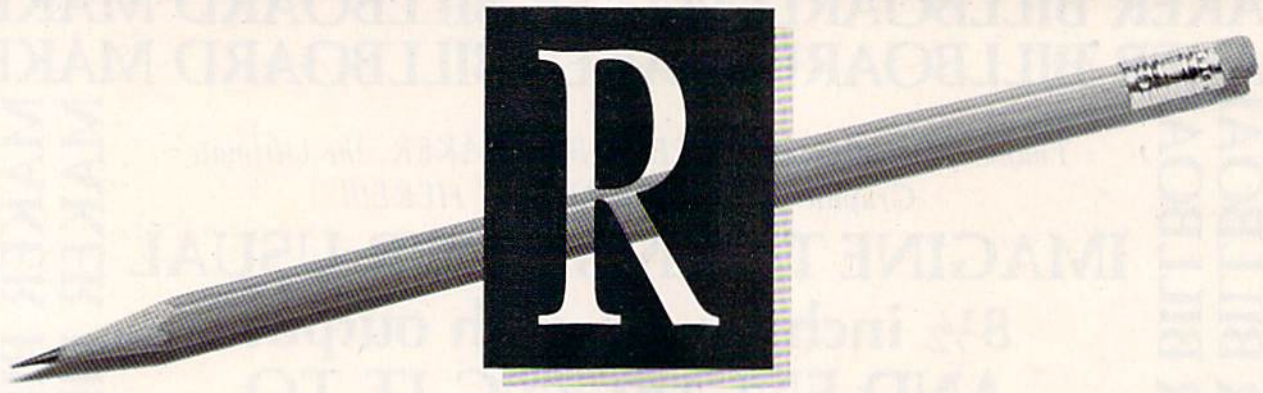
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By MARGARET MORABITO

The most commonly asked question concerning the use of computers in home and school education is, "What software should I buy?" This is often asked after the computer system has been purchased; however, it should be considered as part of the computer-buying process.

Let's assume that you have already bought your Commodore computer and are now wondering which software to buy. There are several major considerations: your hardware setup, your child's learning level, the software itself and the manufacturer.

Hardware

When you are shopping for software, it is important that you match your software selection to your complete computer system. Otherwise, you may be disappointed when the program does not work properly.

For example, you should find out exactly what kind of video monitor a software package needs in order to be completely functional. Sometimes color is required, and if you are using a black-and-white television, the program will be useless. The same applies to sound, if you have a monitor without a speaker.

Most educational software for Commodore computers is on disk. If you only have a cassette recorder, you would be wise to get a disk drive; otherwise, you will eliminate most of your possible software choices.

What about a joystick, a graphics pad or a light pen? Many educational programs take advantage of one of these input devices in conjunction with keyboard control. For optimal use and enjoyment, one of these input devices is recommended.

Before buying educational software, be a smart shopper and do your homework.

A printer is a major peripheral purchase for a computer system. If you've already bought a printer, be sure that the software you buy is compatible with your printer and interface. Often, people buy a program that provides printout capability, only to discover that it doesn't work with their particular system at home. On the other hand, if you don't have a printer and don't want to buy one, then don't buy a program that is inherently tied to printout capabilities.

The User

The second major consideration is the user. Age, developmental level, academic level, interests and needs of the user are of paramount importance to a wise educational software selection. Your child's teacher can be one of your most helpful resources when you are considering factors such as these.

The teacher already knows the yearly plan of study for your child. He or she has given your child diagnostic tests to determine what level your child is on, your child's strengths and those areas that need the most work. Of course, you can still make informed decisions without the aid of a teacher, by simply doing your own careful analysis.

All good educational software is classified according to age or grade level. This is clearly marked on the package. When you are buying educational software, your job is to match the software package to the needs of your child.

Have a clear idea of what kind of program you want and of what that program should accomplish. There is a wealth of software available for broad subject areas, such as math and vocabulary development. You need to decide what areas your child should be working on and then locate software to address those needs. Don't go looking for educational software without a clear idea of the specific content area you want.

Good educational software is clearly labeled with learning objectives—usually two to three sentences that describe the skills or abilities that the program is designed to develop. Learning objectives are important because they help you find a program that does what you want it to do. From there, it's a matter of deciding whether or not those objectives are achieved in an appropriate manner by the particular program.

Child's Readiness for Learning

In all cases, you should evaluate your child's readiness for learning a particular concept and her or his ability to master the computer skills needed to use the program successfully. Your child has to be able to control the program physically and mentally. If hand-eye coordination is required through the keyboard or a joystick, be sure that your child is ready for this activity.

Reading level is also important. Your child must be able to understand the prompts and instructions on the screen. This is particularly

important for younger students; otherwise you, as a parent and teacher, will have to oversee your student every step of the way. This can cause frustration on both sides.

Your child's interests should be considered. You have the choice of many programs that accomplish the same goal. Many of these contain characters or activities that children recognize and associate with favorite pastimes and television characters.

This positive association can break the ice and motivate your child to interact with the well-known characters. Underlying this interaction is the fact that your child is acquiring valuable computer literacy skills. Be very careful, however. There are some programs on the market that rely solely on the child's recognition of characters and are totally lacking in educational value.

Educators have found that colorful, animated educational games with a sound pedagogical aim are far more productive for the child than monotonous drill and practice programs. The key here is that the program must have a strong teaching slant, not just a lot of movement and color.

You should be aware that there are various types of educational software. These include drill and practice programs, learning games (adventure and arcade games), tutorial programs, simulations and creative programs. All of these types may address the same grade level and topic, but the manner in which they achieve their objectives differs greatly. You may want to combine various types of software to give your child variety and exposure to different learning strategies.

Software Features to Consider

Here are some questions to ask in your search for effective and enjoyable educational software.

1. Does the program provide several levels of play? If it does, the student has the chance to start on the beginning level, master that and then move on to more challenging material. This is cost-effective for the parent as well as more interesting for the child. Programs like this can be used a lot longer than those with only one level.

2. Does the program provide options for modifying the questions? In some programs, parents can type in new sets of vocabulary words as their child advances in school. This option for modifying the program gives you more control over the learning process and is less expensive than having to go out and buy new programs as your child advances.

3. Does the program allow and encourage the child to make decisions? There are programs available that have a wide range of settings, plots, characters and activities. The elements of the story line, for example, can be selected by the child. According to the choices made, the story will proceed along a different track. Also, the child can select which type of activity to work on—math problems or vocabulary games, for example.

This control gives the student a bigger stake in the experience. Not only is the child learning how to use the computer, do the problems or play the game, but she or he is also gaining valuable experience in decision-making. The consequences of a bad choice are learned, as are the rewards for a good one.

4. Does the program monitor the student's progress? Score reporting is a valuable feature to look for. Teachers need software that has class-management reporting built in. This retains the scores and progress of an entire class of students. Home users need to be able to keep track of at least one user's scores. This lets children see their progress, and it also motivates them to beat their previous scores. In all cases, score reporting should be done tactfully in the program. Points should be awarded for all efforts made.

5. Does the program provide an outlet for creative activity? Creativity is another valuable feature to look for in a program, and the best-selling programs foster creative play. The Music Shop, The Print Shop and KoalaPainter are three examples of top-selling creative programs. These encourage musical and artistic activities with tangible results in the form of computer pictures and songs. To be most effective, these programs provide options for saving your child's creations to disk and on paper.

6. Is the program difficult to manage? Students should be able to easily discern the point of the program and control their progress. In many cases, menus are the best option for program control. These can be composed of words and phrases or of graphics icons. Choices are made with either a joystick or a single key entry from the keyboard.

Manufacturers' Support

There is so much educational software available for the Commodore

Opportunities for Learning, Inc.
20417 Nordhoff St., Dept. HC
Chatsworth, CA 91311
(free)

Hammet Microcomputer Catalog
Hammet Microcomputing Division
Box 545
Braintree, MA 02184
(free)

Educational Computer Software Catalog
Learning Arts
PO Box 179
Wichita, KS 67201
(free)

MECC Educational Computing Catalog
MECC
3490 Lexington Ave. North
St. Paul, MN 55112
(free)

Sunburst Educational Computer Courseware
Room CE
39 Washington Ave.
Pleasantville, NY 10570
(free)

Family Guide to Educational Software
Garlinghouse Company, Inc.
320 SW 33rd St., PO Box 299
Topeka, KS 66601
($2.50)

Classroom Computer Learning
Peter Li, Inc.
2451 East River Road
Dayton, OH 45439
($3)

Computers in Education
Moorshead Publications Ltd.
25 Overlea Blvd., Suite 601
Toronto, Ontario, Canada
M4H 1B1
($3.25, Canadian)

Table 1. *Additional sources of information about educational software packages for Commodore computers.*

market that there is no reason for you to settle for a program that doesn't have strong support from its manufacturer. The software companies who can never be contacted for advice are starting to disappear. Nevertheless, it is still important for the buyer to check into the reputation of a manufacturer before buying.

This can be done fairly easily. Find out if the program has good-quality documentation. The more reputable manufacturers will provide comprehensive documentation that discusses the best ways to use the program with your child. The manual often includes lesson plans that the teacher or parent can follow. It will also state the manufacturer's guarantees, warranties and the customer service phone numbers.

Many educational software companies now have preview policies. These allow the purchaser to use the program for a limited period and then return it if it doesn't do what it claimed to do. Some of the better preview policies are aimed directly at schools, but home users can also find these kinds of deals.

Does the company offer to supply updates to the program at a reasonable cost? This is particularly important for school buyers who are making large acquisitions for complete curriculum programs. Furthermore, the manufacturer should offer backups of the program at a minimal cost, or, even better, provide a backup with the package.

Many companies that are writing educational software are working with accredited schools and teachers in hopes of creating truly useful software. Granted, a company's association with an educational institution is no guarantee that all the programs created will be appropriate for your purposes, but at least the manufacturer is making a serious effort to produce quality educational software. Most manufacturers clearly display their affiliations with educational institutions and textbook companies.

Where To Buy Educational Software?

You should try to see the software in action before you buy it, but, unfortunately, this is impossible in most cases. Nevertheless, there are plenty of locations for you to look for educational software, and you might be fortunate enough to come across a well-informed salesman. Following are four avenues through which you might find appropriate programs.

1. Many Commodore owners buy software in the same department store in which they bought their computers. These stores often have a large selection. Even if there is no one knowledgeable enough to test-run a program for you, you can at least look at the packaging to read the learning ob-

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BUSINESS APPLICATIONS:

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2-Works with either the MSD SD-2 or two Commodore 1541 disk drives. (Specify your disk drive model when ordering)

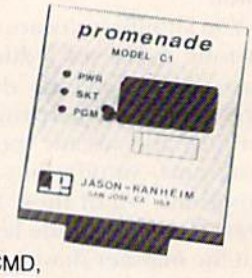
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jectives of the program and the grade level. You might even be able to look over the documentation.

Don't buy a program you can't test in the store unless you are given the option of returning it if not satisfied.

2. Ordering software through advertisements in computer magazines is another avenue. You usually get lower prices on software through mail-order, and you get a wider selection. There is no way, however, for you to see either the program or its documentation before you buy it. You should at least be given the opportunity (in writing) to return the program if it does not do what you thought it was supposed to do.

3. Another logical avenue for educational software is through dedicated computer stores. Unfortunately, most of them don't carry Commodore computers.

4. The fourth source is through educational software catalogs. There are several software manufacturers, software sales centers and educational magazines that describe, review and sell software for Commodore computers. These publications may be one of your best bets for ordering good quality educational software that has a strong guarantee and a return policy.

Even though you still have the hurdle of not actually seeing the program tested, some of these publications do provide reviews by educators who have used the software. Elsewhere in this article is a list of educational catalogs and other resources for educational software reviews.

Conclusion

The job of deciding which kind of software you need for your child or student is difficult. Teachers and software manufacturers realize this and are working together to produce higher quality educational software and to provide competent reviews of programs. Still, out of the hundreds of programs on the market, there is a large amount of unsound software that will most likely disappoint you and your child.

Your best bet is to take as a starting point the advice given in this article, and then do even more reading and research into which programs teachers and parents recommend.

If you've been particularly pleased or displeased with a certain educational program, drop me a letter detailing the name and manufacturer of the program and what you did or did not like about it. Your experiences will help others in their software selection. R

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

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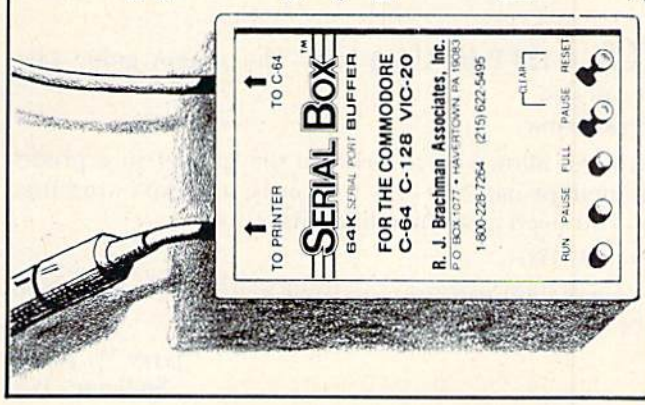
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DEALER INQUIRIES INVITED

From p. 10.

Listing continued.

```
4Ø BSAVE"UNNEW128",P285Ø TO P2923
41 DATA 16Ø,ØØ3,2ØØ,177,Ø45,2Ø1,ØØØ,2Ø8
42 DATA 249,152,1Ø5,ØØ1,16Ø,ØØØ,145,Ø45
43 DATA 165,Ø46,16Ø,ØØ1,145,Ø45,234,165
44 DATA Ø45,133,Ø65,165,Ø46,133,Ø66,16Ø
45 DATA ØØØ,162,ØØØ,177,Ø65,2Ø1,ØØØ,24Ø
46 DATA Ø1Ø,2ØØ,192,ØØØ,2Ø8,243,23Ø,Ø66
47 DATA Ø76,Ø67,Ø11,232,2ØØ,192,ØØØ,2Ø8
48 DATA ØØ2,23Ø,Ø66,224,ØØ3,2Ø8,228,2ØØ
49 DATA 14Ø,Ø16,Ø18,165,Ø66,141,Ø17,Ø18
5Ø DATA Ø96,ØØØ
```

Harv Harris
Wichita, KS

$2C4 Print Using on the C-128—The C-128's system guide doesn't give many examples of the new Print Using statement. The accompanying program illustrates many of its features and is most instructive to work with. It simulates a report for a simple checkbook program.

