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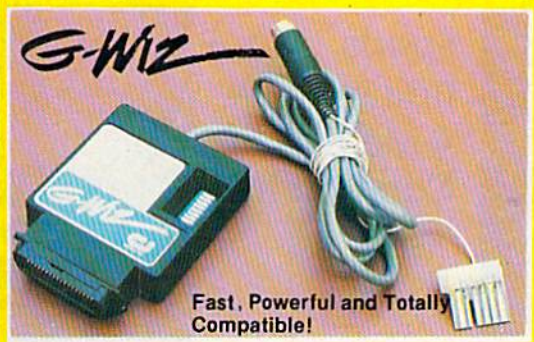

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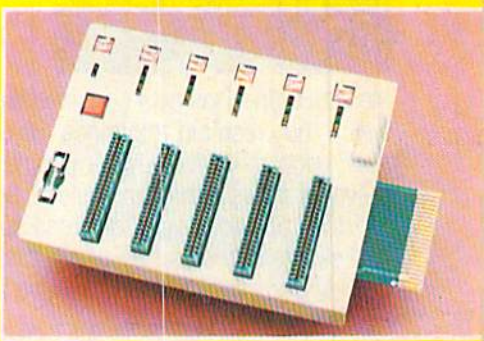

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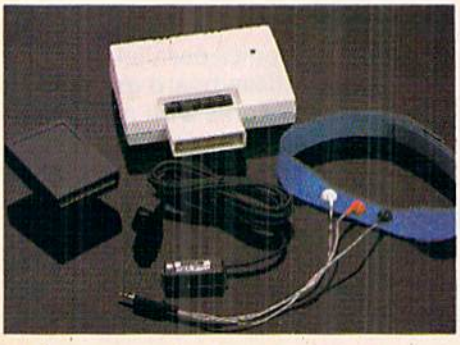

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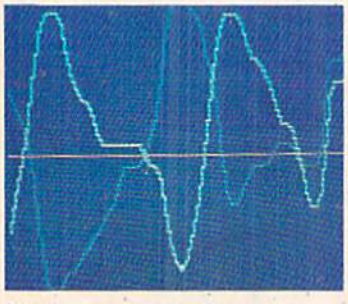

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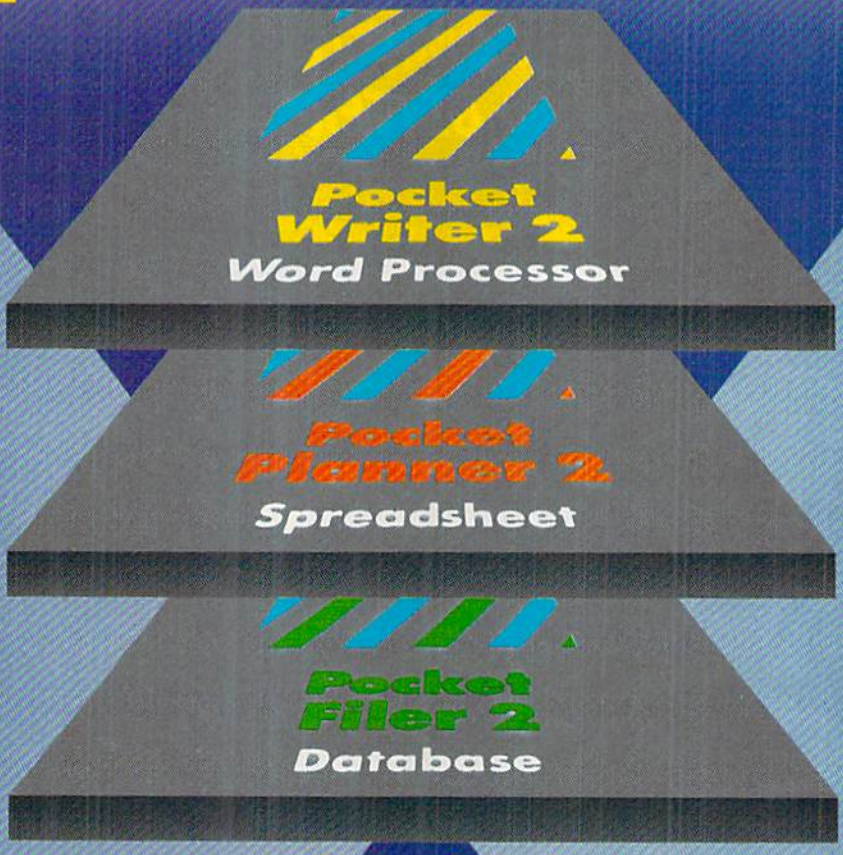

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CONTENTS

FEATURES

RUNNING RUMINATIONS 8
Welcome to our third annual special issue.

COMMODORE CLINIC *by Jim Strasma* 12
Answers to the most-often-asked questions on hardware, software and programming, compiled from three years of *RUN*'s monthly column—plus some questions and answers never before published. Over 200 entries.

MAGIC *by Jim Borden* 24
An invaluable collection of 255 hints and tips that will help you get the most out of your computing experience. A complete index of the Magic tricks, arranged according to 26 categories, begins on page 134.

SUPER MAGIC 34
Some special Magic tricks, straight from the experts.

***MIND YOUR MORTGAGE** *by Robert Kupfer* 39
You may be surprised at how much your mortgage is costing you when you analyze it with this program for the C-128.

***THE LIGHT CHOICE** *by Bob Guerra* 42
Highlighted menu options will make your 128-mode programs easier to use and more attractive to view.

***ADD CALC 128** *by George Noeth* 46
It may not fit in your pocket, but your C-128 can still be a mighty handy printing calculator. You'll also find this program helpful for learning about Basic 7.0.

***LOTS OF LABELS** *by Chris Achtschin* 50
If you need lots of labels, but all with the same address, this C-64 program is for you.

***ENVELOPE MAKER** *by Michael Broussard* 54
Let this C-64 program create envelopes in the size you need, complete with a neatly printed address.

***MASTER MENUS** *by Jim Pellechi* 58
An eye-catching main menu display will start your C-64 programs off with a flourish.

PLUS: PROGRAMMING POSTER INSIDE

INDEX TO MAGIC TRICKS 134

HOW TO TYPE IN LISTINGS 136

***RUN*'S 1986 INDEX** 138
A complete listing of all the articles and reviews we published last year.

LIST OF ADVERTISERS 144

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RUN (ISSN 0741-4285) is an independent journal not connected with Commodore Business Machines, Inc. *RUN* is published monthly by CW Communications/Peterborough, Inc., 80 Elm St., Peterborough, NH 03458. Phone 603-924-9471. Second-class postage is paid at Peterborough, NH, and at additional mailing offices. Canadian second-class mail registration number is 9565. Subscription rates in U.S. are $19.97 for one year, $29.97 for two years and $41.97 for three years. In Canada and Mexico, the one-year subscription rate is $22.97, with U.S. funds drawn on a U.S. bank. Foreign subscriptions are $39.97 for one year, with U.S. funds drawn on a U.S. bank. Please inquire about foreign air mail subscription rates. *RUN* is nationally distributed by International Circulation Distributors. **Postmaster:** Send address changes to *RUN*, Subscription Services, PO Box 954, Farmingdale, NY 11737. (Send Canadian changes of address to *RUN*, PO Box 1051, Fort Erie, Ontario, Canada L2A 5N8.)

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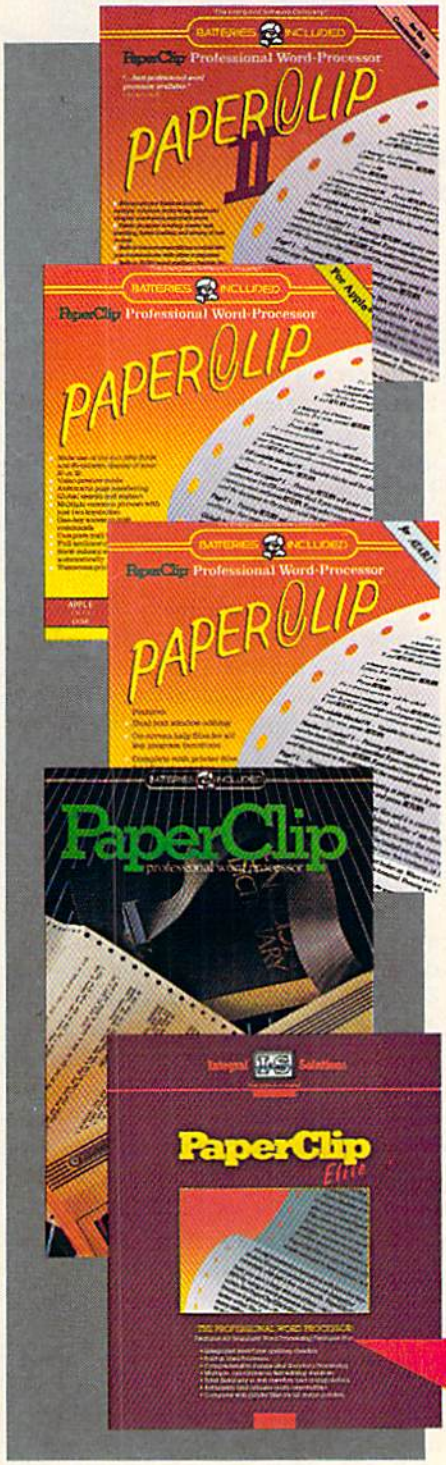

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RUN's Special Issue: 1987

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This issue is designed to help. It brings together some of the best of *RUN* with plenty of new information—all conveniently organized and categorized according to topic, so finding the material you want is easy.

This marks the third consecutive year that we've published a *RUN* Special Issue, which has become highly acclaimed in the computing industry as a valuable reference source. We think that this year's publication is the best yet.

To assure this, we solicited some of the best talent in the Commodore industry to contribute to this issue. We've kept the most popular features of previous years and added new features, which are sure to capture the needs and interests of both C-64 and C-128 users.

The lineup includes:

—Commodore Clinic. In response to requests from our readers, this year's issue spotlights the best of Commodore Clinic, *RUN*'s helpful column compiled by *RUN*'s answer man, Jim Strasma, one of the most-read experts in the field. In this issue, Jim has compiled the best, most-often-asked questions and answers of the past three years, many of them updated. Also included are 20 items of previously unpublished material.

About three-quarters of these questions are 64-related, but, with more than 200 entries in this column (some 40 published pages), C-128 enthusiasts will find plenty to cheer about. Jim (with some able assistance from his wife, Ellen) has organized this material according to category and has covered the main areas of computing—disk drives, printers, monitors, power supplies, keyboards, debugging and entering programs, etc. If you have a question about Commodore computing, then it's probably answered here.

—Magic. Each year *RUN*'s readers look forward to the compilation of Magic tricks in the special issue. Well, this issue won't let you down.

Master programmer and all-around computing wizard Jim Borden has selected page after page of computing hints and tips—about 225 of the best tricks published in 1986, plus some 30 never-before-published gems generated specifically for this issue. For your easy reference, these tricks, which have been revised and updated where necessary, are indexed and organized by topic.

—Free Wall Chart. A trademark of *RUN*'s special issues is the pull-out wall chart, which this year features intermediate programming information not readily found in manuals. This visually attractive wall chart includes, among other information, memory maps to acquaint readers with the structure of Basic 2.0 and Basic 7.0.

We've also added another twist to this year's chart. On the back of the poster you'll find some neat artwork. Be sure to check it out and let us know your reaction.

—For applications users. New this year is a section of useful utilities and applications programs. These brief, one-page program listings will be easy for anyone to type in, save and add to his or her software library. The programs include disk and printer utilities, as well as useful applications for the home. For C-64 and C-128 owners.

—In addition, we have asked some of the biggest names in the industry for their contributions to the Magic section. They provide some of their favorite and most useful computing hints and tips that you'll be able to use and call your own.

—*RUN* magazine contains a wealth of reference information that doesn't quickly lose its value to readers. We provide in this Special Issue an index that references already-published *RUN* programs and articles that readers can refer to for more information about a particular topic.

Whether you're a newcomer or a long-time computerist or a newcomer to the world of Commodore computing, you'll find plenty of valuable material in this 1987 edition.

Programmers, applications users, new owners, or experienced users—there's something here for everyone—introductory material, useful applications and utilities, valuable programming information, reference material, computing hints and tips, and answers to questions—all well-organized and attractively packaged in a special issue that you won't easily put down and will refer to throughout the year. **db**

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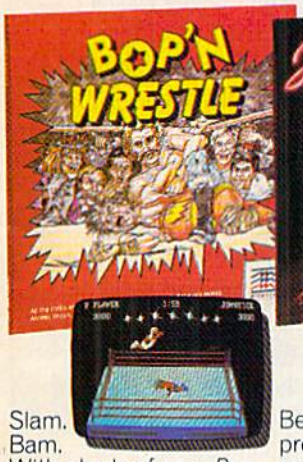

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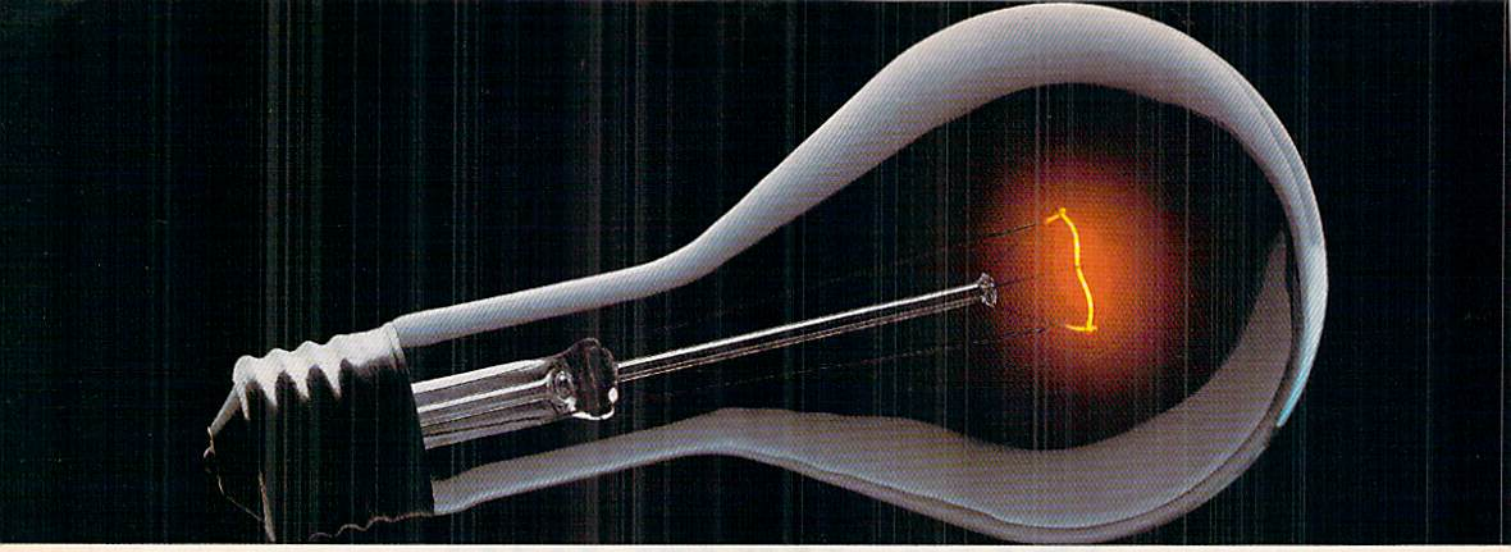

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COMMODORE CLINIC

For the first time, *RUN* is including in this special issue a selection of over 200 of the best items from three years of Jim Strasma's popular question-and-answer column, Commodore Clinic. Divided into categories dealing with software, programming and hardware, these responses to readers' questions by an outstanding Commodore expert deal with a myriad of problems commonly encountered by Commodore users. The table of contents is your guide to the topics covered within each general category. We hope you find much information that's of value to you.

COMMERCIAL SOFTWARE

1. GENERAL 14
2. BUSINESS PROGRAMS 16
3. EDUCATION AND ENTERTAINMENT 20

PROGRAMMING

4. DEBUGGING 21
5. ENTERING PROGRAMS 63
6. BASIC 67
7. DISK AND FILE HANDLING 73
8. LANGUAGES 77

HARDWARE

9. COMPUTER PARTS AND CONNECTIONS 79
10. INPUT DEVICES 81
11. DATA STORAGE DEVICES 82
12. VIDEO OUTPUT DEVICES 87
13. PRINTERS 89
14. NETWORKING/CONTROLLER DEVICES 90
15. SPECIFIC COMPUTERS 92

By JIM STRASMA

ILLUSTRATED BY BOB ZUBA

SOFTWARE

1. General

Q: What is public domain software and how do people get hold of it?

Steave Trelut
Greeley, CO

A: Public domain programs are software donated by programmers for the use of other computerists. The programmers are not interested in marketing their software commercially. It's free, except for a nominal charge for the media on which the program is stored, as well as packaging and shipping costs. There are thousands of such programs, including some of the best-known utilities, such as Micromon.

The easiest way to get such software is through a Commodore user's group. Most now have dozens, if not hundreds, of disks. The Toronto, Ontario, PET User's Group is special in this regard. It is the largest user's group in the world, with a correspondingly huge library that is nonetheless reasonably well organized and documented. It accepts associate memberships from anywhere and ships disks of public domain programs all around the world.

Q: I am a 61-year-old man with an MBA and an EE degree, so you might say I have at least average intelligence. For almost three years I have had a C-64, with disk drive, printer and monitor. During that time, I have had exactly zero seconds of useful work out of the machine, simply because everyone wants me to learn how to program in order to put the machine to work. All the computer jargon is confusing, and I haven't found a dictionary to tell me what it all means.

I don't really want to be a hacker (whatever that is), but I would like to have a machine I can use to do a specific job. Is there a way I can learn the machine, or should I just throw it in the trash barrel (because so far that's all it's been good for)?

George Blume
Wichita, KS

A: First off, thanks for writing, and you're not alone. Although computers are advertised as "easy to use," they aren't yet—at least not compared to a toaster, thermostat or automobile. The problem is, as you have said, that computers need to be programmed before they can do anything useful. Fortunately, you can buy commercial programs that already know how to do what you need done.

When my wife's father was similarly frustrated with his C-64, we solved the problem with a Write Now! cartridge (a pre-written program in a box), made and sold by Supra Corp., in Albany, Oregon.

To use it, my father-in-law only had to plug it into the back of the computer and then turn on the computer. The rest was automatic. Briefly, it turned his C-64 into a fancy typewriter, something that almost anyone would find useful.

Since you already have several hundred dollars invested in your system, I recommend you ask or hire someone who's familiar with the Write Now program to come over to your house for an hour, set up your system to use the program and show you how to get started. Cardco can sell you the cartridge and recommend someone to help you begin using it, perhaps from a local computer user's group.

You needn't throw out your computer; you only need to spend a bit on a specialist, just as if you had car trouble.

Q: I want to purchase some foreign language software written and marketed in West Germany. Can you tell me if the software will run directly on my equipment here in the States without any electrical modification?

Brooks Haderlie
Columbus, OH

A: Yes, it will work just fine here. I've received disks and cassettes from all over the world and have had no trouble using any of them on U.S. equipment.

Q: Are the programs listed in books and magazines public domain, and can I copy them to sell?

Steave Trelut
Greeley, CO

A: No, programs in books and magazines are not usually in the public domain, and you very definitely may *not* sell them, even for a small copying fee. Most magazines do this for the protection of their authors, rather than their own profit.

Q: On several occasions in reading RUN, *I have come across the phrase "copy-protected disk." What does this mean?*

R. Gangadharan
Flushing, NY

A: It a polite way of saying a disk has been altered to make it difficult to duplicate. The purpose is to keep people from giving away copies of the programs on the disk.

Q: Is there any way to tell if a commercial disk-based program is not reproducible before using the 1541 backup? Will repeated insertions and removals shorten the lifetime of the disk?

Stan Goldrich
New York, NY

A: If a commercial program is copy-protected, most reputable firms say so, either on the disk label or early in the program manual. A full service dealer will also usually know. Some reviews now list whether programs are copy-protected.

As for ways to check, try loading the directory first. If it looks at all unusual, odds are the disk has been protected. Similarly, try loading the program normally and listing it. If you can't, that's a big clue. Beyond that, don't mess. Most other things you could do might be interpreted by the program as attempts to break it, and the program may self-destruct.

Any wear will shorten the life of a disk a tiny bit. That why it's good to check on the price and availability of spare disks when buying important programs.

Q: I would like to sell, as a plug-in cartridge, a program that I have written. How can I get it mass-produced? Should I have the program copyrighted? If so, how?

Curtis Finke
Evansville, IN

A: Several companies will gladly sell you EPROM burners to convert your program into ROM form. Two with which I am familiar are the Prom Queen from Gloucester Computers

(1 Blackburn Center, Gloucester, MA), and the Promenade from Jason Ranheim (580 Parrott, San Jose, CA). To complete the process, you will then need cartridge shells, available from Eastern House Software (3239 Linda, Winston-Salem, NC).

Recent court decisions suggest ROM-based programs can now be copyrighted, so long as they claim to be so. Therefore, be sure to include a copyright notice, such as "Copyright 1985 Curtis Finke, all rights reserved" both in the code stored in the ROM and on the outside of the ROM and cartridge. That should be enough to copyright your program. However, you can gain some advantages in a lawsuit to enforce your copyright if the copyright has been registered.

For official forms to do this, anyone may write to the following address, requesting Form TX, or call the telephone number any time, 24 hours a day.

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202-287-9100

The form will be sent at no charge, in about two weeks. Actual registration will cost $10. If you have other questions for the copyright office, you'll need to call a different number, 202-287-8700, between the hours of 8:30 AM and 5 PM.

Q: Is it true that software companies are creating new products that cannot be loaded by the Indus GT disk drive because these disks contain codes meant to prevent duplication?

Alan Ludwig
Staten Island, NY

A: Yes, it's true, although that wasn't the companies' intent. In trying to prevent even skilled programmers from duplicating their disks, several companies have used non-standard disk commands dependent on the precise ROM in the Commodore 1541. Some of these programs won't even run on Commodore's 1571 drive, let alone on Commodore-compatible drives like the Indus.

The only solution is not to buy copy-protected programs you can't return. Personally, I go a step further and don't buy copy-protected programs at all. That allows me to use any disk drive I like.

Q: Is it all right to shut off your computer when the drive is booting up a program?

Tim Brend
Aubern, IA

A: Usually, but not always. Disk drives are used for two main chores: reading and writing information. To safely shut off your computer during the start-up operations of a program, you must know which of the two chores the disk is performing when you shut it off. Turning off your computer while your drive is reading a disk harms nothing; turning it off while your drive is writing to a disk could result in a ruined file, which in turn could mean an unusable program. Fortunately, very few programs attempt to write information to the disk during their start-up operations.

Also, when you shut off the computer, do not shut off the disk unit until you have first removed the program disk from the drive. Turning off most Commodore disk drives with a disk inserted in the slot and the access door closed alters the data under the read/write head at that moment, often rendering the disk useless until it is reformatted.

Q: I am thinking about buying a Fast Load cartridge from Epyx. I want to know if it would be all right for my 1541 drive. I am worried that my drive might overheat or break from all of the pressure on it.

John Bumstead
Upland, CA

A: In general, Fast Load and other similar speed-up cartridges will work and won't hurt your disk drive. However, there are two possible problems. One is that the power supply in some 64s is barely adequate, and the added power consumed by even a cartridge like Fast Load could send a marginal power supply over the edge to failure after extended use. If that happens, upgrade the power supply, and it won't happen again.

The other problem readers are reporting is that Fast Load is still not entirely compatible with all programs that use the disk, particularly some commercial programs that write relative datafiles. If you attempt to use Fast Load with such programs, you may lose all the data on that disk without warning. Therefore, I suggest using Fast Load and similar speed-up programs to quickly load programs, but not to write programs or files back to the disk.

Q: Is there any way to get a directory of the programs that are on a cassette? Can I use the Disk command and change the 8s to 1s?

Tim Winn
Spring, TX

A: To see a list of the programs that are on a cassette, type VERIFY "Q" alone on a blank line, and press the return key. (If you have a program named "Q" in your collection, change "Q" to an unused name.) As each program name is found by the cassette, it will be displayed, until either the tape runs out or an end-of-tape signal is encountered.

Unfortunately, the disk directory command, LOAD"$",8, can't be altered to work on the cassette. This is because there is no directory as such on a cassette to be loaded.

Q: Could you tell me how to end a software package if the menu doesn't provide for a "Quit" option? I have a quick-load disk that will "quit" when the shift/run-stop keys are pressed.

J. Norwood
Pacifica, CA

A: Make sure the disk drive activity light is off, remove the disk, and shut off the machine. Also try pressing the stop key, first alone, then in combination with the restore key.

If these fail, you can quit on the C-128 by pressing the reset button on the right side of the computer (next to the power switch), although you may need to remove the program disk to keep the program from immediately restarting.

Companies sometimes leave out quit options to keep unskilled users from accidentally exiting a program, but I, too, prefer programs with an explicit exit.

2. Business Programs

Q: How do I anticipate printer incompatibility problems with word processor or spreadsheet software? Also, should I run a serial or a parallel printer on my 64? Why?

Kenneth Benson
Columbia, SC

A: The surest way to avoid compatibility problems is to buy the software first, and buy the printer recommended by the creators of the program. Next best is to buy a Commodore printer, because nearly everything for the VIC or 64 supports them.

If you will be buying the printer first, try to interface it via the serial bus, so it will look as much like a Commodore printer to the computer as possible. Also, look for programs that allow you as many choices of printers as possible. For example, PaperClip (from Batteries Included) goes out of its way to work with almost any printer.

As for the type of connection, parallel printers can be a bit faster than serial printers and cost a bit less, but they are also harder to connect to the computer from more than a few feet away.

Clouding the issue is the fact that the VIC and 64 don't support either one without added hardware or software. This currently tilts the balance in favor of parallel printers, which (surprising though it seems) are usually interfaced to the serial bus via smart interfaces, such as Cardco's Card/?. Serial printers are usually connected via the user port. That port works well, too, but it is rarely supported by commercial software.

Q: As a novice shopping for my first computer, I was advised to avoid the Commodore 64 computer if planning to do word processing, because the screen shows only 40 characters while the paper has 80. (What you see is not *what you get.) Is there a way to have an 80-column screen with the 64?*

Estes Gregory
McCall, ID

A: No, there isn't, without a special hardware adapter. But, to offset the limitation of the 40-column screen, the best word processors for the 64 have an 80-column preview option that lets you view your document on screen almost exactly as it will appear on your printout. You'll find this method works quite well for even the largest documents, making Commodores among the most reasonably priced and best small computers for word processing despite the 40-column limitation.

Although good 80-column hardware adapters are also available for the 64 and are compatible with some of the best word processing programs, if you really want 80 columns all the time, you will be happier with the Commodore 128.

Q: I have a 64, a 1541 and a Gemini 10X printer. I have been able to customize the Armenian alphabet on the 64 and download it to the Gemini 10X. These programs will be used by a local church to send out their monthly mailings. Is there a word processor that will accept the customized alphabet?

David Handelsman
Philadelphia, PA

A: The most elegant solution I've seen to this problem is offered by WordPro 64 for the C-64, and the even more advanced WordPro 128/S for the C-128, from Pro-Line Software, Mississauga, Ontario. Each allows you to define ten special characters for both the screen and the printer. The net result is custom characters on both the screen and printer that look exactly like you want them.

Q: I have a C-64 and Easy Script. I bought a Gemini 10X printer, and connected it via a Connection interface, but have been unable to make it work. When I select the MX-80 option in Easy Script, I get only graphics. Would you please advise me?

Omar Barriga
Columbus, OH

A: Your problem is in the settings of The Connection's switches. It has an ASCII code corrector switch, to make upper- and lowercase come out correctly in program listings. Easy Script also includes a correction for the same problem when you choose the MX-80 printer option. The two fight each other, and you end up with graphics. Turning off the ACSII correction option in The Connection will solve the problem. Reader Robert Callard suggests the following:

1. There are two switches under the lower right-hand corner of the label on the Connection. Turn both off.
2. Load Easy Script.
3. Select the MX-80 printer, then Serial.
4. Now press F3 and the return key, followed by sa7 and the return key. This establishes a secondary address of 7, needed for lowercase.

Q: The Easy Script manual indicates that to abort printing you should press the stop key. I have tried both holding down the stop key and pressing it quickly when material is in the buffer of my Commodore 6400 printer, but aborting does not take place. Do you know a way to abort printing?

Robert Smolich
Canton, IL

A: My 6400 has a 2K buffer, which works out to about half a page of text in practice. Once your printout reaches the buffer, it is no longer under Easy Script's control. Pressing the stop key at that point, whether quickly or at length, can only prevent Easy Script from sending any more of your document to the printer, not cancel the printing of the 2K of material already there.

One solution is patience—having pressed the stop key, sit back and wait for the buffer to empty, in 30 seconds or so. Another solution is to press the stop key and then turn the printer's power switch off and on for about five seconds. That will definitely flush the buffer, for a net gain of 25 seconds and a half sheet of paper.

Q: When I try to print out linked files using the PaperClip word processor, the printer prints the first file and loads the second file. The Print format commands are then lost or ignored. Consequently, page 2 begins printing on page 1. I would appreciate help on this.

Alexander Pollatsek
Eugene, OR

A: The problem is most likely that you have duplicated your format commands at the start of each file. That isn't necessary, and can confuse not only PaperClip, but also several other popular word processors. When using linked files, put format commands for such things as page

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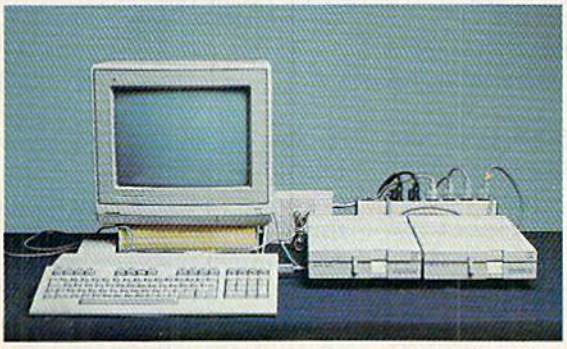

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length only at the start of the first file. From then on, use format commands only when you need to make a change, and limit the command to the setting being altered.

Q: I'm the proud owner of a C-64, Cardco +G interface, Star SG10 printer and WordPro 3+/64. Can you tell me about an interface that would give me the ability to print and continue working on the screen while printing?

Diana Fuson
Port Charlotte, FL

A: The feature you want is called a print buffer. Alpha Omega Computer Products, of 18612 Ventura Blvd., Tarzana, CA 91356 (800/874-0596) makes a neat 6K buffer that attaches to any printer, with a Centronics parallel port (including your Star SG10) for $101. (They also have a 128K version for $175.)

Q: I am planning to buy WordPro 64, but I find this problem with word processors: They sometimes leave too much space between words when you justify the margins, making words look too spread apart in the line. How can I avoid this, so text looks more compact?

Jose A. Alvarez
St. Croix, VI

A: WordPro 64 offers two features to help alleviate this problem. First, you can insert a conditional hyphen into long words as you type them. (Simply press the shift and hyphen keys.) This tells the word processor where to hyphenate the word if it falls at the end of a line when displayed or printed. This leaves less unwanted white space in such lines and can make a huge difference in the neatness of printouts from many popular word processors.

The other way WordPro 64 fights excess white space is by providing true proportional spacing in final printouts. This means that instead of inserting the extra spaces needed to justify margins only between words, much smaller spaces are added between each letter in the printout (called microjustification), and more space is allotted to wide letters like "w" than to narrow ones like "i." This is an advanced feature and requires an equally advanced printer to work properly, so you may need to choose a compatible printer at the same time as your word processor.

Q: I own a Supra Write Now! word processor and think it is great, but could you explain why I get double or triple spaces in between words when there are only single spaces on my television screen?

Joe Rambaldi
Belleville, NJ

A: Those extra spaces are put there by your word processor to make the right margin on your letters as smooth as the left margin. This process, called right-justification, is meant to give you even margins, thus improving the appearance of your printout.

Q: I bought a C-128, 1571, 1902 and Panasonic 1091 and the Timeworks DM128 program so that I could print out a list of all the records I have recorded on cassette tape. I need to print a record for each of my tapes, and them sort them in alphabetical order by song or artist. There are about 50 records, each containing approximately 38 songs. To my despair, Timeworks DM128 can only sort a maximum of 10 fields; I need to sort at least 38. I called Timeworks, who suggested I make a record for each song, then sort by that field; but then I cannot print out a list of songs for each cassette. Is there any program that will do what I want?

George Campbell
Lancaster, CA

A: Do as Timeworks suggests, but add a field for tape title or tape number and sort on that when you want to see or print all of a tape's contents.

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 Supra'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.

Q: I have to call long distance to access CompuServe. The cost is $78 an hour for the phone bill alone. Is there a way around this outrageous phone bill?

Rick Strubell
Moodus, CT

A: Yes, you should be able to cut that bill down a lot. Even here, in the boondocks, I can call CompuServe for under $20 an hour. One trick is to call when rates are lowest, after 11 PM, before 8 AM, and on Saturday and Sunday before 5 PM. Another trick is to find the cheapest way to call CompuServe. You can access it much more cheaply via local phone numbers provided in many large cities by CompuServe, Tymnet, Telenet and similar services, rather than by dialing directly to CompuServe's home in Columbus, Ohio. You may also find that it's cheaper to call across state lines than within your own state.

Finally, an "alternative" phone company, such as MCI or GTE Sprint, may offer low-cost, long-distance ser-

vice in your community. CompuServe will be happy to give you suggested access numbers, and your phone company can tell you which of those numbers would be least expensive to call, plus whether an alternative phone company offers service in your area.

Q: I am 12 years old and recently bought a modem. I know the computer number to CompuServe and Dow Jones, but I am getting bored with them. Do you know of any computer numbers in the Northern California area that are fairly interesting? Maybe a bulletin board controlled by a boy or a girl my age? And maybe boards I have to break a code to get into because I like the challenge?

Scott Kirn
Cloverdale, CA

A: Let me head you off right now about one point you made. Regardless of the challenge involved, it is just as illegal to break into someone else's computer as it is to break into his home. It could very easily lead you to a police record and a ruined future. If you're getting bored with CompuServe, perhaps it's time you got serious about learning to program your computer.

Start with Basic, Logo or Comal, then dig into machine language, Pascal, C and, perhaps, Forth. Next, put that knowledge to use helping people, perhaps as a volunteer programmer for a church, school or charity. I guarantee you won't be bored with your computer once you learn more about it and use that knowledge to benefit someone other than yourself. Volunteer work will also help you find friends now and a real job later.

As for finding bulletin boards you can call legally, *The Complete Commodore Inner Space Anthology*, by Karl Hildon, includes a list of 39 boards in your area code that you'll never have to apologize for calling. The anthology is available from Transactor Publishing, 500 Steeles Ave., Milton, Ontario, L9T 3P7, Canada.

Q: I recently bought a VIC-Modem for my VIC. When I call my computer club's bulletin board modem, it prints weird characters. Everything is set correctly (baud rate, duplex, stop bits, etc.). I thought it was my modem, so I exchanged it, but still had the same problem. I called another modem and it was the same. I thought it was my computer, so I bought a 64, and it is still the same. Can you give me any advice?

David Cardoza
Clovis, CA

A: You didn't mention what terminal program you are using, but I would guess that your problem is either that the program is sending PET ASCII characters to a board that is expecting True ASCII, or that it is sending True ASCII characters to a board that is expecting PET ASCII. If uppercase letters are printed properly but lowercase letters are altered, this is your problem. Some terminal programs offer a choice of character sets. If yours does, try the other setting.

Another possibility is that your parity bit is set incorrectly. It must match the parity setting of the bulletin board you call. Try Ignore, None, Even, Odd, Mark and Space and see if that cures the weird characters. Similarly, your modem can be set for different character lengths, from 5 to 8 bits. It is important to match the length used by the remote system, usually 7, but sometimes 8. If your word lengths differ, that can alter the characters received.

I'd suggest having someone in your user's group who has used the club bulletin board come over and help you make your first call. That's what computer clubs are for.

Q: I own a 64 computer and have recently purchased an automodem. I wish to set up a free community bulletin board system. Are there any specifications or any registries that I would have to fill out? If so, can you tell me how I can contact these authorities?

Chris Armstrong
Waukegan, IL

A: Until recently, you were supposed to report the purchase of the modem to your local telephone company. Officially, they wanted at least two numbers from it, including its FCC-registration number and its ringer-equivalence number. I say officially, because many phone companies no longer care about the numbers and would rather not be bothered with them. But have them handy should they ask.

Theoretically, the phone company could also use the modem as an excuse to charge you a higher phone rate, although earlier attempts to do so were successfully resisted in Oklahoma. On the other hand, if your phone company offers an incoming-calls-only service, your BB line could be even cheaper than your regular line.

One other warning. You, as system operator (sysop), will be responsible for anything illegal that appears on your bulletin board, so keep it cleared of such things as copyrighted programs or information on how to illegally access the phone system, or your next call could be from the FBI or a software company's lawyer.

Q: I have a number of C-64 Multiplan files that I'd like to keep and use if I buy a C-128 and the new Epyx Multiplan. Could I use them without retyping all the information? How about on the Amiga?

J. J. Shawcroft
Seattle, WA

A: Microsoft's Multiplan, like many spreadsheets, supports a standard way to export data to other programs and import it from them as well. In Multiplan, this feature is called SYLK files. They can be used to send data to any version of Multiplan via a terminal program and modem, or straight through the RS-232 port in cases where the disks are not directly compatible, as in moving C-64 files to an Amiga.

Q: I have the Wordcraft 20 word processor on cartridge for my VIC. Is there any way I can use it on a C-64?

Joan Ramos
New York, NY

A: You can't use Wordcraft 20 on a C-64, but there is a Wordcraft 64 as well—a British product from Peter L. Dowson of Dataview, Ltd. Hugh de Glanville, editor of the ICPUG user's group newsletter, is listed in its January 1986 issue as the contact for ICPUG members wanting Wordcraft. His address is 45 Woodland Grove, Weybridge, Surrey KT13 9EQ, England.

Although UMI, the original U.S. distributor of Wordcraft 20, is no longer in business, I seem to recall that another U.S. distributor took the

program on later. I can't recall what company it was. Does anyone know?

Q: I've just purchased a C-128. What version of WordStar will work in its CP/M mode?

Jim Kalin
Matherville, IL

A: Commodore used WordStar 3.3 in prerelease testing of the C-128, and as far as I can tell in brief testing of my own, it works well. It seems to differ from other versions of WordStar only in adding the words "Commodore 128" to the configuration description on the second screen.

3. Education and Entertainment

Q: Is there any program for the C-64 to facilitate learning German?

Clarence Jorgensen
St. Augustine, FL

A: Reader Jeff Collins reports those interested in programs that teach German on the C-64 can contact Micro Learningware (Box 307, Mankato, MN) for his German Packages I, II and III.