Enter the month's name in full (e.g., MARCH). Try different amounts, from a penny to over $10,000, entering some with decimal points and some without. Try different lengths of input in the other areas, as well. Notice how the output lines up on your screen and how it changes as your input changes.

The example demonstrates, among other things, how you can assign a variable name to a format, then use the format anywhere else in the program. It shows how text and cursor-control characters can be used in the format as well, and it shows the use of several of the Print Using format characters.

```
1Ø PRINT"{SHFT CLR}PRINT USING DEMO - HELLM
   AN{CRSR DN}"
15 F1$="{CRSR DN}{3 SPACEs}### {CRSR LF}>##
    {CRSR LF}, 1986{4 SPACEs}NUMBER: ####"
2Ø F2$="AMOUNT ####$.##{8 SPACEs}TO: ######
   #####"
25 INPUT "{2 SPACEs}MONTH";M$
3Ø INPUT "{4 SPACEs}DAY";D$
35 INPUT " CHECK#";C$
4Ø INPUT " AMOUNT";A
45 INPUT "TO WHOM";T$
5Ø PRINT USING F1$;M$,D$,C$
55 PRINT USING F2$;A,T$
6Ø PRINT:GOTO25
```

James C. Helman
K. I. Sawyer AFB, MI

$2C5 C-128 Print Using bug—The system guide says you can use

PRINT#1 USING

which will allow you to print to the printer in a predetermined format. The only trouble is, it doesn't work that way. You need a comma, like this:

PRINT#1,USING

Of course, you can use any legal logical file number in place of the 1.

Jerry W. Jarvis
Spokane, WA

$2C6 C-128 stop key trap—In the new 7.0 Basic, the Trap statement treats a stop-key press as an Error 30. If you're using Resume to continue your program after errors are encountered, the stop key will no longer function. To activate the stop key while avoiding other errors, insert this before the Resume statement:

IF ER = 30 THEN END

Jerry W. Jarvis
Spokane, WA

$2C7 C-128 lines & sounds—This one-liner gives an entertaining random display. It shows how much can be done in a single line when you have 160 characters to work with.

```
1 COLORØ,1:COLOR4,1:COLOR3,RND(Ø)*14+2:GRAP
  HIC3,1:J=RND(Ø)*5+1:N=RND(Ø)*7:DRAW3,N*45
  .7,J*33TOJ*N*7,N*28.5:P$="O"+CHR$(48+J)+C
  HR$(65+N):PLAYP$:GOTO1
```

J. C. Vollmer
Prior Lake, MN

$2C8 Plus/4 and C-16 good news—If you own one of these computers, don't be disheartened by the apparent lack of software and support. Your version of Basic has much in common with that for the C-128, so many 128 tricks and programs will be directly applicable to your machine. In other cases, C-128 material can be easily converted. You should try to acquire the *Commodore 128 Personal Computer System Guide* (which comes with the computer), so you can learn the important differences. Knowing them, you can work out the conversions. C-16 owners should also get a Plus/4 manual, because those two machines work very similarly. The Plus/4, however, has vastly superior documentation.

Also, don't forget that your Basic has its roots in the Basic for the C-64. The more you know of the C-64, the more you can convert its huge array of software. A *Commodore 64 Programmer's Reference Guide* might be a good investment for you, even though much of it will not apply.

Louis F. Sander
Pittsburgh, PA

$2C9 Ergonomic urge?—Try raising the rear of your computer about an inch off the desk. For me, this vastly improves the keyboard angle, making typing much less fatiguing. It also improves the air flow through the computer.

Bertram Schulman
Valley Stream, NY

$2CA 1526/MPS-802 print troubles—Sometimes the output from this printer contains maddening gaps where nothing is printed, or where only the bottoms of the letters show up. The problem arises when the ribbon gets pulled out of position by the printhead.

It's easily solved by increasing the tension where the ribbon emerges from its cartridge. I roll a strip of ⅜-inch-wide paper into a ⅜- × ½- × ⅛-inch pad, then place it as a brake shoe on the horn at the right side of the ribbon cartridge. I wrap it snugly with tape, and my troubles are gone for the life of the ribbon.

In case you cannot visualize it, we have a ribbon sandwich wrapped in tape. The ribbon is squeezed between the paper wad and the plastic horn of the cartridge, while the tape wraps everything up and keeps the pressure on. An alternative is to tape the paper wad to the silver head-position lever. If it's positioned just right, it applies pressure at the appropriate point.

Quinze Vingtetsix
West Chester, PA

$2CB Okimate money-saver—After extensive use, this printer begins to print illegibly, and you reach for your manual to find the order form for a new print head. If you're smart, you'll first reach for a cotton swab and some alcohol. Use them to clean the black part of the print head, and you can probably hold off on the new one.

Joe Buckshaw
Holbrook, NY

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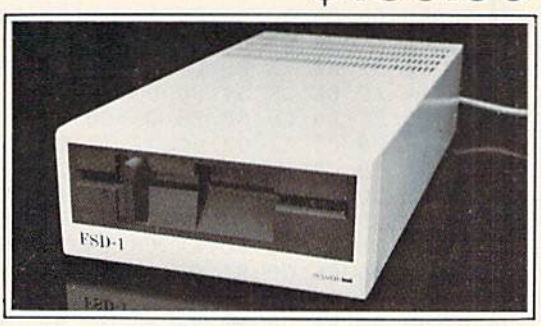
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From p. 47.