Q: I am looking for software that may be useful in college algebra, physics and trigonometry. I am particularly looking for programs that will analyze problems, showing complete solutions, rather than just the answers.

Henry Dove
Atchison, KS

A: Commodore programs suitable for use in college are embarrassingly scarce. The only college-level program I can recommend is CBS Software's Quadratic Equations, from their "Success with Math" series. It is an excellent program and does what you ask.

One other program worth mentioning for college use is Commodore's Sky Travel, which is a fully functional planetarium. I consider it a must for astronomy classes at any grade level. It is so well done that such classes can justify buying a 64 just to use it.

Q: We are looking for a program that will allow us to enter a musical score (melody only) and have the computer transpose as necessary, add a simple four-part harmony, and print the result to a dot matrix printer. Actually playing the music is not that important. Any suggestions?

George Murray
Washington, NC

A: Several music programs for the C-64 allow you to play music through an accessory keyboard or type it in at the computer keyboard, store and edit the result, then print it out. A few are also able to automatically transpose music from one key to another. However, I still haven't heard of a program that can compose harmony to go with an entered melody. The June 1985 issue of *RUN* includes reviews of over a dozen good music programs, at least one of which should get you started.

Q: I recently received a practical gift for my 64—the program Print Shop. However, my MPS-802 printer is not compatible with it. Is there a solution?

Bruce Bracebridge
Purcellville, VA

A: I receive several letters a week from people who wish Print Shop were compatible with one printer or another. Unfortunately, your 802 handles high-resolution graphics differently from the Commodore printers supported by Print Shop.

No printer is 100 percent compatible with every program. Before buying either a printer or a program that uses a printer, be sure the compatibility you need is guaranteed. Better yet, test both together before you buy.

Q: I enjoy painting signs, and recently received a C-64 as a gift. Is there a program available that would allow me to make signs with differing letter styles, upper- and lowercase and Zoom capabilities?

Jim Hooper
Crescent City, CA

A: One program written especially for sign-painting is the Banner Machine, from Cardinal Software (13646 Jefferson Davis Highway, Woodbridge, VA 22191; 703-491-6502). It contains several different fonts and multiple sizes of letters. Using a dot-matrix printer, you can make signs of any desired length sideways on continuous-feed paper. Just be sure yours is among the half-dozen or so printers it supports.

Q: Is there a CAD (computer-aided design) program for the C-64 that would be close to, say, VersaCad on an IBM PC?

John Wardell
Bushnell, IL

A: I haven't seen VersaCad, but I found a recent review of it that convinced me it does (and costs) a good deal more than CAD programs available for the C-64, though not as much as AutoCad, the dominant PC CAD program.

Abacus Software offers two interesting introductions to CAD. One is CADPAK-64, a two-dimensional CAD program that manages up to 104 objects in a 320- by 200-pixel drawing surface, uses a light pen or the keyboard for input and a dot-matrix graphics printer for output.

The other, CADPAK-128, for the C-128 is even better, with graphic resolution of 640 × 360.

Q: I'd like a C-64 DOS Wedge program that would direct commands to disk drive #9. Any suggestions?

Margaret Matthews
Dallas, TX

A: Load and run the DOS wedge on your demo disk normally. Then simply type @#9 to shift succeeding commands to disk unit 9. This will remain effective throughout your current computer session unless you choose to change it again.

People writing about the DOS wedge on the C-64 often miss this command, because it was added after the original PET version.

Q: I have a C-128 with a 1571 disk drive, and I can't Dload locked files. My 1571 is an early unit. Do all 1571s have this bug?

W. Anthony Marsh
Somerville, MA

A: I, too, have a C-128 and an early 1571, and, yes, they refuse to load locked files via the Dload command, the Load command or even the monitor in 128 mode. They will, however,

happily load such files in 64 mode, meaning that locked files should be a problem only for programs that run in 128 mode. This also suggests that the "bug" could be in the C-128 Kernal ROM, instead of the 1571.

For those unfamiliar with the term, a locked file is one that cannot be erased with the usual Scratch command. A locked file is created by setting bit 6 of the file-type byte in the file's directory entry. A good way to set this bit is with a disk utility, such as Disk Keeper (*RUN*, August 1986). There's also a Basic routine that will do the trick on page 70 of the edition of the *Commodore 1541 Disk Drive User's Guide* that I wrote (Commodore part #1540031-03). A locked file can be unlocked by clearing the same bit.

Q: I own the VICMON cartridge, but I am having problems trying to store a byte (listing say ".byt $2c"). I tried to use the Fill command, but I could not get it to work. How should I do it?

Randy Quillen
Neah Bay, WA

A: The syntax to make the fill command put a byte $2c in location $1000 (for example) is:

```
.f 1000 1000 2c
```

(with the leading period already supplied by VICMON as a prompt).

However, I would do it with the Memory command instead. Besides displaying the current contents of a part of memory, the .m command allows you to move the cursor up and over to a byte, change its value and hit the return key to enter the change in memory. For example, in your case, you might see:

```
.m 1000 1001
:1000 aa aa aa aa aa aa aa aa
```

You would then simply change the first $aa to $2c as shown:

```
:1000 2c aa aa aa aa aa aa aa
```

This method is still a bit cumbersome, but to improve on it, you'll need a full assembler, rather than the mini one in VICMON.

Q: The program Disk Master ("Disk Master Revisited," RUN, February 1984) was just what I needed. But since I had many disks before the Disk Master program came out, I need to change their disk names and ID numbers for the program to work. Can you suggest a way this can be done?

Jean Weitzel
Painesville, OH

A: Yes, but you won't like it. Copy each disk entirely onto a fresh disk with the name and ID number Disk Master needs. You can do this with a dual disk drive, or two single disks and a program like Copy All on Commodore's bonus disk, or by using a single disk, with a program like Backup 1541, that's also on the bonus disk.

Although utility programs that change disk names and IDs do exist, I strongly recommend that you not use them to change the ID number. Although the ID number that appears when you load a directory can easily be altered, it is only cosmetic. The real ID is kept in every sector of the disk, in a way you cannot feasibly change. Since the ID is one way the disk drive knows a new disk has been inserted, changing the cosmetic ID may lead to loss of data later.

Q: I've looked and looked for a program that will let me enter genealogical data into a C-128 in a format similar to a standard genealogical work sheet. Is there such a program?

Fred Goldsmith
Phoenix, AZ

A: You might try Family Roots, from Quinsept, Inc., PO Box 216, Lexington, MA 02173; 617-641-2930. It's available in a Commodore version.

Also, don't forget about the CP/M mode on your 128. With that, you can run many programs written for such machines as the Kaypro and Osborne.

PROGRAMMING

4. DEBUGGING

Q: When I am making a program, my keys freeze up and don't work the way they are supposed to. Could you tell me what you think the problem is? I own a 64.

Rodney Lloyd
Gary, IN

A: I can think of two likely causes. One is the "push-wrap crash" found in older C-64s with a bug in the Kernal ROM. It only happens when you're editing a long line at the bottom of the screen. To create it, go to the bottom left of the screen, type 82 characters, then press the delete key three times and stand back! If yours is a −01 ROM 64, you'll see LOAD, SYNTAX ERROR, READY., RUN, READY., and the computer will be "out to lunch."

You avoid it temporarily by changing the cursor color to white before typing anything that could inadvertently extend onto a third line, or permanently by upgrading to the current −03 Kernal ROM. You want a 901227-02 or later ROM for socket U4. A custom version with your choice of sign-on colors and message is available from JSR Enterprises, 10035 White Pine Lane, Santee, CA 92071 (619-449-9748).

The second cause is premature testing of a program that contains a Poke statement. If, for example, your program includes POKE X,Y, but you haven't yet assigned any value to X or Y, Basic will do a Poke 0,0, since 0 is the default value of unassigned numeric variables. Poking to location 0 on a 64 changes the data direction register that controls what chips are in and out of the memory map, which may eventually result in losing control of the machine, unless you know what you're doing there.

To avoid this and similar problems with Poke, always save a copy of your program before typing RUN. Then if it crashes, you haven't lost anything but the time it takes to load it in again.

Q: I have written a useful program, but when I use it, the computer freezes up for ten to 40 seconds, and then continues as if nothing had happened. I'm confused as to why my computer is doing this.

Stephen Ritchey
New Carlisle, PA

A: The cause is "garbage collection," a procedure performed automatically and unpredictably by Basic itself. Its purpose is to reclaim memory space formerly used by dynamic strings your program no longer needs.

When you run a program that uses calculated strings, Basic finds room for them at the top of memory. Then, when you change a string, Basic makes a new copy of it, a bit lower in

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memory. Eventually, you run out of memory, since it is filled with strings you no longer need. To correct this, a special garbage collection routine inside Basic packs the still-valid strings as close to the top of memory as possible, overwriting those that are no longer needed. Even at machine language speeds, this takes time.

Two statements that put strings in this area are:

```
100 INPUT A$
110 A$ = "X" + "Y"
```

A common alternative statement is:

```
120 A$ = "XY"
```

VIC and C-64 owners can minimize garbage collection delays by replacing lines like 100 and 110 with lines like 120 whenever possible. The guiding principle is this: Don't create any more strings than you have to, and change them as infrequently as possible. Garbage collection delays have been nearly eliminated on other current Commodore models, like the Plus/4, C-16 and C-128.

Q: How can I salvage a program I spent 12 hours working on? I have a monitor, so I can see the program in memory. But if I try to list, it starts out okay but later looks like garbage. When I get to certain points, the screen freaks out, turns black and makes little shapes in the corner. What is going on, and can I salvage some of this program by resetting something?

Gil Donbrava
San Antonio, TX

A: The easiest way to restore a program is from a backup copy you made before the disaster. When I am writing a new program, I save a copy to disk every 20 minutes, each with a different version number, ending up with a disk full of ever newer and more complete programs. I also save a final copy before I type RUN the first time. This avoids 99% of the problems you mention.

Unfortunately, it could easily take more than 12 hours to salvage your lost work. You should use a machine language monitor to be sure all the link pointers in the Basic program are pointing in their proper directions.

This is tedious work at best, and *not* for newcomers. If you know which line number is the first one that gives trouble and have a monitor that can convert its value into hex, you may be able to use some monitors' .H command to find that line quickly.

The link pointer is made up of the first two bytes in each line of Basic, and the first one is normally pointed to by locations $2B–2C in the VIC, 64 and Plus/4 (locations $2D–2E on the C-128). Once you've repaired the program, be sure it ends with three $00 bytes in a row and that locations $2D–2E ($2F–30 on the C-128) point one location beyond the last $00. Then, save your work, return to Basic, type CLR, save again and try listing the result. It isn't a job for the faint of heart.

Q: While I was using a copy program, my screen went berserk. Now when I turn on the computer, the entire screen fills with exclamation marks. Anything I type is accepted, but I cannot understand what I type. For example, I type "R" and the system shows "S" on the screen. Would you please tell me how to get rid of the exclamation points?

Wilson Fern
Chicago, IL

A: This is a simple, though annoying, problem—bit 0 of your video RAM is defective and stuck in the "one" position. This causes all characters with even values in the collating sequence of your character set to display as the next higher character in the set. That's why spaces become exclamation marks and R becomes S.

To make sure, type an A. It should appear as an A, because it has an odd value in the collating sequence and thus *needs* bit 0 set.

The cure is equally simple—replace the video RAM chip. On most Commodore computers, it is a widely available 2114 static RAM. If it is socketed on your machine, replacement is a matter of unplugging the old chip and plugging in the new one, making sure both point in the same direction and that no stray electricity, static or otherwise, gets near the computer during the process. If the old chip is soldered in, have a skilled technician remove it and add a socket for the replacement.

Q: While experimenting with REM [shift L] as a way to prevent listing a program,

Continued on p. 62.

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Taxware, the most comprehensive, easy to use, all year around record keeping and tax preparation system available for the **Commodore 64/64C**, is now **available for the Commodore 128.** Better yet, both the improved **C-64 and C-128** versions of this popular package are available in one comprehensive package. **TaxWare** includes forms 1040, 2441, and Schedules A, B, C, D, E, G, W and SE.

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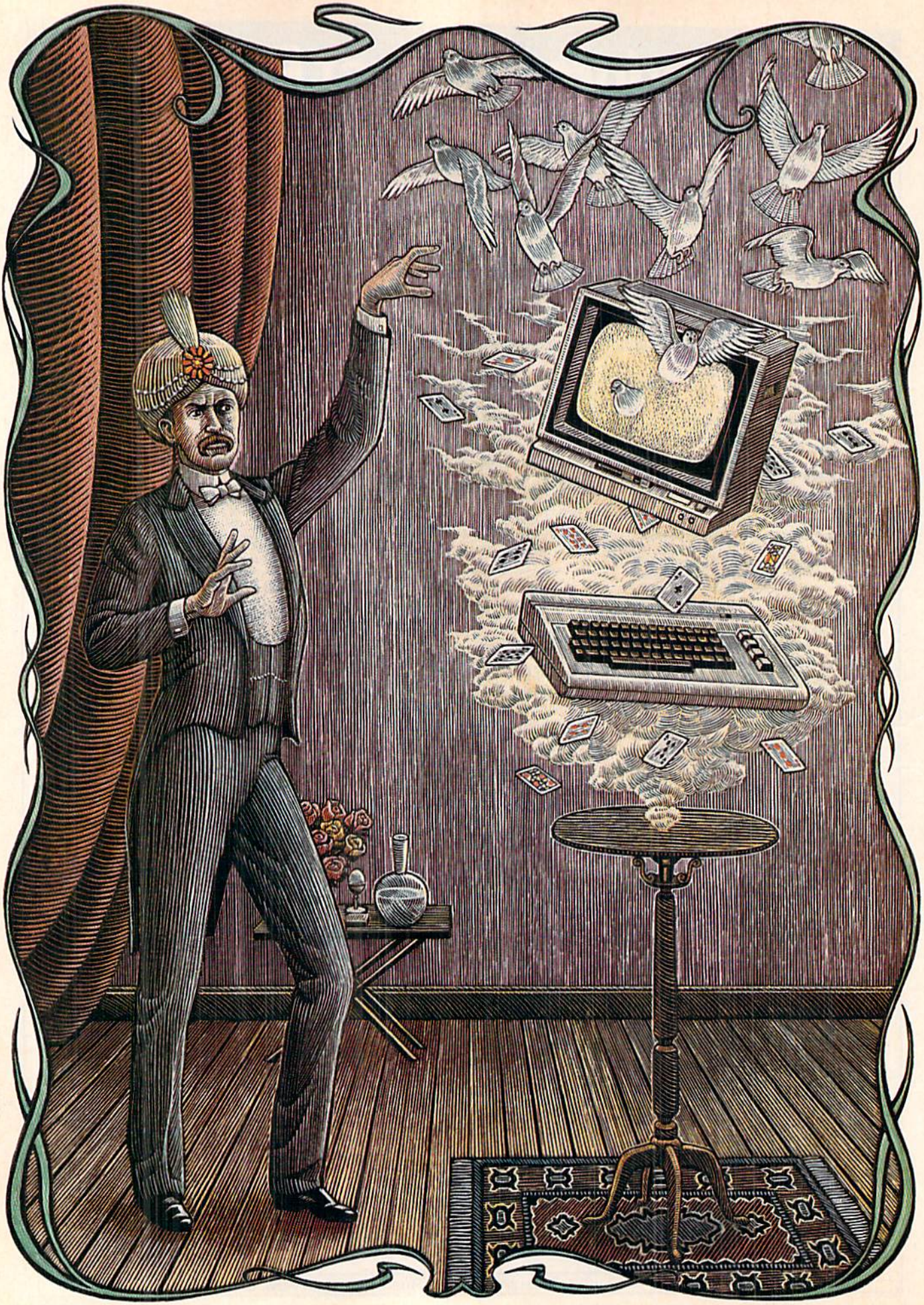

ILLUSTRATED BY DOUG SMITH

MAGIC

In this special issue we've selected 226 of the best Magic tricks that were published in *RUN* in 1986, plus 29 new tricks prepared especially for this issue.
Whether you're a new or experienced Commodore computer owner, a hardware or software devotee, a dedicated hacker or a once-a-year computerist, you'll find many tricks here that will make your computing more enjoyable and useful.

COMPUTER-SPECIFIC TRICKS

1. ..... COMPUTERS—C-64
2. ..... COMPUTERS—C-128
3. ..... COMPUTERS—C-64 AND VIC-20

HARDWARE TRICKS

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5. ..... DISK OPERATION/RECORDING
6. ..... JOYSTICKS AND PORTS
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14. ..... LANGUAGES—MACHINE LANGUAGE
15. ..... LANGUAGES—OTHER
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25. ..... COMPUTER ROOM

MISCELLANEOUS TRICKS

26. ..... ODDS AND ENDS

By JIM BORDEN

1. COMPUTERS—C-64

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 24, and N must be between 0 and 39.

Samir S. Chebli
Beirut, Lebanon

Magic C-64 clock—This program is longer than our customary one-screen limit, but we think you'll be glad we printed it. It uses the seldom-used Time of Day clock to feed a continuous screen display. The TOD clock keeps much better time than TI$, and it isn't affected by other computer operations.

Running the program will start the clock, and nothing short of turning off your computer will stop it. Resets and stop/restore presses will kill the display without affecting the timekeeping. To return the display to life, execute a SYS40822.

```
10Ø PRINT"{SHFT CLR}{2 CRSR DNs}MAGIC CLOCK
    - FLOYD ANDERSON - SYS4Ø822"
11Ø POKE55,118:POKE56,159:CLR
12Ø FORJ=ØTO137:READK:L=L+K:NEXT:RESTORE:IF
    L<>11465THENPRINT"DATA ERROR":STOP
13Ø FORJ=ØTO137:READK:POKE4Ø822+J,K:NEXT
14Ø INPUT"{2 CRSR DNs}HR,MIN,SEC,AM/PM";H,M
    ,S,A$
15Ø IFH>12ORM>59ORS>59THEN14Ø
16Ø IFH>9THENH=16+(H-1Ø)
17Ø IFM>9THENM=16*VAL(LEFT$(STR$(M),2))+VAL
    (RIGHT$(STR$(M),1))
18Ø IFS>9THENS=16*VAL(LEFT$(STR$(S),2))+VAL
    (RIGHT$(STR$(S),1))
19Ø IFLEFT$(A$,1)="P"THENH=H+128
2ØØ POKE56331,H:POKE5633Ø,M:POKE56329,S:POK
    E56328,Ø:SYS4Ø822:END
2Ø1 DATA 12Ø,169,131,141,Ø2Ø,ØØ3,169
2Ø2 DATA 159,141,Ø21,ØØ3,Ø88,Ø96,169
2Ø3 DATA Ø58,141,Ø29,ØØ4,141,Ø32,ØØ4
2Ø4 DATA 141,Ø35,ØØ4,169,Ø13,141,Ø39
2Ø5 DATA ØØ4,173,Ø11,22Ø,Ø41,128,24Ø
2Ø6 DATA ØØ7,169,Ø16,141,Ø38,ØØ4,2Ø8
2Ø7 DATA ØØ5,169,ØØ1,141,Ø38,ØØ4,173
2Ø8 DATA Ø11,22Ø,Ø41,Ø16,Ø24,Ø74,Ø74
2Ø9 DATA Ø74,Ø74,1Ø5,Ø48,141,Ø27,ØØ4
21Ø DATA 173,Ø11,22Ø,Ø41,Ø15,Ø24,1Ø5
211 DATA Ø48,141,Ø28,ØØ4,173,Ø1Ø,22Ø
212 DATA Ø41,24Ø,Ø24,Ø74,Ø74,Ø74,Ø74
213 DATA 1Ø5,Ø48,141,Ø3Ø,ØØ4,173,Ø1Ø
214 DATA 22Ø,Ø41,Ø15,Ø24,1Ø5,Ø48,141
215 DATA Ø31,ØØ4,173,ØØ9,22Ø,Ø41,24Ø
216 DATA Ø24,Ø74,Ø74,Ø74,Ø74,1Ø5,Ø48
217 DATA 141,Ø33,ØØ4,173,ØØ9,22Ø,Ø41
218 DATA Ø15,Ø24,1Ø5,Ø48,141,Ø34,ØØ4
219 DATA 173,ØØ8,22Ø,Ø24,1Ø5,Ø48,141
22Ø DATA Ø36,ØØ4,Ø76,Ø49,234
```

Floyd L. Anderson, Jr.
Niantic, IL

50-Hz clocks—While the Magic C-64 clock, above, will keep time in the United States, it loses ten seconds per minute in countries where the electrical frequency is 50 Hz. To get the correct time in such countries, the following command is necessary:

```
POKE 56334,PEEK(56334) OR 128
```

This command can be entered in Direct mode before loading Magic Clock or in a line before line 200.

The same command must be included in any program using the T.O.D. clock timing (e.g., VIP terminal).

Harry Getliffe
Durban, South Africa

C-64 screen blanking—When the C-64's screen is blanked, the border color temporarily covers the entire face of the monitor, and processing speed increases slightly. The real screen is still active and can be printed to or Peeked in the normal way. You can even use it for dynamic keyboard activities, and no observer will see what's going on.

To blank the screen, you can enter:

```
POKE 53265,PEEK(53265) AND 239
```

To return it to normal, just enter:

```
POKE 53265,PEEK(53265) OR 16
```

Location 53265 is also used to enable bit map graphics, extended background color mode and several other exotic modes. If your program doesn't use any of them, the Pokes become much simpler. To blank the screen, use:

```
POKE 53265,11
```

To return it to normal, use:

```
POKE 53265,27
```

Since very few programs use the exotic graphics modes, these simpler Pokes will almost always work.

Sue Dohnim
Apenna, ME

C-64 text-color change—This has been needed for years. It instantaneously changes the color of all text already printed on the screen.

```
50 POKE 648,224 : POKE 53281,A : PRINT " {COLOR A}
   {SHFT CLR} "
60 POKE 648,4 : POKE 53281,B : PRINT " {COLOR C} "
```

A is the Poke value for the color you want the text to become. Color A is that color's corresponding key; B is the Poke value for the screen color you want when the routine is finished; and C is the key for the text color you want active at that time.

The routine works with all known ROM versions and with the C-128 in C-64 mode. It resets the screen line links, which may occasionally cause minor troubles. The overall effect may be more pleasing if you blank the screen while the routine is being executed.

Louis F. Sander
Pittsburgh, PA

Improving background color changes—Many C-64 programs let you select the background color of your screen. But when you change it to the character color, you cannot see the printed text. This subroutine avoids the problem, taking advantage of the fact that white letters show up well on all colors except white. When the subroutine is called, the background color advances by 1. The cursor color remains white, unless the background is white. In that case, the cursor turns black. When the background changes again, the cursor returns to white.

A demonstration routine is included to illustrate the system. When used in conjunction with the above text color change routine, this subroutine can ensure that preexisting text never becomes invisible.

```
30 REM BACKGROUND CHANGE DEMO ROUTINE
40 PRINT"PRESS A KEY TO CHANGE COLORS{CRSR
   DN}"
50 GETA$:IFA$=""THEN50
60 GOSUB110 : REM CHANGE BKGD COLOR
70 POKE53281,BC:POKE646,CC:PRINT"BKGD";BC,"
   CHAR";CC
80 GOTO50
90 :
100 REM BACKGROUND CHANGE SUBROUTINE
110 BC=PEEK(53281)AND15:CC=PEEK(646)
120 BC=(BC+1)AND15:CC=1AND(CC<>BC)
130 RETURN
```

Dee Plume
Nome, AK

Datapointer for the C-64—This program sets up a machine language routine that can set the data pointer to any Data statement you choose, regardless of its line number. This eliminates the need for arrays to hold data the program already contains, letting you write smaller programs with faster execution and starting.

Once the machine language is in memory, load the Basic program containing the Data statements you need to access. To access the Nth Data statement in the program, just make the indicated Poke and SYS call, then execute a Read statement. You are limited to 255 Data statements, if you consider that a limit.

Datapointer accesses statements rather than individual data items, but once a statement has been accessed, your program can read all the items it contains. Data statements can, of course, stand by themselves or be embedded within multi-statement lines. It's fastest to put them at the beginning of your program.

```
100 PRINT"{SHFT CLR}MAGIC C64 DATAPOINTER -
    EDWARD G. BELL"
110 FORJ=1TO82:READK:CS=CS+K:NEXT:RESTORE:I
    FCS<>11053THENPRINT"DATA ERROR":END
120 FORJ=679TO760:READK:POKEJ,K:NEXT
130 PRINT"{CRSR DN}TO GET NEXT DATA FROM TH
    E NTH STATEMENT,"
140 PRINT"READ IT AFTER POKE254,N:SYS679"
141 DATA169,000,133,251,169,008,133,252
142 DATA160,005,162,001,177,251,201,131
143 DATA240,014,032,230,002,201,032,240
144 DATA243,201,058,240,239,024,144,015
145 DATA228,254,208,007,132,065,165,252
146 DATA133,066,096,232,032,230,002,177
147 DATA251,032,230,002,201,058,240,212
148 DATA201,000,240,009,076,214,002,200
149 DATA208,002,230,252,096,152,024,105
150 DATA004,144,003,024,230,252,168,024
151 DATA144,186
```

Edward G. Bell
Swissvale, PA

Halley's Comet revisited—If you missed the prime viewing period for our once-in-a-lifetime visitor, this C-64 program can show you what you missed. It gives a computer-enhanced image of the famous heavenly body, complete with color and sound.

```
10 PRINT"{SHFT CLR}{CTRL 2}HALLEY'S COMET -
   TAMMY SILVERBERG/MAGIC"
20 POKE53281,0:FORJ=1TO52:PRINTTAB(5)"{6 SP
   ACEs}*{6 SPACEs}*{3 SPACEs}";:NEXT:PRINT
   "{HOME}"
30 S=54272:FORJ=0TO24:POKES+J,0:NEXT:POKES+
   24,15:POKES+1,1:POKES+5,220
40 V=53248:FORJ=0TO62:READK:POKE832+J,K:NEX
   T:POKE2040,13:POKEV+21,1:POKEV+28,1
50 POKEV+37,7:POKEV+38,2:POKEV+39,8:POKES+4
   ,129
60 FORX=1TO255STEP.5:POKEV+1,255-X:POKEV,X:
   NEXT
61 DATA 000,000,252,000,015,255,000,015
62 DATA 255,000,063,255,000,063,255,000
63 DATA 063,255,000,247,255,000,223,252
64 DATA 000,125,124,000,117,240,001,095
65 DATA 192,001,093,000,001,084,000,005
66 DATA 080,000,006,064,000,022,064,000
67 DATA 170,000,000,168,000,000,160,000
68 DATA 000,000,000,000,000,000,000,000
```

Tammy Silverberg
Brooklyn, NY

C-64 wedge and the Auto Menu program—Here's a fast and simple way to use the Auto Menu program (see *RUN*, April 1986) with the C-64 wedge. First, copy the DOS 5.1 program onto the disk containing the Auto Menu program. Then add these lines to the program:

```
8 IFA=0THENA=1:LOAD"DOS 5.1",8,1
9 SYS12*4096+12*256
```

The Auto Menu program will first load the C-64 wedge, then begin working normally. The C-64 wedge commands are now available, and the Auto Menu program can be used over again by typing AUTO MENU.

Richard Reisig
Mitchell, NE

Printing with C-64 sound effects—Use this routine to enhance your programs. Each time a character is printed, it is preceded by a reversed space cursor and a soft beeping sound. You can start printing at any column by changing the tab variable T in lines 120 and 140.

If you wish to customize the routine, poking any number up to 255 into S + 1 in line 200 will change the sound, and increasing or decreasing the delay loop in line 260 changes the printing speed.

```
10 REM PRINT WITH SOUND EFFECTS - JOSEPH R.
   CHARNETSKI
```

Continued on p. 30.

SCIENTISTS A
DISCOVER NE

When we started our company on the west coast, people thought we were a little spaced out. So you can imagine their reactions when we announced we'd discovered a new universe.

People laughed. People scoffed. And they really freaked out when we told them where we'd found it:

Inside a Commodore 64.

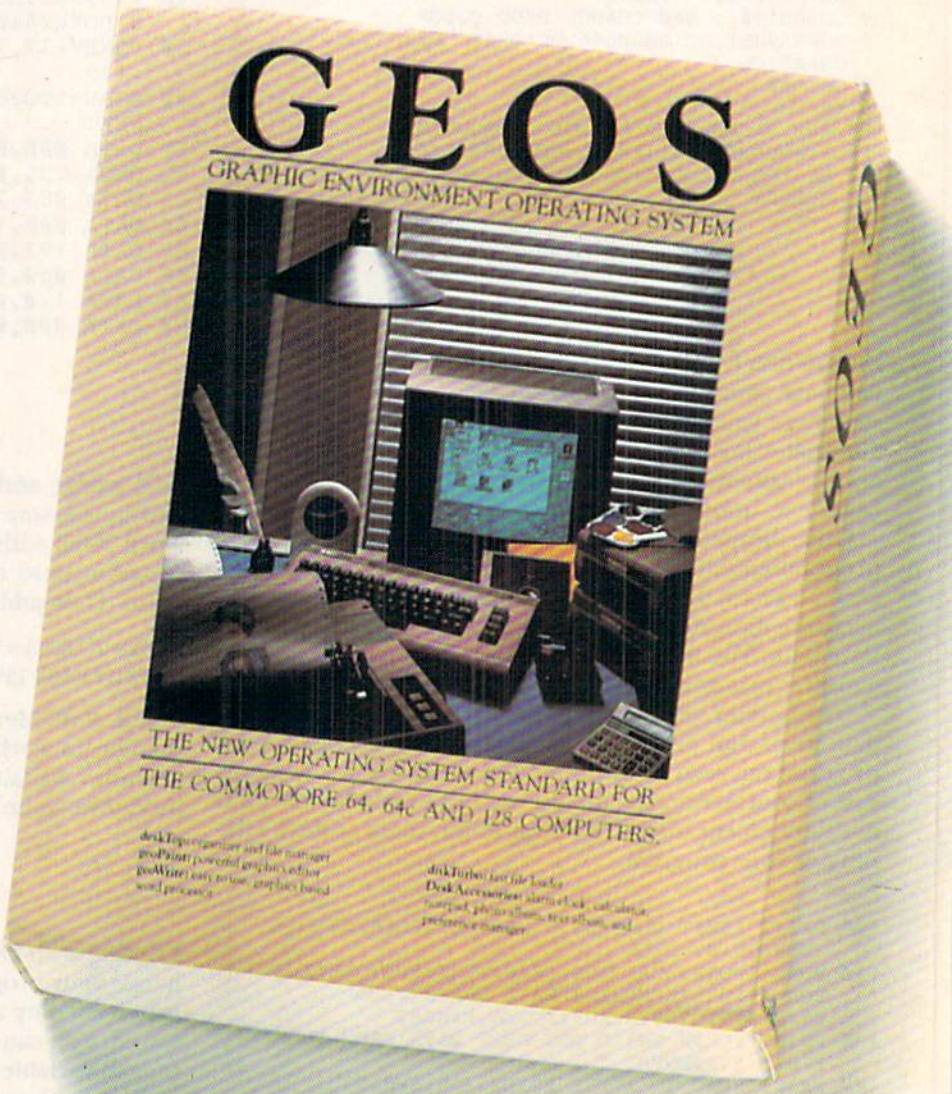
It's called GEOS. And it turns any Commodore into a powerful PC that holds its own against any computer, no matter what kind of fruit it was named after.

GEOS: The superior intelligence. Of course, we always knew Commodores possessed superior brains. It just took GEOS to discover them.

You see, GEOS opens your Commodore to a huge universe that can hold an infinite number of applications. Which means that GEOS can do just about anything the expensive PC's can do, including one thing they can't:

Add even more GEOS applications that are being developed even as you read this.

Increase your speed to warp factor 7. The first thing you notice with GEOS is how its diskTurbo speeds up your Commodore's disk loading and storing time.



Not twice or three times as fast. But five to seven times faster than normal. Which lets you streak through files and documents at what seems like warp speed.

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Every universe comes complete with a desk. The way to keep order in our universe is with the GEOS Desktop. It's just like your desk at home, only without the coffee stains.

The Desktop keeps your art and documents filed, and comes

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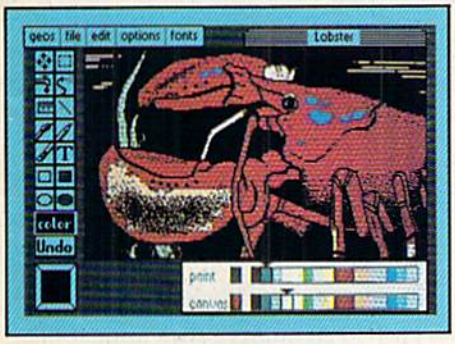
AT BERKELEY
W UNIVERSE.

with all the accessories you need to keep you organized:

An alarm clock keeps you punctual. A notepad keeps your memos. And a calculator keeps your accountant honest.

How to communicate with a new universe. With geoWrite, you can rearrange your written words. Move blocks of copy. Cut and paste. And even display your text in fonts of different styles and sizes, right on the screen.

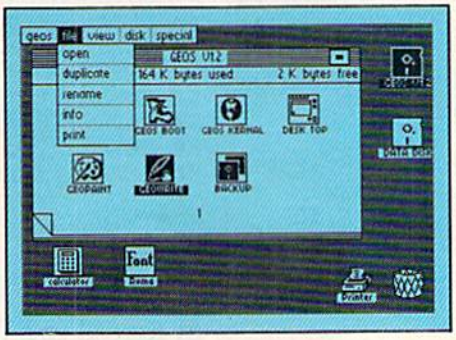
With geoPaint, you become a Michelangelo with a mouse.



Sketching and painting with all kinds of colors, textures and patterns.

You can invert, mirror and rotate images. Insert them into your geoWrite documents. And save them in your GEOS Photo Album for use later.

Finding your way through the universe. The most difficult



thing about a new universe is finding your way around. But with GEOS, you only need to remember two things:

Point and click.

When GEOS offers you options, you just point to your answers and click your mouse or joystick.

You want to draw? Point and click.

You want to write? Point and click.

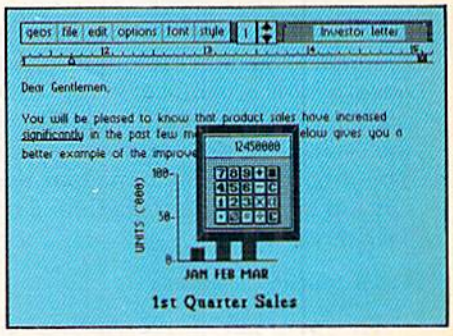
You want to fill in that obtuse rhomboid with an air-brushed geometric pattern in a lighter shade of pink? Point and click.

Easy, huh? And in case you ever do make a mistake, GEOS backs you up with an "Undo" feature that undoes the very last command you entered.

Running out of space. With GEOS, that's hardly likely. Because there's endless space in the universe for new applications.

Unfortunately, there's only so much space in this ad.

So zip down to your nearest software dealer. Tell him you want to explore the new universe in your Commodore.



And if he looks at you like you're some kind of alien, well, just tell him Berkeley Softworks sent you.

The name is universally known.

To order, call 1-800-443-0100 ext. 234

GEOS is just $59.95

(California residents add 6.5% sales tax.) $2.50 US/$5.50 Foreign for shipping and handling. Allow six weeks for delivery.

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Berkeley Softworks

Circle 445 on Reader Service card

The brightest minds are working at Berkeley.

From p. 27.

Listing continued.

```
1ØØ A$="{CTRL 2}PRINTING WITH SOUND EFFECTS
    "
11Ø PRINT"{SHFT CLR}{5 CRSR DNs}"
12Ø T=6:GOSUB18Ø:PRINT
13Ø A$="{CTRL 8}BY JOSEPH R. CHARNETSKI"
14Ø T=8:GOSUB18Ø
15Ø REM CONTINUE
16Ø PRINT"{COMD 7}":LIST
17Ø REM SOUND
18Ø S=54272:FORM=STOS+23:POKEM,Ø:NEXT
19Ø POKES+24,1Ø:IFTTHENPRINTTAB(T);
2ØØ FORJ=1TOLEN(A$):POKES+1,23
21Ø IFLEFT$(A$,1)<>"{CTRL 9}"THEN23Ø
22Ø PRINT"{CTRL 9} {CRSR LF}";:GOTO24Ø
23Ø PRINT"{CTRL 9} {CTRL Ø}{CRSR LF}";
24Ø POKES+6,24Ø:POKES+4,23
25Ø PRINTMID$(A$,J,1);
26Ø FORDLAY=1TO1Ø:NEXTDLAY:POKES+6,Ø
27Ø POKES+4,Ø:NEXTJ:T=Ø:PRINT:RETURN
```

Joe Charnetski
Dallas, PA

Instant reset button—Transform your C-64's restore key into a reset button with this two-line program.

```
Ø FORA=4Ø7Ø4TO4Ø7Ø6:READB:POKEA,B:NEXT:FORA
  =3277ØTO32776:READB:POKEA,B:NEXT:NEW
2 DATA32,248,252,Ø,159,195,194,2Ø5,56,48
```

Chris Mansfield
Poplar Bluff, MO

C-64 quick directory—The following machine language program allows you to easily display the disk directory in or out of a Basic program. It's only 189 bytes long, yet it has several important features. Holding down the shift key will stop the listing, and pressing the Commodore key will abort it. The program can be located anywhere in RAM. Location 251 will hold the status if a Kernal error occurs. The syntax for a directory is:

SYS start adr,dev#,"format"

The "start adr" is the starting value of the loop in line 20; the "dev#" is the number of your disk drive (usually 8); and the format is the string telling the drive what files to display (e.g., "$0" will display all files).

```
1Ø REM C-64 QUICK DIR - GREG LAPORTE
2Ø FORX=49152TOX+188:READ A:POKEX,A:C=C+A:N
   EXT
3Ø IFC<>24767 THEN PRINT"ERROR IN DATA!!"
4Ø DATA 32,253,174,32,158,183,134,251
5Ø DATA 32,253,174,32,158,173,32,166
6Ø DATA 182,133,252,16Ø,Ø,177,34,153,82
7Ø DATA 192,2ØØ,196,252,24Ø,4,2Ø1,13
8Ø DATA 2Ø8,242,132,252,165,251,2Ø1,8
9Ø DATA 48,4,2Ø1,12,48,3,76,72,178,165
1ØØ DATA 252,2Ø1,2Ø,16,247,165,252,162
11Ø DATA 82,16Ø,192,32,189,255,169,1,166
12Ø DATA 251,16Ø,96,32,186,255,32,192
13Ø DATA 255,144,22,133,251,96,Ø,Ø,Ø,Ø,Ø
14Ø DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,162
15Ø DATA 1,32,198,255,32,18Ø,255,162,96
16Ø DATA 32,15Ø,255,32,165,255,32,165
17Ø DATA 255,32,165,255,32,165,255,166
18Ø DATA 144,2Ø8,43,32,165,255,17Ø,32
19Ø DATA 165,255,32,2Ø5,189,169,32,32
2ØØ DATA 21Ø,255,32,165,255,166,144,2Ø8
21Ø DATA 21,32,21Ø,255,2Ø8,244,169,13,32
22Ø DATA 21Ø,255,173,141,2,2Ø1,1,24Ø,249
23Ø DATA 2Ø1,2,2Ø8,2Ø3,32,2Ø4,255,169,1
24Ø DATA 76,195,255,76,195,255,76,195
25Ø DATA 76,195,255
```

Greg B. LaPorte
Blackburg, VA

C-64 Goto variable—Some computers allow calculated Gotos. Below is a program that allows a variable for the Goto/Gosub address.

```
Ø REM VARIABLE GOTO-DEAN SIMONSON
1Ø FORB=828TO885:READC:A=A+C:POKEB,C:NEXT
2Ø IFA<>6599THENPRINT"ERROR IN DATA STATEME
   NTS":END
3Ø SYS828:PRINT"YOU CAN NOW USE CALCULATED
   GOTOS AND GOSUBS":NEW
4Ø DATA 169,Ø,133,95,133,9Ø,133,88,169
5Ø DATA 16Ø,133,96,169,192,133,91,133,89,32

6Ø DATA 191,163,16Ø,1,185,11Ø,3,153,161
7Ø DATA 168,136,16,247,16Ø,5,185,112,3,153
8Ø DATA 52,3,136,16,247,165,1,41,254,133
9Ø DATA 1,96,52,3,32,138,173,76,247,183
```

Dean Simonson
La Grande, OR

64 Keypad and VCR tapes—Use the number labels that come with blank VCR tapes to mark the keys for the 64 Numeric Keypad (*RUN*, March 1986).