Listing 2. *Machine language RUN Script 64 program.*

```
0001 49 12 A2 18 2C A2 0F 2C A2 10 2C FD 02
0002 A2 11 2C A2 12 2C A2 13 2C A2 14 58 03
0003 2C A2 16 2C A2 17 2C A2 15 20 E1 B0 03
0004 19 95 00 E0 10 D0 0F 85 54 C9 00 23 04
0005 F0 04 C9 F1 90 19 A2 01 4C 22 17 84 04
0006 E0 12 F0 EF E0 0F F0 EB E0 11 F0 82 07
0007 E7 E0 14 F0 E3 E0 13 F0 DF 60 A9 80 07
0008 00 85 1B 85 1A A9 FF 85 1C 60 A9 99 04
0009 00 85 1A 85 1C A9 FF 85 1B 60 A9 9A 04
0010 00 85 1B 85 1C A9 FF 85 1A 60 A0 92 04
0011 00 B1 59 C9 9F F0 0A 91 30 C8 D0 D0 05
0012 F5 A2 03 4C 2A 17 94 00 98 18 65 DC 03
0013 59 85 59 90 02 E6 5A 60 A0 00 B1 C7 04
0014 59 C9 9F F0 ED C8 D0 F7 A2 03 4C 2C 07
0015 22 17 A9 35 85 30 A9 10 85 31 A2 EC 03
0016 1D 4C B4 12 A9 35 85 30 A9 11 85 11 04
0017 31 A2 1E 4C B4 12 20 E1 19 18 65 AB 03
0018 10 85 54 B0 10 60 20 E1 19 85 3F F9 03
0019 A5 10 38 E5 3F 90 03 85 54 60 A2 92 04
0020 01 4C 22 17 A9 FF 85 21 60 E6 59 87 04
0021 D0 02 E6 5A A9 80 85 2E A9 13 85 44 05
0022 2F A0 00 B1 2E F0 30 D1 59 D0 1F FD 04
0023 C8 B1 2E D1 59 D0 18 C8 B1 2E 85 FC 05
0024 67 C8 B1 2E 85 68 A9 02 18 65 59 94 04
0025 85 59 90 02 E6 5A 6C 67 00 A9 04 49 04
0026 18 65 2E 85 2E 90 02 E6 2F D0 CA B9 04
0027 A2 02 4C 22 17 20 21 13 A0 00 B1 E9 02
0028 59 C9 2E F0 F5 C9 9F D0 EC E6 59 B4 07
0029 D0 02 E6 5A 60 10 23 49 12 14 0D 3E 03
0030 4C 12 0C 0D 4F 12 02 0D 52 12 12 7B 01
0031 0D 55 12 10 0C 58 12 10 17 5B 12 AD 01
0032 08 13 5E 12 06 13 61 12 0C 13 64 BA 01
0033 12 08 04 E3 12 06 14 F0 12 03 0E 61 02
0034 93 12 0C 0A 9E 12 12 0A A9 12 0C 70 02
0035 2B FD 12 0C 2D 08 13 0C 06 1C 13 F2 01
0036 06 10 11 14 06 0C 2E 14 03 0D D3 96 01
0037 12 00 00 00 00 00 00 00 00 00 00 37 00
0038 00 00 00 00 00 00 00 00 00 00 00 26 00
0039 00 00 00 00 00 00 00 00 00 00 00 27 00
0040 00 00 00 00 00 00 00 00 00 00 00 28 00
0041 00 00 00 00 00 00 00 00 00 00 00 29 00
0042 00 00 00 00 00 00 00 20 1C 18 A4 22 01
0043 55 C4 64 F0 0A B0 0F 20 61 22 E6 EA 04
0044 55 C8 D0 F2 A5 1E F0 F4 20 18 15 FF 05
0045 4C 9C 14 A5 66 C9 04 90 03 20 CC 80 04
0046 FF A0 00 B1 59 29 0F 85 06 C8 B1 13 05
0047 59 C9 2C F0 05 A2 02 4C 22 17 C8 63 04
0048 F0 F8 B1 59 C9 9F F0 08 20 DD 24 A3 06
0049 99 E5 02 D0 EF C0 15 B0 E6 20 12 0D 06
0050 22 88 88 98 A2 E7 A0 02 20 BD FF 03 06
0051 20 7C 21 A6 07 86 AE A4 08 84 AF B0 04
0052 20 FA 1C A5 66 C9 04 90 05 A2 04 7D 04
0053 20 C9 FF A4 08 A6 07 86 59 84 5A 33 05
0054 60 0C 8F 95 94 90 95 94 A0 85 92 CA 05
0055 92 8F 92 A4 55 C4 13 B0 08 20 61 F3 04
0056 22 E6 55 C8 D0 F4 A9 00 85 55 E6 8A 06
0057 18 60 A4 15 88 30 0D A5 55 C5 64 52 04
0058 B0 07 20 61 22 E6 55 D0 F0 60 A4 93 05
0059 0F 88 30 FA 20 61 22 E6 55 D0 F6 A0 05
0060 A4 54 F0 EF A9 20 20 D2 FF 88 D0 25 07
0061 FA 60 85 6A 84 6B B5 00 85 6C A0 BB 05
0062 00 C4 6C 90 05 E6 55 4C 61 22 B1 BE 04
0063 6A C9 23 D0 06 20 10 18 4C FF 14 12 04
0064 20 12 16 C8 D0 E5 A2 1D A9 35 A0 42 05
0065 10 20 DD 14 A6 16 F0 08 20 61 22 B9 03
0066 E6 55 CA D0 F8 60 A2 1E A9 35 A0 AD 06
0067 11 4C DD 14 48 AD 8D 02 C9 06 D0 B4 04
0068 05 A2 06 4C 13 17 68 20 D2 FF B0 70 04
0069 07 A5 90 29 BF D0 01 60 A2 07 4C 8F 04
0070 13 17 A5 14 38 E5 54 E5 12 85 5D 73 04
0071 85 5E A8 C8 84 62 A5 5F 85 60 A0 09 06
0072 00 84 5F 84 61 C4 62 B0 0E B1 59 FE 04
0073 C8 C9 9F D0 08 84 5F 84 5E 88 84 22 06
0074 5D 60 29 FF 10 06 E6 62 E6 61 D0 A4 05
0075 E3 C9 20 D0 DF 84 5E 88 84 5D C8 D9 06
0076 D0 D7 20 D0 14 A0 00 A5 1B F0 1C 63 05
0077 A5 60 D0 03 20 F9 15 A5 5D D0 05 2A 05
0078 E6 55 4C 61 22 B1 59 20 12 16 C8 72 04
0079 C4 5D 90 F6 B0 EF A5 1A F0 17 20 7B 06
0080 E9 15 A5 5D F0 E4 20 DC 15 A8 C8 A5 06
0081 88 F0 E1 A9 20 20 21 15 4C B7 15 E1 04
0082 A5 1C F0 13 20 F9 15 20 E9 15 A5 07 05
0083 5D F0 C6 20 DC 15 4A A8 C8 4C B7 34 06
0084 15 60 EA EA A5 14 38 E5 54 E5 12 BE 05
0085 E5 5D 18 65 61 60 A4 5D F0 0B 88 59 05
0086 B1 59 C9 20 D0 04 C6 5D D0 F5 60 65 06
0087 A0 00 A5 5D F0 F9 B1 59 C9 20 D0 A5 06
0088 F3 E6 59 D0 02 E6 5A C6 5E C6 5D E3 06
0089 D0 EE 60 29 FF 10 03 4C 94 16 24 CC 04
0090 24 10 06 20 29 16 4C 26 16 20 DD 78 02
0091 24 4C 21 15 20 DD 24 29 FF 30 0B 85 03
0092 C9 41 90 06 C9 5B B0 02 09 20 60 5B 04
0093 C9 C1 90 FB C9 DB B0 F7 29 7F 60 C5 07
0094 85 2D 84 56 20 09 22 A9 00 85 57 BA 03
0095 A9 FE 85 58 A0 00 B1 57 F0 13 C5 53 06
0096 2D F0 21 C8 B1 57 18 65 57 85 57 1E 05
0097 90 02 E6 58 4C 55 16 A5 56 18 65 60 04
0098 59 85 5B A5 5A 69 00 85 5C A2 00 86 04
0099 4C 2A 17 A0 01 B1 57 85 3F C8 B1 D6 04
0100 57 99 35 12 C8 C4 3F 90 F6 4C 12 4A 05
0101 22 20 46 16 A5 66 C9 03 F0 31 C9 C4 04
0102 04 90 0C C9 06 B0 08 20 CC FF A2 1A 05
0103 05 20 C9 FF A0 02 C4 3F B0 09 B9 6B 05
0104 35 12 20 21 15 C8 D0 F3 A5 66 C9 64 05
0105 04 90 0C C9 06 B0 08 20 CC FF A2 1D 05
0106 04 20 C9 FF A4 56 60 11 8D 81 83 52 05
0107 92 8F A0 8E 8F 94 A0 84 85 86 89 95 06
0108 8E 85 84 10 89 8C 8C 85 87 8C A0 EC 05
0109 91 95 81 8E 94 89 94 99 0F 86 89 0A 06
0110 8E 89 93 88 85 84 A0 8F 95 94 90 91 06
0111 95 94 D1 16 45 20 52 20 AE 20 E3 07 05
0112 16 F3 16 4D 2B 8F 14 98 18 65 59 18 04
0113 85 5B A5 5A 69 00 85 5C 4C 2A 17 27 04
0114 A5 59 85 5B A5 5A 85 5C 86 3F A2 97 05
0115 FF 9A A5 3F 0A 48 20 12 22 20 CC 82 04
0116 FF A9 04 20 C3 FF A9 05 20 C3 FF 92 06
0117 A9 93 20 D2 FF 20 39 24 A5 07 85 50 05
0118 28 A5 08 85 29 20 82 2D 68 AA BD 97 04
0119 04 17 A8 BD 03 17 AA A9 00 20 20 A4 03
0120 24 A5 5B 85 28 A5 5C 85 29 A9 00 A1 04
0121 85 C6 20 50 26 20 D8 2E 20 59 21 1A 04
0122 4C 3C 2D A9 00 85 55 20 C4 14 A5 4F 04
0123 1D F0 03 20 02 15 A5 55 D0 01 60 ED 03
0124 A5 59 38 E5 09 85 3F A5 5A E5 0A 52 05
0125 05 3F 90 19 F0 17 C6 6D F0 03 4C E3 04
0126 CD 19 20 11 14 A5 09 85 5B A5 0A E6 03
0127 85 5C A2 05 4C 2A 17 20 F4 17 D0 8F 04
0128 CE 20 1C 18 A5 55 18 65 17 C5 64 59 04
0129 90 03 4C 11 14 20 26 18 20 40 15 58 02
0130 20 82 15 20 B1 14 A5 66 C9 03 D0 C5 04
0131 09 AD 8D 02 C9 02 D0 02 F0 F7 A5 F1 05
0132 5E 18 65 59 85 59 90 02 E6 5A D0 38 05
0133 97 A9 00 85 69 A5 5F D0 01 60 A0 88 05
0134 00 B1 59 C9 2E D0 08 E6 69 20 6A 38 05
0135 13 4C FD 17 A5 69 60 98 48 A6 18 06 05
0136 A9 00 20 3B 22 68 A8 60 A5 13 38 0E 04
0137 E5 11 E9 01 85 64 60 A5 14 38 E5 88 05
0138 12 E5 54 B0 05 A2 01 4C 22 17 A5 57 04
0139 13 38 E5 0F E5 11 A6 1D F0 04 E5 5C 05
0140 16 E9 01 A6 1E F0 04 E5 17 E9 01 2A 05
0141 90 E2 60 10 8F 95 94 90 95 94 A0 80 06
0142 84 85 96 89 83 85 A0 BF A0 A2 4E AD 06
0143 A0 18 A9 31 85 40 A9 5B 85 41 85 35 05
0144 39 A9 01 20 44 24 AD E8 02 29 0F CA 03
0145 85 66 C9 02 F0 E2 90 38 C9 08 B0 62 06
0146 29 C9 06 B0 D8 C9 03 D0 02 A9 04 5D 05
0147 85 65 A9 00 20 BD FF A9 04 A6 65 BA 05
0148 A4 0D 20 BA FF 20 C0 FF A9 05 A6 51 06
0149 65 A4 0E 20 BA FF 4C C0 FF 20 F7 A7 06