Roger Stokes
Tunkhannock, PA

2. COMPUTERS—C-128

C-128 load and run—One simple command can be used to load a C-128 program from disk and to run it automatically:

RUN "programname"

This does everything you need.

Kenneth H. Hottes
Danbury, CT

C-128 joystick ports—The C-128 boasts a slick appearance, but its designers overlooked at least one small detail. The contour of the molding near the joystick ports prevents insertion of the PaperClip (C-64 version) dongle and other similar copy-protection plugs.

I solved the problem by buying a $4.95 joystick accessory at a local discount store. The accessory is a Y cable that allows you to plug two joysticks into a single port on an Atari video game. When the Y cable is plugged into the C-128, the dongle can easily be inserted into either of its female connectors.

Others have made extensions from the subminiature D

connectors available at Radio Shack, but that requires knowledge of soldering and other expertise.

Harold Gath
Brownsville, PA

C-128 MID$ feature—In C-128 mode, MID$ has a wonderful but undocumented feature: You can use it to replace characters in one string with those from another! The format is

```
MID$(string1,position<,length>)=string2
```

What happens is the first length characters of string2 replace the length characters of string1, starting at the variable "position." The remainder of string1 is not affected.

The length is an option, but if you leave it out, string2 cannot be longer than the remaining number of characters in string1, or an Illegal Quantity error results.

Rick Rothstein
Trenton, NJ

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

Robert B. Cook
Braintree, MA

C-128 bytes free—At power-up, the F8 function key activates the machine language monitor, which is a feature that most of us seldom use. I redefine that key to give me something more valuable—an instantaneous reading of the amount of remaining memory. Doing the magic is simple:

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

Gerhard Schilling
Hemet, CA

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

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

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

Jim Borden
Carlisle, PA

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

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

Ken Garber
Windsor, Ontario
Canada

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

Jerry W. Jarvis
Spokane, WA

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=0TO360STEPA:BOX1,0,
   0,319,199,J,0:NEXT:REM CHANGE A!
```

Matt Woodring
Cordell, OK

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

C-128 Unnew program—This works in 128 mode only. Type the accompanying program and save it as UNNEW 128 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
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

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

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

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

C-128 disk operations—Some of Basic 7.0's disk commands give trouble when you try to use them with string variables in their arguments. If you put your string variables inside parentheses, your troubles should vanish like magic. Another good solution is to operate on the variables before using them. Any of these should work:

```
DOPEN#1,"FILENAME"
```

Continued on p. 94.

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SUPER MAGIC

Several experts among our Commodore computing friends have contributed to this melange of useful little programs and other tid-bits.

C-64 reference guide clarifications—While preparing the *Programmer's Reference Guide for the Commodore Plus/4* with Sarah Meyer, I discovered a number of obscurities in the *C-64 Programmer's Reference Guide*. For instance:

It's incorrect that a NOT operation (page 63) results in a two's-complement of a number. In fact, the result is the one's-complement of the number. The NOT operator inverts each bit in a binary number. For example, 0000 0000 0001 0010 is inverted to 1111 1111 1110 1101. The addition of 1 is required to get the two's-complement additive inverse, 1111 1111 1110 1110. Basic version 2.0 uses 0000 0000 0000 0000 for a false value, and 1111 1111 1111 1111 for a true value, so the statement NOT(A = B) is false when A equals B and true otherwise.

Also, in a RND operation (page 80), only a nonnegative argument is a dummy. Any positive argument returns the next element of the current pseudo-random sequence. A 0 argument reseeds the random number generator from the jiffy clock. A negative argument reseeds the generator using the value of the argument. Normally, a program seeds the generator once with a nonpositive argument and uses a positive argument thereafter.

Following are two examples that demonstrate how the random number generator operates. The first statement results in the same sequence each time it is run:

```
X = RND(-.4):FOR I = 1 TO 4:PRINT RND(1):NEXT
```

The next statement results in a different sequence each time:

```
X = RND(0):FOR I = 1 TO 4:PRINT RND(1):NEXT
```

Cyndie Merten

Cyndie Merten, a founding member of Dyadic Software Associates, has a master's degree in mathematics from Temple University and was previously a programmer for Commodore Business Machines.

Traveling disk drives—Your 1541 or 1571, like any disk drive, is sensitive to movement. If you have to transport it any distance, it's important to take precautions. First and foremost, insert into the drive an old disk or the cardboard head protector that came with the drive and close the door. This will protect the fragile head alignment.

Then, place the drive in its original box with the styrofoam packing, or surround it with styrofoam "popcorn" in another box. If you move the drive often, you could build a special padded carrying case for it.

Commodore "boom box"—You'll find that adding an inexpensive "boom box" or an independent speaker to your C-64 or C-128 will greatly enhance the sound it produces. Just get one with a phono input connector that matches the plug on the serial audio output wire, and plug it in. If you use a boom box, you can even disconnect your computer's sound system and take it to the beach!

Jon Medek

Jon Medek, an assistant producer for Electronic Arts, is particularly interested in the music synthesis and editing potential of computers. When he's not at a computer, he enjoys classic cars and comic books, and he's a performing musician.

Ultra Hi-Res update—In February and May of 1986, *RUN* published a two-part article, Ultra Hi-Res Graphics, for the C-128 in 80-column mode. When using the Ultra Hi-Res program, I've found it helpful to redefine the function keys so as to enter the 80-column graphics commands more easily. To redefine the keys, enter the following statements in immediate mode or add them near the end of the boot program:

```
KEY 1,"@GRAPHIC,"
KEY 4,"@DRAW,"
KEY 8,"@CLR,"
```

The listing below creates ultra hi-res patterns using the character fonts.

```
10 REM ULTRA HIRES PATTERNS FROM CHARACTERS
                                    :REM*208
20 @GRAPHIC,0,2:@CLR,0:FAST:TRAP110:P=0
                                    :REM*72
30 FORY=0TO199STEP25:FOR X=0 TO 639 STEP 64
                                    :REM*90
40 IFCK=0THEN @CIRCLE,1,X+32,Y+12,28,12,0,3
   60                               :REM*92
50 IFCK=1THEN @BOX,X+2,Y+2,X+62,Y+23,1
                                    :REM*78
60 IFCK=2THEN @DRAW,X+2,Y+25,X+64,Y+25,1:@D
   RAW,X+64,Y+25,X+32,Y,1:@DRAW,X+32,Y,X+2,
   Y+25,1                           :REM*222
70 IFCK=3THEN @DRAW,X+32,Y,X+62,Y+12,1:@DRA
   W,X+62,Y+12,X+32,Y+25,1:@DRAW,X+32,Y+25,
   X+2,Y+12,1:@DRAW,X+2,Y+12,X+32,Y,1
                                    :REM*202
80 GOSUB120:@PAINT,X+32,Y+12,1,P(0),P(1),P(
   2),P(3),P(4),P(5),P(6),P(7)      :REM*2
```

→

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Listing continued.

```
9Ø P=P+1:CK=CK+1:IF CK=4 THEN CK=Ø :REM*192
1ØØ NEXT:NEXT:GETKEY A$:           :REM*134
11Ø @TEXT:END                       :REM*38
12Ø BANK14:FOR I=ØTO7:P(I)=PEEK(53248+I+P*8
    ):NEXT:BANK15:RETURN           :REM*236
```

Louis R. Wallace

Louis R. Wallace has written software for both the C-128 and the Amiga. He is the co-author of Ultra Hi-Res Graphics.

A bizarre dude—To get C-64 Basic programs up and running faster, use the following format for the Save statement:

SAVE"<name, eleven or less characters long><shift/space><Commodore/DUDE>",8<return>

"Commodore/DUDE" means hold down the Commodore key while you type DUDE. Later, when you want to load the program, load the disk directory and list it. Then position the cursor to the left of the program you saved using this method and press the shift and run/stop keys simultaneously. Presto!

To rename an existing DUDE file, type in:

OPEN 15,8,15,"R0:<new name><shift/space><Commodore/DUDE>=<old name>" CLOSE 15.

Paul Grace

Paul Grace, an assistant producer for Electronic Arts, has been involved with computing since 1979. He currently programs on a C-64 and an Amiga.

Easy ellipses—R. West, in his book *Programming the PET/CBM*, includes a particularly efficient algorithm for drawing ovals or ellipses. The trigonometric calculations are performed only once, outside the drawing loop.

The listing below is a variation on West's algorithm that has been modified to work with RUN Basic 1.0. It draws a polygon with a 1-degree change in direction at each vertex. Because the sides of the polygon are so short and each angle so large, the result appears as a rough ellipse. The shape of the ellipse is determined by the horizontal and vertical radii (xr and yr, respectively), so by varying these values, you can make the curve appear more—or less—circular.

```
100 HIRES0,1:GCLR:PEN1:PENDOWN
110 PI=3.14159265
120 XR=50:YR=25:AN=1:A1=0:A2=359
130 XC=160:YC=100:RD=PI/180
140 N=360/AN:P1=A1/AN:P2=A2/AN
150 PC=AN*RD:MY=YR/XR
160 CS=COS(PC):SI=SIN(PC)
170 PH=YR*COS(AL*RD):PV=XR*SIN(AL*RD)
190 FORJ=P1TOP2
200 PX=PH*CS-PV*SI
210 PY=PH*SI+PV*CS
220 MOVXYPX+XC,MY*PY+YC
230 PH=PX:PV=PY:NEXT:FORT=1TO2500:NEXT
240 TEXT
```

Better number-rounding—If you need rounded numbers for, say, plotting graphs, you have undoubtedly used the

Circle 410 on Reader Service card.

INT function to calculate them. However, because INT converts negative as well as positive fractions to the next *lower* integer (for instance, −1.4 to −2), the results of your calculations may be wrong. The following subroutine corrects this problem, making negative (and positive) values round to the *nearest* integer, which is what you normally need:

```
10 INPUT"ENTER A NUMBER";X
20 V = SGN(X)*INT(ABS(X)+0.5)
30 PRINT V
```

Elizabeth Deal

Elizabeth Deal is a computer programmer, consultant and writer with experience on Commodores ranging from the PET to the C-128.

First things first—An Apple computer version of the sorting program below appeared in the 1986 edition of *What Color Is Your Parachute?*, a popular self-help book about job hunting. *RUN*'s New Products Editor, Harold R. Bjornsen, appealed to me to modify the program to work on Commodore computers. So, I converted it to run flawlessly on any model Commodore.

What sets this sorter apart from others is that you, not the computer, assign the priorities to the items within a list. You can use the program to quickly establish a hierarchy of items whose names contain any combination of characters, numbers and graphics symbols. The program instantly displays how many times you gave a selected item priority over another.

To keep the program as short as possible, I didn't include a printer option, and long item names will have a tendency to scramble the screen display.

```
5 DIMT(2ØØ),T$(2ØØ):PRINT"{SHFT CLR}ENTER T
  HE ITEMS YOU WANT TO PRIORITIZE"   :REM*5
1Ø PRINT"PRESS RETURN WITHOUT AN ENTRY WHEN
    DONE."                          :REM*9Ø
15 N=N+1:PRINT:PRINTTAB(1)N;:INPUTT$(N):IFT
   $(N)=""THEN25                    :REM*161
2Ø GOTO15                           :REM*24
25 N=N-1                            :REM*143
3Ø FORC=1TON-1:FORO=C+1TON:PRINT"{SHFT CLR}
   ":PRINT"1";TAB(4)T$(C):PRINT"2";TAB(4)T$
   (O)                              :REM*44
35 PRINT"CHOOSE 1 OR 2"             :REM*67
4Ø GETKE$:IF(VAL(KE$)<1)OR(VAL(KE$)>2)THEN4
   Ø                                :REM*182
45 IFVAL(KE$)=2THEN55               :REM*1Ø5
5Ø T(C)=T(C)+1:GOTO6Ø               :REM*168
55 T(O)=T(O)+1                      :REM*143
6Ø NEXT:NEXT:PRINT"SORTING...":FORI=1TON:FO
   RJ=1TON-1:IFT(J)<=T(J+1)THEN7Ø   :REM*238
65 A=T(J):A$=T$(J):T(J)=T(J+1):T$(J)=T$(J+1
   ):T(J+1)=A:T$(J+1)=A$            :REM*69
7Ø NEXT:NEXT:PRINT"{SHFT CLR}":PRINTTAB(5)"
   {CTRL 9}ITEM{CTRL Ø}",,"{CTRL 9}NO. OF O
   CCURANCES{CTRL Ø}":PRINT         :REM*134
75 FORK=NTO1STEP-1:PRINTT$(K)TAB(25)T(K):T(
   K)=Ø:NEXT                        :REM*5
8Ø PRINT"{CRSR DN}{CRSR RT}{CTRL 9}R{CTRL Ø
   } TO RE-EVALUATE":PRINT"{CRSR RT}{CTRL 9
   }U{CTRL Ø} TO USE AGAIN":PRINT"{CRSR RT}
   {CTRL 9}N{CTRL Ø} TO END"        :REM*7Ø
85 GETS$:IF S$=""THEN85             :REM*127
9Ø IF S$="R"THEN3Ø                  :REM*44
95 IF S$="U"THEN N=Ø:RUN            :REM*33
```

1571 DOS Shell trick—If you need to copy files such as hi-res screens and word processing documents, the 1571 DOS Shell disk is invaluable. The only problem is that if the disk to be copied was formatted on one of certain third-party disk drives, your 1571 might not be able to read it. The cure is to boot up the DOS Shell, and, at the "D.O.S. SHELL ON F1 KEY" prompt, enter:

```
OPEN 15,8,15:PRINT#15,"U0>M0":CLOSE15 <return>
```

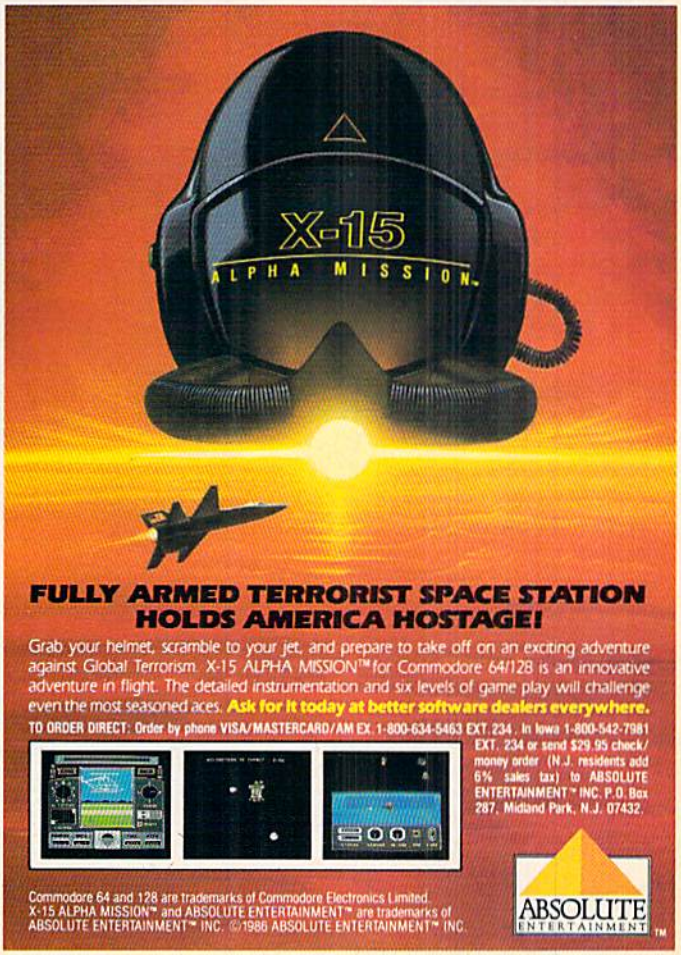
Then place the disk to be copied into the drive and press the F1 key to activate the DOS Shell.

RUN Script sentence detector—Many *RUN* readers are now using RUN Script 2.40, the latest version of *RUN*'s own word processor, on their C-128s. There's a trick you can do with this program that will let you jump from sentence to sentence at blinding speed. To perform this feat, load a document into RUN Script 2.40 and press the F2 key. Then enter a period followed by a space and press return. Finally, place the cursor at the beginning of the document, hold down the F2 key and watch what happens!

The space after the period prevents the program from detecting decimal points within numbers. Of course, for this trick to work, you must insert a space at the end of a paragraph between the period and the return. ■

Tim Walsh

Tim Walsh is RUN*'s technical editor. He holds a bachelor's degree in computer science from Franklin Pierce College in Rindge, New Hampshire.*



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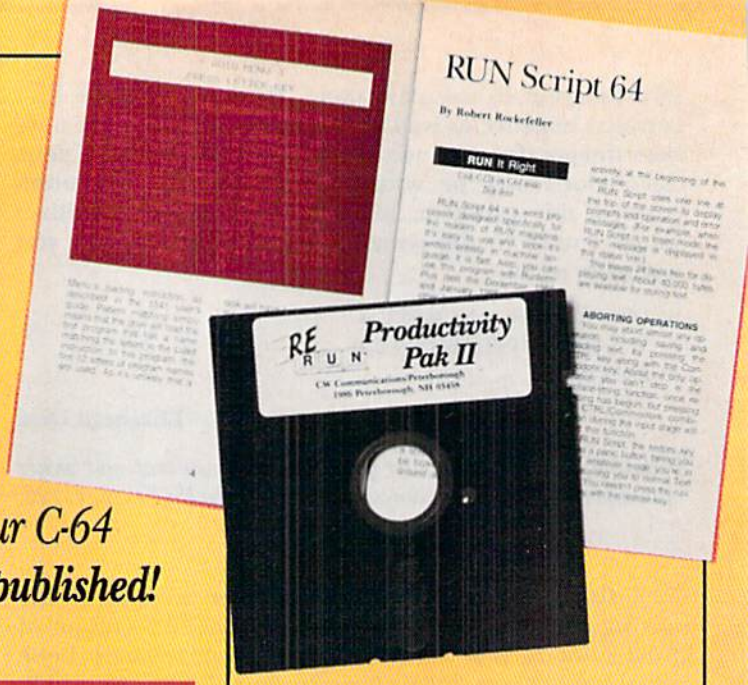

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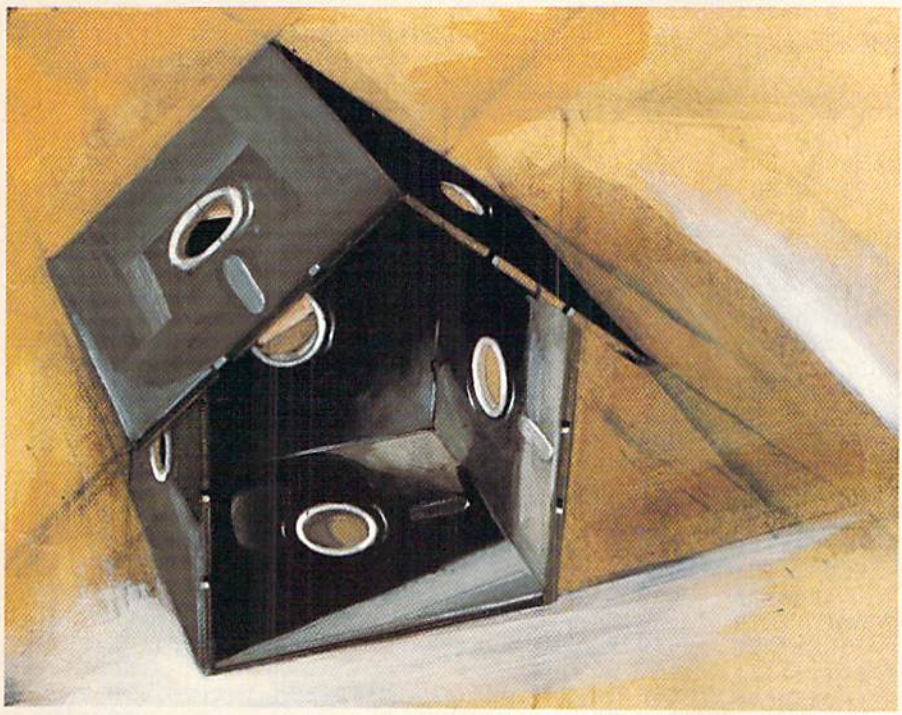

If you're planning to purchase a home or refinance the one you have, you need all the information you can get to make sound mortgage decisions. Such information can also be helpful with the mortgage you have, by revealing how much the loan is really costing you and how you might be able to save on it.

Loan Analysis 128 will tell you everything you need to know concerning the payments, interest rate and repayment period on a mortgage. It will also provide a month-by-month amortization schedule for the life of the loan, which, in addition to the items mentioned above, will include your cumulative interest, cumulative equity and a breakdown of your monthly payments into interest and principal portions. At the end of every year, the program will calculate the amount of interest you paid, which is important for tax purposes, and the amount of equity you built up for that year.

Loan Analysis 128 will work on any fully amortized loan for which interest is calculated on the remaining balance. This covers just about all loans that are currently offered by financial institutions.

A Sample Loan

After you've typed in the program and saved it to disk, make sure you've set your monitor to 80 columns, then type RUN. Now, let's say you're buying a home for $100,000 and are considering an 11.5 percent mortgage over 30 years. Enter these figures when the program asks for them, being sure not to include any commas. Then a display will appear that includes the loan amount, interest rate, monthly payment and total cost of the loan over its life span. These calculations are done in Fast mode.

Then the program will ask if you want to see an amortization table. For this example, press Y. The screen will clear and an amortization table for the first 12 months of the loan will be calculated and displayed. The sum of the two columns marked INTEREST PAYMT and EQUITY PAYMT equals your monthly payment. Note that, for quite a few years, the interest portion of the payment greatly exceeds the equity portion. To get the next year's amortization schedule, press the return key; press any other key to quit.

Loan Analysis 128 is designed to be used with an 80-column RGB monitor or a 40-column monitor with one of the special cables being offered by third-party vendors. However, you can use the program with 40 columns if you're willing to do without some of the amortization table displays. I would suggest leaving off the displays for TOTAL, CUM INT and CUM EQUITY.

A Money Saver

You might want to use the amortization table to determine how to repay your loan sooner. Perhaps you could save thousands of dollars in in-

RUN It Right

C-128

ILLUSTRATED BY GWYN STRAMLER

terest, while paying little additional money each month. For example, say you're about to make payment number 5 on your loan. Make out a check for that payment as usual, then check the amortization table to see what the equity portion of payment number 6 is. Make out a separate check in that amount, and print on the back of the check, "To be used toward principal only." Enclose this check with the regular payment for month 5.

When you're ready to make payment number 6, send in the full amount as usual, plus a separate check for the equity portion of month 7, and so on, as long as there is any principal balance outstanding. What you're doing is reducing the amount of the principal that the interest is calculated on, thus reducing the total cost of the loan and the time it'll take to pay it off. R

Address all author correspondence to Robert E. Kupfer, PO Box 1056, Sturbridge, MA 01566.

Listing 1. *Loan Analysis 128 program.*

```
10Ø SCNCLR:FORX=1TO11:PRINT:NEXT:PRINTTAB(2
    6)"{CTRL 2}**** LOAN ANALYSIS-128 ****"
                                        :REM*214
11Ø SLEEP2:IY=12:IR=Ø:IE=Ø:I=Ø:IS=Ø:TE=Ø:TN
    =Ø:TP=Ø:Y=Ø                         :REM*5Ø
12Ø SCNCLR:PRINT"AMOUNT OF YOUR LOAN INCLUD
    ING FEES";:INPUTAM:IFAM<=ØTHEN12Ø
                                        :REM*252
13Ø PRINT"ENTER INTEREST RATE (EXAMPLE: ENT
    ER 13% AS 13)";:INPUTIR:IFIR<=ØTHEN13Ø
                                        :REM*74
14Ø INPUT"NUMBER OF YEARS OF LOAN";Y:IFY<=Ø
    THEN14Ø                             :REM*66
15Ø FAST:P=AM*((IR/12ØØ)/(1-(1/(1+(IR/12ØØ)
    ){UP ARROW}(Y*12)))):REM PAYMT EACH MON
    TH                                  :REM*94
16Ø P=(INT(P*1ØØ+.5))/1ØØ:REM ROUNDS (P) TO
     2 DECIMAL PLACES                   :REM*1Ø6
17Ø SCNCLR:PRINT"{CTRL 9}AMOUNT OF LOAN IS:
    {CTRL Ø}";" $";AM:PRINT             :REM*96
18Ø PRINT"{CTRL 9}ANNUAL INTEREST RATE IS:{
    CTRL Ø}";IR;"%":PRINT               :REM*36
19Ø PRINT"{CTRL 9}NUMBER OF MONTHLY PAYMENT
    S:{CTRL Ø}";Y*12:PRINT              :REM*18Ø
2ØØ PRINT"{CTRL 9}MONTHLY PAYMT. AMOUNT:{CT
    RL Ø}";" $";P:PRINT                 :REM*3Ø
21Ø PRINT"{CTRL 9}TOTAL REPAYMENT AMT.:{CTR
    L Ø}";" $";P*(Y*12)                 :REM*22Ø
22Ø PRINT:P=P*(Y*12)-AM:P=(INT(P*1ØØ+.5))/1
    ØØ                                  :REM*58
23Ø PRINT"{CTRL 9}TOTAL COST OF LOAN:{CTRL
    Ø}";" $";P                          :REM*92
24Ø PRINT:PRINTTAB(21)"{CTRL 9}DO YOU WANT
    AN AMORITIZATION TABLE Y/N{CTRL Ø}"
                                        :REM*64
25Ø GETG$:IFG$=""THEN25Ø                :REM*2Ø
26Ø IFG$<>"Y"THENCLR:SLOW:SCNCLR:END:REM*77
27Ø SCNCLR:GOSUB77Ø                     :REM*41
28Ø IP=Y*12:IR=IR/12ØØ:XF=(1-(1+IR){UP ARRO
    W}(-IP))/IR:OA=AM:R=AM/XF           :REM*211
29Ø IV=(R+.ØØ5)*1ØØ:R=IV/1ØØ           :REM*17
3ØØ I=I+1:PI=AM*IR:IV=(PI+.ØØ5)*1ØØ:REM*125
31Ø PI=IV/1ØØ:PE=R-PI:IFI=IPTHEN39Ø:REM*221
32Ø TN=TN+PI:TE=TE+PE:TP=TP+R:II=II+PI:IE=I
    E+PE                                :REM*149
33Ø GOSUB59Ø                            :REM*197
34Ø IFI=IYTHEN44Ø                       :REM*169
35Ø AM=AM-PE                            :REM*39
36Ø IFIS=1THENSTOP                      :REM*29
37Ø GOTO3ØØ                             :REM*61
38Ø GOTO33Ø                             :REM*119
39Ø IS=1                                :REM*153
4ØØ OO=OA-TE-PE                         :REM*231
41Ø R=R+OO                              :REM*115
42Ø PE=PE+OO                            :REM*221
43Ø GOTO32Ø                             :REM*153
44Ø IY=IY+12                            :REM*65
45Ø II=II+.ØØ5:II=II*1ØØ:II=INT(II):II=II/1
    ØØ                                  :REM*179
46Ø IE=IE+.ØØ5:IE=IE*1ØØ:IE=INT(IE):IE=IE/1
    ØØ                                  :REM*199
47Ø I$=STR$(INT(II))+"."+RIGHT$(STR$(II*1ØØ
    ),2)                                :REM*43
48Ø PRINT"{CRSR DN}{CTRL 4}YEAR #";I/12:PRI
    NT"INTEREST PAID THIS YEAR-- ";II
                                        :REM*253
49Ø I$=STR$(INT(IE))+"."+RIGHT$(STR$(IE*1ØØ
    ),2)                                :REM*45
5ØØ PRINT"EQUITY PAID THIS YEAR-- "IE:PRINT
                                        :REM*2Ø1
51Ø II=Ø:IE=Ø                           :REM*63
52Ø PRINTTAB(16)"PRESS RETURN TO CONTINUE -
     ANY OTHER KEY TO STOP":PRINT       :REM*144
53Ø GETA$:IFA$=""THEN53Ø                :REM*216
54Ø IFA$<>CHR$(13)THEN58Ø               :REM*68
55Ø GOTO56Ø                             :REM*98
56Ø IFISW=1THENCLR:SCNCLR:SLOW:END      :REM*2Ø4
57Ø SCNCLR:GOSUB77Ø:GOTO35Ø             :REM*3Ø
58Ø CLR:SLOW:SCNCLR:END                 :REM*124
59Ø GOSUB61Ø:GOTO6ØØ                    :REM*25Ø
6ØØ RETURN                              :REM*148
61Ø AM=AM+.ØØ5:AM=AM*1ØØ:AM=INT(AM):AM=AM/1
    ØØ                                  :REM*84
62Ø R=R+.ØØ5:R=R*1ØØ:R=INT(R):R=R/1ØØ
                                        :REM*2Ø2
63Ø PI=PI+.ØØ5:PI=PI*1ØØ:PI=INT(PI):PI=PI/1
    ØØ                                  :REM*126
64Ø PE=PE+.ØØ5:PE=PE*1ØØ:PE=INT(PE):PE=PE/1
    ØØ                                  :REM*146
65Ø TN=TN+.ØØ5:TN=TN*1ØØ:TN=INT(TN):TN=TN/1
    ØØ                                  :REM*192
66Ø TE=TE+.ØØ5:TE=TE*1ØØ:TE=INT(TE):TE=TE/1
    ØØ                                  :REM*32
67Ø TP=TP+.ØØ5:TP=TP*1ØØ:TP=INT(TP):TP=TP/1
    ØØ                                  :REM*8Ø
68Ø PRINT"{COMD 2}"TAB(4-LEN(STR$(I)))I;
                                        :REM*238
69Ø PRINT USING"########.##";AM;        :REM*248
7ØØ PRINT USING"#######.##";R;          :REM*224
71Ø PRINT USING"#######.##";PI;         :REM*25Ø
72Ø PRINT USING"#######.##";PE;         :REM*244
73Ø PRINT USING"#######.##";TN;          :REM*42
74Ø PRINT USING"#########.##";TE;       :REM*13Ø
75Ø PRINT USING"#########.##";TP        :REM*214
76Ø RETURN                              :REM*52
77Ø PRINT"{CTRL 4}PAYMENT"TAB(9)"OUTSTAND"T
    AB(2Ø)"GROSS"TAB(29)"INT"TAB(39)"EQUITY
    ";                                  :REM*67
78Ø PRINTTAB(5Ø)"CUMU"TAB(61)"CUM"      :REM*17
79Ø PRINT"NUMBER"TAB(9)"BALANCE"TAB(2Ø)"PAY
    MT"TAB(29)"PAYMT";                  :REM*251
8ØØ PRINTTAB(39)"PAYMT"TAB(5Ø)"INT"TAB(61)"
    EQUITY";                            :REM*87
81Ø PRINTTAB(74)"TOTAL"                 :REM*93
82Ø FORXX=1TO79:PRINT"-";:NEXT:PRINT
                                        :REM*185
83Ø RETURN                              :REM*123
```

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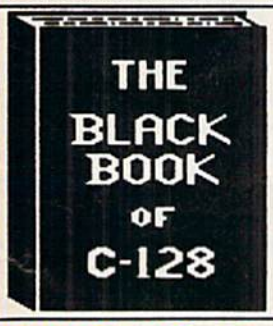

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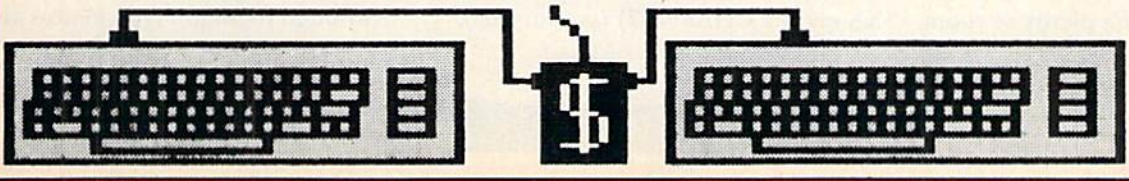

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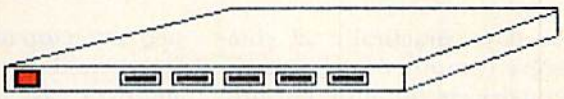

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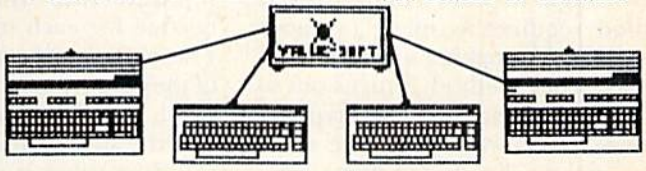

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THE LIGHT CHOICE

Highlight your programs with easy-to-choose menus.

By BOB GUERRA

These days, practically all commercial computer programs are menu-driven, but different programs provide different ways to select the option you want. Some have you enter the first letter of the option, such as P for print, S for search or Q for quit. Others number the options and ask you to enter the number of your choice.

For most Basic programmers, these two methods have become standbys. A slightly more sophisticated approach uses a joystick- or mouse-controlled arrow to point to the option, but this approach has to be written in machine language to make the arrow travel smoothly and quickly around the screen.

A third method, possible to code in Basic with only a little more effort than the letter and number systems, is the moving highlight. Here, the options are displayed across a command line at the top of the screen, and you use the left/right cursor key to make the highlight move from option to option. When the highlight covers the option you want, you press the return key to send execution to that routine.

Although the moving-highlight method requires as many or more keystrokes for making a selection as the first-letter method, it turns out to be faster (especially for nontypists), because you always press the same key to make a choice. Another advantage of this approach is that it gives programs a polished, professional appearance.

Also, when you program a moving-highlight menu for the C-128 in 80-column mode, there's plenty of room across the top of the screen for menu items, and the Window command makes it easy to create "pull-down" submenus from the main selections.

Get Routines

Here's how the highlight system works. As the menu is initially displayed, the first option (on the left) appears in reverse lettering, and the rest are in normal lettering. This makes the first option look highlighted. A Get routine waits for you to press either the left (CHR$(29)) or right (CHR$(157)) cursor key, so it can decide whether to move the highlight to the next option on the right or jump it to the last option on the right.

What actually happens when the highlight "appears" to move is that the two options involved are rewritten—the one that was originally in reverse lettering is rewritten in normal lettering, and vice versa. Because the rewriting happens so quickly, it looks like the highlight changes position. Once you've moved the highlight, a second Get routine made for the new situation is executed.

To make the whole system work, a separate four-line Get routine is needed for each of the menu items. These routines reside in lines 50–320 of the demonstration program in Listing 1. The first line of each routine gets the string variable X$, checks to see if its value is CHR$(29) (cursor-right) and, if it is, rewrites the two options and sends execution to the appropriate routine. If the value of X$ isn't CHR$(29), execution falls through to the second line to see if X$ equals CHR$(157) (cursor-left). Again, if it does, the options are rewritten and execution goes to the appropriate routine.

If X$ isn't CHR$(157), execution proceeds to the third line, where the variable is checked for CHR$(13), the return key. If it is, execution branches to that part of the program named in the menu option that was highlighted when you pressed return.

If you didn't press an appropriate key, execution falls through to the fourth line, which loops back to the first line to get X$ all over again. Thus, the program ignores all keystrokes other than cursor-right, cursor-left and return. An advantage to using multiple Get routines is that they enable you to hold down the cursor keys and rapidly cycle through the various menu choices in either direction.

Pull-Down Menus

You can create pull-down submenus by defining a small screen window in the area directly below a main-menu choice, then listing the options in a column within the window. This time the highlighted option is the only one *not* written in reverse, and the program checks the keystrokes for CHR$(145) or CHR$(17) (cursor-up or cursor-down).

To see an example of a pull-down menu, select option 4 in the main menu of the demonstration program. The code for this submenu resides in lines 4000–4200 of the listing. When you're programming pull-down menus, remember to clear and redefine the window immediately after a selection has been made.

Although highlight-type menus are

usually associated with productivity applications and utilities, they work equally well with games, and if the game you write is largely joystick-controlled, you can easily use it to move the highlight and make selections. Instead of getting a keystroke and checking to see if it was a cursor key, you check the status of the reserved variable—JOY(1) or JOY(2), depending on which port the joystick is using.

A value of 3 means the stick has been moved to the right, and a value of 7 indicates a move to the left. A value of 128 or higher means the firebutton—which has the same function as the return key—has been pressed. If you wanted to allow both keyboard and joystick selection, you certainly could combine both methods. ®

Address all author correspondence to Bob Guerra, 7 Russell St., Charlestown, MA 02129.

Listing 1. *Highlight demonstration program.*