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0150 21 A0 02 A9 04 A6 66 D0 EF 20 F7 E8 05
0151 21 A2 90 A0 1B 20 C2 1B A0 01 D0 13 05
0152 EC 13 83 8F 8E 94 89 8E 95 8F 95 9B 06
0153 93 A0 A8 99 AF 8E A9 A0 BF A0 16 08 07
0154 8E 85 98 94 A0 8F 95 94 90 95 94 EA 06
0155 A0 A8 83 AF 90 AF 93 A9 A0 BF A0 8F 07
0156 12 88 8F 97 A0 8D 81 8E 99 A0 83 54 06
0157 8F 90 89 85 93 A0 BF A0 20 12 22 B0 05
0158 20 CC FF A9 04 20 C3 FF A9 05 20 E6 05
0159 C3 FF A5 07 85 59 A5 08 85 5A A9 20 06
0160 FF 85 5F A2 00 BD 25 1A 95 0D E8 AB 05
0161 E0 12 90 F6 A5 10 85 54 20 F4 17 D2 05
0162 A2 F0 A0 18 A9 30 85 40 A9 3A 85 F2 05
0163 41 A9 02 85 39 20 44 24 20 1B 22 32 03
0164 85 6D 29 FF F0 E4 20 5F 18 A5 66 34 06
0165 C9 08 B0 04 C9 03 B0 19 A2 04 20 85 04
0166 C9 FF 20 7D 17 4C 60 19 A5 66 C9 BB 05
0167 03 D0 EF A9 93 20 D2 FF 4C 60 19 5B 06
0168 A2 C5 A0 18 A9 41 85 40 A9 5A 85 FE 05
0169 41 A9 01 85 39 20 44 24 AD E8 02 71 04
0170 C9 59 F0 D8 A2 D9 A0 18 A9 01 20 91 06
0171 44 24 AD E8 02 C9 43 F0 C8 C9 50 87 06
0172 F0 16 C9 53 D0 E8 A9 03 85 66 20 3D 06
0173 39 24 A9 93 20 D2 FF 20 7D 17 4C 37 05
0174 8E 19 A2 04 20 C9 FF 20 39 24 A5 05 05
0175 65 85 66 20 7D 17 20 CC FF 4C 8E 78 05
0176 19 20 11 14 A5 07 85 59 A5 08 85 CA 03
0177 5A A9 FF 85 5F A9 01 85 18 60 A0 DE 05
0178 00 98 85 3D B1 59 C9 30 90 21 C9 89 05
0179 3A B0 1D 29 0F 48 A5 3D 0A 0A 18 48 03
0180 65 3D B0 0C 0A 85 3D 68 18 65 3D 00 04
0181 85 3D C8 90 DE A2 04 4C 22 17 98 70 05
0182 18 65 59 85 59 90 02 E6 5A A5 3D 1E 05
0183 60 01 03 09 04 08 10 2F 10 2F FF AD 02
0184 CE 07 07 06 08 06 08 42 50 00 00 42 02
0185 00 01 20 00 01 00 00 00 00 00 00 DB 00
0186 00 00 00 22 D2 D5 CE A0 D3 83 92 D9 05
0187 89 90 94 A0 B6 B4 A0 B1 AE B0 A0 C1 07
0188 A0 A0 D2 AE A0 D2 8F 83 8B 85 86 96 07
0189 85 8C 8C 85 92 8C 85 92 A2 48 BD BB 06
0190 1A 1A 95 02 CA 10 F8 A2 49 A9 00 EF 04
0191 95 02 E8 E0 8F D0 F9 20 7C 21 20 53 06
0192 12 22 A5 02 8D 21 D0 A5 03 8D 20 6E 04
0193 D0 A5 04 8D 86 02 20 CC FF A9 00 E3 05
0194 85 C6 20 90 FF A9 93 20 D2 FF 20 09 07
0195 59 21 20 39 24 A9 00 A2 3D A0 1A FC 03
0196 20 20 24 20 CF 24 A9 08 20 D2 FF DD 04
0197 A9 13 8D 18 D0 A9 80 8D 8A 02 20 58 05
0198 AB 21 A9 70 8D 28 03 A9 1B 8D 29 DD 04
0199 03 A9 7B 8D FA FF 8D FC FF 8D 18 A1 07
0200 03 A9 1A 8D FB FF 8D FD FF 8D 19 44 07
0201 03 78 A9 06 8D FE FF A9 1B 8D FF CD 06
0202 FF A9 16 8D 14 03 A9 1B 8D 15 03 95 04
0203 58 D8 20 09 22 20 33 1B A2 FF 9A EF 04
0204 20 59 21 4C 3C 2D 48 8A 48 98 48 15 04
0205 BA BD 04 01 29 10 F0 03 4C 63 1A 3E 04
0206 A5 01 48 A9 36 85 01 A9 1B 48 A9 D6 04
0207 2A 48 08 48 48 48 4C 31 EA 68 85 75 04
0208 01 68 A8 68 AA 68 40 A9 00 85 2E F7 04
0209 A5 0C 85 2F A4 0B B1 2E C9 20 D0 7D 05
0210 20 88 D0 F7 B1 2E C9 20 D0 17 C6 B6 06
0211 2F 88 A5 08 C5 2F 90 E8 C4 07 F0 5E 06
0212 0A B1 2E C9 20 D0 04 88 4C 55 1B BE 04
0213 98 18 65 2E 85 09 A5 2F 69 00 85 68 04
0214 0A 60 AD 8D 02 C9 06 D0 05 20 CC 0C 05
0215 FF 85 C6 60 12 90 92 85 93 93 A0 00 07
0216 90 8C 81 99 A0 8F 8E A0 94 81 90 10 07
0217 85 1B 90 92 85 93 93 A0 92 85 83 80 06
0218 8F 92 84 A0 A6 A0 90 8C 81 99 A0 3B 07
0219 8F 8E A0 94 81 90 85 10 84 89 93 72 06
0220 8B A0 83 8F 8D 8D 81 8E 84 A0 BF 25 07
0221 A0 20 A9 10 24 01 60 20 BD 1B F0 C3 04
0222 11 84 3F 20 39 24 A4 3F A9 00 20 DB 03
0223 20 24 20 BD 1B D0 FB 60 20 12 22 9A 04
0224 A9 93 20 D2 FF A9 24 8D E8 02 A9 FA 06
0225 01 8D E7 02 20 FF 21 A9 7F A0 60 C0 05
0226 A6 06 20 BA FF 20 C0 FF 90 03 4C 25 06
0227 BF 21 A2 7F 20 C6 FF 20 43 1C 20 68 05
0228 43 1C 20 43 1C 20 43 1C A9 00 85 6F 03
0229 C6 AD 8D 02 C9 02 F0 F5 29 04 D0 94 06
0230 06 A5 C5 C9 3F D0 03 20 4E 1C 20 DB 04
0231 43 1C AA 20 43 1C 20 3B 22 20 43 4F 03
0232 1C D0 07 A9 0D 20 D2 FF D0 CC 20 3E 06
0233 D2 FF D0 EF 20 E4 FF A8 20 B7 FF FA 08
0234 29 C0 F0 24 20 CC FF A9 7F 20 C3 DD 06
0235 FF AD 8D 02 C9 06 D0 F9 A9 00 85 EC 06
0236 C6 68 68 20 09 22 20 50 26 20 D8 5B 04
0237 2E 20 59 21 4C 9D 22 98 60 20 F7 CF 04
0238 21 A0 00 98 A6 06 20 BA FF A5 06 77 05
0239 C9 01 D0 0A 20 39 24 A2 90 A0 1B FD 04
0240 20 C2 1B 20 39 24 A9 00 A2 9C A0 F1 04
0241 1E 20 20 24 A9 07 A6 09 A4 0A E8 68 04
0242 D0 01 C8 20 D8 FF 08 48 20 39 24 4F 05
0243 68 28 B0 29 A2 41 A0 21 A5 90 29 5E 05
0244 BF F0 13 A9 00 20 20 24 20 CF 24 D6 04
0245 68 68 20 09 22 20 AB 21 4C 3C 2D B1 03
0246 20 50 26 20 09 22 20 D8 2E 4C 9D E6 03
0247 22 4C BF 21 20 7C 21 A6 07 A4 08 5B 04
0248 20 F3 1C 20 09 22 20 33 1B 20 AB AB 03
0249 21 4C 9D 22 86 AE 84 AF 20 F7 21 C4 05
0250 A6 06 A9 00 A8 20 BA FF A5 06 C9 44 06
0251 01 D0 0A 20 39 24 A2 7D A0 1B 20 4D 04
0252 C2 1B 20 39 24 A9 00 A2 A3 A0 1E 02 05
0253 20 20 24 A9 00 A6 AE A4 AF 20 D5 A6 05
0254 FF 08 48 20 39 24 68 28 B0 AA A2 56 05
0255 4C A0 21 A5 90 29 BF F0 03 4C 09 71 05
0256 2D 60 A6 28 A4 29 4C E4 1C 20 12 A6 04
0257 22 A5 06 20 B4 FF A9 6F 20 96 FF 6E 06
0258 A0 00 20 A5 FF C9 0D F0 0B 20 89 E0 05
0259 22 09 80 99 E8 02 C8 D0 EE 8C E7 2A 07
0260 02 20 AB FF 20 39 24 A2 E7 A0 02 78 05
0261 A9 00 20 20 24 4C CF 24 20 12 22 A5 03
0262 20 39 24 A2 AC A0 1B A9 00 20 20 75 04
0263 24 A9 00 85 C6 A5 C6 F0 FC A2 57 6F 07
0264 A0 21 A9 26 85 39 20 44 24 AD E7 72 05
0265 02 A2 E8 A0 02 20 F5 1E 4C 9D 22 75 05
0266 20 39 24 A9 31 85 40 A9 39 85 41 CE 04
0267 A2 DD A0 20 A9 01 85 39 20 44 24 3A 05
0268 AD E8 02 29 0F C9 01 F0 04 C9 08 6A 05
0269 90 DD 85 06 4C 9D 22 A5 0B 38 E5 DD 05
0270 09 AA A5 0C E5 0A 20 CC 22 20 39 C8 04
0271 24 A0 00 B1 2E F0 08 09 80 99 00 CC 04
0272 04 C8 D0 F4 C8 98 A2 36 A0 21 20 B9 06
0273 20 24 4C CF 24 20 12 22 4C E2 FC 12 05
0274 A2 D2 A0 20 A9 20 85 40 A9 5B 85 5D 06
0275 41 A9 01 85 39 20 44 24 AD E8 02 DB 04
0276 C9 53 D0 03 4C 74 1C C9 4C D0 03 C7 05
0277 4C DD 1C C9 41 D0 03 4C 3E 1D C9 A7 05
0278 50 D0 03 4C 03 19 C9 24 D0 03 4C AD 04
0279 D9 1B C9 3C D0 03 4C 45 1D C9 3E 98 05
0280 D0 03 4C 7B 1D C9 58 D0 03 4C FC 0B 06
0281 1D C9 44 D0 03 4C AA 1D C9 46 D0 08 06
0282 03 4C D2 1D C9 54 D0 49 A2 84 A0 54 06
0283 1E A9 4E 85 40 A9 5A 85 41 A9 01 68 05
0284 20 44 24 AD E8 02 C9 59 D0 03 A9 D9 05
0285 FF 2C A9 00 85 24 4C 9D 22 17 95 51 05
0286 93 85 A0 94 92 95 85 A0 81 93 83 4D 07
0287 89 89 A0 A8 99 AF 8E A9 A0 BF A0 F7 07
0288 06 93 81 96 89 8E 87 07 8C 8F 81 11 06
0289 84 89 8E 87 C9 40 D0 65 20 12 22 D5 05
0290 A9 80 20 4B 22 AD E7 02 48 AA AD 0D 06
0291 E9 02 C9 3A D0 0D A9 53 8D E7 02 60 06
0292 E8 8A A0 02 A2 E7 D0 17 E8 E8 E8 60 08
0293 A9 3A 8D E7 02 A9 30 8D E6 02 A9 75 06
0294 53 8D E5 02 8A A0 02 A2 E5 20 F5 B5 06
0295 1E 68 A2 E8 A0 02 20 BD FF 4C 77 78 06
0296 1C 86 2E 84 2F 85 34 A5 06 20 B1 E0 04
0297 FF A9 6F 20 93 FF A0 00 B1 2E 20 91 06
0298 A8 FF C8 C4 34 90 F6 4C AE FF C9 D9 08
```