```
5 FAST                                    :REM*43
1Ø SCNCLR:PRINT"{CTRL 9}CHOICE 1{CTRL Ø}","
   CHOICE 2","CHOICE 3","CHOICE 4","CHOICE
   5","CHOICE 6","CHOICE 7"               :REM*112
2Ø PRINT"{CTRL 8}{67 COMD Ts}{CTRL 9}{2 SPA
   CEs}MAIN MENU{2 SPACEs}{CTRL Ø}"       :REM*58
3Ø FOR I=1TO21:PRINT:NEXT                 :REM*1Ø
4Ø PRINT"{CTRL 9}{COMD 3}{2 SPACEs}<CRSR> T
   O SELECT{2 SPACEs}<RETURN> TO EXECUTE{41
    SPACEs}{CTRL Ø}{CTRL 4}"CHR$(19)
                                          :REM*168
45 Z$=CHR$(29):Y$=CHR$(157):C$=CHR$(13):F$=
   CHR$(145):S$=CHR$(17)                  :REM*111
5Ø GETX$:IFX$=Z$THENPRINT"{CRSR UP}CHOICE 1
   ","{CTRL 9}CHOICE 2{CTRL Ø}":GOTO9Ø
                                          :REM*128
6Ø IFX$=Y$THEN PRINT"{CRSR UP}CHOICE 1"TAB(
   6Ø)"{CTRL 9}CHOICE 7{CTRL Ø}":GOTO29Ø
                                          :REM*142
7Ø IFX$=C$THENY=1:GOTO 1ØØØ               :REM*4Ø
8Ø GOTO5Ø                                 :REM*36
9Ø GETX$:IFX$=Z$THENPRINTTAB(1Ø)"{CRSR UP}C
   HOICE 2","{CTRL 9}CHOICE 3{CTRL Ø}":GOTO
   13Ø                                    :REM*78
1ØØ IFX$=Y$THEN PRINT"{CTRL 9}{CRSR UP}CHOI
    CE 1{CTRL Ø}","CHOICE 2":GOTO5Ø       :REM*22
11Ø IFX$=C$THENY=2:GOTO 1ØØØ              :REM*88
12Ø GOTO9Ø                                :REM*1Ø8
13Ø GETX$:IFX$=Z$THENPRINTTAB(2Ø)"{CRSR UP}
    CHOICE 3","{CTRL 9}CHOICE 4{CTRL Ø}":GO
    TO17Ø                                 :REM*Ø
14Ø IFX$=Y$THEN PRINTTAB(1Ø)"{CTRL 9}{CRSR
    UP}CHOICE 2{CTRL Ø}","CHOICE 3":GOTO9Ø
                                          :REM*16
15Ø IFX$=C$THENY=3:GOTO 1ØØØ              :REM*136
16Ø GOTO13Ø                               :REM*138
17Ø GETX$:IFX$=Z$THENPRINTTAB(3Ø)"{CRSR UP}
    CHOICE 4","{CTRL 9}CHOICE 5{CTRL Ø}":GO
    TO21Ø                                 :REM*128
18Ø IFX$=Y$THEN PRINTTAB(2Ø)"{CTRL 9}{CRSR
    UP}CHOICE 3{CTRL Ø}","CHOICE 4":GOTO13Ø
                                          :REM*16
19Ø IFX$=C$THEN4ØØØ                       :REM*126
2ØØ GOTO17Ø                               :REM*242
21Ø GETX$:IFX$=Z$THENPRINTTAB(4Ø)"{CRSR UP}
    CHOICE 5","{CTRL 9}CHOICE 6{CTRL Ø}":GO
    TO25Ø                                 :REM*5Ø
22Ø IFX$=Y$THEN PRINTTAB(3Ø)"{CTRL 9}{CRSR
    UP}CHOICE 4{CTRL Ø}","CHOICE 5":GOTO17Ø
                                          :REM*88
23Ø IFX$=C$THENB=5:GOTO5ØØØ               :REM*188
24Ø GOTO21Ø                               :REM*194
25Ø GETX$:IFX$=Z$THENPRINTTAB(5Ø)"{CRSR UP}
    CHOICE 6","{CTRL 9}CHOICE 7{CTRL Ø}":GO
    TO29Ø                                 :REM*228
26Ø IFX$=Y$THEN PRINTTAB(4Ø)"{CTRL 9}{CRSR
    UP}CHOICE 5{CTRL Ø}","CHOICE 6":GOTO21Ø
                                          :REM*143
27Ø IFX$=C$THENB=6:GOTO5ØØØ               :REM*237
28Ø GOTO25Ø                               :REM*43
29Ø GETX$:IFX$=Z$THENPRINT"{CTRL 9}{CRSR UP
    }CHOICE 1{CTRL Ø}"TAB(6Ø)"CHOICE 7":GOT
    O5Ø                                   :REM*117
3ØØ IFX$=Y$THENPRINTTAB(5Ø)"{CTRL 9}{CRSR U
    P}CHOICE 6{CTRL Ø}","CHOICE 7":GOTO25Ø
                                          :REM*215
31Ø IFX$=C$THENB=7:GOTO5ØØØ               :REM*29
32Ø GOTO29Ø                               :REM*147
1ØØØ SCNCLR:PRINTTAB(3Ø)"{CRSR DN}BRANCHING
     TO CHOICE "Y:GOTO8ØØØ                :REM*119
4ØØØ WINDOW3Ø,1,39,8:PRINT"{CTRL 9}{11 SPAC
     Es}{CTRL Ø}OPTION A{CTRL 9}{2 SPACEs}O
     PTION B{2 SPACEs}OPTION C{2 SPACEs}OPT
     ION D{2 SPACEs}OPTION E{11 SPACEs}{6 C
     RSR UPs}"                            :REM*2Ø5
4Ø1Ø GETX$:IFX$=S$THENPRINT"{6 CRSR UPs}{CT
     RL 9} OPTION A{2 SPACEs}{CTRL Ø}OPTION
      B":GOTO4Ø5Ø                         :REM*1Ø5
4Ø2Ø IFX$=F$THENPRINT"{6 CRSR UPs}{CTRL 9}
     OPTION A {3 CRSR DNs} {CTRL Ø}OPTION E
     ":GOTO417Ø                           :REM*243
4Ø3Ø IFX$=C$THENLETA$="A":GOTO 49ØØ:REM*221
4Ø4Ø GOTO4Ø1Ø                             :REM*213
4Ø5Ø GETX$:IFX$=S$THENPRINT"{5 CRSR UPs}{CT
     RL 9} OPTION B{2 SPACEs}{CTRL Ø}OPTION
      C":GOTO4Ø9Ø                         :REM*253
4Ø6Ø IFX$=F$THENPRINT"{5 CRSR UPs}{CTRL 9}
     OPTION B {2 CRSR UPs} {CTRL Ø}OPTION A
     ":GOTO4Ø1Ø                           :REM*179
4Ø7Ø IFX$=C$THENLETA$="B":GOTO 49ØØ :REM*69
4Ø8Ø GOTO4Ø5Ø                             :REM*125
4Ø9Ø GETX$:IFX$=S$THENPRINT"{4 CRSR UPs}{CT
     RL 9} OPTION C{2 SPACEs}{CTRL Ø}OPTION
      D":GOTO413Ø                         :REM*157
41ØØ IFX$=F$THENPRINT"{4 CRSR UPs}{CTRL 9}
     OPTION C {2 CRSR UPs} {CTRL Ø}OPTION B
     ":GOTO4Ø5Ø                           :REM*58
411Ø IFX$=C$THENLETA$="C":GOTO 49ØØ:REM*174
412Ø GOTO4Ø9Ø                             :REM*4Ø
413Ø GETX$:IFX$=S$THENPRINT"{3 CRSR UPs}{CT
     RL 9} OPTION D{2 SPACEs}{CTRL Ø}OPTION
      E":GOTO417Ø                         :REM*168
414Ø IFX$=F$THENPRINT"{3 CRSR UPs}{CTRL 9}
     OPTION D {2 CRSR UPs} {CTRL Ø}OPTION C
     ":GOTO4Ø9Ø                           :REM*114
415Ø IFX$=C$THENLETA$="D":GOTO 49ØØ :REM*24
416Ø GOTO413Ø                             :REM*158
417Ø GETX$:IFX$=S$THENPRINT"{2 CRSR UPs}{CT
     RL 9} OPTION E {5 CRSR UPs} {CTRL Ø}OP
     TION A":GOTO4Ø1Ø                     :REM*222
418Ø IFX$=F$THENPRINT"{2 CRSR UPs}{CTRL 9}
     OPTION E {2 CRSR UPs} {CTRL Ø}OPTION D
     ":GOTO413Ø                           :REM*188
419Ø IFX$=C$THENLETA$="E":GOTO 49ØØ:REM*128
42ØØ GOTO417Ø                             :REM*7Ø
49ØØ WINDOWØ,Ø,79,24,1:PRINTTAB(3Ø)"{CRSR D
     N}BRANCHING TO OPTION "A$:GOTO8ØØØ
                                          :REM*75
5ØØØ SCNCLR:PRINTTAB(3Ø)"{CRSR DN}BRANCHING
     TO CHOICE "B:GOTO8ØØØ                :REM*15
8ØØØ GETKEYX$                             :REM*191■
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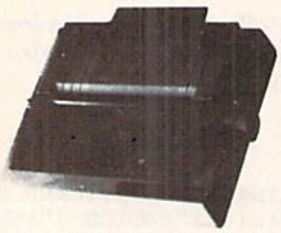

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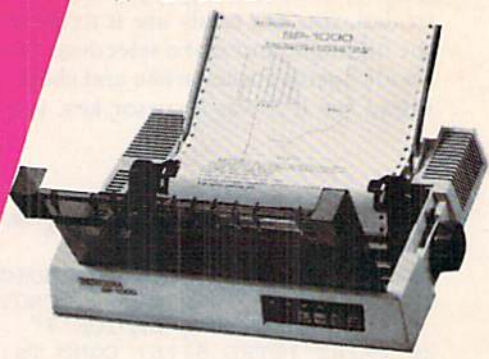

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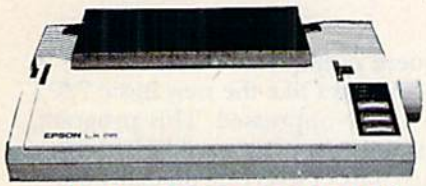

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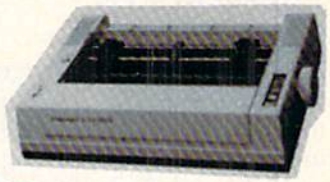

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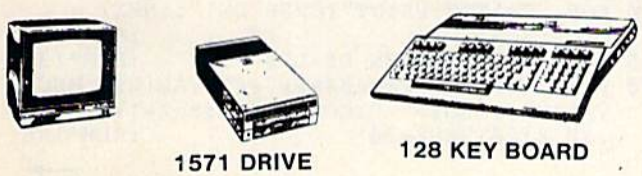

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ADD/CALC-128

Using this program for arithmetic calculations turns your C-128 into a printing calculator.

By GEORGE NOETH

This little calculator program, written in Basic 7.0, is designed to turn your fancy new C-128 system into a rather simple printing calculator. I wrote Add/Calc-128 to learn about Basic 7.0, so I used as many commands as possible, as well as the 80-column screen and the numeric keypad. As a programming challenge, I also avoided the Peeks and Pokes I normally use.

When you run Add/Calc-128, it first asks if you intend to use the printer; respond Y or N. Then a screen appears, displaying two windows and the program instructions.

Press a number on the numeric keypad. You'll hear a tone and the number will appear in the left window. If it's a negative number, it'll be in red. To clear the window, press the F5 key. If you make a mistake entering a number, hit the F5 key and then reenter the number.

Pressing the + key moves the number to the right window, clearing the left window in the process. As the right window fills with figures, they scroll vertically out of the window, with the most recent entries remaining in view.

To total a column of figures, press the return key after the last entry. To multiply two numbers, press the F1 key after the first entry, then the return key after the second. For instance, the proper entry sequence for multiplying 25 by 50 would be 25, F1, 50, return. The sequence for division is similar, except you press F3 instead of F1.

The program retains the result of an operation to use in the next. For example, if you press the + key after taking a sum, that sum will appear on the screen as the first entry for a subsequent multiplication.

How did I like the new Basic 7.0? I was really impressed. This program, as simple as it is, would have been much harder to create on many other machines.

If you're interested in exploring Basic 7.0, you might begin by adding some enhancements to Add/Calc-128. There's plenty of room for improvement, because it lacks most of the features of the more sophisticated printing calculators. It could use multiple memory keys and a percent key, for instance. Whether you're an old pro or a novice like me, I'm sure you'll find the C-128 and Basic 7.0 an extremely versatile and easy-to-use combination. ®

Address all author correspondence to George Noeth, 2781 Fort Island Drive, Akron, OH 44313.

Listing 1. *Add/Calc-128 program.*

```
8Ø FAST:FORI=1TO8:KEYI,CHR$(I+132):NEXT:PRI
   NT"{CTRL 4}";                          :REM*4Ø
9Ø TC=53:TR=2:BC=71:BR=22:Z=1             :REM*228
1ØØ PRINT"{SHFT CLR}{4 CRSR DNs}{5 CRSR RTs
    }{CTRL 9}{2 SPACEs}CALCULATOR FOR C128
    IN 8Ø COLUMN MODE"                    :REM*228
1Ø5 GOTO13ØØ                              :REM*95
11Ø PRINT"{CRSR DN}{7 CRSR RTs}{CTRL 9}{2 S
    PACEs}KEY{1Ø SPACEs}FUNCTION{2 SPACEs}"
                                          :REM*22Ø
12Ø PRINT"{CRSR DN}{1Ø SPACEs}+{11 SPACEs}A
    DD                                    :REM*9Ø
13Ø PRINT"{CRSR DN}{1Ø SPACEs}-{11 SPACEs}S
    UBTRACT                               :REM*32
14Ø PRINT"{CRSR DN}{1Ø SPACEs}F1{1Ø SPACEs}
    MULTIPLY                              :REM*138
15Ø PRINT"{CRSR DN}{1Ø SPACEs}F3{1Ø SPACEs}
    DIVIDE                                :REM*126
16Ø PRINT"{CRSR DN}{1Ø SPACEs}F5{1Ø SPACEs}
    CLEAR ENTRY                           :REM*4Ø
17Ø PRINT"{CRSR DN}{1Ø SPACEs}ENTER{7 SPACE
    s}=/TOTAL                             :REM*188
2ØØ PRINT"{HOME}";:PRINTTAB(5Ø);"{CTRL 9}{2
    5 SPACEs}"                            :REM*2Ø2
21Ø FORX=1TO22:PRINTTAB(5Ø)"{CTRL 9}{2 SPAC
    Es}{CTRL Ø}{21 SPACEs}{CTRL 9}{2 SPACEs
    }{CTRL Ø}":NEXT                       :REM*152
22Ø PRINTTAB(5Ø)"{CTRL 9}{25 SPACEs}{CTRL Ø
    }"                                    :REM*196
23Ø PRINT"{3 CRSR UPs}{1Ø SPACEs}{CTRL 9}{2
    3 SPACEs}{CTRL Ø}"                    :REM*2Ø8
24Ø PRINT"{1Ø SPACEs}{CTRL 9}{2 SPACEs}{CTR
    L Ø}{19 SPACEs}{CTRL 9}{2 SPACEs}{CTRL
    Ø}"                                   :REM*252
25Ø PRINT"{1Ø SPACEs}{CTRL 9}{23 SPACEs}{CT
    RL Ø}"                                :REM*17Ø
255 PRINT"{CTRL 2}";                      :REM*217
26Ø WINDOW 12,22,3Ø,22,1:PRINT"{4 SPACEs}";
                                          :REM*167
27Ø GETKEY A$:B$=B$+A$:SOUND1,15ØØØ,1:IF AS
    C(A$)>57 THEN3ØØ                      :REM*23
28Ø IFASC(A$)<48 THEN3ØØ                  :REM*69
29Ø PRINTA$;:GOTO27Ø                      :REM*239
3ØØ IFA$="+"THEN5ØØ                       :REM*231
31Ø IFA$="."THEN29Ø                       :REM*175
32Ø IFA$="-"THEN6ØØ                       :REM*255
33Ø IFASC(A$)=13 THEN 7ØØ                 :REM*155
34Ø IFASC(A$)=137 THEN 8ØØ                :REM*65
35Ø IFASC(A$)=133 THEN 9ØØ                :REM*75
36Ø IFASC(A$)=135 THEN 1ØØØ               :REM*147
37Ø SOUND1,1ØØØ,5:GOTO27Ø                 :REM*1Ø3
5ØØ WINDOW TC,TR,BC,BR                    :REM*17
51Ø FOR SP=1TOZ:PRINT"{CRSR DN}";:NEXT
                                          :REM*163
515 IF VAL(B$)=ØTHEN B$=LP$               :REM*131
52Ø PRINT USING"##########.##";VAL(B$):MSG=
    VAL(B$):MSG$=" ":GOSUB12ØØ:Z=Z+1:LP$=B$
    :IF Z>2ØTHENZ=2Ø                      :REM*146
```

→

RUN It Right

C-128 (in 80-column mode); printer optional

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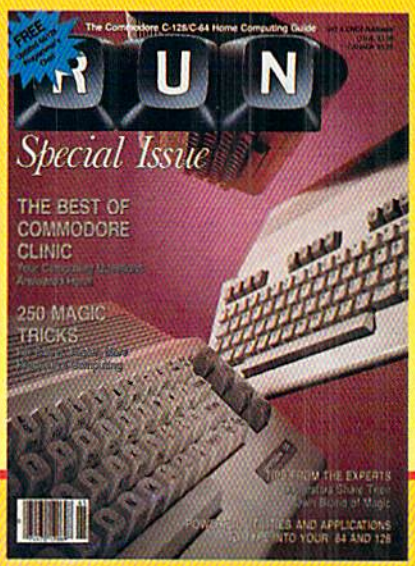

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RN3SP

Listing 1 continued.

```
53Ø T=T+VAL(B$):B$="{2 SPACEs}":GOTO26Ø
                                        :REM*194
6ØØ WINDOW TC,TR,BC,BR                  :REM*118
6Ø5 PRINT"{COMD 3}";                    :REM*83
61Ø FOR SP=1TOZ:PRINT"{CRSR DN}";:NEXT
                                        :REM*8
615 IF VAL(B$)=ØTHEN B$=LP$             :REM*231
62Ø PRINT USING"##########.##";VAL(B$):MSG=
    VAL(B$):MSG$="-":GOSUB12ØØ:Z=Z+1:LP$=B$
    :IF Z>2ØTHENZ=2Ø                    :REM*42
63Ø T=T-VAL(B$):B$="{2 SPACEs}":PRINT"{CTRL
     2}";:GOTO26Ø                       :REM*198
7ØØ WINDOW TC,TR,BC,BR:IF MU=1 THEN 91Ø
                                        :REM*4Ø
7Ø5 IF DV=1 THEN 1Ø1Ø                   :REM*199
71Ø FOR SP=1TOZ:PRINT"{CRSR DN}";:NEXT
                                        :REM*1Ø8
72Ø PRINT USING"##########.##";T," T":MSG=T
    :MSG$=" T":GOSUB12ØØ:Z=Z+2:LP$=STR$(T):
    IF Z>2ØTHENZ=2Ø                     :REM*19Ø
73Ø T=Ø:B$="{2 SPACEs}":PRINT:GOTO26Ø
                                        :REM*96
8ØØ B$="":GOTO26Ø                       :REM*173
9ØØ WINDOW TC,TR,BC,BR                  :REM*163
91Ø FOR SP=1TOZ:PRINT"{CRSR DN}";:NEXT
                                        :REM*53
92Ø M=VAL(B$):IF ASC(A$)=13THEN97Ø      :REM*89
93Ø IF M=ØTHEN M=VAL(LP$)               :REM*19
94Ø PRINT USING"##########.##";M," X":MSG=M
    :MSG$="X":GOSUB12ØØ:Z=Z+1:IF Z>2ØTHENZ=
    2Ø                                  :REM*1Ø5
95Ø IF MU=O THEN T=M:MU=1:B$="{2 SPACEs}":G
    OTO26Ø                              :REM*25
96Ø T=T*M:B$="{2 SPACEs}":GOTO26Ø       :REM*83
97Ø PRINT USING"##########.##";M:MSG=M:MSG$
    =" ":GOSUB12ØØ:Z=Z+1:IF Z>2ØTHENZ=2Ø
                                        :REM*225
98Ø T=T*M:MU=Ø:B$="{2 SPACEs}":GOTO 7ØØ
                                        :REM*129
1ØØØ WINDOW TC,TR,BC,BR                 :REM*7
1Ø1Ø FOR SP=1TOZ:PRINT"{CRSR DN}";:NEXT
                                        :REM*153
1Ø2Ø D=VAL(B$):IF ASC(A$)=13THEN1Ø7Ø:REM*19
1Ø25 IF D=ØTHEN D=VAL(LP$)              :REM*167
1Ø3Ø PRINT USING"##########.##";D," /":MSG=
    D:MSG$="/":GOSUB12ØØ:Z=Z+1:IF Z>2ØTHEN
    Z=2Ø                                :REM*244
1Ø5Ø IF DV=O THEN T=D:DV=1:B$="{2 SPACEs}":
    GOTO26Ø                             :REM*178
1Ø55 IF D=Ø THEN T=Ø:PRINT"ERROR":B$="{2 SP
    ACEs}":DV=Ø:GOTO26Ø                 :REM*19
1Ø6Ø T=T/D:B$="{2 SPACEs}":GOTO26Ø      :REM*15Ø
1Ø7Ø PRINT USING"##########.##";D:MSG=D:MSG
    $=" ":GOSUB12ØØ:Z=Z+1:IF Z>2ØTHENZ=2Ø
                                        :REM*146
1Ø75 IF D=Ø THEN T=Ø:PRINT"ERROR":B$="{2 SP
    ACEs}":DV=Ø:GOTO26Ø                 :REM*39
1Ø8Ø T=T/D:DV=Ø:B$="{2 SPACEs}":GOTO 7ØØ
                                        :REM*188
12ØØ IF PR=1THEN121Ø:ELSE 123Ø          :REM*52
121Ø PRINT#4,TAB(2Ø);:PRINT#4,USING"#######
    ###.##";MSG;:PRINT#4,MSG$:RETURN
                                        :REM*118
123Ø RETURN                             :REM*12
13ØØ PRINT"{6 SPACEs}DO YOU WANT PRINTER OU
    TPUT{3 SPACEs}(Y/N)"                :REM*139
131Ø GETKEY Z$:IFZ$="Y"THEN133Ø         :REM*43
1315 IFZ$="N"THEN135Ø                   :REM*154
132Ø GOTO 131Ø                          :REM*67
133Ø OPEN4,4:PR=1                       :REM*2Ø9
134Ø PRINT"{CRSR UP}{18 SPACEs}PRINTER ON{1
    5 SPACEs}":GOTO11Ø                  :REM*163
135Ø PRINT"{CRSR UP}{18 SPACEs}PRINTER OFF{
    14 SPACEs}":GOTO11Ø                 :REM*241
```


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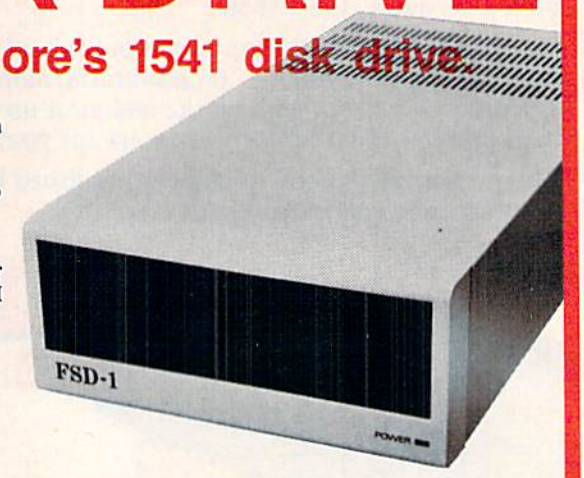

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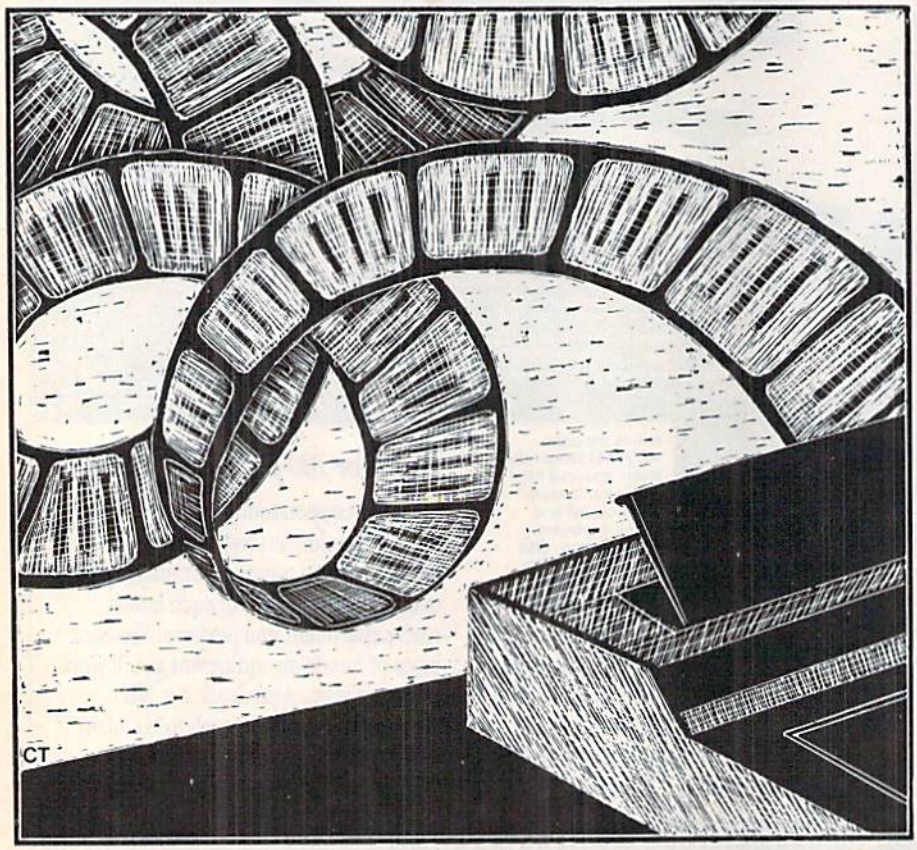

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Label Copy will print up to five lines on a label for a specified number of prints. You can also determine the number of vertical spaces between the last line and the new first line, thus adjusting to the depth of the labels you're using. Printing some test labels will get the text alignment right.

After you've entered your text, the program will display it so you can check it for errors. If you say everything is okay, the labels will begin printing with the current label number displayed on the screen.

You can save your label text on disk if you intend to reuse it. When the prompt appears for a "save name," use a short one that will remind you of the text. You can use a save name only once.

Label Copy includes defaults for some of the text parameters. To customize the program to your own needs, you can easily change these defaults by changing the poked characters. For example, line 50 pokes screen location 1078 with 14 if you type N for no instructions. A 25 would mean Y for yes. You can find the screen display codes in the *Commodore C-64 User's Guide*.

Label Copy could be used for much more than return address labels. Some other applications might include name tags, owner tags for luggage, books or record albums and ID tags for appliances. R →

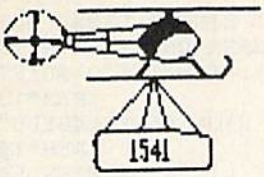
Address all author correspondence to Chris Achtschin, PO Box 42, Middlesex, NY 14507.

RUN It Right

C-64; printer

ILLUSTRATED BY CLAUDIA TANTILLO

1541 MASH V2.0



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Listing 1. *Label Copy program.*

```
10 PRINT"{SHFT CLR}":POKE53280,8:POKE53281,
   8:POKE646,1:PRINTCHR$(14)          :REM*94
20 FORU=1TO10:PRINT:NEXTU             :REM*134
30 PRINT"{14 SPACEs}{CTRL 9}{SHFT L}ABEL {S
   HFT C}OPY{CTRL Ø}{9 SPACEs}"       :REM*Ø
40 FOR J=1TO1ØØØ:NEXTJ:PRINT"{SHFT CLR}"
                                      :REM*84
90 PRINT"{SHFT CLR}{SHFT T}HIS PROGRAM PRIN
   TS A SPECIFIED NUMBER              :REM*32
100 PRINT"OF LABELS. {SHFT L}INES CAN BE AD
    DED BETWEEN":PRINT"LABELS. {SHFT E}XAMP
    LE:":PRINT                        :REM*204
110 PRINT"1 1/4 INCH LABELS REQUIRE ONE LIN
    E{6 SPACEs}BETWEEN LABELS.":PRINT
                                      :REM*228
190 PRINT"{2 CRSR DNs}{SHFT U}P TO 5 LINES
    OF TEXT CAN BE ENTERED ON EACH LABEL.
                                      :REM*58
210 PRINTTAB(12)"{CRSR UP}{SHFT L}ABELS CAN
     ALSO BE SAVED TO DISK            :REM*162
220 PRINTTAB(5)"{CRSR UP}BY ENTERING A FILE
    NAME AT THE":PRINT"SPECIFIED PROMPT.
                                      :REM*5Ø
240 PRINTTAB(7):INPUT"{CRSR DN}{SHFT P}RESS
     <RETURN> TO CONTINE{COMD 1}";A:REM*26
250 POKE19,64:PRINT"{SHFT CLR}{CTRL 2}{SHFT
     E}NTER (Y) TO ALIGN AND PRINT A FIVE-L
    INETEST LABEL.                    :REM*204
260 INPUT"{CRSR DN}{SHFT T}EST LABEL (Y/N)"
    ;L$                               :REM*139
280 IFL$="Y"THEN700                   :REM*73
282 POKE19,Ø                          :REM*41
285 PRINT"{SHFT CLR}{SHFT E}NTER LABEL DATA
     AT PROMPTS":PRINT"{CRSR DN}{SHFT N}{SH
    FT O}{SHFT T}{SHFT E}: {SHFT N}O SHIFTE
    D CHARACTERS!"                    :REM*136
290 INPUT"{CRSR DN}{SHFT H}OW MANY LABELS";
    C                                 :REM*105
300 INPUT"{SHFT H}OW MANY LINES BETWEEN LAB
    ELS";P                            :REM*253
310 INPUT"NEW (N) OR OLD (O)";U$      :REM*157
320 IF U$="O"THEN890                  :REM*1
330 X=1532:E=E+1:                     :REM*249
340 INPUT"LINE 1";N$                  :REM*237
350 INPUT"LINE 2";A$                  :REM*41
360 INPUT"LINE 3";C$                  :REM*85
370 INPUT"LINE 4";Z$                  :REM*211
380 INPUT"LINE 5";E$                  :REM*141
410 PRINT"{3 CRSR DNs}{CTRL 9}LABEL DATA:{2
     CRSR DNs}"                       :REM*173
420 PRINT"{CTRL 9}"                   :REM*131
430 PRINT"{CTRL 9}";N$                :REM*167
440 PRINT"{CTRL 9}";A$                :REM*41
450 PRINT"{CTRL 9}";C$                :REM*53
460 PRINT"{CTRL 9}";Z$                :REM*203
470 PRINT"{CTRL 9}";E$                :REM*73
480 PRINT"{SHFT T}HIS WILL PRINT";C;"{CRSR
    LF} COPIES"                       :REM*3
490 PRINT"{SHFT W}ITH ";P;"{CRSR LF} LINES
    BETWEEN LABELS"                   :REM*205
500 PRINT"{24 SPACEs}"                :REM*143
```

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Listing 1 continued.

```
51Ø INPUT"{SHFT C}HANGE (Y) OR (N)";B$
                                        :REM*115
53Ø IF B$="Y" THEN282                   :REM*64
54Ø INPUT"WANT TO SAVE DATA ";I$        :REM*96
55Ø IF I$="Y"THENGOSUB81Ø               :REM*24Ø
56Ø OPEN5,4                             :REM*162
57Ø FOR X=1 TO C                        :REM*34
58Ø PRINT#5,N$                          :REM*232
59Ø PRINT#5,A$                          :REM*8Ø
6ØØ PRINT#5,C$                          :REM*154
61Ø PRINT#5,Z$                          :REM*136
62Ø PRINT#5,E$                          :REM*238
63Ø FOR T=1TOP:PRINT#5:NEXTT            :REM*136
64Ø PRINT"{SHFT CLR}":PRINT"PRINT #";X
                                        :REM*42
65Ø NEXTX                               :REM*88
66Ø PRINT"{SHFT CLR)":FORF=1TO1ØØØ:NEXTF
                                        :REM*8
67Ø POKE1Ø82,14:INPUT"PRINT NEW LABELS";H$
                                        :REM*1Ø6
68Ø IF H$="Y"THENCLOSE5,4:CLR:GOTO25Ø
                                        :REM*1Ø8
69Ø IF H$="N"THENEND                    :REM*224
7ØØ POKE19,Ø:OPEN5,4                    :REM*7Ø
71Ø PRINT"{SHFT CLR}PUT LABELS IN PRINTER"
                                        :REM*254
72Ø INPUT"ENTER 'Y' <RETURN> TO CONTINUE";V
    $                                   :REM*88
73Ø PRINT#5,"LINE 1 ******THIS*******"
                                        :REM*184
74Ø PRINT#5,"LINE 2 ******IS*A*******"
                                        :REM*188
75Ø PRINT#5,"LINE 3 *****SAMPLE******"
                                        :REM*23Ø
76Ø PRINT#5,"LINE 4 ******TEST*******"
                                        :REM*64
77Ø PRINT#5,"LINE 5 ******LABEL******"
                                        :REM*253
78Ø INPUT"{SHFT CLR}PRINT AGAIN";M$ :REM*57
79Ø IF M$="N"THENCLOSE5,4:GOTO282  :REM*155
8ØØ IF M$="Y"THENGOTO73Ø            :REM*19
81Ø PRINT"INSERT DATA DISK AND ENTER FILE N
    AME":INPUTV$                    :REM*93
82Ø OPEN2,8,2,"Ø:"+V$+"S,W"         :REM*177
83Ø PRINT#2,N$                      :REM*2Ø3
84Ø PRINT#2,A$                       :REM*51
85Ø PRINT#2,C$                      :REM*125
86Ø PRINT#2,Z$                      :REM*1Ø7
87Ø PRINT#2,E$                      :REM*2Ø9
88Ø CLOSE2,8,2:RETURN               :REM*2Ø7
89Ø PRINT"INSERT DATA DISK AND ENTER FILE N
    AME":INPUTV$                    :REM*173
9ØØ OPEN2,8,2,"Ø:"+V$+"S,R"         :REM*177
91Ø INPUT#2,N$                      :REM*2Ø3
92Ø INPUT#2,A$                       :REM*51
93Ø INPUT#2,C$                      :REM*125
94Ø INPUT#2,Z$                      :REM*1Ø7
95Ø INPUT#2,E$                      :REM*2Ø9
96Ø CLOSE2,8,2:GOTO41Ø              :REM*115■
```


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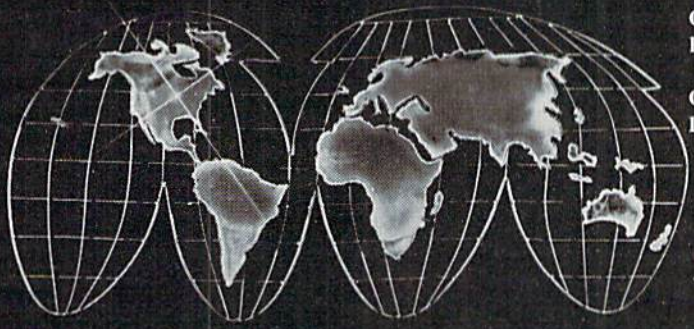

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ENVELOPE MAKER

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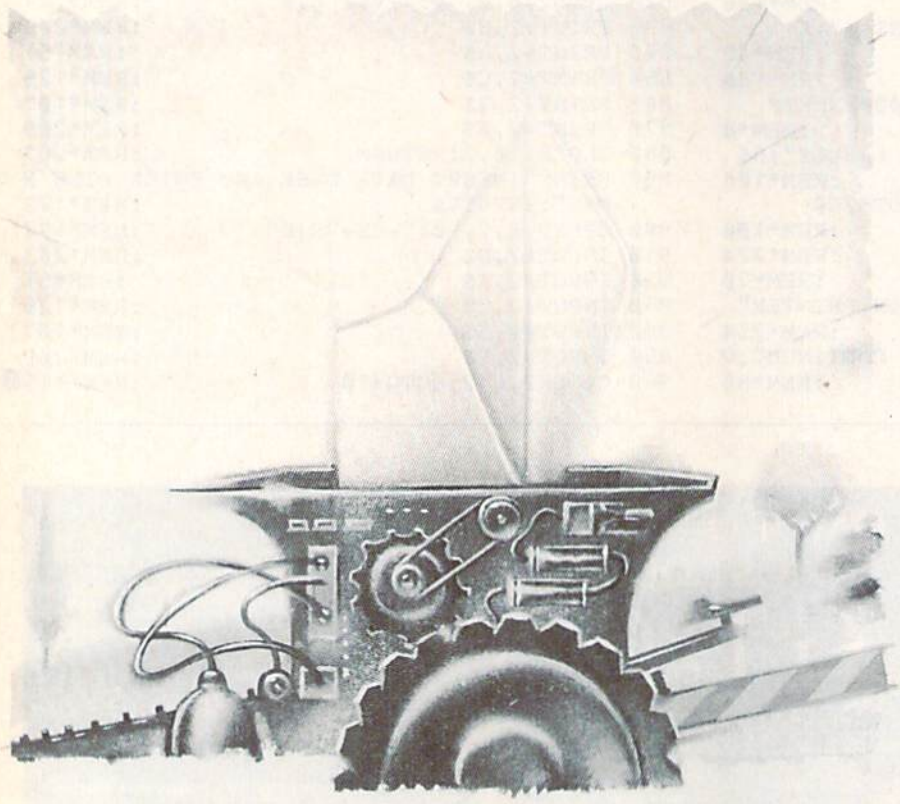
By MICHAEL BROUSSARD



If your handwriting is as sloppy as mine, you probably write letters with your word processor. However, when it's time to mail the letter, chances are you end up addressing the envelope by hand, because it's too much trouble to get out the typewriter or load labels into the printer. Don't your letters deserve to be as neat on the outside as they are on the inside? Here's a utility that can help.

Envelope Maker is a Basic program that uses your printer to create envelopes in a couple of common sizes, with the address printed right on the front. It takes regular 8½-by-11 paper, and you can choose whatever color you like. After the printer is done, you cut on the dotted lines, fold and fasten with tape or a bit of glue. The procedure is fast and easy, the envelopes are professional looking and your postman will love them.

To use Envelope Maker, type in the program in Listing 1 and save it before you run it. When you get to the Data statements in lines 780 through 810, type in your own return address in place of mine, placing each address line in quotes. The program expects four lines of return address, but I used only three, so the last Data statement specifies an empty string.

Formatting Envelopes

When you run Envelope Maker, the screen clears, and it asks which kind of envelope you want, standard letter or French fold. Standard letter is 6$\frac{7}{16}$-by-3$\frac{13}{16}$ inches, a size often used for informal correspondence or paying bills. French fold is a greeting-card-type envelope of 5¾-by-4½ inches. French fold is the perfect size for a card produced by Broderbund's Print Shop. If you've been searching in vain at stationery stores for plain white envelopes to use with Print Shop cards, look no further! Choose the envelope type by pressing 1 or 2.