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Listing 2 continued.

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0306 20 DD 24 20 D2 FF 20 70 1B D0 06 C5 05
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0327 87 89 8E A0 85 92 92 8F 92 0C 93 EE 06
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0333 0A 83 8F 90 99 A0 82 8C 8F 83 8B DD 06
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0336 83 8B 0F 93 94 92 89 8E 87 A0 94 F8 06
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0343 93 94 92 89 8E 87 A0 BF A0 10 92 4F 07
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0349 93 A0 86 92 85 85 0A 93 81 96 85 EB 06
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0369 36 85 01 60 A9 00 AA 85 3D A5 3D 84 05
0370 0A 0A 18 65 3D 0A 85 3D BD E8 02 B3 04
0371 29 0F 18 65 3D 85 3D E8 EC E7 02 E4 05
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0376 21 15 A5 21 F0 05 A9 0A 4C 21 15 9E 04
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0379 16 09 40 60 29 FF 10 05 29 7F 09 28 04
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0395 2E E5 30 A5 2F E5 31 B0 3B A5 35 7D 06
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0404 D0 03 68 68 60 A5 34 49 FF A8 85 E5 06
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0408 23 68 91 30 C8 D0 FB E6 31 C6 35 89 07
0409 D0 F5 60 86 D6 84 D3 98 B4 D9 30 C6 08
0410 08 18 69 28 85 D3 CA 10 F4 B5 D9 FF 06
0411 29 03 0D 88 02 85 D2 BD 01 24 85 1C 05
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0421 71 2E 85 3B B1 2E 85 3A 85 3C A4 07 06
0422 3C A9 20 99 00 04 20 FE 2C 20 06 B8 04
0423 25 F0 F8 A4 3C C9 0D F0 3A C9 14 71 07
0424 F0 04 C9 9D D0 0E A9 A0 99 00 04 C6 06
0425 C4 3A F0 DA C6 3C 4C 5D 24 C9 20 29 07
0426 90 D1 C9 80 90 04 C9 A0 90 C9 C5 6F 08
0427 40 90 C5 C5 41 B0 C1 C4 3B B0 BD 23 08
0428 20 89 22 09 80 99 00 04 E6 3C D0 8F 05
0429 B1 A5 39 F0 04 C4 3A F0 A9 84 3B 86 07
0430 A2 00 A4 3A B9 00 04 20 DD 24 9D A9 05
0431 E8 02 C8 E8 C4 3B 90 F1 8E E7 02 40 08
0432 4C CF 24 A9 FF 85 22 60 A5 D3 85 9B 07
0433 36 A5 D6 85 37 60 29 7F C9 40 90 BF 06
0434 02 09 80 C9 20 B0 02 09 40 60 A4 25 05
0435 D3 B1 D1 AA 09 80 91 D1 8A A6 C6 93 08
0436 86 CC F0 FA 91 D1 A9 00 85 CF A9 F8 08
0437 02 85 CD A5 C6 F0 16 78 AD 77 02 18 07
0438 48 A2 00 BD 78 02 9D 77 02 E8 E4 B9 06
0439 C6 90 F5 C6 C6 58 68 60 AD 03 10 6E 07
0440 38 E5 07 85 2A AD 04 10 E5 08 05 3E 05
0441 2A F0 0C B0 0B A5 07 8D 03 10 A5 8B 05
0442 08 8D 04 10 60 AD 03 10 38 E9 02 A6 04
0443 85 30 AD 04 10 E9 00 85 31 A2 00 72 05
0444 A1 30 C9 9F F0 0B A5 30 D0 02 C6 5D 07
0445 31 C6 30 4C 50 25 E6 30 D0 02 E6 73 06
0446 31 20 66 2D A5 30 85 2E 18 65 2C D3 04
0447 85 30 A5 31 85 2F 69 00 85 31 A5 C2 05
0448 30 38 ED 03 10 A5 31 ED 04 10 90 8F 05
0449 DF A5 2E 8D 03 10 A5 2F 8D 04 10 88 05
0450 60 C9 85 D0 03 4C 02 1E C9 0D D0 55 06
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Listing 2 continued.

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0455 E5 08 05 2A F0 18 A5 28 D0 02 C6 50 06
0456 29 C6 28 A5 28 38 ED 03 10 A5 29 B2 05
0457 ED 04 10 B0 03 20 21 25 4C D8 2E 35 05
0458 C9 11 D0 35 A5 D6 0A AA BD 03 10 A8 06
0459 85 28 18 65 D3 85 2A BD 04 10 85 CD 05
0460 29 69 00 85 2B A5 2A 38 E5 09 A5 A8 05
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0467 4C AB 21 A0 00 A2 01 4C D2 23 C9 38 06
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0469 02 4C 59 21 C9 05 D0 08 E6 02 A5 D0 05
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0471 4C 59 21 C9 9F D0 08 E6 03 A5 03 6E 06
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0474 2A C9 C9 B0 01 60 A9 C8 A0 00 A2 5A 07
0475 64 20 ED 2A 4C D8 2E C9 83 D0 72 56 07
0476 20 E1 2E A0 00 B1 28 C9 64 F0 01 A2 06
0477 60 A5 28 85 2E 85 30 A5 29 85 2F F4 05
0478 85 31 B1 2E C9 64 D0 08 E6 2E D0 5C 07
0479 F6 E6 2F D0 F2 A5 09 38 E5 2E AA 4F 08
0480 A5 0A E5 2F A8 B0 01 60 E8 D0 01 15 07
0481 C8 86 34 84 35 A5 2E 38 E5 30 85 C1 06
0482 2A A5 2F E5 31 85 2B 20 33 23 A5 C1 05
0483 2A 85 34 A5 2B 85 35 A5 09 38 E5 1B 06
0484 34 85 30 A5 0A E5 35 85 31 E6 30 62 06
0485 D0 02 E6 31 A9 20 20 C1 23 20 33 EE 05
0486 1B 4C D8 2E C9 06 D0 32 A5 09 38 0A 06
0487 ED 33 10 A5 0A ED 34 10 90 11 A5 3D 06
0488 D6 C9 18 90 04 A5 D3 F0 07 A2 18 5C 07
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0490 02 E6 0A A5 09 85 28 A5 0A 85 29 94 05
0491 4C D8 2E C9 09 D0 09 A9 FF 45 20 F5 06
0492 85 20 4C 9D 22 C9 8D D0 0A A6 D6 48 07
0493 A0 00 20 D2 23 4C EE 25 C9 14 D0 AE 06
0494 27 A5 28 85 2E AA 38 E5 07 85 3F 27 06
0495 A5 29 85 2F A8 E5 08 05 3F 90 02 DC 05
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0497 31 20 C2 27 4C C0 25 C9 8C D0 3F C0 06
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0503 09 D0 02 C6 0A C6 09 60 C9 94 D0 FE 06
0504 0C A9 01 A0 00 A2 20 20 ED 2A 4C 93 05
0505 D8 2E C9 93 D0 2D A2 BE A0 20 A9 21 08
0506 41 85 40 A9 5B 85 41 A9 01 85 39 32 06
0507 20 44 24 AD E8 02 C9 59 D0 10 20 3C 06
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0599 52 60 C9 89 D0 3F 20 D6 28 F0 03 7B 07
0600 20 D3 2B A5 4F D0 03 4C 9D 22 A5 ED 06
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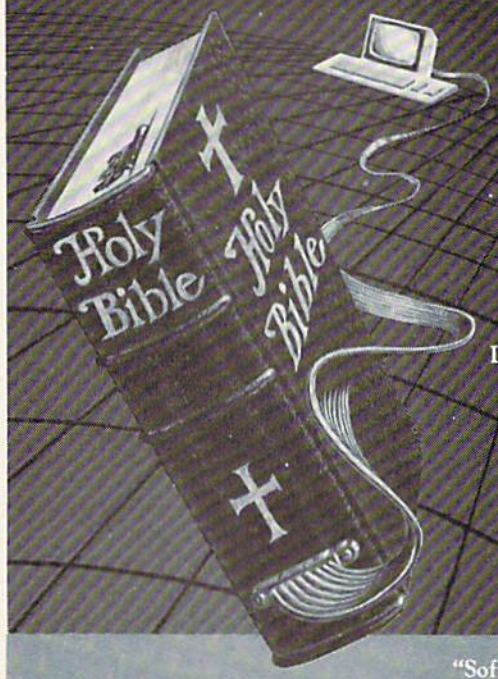
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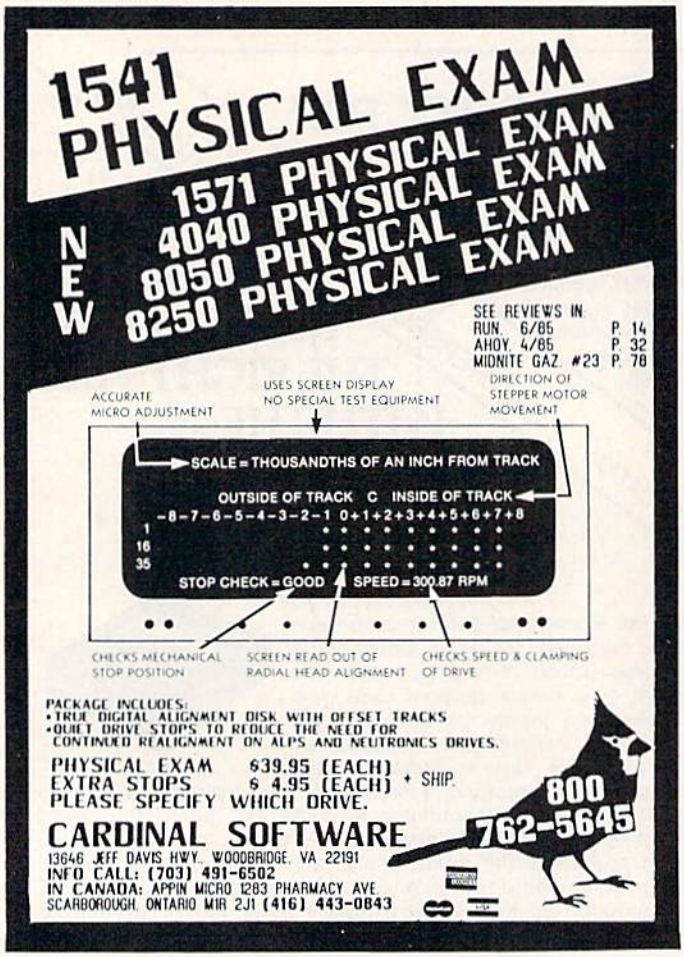
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```
0601 28 85 50 A5 29 85 51 20 A5 2B F0 DA 06
0602 15 20 39 24 A9 00 A2 13 A0 21 20 2B 05
0603 20 24 20 CF 24 20 50 26 4C D8 2E 9A 05
0604 A5 50 85 28 A5 51 85 29 20 D8 2E C8 06
0605 4C 9D 22 C9 8A F0 01 60 A0 80 84 B0 07
0606 53 20 D6 28 D0 04 A9 00 85 53 20 44 06
0607 D3 2B 20 E7 2B 20 39 24 A5 28 85 5E 06
0608 50 A5 29 85 51 20 A5 2B F0 0D 24 65 06
0609 53 30 B1 20 9D 22 20 50 26 4C D8 2E 06
0610 2E 24 53 10 36 A5 50 85 28 A5 51 E5 05
0611 85 29 A9 00 85 CC 20 D8 2E A2 02 D5 06
0612 A0 21 A9 41 85 40 A9 5B 85 41 A9 47 07
0613 01 85 39 20 44 24 A9 01 85 CC AD 54 06
0614 E8 02 C9 59 F0 09 E6 50 D0 02 E6 59 08
0615 51 4C 61 2C A5 50 85 42 18 65 4F 19 06
0616 85 44 A5 51 85 43 69 00 85 45 20 42 06
0617 9E 29 A5 50 85 32 A5 51 85 33 A5 2F 07
0618 52 F0 94 A0 00 20 F7 2A A5 50 85 9B 07
0619 30 A5 51 85 31 A9 C7 85 2E A9 02 15 07
0620 85 2F A5 52 85 34 A9 00 85 35 20 53 06
0621 33 23 A5 52 18 65 50 85 50 90 02 EE 05
0622 E6 51 20 33 1B 4C 61 2C AD 8D 02 28 06
0623 C9 06 D0 36 A2 4D A0 2B 98 48 8A 68 07
0624 48 20 12 22 20 CC FF A9 93 20 D2 25 07
0625 FF 20 39 24 68 AA A8 A9 00 85 3D 07
0626 C6 20 20 24 A2 FF 9A 20 09 22 20 42 06
0627 50 26 20 D8 2E 20 CF 24 20 59 21 BC 05
0628 4C 3C 2D 60 20 09 22 20 EC 24 48 4C 05
0629 A6 22 10 03 20 9D 22 20 E1 2E 68 C6 05
0630 20 54 2D 4C 3C 2D C9 20 B0 03 4C B4 05
0631 93 25 C9 A0 B0 04 C9 80 B0 F5 4C 86 08
0632 89 2E A9 28 85 2C A0 00 C0 28 B0 E9 06
0633 11 B1 30 C8 C9 9F F0 08 C9 20 D0 4C 08
0634 F1 84 2C F0 ED 84 2C 60 A9 00 85 36 08
0635 25 20 3F 2E BD 03 10 85 30 BD 04 73 05
0636 10 85 31 20 66 2D A5 30 9D 03 10 7A 05
0637 E8 A5 31 9D 03 10 E8 A5 2C 18 65 21 07
0638 30 85 30 90 02 E6 31 E0 32 90 E2 90 07
0639 A2 30 A5 28 38 FD 03 10 A5 29 FD 31 07
0640 04 10 90 13 A2 02 BD 03 10 9D 01 49 05
0641 10 E8 E0 32 D0 F5 A2 30 86 25 D0 9D 08
0642 C0 60 A9 01 85 25 A5 25 F0 04 A2 56 07
0643 00 F0 04 A6 D6 CA CA A9 00 85 30 E5 07
0644 A9 04 85 31 A9 28 18 65 30 85 30 1A 06
0645 90 02 E6 31 CA 10 F2 20 3F 2E BD 44 07
0646 05 10 38 FD 03 10 A8 48 BD 04 10 A4 05
0647 85 2F BD 03 10 85 2E 88 B1 2E 10 35 06
0648 06 C9 9F D0 02 A9 1F 91 30 88 10 E9 06
0649 F1 68 A8 C0 28 B0 07 A5 19 91 30 A8 07
0650 C8 90 F5 A5 30 18 69 28 85 30 90 9A 07
0651 02 E6 31 E8 E8 E0 30 90 BF 60 A6 D9 08
0652 D6 F0 01 CA F0 01 CA 8A 0A AA A4 BA 08
0653 25 F0 02 A2 00 60 A6 D6 F0 01 CA DD 07
0654 8A 0A AA A5 28 38 FD 03 10 A5 29 AF 06
0655 FD 04 10 B0 04 CA CA 90 EF E8 E8 37 09
0656 A5 28 38 FD 03 10 A5 29 FD 04 10 84 06
0657 B0 F1 CA CA A5 28 38 FD 03 10 A8 83 08
0658 8A 4A AA E8 4C D2 23 20 89 22 A6 AA 07
0659 23 10 0A C9 1B B0 06 C9 00 F0 02 25 06
0660 09 40 85 2D A5 09 38 E5 0B A5 0A 14 06
0661 E5 0C 90 07 A2 36 A0 20 4C 09 2D 37 06
0662 A6 20 10 07 A9 01 A0 00 20 ED 2A F4 05
0663 A5 2D A2 00 81 28 E6 28 D0 02 E6 7A 07
0664 29 A5 28 38 E5 09 A5 29 E5 0A 90 01 07
0665 08 A5 28 85 09 A5 29 85 0A 20 82 FB 05
0666 2D 20 D8 2D 4C 51 2E A6 D6 CA 8A 87 07
0667 0A AA BD 03 10 85 26 BD 04 10 85 20 06
0668 27 A0 00 C4 D3 F0 0B B1 26 D1 D1 6E 08
0669 D0 05 C8 C0 28 90 F1 98 18 65 26 DE 07
0670 85 28 A9 00 65 27 85 29 60 9F 2D 06
```


Circle 192 on Reader Service card.



Listing 3. *RUN Script 64's Character Set program.*

```
10 REM COPY C64 CHARACTER SET        :REM*54
40 POKE 56333,127 : REM IRQ OFF     :REM*190
50 POKE 1,PEEK(1)AND 251 : REM CHAR SET IN,
   I/O CHIPS OUT                     :REM*80
80 REM COPY SET TO $6000             :REM*188
90 CSET=13*4096+8*256 : COPY=6*4096:REM*116
100 FOR LOOP=0 TO 2047                :REM*6
110 POKE COPY+LOOP,PEEK(CSET+LOOP)   :REM*90
120 NEXT LOOP                        :REM*214
150 POKE 1,PEEK(1)OR4 : REM I/O CHIPS IN, R
    OM CHAR SET OUT                  :REM*202
160 POKE 56333,128+1 : REM IRQ ON    :REM*168
190 REM SAVE CHARACTER SET           :REM*240
210 PRINT"{SHFT CLR}{2 CRSR DNs}8 - DISK"
                                     :REM*4
220 PRINT"9 - DISK"                  :REM*232
230 INPUT"SAVE TO DEVICE NUMBER";DEV
                                     :REM*134
240 IF DEV<>1 AND DEV<>8 AND DEV<>9 THEN 23
    0                                :REM*64
250 POKE 780,0:POKE 781,DEV:POKE 782,0
                                     :REM*230
260 SYS 65466:REM SETLFS             :REM*147
280 NAM$="C64 CHAR SET"              :REM*77
290 FOR LOOP=1 TO LEN(NAM$)          :REM*65
300 POKE 849+LOOP,ASC(MID$(NAM$,LOOP,1))
                                     :REM*139
310 NEXT LOOP                        :REM*149
320 POKE 780,LEN(NAM$) : POKE 781,850AND255
     : POKE 782,850/256              :REM*233
330 SYS 65469 : REM SETNAM           :REM*83
350 POKE 253,0 : POKE 254,6*16       :REM*85
360 POKE 780,253 : POKE 781,26624AND255 : P
    OKE 782,26624/256                :REM*255
370 SYS 65496 : REM SAVE             :REM*163
400 END                              :REM*147
```

How To Use ML Perfect Typist

RUN's machine language listings for the C-64 (or the C-128 in C-64 mode) consist of a series of program lines, each of which begins with a four-digit line number followed by 13 pairs of hexadecimal characters (letters and/or numbers). ML Perfect Typist is provided for accurate and easy entry of these listings.

The first eleven pairs of numbers after the line number are the program's machine code. The last two pairs are checksum values used by ML Perfect Typist. You do not have to type in line numbers or spaces; these are automatically entered. Only the 0–9, A–F, delete and return keys are active.

To type in a machine language listing, load and run ML Perfect Typist. At the opening menu, select option 1 to enter a new program. A line number will appear on the screen. Find this line number in the magazine listing and type in its characters. When you have finished typing the line, compare what you see on the screen with the line in the magazine. If they are the same, press the return key. You will then be prompted with the next line number to enter.

If you notice a mistake before pressing the return key, use the delete key to fix your error. If you have made a mistake and didn't catch it, ML Perfect Typist will alert you to this after you press the return key and will prompt you to reenter the line.

Command Codes

There are three command codes: CTRL-A, CTRL-C and CTRL-E. If you enter CTRL-A (the CTRL key and the A together), the program will abort without saving any of the entered lines to disk.

When you type CTRL-C, ML Perfect Typist will erase the current line and prompt you to enter it again.

CTRL-E has two uses. First, use it if you want to end a session before you have finished entering a complete listing. (In this case, be sure to have a disk in the drive, or you'll lose the data you've already entered.) Instead of entering the next line, press CTRL-E and type the filename. A short menu will then be displayed. Choose option 2 to save the incomplete file to disk. You *must* use option 2 to save your incomplete file! If you use option 1, you'll never be able to recover your program.

Later, when you're ready to resume entering the listing, load and run ML Perfect Typist and select option 2 from the opening menu. Enter the name of the incomplete file and press the return key. That file will be loaded and the next line number will be displayed.

Storing the Completed Program

The second use for CTRL-E comes when you've entered the last line of a listing. When you're prompted with the line number that follows the last line number in the listing, enter CTRL-E and supply the filename. At the menu, select option 1 for storing a completed program, and ML Perfect Typist will store it to disk. You must have a disk with sufficient free space in the drive before you enter CTRL-E.

Check with Care

You will notice that all lines are the same length. Therefore, when you've entered all the characters in any line (except the last one), your cursor should be in the 40th column on the screen. If it isn't, you must have left out one or more characters. For the special case of the last line, which often is not full length, there isn't a checksum number pair, so be sure to check your entry carefully before pressing return. R

RUN It Right

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

Listing 1. *ML Perfect Typist program.*