Next, the program asks if you want to use the default return address. If you respond Y, for yes, Envelope Maker automatically uses the return address specified in the Data statements at the end of the program. If you answer N, it asks for up to four lines of return address, one line at a time. To skip part of an address, press the return key when the prompt for that line appears.

Now you must enter the address of the person to whom you are sending the letter. Type in the address lines, one at a time, pressing return after each. Again, you may specify up to four lines.

Then you are asked if you want to center the address lines. If you enter Y, the lines will be centered in relation to each other. If you specify N, the lines will align on the left, but the block will still be centered on the en-

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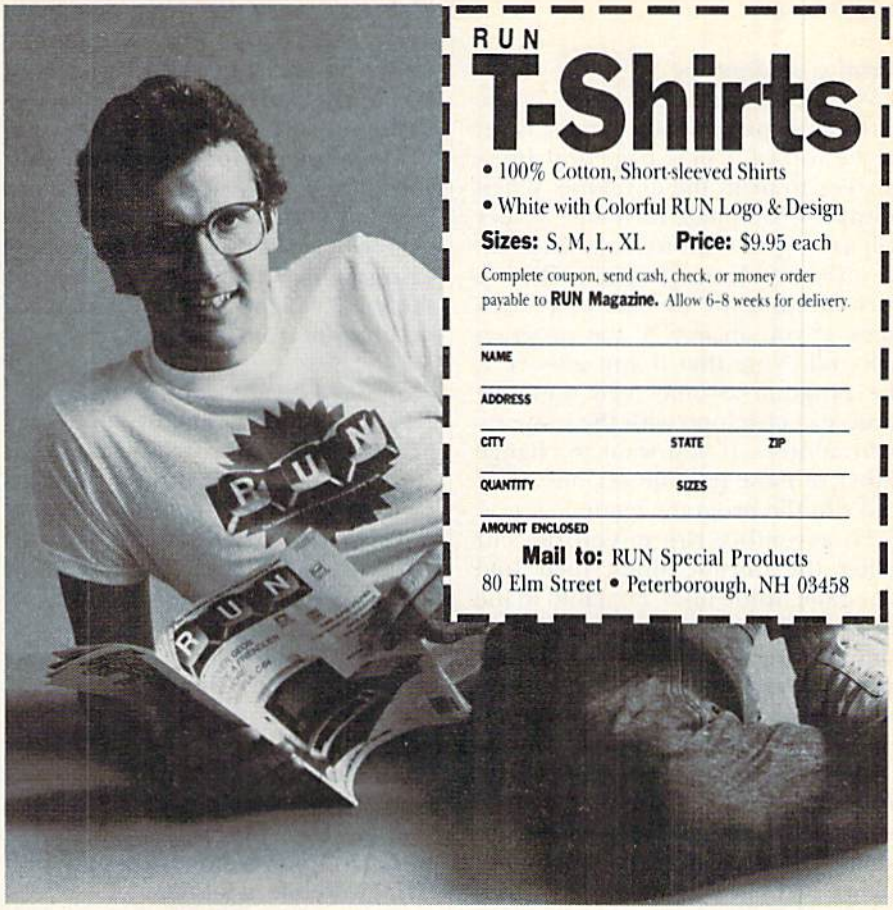

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velope. In either case, the address is double spaced.

Creating an Envelope

With the formatting done, make sure the paper in your printer is set at the top of a new page and press any key to print the envelope. When output is complete, Envelope Maker will ask if you want to make another. If you answer Y, the program will loop back to prompt for more address lines. If you answer N, the program will end. Note that if you answer Y, the program assumes you want the same size envelope with the same return address. If you want to change either of these parameters, answer N and run the program again.

To assemble the envelope, cut along the outside lines, then fold along the inside lines. First fold in the little side flaps, then fold up the bottom. Fasten with glue or tape (I use a glue stick, available at most office supply stores). Finally, insert your letter and fold and fasten the main flap.

Envelope Maker is designed to run on printers with pica type (10 characters per inch). If you have a printer with elite type (12 characters per inch), such as Commodore's 1526, change the value assigned to the variable ELITE on line 100 of the program from 0 to 1. Also, Envelope Maker assumes that your printer is device 4. If you're using a different device number for your printer, substitute the appropriate value in the variable PDEV in line 100.

The printer is opened with a device subaddress of 7, so the envelope is printed with the upper/lowercase character set. If you prefer the uppercase/graphics character set, change the value assigned to the variable SA on line 100 from 7 to 0.

Customized Input Routine

As an extra benefit, Envelope Maker contains a short machine language subroutine you can include in your own programs. This routine functions as an alternative to Basic's standard Input statement and behaves like the Input statement with the following exceptions:

1. It doesn't print a ? prompt, so you can specify whatever prompt you like.

2. It accepts the whole line you type as input, even if the line contains commas or colons.

3. Because of the second exception, it inputs a value for only one string variable at a time.

To use the subroutine, your program must first poke it into memory. Envelope Maker does this in lines 120 and 130. You should include these lines in your own program, along with the Data statements numbered 720 through 750.

Envelope Maker pokes the subroutine into RAM starting at location 49152, but you can move it anywhere you like by changing the value assigned to the variable SUB on line 120. (Just be sure you don't put it where it will interfere with Basic.) The subroutine is invoked with a SYS statement that also specifies the name of the variable to be input. Here's how a typical call might look:

```
PRINT"Input your name: ";:SYS
  SUB,N$:PRINT
```

Assuming the subroutine has already been poked in beginning at the RAM location indicated by SUB, this line first prints a prompt and then assigns a string to the variable N$.

I'll be happy to answer any questions you may have about Envelope Maker, but please enclose a self-addressed, stamped envelope. Now, where on earth are those stamps? Ⓡ

Address all author correspondence to Michael Broussard, 13136 Lazy Glen Court, Herndon, VA 22071.

Listing 1. *Envelope Maker program.*

```
10Ø TE=Ø:PDEV=4:SA=7:REM SET TE TO 1 IF YOU
     HAVE A 1526 PRINTER              :REM*18
11Ø POKE5328Ø,Ø:POKE53281,Ø:PRINTCHR$(14):P
    RINTCHR$(3Ø):PRINT"{SHFT CLR}"    :REM*44
12Ø SUB=49152:FORJ=SUBTOSUB+76:READN:CS=CS+
    N:POKEJ,N:NEXT                    :REM*24Ø
13Ø IFCS<>1Ø586THENPRINT"ERROR IN DATA STAT
    EMENTS.":END                      :REM*136
14Ø CLOSE4:OPEN4,PDEV,SA:B$="{2Ø SPACEs}":B
    $=B$+B$+B$+B$+B$                  :REM*64
15Ø PRINT"{SHFT CLR}{CRSR DN}"TAB(13)"{SHFT
     E}{SHFT N}{SHFT V}{SHFT E}{SHFT L}{SHF
    T O}{SHFT P}{SHFT E}{SHFT SPACE}{SHFT M
    }{SHFT A}{SHFT K}{SHFT E}{SHFT R}{CRSR
    DN}":FORK=1TO6:READW(K):NEXT      :REM*122
16Ø T$(1)="1) {SHFT S}TANDARD {SHFT L}ETTER
    ":T$(2)="2) {SHFT F}RENCH {SHFT F}OLD"
                                      :REM*3Ø
17Ø PRINT"{2 CRSR DNs}"TAB(9)"{SHFT C}HOOSE
     ENVELOPE TYPE:":GOSUB71Ø         :REM*82
18Ø A$="":GETA$:IF(A$<>"1")AND(A$<>"2")THEN
    18Ø                               :REM*224
19Ø ET=VAL(A$):T$(ET)="{CTRL 9}"+T$(ET):PRI
    NT"{8 CRSR UPs}":GOSUB71Ø         :REM*144
2ØØ IF ET=1 THEN W(1)=64:W(2)=W(2)-4:W(5)=W
    (5)-5:W(6)=W(6)-2                 :REM*148
21Ø IF TE THEN W(1)=W(1)+4:IF ET=1 THEN W(3
    )=W(3)-2                          :REM*162
22Ø FORJ=1TO4:READT$(J):NEXT          :REM*62
23Ø PRINT"{2 SPACEs}{SHFT U}SE DEFAULT RETU
    RN ADDRESS";:GOSUB68Ø             :REM*136
24Ø IFA$="Y"THEN27Ø                   :REM*236
25Ø IFA$<>"N"THEN23Ø                  :REM*1ØØ
26Ø P$=" RETURN":GOSUB61Ø             :REM*181
27Ø FORJ=1TO4:R$(J)=T$(J):NEXT        :REM*41
28Ø P$="":GOSUB61Ø:FORK=1TO4:AD$(K)=T$(K):N
    EXT                               :REM*163
29Ø PRINT"{2 CRSR DNs}{5 SPACEs}{SHFT C}ENT
    ER ADDRESS LINES";:GOSUB68Ø:CF=(A$="Y")
                                      :REM*1Ø5
3ØØ IF CF THEN33Ø                     :REM*99
31Ø CI=Ø:FORJ=1TO4:IFLEN(AD$(J))>CITHENCI=L
    EN(AD$(J))                        :REM*145
32Ø NEXT                              :REM*75
33Ø PRINT"{CRSR DN}{4 SPACEs}{CTRL 9}{SHFT
    P}RESS ANY KEY TO BEGIN PRINTING."
                                      :REM*87
34Ø A$="":GETA$:IFA$=""THEN34Ø        :REM*69
35Ø S=5:PRINT#4,MID$(B$,1,W(3)+S+2);
                                      :REM*243
36Ø FORJ=1TOW(1)-2*S:PRINT#4,"-";:NEXT:PRIN
    T#4                               :REM*223
37Ø FORJ=S TO 1 STEP -1               :REM*233
38Ø PRINT#4,MID$(B$,1,J+W(3))"."MID$(B$,1,W
    (1)-2*J+2)".":NEXT                :REM*83
39Ø FORJ=1TOW(4)-S:PRINT#4,MID$(B$,1,W(3)+1
    )":"MID$(B$,1,W(1))":":NEXT       :REM*25
4ØØ GOSUB66Ø:S=W(3):F1=S:F2=S:FORJ=1TOW(2)
                                      :REM*131
```

→

Listing 1 continued.

```
41Ø Y=1+(-1*(J<=S))+(-1*(J<=(W(2)-S))):ON Y
    GOTO44Ø,43Ø,42Ø                    :REM*115
42Ø X$=":":IFF1THENX$=".":X=F1:GOTO45Ø
                                       :REM*195
43Ø PRINT#4,":"MID$(B$,1,S);:GOTO46Ø:REM*39
44Ø X$=":":IFF2THENX$=".":X=S-F2+1 :REM*113
45Ø PRINT#4,MID$(B$,1,X)"."MID$(B$,1,S-X);
                                       :REM*157
46Ø Z$="":IF(J>1)AND(J<6)THENZ$=" "+R$(J-1)
    :GOTO5ØØ                           :REM*59
47Ø IF(J<W(6))OR(J>W(6)+6)OR(INT(J/2)<>J/2)
    THEN5ØØ                            :REM*225
48Ø Z$=AD$((J-W(6))/2+1):CZ=LEN(Z$):IFCF=ØT
    HENCZ=CI                           :REM*75
49Ø X=INT((W(1)-CZ)/2):Z$=MID$(B$,1,X)+Z$
                                       :REM*151
5ØØ Z=LEN(Z$):Z$=Z$+MID$(B$,1,W(1)-Z):PRINT
    #4,":"Z$":";                       :REM*211
51Ø X$=":":ON Y GOTO54Ø,53Ø,52Ø       :REM*3
52Ø IFF1THENX$=".":X=F1:F1=F1-1:GOTO55Ø
                                       :REM*1Ø
53Ø X=Ø:GOTO55Ø                        :REM*234
54Ø IFF2THENX$=".":X=S-F2+1:F2=F2-1 :REM*9Ø
55Ø PRINT#4,MID$(B$,1,S-X);X$          :REM*232
56Ø NEXT:GOSUB66Ø:FORJ=1TOW(5)         :REM*1Ø6
57Ø PRINT#4,MID$(B$,1,W(3)+1)":"MID$(B$,1,W
    (1))":":NEXT                       :REM*1Ø4
58Ø GOSUB66Ø:FORJ=1TO6:PRINT#4:NEXT:PRINT"{
    CRSR DN}{1Ø SPACEs}{SHFT M}AKE ANOTHER"
    ;:GOSUB68Ø                         :REM*154
59Ø IFA$="Y"THEN28Ø                    :REM*84
6ØØ PRINT#4:CLOSE4:END                 :REM*194
61Ø PRINT"{2 CRSR DNs}":X$="{SHFT E}NTER"+P
    $+" ADDRESS LINES:":PRINTTAB((4Ø-LEN(X$
    ))/2)X$"{2 CRSR DNs}"              :REM*148
62Ø Z=W(1)-1:FOR J=1 TO 4              :REM*152
63Ø PRINTMID$(STR$(J),2)"> ";:SYSSUB,T$(J):
    PRINT:PRINT                        :REM*2ØØ
64Ø IFLEN(T$(J))>Z THENPRINT"{CRSR DN}{SHFT
     L}INE TOO LONG, MAX IS"Z"CHARS. {SHFT
    R}EENTER."                         :REM*222
65Ø NEXT:RETURN                        :REM*8Ø
66Ø PRINT#4,MID$(B$,1,W(3)+2);         :REM*236
67Ø FORJ=1TOW(1):PRINT#4,"-";:NEXT:PRINT#4:
    RETURN                             :REM*134
68Ø PRINT" [Y/N]? ";                   :REM*14
69Ø A$="":GETA$:IF(A$<>"Y")AND(A$<>"N")THEN
    69Ø                                :REM*178
7ØØ PRINTMID$("YESNO ",-1*(A$="Y")-4*(A$="N
    "),3):FORJ=1TO8Ø:NEXT:RETURN       :REM*138
71Ø PRINTTAB(11)"{2 CRSR DNs}"T$(1):PRINTTA
    B(11)"{CRSR DN}"T$(2)"{2 CRSR DNs}":RET
    URN                                :REM*224
72Ø DATA 32,253,174,32,139,176,133,251,132,
    252,32,143,173,16Ø,Ø,32,2Ø7,255:REM*222
73Ø DATA 2Ø1,13,24Ø,6,153,Ø,2,2ØØ,2Ø8,243,1
    92,1,2Ø8,8,173,Ø,2,2Ø1,32,2Ø8,1,136
                                       :REM*1Ø
74Ø DATA 132,253,152,32,125,18Ø,165,99,16Ø,
    2,145,251,136,165,98,145,251,136
                                       :REM*12Ø
75Ø DATA 165,97,145,251,165,253,24Ø,1Ø,185,
    Ø,2,145,98,2ØØ,196,253,2Ø8,246,96
                                       :REM*1Ø
76Ø DATA 57,26,6,13,19,14              :REM*38
77Ø REM DEFAULT RETURN ADDRESS         :REM*143
78Ø DATA "{SHFT M}ICHAEL {SHFT B}ROUSSARD"
                                       :REM*55
79Ø DATA "13136 {SHFT L}AZY {SHFT G}LEN {SH
    FT C}OURT"                         :REM*91
8ØØ DATA "{SHFT H}ERNDON, {SHFT V}IRGINIA{2
     SPACEs}22Ø71-2326"                :REM*17
81Ø DATA ""                            :REM*111
```


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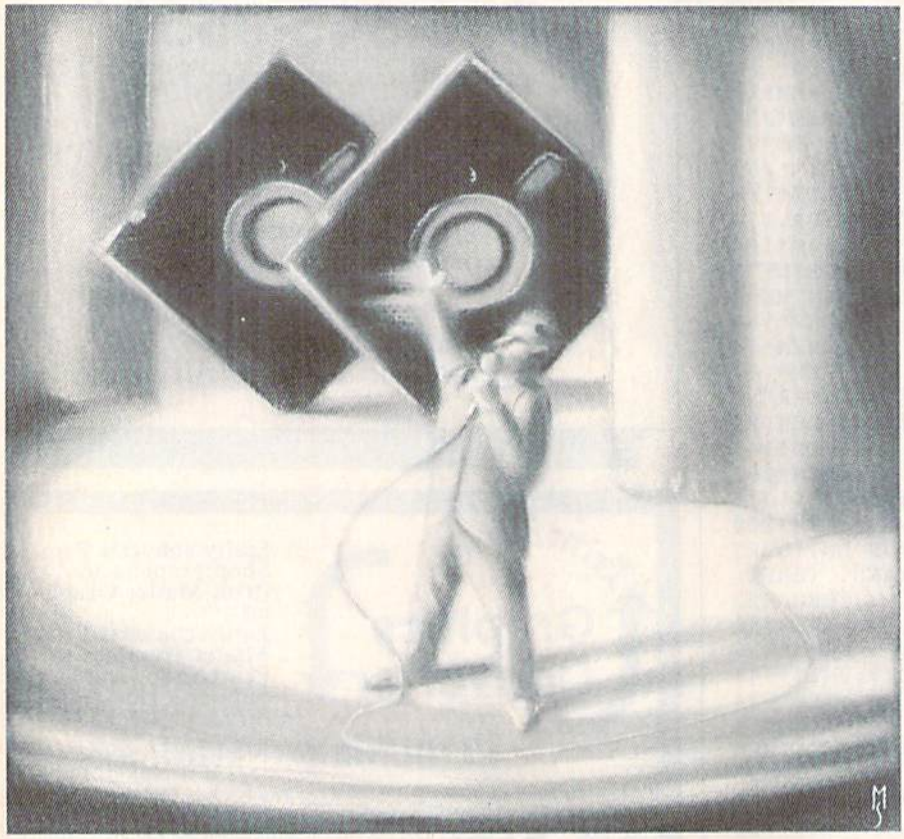
By JIM PELLECHI



One of the most important elements of any successful program is its introduction. The appearance of the opening displays can win or lose an audience.

The two Master Menus programs provide a professional-looking main-menu screen with colorful, animated special effects. You can easily adapt the menu to any program you might develop.

The two programs consist of the Basic main program, entitled Master Menus (Listing 2), and a Basic loader called ML/Menu-Window (Listing 1) that creates windows. These two programs are designed to go at the beginning of your program listing.

Customizing the Menu

By making slight changes to a few lines in the Master Menus listing, you can design the menu for your program's needs. I set up Master Menus for a maximum of seven menu choices, to be selected by keys 1–7. If you need fewer choices in your program, alter line 1120 to check for fewer keypresses. For example, to test for keys 1–3, change the second CHR$ number to CHR$(51). Altering this line won't affect any other part of the program, so you won't have to rewrite portions of the listing.

In line 1250, insert a 34-character message—perhaps instructions for choosing from the menu—that will scroll continuously across the screen.

In lines 1295–1325, insert up to seven menu items, each up to 16 characters long, on the appropriate lines. The periods in the lines indicate where to enter the characters. Don't erase any periods, even if you don't use them all.

Lines 1365–1455 hold the instructions for branching to sections of your program that the user chooses. Change these locations to match your program.

Program Functions

To use these programs, type in ML/Menu-Window (Listing 1) and save it to disk. Next, type in and save Master Menus (Listing 2). Run ML/Menu-Window, then load and run Master Menus.

You must have ML/Menu-Window on disk with any program that uses Master Menus. ML/Menu-Window pokes the machine language in its Data statements into upper memory at $C100–$C318 (decimal 49408–49944).

Add Master Menus to your programs. Your opening menus should then be winners! R

Address all author correspondence to Jim Pellechi, 269 Pinecone St., Middle Island, NY 11953.

RUN It Right

C-64; disk drive

ILLUSTRATED BY MARY ANN SMITH

Listing 1. *ML/Menu-Window*

```
10 REM WINDOW LOADER BY JIM PELLECHI...
                                        :REM*198
12 REM INITIALIZE THE FOLLOWING VARIABLES I
   N YOUR BASIC PRGS:                   :REM*172
14 REM UP=49152:DWN=UP+58:LFT=UP+10:
                                        :REM*18
15 REM RHT=UP+169:RVS=UP+232:COL=UP+293
                                        :REM*27
16 REM FILL=UP+323:BRDR=UP+356          :REM*58
17 PRINT"{SHFT CLR}"                    :REM*7
20 FORX=49152TO49804:READZ:POKEX,Z:L=L+1:PR
   INT"{HOME}"TAB(1)"READING BYTE:"L:NEXT:
                                        :REM*6
21 DATA 32,169,193,134,184,165,185,166,186,
   32,5,194,32                          :REM*207
22 DATA 55,194,166,188,202,48,21,24,165,176
   ,105,40,133                          :REM*222
23 DATA 178,133,182,165,177,105,0,133,179,3
   2,105,194,202                        :REM*131
24 DATA 16,235,164,187,185,156,194,145,176,
   185,196,194,145                      :REM*170
25 DATA 180,136,16,243,48,109,32,169,193,13
   4,184,32,252                         :REM*111
26 DATA 193,170,165,185,32,5,194,32,55,194,
   166,188,202                          :REM*2
27 DATA 240,217,56,165,176,233,40,133,178,1
   33,182,165,177                       :REM*109
28 DATA 233,0,133,179,24,32,105,194,202,16,
   234,48,193                           :REM*128
29 DATA 32,169,193,134,184,32,252,193,165,1
   85,166,179,32                        :REM*131
30 DATA 5,194,160,0,177,176,133,178,177, 18
   0,72,144,13                          :REM*222
31 DATA 200,177,176,72,177,180,136,145,180,
   104,145,176,200                      :REM*97
32 DATA 196,187,144,239,165,184,208,3,169,3
   2,44,165,178                         :REM*206
33 DATA 145,176,104,145,180,198,179,198,188
   ,16,201,48,61                        :REM*137
34 DATA 32,169,193,134,184,32,252,193,165,1
   85,166,179,32                        :REM*136
35 DATA 5,194,177,176,133,178,177,180,72,16
   4,187,240,15                         :REM*35
36 DATA 136,177,176,72,177,180,200,145,180,
   104,145,176,136                      :REM*78
37 DATA 208,241,165,184,208,3,169,32,44,165
   ,178,145,176                         :REM*155
38 DATA 104,145,180,198,179,198,188,16,203,
   48,56,32,176                         :REM*120
39 DATA 193,160,0,177,122,201,44,208,8,32,2
   41,183,134                           :REM*145
40 DATA 191,169,0,44,169,255,133,189,32,252
   ,193,165,185                         :REM*254
41 DATA 166,179,32,5,194,177,176,73,128,145
   ,176,165,189                         :REM*61
42 DATA 208,4,165,191,145,180,136,16,239,19
   8,179,198,188                        :REM*142
43 DATA 16,226,32,233,193,88,96,32,169,193,
   134,191,32                           :REM*3
44 DATA 252,193,165,185,166,179,32,5,194,16
   5,191,145,180                        :REM*124
45 DATA 136,16,251,198,179,198,188,16,236,4
   8,221,32,76                          :REM*11
46 DATA 194,165,185,166,179,32,5,194,165,19
   0,145,176,165                        :REM*124
47 DATA 189,208,4,165,191,145,180,136,16,24
   1,198,179,198                        :REM*131
48 DATA 188,16,228,48,188,32,76,194,165,185
   ,166,179,32                          :REM*162
49 DATA 5,194,165,190,145,176,165,189,208,4
   ,165,191,145                         :REM*231
50 DATA 180,136,16,241,198,179,198,188,240,
   228,48,221,165                       :REM*134
51 DATA 185,166,179,32,5,194,165,190,145,17
   6,165,189,208                        :REM*61
52 DATA 4,165,191,145,180,136,48,4,160,0,24
   0,237,198                            :REM*222
53 DATA 179,198,188,240,194,16,222,48,185,3
   2,176,193,32                         :REM*93
54 DATA 241,183,96,32,233,193,32,241,183,13
   8,41,63,133                          :REM*148
55 DATA 185,32,241,183,138,41,31,133,186,32
   ,241,183,202                         :REM*51
56 DATA 134,187,24,165,185,101,187,201,40,1
   76,16,32,241                         :REM*244
57 DATA 183,202,134,188,24,165,186,101,188,
   201,25,176,1                         :REM*165
58 DATA 96,32,233,193,88,76,72,178,120,162,
   15,181,176                           :REM*56
59 DATA 72,189,141,194,149,176,104,157,141,
   194,202,16,241                       :REM*81
60 DATA 96,166,186,138,24,101,188,133,179,9
   6,72,169,216                         :REM*54
61 DATA 133,176,172,136,2,136,132,177,24,16
   5,176,105,40                         :REM*43
62 DATA 133,176,165,177,105,0,133,177,202,1
   6,240,24,104                         :REM*164
```

→

Listing 1 continued.

```
63 DATA 1Ø1,176,133,176,133,18Ø,165,177,1Ø5
   ,Ø,133,177,41                          :REM*169
64 DATA 3,9,216,133,181,164,187,96,165,184,
   2Ø8,3,169                              :REM*74
65 DATA 32,44,177,176,153,156,194,177,18Ø,1
   53,196,194,136                         :REM*165
66 DATA 16,236,96,32,169,193,134,19Ø,16Ø,Ø,
   177,122,2Ø1                            :REM*154
67 DATA 44,2Ø8,8,32,241,183,134,191,169,Ø,4
   4,169,255                              :REM*167
68 DATA 133,189,32,252,193,96,41,3,9,216,13
   3,183,164                              :REM*212
69 DATA 187,177,178,145,176,177,182,145,18Ø
   ,136,16,245,165                        :REM*183
7Ø DATA 179,133,177,165,178,133,176,165,183
   ,133,181,165,182                       :REM*2Ø2
71 DATA 133,18Ø,96                        :REM*147
```

Listing 2. *Master Menus.*

```
1ØØØ REM MASTER MENU UPDATE 5/17/86 (2/17/8
     6) BY JIM PELLECHI                   :REM*1
1ØØ5 REM SETUP/BLANK SCREEN               :REM*6Ø
1Ø1Ø CLR:POKE5328Ø,Ø:POKE53281,Ø:POKE646,8:
     POKE53265,PEEK(53265)AND239          :REM*127
1Ø25 REM WINDOW VALUES                    :REM*83
1Ø3Ø UP=49152:DWN=UP+58:LFT=UP+1Ø4:RHT=UP+1
     69:RVS=UP+232:COL=UP+293             :REM*22
1Ø31 FILL=UP+323:BRDR=UP+356              :REM*161
1Ø35 MG$="{HOME}{2Ø CRSR DNs}"            :REM*75
1Ø45 REM MENU DISPLAY                     :REM*43
1Ø5Ø PRINTCHR$(8)"{SHFT CLR}{HOME}";:GOSUB1
     24Ø                                  :REM*2Ø
1Ø6Ø REM SCREEN OFF                       :REM*17Ø
1Ø65 SYSCOL,Ø,Ø,4Ø,25,Ø:POKE53265,PEEK(5326
     5)OR16                               :REM*249
1Ø75 REM SCREEN APPEARS                   :REM*2Ø7
1Ø8Ø FORX=1TO22:SYSDWN,3,Ø,34,22,1:SYSCOL,Ø
     ,Ø,4Ø,1,8:NEXT                       :REM*234
1Ø85 PRINTLEFT$(MG$,7);:GOSUB1265         :REM*113
1Ø95 REM SELECT ROUTINE                   :REM*123
11ØØ A$="":POKE198,Ø:SYS RVS,12,2Ø,16,1,8:C
     =C+1:IFC=15THENC=1                   :REM*22
11Ø5 LL=11:FORLC=29TO32:LL=LL-1:SYSCOL,LC,2
     Ø,1,1,C:SYSCOL,LL,2Ø,1,1,C:NEXT:REM*35
111Ø FORTR=21TO6 STEP-2:SYSCOL,32,TR-1,1,1,
     C:SYSCOL,7,TR-1,1,1,C                :REM*2
1115 IF TR/7=INT(TR/7)THEN SYSLFT,3,2,34,1,
     1:REM SCROLLS MESSAGE                :REM*35
112Ø NEXT:GETA$:IF A$<CHR$(49) OR A$>CHR$(5
     5)THEN11ØØ                           :REM*84
1125 ME=VAL(A$):IFC/2<>INT(C/2)THEN SYS RVS
     ,12,2Ø,16,1,8                        :REM*135
1135 REM ROTATE/DISPLAY SELECTION          :REM*9
114Ø FOR X=1 TO ME:READ CL:NEXT:ON-(ME=7)GO
     TO1145:FOR X=ME TO 6:READ XX:NEXT
                                          :REM*176
1145 FOR X=1 TO ME:READ CC:NEXT:FOR X=1 TO
     5:SYS LFT,12,2Ø,16,1,Ø:NEXT          :REM*61
115Ø SYS COL,8,2Ø,24,1,CL:POKE646,CL:PRINTM
```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```
    G$SPC(24)ME"{3 CRSR LFs}#":GOSUB134Ø
                                    :REM*248
116Ø REM FLASH CHOSEN CATEGORY      :REM*226
1165 FOR X=1 TO 16:SYS RVS,13,ME*2+4,16,1:D
    EL=6Ø:GOSUB1225:NEXT            :REM*143
1175 REM BUBBLE CHOICE              :REM*245
118Ø SYS FIL,3,3,34,1,32,Ø:DEL=2Ø:FOR X=ME
    TO 1 STEP-1:FORSH=1TO2          :REM*6Ø
1185 SYS UP,8,X*2+1,23,4,1:GOSUB1225:NEXT:N
    EXT                             :REM*31
119Ø FOR X=1 TO 3:SYS UP,Ø,Ø,4Ø,5,Ø:GOSUB12
    25:NEXT:POKE5328Ø,CL:POKE646,CL
                                    :REM*142
12ØØ REM COLLAPSE MENU              :REM*4Ø
12Ø5 GOSUB134Ø:FOR X=1 TO 13:SYS RHT,7,5,13
    ,16,Ø:SYS LFT,2Ø,5,13,16,Ø:NEXT:REM*17
121Ø SYS FILL,2Ø,5,1,16,71,CL:FORX=1TO8:SYS
     FILL,2Ø,4+X,1,1,32,Ø           :REM*218
1215 SYS FILL,2Ø,21-X,1,1,32,Ø:NEXT:GOTO134
    5                               :REM*37
1225 FOR XX=ØTODEL:NEXT:RETURN      :REM*181
1235 REM DISPLAY                    :REM*99
124Ø PRINTSPC(13)"{CTRL 9} MASTER MENUS "
                                    :REM*56
1245 PRINTSPC(13)"{14 COMD Ys}"     :REM*17
125Ø PRINTSPC(3)"..CHOOSE MENU SELECTION 1
    THRU 7.."                       :REM*32
1255 PRINTSPC(3):FORX=1TO34:PRINT"-";:NEXT:
    PRINT"{2 CRSR DNs}"             :REM*177
1265 REM MENU COLOR                 :REM*1Ø7
127Ø FOR TR=5TO17 STEP2:READCL:SYSFILL,9,TR
    ,22,1,121,CL:NEXT:RESTORE:CL=11
                                    :REM*234
128Ø REM COLOR DATA                 :REM*251
1285 DATA 3,5,8,6,11,2,14,1,13,7,14,15,1Ø,3
                                    :REM*12
1295 PRINTSPC(8)" {CTRL 9}{CTRL 4} {CTRL 2}
    1) ..... {CTRL 4} {CRSR DN}
    "                               :REM*116
13ØØ PRINTSPC(8)" {CTRL 9}{CTRL 6} {COMD 6}
    2) ..... {CTRL 6} {CRSR DN}
    "                               :REM*167
13Ø5 PRINTSPC(8)" {CTRL 9}{COMD 1} {CTRL 8}
    3) ..... {COMD 1} {CRSR DN}
    "                               :REM*16
131Ø PRINTSPC(8)" {CTRL 9}{CTRL 7} {COMD 7}
    4) ..... {CTRL 7} {CRSR DN}
    "                               :REM*221
1315 PRINTSPC(8)" {CTRL 9}{COMD 4} {COMD 8}
    5) ..... {COMD 4} {CRSR DN}
    "                               :REM*1ØØ
132Ø PRINTSPC(8)" {CTRL 9}{CTRL 3} {COMD 3}
    6) ..... {CTRL 3} {CRSR DN}
    "                               :REM*221
1325 PRINTSPC(8)" {CTRL 9}{COMD 7} {CTRL 4}
    7) ..... {COMD 7} {CRSR DN}
    "                               :REM*182
133Ø PRINTSPC(7)"**** ENTER{2 SPACEs}SELECT
    ION ****{HOME}"                 :REM*221
1335 SYSFILL,7,5,1,16,42:SYSFILL,32,5,1,16,
    42:CL=8:REM STAR COLUMNS        :REM*18
134Ø SYSCOL,7,5,1,16,CL:SYSCOL,32,5,1,16,CL
    :RETURN:REM STAR COLORS          :REM*5
1345 REM CONTINUE                   :REM*36
135Ø ON ME GOTO 146Ø                :REM*125
146Ø FORX=1TO15ØØ:NEXT:END          :REM*77
```

■

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C L I N I C

From p. 22.

I discovered that this is the only *combination that produces an error message when listed. The other letters of the alphabet produce Basic keywords. Have I discovered some secret code, or is there some mundane explanation? And what use is it, apart from shortening REM statements?*

John Shimwell
San Francisco, CA

A: You have discovered an undocumented feature (a bug) in Microsoft Basic. Unfortunately, we can't name it after you, as others have also discovered it. What is happening is that the internal tokens, used to save memory space when entering the various Basic keywords, have the same ASCII value as the key combinations you tried. Normally, Basic knows when a particular value is a keyword and when it is a keystroke, but inside a REM statement, it forgets. No harm is done, but unless you want the unusual effects, it's best to either avoid capital letters inside a REM statement or precede them with a quotation mark.

As for the usefulness of the effect, you could also use it as a secret code that could only be read after typing it into a REM statement and listing it.

Q: How can I make my printer print what I type onto the screen?

Raymond Kirlin
Seattle, WA

A: Here is a simple routine to make your computer plus printer act like a typewriter and send everything you type to both your printer and the screen. To quit, press the @ key.