```
0 REM ML ENTRY                                  :REM*214
1 REM ROBERT SIMS                               :REM*73
2 REM 7818 SUMMERFIELD RD                       :REM*206
3 REM SUMMERFIELD, NC 27358                     :REM*249
4 REM 919-643-7840                              :REM*206
5 REM                                           :REM*67
10 FORB=9728TO11675:READ A:POKEB,A:PRINT"."
   ;:NEXT                                       :REM*238
20 POKE631,83:POKE632,89:POKE633,83:POKE634
   ,57:POKE635,55:POKE636,50:POKE637,56
                                                :REM*216
30 POKE638,13:POKE198,8                         :REM*98
40 NEW:END                                      :REM*140
101 DATA 165,1,41,254,133,1,32,231,255,32,1
    93,42,32,129,42,162,0,142,33    :REM*233
102 DATA 46,142,34,46,76,69,38,32,204,255,1
    69,3,32,195,255,32,231,255,96   :REM*144
103 DATA 169,0,141,235,45,169,0,133,251,169
    ,48,133,252,96,32,170,42,169,149
                                                :REM*249
104 DATA 141,110,42,169,45,141,111,42,32,98
    ,42,96,32,38,38,169,165,141,110 :REM*66
105 DATA 42,169,44,141,111,42,32,98,42,32,1
    61,42,32,58,43,32,170,42,173    :REM*69
106 DATA 238,45,201,49,240,11,201,50,240,10
    ,201,1,208,216,76,26,38,76,21   :REM*16
107 DATA 39,32,179,42,32,176,41,174,32,46,2
    24,1,208,3,76,26,38,224,3       :REM*17
108 DATA 240,236,32,112,44,174,237,45,169,8
    2,157,156,45,232,169,0,157,156,45:REM*6
109 DATA 142,237,45,32,29,43,174,241,45,224
    ,1,240,206,32,29,44,172,235,45 :REM*139
110 DATA 173,238,45,145,251,32,3,44,32,28,4
    2,173,236,45,201,0,240,232,32   :REM*100
111 DATA 204,255,169,3,32,195,255,32,153,44
    ,173,238,45,141,34,46,32,153,44  :REM*3
112 DATA 173,238,45,141,33,46,162,3,142,233
    ,45,32,153,44,173,238,45,201,48 :REM*14
113 DATA 144,23,201,58,176,19,174,233,45,15
    7,149,45,206,233,45,174,233,45,224
                                                :REM*179
114 DATA 255,208,226,76,21,39,169,215,141,1
    10,42,169,44,141,111,42,32,98,42
                                                :REM*138
115 DATA 162,0,142,33,46,142,34,46,76,69,38
    ,32,107,43,32,52,38,162,0       :REM*143
116 DATA 142,233,45,174,233,45,169,0,157,17
    7,45,238,233,45,174,233,45,224,56
                                                :REM*46
117 DATA 144,238,162,0,142,233,45,32,58,43,
    173,238,45,201,20,208,28,32,137:REM*243
118 DATA 44,174,233,45,224,0,240,236,206,23
    3,45,173,233,45,24,106,144,226,169
                                                :REM*68
119 DATA 20,32,137,44,76,55,39,201,1,208,3,
    76,26,38,201,3,208,3,76         :REM*27
120 DATA 24,39,201,5,208,6,32,183,43,76,175
    ,40,201,13,208,3,76,174,39      :REM*74
121 DATA 174,233,45,173,238,45,157,189,45,2
    38,233,45,173,233,45,24,106,176,5
                                                :REM*37
122 DATA 169,32,32,137,44,174,233,45,224,27
    ,176,3,76,55,39,169,117,141,110 :REM*52
123 DATA 42,169,45,141,111,42,32,98,42,76,2
    4,39,162,0,142,233,45,142,31    :REM*67
124 DATA 46,174,33,46,142,26,46,174,34,46,1
    42,27,46,162,25,142,30,46,174   :REM*200
125 DATA 30,46,189,189,45,201,0,208,13,206,
    30,46,174,30,46,224,0,208,236   :REM*217
126 DATA 76,24,39,141,29,46,206,30,46,174,3
    0,46,189,189,45,141,239,45,32   :REM*194
127 DATA 47,44,173,29,46,141,239,45,32,79,4
    4,173,239,45,141,29,46,206,30   :REM*121
128 DATA 46,174,30,46,189,189,45,141,28,46,
    206,30,46,174,30,46,189,189,45  :REM*12
129 DATA 141,239,45,32,47,44,173,28,46,141,
    239,45,32,79,44,173,239,45,141 :REM*125
130 DATA 28,46,32,162,40,32,47,44,32,162,40
    ,32,79,44,174,31,46,173,239     :REM*112
131 DATA 45,157,177,45,238,31,46,24,173,239
    ,45,109,26,46,141,26,46,169,0   :REM*107
132 DATA 109,27,46,141,27,46,174,233,45,236
    ,30,46,144,206,174,29,46,236,27:REM*118
133 DATA 46,208,47,174,28,46,236,26,46,208,
    39,174,31,46,142,30,46,162,0    :REM*145
134 DATA 142,31,46,174,31,46,189,177,45,172
    ,235,45,145,251,32,3,44,238,31 :REM*100
135 DATA 46,174,31,46,236,30,46,144,231,76,
    21,39,169,134,141,110,42,169,45:REM*101
136 DATA 141,111,42,32,98,42,76,24,39,174,2
    33,45,189,189,45,141,239,45,238:REM*168
137 DATA 233,45,96,32,179,42,32,176,41,174,
    32,46,224,1,240,243,224,3,240   :REM*249
138 DATA 239,32,112,44,174,237,45,169,87,15
    7,156,45,232,169,0,157,156,45,232
                                                :REM*218
139 DATA 142,237,45,169,3,162,8,160,3,32,18
    6,255,173,237,45,162,155,160,45 :REM*69
140 DATA 32,189,255,32,192,255,32,211,42,17
    4,241,45,224,1,208,3,76,154,41  :REM*130
141 DATA 169,253,141,110,42,169,44,141,111,
    42,32,98,42,32,161,42,32,58,43  :REM*155
142 DATA 173,238,45,141,239,45,201,49,240,4
    ,201,50,208,239,32,58,43,173,238
                                                :REM*198
```


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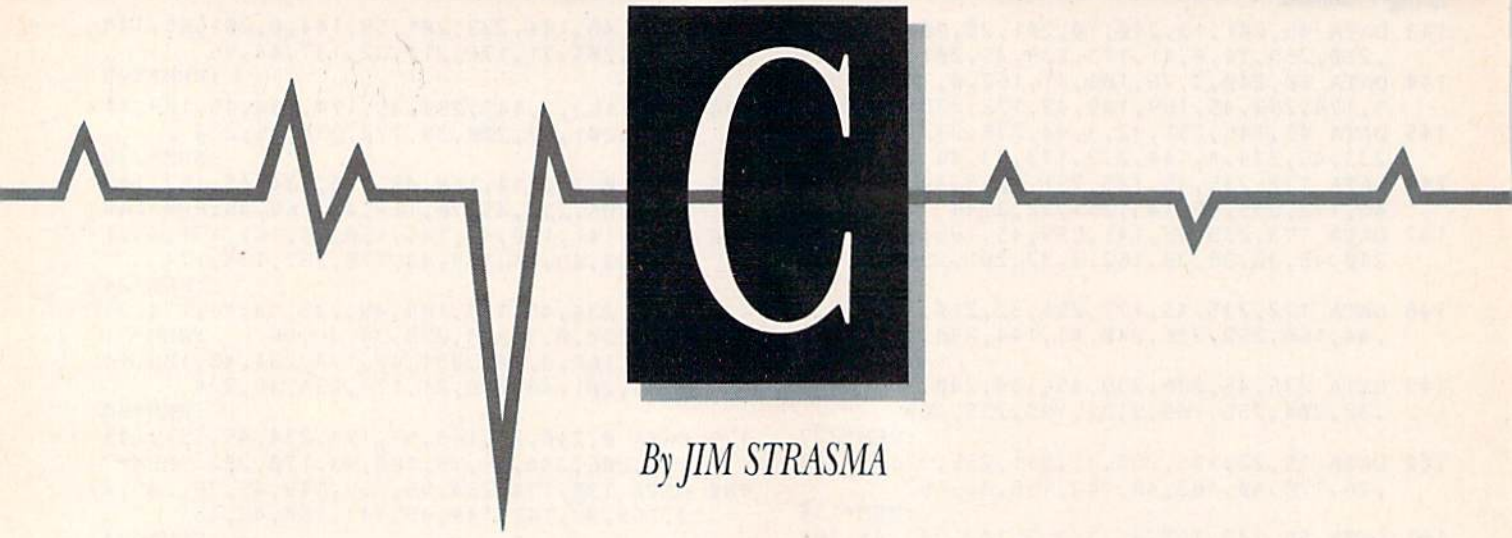
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Listing 1 continued.

```
143 DATA 45,201,13,240,10,201,20,208,242,32
    ,210,255,76,8,41,173,239,45,201:REM*125
144 DATA 50,240,3,76,106,41,162,0,142,233,4
    5,174,233,45,189,149,45,172,235 :REM*80
145 DATA 45,145,251,32,3,44,238,233,45,174,
    233,45,224,4,144,232,173,33,46 :REM*113
146 DATA 172,235,45,145,251,32,3,44,173,34,
    46,172,235,45,145,251,32,3,44  :REM*224
147 DATA 173,235,45,141,239,45,165,252,141,
    240,45,32,38,38,162,3,32,201,255
                                   :REM*177
148 DATA 172,235,45,177,251,32,210,255,32,3
    ,44,166,252,236,240,45,144,238,174
                                   :REM*210
149 DATA 235,45,236,239,45,144,230,76,26,38
    ,32,204,255,169,3,32,195,255,169
                                   :REM*227
150 DATA 15,32,195,255,32,231,255,32,193,42
    ,76,175,40,162,48,142,156,45,162
                                   :REM*136
151 DATA 58,142,157,45,162,2,142,233,45,162
    ,0,142,32,46,32,37,42,173,238   :REM*57
152 DATA 45,201,20,208,16,32,137,44,174,233
    ,45,224,3,144,236,206,233,45,76 :REM*36
153 DATA 196,41,201,1,208,6,141,32,46,76,23
    9,41,201,3,208,4,141,32,46      :REM*243
154 DATA 96,32,137,44,173,238,45,201,13,208
    ,3,76,16,42,174,233,45,224,18   :REM*18
155 DATA 176,12,173,238,45,157,156,45,238,2
    33,45,76,196,41,174,233,45,169,0
                                   :REM*247
156 DATA 157,156,45,142,237,45,96,32,183,25
    5,41,64,141,236,45,96,32,204,255
                                   :REM*166
157 DATA 32,228,255,201,0,240,246,141,238,4
    5,201,1,240,43,201,3,240,39,201 :REM*81
158 DATA 13,240,35,201,20,240,31,201,32,144
    ,223,201,91,144,23,201,97,144,215
                                   :REM*116
159 DATA 201,125,144,15,201,187,240,11,201,
    193,144,203,201,219,144,3,76,37,42
                                   :REM*109
160 DATA 96,162,0,142,234,45,32,204,255,174
    ,234,45,189,98,42,141,238,45,201
                                   :REM*152
161 DATA 0,240,9,32,137,44,238,234,45,76,10
    6,42,96,32,204,255,169,151,32   :REM*181
162 DATA 137,44,169,147,32,137,44,173,24,20
    8,41,253,141,24,208,169,14,141,32
                                   :REM*160
163 DATA 208,169,1,141,33,208,96,32,204,255
    ,169,62,32,137,44,96,32,204,255 :REM*37
164 DATA 169,13,32,137,44,96,169,105,141,11
    0,42,169,45,141,111,42,32,98,42:REM*242
165 DATA 96,169,15,162,8,160,15,32,186,255,
    169,0,32,189,255,32,192,255,96 :REM*119
166 DATA 32,204,255,162,0,142,241,45,162,15
    ,32,198,255,162,0,142,234,45,32:REM*212
167 DATA 228,255,172,234,45,153,242,45,238,
    234,45,201,13,208,240,169,0,172,234
                                   :REM*31
168 DATA 45,153,242,45,173,242,45,201,50,14
    4,21,32,204,255,162,1,142,241,45:REM*18
169 DATA 169,242,141,110,42,169,45,141,111,
    42,32,98,42,32,204,255,96,169,3 :REM*57
170 DATA 162,8,160,3,32,186,255,173,237,45,
    162,156,160,45,32,189,255,32,192
                                   :REM*194
171 DATA 255,32,204,255,32,211,42,96,32,204
    ,255,32,228,255,141,238,45,201,20
                                   :REM*237
172 DATA 240,35,201,13,240,28,201,1,240,27,
    201,3,240,23,201,5,240,19,201    :REM*24
173 DATA 48,144,223,201,58,144,8,201,65,144
    ,215,201,71,176,211,32,137,44,96
                                   :REM*199
174 DATA 162,3,142,234,45,174,234,45,189,14
    9,45,201,57,208,38,174,234,45,224
                                   :REM*238
175 DATA 0,240,14,169,48,174,234,45,157,149
    ,45,206,234,45,76,112,43,169,48:REM*149
176 DATA 141,149,45,141,150,45,141,151,45,1
    41,152,45,76,169,43,170,232,138,174
                                   :REM*24
177 DATA 234,45,157,149,45,238,33,46,174,33
    ,46,224,0,208,3,238,34,46,96     :REM*51
178 DATA 162,3,142,234,45,174,234,45,189,14
    9,45,201,48,208,21,174,234,45,224
                                   :REM*80
179 DATA 0,240,26,169,57,174,234,45,157,149
    ,45,206,234,45,76,188,43,170,202 :REM*7
180 DATA 138,174,234,45,157,149,45,76,245,4
    3,169,48,141,149,45,141,150,45,141
                                   :REM*194
181 DATA 151,45,141,152,45,206,33,46,174,33
    ,46,224,255,208,3,206,34,46,96 :REM*107
182 DATA 238,235,45,174,235,45,224,0,208,2,
    230,252,96,206,235,45,174,235,45:REM*10
183 DATA 224,255,208,2,198,252,96,32,204,25
    5,162,3,32,198,255,32,207,255,141
                                   :REM*191
184 DATA 238,45,32,204,255,96,173,239,45,20
    1,58,144,15,41,15,24,105,9,10   :REM*190
185 DATA 10,10,10,141,240,45,76,78,44,41,15
    ,10,10,10,10,141,240,45,96      :REM*245
186 DATA 173,239,45,201,58,144,11,41,15,24,
    105,9,141,239,45,76,102,44,41    :REM*70
187 DATA 15,141,239,45,173,239,45,13,240,45
    ,141,239,45,96,174,237,45,169,44
                                   :REM*139
188 DATA 157,156,45,232,169,80,157,156,45,2
    32,169,44,157,156,45,232,142,237,45
                                   :REM*200
189 DATA 96,72,169,20,32,210,255,104,32,210
    ,255,169,164,32,210,255,96,32,16:REM*31
190 DATA 44,172,235,45,177,251,141,238,45,9
    6,13,13,32,49,41,32,78,69,87     :REM*52
191 DATA 32,80,82,79,71,82,65,77,13,32,50,4
    1,32,80,82,79,71,82,65           :REM*11
192 DATA 77,32,80,65,82,84,73,65,76,76,89,3
    2,69,78,84,69,82,69,68           :REM*212
193 DATA 13,13,0,13,78,79,84,32,65,78,32,73
    ,78,67,79,77,80,76,69            :REM*113
194 DATA 84,69,32,70,73,76,69,46,32,84,82,8
    9,32,65,71,65,73,78,46           :REM*110
195 DATA 13,13,0,13,32,49,41,32,83,84,79,82
    ,69,32,84,72,69,32,67            :REM*53
196 DATA 79,77,80,76,69,84,69,68,32,80,82,7
    9,71,82,65,77,13,13,32           :REM*188
197 DATA 50,41,32,83,84,79,82,69,32,65,78,3
    2,73,78,67,79,77,80,76           :REM*23
198 DATA 69,84,69,32,80,82,79,71,82,65,77,3
    2,65,78,68,13,32,32,32           :REM*74
199 DATA 32,70,73,78,73,83,72,32,73,84,32,7
    6,65,84,69,82,13,13,0            :REM*59
200 DATA 48,49,50,51,52,53,54,55,56,57,65,6
    6,67,68,69,70,70,73,76           :REM*242
201 DATA 69,78,65,77,69,32,62,32,0,13,13,76
    ,73,78,69,32,84,79,79            :REM*175
202 DATA 32,76,79,78,71,13,0,13,13,69,78,84
    ,82,89,32,69,82,82,79            :REM*222
203 DATA 82,13,0,48,48,48,48,13,0,64,0
                                   :REM*191
```

COMMODORE CLINIC



By JIM STRASMA

Do you have a problem or question about your Commodore computer? Commodore Clinic can help. Just send your question on a postcard *(limit of one question per card) to:*

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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.

HARDWARE

***Q:** I have a VIC 1520 plotter/printer, for which I need paper. Paper sold by Radio Shack is too stiff for the 1520. Could you give me the name of a dealer who carries paper for the 1520?*

Gilbert Ashburn
Winston-Salem, NC

A: I normally recommend Radio Shack as a handy source for that paper, since they used to sell an essentially equivalent printer. If it's not working for you, your next step should be to order a good supply from Commodore through your dealer. I expect Carl Moser of Eastern House Software in Winston-Salem will know which dealers in your area are willing to place special orders.

***Q:** I recently purchased a Plus/4 computer with all accessories, and have been looking for additional software, but have only found programs for the C-64. I've been told that software for the 64 is not compatible with the Plus/4 and that Commodore is now concentrating its efforts on the C-128.*

I also have an abundance of information stored on 5¼-inch disks, which I am told will not be compatible with either the 64 or the 128. Is the information above correct? If so, what do I do?

Wallace Wilkerson
Anniston, AL

A: Most of what you've been told is accurate, but not the part about the disks. Disks are freely exchangeable among most Commodore computers, including PETs and CBMs with 2040, 4040 and 2031 disk drives; VICs, 64s, 16s, Plus/4s and 128s with 1540, 1541 and 1571 disk drives; plus most non-Commodore C-64-compatible disk drives. The only exception is that 1571 disk drives must not be more than half full if they are to be completely read by the other listed drives.

As for what to do about too few product offerings for your machine, I suggest you unite with other Plus/4 owners and work together to modify and make compatible non-Plus/4 programs. There are far more Plus/4s than there were original 8K PETs, which means that by working together you can get everything you need, just as we early PET owners did.

***Q:** Whatever happened to the super-fast disk drive that is mentioned in the Plus/4's manual?*

Craig Ede
Minneapolis, MN

A: It was never actualized for the Plus/4, but it became a reality for the C-128 in the form of the 1571.

***Q:** I've heard that Commodore has given the impression that a Mac-like operating system (GEM) could be a possibility in the future. Is this possible for an eight-bit computer such as the 128?*

Tom Moore
Birmingham, AL

A: Certainly. Anything a 16-bit computer can do, an eight-bit computer can also do, although usually not as quickly, and sometimes it requires added hardware for some operations. Commodore's 1984 program Magic Desk, for the C-64, worked much like the visual interface of Apple's Macintosh and Digital Research's GEM operating system for the IBM PC and Atari 520.

On the other hand, an effective visual interface needs both very high-resolution graphics and an extremely high-speed hardware design to update it. Commodore's new Amiga is one of the few computers truly suited to this means of control.

PROGRAMMING

***Q:** Using the format option in DOS on a 1571 drive, I find I have 1328 blocks free on both single- and double-sided disks. Is this right? If so, why purchase double-sided disks at nearly twice the cost?*

E. Cozzi
Barre, VT

A: Yes, it's right, and there's no reason to pay twice the cost. When double-sided disks differ from single-sided disks at all, they are said to be thicker, and burnished on both surfaces rather than one. But the real dif-

ference is in testing; only double-sided disks have been tested and verified good on both surfaces. Other disks have either not been tested on the second surface or have failed the test.

Your disk drive has no way to know whether you're formatting a single- or a double-sided disk, so it normally formats them as double-sided in 128 mode and single-sided in 64 mode. Either way, if the formatted disk contains any errors, the format command will fail, and you should replace the disk.

In my own experience, 90 percent of the single-sided, single-density disks that I own format properly as double-sided, double-density disks. And five years into the experiment, I am still waiting for the first disk so formatted to fail later. I still buy double-sided disks for double-sided use, but I pay only a small surcharge to get them.

Q: I am a neobyte (neophyte computer hobbyist). I have a C-64 and a Datassette and have no problems saving or copying data with them. Recently, I purchased a 1541 disk drive, but I have a problem. How do I save data to a disk, and how do I copy part or all of a disk? What is a formatted disk? How do I format a disk? I certainly don't find that information in my non-user-friendly 1541 manual.

R. G. Legener
Bryan, TX

A: Let's hope your 1541 manual is the older edition rather than the one I wrote. Otherwise, I may not be any clearer this time than before.

With that in mind, to format a disk, simply enter

```
OPEN15,8,15<return>
PRINT#15"DISK NAME,##"<return>
CLOSE15<return>
```

A formatted disk is one that is no longer entirely blank, as it was when first manufactured. A command to the disk drive has caused the drive to write a pattern of magnetic impulses over much of the disk's surface. You can't see a disk format by looking at the disk surface, and you must be careful to keep the disk away from stray magnetic fields that might erase its format pattern, just as a bad scratch can ruin a phonograph record.

If you try to save information on a brand new disk without formatting it first, you'll have no more success than you would have trying to play a record without grooves.

To save a program, enter:

```
SAVE "PROGRAM",8
```

To copy a program with a single disk drive, use the 1541 demo disk.

Q: I have been knocking my brains out trying to make a character move by itself and home in on a main character controlled by the keyboard or joystick on my VIC. I think this is called artificial intelligence. If you can, would you try to explain how it works.

Mike Baluch
Address not given

A: As one of the other computer professors here at Western Illinois University said recently, "If it works, it isn't artificial intelligence." The truth beneath that bit of humor is that whenever the computer appears to show intelligence, it does so by following your instructions.

Therefore, to make the computer direct a character in a way that homes in on a moving target, you must instruct it to do so in a program. To do this, you must first find a way to represent the locations of both characters in a form the computer can understand and work with. Second, you must explain how to perform the task in steps that are simple and small enough for the computer to follow.

A good way to represent the screen within a computer program is as a two-dimensional array, with each location on the screen having its own pair of X and Y coordinates.

To solve the rest of the problem, it helps to have studied geometry, which teaches how to measure the distance between any two points on a graph. Briefly, the idea is for the computer to move its character to minimize the X and Y distance between its position and your character's position.

In doing this, there will be four cases: add 1 to both X and Y; add 1 to X but subtract 1 from Y; subtract 1 from X but add 1 to Y; and subtract 1 from both X and Y. Each time it is the computer's turn to move, it should choose the case that minimizes its character's distance from your character's location. This will be a good project for you.

Q: While saving a program on tape with my VIC, I ran out of tape shortly before the end. I'm sure one copy is there, but I cannot load it without a Load error. Please suggest any methods that might work to save it.

Alan Callander
Arlington, VA

A: Next time, immediately save it again on another tape, something you should always do in any case, to guard against all such errors. Fortunately, as long as at least 50 percent of the save was completed before you ran out of tape, you can probably recover with the help of a machine language monitor.

The monitor should be loaded first, in a part of memory your program doesn't use. Next, load the program using your monitor's Load (L) command. As before, the load will eventually fail. However, by afterwards displaying memory used by the program, you will notice that the program did load after all. Only its pointers have not been updated. This means you can at that point recover the program by using the monitor's Save (S) command to make a new copy on another tape.

The addresses to save are all between the zero byte that marks the start of your Basic program workspace (varies by memory size) and the location after the next three zero bytes in a row following that location. Use your monitor's Hunt (H) command to locate the zero bytes.

Q: I am currently working on a program that stores phone numbers. It has an alphabetizing option in machine language. After the sort is done, it returns me to the main menu. However, after about 30 seconds, the program locks up. Do you know any way to stop the locking up?

Barry Allyn
Arlington, WA

A: Sure, fix the bug in your sort. You've reminded me of the many hours I spent perfecting my own first machine language program, which

was also a sort called from Basic. Based on my own problems then, I'm reasonably sure you'll discover one of two things when you study your sort again.

One, it is using a memory location you thought was unused, but which is actually shared with Basic, probably in page zero. Two, it is using a memory location you don't know about, perhaps because an error caused it to branch there.

My favorite cure for the first problem is to copy the first half of page zero to a save area elsewhere in memory; let the sort use any page-zero locations (excluding the first two) that it wants to use in that range; then restore to page zero its original contents from the save area before returning to Basic.

If that doesn't help, you'll need to single-step all the way through your sort's execution with the help of a machine language monitor. That can take hours, but is sometimes unavoidable. One shortcut might be to compare memory contents before and after the sort, so you'll know which memory locations were altered by it.

REPAIRS

Q: A program I wrote and have been using for several years on my VIC-20 suddenly turned up with strange characters in place of what I had typed in. What caused this? Could it have resulted from validating the disk in my 1541?

Joan Ramos
New York, NY

A: It's difficult to know for sure what caused a particular program to die after several years of use, but one common cause is gradual deterioration of the magnetic media on the disk itself. A few brands of disks tend to self-erase over a period of years as the signal stored on the disk fades away and becomes unreadable by your drive. Some drives also physically wear out the media on which the program is stored, with the same net result.

As for the Validate command being responsible—no way. On the other hand, I'd be suspicious of whatever happened to the disk to make you want to validate it.

The real message here is that nothing is forever in computers; you simply must maintain backup copies of all important programs in a safe place. Then when such disasters do strike, you need only make a new copy of the program.

Q: I am having problems with my 1541 disk drive, and need whatever repair manuals are available. I have been told Commodore has such manuals, but I cannot find the address.

Carroll James Moore, Jr.
Webster, TX

A: The *Commodore Single Disk Drive Technical Manual Model 1540/1541* is P/N 990445 and should be available directly from Commodore's Customer Support group, located at 1200 Wilson Drive, West Chester, PA 19380. A good alternative is *The 1541 Repair and Maintenance Handbook*, new from Abacus Software, PO Box 7211, Grand Rapids, MI 49510. Howard W. Sams & Co., Inc. (4300 W. 62nd St., Indianapolis, IN 46268) also sells a 1541 repair manual as part of their photofacts series.

Q: I'm using a Turboprint/GT interface and Legend 880 printer with my 64/1541/1702 system. After one month of no problems, the following has started: When loading, the monitor shows "loading," and the disk drive sometimes starts, but never stops, and the cursor does not return to the screen.

If I do not have to use the printer, pulling the serial interface plug or the 5V plug to the interface allows everything to operate properly. Is my problem with the 64, drive, interface or printer?

Jack Anderson
Tacoma, WA

A: If you're lucky, the only problem is that your printer is "off-line." You can determine this by looking at the lights next to the buttons on the top of your printer. If the on-line light is off, your printer won't print, and the interface will tie up the serial bus and keep the disk drive from loading or saving files. The next time you have this problem, push the on-line button on the printer and see if that cures it. If not, check the connections between the printer and its interface to be sure they are properly connected. If they are, one or the other needs repair.

If the printer still passes its power-on self-test, the problem may be in the interface. To be sure, borrow another interface and see if that cures the problem. In any case, the problem isn't in the 64 or 1541.

SOFTWARE

Q: I am the treasurer of First Christian Church here and have a Commodore 64 computer, MSD disk drive and Star 10 printer. Is this system large enough to write a monthly report and possibly a yearly report?

Marion Elsworth
Aurora, IL

A: First, a monthly report is quite feasible, using any of three popular types of commercial software. My favorite method is one we employ in our own church at the moment: We use our word processor to prepare the report. This requires a word processor able to do row-and-column math, such as PaperClip, from Batteries Included. After you design a suitable report form, its monthly use is a simple matter of entering current data and letting the program add it up.

Another excellent approach is to prepare the report using a spreadsheet program, such as Cardco's Calc Now. A spreadsheet allows you to lay out an entire church budget, showing all sources of income and expense in rows down the left margin, and the months of the year across the top.

Better yet, you can design formulas for it, so that when you enter raw income and expense items for a month, the system will total them and show you graphically how the church is doing on its budget so far. This analysis can even take into account such factors as seasonal variations in individual items.

The only problem is running out of memory. Even a small church can fill the 1000 or so cells available on most Commodore 64 spreadsheets. Thus, you may need to combine similar items. The other approach is to use a general ledger program to prepare your reports. Unfortunately, the BPI general ledger I use is no longer sold in Commodore format. R

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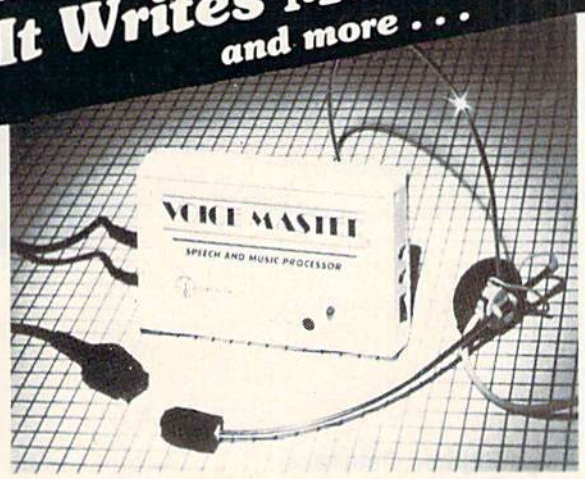
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High-Caliber Database

I have just finished typing in Mike Konshak's DFRestructure (November 1985), an addition to his original program, Datafile. It is your selection of this type of program and programmer that makes your magazine one of the leaders in its field.

As long as you publish programs of this caliber, you will have me as a subscriber.

Jack Wolfthal
Tamarac, FL

Double Your Pleasure

I recently received your ReRUN Productivity Pak disk and am delighted with it. You did a splendid job of putting it all together.

One of the main reasons I bought this first disk was because of your ad, wherein you listed the programs that were to be included on this disk. I knew what I would be getting, and it grabbed my interest.

Joseph Lippert
Locust Valley, NY

We are pleased to announce that ReRUN will now be published bimonthly. All programs published in RUN *will be made available to our readers on disk.*

Editors

Chess for Beginners

We appreciate your superb "A" rating for our product, Paul Whitehead Teaches Chess, in your December 1985 issue, but we feel the review missed an important point. It states that our program is "a terrific program for the serious chess player," but it is, in fact, aimed at the absolute beginner. Our more advanced products—Jeremy Silman's Complete Guide to the Openings, King's Indian Defense and the Najdorf Sicilian Defense—are meant for the experienced chess player.

The review concentrates on the Coffeehouse Chess Monster chess opponent program, our Sargon III-like program that is included free in each of our products, but it virtually ignores the unique part of our software—the Paul Whitehead tutorial, which contains over 40 hours of carefully organized chess instruction.

Finally, the review does not mention the Road Maps to the Whitehead tutorial, which we provide with each package; they show at a glance the intricacies of the tutorial.

As publishers of educational software, we must take it as our own failing that the reviewer did not understand our product. Our success with elementary, junior high and high school students in California, however, tells us that it does work for the absolute beginner.

Martin Marshall, President
Enlightenment, Inc.
San Franscisco, CA

Error-Free Programs

As an officer of the Capitol Region Commodore Computer Club and one who is familiar with all Commodore publications, I find that only *RUN* gives me a very high (almost 100%) working-program rate and is now the only magazine from which I routinely type in programs.

Your C-64 Perfect Typist checksum program works very well indeed, and makes typing programs from *RUN* even easier. One can now type at greater speed and, by simply looking at the checksum, minimize the double-checking previously needed.

Ron Murphy
Tolland, CT

Improved Video Display

In "Video Monitors for Your C-128" (October 1985), Margaret Morabito discusses using the 1702 and states that she was able to use the 128's 80-column mode via a homemade cable. This is great! However, you can get a better display with less interference by replacing the microphone cable she uses with an RGU-59 or RGU-58 cable.

This cable is designed to carry the high bandwidths required for an 80-column screen. As such, the clarity is much better than when you use a microphone cable, which was designed to carry bandwidths of only about 50 kHz.

The cable is readily available at Radio Shack; even though it costs a bit more, you can still make a six-inch cable for about $12. The clarity of the display more than makes up for the difference in price.

Armando Canales
College Station, TX

I would like to thank all the sponsors who participated in The Great RUNaway Contest. I know I will have many hours of enjoyment making use of all the various prizes. I hope others in the future will be as lucky as I have been.

Michael Grazer
Brantford, Ontario
Canada

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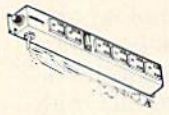


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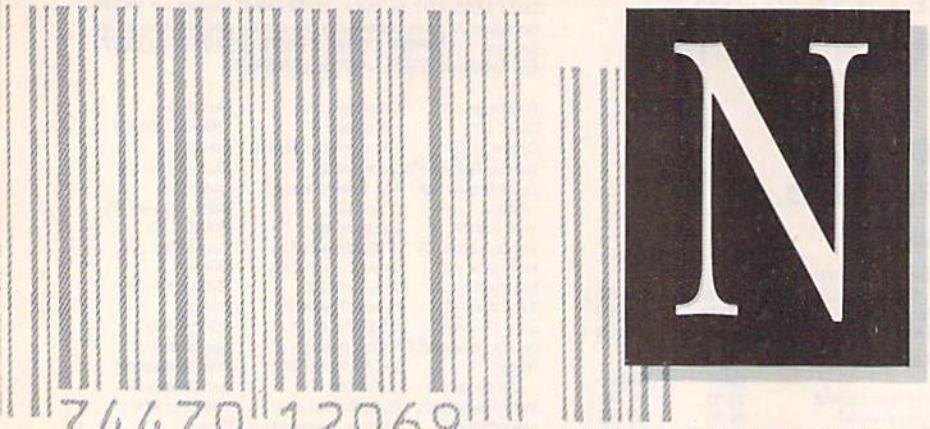
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Compiled by HAROLD R. BJORNSEN

Computer Movie

Eurosoft International (114 East Ave., Norwalk, CT 06851) announced the release in North America of Valhalla, a software game for the C-64 from Great Britain.

Using the Movisoft technique, which keeps the action going regardless of your involvement, Valhalla takes place in Nordic mythology and features 36 Norse characters.

During the pursuit of the lost treasure of Valhalla, you interact with each character, who either helps or hinders you, depending on his or her disposition.

Valhalla is available on disk for $24.95.

Check Reader Service number 400.

A Home for Your C-128

The 128-Command Center is a cabinet designed to hold the C-128, two 1571 disk drives and the 1902 or compatible monitor.

The command center includes a master on/off switch, six ac-switched outlets, system surge protection, ac line-noise filtering and a built-in cooling fan. Available for $149.95 from Iowa City Computer Consultants, 327 Bon Aire, Highway 6 East, Iowa City, IA 52240.

Check Reader Service number 403.

Zip

Zip, a business software package from Lawco (PO Box 2009, Manteca, CA 95336), can create a business plan for a small business or develop a complex business plan for a large corporation.

The program helps you to identify the best mix of objectives and projects; identify critical activities; print a business plan; and track activity and project costs.

Zip consists of a double-sided program, a data disk and a 63-page manual and is available for the C-64 for $99.95.

Check Reader Service number 404.

"Great Caesar's Ghost!"

First Star Software (18 East 41st St., New York, NY 10017) has released Superman—The Game, the first in its Super Powers Software Collection.

The game pits the Man of Steel against Darkseid, whose evil powers threaten the universe. You can select from three levels of difficulty and assume the identity of either Darkseid or Superman, as they can play against one another or against the computer.

As Superman, you use your super powers to prevent Darkseid from wresting the secret of the Anti-Life formula from his hostages. The game is available on disk for the C-64 for $29.95.

Check Reader Service number 413.

Solo Flight Revision

A new version of Solo Flight, the flight-simulation program from MicroProse (120 Lakefront Drive, Hunt Valley, MD 21030), now includes a more functional and easier-to-use cockpit, with a double-sized attitude indicator and a new instrument landing system. The latter is more accurate and provides a better graphics representation of your aircraft's position in relation to the desired glide scope.

The program also includes a night-flying option and 42 airports, with the addition of the states of Texas and Michigan and the Commonwealth of Massachusetts.

The instructor pilot has been given a voice of the same quality that is available in the company's speaking air-traffic controller simulator, Kennedy Approach. When you arrive at your local airport, you will hear the voice of Monique, the friendly tower operator, who will give you weather conditions and instructions for take-off and landing. Available on disk for the C-64 for $34.95.

Check Reader Service number 414.

New Income Tax Programs

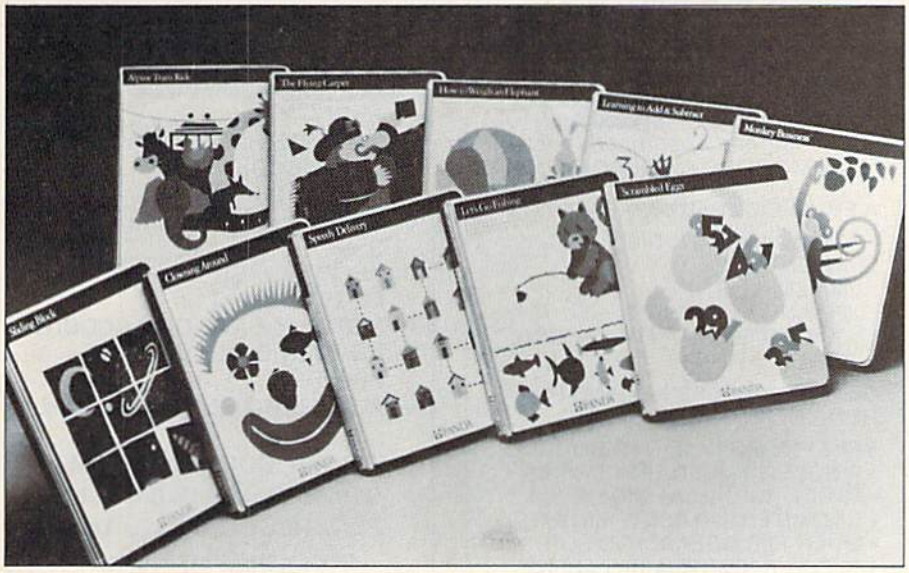
Northland Accounting (606 Second Ave., Two Harbors, MN 55616) has released the newly revised editions of the Taxaid series of income tax preparation programs for the C-64, VIC-20 and Plus/4 computers.

The programs were written by tax accountants and are designed for home use. These editions contain all the latest changes in the tax laws.

Taxaid comes with a manual that leads you step by step through the data entry. The program includes editing features that allow you to make changes and revisions at any time.

Calculations are automatic and all tax tables are built in. Taxaid will prepare any IRS form 1040. Updates for future tax years are updated annually. Available on disk or tape for $39.95.

Check Reader Service number 402.



New educational software, from Learning Technologies.

Educational Software

Learning Technologies (4255 LBJ, Suite 131, Dallas, TX 75244) introduces 20 new educational programs for the C-64.

The new programs, designed for children from preschool to eighth grade, teach prereading, memory and problem-solving skills and early math concepts.

In addition, each program offers a learning kit of supplemental learning aids. Each kit contains a full-color poster featuring characters from the programs; custom lesson plans that help define skills and learning objectives presented in each program; reproducible worksheets containing activities to support and extend the activities presented; and reproducible student-management charts to record students' progress. Each program is available on disk for $19.95.

Check Reader Service number 412.

New Bank Street Programs

Broderbund Software (17 Paul Drive, San Rafael, CA 94903) has released two C-64 programs.

Bank Street Mailer, a home-mailing program based on the format established in Bank Street Writer, is a complete correspondence system that lets you insert names and addresses in form letters, print labels and envelopes and sort by name, address and Zip code. The program is compatible with Bank Street Writer, Filer and Speller.

Bank Street Filer is a home-filing and report-generating program that lets you collect, explore, organize and manipulate data and print out custom reports. The program can be used with Bank Street Writer and Mailer.

Both Bank Street Mailer and Bank Street Filer are available on disks for the C-64 for $49.95 each.

Check Reader Service number 407.

Adventure Game

Elite is an intergalactic trading and combat game that combines elements of arcade action, flight simulation and adventure strategy.

As commander of a trading and combat craft, your task is to accumulate wealth and status by trading in 17 commodities on 2000 planets in eight galaxies, and deal with hostile spacecraft.

As you profit from trade and bounty, you can upgrade your spacecraft with extra cargo holds and equipment from defense systems.

Elite is available on disk for the C-64 at $29.95 from Firebird, PO Box 49, Ramsey, NJ 07446.

Check Reader Service number 401.

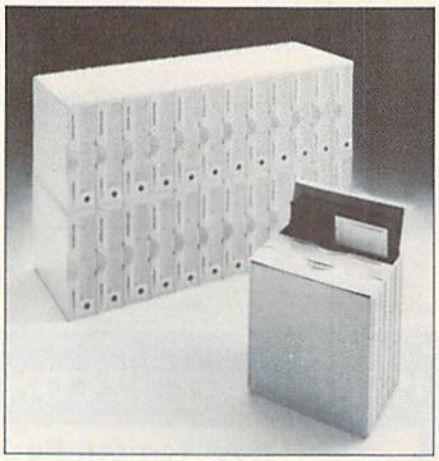
You'll Get a Kick Out of This

Joe Theismann's Pro Football (Avant-Garde, 37B Commercial Blvd., Novato, CA 94947), a computerized football-training tool, gives you advice on training and strategy in quarterbacking techniques, improves your overall football skills and helps you understand the finer details of the game.

Plays are choreographed with live-action diagrams. Stance, cadence, strategy, quarterback position and running and passing techniques are highlighted with close-up animation. Also, the program goes into the details of handoffs, pivots, the passing tree and how to beat defenses.

Pro Football is available on disk for the C-64 for $34.95.

Check Reader Service number 411.



Datafinder, a disk organizer from Datatank.

Where's My Disk?

Datatank (One Appletree Square, Minneapolis, MN 55420) has released the Datatank Datafinder System, a hardware storage and retrieval system for your 5¼-inch disks.

The system consists of modular boxes that interlock side by side or on top of one another to provide you with an ever-expandable storage area. A spring-loaded mechanism raises up to ten disks for easy access. Also, self-adhesive labels use color, letter and number combinations to index your disks.

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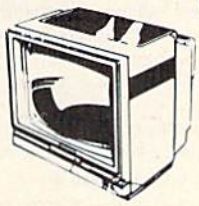
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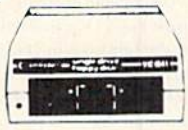
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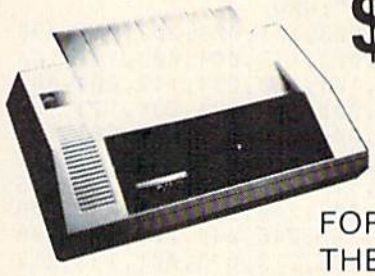
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How to Type in C-64 and C-128 Listings from RUN

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.

The RUNning Board also features a menu format that makes it easier and faster for you to select a specific section of the bulletin board. We use a standard protocol, 300 baud, one stop-bit, no parity, full duplex and a word length of eight bits.

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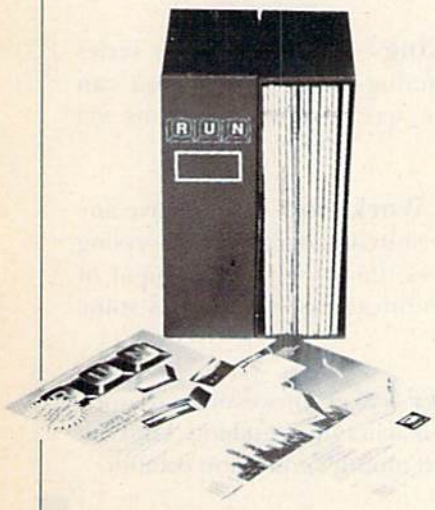
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April

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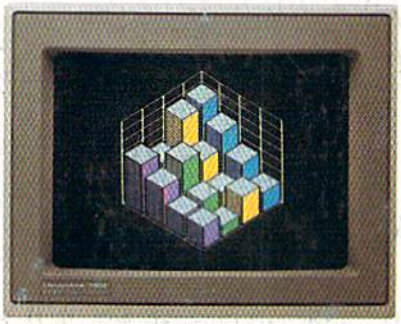
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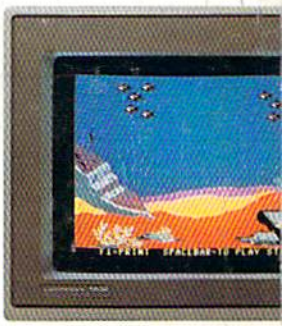
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