```
10 OPEN 4,4
20 GET A$:IF A$="" THEN 20
30 IF A$="@" THEN 70
40 PRINT#4,A$;
50 PRINT A$;
60 GOTO 20
70 CLOSE 4
80 END
```

Q: Do you know of any way to get something printed with both upper- and lowercase letters?

Mike Manning
Sauk Village, IL

A: Yes, but the method depends on the device in question. To shift to Text mode (lower- and uppercase) on the screen, press the Commodore key while holding down the shift key. To output text to a Commodore serial bus printer, such as the 1525, open your file to it with a secondary address of seven (i.e., OPEN 4,4,7).

If you have a non-Commodore printer, you'll need an interface able to convert the Commodore character codes (PETSCII) into those used by the printer (usually ASCII).

Q: I have been unable to determine how—or if it is even possible—to print out the run of a program on my 1541 Commodore printer. Can I do this with my C-64?

Evelyn Arnold
Fort Lauderdale, FL

A: Hmmm, the 1541 is a disk drive. Well, no matter. We can do it both ways. This is one of those rare times when the CMD command is essential. To dump a program run to paper, start the program this way:

```
OPEN 4,4
CMD 4:GOTO 100
```

where line 100 is the first line in the program. When you are done, type:

```
PRINT#4
CLOSE 4
```

(but don't abbreviate Print# as ?#!). While your program is running, whatever would normally go to the screen will now go instead to the device specified in the Open statement for file 4—in this case, the printer.

To send your running program to the disk, instead, simply change the Open statement in the above sequence to:

```
OPEN 4,8,2,"0:DUMP,S,W"
```

(DUMP is replaced with the filename you choose.)

Let me add one qualification here: do not include a Get statement in your program. One of its lesser-known effects is to turn off any current CMD command and halt dumps to a printer. To get around it, replace all lines such as this:

```
115 GET A$:IF A$ = "" THEN 115
```

with an Input statement:

```
115 INPUT A$
```

5. Entering Programs

Q: In many of the program listings in RUN, *there are two characters that I cannot locate on my 64's keyboard. The characters are the left and right braces. How can I locate this symbol on my keyboard?*

Thomas Skeen
S. Lake Tahoe, CA

A: The braces, { and }, are not on Commodore keyboards. That's one reason they are used in *RUN*'s program listings—they mark off things you *don't* type in as printed. When you see them, notice the words between the braces. Instead of the braces, press the key named between them. Thus, if you see

```
10 PRINT "{CLR}"
```

do not type either the {, the } or what is between them. Rather, when you reach that spot in the line, press the key labeled CLR. Since it is printed on the upper half of its keytop, you'll also need to hold down the shift key as you press it. If your computer is in Graphics mode, as it is when first turned on, the result will look like a heart within a box.

Many printers are not able to properly print the braces, but if yours can, you can print out both the left and right braces as follows:

```
10 OPEN 4,4
20 PRINT#4,CHR$(123):REM ASCII LEFT
   BRACE CHARACTER
30 PRINT#4,CHR$(125):REM ASCII RIGHT
   BRACE CHARACTER
40 CLOSE 4
```

Q: When I type in programs, I always use as many keyword abbreviations as possible. I've been told this saves memory. Invariably, though, I have to make corrections, and when I list the lines, they appear unabbreviated. Have I scrubbed the abbreviations by listing and editing?

Tom Hedges
Ft. Mitchell, KY

A: Not at all. Although keyword abbreviations are quite handy, they have almost nothing to do with the amount of memory used by Basic statements. Once you press the return key on a line, abbreviated or not, it is converted into a token that's even more abbreviated. In this form, each Basic keyword requires only *one* character space in memory. However, since full words are needed when you list the program, the List command expands tokens in the listing itself into equivalent Basic words, without altering the program in memory.

Feel free to use keyword abbreviations, but do so to save typing or to cram more on to a single program line, not to cut the amount of memory used to store a Basic keyword.

Q: Between lines 57 and 58 of a program I typed, there is a line 32. It is out of sequence, and I cannot delete it. How can I get this line out of the program?

Ruth Fox
Tonawanda, NY

A: No amount of deleting will remove this line, because it isn't really a separate line. Rather, it is part of the line before it in the listing. If you list the preceding line (57 in your case), your spurious line (32) will also appear. To get rid of it, edit or retype the preceding line (57).

Q: When I make a mistake and press the delete key, the error erases on the screen, but still prints out on paper. Is there another command I have to use?

Darlene Davis
Fairfield, CA

A: I can think of two common causes for this problem. First, many new programmers forget to press the return key after correcting a Basic program line on the screen. Until you press return on that line, the correction will not become part of your program.

Another common cause is a program that accepts all keystrokes, including delete, as part of its input. The resulting data appears all right on the screen, because the deletion works normally there, but it can't work on most printers. Even if your printer can back up one space, it cannot erase characters it has already printed.

In this case, the solution is to modify the Get loop used to accept input data in your program. Add an If statement to make the Get loop notice the delete key; then, instead of adding the delete

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to the growing string of characters, have the loop reassign the string to all but the string's own last character, using a subroutine similar to this:

```
10 A$=""
15 L=LEN(A$)
20 IF L > 254 THEN 65
25 GET G$
30 PRINT G$;
35 IF G$<>CHR$(20) THEN 50
40 IF L THEN A$=LEFT$(A$, L-1)
45 GOTO 15
50 IF G$=CHR$(13) THEN 65
55 A$=A$+G$
60 GOTO 15
65 RETURN
```

Q: *A short time ago, I found a program for formatting a new disk. It would header a disk and then ask, "Do you want to format another Y/N?" Could you furnish me with a program like this?*

Robert Smith
Ennis, TX

A: Here's a simple one:

```
100 REM HEADER JFS
110 OPEN 15,8,15
120 ?"INSERT A NEW OR REUSABLE"
130 ?"DISK. THEN ENTER A DISK"
140 ?"NAME OF 1-16 CHARACTERS."
150 INPUT N$
160 ?"NOW ENTER A UNIQUE 1-2"
170 ?"CHARACTER DISKETTE ID."
180 INPUT ID$
190 ?"WORKING. PLEASE WAIT."
200 PRINT#15,"N0:"+N$+","+ID$
210 INPUT#15,EN,EM$,ET,ES
220 IF EN=0 THEN 250
230 ?"ERROR:";EN;EM$;ET;ES
240 ?"UNABLE TO HEADER THIS DISK."
250 ?"PRESS 'Y' TO FORMAT NEXT"
260 ?"DISKETTE, OR 'N' TO QUIT."
270 GET A$
280 IF A$="N" THEN CLOSE 15:END
290 IF A$="Y" THEN 120
300 GOTO 270
```

If you want to use the program on a second disk unit, change the 8 in line 110 to the correct device number for that disk. Similarly, to use it on drive 1 of a dual disk drive, change the 0 in line 200 to a 1.

Q: *Occasionally, when I attempt to format a disk on my 1541, my disk drive cranks for a minute or so and then the red light comes on, indicating an error. When I attempt to list the disk's directory, I receive only garbage. When I attempt to format the disk again, the drive sometimes produces the same error and sometimes formats the disk properly. Do you know why this occurs?*

Frank Cox
Kindersley, Sask., Canada

A: You've just described a typical disk failure when formatting. Such a failure usually means either that the disk wasn't seated properly in the disk when you tried to format it or that the disk is faulty.

If you succeed in formatting the disk on your second try, after removing and inserting the disk again, you probably don't have anything to worry about. If a second try also fails, I would return the disk for a replacement (the disks I use are guaranteed for life).

However, you still have one more option: Use a bulk eraser (a big magnet) on the disk and then try to format it one more time. Friends who do this claim it often works.

Q: *I have a Commodore 1541 drive that won't save any programs I write. It does, however, save a file through my word processor or from my terminal program. That killed the theory I originally had—that my head is out of alignment. What could it be and what can be done about it?*

Jeffrey Luckett
Rutherford, NJ

A: If your disk drive is able to save files written by other programs, but not programs you write yourself, it's almost certain that the problem is in the syntax of your command, not in the disk drive itself. Here is the correct syntax (wording) to use when saving to a Commodore-compatible disk drive a Basic program you have written on a Commodore computer:

```
SAVE "0:MYPROGRAMNAME",8
```

Replace MYPROGRAMNAME with your own chosen filename of up to 16 characters. When you press the return key, the disk drive motor should start up and run for a short time. When it stops, look at the front of the disk drive. If no lights are flashing there, you've successfully saved your program. Otherwise, you have another problem.

The most common problems in such cases are failing to format a brand new disk before trying to use it to save programs and trying to save on the same disk two programs with the same name. It's also possible you have included an illegal character in your filename. To be sure, start out by limiting your filenames to the 26 letters of the alphabet.

Q: I have a C-64 and 1541 and am heavily into programming. I've noticed that when I save a ten-line program, it uses 40–78 blocks on my disk. I don't see how.

Robert Schiffman
Hampton Bays, NY

A: Most likely, your program altered the start-of-Basic or end-of-Basic pointer during a run. That's the problem. You saved your program to disk after running it. I suggest you *never* save a program to disk after running it.

Instead, load the old version (if any) from disk, make your changes, save the new version and only *then* type RUN. In the case of your ten-line program, you need only load it, clear the screen, list all lines on the screen at once, type NEW, move the cursor back to the top of the screen and press the return key until all ten lines have been reentered. To be sure, list again. Then save the program before trying to run it. I'm sure it will then take only a few blocks on disk.

Q: My 1541 drive will load, but will not save, programs. Something may be out of alignment, because shortly before this, the write-protect tab on a disk came loose in the drive; it had to be pulled out and offered some resistance. Does this seem likely to be the cause? If so, do you think it's a problem that can be corrected at home?

James Grossie
Houston, TX

A: Yes, a write-protect tab caught in the drive can indeed cause the drive to load but not save programs. The write-protect sensor in the 1541 is optical (triggered by the breaking of a beam of light by an opaque object). Any opaque object trapped within the path of that beam will prevent the drive from saving programs.

As for correcting this situation, the first thing to try would be a can of compressed air with a narrow flexible nozzle that can be inserted into the disk slot. Use it to blow any dust or other foreign materials out of the write-protect sensor, which is located at the left end of the disk slot.

If this fails to correct the problem, you or a dealer may have to disassemble the drive and pick any remaining debris out of the sensor. This is a matter of removing about a half dozen screws, so you might be able to handle it yourself if you are mechanically inclined and your 1541 is out of warranty.

If, however, anything has been moved out of position or broken in the mechanism itself, you will probably need the help of a dealer's service department to fix things properly. But unless something is broken or other work is needed, the time required should be minimal.

Q: After typing in a program, I saved it to my 1541 disk, then loaded and ran it. Later, I wrote another one. It, too, loaded and ran all right.

Now here's the funny part. When I went back to load the first program, I got the second instead. I can't figure it out; I hope you can.

Joe Nakles
Blairsville, PA

A: The problem often arises when a disk has been used for a while, contains some programs, and at least one program has been scratched. Then another program is saved, but something happens and the save doesn't work. The red error light flashes and you know you have a problem.

Your files have become cross-linked. The only sure cure is to copy the entire disk to a freshly formatted disk, copying one file at a time, rather than using a disk backup program.

The most probable cause is that at some previous time you scratched (erased) an improperly saved program or file (one whose name appeared in the directory with an asterisk next to its filetype, but could not be loaded). For future reference, the proper way to get rid of such improperly saved files is with the disk Validate command (known as the Collect command on the Plus/4 and C-16).

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Q: I was going to buy a C-128 computer and a 1571 disk drive until I heard rumors that the 1571 shares the same bug as the 1541 in regard to the @Save command. Is this true?

John Menke
Mt. Vernon, IL

A: Leaving aside any discussion of the "truth" of the bug's existence, I suggest you don't use the @Save command on any Commodore computer. On the C-128, scratch any file you wish to replace and Dsave normally. Owners of other models can use equivalent Basic 2 commands.

Q: Could you please explain why the C-64 clears the screen when reading from or writing to cassette? Is there any way of preventing this? Does it also happen on a monitor?

Bob Wrobel
Morris, IL

A: Yes, no and yes. The 64 turns off (not clears) its screen when using the cassette to avoid interference in cassette operations by the VIC-II video chip. The video chip grabs control of the computer at unpredictable intervals to service its own needs. The delay this adds to the regular processor's operations would disrupt the timing routines used by the cassette if the VIC chip weren't first disabled.

Q: Is there any way to transfer my existing programs on tape for the C-64 onto a 1541 disk, and if so, how?

W. J. Gannon
Suffern, NY

A: If the programs are in Basic, simply load them into the computer from the datassette, then resave them to disk. If they're in machine language and have to be loaded with ",1,1" to avoid relocation in memory, you'll need a machine language monitor (available from user groups) to save them properly. You'll also need to know where they are stored in memory when loaded before the monitor can save them to disk.

Copy-protected programs are another story—some companies have taken steps to prevent you from successfully copying their programs. In those cases, contact the company, tell them you've bought a disk and ask what (if any) trade-in policy they have for changing from a tape to a disk version of the program. Companies likely to be around for a while will have some reasonable update policy to handle this situation.

Q: I have a C-64 with a cassette player and an SX-64 with a built-in disk drive and no tape port. Is there a way I can connect my SX-64 to my C-64 to transfer my tape programs to the SX-64 disk drive?

Jeff Hickman
Page, AZ

A: If you can buy or borrow a 6-pin male-to-male DIN cable (i.e., a Commodore serial bus disk drive or printer cable), you're in business.

Simply hook up the cable to the serial bus connector on both computers, and then use the SX-64's disk drive from the C-64. It will behave as if it were a 1541 hooked directly to the C-64 along with the tape unit. Then simply alternate loading from cassette and saving to disk from the C-64, as follows:

```
LOAD"name"
SAVE"0:name",8
```

Q: I have both a 64 and a VIC. Since the 64 has better games, I don't get much time to use it with my whole family at home. Can I type a program on my VIC, save it on tape, take the tape to by 64 and load it there?

Yosef Guttman
Scranton, PA

A: Yes. And nice to hear your computers are well used.

Q: I am writing an adventure in which one program loads another. This creates a problem, because the program being loaded must be shorter than the one loading it. I have been avoiding this with REM statements and dummy lines. However, this is very troublesome.

Clinton Allen
Baird, TX

A: Actually, only the *first* program loaded must be longer than all others loaded later, but the others may be of any smaller size without worrying about their size relative to each other. Further, it is quite easy to fool Basic into thinking your first program is much larger than it is. A single line does it for one of my own programs:

```
1060 POKE 45,0:POKE 46,64:CLR
```

This must appear right at the start of your first program, before you define any variables, because the CLR command will erase all variables. Apart from that small limitation, the only difficult part of using this trick is calculating the correct value to poke into location 46. To obtain the correct value, store all your programs on disk, see which one occupies the most blocks and load that one into memory. Then type the following line in Immediate mode (without a line number):

```
PRINT PEEK(46) + 2
```

The number that appears on your screen as a result is the one you want to poke into location 46 in your first program.

There are other ways to chain between programs, but this method has the advantage of preserving all dynamic variables for use in programs loaded later. To be sure a string variable is dynamic, define it this way:

```
A$ = "LAMP ON" + ""
```

The concatenation of the two strings forces Basic to make the resulting string dynamic and store it where it won't be disturbed by further program loads.

Q: What is the Poke to load one program without wiping out another already in memory?

Dennis Hallingstad
Sparta, WI

A: The programmer's aid, Power 64, has an especially good command for this. MRG lets two Basic programs share memory at once without interfering with each other at all. Several other aids have slightly similar Append commands that tack new programs on to the end of an existing program.

Another way to load a second program is from within a machine language monitor, such as Micromon. Monitor loads don't change Basic's

program pointers as Basic loads do. However, programs can still interfere with each other if they use the same memory locations.

There are two regions of memory: program and screen. Thus, it is possible to load two programs in memory at once, one in main memory and one on the screen. By editing the one on the screen to have different line numbers, it may be added to the one in memory by simply running the cursor up to its corrected lines and pressing the return key.

At least two other methods (fooling the cassette pointers and re-entering via the dynamic keyboard method) also work.

Q: I'm using a variable to load a program, and it works fine. However, when I want to load a third program, I need to use the first variable plus a new one. Can variables be used together to load a program on the C-64?

Travis Sonsalla
Arcadia, WI

A: They sure can. Here's an example of what I think you want to do:

```
100 INPUT "WHAT SHALL I LOAD";A$
110 LOAD "0:" + A$,8
```

Then, in your second program, you would add to the name before loading the third program:

```
100 PRINT "WHAT COMES AFTER ";A$
110 INPUT "IN YOUR NEXT LOAD";B$
120 LOAD "0:" + A$ + B$,8
```

When you load one program from another like this, there are two key things to remember. First, use only dynamic variables. These are variables whose values are entered via Input statements, whose values have changed since they were first assigned or whose values result from a concatenation (such as, A$ + "ONE" + ""), as opposed to static strings like A$ = "ONE" that never change. Second, be sure the first program is the longest, or else fool Basic into thinking it is.

6. BASIC

Q: I'm converting some Apple programs to the 64. My only hang-up is the command MOD. I know what the purpose of the command is, but I can't find a command on the 64 that will replace it. If you could help, I will be most grateful.

Jimi Kilby
Fort Mill, SC

A: For the benefit of others who *don't* know what MOD does, it finds the remainder portion of the result when one number is divided by another. To simulate it on a Commodore computer, use this expression:

```
INT(T - B*INT(T/B))
```

(B is divided into T). As usual, to save the result, you must either assign it to a variable or print it out. Thus,

```
C = A MOD B
```

on the Apple, becomes

```
C = INT(A - B*INT(A/B))
```

on a Commodore.

Q: I would like to run a program from the Apple computer on my Commodore. The only things that won't run are the Plot and Color commands. I would appreciate it if you could tell me what to do instead.

Robert Fryz
Dearborn, MI

A: The easiest way to emulate Apple's Plot and Color commands is with a Commodore C-128 or Plus/4. Their equivalent commands, Draw and Color, work in a similar way, but have added options and will probably need different data values. For instance, white is color number 15 on the Apple and color number 1 on the 64. Similarly, the plot range on the Apple is 0–39 and 0–47, while the range on the 64 is 0–320 and 0–160 in the Split-Screen mode most similar to Apple's.

Q: I have a Sybex book called Commodore 64, Basic Programs in Minutes *by Stanly R. Trost. The book has many wonderful programs, but I can't get them to work because of one symbol. Here is a quote of the whole line:*

```
340 P = AM*I1(1 - V1N1)
```

What is the ↑ symbol?

Wayne Tierney
Victoria, Australia

A: It's the up arrow between the asterisk and restore keys on the keyboard. This key is used to raise a number to a power, called exponentiation, and is different from the control key on the left end of the same row, which is sometimes represented with the same character in printouts.

Q: How can you make the control key work in a program other than a color controller; for example, in an options menu, such as CTRL-X, to exit?

David Pugh
Kensington, CA

A: Type

```
GET A$:if A$ = "
```

Then press control-X and a reverse graphic character will appear after the ". End the line by typing

```
" THEN 1000
```

Now whenever you press the control-X key sequence at that point in the program, you'll go to line 1000.

Q: I need to find a way to get rid of keyboard input. In a program I'm writing, when it's time to roll dice, I hold the program with Getkey. When the player presses the space bar, it Gosubs to get a random number. But if the player presses the space bar twice, the game is ruined because the C-128 remembers keypresses made while it was away in the subroutine.

Robert Perillo
Garfield, NJ

A: Here is a suggested cure that will work on all Commodore systems:

```
1000 GET A$
1010 IF A$<>"" THEN 1000
1020 GOSUB 2000
1030 GET B$
1040 IF B$ > "" THEN 1030
```

Naturally, it won't work unless you have a subroutine at line 2000. The key lines are 1030 and 1040, which throw away any keystrokes entered during the subroutine.

Q: In typing a program, there are occasions when one must press the CLR key (between quotation marks, of course). What has happened is that, for some reason, my leading quote mark wasn't there, with the consequence that the program was wiped out. Is there any way to recover the typed program after hitting CLR?

L.P. Thomason
Jacksonville, FL

A: Pressing the CLR key should have no effect on your program. If you ac-

cidentally erase the screen by pressing the CLR key, you can view your program listing again by simply typing the word LIST and pressing the return key. Then, retype the line where you initially erred.

Q: What locations do you have to peek to distinguish between various Commodore computers?

Herb Gross
Elgin, IL

A: Any location that gives a different answer when peeked on each different model will do. Here is the location I use, with its Peek values in decimal (and hexadecimal). Location 61654 ($F0D6) contains:

0 ($00) on the C-128
82 ($52) on the C-64
145 ($91) on the VIC-20
32 ($20) in PET Basic 4.0
169 ($A9) in PET Upgrade Basic 2.0
240 ($F0) in Original Basic 1.0 PETs

Does anyone know what it contains on a Plus/4?

Q: What is the Poke for shortened commands (up to eight letters from one key)?

Dennis Hallingstad
Sparta, WI

A: No Poke is needed. Simply type the unshifted first character of the Basic word you want and then type its second character with the shift key down. This is accepted by the computer just as though you had typed the whole word. Since some Basic words can be confused, you may need to type the first two characters unshifted, and then shift the third character. For instance, G(shift)O is the same as GOTO, whereas GO(shift)S is the same as GOSUB.

Q: What is the Poke for listing two separate sections of a program?

Dennis Hallingstad
Sparta, WI

A: This is easiest to do on a C-128. Simply clear the screen and list the first section of your program. Then press the cursor-down key until the needed lines are at the top of the screen.

Next, move the cursor to a point just after the last line you need to keep in view, and then press the escape key, followed by the unshifted t key. This makes the rest of the screen a separate window, in which you can now list the second section of your program. When you are finished using the window, press the home key twice in succession to remove the window.

Q: I have been writing a program for the C-64 that I planned on putting into a cartridge. However, my 64 just locked up. Where do I put the entry point for my program on the cartridge?

Joe St. Lucas
San Diego, CA

A: When the 64 is turned on or reset, it first checks for the presence of a cartridge. It does this by checking to see if locations $8004 and following contain the characters CBM80. If so, the 64 does a JMP Indirect to the 2-byte address contained in locations $8000 and 8001. Locations $8000–3 should contain the address to be JMPed to if the user generates an NMI (presses Stop plus Restore).

If you are using the MAE assembler, you can allow for this as follows:

```
0100 .ba $8000 ;begin assembly
0110 .wo rst ;2-byte address
0120 .wo nmi ;low, then high byte
0130 .by $c3 $c2 $cd $38 $30
0140rst nop ;here on cold.start
0150nmi nop ;here on warm.start
```

Other good assemblers use similar commands.

Q: POKE 808,225 disables the run/stop and restore keys and the List command. What is the Poke that reactivates these commands?

Larry S. Harmon
El Centro, CA

A: To be sure of the correct value on your computer, simply type

```
PRINT PEEK (808)
```

when you turn on your computer, and press the return key. The number that appears on the next line is the one to type after POKE 808 to restore normal function to that location. On my C-128 in 64 mode, the number is 237, so you would type POKE 808,237.

Q: Is there any way, possibly by using a Poke or a short program, to make characters overlap, rather than having one character erased when a new one is typed in its place?

Russell Swift
Elkhart, IN

A: Sometimes another character will give the desired effect. Commodore especially designed its graphics characters to work together for this purpose. For example, the keyboard includes a full set of graphics characters that allow you to draw a line through the middle of a character space and link it to another similar line in any desired way.

If that isn't good enough, the next step is to use bit-mapped graphics. The C-128 and Plus/4 allow you to display characters on a bit-map screen with the CHAR command. You can then make the characters overlap by carefully using the Sshape and Gshape commands. Here's an example:

```
10 GRAPHIC 2,1
20 CHAR 1,0,,0,"II",0
30 SSHAPE S$,9,0,19,8
40 GSHAPE S$,6,0,0,0
```

It displays two capital letter I's in the top-left corner of the screen, then moves them closer together. Further options in Gshape even allow you to place a character on top of an existing character, with both visible together.

Q: The VIC-20 allows easy placement of characters anywhere on the screen from within a program by poking row and column locations with the following:

POKE 214,ROW
POKE 211,COL

What are the comparable locations on the C-64?

J. Grove
Chicago, IL

A: Let me first suggest a different approach—one that works on nearly all Commodore models. First, define the

following string at the start of your program:

```
10 DN$ = {"home}{24 cursor downs}"
```

Then set variable Y to the row (0 through 22 or 24) and X to the column (0 through 21, 39 or 79) desired, and call the following subroutine:

```
100 PRINT LEFT$(DN$,Y + 1)TAB(X);
110 RETURN
```

It's just as fast as a Poke, and much easier to keep working when you change systems.

Q: When drawing in bit-mapped graphics, is there a way to change the color of only one horizontal line, without changing the color of the horizontal lines directly above and below the line? That is, is there a way to change the color of just one pixel instead of an area the size of the cursor?

Bill Akler
Cheney, KS

A: Not easily. However, the illusion of doing so can be achieved by careful selection of foreground and background colors for each character position. This is done very well and understandably in the Pen Palette program I use with the Flexidraw light pen (both from Inkwell Systems, San Diego, CA).

Q: Is there any program you know of that would allow me to blink selected program lines on my display, so that warnings will stand out?

Howard Sirois
Huntington, CT

A: This is one time Plus/4 owners can laugh at the rest of us. All they need do is to include an Escape command at the start of the message they want to blink. The rest of us have to do this through a three-stage procedure. First, to position the message anywhere on the screen, you define a string of one cursor-home, followed by 24 cursor-downs, calling it DN$, as suggested in the answer to Mr. Grove, above. Next, you define the message or title to be blinked as M$. Finally, after setting Y equal to the line on the screen, X equal to the column and NO equal to the number of blinks needed (at least 1), you GOSUB to the following subroutine:

```
1100 REM BLINK MESSAGE S/R
1110 JI = 30:REM JIFFIES PER BLINK
1120 BL = 0:REM FIRST BLINK IS 'ON'
1130 FOR I = 1 TO NO
1140 : ?LEFT$(DN$,Y + 1);TAB(X);CHR$
     (18 + ABS(128*BL));ME$;
1150 : TT = TI + JI
1160 : BL = BL = 0:REM TOGGLE SWITCH
1170 : IF TI < TT THEN 1170
1180 NEXT
1190 RETURN
```

You may use this subroutine in any Basic program.

Q: Is there a way to convert screen codes into PET ASCII character codes? I'm trying to create my own screen dump.

Joe McGuire
Mooresville, IN

A: Yes; in Basic, it's done this way, using the variable A to hold both the character to be converted and the altered result:

```
100 B6 = A AND 64
110 A = A AND 63
120 IF A < 32 THEN A = A OR 64
130 IF B6 = 64 THEN A = A OR 128
```

This code works on all characters except those in reverse field, which cannot be converted with a single character, but with three.

Q: I am writing a program and I use the Get command to get a character. Then I need to Poke the character into a screen location. However, when I do, I end up Poking the character code rather than the screen code. How do I solve this?

Mark Shaw
Joliet, IL

A: Here's a short program for the 64 to do the conversion and the Poke.

```
10 S = 1024:REM START OF SCREEN
20 GET G$:IF G$ = "" THEN 20
30 G = ASC(G$)
40 B = G AND 128
50 G = G AND 63
60 IF B THEN G = G OR 64
70 POKE S,G
80 S = S + 1
90 IF S < 2025 THEN 20:REM FULL?
99 END
```

If you have a VIC or Plus/4, just change the screen addresses in lines 10 and 90 to match your system.

Q: On the C-128, I can move the pixel cursor to absolute coordinates or to coordinates relative to a previous position only in the positive direction. For example, I get these results:

```
10 GRAPHIC 1,1
30 DRAW 1,100,50 :REM OK
40 DRAW 1, + 10, + 20:REM OK
50 DRAW 1, – 10, + 20:REM NOT OK
60 DRAW 1, + 10, – 20:REM NOT OK
```

The last two commands give an Illegal Quantity error. Any thoughts?

Fred Tirraccine
Rochester, NY

A: Although the *C-128 System Guide* shows relative positioning in negative directions as an option, I could find no reference to the idea in the more recent *C-128 Programmer's Reference Guide*; nor could I find an example program that uses relative positioning in negative directions in any of the C-128 books I have. Furthermore, I couldn't make it work, myself. Therefore, unless a reader knows a trick, let's consider negative relative coordinates a bug, either in the System Guide for saying you can have them, or in the computer for refusing them.

Fortunately, you can achieve the same effect by assigning a variable to your starting coordinates and subtracting from its value to get your new position. Basic accepts this happily, because after parsing the expression, all it sees is an absolute coordinate. Here is your sequence of commands, converted to use a variable.

```
10 GRAPHIC 1,1
20 X = 100:Y = 50
30 DRAW 1,X,Y:REM OK
40 DRAW 1,X + 10,Y + 20:REM OK
50 DRAW 1,X – 10,Y + 20:REM NOW OK
60 DRAW 1,X + 10,Y – 20:REM NOW OK
```

Q: I need to put two different sprites on the screen of my C-64 at the same time. How do you do that? I tried to poke the other sprite into the 14th block, but it didn't work.

Michael Intravaia
Bayville, NY

A: Here's a simple program that defines and turns on two sprites, both in block 13 and one of the two also occurring in block 14:

```
10 REM SPRITE 0 DATA
```

```
20 FOR I = 13*64 TO 13*64 + 63
30 : POKE I,165
40 NEXT
50 REM SPRITE 1 DATA
60 FOR I = 14*64 TO 14*64 + 63
70 : POKE I,73
80 NEXT
90 REM POINTER TO SPRITE 0 DATA
100 POKE 2040,13
110 REM POINTER TO SPRITE 1 DATA
120 POKE 2041,14
130 REM SPRITE 0'S X & Y COORDS
140 POKE 53248,50
150 POKE 53249,60
160 REM SPRITE 1'S X & Y COORDS
170 POKE 53250,100
180 POKE 53251,115
190 REM TURN ON SPRITES 0 & 1
200 POKE 53269,1 + 2
```

This example left out lots of details, such as colors, and useful shapes, but should be enough to help you get two sprites on screen at once.

The only other caution is that the program puts your sprite data in the cassette buffer. If you use a cassette data file, the sprite data will be erased.

Q: I would like to know how I could make a figure appear on the screen, say, a small man, and make it walk across the screen, controlled by joysticks. I would also like to be able to make a ladder and have the figure climb it. And one more thing: I would like to make him shoot by pushing the fire-button, and have the shots affect certain objects on the screen rather than others.

Could you send a short program that would illustrate such an action? Even a recommendation for a book would be deeply appreciated.

Mike Martin
Wilmington, DE

A: You need to learn about sprites, also known as movable object blocks. They are one of the most powerful features of the 64, and can be used to do everything you ask, but not in a program short enough to print here.

I've reviewed some books that might help you—*Sprite Graphics for the Commodore 64*, from Prentice-Hall/Micro Text (Englewood Cliffs, NJ), *The Graphics Book for the Commodore 64*, from Abacus Software (Grand Rapids, MI) and *Graphics for the Commodore 64 Computer*, from Spectrum Books/Prentice-Hall (Englewood Cliffs, NJ).

Also, consider using a sprite-making program, such as Sprite Master, from Access Software (Salt Lake City, UT), or Spwriter, from the October 1984 issue of *RUN*. Such programs take much of the drudgery out of using sprites.

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.

For more information on AI, write Eloisa Yeargain, PO Box 241807, Los Angeles, CA 90024. In return for a self-addressed stamped #10 envelope, he will send you an AI fact sheet he has developed.

Q: I am confused with the logic commands AND and OR. Whenever you encounter A = 96 AND 32, does the A equal the lower number, 32? And when A = 64 OR 32, does A equal the sum of both numbers, 96?

Bill Goldman
Langhorne, PA

A: To understand the AND and OR commands as used in Basic computer programs, you must realize that they are written in decimal (base 10), but do their work in binary (base 2). To see their effects, you must convert the numbers they use into base 2. Casio and Radio Shack both make inexpensive calculators that do this.

Next, remember that logical commands are not arithmetic. Rather, the AND command defines a set of conditions, *all* of which must be true before the result is true. Similarly, when you're using the OR command, if *either* of two conditions is true, then the result is true.

To put these ideas together and solve one of your examples, remember that a binary 1 is considered true and a binary 0 false. Thus,

```
96 AND 32
```

is the same as:

```
%01100000 AND %00100000
```

Notice that only one bit (binary digit) is true in both numbers. Therefore, it is the only bit true in the result:

```
%00100000
```

Converted back to decimal, your answer is 32.

The practical value is that the AND and OR commands allow you very precise control of the computer and its memory.

Q: I have seen many programs with an XOR command in them. The Commodore 64 does not have this command in Basic. Could you please explain its use and show how it can be created using PET Basic?

Robert Oesterreich
Costa Mesa, CA

A: XOR stands for eXclusive OR, a logical operation in which binary digits are compared and set to 0 (false) if they are the same, and to 1 (true) if they differ. The practical value of this ability is in flipping specified bits from on to off to on again.

For instance, it can easily be used to flip the screen into reverse field and back again, because doing so only involves flipping one bit in each byte of screen memory. A further advantage is that EOR (as it is known in assembly language) is nondestructive. That is, any change caused by its use may be undone by repeating the same command.

Given a value, A, that we wish to EOR with another value, B, we could use the following code, in assembly language and in Basic, respectively:

```
Assembly
LDA #A
EOR #B

Basic

A = (A OR B) AND NOT (A AND B)
```

In both cases, the result ends up in A (the A register in the assembly language version). This is one time assembly language is simpler than Basic.

Q: There resides a beast underneath the keyboard of my 64, and its number is −1.49011612E-08. To awaken the beast, run this:

```
10 A=40
20 B=.18
30 C=A+B
40 D=40.18
50 PRINT D-C
```

The zero you would expect to see has been eaten by the beast. Is there a glitch in Commodore's engineering?

Gaylen Moore
Bovey, MN

A: No, you've simply discovered that the computer uses binary (base 2) for its calculations, while you use decimal (base 10). Your beast comes from errors in converting from one to the other. Precision in all Microsoft Basics except the one in Commodore's B-128 model is limited by the space set aside to do these conversions. A fix for your line 50 is shown below.

```
50 PRINT INT(100*(D-C)+.5)/100
```

This change rounds the result to the nearest two digits, well within the limits of precision on all Microsoft Basics. To select more or fewer digits of precision, add or subtract zeroes from the numbers used for both multiplication and division in my version of line 50.

Let me also remind you that in scientific work, if you want two valid known decimal places in your answer, line 10 should also be changed to

```
10 A=40.00
```

The computer doesn't care about the extra zeroes, but without them, anyone checking your program must assume A was calculated only to the nearest whole number.

Q: I am having trouble making a program add up numbers the user enters, like this:

```
10 INPUT A$
20 INPUT B$
```

Could you please tell me how to do this?

Joe Sadauskas
Chicago, IL

A: There are at least two ways to add a column of numbers in Basic. One is just like your program, except that the string symbol ($) is left off from the variable names, making them numeric:

```
10 INPUT A
20 INPUT B
30 ? A+B
```

The other approach keeps your original lines and uses the VAL statement to convert the string variables into numeric values for adding:

```
10 INPUT A$
20 INPUT B$
30 ? VAL(A$)+VAL(B$)
```

Q: When programming, I often work with dates and need to add certain amounts of time to a given calendar date. My programs have become cumbersome from my having to deal with 30 or 31 days per month, 28 days for February, adding 1 day in leap years, and so on. Can you advise me on how I might better handle this kind of date calculation?

Donald Izzi
Laurel Springs, NJ

A: In calculating dates, the trick is to use a common unit of measurement throughout. Since you want to know, to the nearest day, the time between two events, it will help if you first convert Gregorian dates (years and months and days) into so-called Julian days.

The zero, or beginning point, in your calculations can be any date earlier than all other dates to be considered. For example, many simple Julian date programs use January 1, 1900, as their zero point. These programs calculate the number of days between events by first converting both of the dates in question into the number of days that intervene between each one and January 1, 1900. They then subtract the smaller number of days from the larger to find the elapsed time. The results are valid for any time in the 20th century.

Following are two short program segments to help you use Julian dates.

Given a numeric day, month and year in variables DA, MO and YR, the first set of lines will return a Julian day in variable JU.

```
1000 YR=YR+1900
1010 JU=INT(30.57*MO)+INT(365.25*
     YR-395.35)+DA
1020 IF MO>2 THEN JU=JU-1:IF
     INT(YR/4)*4<>YR THEN JU=
     JU-1
```

Similarly, the next set of lines, given JU and using LD as temporary leap-day variable, will return DA, MO and YR.

```
2000 RE=INT(JU/365.26)+1
2010 DA=JU+INT(395.25-365.25*YR)
2020 LD=1
2030 IF INT(YR/4)*4<>YR THEN LD=2
2040 IF DA>(91-LD) THEN DA=DA
     +LD
2050 MO=INT(DA/30.57)
2060 DA=DA-INT(30.57*MO)
2070 IF MO>12 THEN MO-1:YR=
     YR+1
2080 YR=YR-1900
```

Q: Could you tell me how to write a program to generate random non-repeating numbers?

Bob Hendershot
Carrollton, TX

A: The first step is to decide how many random numbers you need and what range (top and bottom values) and increment (distance between pos-

sible values) you require. Then you can dimension a suitable array, fill it with appropriate numbers and finish by shuffling the values within the array. After all this, you generate your random, non-repeating sequence by printing the contents of the array in order.

Here is a program to generate and shuffle a suit of cards:

```
100 REM RND DEMO
110 X=RND(-TI):REM RANDOMIZE
120 DIM A(13)
130 REM MAKE 13 CARDS
140 FOR I=1 TO 13
150 : A(I)=I
160 NEXT
170 REM NOW SHUFFLE
180 FOR I=1 TO 99
190 : C1%=RND(1)*13+1
200 : C2%=RND(1)*13+1
210 : T=A(C1%)
220 : A(C1%)=A(C2%)
230 : A(C2%)=T
240 NEXT
250 REM PRINT SEQUENCE
260 FOR I=1 TO 13
270 : PRINT A(I)
280 NEXT
290 END
```

The key lines are 110, which makes the sequence of random numbers more truly random; 190–200, which select a random integer between 1 and 13; and 210–230, which do the actual shuffling.

Q: When using RND( ) statements on my C-64, the computer generates the same initial numbers in the same order every time the power is turned off and on. What can be done to create a different first number each time the system is reset?

Brian Wickizer
Salem, OR

A: Random numbers don't come from thin air—they have to be initialized somehow, and no matter how involved the process, it is likely to give the same results each time on any one machine when it is first turned on. Therefore, Commodore allows you to further randomize the numbers by changing the seed value from which the random numbers are generated. Although other approaches also work, I add the following line to the start of my programs to alter the initial value from which other seeds generate random numbers:

```
140 X=RND(-TI):REM RANDOMIZE
```

After using this line, I simply use RND(1) to generate my random numbers, with entirely satisfactory results.

Q: When counting down in seconds, my C-64 goes from 10 seconds to 90 seconds. How do I correct this so it will read 09 seconds?

Jim Smith
Sterling, KS

A: The problem is that 9 is one character shorter than 10. As a result, when it is printed after a 10, there is nothing to erase the 0. A simple way to get the display you want is to notice when the counter drops below 10 and print a 0 before the counter value from then on, as shown below:

```
10 FOR I=99 TO 0 STEP -1
20 : PRINT CHR$(19) : REM HOME
   CURSOR
30 : IF I<10 THEN PRINT " ";
40 : PRINT I
50 NEXT I
60 END
```

Q: In my program, I repeatedly use the Gosub statement to access a subroutine I sometimes don't have to return from. As a result, I quickly get an Out of Memory error. I know there is a stack somewhere in memory that holds the return, and that I have to pop it to avoid filling the stack. The problem is that I don't know the Poke to do this. Can you help me?

Larry Cohen
Englishtown, NJ

A: Exiting a subroutine in any other way than via a Return statement at its end is a very bad programming practice that will bite you when you least expect. Don't do it!

Instead, set a flag variable to indicate your wish to change course in the program, exit the subroutine normally and branch from that point according to the value of the flag variable. Here is an example:

```
10 C$="FRED"
20 ? "WHAT'S THE PASSWORD";
30 GOSUB 100
40 IF F>0 THEN ?"GUESS!":GOTO 20
50 ? "WOW, WHAT FUN!"
60 END
100 F=0
110 INPUT A$
120 IF A$="?" THEN F=1:GOTO 150
130 IF A$=C$ THEN ? "CORRECT"
140 IF A$<>C$ THEN ? "SORRY"
150 RETURN
```

Q: Can a Basic program contain an On...Goto command on more than one line? A program that does this was written for the Apple, but I've heard it will also run on other computers.

Michael Feeney
Roswell, GA

A: On Commodore machines an On...Goto combination is limited to about 14 destinations, due to the requirement that commands fit entirely within the 80–88 character size of the input buffer. Apple's input buffer is 255 characters, which can lead to problems when converting long lines.

Fortunately, there is a simple solution. Just follow one On...Goto line with another, changing the expression between the words On and Goto. For example, instead of saying,

```
10 ON X GOTO 1,2,3,4,5,6,7,8,9
```

you may also say,

```
10 ON X GOTO 1,2,3,4,5
11 ON X-5 GOTO 6,7,8,9
```

Both versions work in the same way, but the second shows how to convert a line that is too long into two or more shorter lines.

Q: I have written a program to keep track of six mutual funds. I think I should use a Dimension statement, but I can't figure out how. I want to list the name of each fund, and under this the quotation for five days. The list will include five weeks for each month.

Harry Cowles
San Diego, CA

A: It sounds like you want a three-dimensional array, with the first dimension being the fund, the second the week of the month and the third the day of the week. Since there are six funds, five weeks and five days per week to consider, the following line will dimension a suitable array:

```
100 DIM S(6,5,5)
```

Here is a simple routine to fill your array:

```
110 ? CHR$(147):REM CLEAR SCREEN
120 FOR I = 1 TO 6
130 : FOR J = 1 TO 5
140 : : FOR K = 1 TO 5
150 : : : ? "ENTER PRICE FOR FUND #";I
160 : : : ? "IN DAY";K;"OF WEEK";J
170 : : : INPUT S(I,J,K)
180 : : NEXT
190 : NEXT
200 NEXT
```

Then, to print out the results, you might use

```
210 ? CHR$(147):REM CLEAR SCREEN
220 FOR I = 1 TO 6
230 : ?"RESULTS FOR FUND #";I
240 : FOR J = 1 TO 5
250 : : ?"WEEK # ";J;":";
260 : : FOR K = 1 TO 5
270 : : : ? S(I,J,K);
280 : : : ? S(I,J,K);
280 : : NEXT
290 : : ?
300 : NEXT
310 : ?
320 NEXT
330 END
```

Naturally, this simple program could use a lot of help, but it may get you started. Skilled users will notice that we have ignored the zero elements of the array, thereby wasting some space but simplifying the program.

Q: I am writing a program and need it to start over, but it doesn't reread the data. Is there a way to reset variables, strings, etc.? Also, can I reset the DIM statements so I won't get a Redimensioned Array error?

James Soldi
El Centro, CA

A: Basic provides at least two ways to do what you ask. One way is by using the Run command. We type it all the time, but many people don't realize you can include it within a program itself. You can even follow it with a line number from which you wish the program to begin running again.

Also, the CLR statement resets all the variables, including arrays. Most new programmers think the CLR key only erases the screen. However, Basic also provides a CLR statement that has nothing to do with the screen. It is called automatically by the Run command, but can also be used manually. Its purpose is to clear all the variable pointers, including array pointers.

Q: How can I run a program without clearing existing variables?

Chad Jones
San Gabriel, CA

A: Simply list the program and jot down its first line number. Then, instead of typing RUN, use the Goto command to access that line number. Thus, if 100 were your first line number, you would type GOTO 100.

Q: My 64 always has displayed an Out of Data error when I run a program with a Read statement. What can I do?

Louis Minakaki
Brooklyn, NY

A: An Out of Data error means your program attempted to read more data than the program contains. Accidentally omitting a comma when typing in a data line is a common cause of the error. To trace the problem, add a Print statement just after each Read, to show what has been read, and perhaps a counter variable as well, to show how many items have been read.

Q: I have a C-64 and plan to get a C-128 in the future. If I type in and save programs (Basic and machine language) for the C-128 on my C-64, can I load and run them later on the C-128?

Michael Chimchusky
Hernando, MS

A: Sure, no problem. Machine language programs for the C-64 and the C-128 tend to be different, but you can easily enter them in Data statement form on either computer for the other computer to load and run. Similarly, although the starting address of Basic programs on the two machines is different, it's automatically adjusted at load time. Just be sure to type in the C-128 version of a program when it differs from the C-64 version.

When you get your C-128, load the program into it and list each line that uses the new Basic 7.0 commands. You'll need to move the cursor to such lines and press the return key to properly store them in Basic 7.0 form. When you've taken care of them all, resave the program.

Q: I'm considering buying a C-128, but I've discovered that the 10-key numeric pad functions only in 128 mode, not in 64 mode. Do you know if Commodore has plans to change this, or if there's any software on the market that makes using the keypad in 64 mode possible?

Keane Foster
Schofield, WI

A: Some commercial programs, such as Grade Manager III from Smoky Mountain Software, already use the numeric keypad in 64 mode on the C-128. You can too, thanks to a hint from the new Abacus book, *128 Tricks and Tips*. First, type in the command POKE 53295,248 to turn on the added lines K0–K2 in the C-128's keyboard matrix. Then you have to decode the matrix to make sense out of it. One simple, but limited, way to do this is with a Basic Get loop like the following:

```
100 POKE 53295,248
110 PRINT "PRESS A KEY ON THE
    KEYPAD"
120 GET A$
130 A = ASC(A$ + CHR$(0))
140 IF A = 95 THEN PRINT "0 OR 8 OR +"
150 IF A = 29 THEN PRINT "5 OR . OR -"
160 IF A = 160 THEN PRINT "2 OR
    ENTER"
170 IF A = 131 THEN PRINT "1 OR 3"
180 IF A = 61 THEN PRINT "4 OR 6"
190 IF A = 81 THEN PRINT "7 OR 9"
200 GOTO 120
```

A better solution would be to write your own keyboard scan routine in machine language, with the help of the C-128 keyboard table on page 642 of the *Commodore C-128 Programmer's Reference Guide*.

7. Disk and File Handling

Q: While using my C-64, I am occasionally unable to recall a letter that is listed in the disk directory, even though documents before and after it can be recalled. Is this a fault of the 1541 or is it a bad spot on the disk? How can I recall this missing letter?

G. L. Curtice
Rockport, TX

A: If there is an asterisk (*) next to the filetype in a directory listing, that file is called a "splat" file, because it was not properly closed when first written. The disk will not let you load such files normally, because it has no way of knowing where the file ends.

A skilled user can rescue at least part of a splat file by opening it with a filetype of ",S,M" and copying it to another file. The new file can be closed when no more valid data can be retrieved from the splat file. Once rescue attempts are completed, such files should immediately be deleted from the disk with the disk Validate or Collect command. On your C-64, type:

```
OPEN 15,8,15,"V0"
```

Do *not* omit the zero!

On a C-128 or Plus/4, type:

```
COLLECT D0
```

This is essential; erasing the file any other way creates a serious risk of losing other valuable data on the disk.

The most common cause of a splat file is running out of room on the disk while saving a file. If the disk formatted properly when you first bought it and has not been abused, the odds are that it is still in good shape physically. Similarly, if you can still load other letters, your 1541 is probably in good shape as well.

***Q:** I accidentally created a file named ""movies". Note the double quotes at the beginning of the name! Is there a way, short of reformatting the entire disk, to rename or scratch the file? I'd hate to reconstruct the whole thing.*

Vito Devenere
Spokane, WA

A: Scratching it would be simple. Simply replace the unwanted quote mark in the name with a question mark when you give the command. The question mark serves as a wild card, making the disk not care what character occupies that position in the name. Thus, your command could read:

```
OPEN 15,8,15,"S0:?MOVIES"
```

Unfortunately, by using the wild card, a similar name, such as "XMOVIES", would also be scratched. If that is a problem, rename the other files first.

Renaming the troublesome file without scratching it is also straightforward, but the method is not as obvious. Here is the required command:

```
OPEN 15,8,15,"R0:MOVIES = " + CHR$(34)
+ "MOVIES"
```

The CHR$(34) in the middle forces the extra quote mark, which you need, into the command string, without upsetting Basic.

By the way, the same techniques may help you if you manage to open or save a file without any name at all. You'll hear this situation referred to as a comma file, because it will appear in the disk directory with a name consisting of a single comma.

Scratch such files with:

```
OPEN 15,8,15,"S0:?"
```

***Q:** Is there a function, such as CLOSE 15, that will close all the files previously opened?*

Dennis Lancaster
Gaylord, MI

A: Yes, there is, and you've just given it. Assuming you've previously opened a command channel to the disk (with OPEN 15,8,15), the channel and all open disk files are closed simultaneously by the single command CLOSE 15. To cover all possibilities, you could give it twice, as follows:

```
970 CLOSE 15
980 OPEN 15,8,15
990 CLOSE 15
```

The extra Close statement takes care of situations in which file 15 was already open unexpectedly, and the Open statement takes care of times when you forgot to open file 15 earlier.

***Q:** I wrote some programs that input data from my C-64's keyboard and then print the data on my 802 printer. Even though I close the file and device, I cannot regain use of the keyboard without pressing the restore key at the end of the program. The same thing happens when I list a program to the printer. What can I do?'*

Wendel Hans
Goleta, CA

A: Assuming that you opened your file to the printer with

```
OPEN 4,4
```

what you have left out in both cases is the command

```
PRINT#4
```

before closing your files. In the case of listings, it is necessary to use the CMD 4 command, but even that causes trouble; it would be much better if you rewrote your keyboard program so as not to need it. Here's how.

Presumably, your keyboard program now looks something like this:

```
10 OPEN 4,4
15 CMD 4
20 GET A$: IF A$ = "" THEN 20
30 IF A$ = "@" THEN 60
40 PRINT A$;
50 GOTO 30
60 CLOSE 4
70 END
```

A cleaner and otherwise equivalent program would be:

```
10 OPEN 4,4
20 GET A$: IF A$ = "" THEN 20
30 IF A$ = "@" THEN 60
40 PRINT#4,A$;
50 GOTO 30
60 CLOSE 4
70 END
```

***Q:** How can I save a variable?*

Tim Holl
Roswell, NM

A: By putting it in a data file. Saving the contents of variables is the main reason for having data files. Otherwise, all the information developed during the run of a program would be lost when you turn off the computer. Assuming your variable is named A$, save it on cassette this way:

```
900 OPEN 1,1,1"NAME"
910 PRINT#1,A$
920 CLOSE1
```

If you have a disk, change line 900 to:

```
900 OPEN 1,8,2"0:NAME,SW"
```

Then, to load back your variable the next day, use these lines:

```
950 OPEN 1,1,0,"NAME"
960 INPUT#1,A$
970 CLOSE 1
```

And for disk:

```
950 OPEN 1,8,2,"0:NAME,S,R"
```

If you have more than one variable to save, add more lines like 910 and 960, one line per variable. (It's OK to combine several variables in line 960, separated by commas, but don't combine variables like that on line 910.)

Q: I was experimenting with files on my Datassette, and it gave me a File Data error. What is it, and what did I do to cause it?

David Rainbolt
Marshall, AR

A: This error is incorrectly identified in the VIC and 64 programmer's reference guides as a Bad Data error. What actually appears on your screen is the more descriptive phrase, File Data error.

However, Commodore's explanation of the error is correct. You were trying to read a non-numeric character into a numeric (real or integer) variable. It is the file-handling equivalent of Redo From Start, which you'll see if you attempt to do the same thing in an Input statement. One cure is to use only string variables when working with files, and use the VAL( ) statement later to convert those that must be numeric into proper form.

Q: The Commodore 64 Programmer's Reference Guide *has a table of status values for the reserved variable ST. It is incomplete, as I once had an ST value of 66 when trying to read a disk file. What other status numbers are there?*

Henry Elwell
Cleveland, NC

A: ST is actually a binary value, even though we read it in decimal. That means it can simultaneously show several different errors, each contributing part of the value of the error status number displayed by ST. To decode such ST values as 66 without learning more about binary, simply subtract from your ST value the largest number in the ST table that is less than or equal to your value. Your value includes the error listed next to that value. If there is a remainder, repeat the process on it until you have identified all errors.

In the example you cited, an ST value of 66 indicates 64, "End of File," with a remainder of 2, which in turn indicates "Time Out on Input." This combination could result from trying to read past the end of your file.

Q: On p. 16 of my 1541 user's manual (part number 1540031-2), there is a format to combine files. I simply cannot get this to work.

Barry Ashworth
Tucson, AZ

A: In the current 1541 manual (part number 1540031-03), which you can purchase for $5 directly from Commodore, I describe on p. 37 how to combine several already-existing sequential datafiles on the same disk.

Assuming there are three files to be concatenated ("AG", "HM" and "NZ"), each containing the words from part of a short dictionary, the commands to combine them into a single dictionary file ("AZ") are:

```
10 OPEN 15,8,15
20 PRINT#15,"C0:AZ=0:AG,0:HM,0:NZ"
30 INPUT#15,EN,EM$,ET,ES
40 IF EN THEN PRINT EM$:STOP
50 CLOSE 15
```

(Line 20 does most of the work, but lines 30 and 40 are needed to alert you to any problems that arise during the process.)

Unfortunately, this method of concatenating files is only intended for use on datafiles, not program files.

Q: I have a 64 and cassette. Is there any Basic statement or short program that will combine programs by loading more than one without erasing previous ones?

Bryson Payne
McCaysville, GA

A: The commands that do what you request are Append and Merge. They are often found in programmer's aids, such as SYS RES, from Solidus International, and PAL, from Pro-Line Software. The difference between the two is that Append attaches to the end of the previously loaded programs each new program that's loaded, regardless of its line numbers, while Merge inserts the new program into the existing program line by line, replacing any duplicated lines with the version currently being loaded. Of the two commands, Merge is usually more useful, but each has its place.

Q: Why do I get a Syntax error when I try to type in more than two lines of a program that has five or six lines between line numbers?

Gilbert Neldner
Haines City, FL

A: Programs that have lines longer than two lines have done one of two things: either they have been typed in using the abbreviated forms of the Basic keywords, or they have been run through a compactor program after they were finished. If the Basic line you see is five or six screen lines in length, it almost certainly has been compacted. To type it in, you will have to split its parts down into several smaller Basic lines, no one of which is longer than two screen lines. An uncompactor program to automate this chore was featured in the November 1984 issue of *RUN*.

If it is important to restore the line to its original oversize length later on, you'll have to run it through a compactor program afterwards, such as the one also included in the *RUN* article. As the name suggests, compactor programs combine Basic lines as much as possible, up to the theoretical maximum line length (255 characters), without affecting the logic of the program, and also delete Remark statements and spaces that are not within quote marks. Most require a disk drive.

Q: I have a program that uses Data statements. Some statements are longer than the 80-column logical line limit. How can I concatenate these to accommodate longer lines?

John Schenck
Aberdeen, SD

A: Although there are ways to build data lines longer than 80 columns directly, I prefer to handle such needs by concatenating strings during the program run. To do so, simply read the strings to be concatenated, and then assign them to the same string, using the + sign as a concatenation operator.

Here is an example of a program that reads data lines and combines

any over a preset length (five in this example) with the next line of data:

```
10 DATA 12345
20 DATA 6789
30 A$=""
40 READ B$
50 A$=A$+B$
60 IF LEN(B$)>5 THEN 40
70 PRINT A$
```

Q: Is it possible to list a sequential file from the directory? If so, how could I go about it?

Stephen Yue
Monterey Park, CA

A: The easiest way to list a sequential file is with a memory-resident programming aid. For example, "Disk Reader" (*RUN*, May 1986) is such a program. Also, commercially available is SYSRES, from Solidus International (215 W. Holly, Suite 241, Bellingham, WA 98225). It includes both sequential- and program-file-reading commands that work just like the DOS wedge on Commodore's test demo disk. The command

```
@L"yourfile"S
```

lists your sequential file to the current output device (screen, printer or disk).

Q: I often need to change a word or line in a text file. Could you show me a way to edit a sequential file without retyping the whole file?

Peder Sterling
North St. Paul, MN

A: The easy way to edit a text file is with a word processor or terminal program designed for the purpose. Easy Script, from Commodore, VIP Terminal, from Softlaw, and PaperClip, from Batteries Included, are three among many programs with this option. Even programming aids such as SYSRES from Solidus International and compilers such as Commodore's 6502 assembler/editor include Get and Put commands to ease the editing of sequential files.

Q: I wrote a sequential file program for either the VIC or 64, using the 1541 disk. I use Input statements to enter data for fields, but if I enter more than 76 characters in a string field, I receive a Syntax error. Is it possible to enter larger fields? I would like fields of at least 1000 characters, and more if possible.

William Kerr
Lynbrook, NY

A: At the moment, your problem isn't in your file, but rather in your data entry method. And it's a serious problem. You are asking to violate two of the fundamental limits of Commodore (and most other) computers.

First, there is a strict limit to the length of an Input statement, set by the size of the input buffer reserved by the operating system. On the 64, it's set at two screen lines, including the leading question mark and space and the trailing carriage return. On the VIC's narrower screen, up to four lines are allowed. The buffer holds 88 characters, so your guess of 76 characters is close enough.

The other fundamental limit is the 255 character limit on the length of a single string. If it weren't for this limit, you could solve your problem by using the Get statement in place of the Input statement. As it is, you'll have to divide your data somehow so it can be grouped in bunches no larger than 255 characters. Note: You can stack as many of these as you wish end to end in a sequential file, and consider them all part of the same logical record.

One other consideration—if you do use Get to lengthen your fields, also use Get# to retrieve them from disk. Input#'s capacity is the same as Input's.

Q: I find I can't write to an individual field in a relative record (except the last field), without botching the record. How can I emulate the U2 command used with random files for this use?

John Menke
Mt. Vernon, IL

A: No need to emulate it—use it if you want. Relative records are stored in physical sectors that U2 can alter, just like any other file. You need only trace the pointers through one more step than with random files, including the side sectors in your calculations.

However, the proper way to edit a relative record is all at once—inside the computer, not on disk. Using a readily available public domain utility like String Thing, you can easily read a record of any size into memory, alter it with Basic's standard string-handling commands (Left$, Mid$, Right$), and finish by rewriting it with a single Print# statement.

Q: Is it possible for relative files to co-exist peacefully with other DOS files—that is, without writing over them?

Bob Sullivan
Oak Park, Il

A: Yes, that is one advantage of relative files over direct-access files. A direct-access file may not respect existing files. Relative files give equally flexible access to any record within a file, but keep themsleves separate from all other files properly allocated in the BAM. Relative files also appear properly in the disk directory, and are compatible with DOS's Validate command.

Q: I have had several requests for a very large relative record program, consisting of 48 fields and a record length of 600 bytes. Is it possible to write such a long record?

David Runnion
Ashtabula, OH

A: To go beyond 254 characters per record, simply separate your logical records within the program from the physical records on disk. Instead of cramming all 48 fields into a single disk record, limited to 254 characters, let each disk record be a single field in your logical file and think of each multiple of 48 disk records as a new logical record. The disk record length for this file will be the length of your longest field, and the number of disk records needed will be 48 times the number of logical records wanted.

Q: I am writing 20 fields to one relative record, each ten characters long. The Print# statement should look like this:

```
100 PRINT#2,A$CHR$(13)B$CHR$(13)...T$
```

However, because of the two-line limit in a C-64 statement, I cannot fit the whole list in one statement. And when I break the statement into two line numbers, the fields are printed in two separate records, even when a semicolon ends the first line. I have also tried printing two strings with the information in them, but they are read lit-

erally and printed all into one field. Does anyone know the solution?

Richard Wolf
Oneonta, NY

A: When you built two strings, you were close to the solution. Briefly, a relative record must be entirely written out with a single Print# statement, but there is no rule against building a very long string in earlier lines for that one line to print out. What you probably didn't realize was that you needed the code CHR$(13) in your strings, not the letters *C*, then *H*, then *R*, and so on.

Here's a version that shows the needed technique:

```
100 A$ = ""
110 FOR I = 0 TO 19
120 : A$ = A$ + F$(I) + CHR$(13)
130 NEXT I
140 PRINT#2,A$;
```

It usually works best to store data fields in memory as elements in an array, F$(0) through F$(19) in this case.

Q: *I am writing an inventory program for vending machines. Each machine is saved in a separate sequential file. I would like to get a listing of all machines without entering each filename individually. Is this possible? Also, how can I change just one field in a file?*

E.H. McCuaig
San Mateo, CA

A: To list all the sequential files in order, without reentering their names each time, you could keep the filenames in an array that is itself saved as a sequential file and automatically reloaded when the program runs.

However, another approach is simpler, and it's the easiest way to change only one field in a file. Simply replace your sequential files with a single relative file that keeps data for each machine in one or more records. If each vending machine is allocated with enough records to hold each field in a separate record, you can easily edit any one field.

8. LANGUAGES

Q: *Do you know of a compiler program that will let you write a whole program in Commodore C-64 Basic, and then compile it into machine language? The ones I've tried leave out such necessities as string variables, including CHR$ and TI$. Another program wanted to scratch the original program from the disk. There has to be a compiler that's perfect for me somewhere out there, but where? I'm tired of just Basicly plodding along.*

Kelsey B. Tidwell
Address unknown

A: As I'm learning each day in my own studies, there are many differences between an interpreter and a compiler, and no compiled Basic is likely to be 100% compatible with an interpreted Basic. Strings, for example, are a real problem for a compiler. Should it bind them to a fixed size at compile time for maximum speed, or should it delay binding until execution time, and handle them no faster than interpreted Basic, including all the garbage collection problems? Different vendors answer that question in different ways.

Even so, if you're willing to go to the trouble of reading the compiler manual, and make a few changes in your interpreted Basic programs to support the needs of the compiler, any of the several good compilers available to Commodore owners should be satisfactory for most uses.

Two new compilers to consider are Abacus Software's Basic-128 (a Basic-64 is also available) and Syntech's Gnome Kit. The latter has the unusual added virtue of not being copy-protected.

Q: *I have recently become interested in machine language. When attempting to "fall below" Basic, it has become apparent that my 64 does not contain the monitor program. Could you offer suggestions as to how I could either trade in my 64 for one with a monitor or acquire a monitor program on disk?*

Aaron Starr
Salem, OR

A: Almost any user group can supply you with a copy of Micromon or Supermon for the 64, on disk at little or no cost. Both are excellent learning tools for machine language.

Q: *What is the difference between an assembler and a machine-language monitor? Can I use a monitor instead of an assembler to write machine language programs?*

Troy Lund
Hermantown, MN

A: When computers were first developed, they were programmed directly, in a language composed entirely of numbers that they could execute unchanged. A typical simple instruction was written as 11001000 (binary), with each digit standing for an actual switch within the computer. Later, machine instructions were written in shorter numbers (base 16) that were easier for humans to remember. For the same reason, the numbers were eventually replaced by short words that stood for each instruction, allowing people to write programs as a series of words.

This added a translation step to programming, since computers could still only obey numeric instructions directly. The program that did the translation is called an assembler. Its development was the first great leap forward in software development and heralded the eventual development of Basic.

However, even after the advent of assemblers, there remained a need to view and change numbers in the machine directly, via machine language monitors, so called because they directly monitor the actual values used by the machine.

As this brief history suggests, there is a continuing need in programming for both assemblers and monitors. Short programs can be written entirely with a monitor, but larger programs are much easier to develop with an assembler. Most machine language programmers use at least one of each.

Q: *Where I work, I am used to programming Z80s with a multi-pass assembler. I recently bought a C-128, but I cannot find a multi-pass assembler anywhere. Are there any?*

Erik Skyten
Nashua, NH

A: Yes, there are several two-pass assemblers for Commodore computers, and the one I use most, MAE, even offers a third pass to create relocatable object code. It is in many respects

equal to the IBM mainframe assembler used here at Western Illinois University. A new macro assembler you might find especially helpful on the C-128 is the Buddy 128, from Pro-Line Software. Unlike some otherwise excellent competitors, BUDDY and MAE are not copy-protected, making them far easier and safer to use than others.

Q: Must I know machine language to know where to use the SYS command, or is there some way I can use SYS calls without learning machine language?

Jonathan Jackson
Riverside, RI

A: It isn't necessary to know machine language to use SYS calls that others have discovered, but it certainly helps in understanding what's going on after the call. Until you feel like investigating machine language, just be very careful you type the numbers in published SYS calls exactly as written. (A mistake normally won't hurt the machine, but you might have to turn it off and start over.)

Q: In many programs, I notice the number 169 appearing frequently in Data statements. Is this a Gosub in machine language? I'm curious to know the basics of machine language contained in Data statements.

Jim Smith
Sterling, KS

A: The number 169 is the decimal representation of the machine language command LDA #. It loads the value in the number following 169 into the primary accumulator of the microprocessor. This is indeed a very common command, and often you will find the next number is 0, meaning that the accumulator contains a zero.

If you're ready to learn more about machine language, one tool I use almost daily is Micro Logic's 6502 reference card. It lists on a single plastic sheet all the reference material I need for 65xx programming, including the answer to your question about what instructions are represented by various numbers. To order, send a check for $6.95, marked "Send (1) MC-6502," to PO Box 174, Hackensack, NJ 07602.

Q: I have recently purchased a C-128 to take advantage of the programs available for CP/M users. Would you please tell me where I can find CP/M public domain programs? The user groups in my area are new to CP/M and the C-128.

Ken Flippo
Milan, TN

A: Cheryl Peterson listed dozens of sources in the January 1986 *RUN*. Her suggested sources included Poseidon Electronics, 103 Waverley Place, New York, NY 10011, Kaypro and Osborne computer user groups, and RCP/M bulletin board systems.

Q: I understand that the 1571 disk drive will read and write IBM DOS disk formats under the C-128's CP/M mode. Can the format be read and written under the C-128 mode?

Jerry Mulherin
Kaneohe, HI

A: I haven't heard of anyone successfully reading a PC-DOS-format disk on the C-128 yet, although I expect it will be done; it's already been done for some other CP/M machines, such as the Osborne and Kaypro, via commercial programs like Uniform and Media Master. The IBM format that Commodore supports on the C-128 is a CP/M format, not PC-DOS.

Getting at CP/M disk formats from the C-128 side of the machine isn't easy, but it is possible, using the 1571's new Burst mode. However, the needed read and write commands require the speed of machine language control and aren't at all a project for the faint-hearted.

Q: If I purchase a non-Commodore printer with a built-in Commodore interface, will the built-in interface be a disadvantage when using CP/M mode?

Eugene Cozzi
Barre, VT

A: Yes, it often is a disadvantage. Only a few interfaces explicitly support CP/M mode on the C-128 so far. Also, such a printer is incompatible with Apple and IBM computers, whereas a separate interface can easily be removed for use with other systems.

Q: I'd like to learn about the Cobol offered by Digital Research for CP/M mode on the C-128. Is it a limited subset of ANSI-74 Cobol, or is it complete? What is its cost, and how is it ordered?

Ted Chidester
Sante Fe, NM

A: All microcomputer versions of Cobol are still subsets of that massive language, although often complete enough for likely needs. DR describes their Level II Cobol as enabling micros "to compile and run programs written in full ANSI '74 Cobol." If the $1600 list price doesn't scare you off, you can reach them at 60 Garden Court, Monterey, CA 93942 (408-649-3896). However, for the money, a better choice may be Abacus Software's new $60 Cobol-128. (They also sell a Cobol 64.)

Q: I am interested in learning the relative merits of Simons' Basic and Comal. Both of these have commands—such as Auto, Renumbering, MOD and Print Using—that are not available on my C-64.

Lawrence A. Kiefer
Saint Ann, MO

A: Simons' Basic as first released by Commodore is bug-infested and nonstandard in its syntax for many commands. It is, however, a magnificent first effort by a teenage programmer. Comal, on the other hand, is the highly polished result of several years of development, and compatible with generally accepted international standards. The other practical and important difference is that Simons' Basic adds to Basic, while Comal replaces it.

Q: I use Nevada Fortran with my C-64 and a CP/M cartridge. To my surprise, the Fortran manual is geared to the experienced Fortran programmer already familiar with CP/M. Would you please assist me in obtaining a tutorial book on CP/M for the Commodore 64, with respect to Fortran applications?

Reynaldo Reyes, Sr.
South Gate, CA

A: First, CP/M and Fortran are entirely different from each other. Fortran is a very old, but still popular, programming language, of which Basic is a somewhat modified subset. CP/M, on the other hand, is an oper-

ating system, helping the computer run whatever language you like with equal ease. Thus, you aren't likely to find a single text that teaches both Fortran and CP/M. On the other hand, most bookstores carry books that deal with each subject separately.

Of the CP/M books, my personal favorite is still Thom Hogan's *Osborne CP/M User Guide*, From Osborne/McGraw-Hill. My favorite Fortran book is the *Fortran Color Book*, although nearly all textbook publishers offer good introductory Fortran texts for classroom use, available from the nearest university bookstore.

Q: I have a machine language monitor program called Micromon, but no longer have the instructions for it. Can you tell me how to save programs with this monitor?

John Guillory
West Lake, LA

A: Saving programs with most versions of Micromon is fairly simple. The statement .S"0:NAME",1000,2000 will save the contents of memory addresses $1000–$1FFF to disk. If you have a cassette, use .S"0:NAME", 1000,2000,01 instead. (Micromon defaults to disk.) Note that, in both cases, the final address is one location beyond the actual last address you want saved. By now, most Commodore user's group libraries should have both Micromon and an instruction file for it.

Q: Is there any way to get the C-64 to keep time with millisecond accuracy?

David A. Washburn
Atlanta, GA

A: Yes, using machine language. You'll need to set up a timing loop and add together the number of clock cycles used by each command in the loop. Just bear in mind that when a branch is taken, it requires one or two (depending on the distance of the destination address) more cycles than when it's skipped. The clock cycles needed for various commands are shown in nearly all machine language guides.

As an example of a timing loop, the subroutine

```
WAIT  LDX #199
LOOP  DEX
      BNE LOOP
      RTS
```

uses two cycles one time for the load, two cycles 198 times for the decrement, three cycles 198 times and two cycles one time for the branch (assuming the whole sequence is within the same 256-byte page of memory) and six cycles for the return. Adding these up, the subroutine takes a total of 1000 clock cycles, of which ten are needed regardless of the value in the X register, and the rest are used at the rate of five per loop iteration.

On a C-64, with its approximately 1-MHz clock, a WAIT would execute in very close to one millisecond. For longer delays, just call WAIT repeatedly, also taking into account the clock cycles used by the calling program.

HARDWARE

9. Computer Parts and Connections

Q: When I contacted my local authorized repair service, I was told that it would cost $74 just to open my C-64. I thought that a little high for a $139 unit. The service people also refused to sell me a 6526 chip over the counter. Could you give me an address where I could purchase the chip?

Bob Prosser
Chicago, IL

A: Jameco Electronics (1355 Shoreway Road, Belmont, CA 94002, 415-592-8097), with whom I have had good dealings for several years, now sells the 6526 and several other key chips for the C-64, along with a full line of general-purpose IC chips.

Q: I represent Commodore computers in the Army and Air Force Exchange System throughout the Republic of Korea. Where can I get diagnostic disks for the many models of the VIC and 64? Is it possible to buy schematics and part-location charts for each model? There are a lot of Commodore users here in the military.

Russel Garecht
APO, San Francisco

A: Schematics for the VIC and 64 were available from Sams' Photofacts, Howard Sams Publishers, Indianapolis, IN, as CC3 and CC4. Diagnostic programs for some Commodore products should be available to authorized dealers directly from Commodore; if you can't them from Commodore yourself, check with a full-service dealer. Micro-W, Box 113, Pompton Plains, NJ 07444, also sells Mr. Tester, a diagnostic disk for the C-64.

Q: I've read that something called the serial bus is used to connect both a disk drive and a printer to the computer at one time. Could you please explain exactly what it is, where I can buy it and approximately how much it costs?

Bruce Romney
Suffern, NY

A: Good news! The serial bus won't cost you a dime extra. The bus involves components built into every 64 computer. Another essential part of the bus is the six-wire cable that comes with Commodore printers and disk drives to connect them to the computer.

You see, the computer needs a way to communicate between the microprocessor chip, the interface adapter chips and external devices they control, such as the disk and printer. Running a full set of wires between the processor and each of the other chips would be very costly. Instead, the computer uses a system much like a telephone party line.

In both cases, only one set of wires serves several neighbors, and information carried on them is preceded by a code that tells which location is to receive that information. The phone company uses a special ring; the computer uses special addresses. In each case, however, the result is that only the intended recipient gets the information.

In the case of the 64's serial bus, the wires start at an interface adapter chip called a CIA. From there, they run to a connector jack on the back of the computer. A cable goes from the jack to a disk drive, if you have one, or directly to a printer, if that's all you have. If you have both, another serial bus connector on the back of the disk drive extends the signals from the CIA chip in

the computer to another cable, going this time to a second disk drive or to the printer. With up to five different computer accessories sharing the same serial bus, it is essential to be sure each one has its own unique address (also called device number). This assures that only the correct device will listen to each command from the computer. You'll sometimes hear people refer to this sharing of the serial bus as daisy-chaining.

Q: Could you please tell me the device numbers for the computer, and everything you can hook up to it?

Mark Vogt
Address unknown

A: Here is a partial list of devices that are often connected to Commodore computers. All devices numbered 4 or higher are on the serial bus.

0—keyboard
1—cassette drive
2—user port: Commodore modems and RS-232 interface
3—display screen
4—printer
5—printer #2
6—plotter
8—disk drive
9—disk drive #2 (B: in CP/M on C-128)
10—disk drive #3 (C: in CP/M on C-128)
11—disk drive #4 (D: in CP/M on C-128)

Q: I am going to purchase a printer and use it, if possible, at the same time as a modem. However, if I buy a non-Commodore printer, both accessories plug into the parallel port. What can I purchase that will allow me to use both at the same time?

Sean Hull
Schenectady, NY

A: Unless you have a Plus/4, I would not count on using both a printer and a modem simultaneously, because most Commodore computers (with the exception of the Plus/4) utilize one I/O chip for both modem and printer operations. This chip can't perform both functions at once.

One cure is to use them alternately, storing text to be printed in memory until you can pause your modem conversation long enough to print what is in memory. Many terminal programs allow this.

As for plugging non-Commodore printers into the parallel port, it isn't necessary and I don't recommend it. The normal way to control most printers from current Commodore computers is via the serial bus, and special interfaces to make this possible are widely available at reasonable cost. The problem is that the parallel port on most Commodore computers is not a Centronics parallel printer port, such as you find on most printers; rather, it is an experimenter's port, not intended to be compatible with other parallel devices. It is, however, almost compatible with serial RS-232 devices, and makes a good modem port.

Q: I don't understand the theory behind surge protectors. Why can't you plug an $8 surge suppressor into an outlet and a multiple outlet into the surge protector? Would this not accomplish the same thing as using the Lemon, Lime and Orange brand of surge suppressors?

Ronald Moore
Richmond, VA

A: Fancy surge protectors provide two services. First, they provide some protection against surges of moderately high voltage, just like your $8 version. Second, they also provide filtering of more ordinary variations in voltage, damping down deviations from the standard voltage and frequency. A water heater is a good analogy for the way this works.

A water heater's size allows it to hold enough water to give a comfortably warm shower. Even though cold water is constantly entering the tank as you bathe, the water doesn't normally leave the tank until it has been warmed. On the other hand, if the water were ever to boil, a separate emergency valve would open, to give steam an escape route and prevent an explosion.

In a surge protector, the surge protection is like the emergency valve, and the filtering is like the water tank.

Thus, you do get something extra when you spend more for fancy surge protectors. Whether you need that extra protection is another question. I have yet to hear of a piece of Commodore equipment failing for lack of a power-line filter, although several systems have been lost for lack of a simple surge protector.

One more thing—don't expect more of a surge protector than it can deliver. Nothing will protect your system against a lightning strike on nearby wiring except unplugging the computer completely.

Q: Should one leave the power supply for the 64 plugged in when not in use, or should it be disconnected?

C. E. McDougal
Salinas, CA

A: I plug mine into a switched multi-outlet powerstrip, along with the rest of the computer system, and switch it on and off with everything else. This works very well and avoids the whole problem.

Q: If the power supply, the 64 or the 1541 overheat, how can you tell?

Mike Gross
Bethlehem, PA

A: Smoke curling up out of the cooling vents would be a dead giveaway. Short of a fire, the clearest sign of a heat problem is a system that works well when first turned on, but fails anywhere from a minute to two hours later.

One way to trace the problem is to cool the suspected device, with a fan or a can of Frost Test (although some folks recommend against using the latter on grounds it may cause a static shock to your chips). If the cooled device begins working properly again, you've found the trouble.

Replacement power supplies are available from JSR Enterprises, 10035 White Pine Lane, Santee, CA 92071; 619-449-9748.

Q: My Commodore 64 seems to lock up about five minutes after I turn it on. If I turn it off for a few minutes, it will work for a few minutes before the problem appears again. Do you know what could be causing this problem?

John Allison
Rockville, MO

A: Heat. I receive letters like yours several times a week, and, in most cases, the culprit appears to be an overheating power supply. As a general rule, if a 64 fails anywhere from five minutes to a few hours after being turned on, the problem is heat-related, and the power supply should be checked first.

If the red power light on the top of the keyboard dims or goes out, the power supply is probably at fault. But even if the light is on normally, the power supply could still be inadequate. The way to be sure is to borrow a different power supply and try it. If the problem goes away, your power supply will have to be fixed or replaced.

Let me make a couple of suggestions. First, be sure your power supply is plugged in properly; on some 64s, it's possible to force its connector in the wrong way. On most units, the dimple in the side of the connector should face up when plugging in.

Second, keep your power supply in an open area. It needs ventilation, because it is in a sealed case and generates a lot of heat.

Third, try to minimize the number of add-ons you plug into a 64 using the standard power supply, and be sure their connectors are on properly.

Fourth, if your power supply fails, replace it with one of the repairable or oversized power supplies now being offered by various companies.

Q: *Are the C-64 chips plug-ins or soldered? If they're soldered, would it be feasible to install sockets?*

Richard Stephens
Yonkers, NY

A: The C-64's chips are soldered in, and I've had considerable success removing soldered chips with an inexpensive desoldering iron from Radio Shack. However, I must warn you that it's a lengthy and frustrating project, and it could destroy your circuit board. If you do remove soldered-in chips, you can install sockets for the replacements. In fact, that's the only way I do it.

Q: *Is there any help you can recommend for a C-64 that loads but doesn't run certain programs (e.g., Beachhead). I've gone to three technicians, all of whom say, "It's the nature of the beast. Some C-64's just act that way." The disk is good, and so is the 1541 drive.*

Name and address unknown

A: I'd be suspicious of the Kernal ROM in your C-64. Most likely it's the older Rev 1 or Rev 2 type, and some programs work only with the current Rev 3 chip. Similarly, your 1541 may have an older ROM and need the current –05 ROM.

Q: *There are 3-MHz versions of the 6510 and 6502 chips available now. Is there any way to use these chips to increase the speed of my C-64 or 1541?*

Brian Jedrick
Nutley, NJ

A: Not yet, because you'd also need faster versions of all the supporting chips. For example, the C-128 won't run at 2 MHz in 40-column mode because the Commodore's 40-column color chip can't run at higher speeds.

10. Input Devices

Q: *I have a problem with my C-64. Every other key on the top row (1–3–5–7–9–+–English pound–INS) will not print or move. All the other keys on the keyboard are OK.*

Marcia Shawgo
Lewistown, IL

A: Those keys are all connected to pin 12 on the 6526 CIA chip at U1. Since pin 12 is also connected to joystick 1, first unplug your joystick if you are using one, and see if that helps. If not, you or a technician will probably need to replace the 6526, although after you get the case open to do so, first check that the keyboard connector is firmly in place.

Q: *My C-64 keyboard is beginning to suffer from key oounce. Do any companies (Commodore included) offer replacement keyboards?*

Laura Thompson
Alexandria, VA

A: Gregory Kundert, of Detroit Lakes, MN, recently wrote to suggest one solution—swapping a keyboard from a VIC. With VICs widely available on the used market, this is probably a good solution. You can also have your dealer order a replacement keyboard from Commodore.

However, let me make one other suggestion. When key bounce becomes a problem on Commodore keyboards, it's usually limited to one or two keys. If you are mechanically inclined, you can disassemble the keyboard with a #0 Phillips screwdriver and swap the offending key contacts with those of a rarely used key; clean the keyboard contacts with a pencil eraser, and you'll have a usable keyboard again at no charge other than your labor.

Reader Roy Holland of Las Vegas, Nevada, suggests that you can usually stop key bounce by spraying a little DE-OX-ID contact cleaner (General Cement part number 10–1906) into the faulty keys.

Q: *I own a C-64 and use two joysticks. About a month ago, one of the joysticks began malfunctioning; when I push it to the left, nothing happens. I know that the problem is either in the port itself or in the 6526 to which it is connected. How much would it cost to replace one or both, and where would I find them?*

Stephen Legate
Los Alamos, NM

A: The problem is probably in the joystick. Remove the screws from the base of the joystick and open the case. Slightly bend the contacts on the inside to get a good circuit and reassemble.

If the joystick checks out all right, get a continuity tester, or ohmmeter, and check for continuity between the pins of port 1 and the pins of the 6526 at U1 on your circuit board. Use the schematic in the *Commodore 64 Programmer's Reference Guide* to be sure which pins should match.

If there is continuity for each pin and no electrical shorts, then the port itself is all right. If continuity is not present, check the solder connections to the main board.

Usually, it is the 6526, not the main board, that is damaged. If you must

replace the 6526, see your nearest authorized Commodore service center; or you can order one for $20 from K. Boufal, 244 Fitzwater St., Philadelphia, PA 19147; 215-925-6469.

Q: I own a C-128 and I would like to know how good are its joystick port chips? I have had my C-128 only six months and have already blown four chips. Is there something I'm doing wrong?

Mike Douglass
Rochester, NY

A: Commodore's 6526 CIA chip controls the joysticks on the C-128, as it does on the C-64. As chips go, it's powerful, and more reliable than the earlier 6522 chip, which does the same chore on the VIC. However, both chips have a definite weak spot as used in Commodore computers. They are directly connected to the joysticks, without any buffer chips in between. This makes them very sensitive to accidental shorts when plugging in a joystick, as well as to static shocks when the port is touched.

The most likely cure to your problem is to never plug anything into your system when it is turned on, and to protect your system from shocks even when it is turned off.

Q: When I hold a light pen, which I constructed, to the screen in one spot, the Y values remain constant, while the X values range up or down by 15 over a one-second interval. Why? Will software written for other light pens work with mine?

Also, do you have a formula for changing the X,Y coordinates into screen locations on the 64?

Keith Spencer
Groves, TX

A: Your experience is typical of the 64's resolution with inexpensive light pens. Newer 64s may do better than older ones, due to a revised VIC-II chip, but truly usable resolution requires a light pen that costs almost as much as a 64. The only truly accurate light pen I've seen that you can buy is Flexidraw, from Inkwell Systems of San Diego, CA.

The Flexidraw programs do *not* work with other light pens, but simpler programs should, as long as you don't mind only being able to choose accurately among rows rather than columns on the screen.

Here is Supra's Cardwriter algorithm for converting X and Y to a screen location:

```
LC = SS + SW*INT((Y - LY)/
DY) + INT((X - LX)/DX)
where  SS  =  screen start: 1024 (7680 or
              4096 on VIC)
       SW  =  screen width: 40 (22)
       LY  =  low Y value: 50 (24)
       LX  =  low X value :45 (34)
       DY  =  dots/Y location: 8 (4)
       DX  =  dots /X location : 5 (4)
```

Q: I just saw the Omni-Reader by Oberon Int. It transfers material from a typed page to the screen of your computer without touching the keyboard. It has a standard RS-232 serial port hookup and is made for the IBM PC-AT. Is this compatible with the C-64?

L.C. Blanchard
Address unknown

A: Currently, versions are available only for Apple and IBM. Since it does work via an RS-232 interface, you could write your own controller software for it, but a better approach could be to write and ask them to make a Commodore version available.

11. Data Storage Devices

Q: When I plug a Commodore cartridge into the cartridge slot of my 64 after *the power is on, I lose Basic. I was hoping to read the cartridge source code with a machine-code reader such as MLX. Using a monitor (e.g., Supermon) also proved unsuccessful. I don't see how an expansion motherboard (e.g., Supra CB-5) will solve this. What is energized by the Commodore cartridges to disable Basic, and can this be counteracted?*

Henry Metz
Bronx, NY

A: You're lucky that Basic is all you lost when you plugged in that way! Many VIC owners have lost their whole systems by plugging in cartridges with power already on. What's getting you isn't something magic in the cartridges, but rather their very nature. To ensure maximum flexibility, the cartridge port is connected to nearly all the important wires that run the 64. When you plug something in with power on, you disrupt the signals on all these wires. Don't do it!

When the computer is reset, it checks the cartridge port; if certain characters are found in the first few locations of the cartridge memory, the computer turns control over to the cartridge instead of Basic. If you need to study a cartridge, use the CB-5.

Q: I know the difference between RAM and ROM. I load a program from the Datassette into RAM. But what happens when I load a program in from a cartridge attached to the cartridge port? Does it go into RAM or what?

Tom Murphy
Maplewood, NJ

A: When a cartridge is installed, its ROM takes precedence over any RAM located in the same memory addresses. It doesn't have to load at all (because it is already connected to the machine at the correct addresses), as long as it contains a machine language program that the computer can obey directly from the cartridge's ROM.

A few cartridges contain Basic programs that relocate themselves inside the computer at start-up, and then run in the same RAM as other Basic programs.

Q: Is it better to buy commercial software on disk or cartridge? What are the advantages and disadvantages of each?

Dee Daviess
St. Louis, MO

A: Disks are more common, partly because they are usually about $5 cheaper than an equivalent cartridge, but also because they can be updated more easily and don't require changing any hardware connections when going from one program to another.

On the other hand, cartridges are far more durable than disk, cannot damage your disk drive and start instantly.

As copy-protection schemes have grown ever more elaborate and fragile, I have come to prefer cartridge versions of programs that cannot easily be copied, especially for use by kids and unskilled users.

On the other hand, constant insertion and removal of cartridges can eventually wear out the contacts on the cartridge port, so no one answer is perfect for everyone.

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 difference is in testing; only double-sided disks have been tested and verified as 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 would like to know if a disk notcher (a puncher used to make another write-enable notch on the back side of a disk) is safe to use on a disk that is full on one side. Can it damage disks?

Gordon Rimac
Sterling Heights, MI

A: On a single-sided disk drive like the 1541, you can easily use the flip side of a disk by adding another write-protect notch. You can do this with either a commercial notcher or a 59-cent paper punch. However, this should be done only on disks that will be rarely used and that can easily be replaced, such as a copy of an entire library of public domain programs from your user's group.

The caution is due to two problems. One, the disks prepared this way will have to be recopied to be used with the new 1571 disk drive in its double-sided mode. This is because true double-sided drives like the 1571 always rotate disks in the same direction, whereas flipped disks rotate backwards when using the back side. That makes it difficult for the 1571 to make sense out of your disk unless you continue flipping it manually as before.

Second, the backwards rotation tends to release dirt that has been captured by the cleaning pad inside the disk jacket, and more of it than usual will end up on the read/write head. This will require more frequent cleanings and possible repairs down the road.

Q: Lately, my 1541 won't read or write on track 1; it just clicks against the end stop. A disk-aligning program from CSM Software has an option to check alignment where it reads all the tracks, and it says my drive is in alignment. Please help.

Marty Westra
Sioux Falls, SD

A: Since the alignment program claims that all is well, how sure are you that track 1 can't be read from or written to? Here's a short program to test writing to track 1:

```
10 OPEN 15,8,15
20 OPEN 4,8,4,"#"
30 PRINT#4,"TRACK-ONE"
40 PRINT#15,"U2";4;0;1;1
50 CLOSE 4
60 CLOSE 15
70 END
```

Here's another to read back what you've written:

```
10 OPEN 15,8,15
20 OPEN 5,8,5,"#"
30 PRINT#15,"U1";5;0;1;1
40 FOR X = 1 TO 9
50 : GET#5,A$
60 : PRINT A$;
70 NEXT X
80 CLOSE 5
90 CLOSE 15
99 END
```

If you really do have a problem using track 1, you or your dealer will need to adjust the end stop. It's just a matter of moving a bit of metal that's held by a screw. Or better yet, replace it with a Quiet Drive spring from Cardinal Software (13646 Jefferson Davis Highway, Woodbridge, VA). This spring appears to permanently solve the problem of drives being forced out of alignment because of being thumped against the stop when some copy-protected programs load.

Q: I have one Commodore 64 system at home and another at the office. I recently discovered that disks formatted on one 1541 drive will not load reliably from the other, and vice versa; however, both drives will load disks formatted on their own particular drive. Each unit passes the performance test program on the demonstration disk that comes packed with the unit.

I assume the trouble lies with a calibration problem on one or both drives. I have heard rumors of a software package that provides instructions for calibrating malfunctioning 1541 disk drives. Is such a product available commercially?

Albert Wellman
Santa Rosa, CA

A: I agree with your diagnosis. One or, more likely, both of your 1541s are somewhat out of alignment—not enough not to load a disk formatted by a properly aligned drive, such as the test/demo disk, but enough to be incompatible with each other.

To make sure, you could buy the new 1541 Physical Exam program from Cardinal Software (Woodbridge, VA 800-762-5645). It will quickly and easily show you whether or not your drives are properly aligned, and, if they're not, will show you in a simple graph which direction they are off and how far. It will also test the Track 0 stop and the motor speed. If you are mechanically inclined, you can use this information to make corrections. In addition, the brief manual does include instructions on the necessary steps involved.

Q: I have a problem with the Check Disk program supplied with the 1541 drive. The program takes so long to run through a disk that I normally give up before it checks 500 blocks. How long should Check Disk

take? I'm used to three to ten minutes on other computers.

Barry Hoefermann
Oreland, PA

A: Unfortunately, the results you report are typical for the original Check Disk program on the 1541—over two hours to run, and increasing delays as it moves the read/write head further from the block where it keeps its results.

Few 1541s are solid enough to complete the Check Disk program without reporting spurious errors. The then-overheated drive may indeed refuse to load other programs.

Avoid the Check Disk program except as a torture test for new 1541 drives. The header (disk NEW) command, which formats disks, already writes to and then verifies every byte on the disk's surface. You will rarely need any further assurance that the disk is good. I've never had a formatted disk suffer an error that couldn't be fixed by reheadering the disk. Also, buy good disks, and replace important ones before they wear out.

Q: *In testing a 1541 disk drive with the demo disk provided, I ran the performance test program and received a number of unit-is-failing-performance-test messages. Is the drive defective?*

D.W. Shilling
Shoreham, NY

A: Probably not. As the message at the start of the performance test indicates, you are only supposed to run it on a "scratch" disk (a disk that does not contain any valuable information), not the Test/Demo disk itself. Fortunately, you left on the write-protect tab; if you hadn't, the whole disk would have been erased by the test.

Before worrying about the drive, try running the program again, using a new or reusable disk instead of the Test/Demo disk. The program called it a scratch disk because its contents, if any, can be safely scratched (erased). Be sure its write-protect notch is not covered by anything.

Q: *I have had my 1541 disk drive for approximately one year, having little or no trouble with it. I am beginning to see more and more advertisements for disk drive cooling units. Are they really worth buying?*

Darrell Dopkin
York, PA

A: If your drive were failing or constantly going out of alignment due to overheating, a cooling unit might help. Since your disk is working properly, just enjoy it. I'd only recommend a cooling fan or heat sink for a properly functioning 1541 if it were mounted where air can't circulate or where temperatures often exceed 90 degrees F.

Q: *When my disk drive motor is running, it makes a squeaking noise. It did not always do this. Does it need some kind of lubrication? If not, what does it need?*

Phil Spicer
Houghton Lake, MI

A: If your drive is a 1541, more than a year or so old, and the noise began suddenly rather than gradually, your problem may be a loose flywheel. To be sure, you'll have to remove the drive from its case and look at the bottom of the drive. The flywheel has a strobe disk on it to assist in setting motor speed (if anyone could see it down there).

If it is held on by a screw and the screw is tight, that isn't your problem. But if there is no holding screw, you may need to gently tap the flywheel back onto its spindle with a small hammer (don't bend anything in the process) and seal it in position with superglue

If the flywheel isn't your problem, be sure the head is clean and the load pad in good condition. The head may be cleaned with 91% isopropyl alcohol on a Q-Tip. If the load pad is missing, dirty or worn, replace it. If noise persists, try to notice whether it is constant or is heard only when the head moves.

If it is associated with head movement, you can, with high-quality lithium grease, lightly lubricate the rail on which the head moves, taking care to keep it off the rest of the drive. If the noise is constant, the washer that is atop the collet assembly and clamps the disk in place also may need a bit of grease. It can be replaced, but about now I'd begin thinking about letting a professional do the work.

Q: *What is the proper procedure for cleaning the head on the 1541 disk using a head-cleaning kit? I can't figure out how to run the drive with the head engaged for more than a few seconds.*

John Aloi
Ridgway, PA

A: The trick is to repeatedly give the disk command until the cleaning is done, and make the command one that won't halt on an error. Here's a sequence that should work:

```
10 OPEN 15,8,15
20 FOR I = 1 TO 500
30 : PRINT#15,"I0"
40 NEXT
```

Contrary to the directions packed with many disk-cleaning kits, I have found no visible benefit from cleaning a disk drive weekly. For folks that use good disks and avoid obvious sources of dirt and pollution, once a year is enough.

Q: *To reduce dust in the house, I just got an electronic air filter to go with my heat pump. Afterwards, I heard from a friend that the filter ionizes dust particles that are not caught and that disk drives attract them like a magnet. Further, it was suggested that I keep the drives covered at all times, especially during operation. However, I am reluctant to do so because of the heat problem. Have I a problem?*

Ed White
Sacramento, CA

A: In a word, no. A whole-house electronic air cleaner is one of the nicest presents you can give a computer to keep its environment clean.

Although it can take up to a week to do so when first installed, the net effect of installing an electronic air cleaner is a large reduction in the number of particulates in the air. We've used them for years, and almost never have to clean dust out of our systems.

You are also correct in assuming that the heat from running your system under a cover would be much worse for it than any amount of dust. If you should someday accumulate enough dust inside your system to need cleaning, five seconds with a compressed-air camera cleaning spray will do the job.

Q: I have had a C-64 with two disk drives for about a year now. About a month ago, my #9 drive started doing something abnormal. When it is on, reading or writing a disk, both lights suddenly go off, although the disk continues rotating. A few seconds later, a Device Not Present error message appears on the screen. Is there any way I can fix it?

Leon Esquenazi
Mexico DF, Mexico

A: Reader Steven Walley had the same thing happen to him. He reports that the bridge rectifier supplying 5V had gone intermittent, not allowing the rectified current to pass through. He just replaced the bridge rectifier with a 50-PIV, 25-amp one from Radio Shack (part number 276–1185).

When my own 1541 failed with the same symptom, I had equal success by replacing the rectifier with Radio Shack's part number 27601146, a 4-amp, 50-PIV unit.

The needed rectifier is one of two located on the back row of components, near the right rear of the 1541's main circuit board, and looks like half of a domino. The 5-V rectifier is to the left of the 12-volt rectifier when viewed from the front of the drive. Some soldering is required to replace it.

Q: As a cardiologist, I am asking for a heart consultation in your medical clinic. The patient is my 1541 (two months old), which, suddenly, during reading a file, kept running and turned the red light on permanently. It now does only that, until I turn it off with the back switch. It seems like a cardiac arrest and ventricular tachycardia (forgive the analogy). Can you help?

Lelis Borges do Couto
Rio de Janeiro, Brazil

A: I presume from the analogy that the failure was complete—that is, nothing loads anymore, neither the file you were using nor any other files, programs or directories. If this is not the case, there may be something wrong with your file-reading program, such as a failure to check the file-status variable ST for the end of file (ST = 64).

If everything is dead, I'd first try to return the drive for a replacement. In the U.S. at least, you still have a month of warranty left and can let your dealer take care of it. If that is not possible, find and try out another 1541. If it works, the trouble is in your 1541; if not, the trouble may be in the 64.

Next, if you find a cooperative 1541 owner, you could try swapping the removable chips on the two 1541 circuit boards, hoping some swap will make a difference. If one does, you've found the bad chip. Also use a volt meter to be sure the 1541 has power. If not, the 5-volt bridge rectifier may be bad, as mentioned in the February 1985 Clinic.

If swapping the removable chips makes no difference, you could try swapping the entire circuit board. If this doesn't help either, the trouble could be in the drive itself. By now, you'll be ready either to buy and install the needed part or to defer to the specialist's skills of your dealer.

Q: I recently purchased a 1541 disk. After a month, I got an errror message—"file not found." This occurred with every disk I tried, and I know all the disks were good. Commodore sent me a replacement drive, but after a week the same thing happened, so I also sent that drive back for repair or replacement.

What I would like to know is—am I doing something wrong, or is this a common problem with the 1541?

James Kerins
Seaford, NY

A: I can't say anything definite, as you haven't quite given me enough information. The error message you received is an operating system message from the 64, not the 1541 (although there is an equivalent disk error message). It means what it says—the computer tried to find and load the file you requested, but either didn't find it at all or did not succeed in loading it.

After you see this message from the computer, the error light on the front of the 1541 should be flashing. To find out what the real problem was, you need to read the error channel of the disk. Here is a brief program which does that.

```
10 OPEN 15,8,15:REM OMIT IF ALREADY
   OPEN
20 INPUT#15, A,B$,CD
30 ? B$
40 CLOSE 15:REM OMIT IF ANY FILE
   STILL NEEDS TO BE OPEN
```

It must be entered into memory, not used in Immediate mode. The variable names can differ, but the second one must be a string, as shown in line 20. When the program is run, the true reason for the disk failure will appear on your screen. It could be anything—from not having a disk in the drive, to misspelling the name of the program desired, to one of dozens of actual faults in the disk or drive.

Before you send another drive back, get some help from the dealer or friend who knows how to use the 1541, and test your drive and disks by substituting them with the drive and disks already known to work. If, for instance, those disks that you know worked before now fail on a drive that works for its owner, then something has hurt your disks, and getting a new drive probably won't help.

Q: My question involves the compatibility of the 1541 and 1571 drives when used together. I thought I'd be able to keep both drives as device #8 and simply specify drive 0 or 1 when using them. If I attempt it, however, sometimes both drives activate, and sometimes the lights on each machine come on, and the computer locks up, but the drives don't activate. Can you give me any advice?

James Baker
Flaxcombe, Sask.
Canada

A: It's quite easy to use a 1541 and 1571 together, but you have to do it with one as device 8 and the other as device 9. Commodore makes this easy by including a pair of small switches on the back of the 1571 to set its device number. However, if you wish to permanently change the device number on the 1541, Larry Cotton's article on page 82 of the April 1986 *RUN* gives complete details.

If you really do need a dual disk drive, with drives 0 and 1, MSD's SD-2 and Commodore's CBM 4040 are both format-compatible with current 1541s. Neither is being produced any longer, but both are still available, used.

Q: I have upgraded to a C-128 and 1571. I converted my existing 1541 to device 9, as detailed in the April 1986 RUN. *I connected the two drives in series, and I know*

each drive has to be addressed separately by its number, but that is all I know. Where is information on using the two drives available?

G. Lee Curtice
Rockport, TX

A: It sounds like you've hooked up the two drives properly. Having done that, all you need to do to use the 1541 as device 9 instead of the 1571 as device 8 is to substitute a 9 in place of the 8 in your disk commands. For example, instead of typing

```
DOPEN #1,"BOO",W,U8
```

to create a new file named "BOO" on the 1571, just change the 8 to a 9, and the file will be created on the 1541 instead:

```
DOPEN #1,"BOO",W,U9
```

The only source of confusion is that disk commands default to Unit (device) 8. As a result, they are often written without mentioning either Unit 8 or Unit 9. In such cases, to use Unit 9, just spell out the command and its Unit number.

In C-64 mode, using device 9 is equally simple. Once again, replace the 8's in your commands with 9's:

```
OPEN 1,8,3,"0:BOO,S,W"
```

becomes

```
OPEN 1,9,3,"0:BOO,S,W"
```

To use the second drive in CP/M on the C-128, just have your commands use drive B: instead of A:. Typing "B:" alone as a command will make the 1541 your default CP/M drive until you switch back to the 1571 with "A:".

Q: I plan to buy a disk drive for my C-64, but I'm confused as to which is best. I've read that the 1541 has many flaws (head-banging, overheating, kicking out disks, chatter, and more), and I see ads for other drives claiming to be better. Should my first drive be a 1541 or not?

S. W. Hall
Gray Court, SC

A: First, everything you have heard about the 1541 is true. It's still one of the least expensive intelligent disk drives available, and it has obvious deficiencies compared to most of its competitors. On the other hand, since its Kernal ROM is copyrighted, potential competitors can't license the ROM for their drives the way, for example, makers of clones of the IBM PC can license 100-percent-compatible BIOS ROMs.

For normal commands this doesn't matter; all 1541 clones I've seen emulate the full Commodore command set properly. The problem arises when you try to run commercial software. Far too much commercial C-64 software is still copy-protected, usually in ways that tie the programs specifically to the 1541. I often receive mail from people wondering why this or that program won't run on a particular 1541 clone, or even the 1571, and the answer is nearly always the same—copy protection. As long as Commodore owners tolerate protected programs, they'll continue to be tied to the 1541, despite the ready availability of better drives.

Q: Is there a SYS or Poke or something that will make the 1541 reset?

Theodore Austin
Washington, DC

A: Assuming the 1541 is sufficiently in control of itself to respond to commands, you can reset it by sending the command "UJ" to its command channel:

```
OPEN 15,8,15
PRINT#15,"UJ"
CLOSE 15
```

If this doesn't work, remove any disk in the disk drive and turn the 1541 off and on again.

A true hardware reset switch can also be added tothe 1541. On a short board (tan) 1541, connect the front end of R15 to the back end of R16 through a simple pushbutton. Naturally, you do this at your own risk, and it will void your warranty.

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: Is the read/write head on the SX-64's disk drive on the top or bottom? I read an article that claimed the head is on the bottom. I need to know this to make sure I put a cleaning disk in properly. (All the articles I read recommend cleaning the head on a regular basis.)

Seymour Gerr
South Windsor, CT

A: The head is on the bottom. Actually, it does make sense; dust and other contaminents are more likely to settle on the top surface (even so, a few other disk drives put the head on top).

As for cleaning the head on a regular basis, I recommend cleaning it no more than once a year. The oft-suggested weekly cleaning with a chemical cleaner causes more problems than it cures.

Q: I have an MSD dual drive. Is there an MSD user's group, and are there any listings of software designed to use the full capabilities of the SD-2?

Peter Clemenko
Ahlhorn AFB
West Germany

A: Fellow reader Paul Eckler has organized an MSD Information Exchange, with its first project being a database of compatible software. The group will also maintain files on parts, service, manuals, memory maps and such.

For a self-addressed stamped envelope, the exchange offers *RUN* readers a printout of information in a selected category. For a blank disk with mailer and return postage, it offers a copy of the exchange data disk in Superbase data format.

The address of the group is MSD Information Exchange, 2705 Hulman St., Terre Haute, IN 47803.

Q: When using a C-64 with a 1541 disk drive, can I load and run a PET Basic program that's on a 2031 disk, and vice versa?

Don Nyre
Newport Beach, CA

A: Going from the PET to a VIC, C-64, Plus/4, B-128 or C-128 should be no problem, as long as the program itself doesn't need any changes, which it won't unless it includes one or more of the "fatal five" commands (Peek, Poke, Wait, SYS and USR). Going the other way will require a bit more effort.

When you load a PET program into any of the newer machines, they relocate it as necessary to put it into their own Basic workspace, which varies from machine to machine. This is automatic, so you needn't worry about it. Simply save the program on a 2031 disk, put the same disk into your C-64 and load normally.

Going the other way depends on the model. Essentially, you must either convince your newer model that Basic programs begin where they do on the PET, or else convince the PET that its programs begin where they do on the C-64, or whichever machine. In both cases, it's a matter of Poking a new value into the start-of-Basic pointer in page zero of memory, a $00 byte into the memory location prior to the new Basic work space and then doing a Basic NEW.

Specifically, if you were to give the commands:

```
POKE 1024,0
POKE 41,8
NEW
```

on the PET, you'd then be able to load, list and run compatible programs that were written on the C-64, as long as they fit within the PET's smaller memory.

12. Video Output Devices

Q: Upon hooking up my 64 (serial #45447) to my Zenith 19-inch color TV, I noticed the display was not as sharp as the one in the store. Despite repeated attempts to tune the TV, the waviness of the images continued.

I have read that early 64s suffer from serious video problems. Could my machine be suffering from video defects? The letters on the screen are legible in blue on blue, but unreadable in many other colors—they seem smudged. Also, the screen shows diagonal waves that travel vertically up or down, distorting the image.

A letter to Commodore brought a suggestion that the cause was an asynchronous scan being put out by the TV's automatic fine tuner, but turning off the automatic fine tuner did not help. I would appreciate any help you could give me on this matter.

Bill Reed
Palmdale, CA

A: Your 64 is old enough that it might have some video problems, including the smudging together of a few combinations of colors. In part, this is not Commodore's fault; it is due to the method used to make U.S. TV signals and will continue even on the newest 64s and most non-Commodore video monitors.

A newer VIC II chip might give better results, but the bulk of your problem is due to your TV, not the 64. According to information Commodore sent its dealers in December 1982, the problem is unstable vertical synchronization, and there is a simple fix—defeat the integrated vertical mode circuit on the TV.

On the Triple Plus chassis, it is located on the 9-152 series module. On 9-152-01, remove the 2K jumper to the right of R2129. On 9-152-02, unplug the yellow wire from 2H. On the Z chassis, it is on the 9-181 module and is defeated by turning jumper 5M 90 degrees.

Although it sounds simple enough to remove a wire or jumper, nothing is simple about the interior of a modern TV. Unless you are skilled at working in areas of very high voltage, leave the fix to your Zenith dealer.

Q: I purchased a Sears TV/monitor (#57H4084C) to use with my C-64. I used the 5-pin, 2-plug monitor cable to connect the 64 to the monitor. This arrangement worked fine for games and made an excellent television.

A problem turned up, however, when I used a terminal emulator with an 80-column mode. It is extremely hard to decipher characters in the 80-column mode. Clarity was much better on a friend's Commodore monitor. The Sears monitor supports 80 columns in RGB mode, so is there any way to convert to an RGB signal?

Sean Flynn
West Simsbury, CT

A: The problem is partly in the way 80 columns are emulated in software by Commodore programs. Instead of the usual eight horizontal dots per character, most such programs use three, allowing two characters to fit in the space normally occupied by one.

However, the fundamental resolution is still 40 columns, so the Sears RGB mode wouldn't help. The reason the Commodore monitor gives a better result is because it is connected via the rear chrominance and luminance connectors, which optimize the performance of the VIC-II color video chip.

For the moment, I can only suggest that you turn down the color and contrast slightly, or trade up to a C-128.

Q: I am using a monitor that has no sound capabilities with my 64. What is the cheapest, easiest way to obtain sound for my system?

J.F. Stadalsky
Campobello, SC

A: Short of replacing your monitor, the simplest solution is to simply connect the audio plug from your 64's video cable to a high- level input jack on a stereo system's amplifier. I use the jack that normally gets its signal from the tuner.

Another alternative, if you don't have a stereo nearby, is to connect the audio plug into a small battery amp. Radio Shack sells a $12 model (#277-1008) that has been popular with PET owners for years and has the needed adapter (#274-330) to feed it from your audio cable. Pick up a few cheap 9-volt batteries, too, as you'll use one up every time you forget to turn off the amp after use.

Q: I am planning to buy a C-128. However, color monitors and even TVs bother my eyes. I want to know what kinds of monochrome monitors can hold the C-128's 80-column screen.

Antonio Gomex
Mexicali, Mexico

A: Only two kinds of monochrome monitors are commonly sold in the U.S. these days. One is usable only by IBM PC and PC-compatible computers with special monochrome adapter cards. This is recognizable by its video connector, which has eight pins, in two rows of four. The other kind of monochrome monitor (sometimes called a B&W monitor) has an RCA phono connector (a single pin surrounded by a shield) and works fine on the VIC, C-64 and C-128, as well as on Apples, IBMs with color cards and most other computers.

To use this type of monitor with the C-128 in 80-column mode, you must obtain a suitable cable. Both Commodore and other suppliers have already announced special cables for this purpose; some contain an extra connector and switch, so you can use the cable in both 40- and 80-column modes without changing any plugs.

Q: I would like to add a monochrome monitor to my 64, but my primary misgiving is the compatibility of the 64's 40-column format versus the 80-column capacity of the monochrome CRTs. What kind of a display will I see? Will it be half the screen?

Stephen Ballo
Plymouth, PA

A: Rest easy—the monitor will give the same display as a 40-column TV, except with less interference and with added sharpness. Even though you could hook up an 80-column computer to most monochrome monitors, no rule says you have to. The format of the display lines is determined by the computer, not the monitor.

Do ask about a built-in speaker if that matters to you. Some monitors have one and other don't. The 64 uses that speaker for all its sound.

Q: I use a green screen for a primary computer monitor on my C-64, but sometimes I need to use a color monitor. I would like to use both at the same time. Is it OK to run two monitors at the same time—the color connected to the TV connector and the green screen to the audio/video connector?

David Franks
McAlester, OK

A: Sure, no problem. Lots of folks do it. Both will show the same picture, but one will be in color and the other in green on black.

Q: I am looking for a color monitor. Will any color composite monitor work with the 64? What are items I should be aware of when buying another brand?

Breit Ketterer
Fairborn, OH

A: Most, but not all, color composite monitors work just fine with the 64. Those few that fail seem to have trouble locking in a stable picture, making their incompatibility obvious the moment you try using them with a 64.

Most composite monitors have only one video-in connector, which generally gives satisfactory results. However, for maximum quality, look for a monitor with two separated video inputs, one for chroma (color) and the other for luma (brightness). Since the 64 also sends an audio signal to the monitor, be sure there's an audio-input connector.

If you expect someday to upgrade to either a 128 or an Amiga and want to continue using the same monitor, you may be wise to get a monitor that also has one or more inputs for RGB.

Q: We purchased a Commodore 1702 video monitor, which came with an 8-pin DIN plug. Our 64 has a 5-pin DIN jack. What can we do?

I.A. Smith
Boston, MA

A: You can buy a suitable 5-pin DIN cable from many Commodore dealers. If none in your area has it, try a stereo store.

The cable you need has a 5-pin DIN plug at one end and four RCA phono plugs at the other. It is normally used to plug European stereos into speakers and tape decks. Also, the 5-pin cable is intended to use the jacks on the front of the monitor, not those on the rear. If you want to use the rear jacks, you'll need to modify 64s with 5-pin DIN jacks.

According to an article in *Baron's Microcomputing Reports*, if you disconnect resistor R10, the chrominance signal required by the 1702's rear connector will be available on pin 4 of the 5-pin DIN jack, which formerly carried composite video. Since this will make the computer incompatible with ordinary TVs, you can add a switch to reconnect the resistor when using a TV.

Q: When I first ran the color adjustment check in the Commodore 64 User's Guide *(holding CTRL and a number), it worked excellently. But when I went back to do it again, it would only display letters in color and wouldn't display color bars when I held down the space bar. Is this a defect?*

Ronnie Barcak
Fort Stewart, GA

A: I expect your 64 is working just fine. You merely need to press one more pair of keys when you do the color-bar test—the CTRL key plus the 9 key. This turns on reverse field (labeled RVS ON on the front of the 9 key), which makes the space character show up as a bright bar on your screen. The bar will be the same color as any characters you type and will change in color when you change the character colors.

To turn *off* the color bars, merely press the return key, alone or together with a shift key. You can also turn it off without moving the cursor by simultaneously pressing the CTRL key with 0 (the RVS OFF key).

Q: I want to use both my C-64 and a VCR with my TV. To set this up, I purchased a Radio Shack #1501628 splitter to go from the computer to the VCR, then connected the 75-ohm output and the signal coming from the cable company to the splitter.

The problem is that while the TV and VCR work correctly, the picture is snowy or cross-hatched when I use my word processor. Am I doing something wrong? Is the splitter malfunctioning? Or do I need a monitor because I'm asking too much from my equipment?

Jeremy A. Michele
Big Timber, MT

A: Video interference is often a problem when you're using a TV as a display, but it's probably not the fault of the splitter. Before you give up and get a monitor, here's an alternative connection scheme to try.

First, connect the cable-TV wire directly into the VCR. Second, connect a 300-ohm TV wire from the VCR to

the antenna terminals of the video switch you got with your C-64. Third, run the wire Commodore included with the switch from the computer to the switch. Fourth, feed the output connectors from the switch into the antenna terminals on your TV.

Q: I have a VCR, and the article called "Making the Video Connection" in the January 1986 issue of RUN *really interested me. However, in trying to set up my system to add screen displays to a videotape, I've run into one problem. The article included instructions for using a 1702 monitor, but not a 1902, such as I have. I've figured out how to hook the monitor up, but the picture appears only in black and white. How can I get color? Also, is this setup also supposed to record sound?*

Matt Linden
LaGrange, OH

A: Using a Y connector from Radio Shack to tie together the chrominance and luminance signals from the computer should give you color. Connect the cable that came with your 1902 from the video-out port on your computer to the VCR via a Y connector fitted with two female RCA phono jacks and one male RCA phono plug. The chrominance and luminance plugs from the computer go into the two jacks, and the plug from the Y connector goes into the VCR's video-in connector.

Then run an ordinary hi-fi cable with male RCA phono plugs at each end from the VCR's video-out jack to the female jack of another Y connector, one whose other two ends are male plugs. These go into the chrominance and luminance connectors on the back of the 1902. The result won't be perfect, especially compared to the clarity of running chrominance and luminance signals directly from the computer to the monitor, but it will be far superior to the luminance-only signal you have now.

As for audio, just run a second hi-fi cable from the VCR's audio-out jack to the audio jack on the 1902.

Q: I have a C-64 and use my TV for a display. I would like to buy a monitor, but am also considering upgrading to a C-128. Could I use a 1902 or 1902A monitor with my C-64 now and with a C-128 later, and, if so, would I need any special cables?

Greg Diehl
Lawrence, KS

A: Yes, the 1902 and 1902A should work just fine with your C-64, as long as it's new enough to have eight holes in its monitor jack (early C-64s had only five holes). The monitor will need one cable to work with the 64, then an additional one for 80-column color when you get your 128. Both cables come with the monitor.

13. PRINTERS

Q: Which printers do C-64 graphics? How is it done?

Kenneth Benson
Columbia, SC

A: The only printers that do Commodore character graphics properly without any fuss whatsoever are Commodore's own dot-matrix printers. Next best is a non-Commodore printer or printer-plus-interface combination designed specifically to do Commodore graphics. Examples are the Star 10C, or an Epson-compatible printer with a Centronics parallel port connected to an intelligent interface like the Micro-World Electronic MW-350, which is in turn plugged into the serial bus on the C-64.

Q: I do a weekly bulletin for a service club. I have a DPS1101 printer. Is there anything like Broderbund's Print Shop that I can use with my equipment?

Thomas Reese
Kihei, HI

A: If you are wanting a program to print high-resolution drawings on your daisy-wheel printer, the practical answer is no. Although such programs have been written, and one company has actually sold interfaces designed to automate the needed translations, the net result is unworkable. The problem is that the only way to generate high-resolution graphics with a daisy-wheel is with the period character. In practice, this has two consequences: a drawing takes an impossibly long time to complete, and the period on the print wheel wears out almost immediately.

With dot-matrix printers now available for well under $200, it would be much more practical for you to buy a second printer for use with Print Shop and other graphic programs.

Q: What are the advantages and disadvantages of a thermal printer, aside from the special paper needed?

Gary Payne
Fresno, CA

A: Some advantages are extremely quiet operation, low purchase cost and compact size. Some disadvantages are the very high long-term cost, difficulty in finding the special paper, and deterioration of the printouts within a year or two. One solution is thermal-transfer printers. These are also able to use plain paper and a thermal ribbon.

Q: I have a C-64, a 1541 disk drive and a Riteman printer. I recently purchased an Okimate 10 color printer. I want to connect both printers to the computer, but can find no additional outlet to plug in the color printer. It is a simple matter to change the device number of the color printer to 5. Can you help me?

James B. Rovinson
Aiken, SC

A: One available product that does this is the Y-NOT?, from Master Software, 6 Hillery Court, Randallstown, MD 21133 (301-922-2962). It is a special three-ended cable designed for just this purpose. One end contains a male six-pin plug to connect to your C-64 or the back of your disk drive, while the other end has two female six-pin jacks that you connect to a cable from each of your two printers.

Q: I have a Cardprint A printer interface connected to an Olivetti Praxis typewriter, with a typewriter interface from Williams Labs. My problem is that some programs require several blank linefeeds, and I cannot get these on my printer. What's the secret?

Larry Thomas
Hooks, TX

A: The solution is not to send linefeeds or carriage returns by themselves. Instead, send a single space followed by a carriage return (and

linefeed, if needed). Thus, instead of typing

```
PRINT#4
```

try

```
PRINT#4," "
```

and everything should be fine.

Q: I bought a Panasonic typewriter called Thermalwriter 12, and the instructions call for a VIC 1011A interface card or equivalent. Commodore doesn't make it anymore. What do I do now?

Michael Calavito
Staten Island, NY

A: A VIC 1011A interface is a standard RS-232 interface, such as the Deluxe RS-232 advertised by Omnitronix in *RUN*.

Q: Can used ribbons be reinked if they are otherwise in good shape?

James David
Bloomington, MN

A: Yes, they can, if you use the proper ink. Dot-matrix printers use a special ink, formulated so it won't clog the tiny passages of the printhead, yet still give needed lubrication. Computer Friends (Suite 10, 6415 SW Canyon Court, Portland, OR 97225; 503-297-2321) is one supplier of the special inks and reinking machines needed. They have models for most printers.

Q: Why won't my Commodore 802 act like a Commodore printer? It won't print from Doodle!, The Print Shop or GEOS, to name a few programs. Is there anything I can do to get more use out of the 802, or should I just junk it?

Chuck Kinsey
Bellevue, WA

A: The 802 is another example of an otherwise good product that's been defeated by a prior standard. Although the 802 has several advantages over the 801, Commodore chose not to make it fully software-compatible with the 801, especially in the way it handles graphics. Further, even though the protocol for doing graphics on the 802 has been known for a number of years, several graphics software vendors still ignore it. Probably all you can do is remind vendors of the sales to 802 owners that they're losing.

Q: Recently the carriage returns on my 1525 printer became slower and slower. Now the head doesn't reach the next line without a nudge. Can you tell me what's wrong?

James Ryan
Winthrop, MA

A: Unlike most printers, Commodore's 1515, 1525 and MPS 801 use a spring to return the head to the left end of the print line after finishing a line. One of two things has probably happened to your printer. Either the spring has become fatigued after use (it's less springy) or it is binding due to foreign matter in the mechanism or lack of lubrication (it's more sticky).

Q: I own an 801 printer, and the letters that go under the line (like p or g) are written above the line. Do you have any suggestions?

Jess Rosenblad
Princeton, NJ

A: The feature you want is called "descenders;" that is, the lower portions of extended characters descend below the typing line. The 1525 and 801 printers don't have it, but most others, including Commodore's 1526, do. Thankfully, Paul Blair has developed a replacement character ROM chip for the 801 that gives it true descenders. The ROM is available from Wilanta Arts, 6943 Barrisdale Drive, Mississauga, Ontario L5N 2H5, Canada (416-858-9298).

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.

14. Networking/ Controller Devices

Q: Can I hook up my 64 to a video recorder? I was considering video birthday cards.

Joe Sleeting
N. Aurora, IL

A: Yes, the 64 works fine connected to a VCR—that is one way of improving its video quality on some TVs. The 64 can be plugged into either the VHF-IN jack, using an RCA phono-to-RCA phono cable and RCA phono-to-F Connector adapter (Radio Shack sells both), or can be plugged into the video- and audio-in phono plugs from a standard monitor cable for the 64. (If your C-64 has individual chrominance and luminance pins, you'll have to use a "Y" connector to connect them both to the video-in on the VCR.) Without this connector, the picture appears in black and white or not at all, depending on which video plug is connected.

Q: How can I interface my C-64 with a servo, an electromechanical device which responds to digital signals and is used to control model airplanes, boats and the like. I want to develop a teaching unit on robotics.

Ray Orobona
East Northport, NY

A: The user port is the best way to interface any Commodore computer to electromechanical devices, both for receiving data from remote sen-

sors and for sending output signals to such devices as model airplanes. One company that offers a robotics experimenter's board to connect such projects to the user port is Kobetek Systems, of 1113 Commercial St., New Minas, NS, Canada B4N 3E6.

Q: I live in a rural area that does not have touch-tone telephone service. Is there any way to get on-line that is pulse dial and then emulate the tones to access computer service?

Rosalinda DeWitt
Seneca Falls, NY

A: I live in an area without tone dialing, too, but you're luckier than we are. Even pulse dialing fails sometimes here. If you need both pulse and tone dialing, some phones now have both methods built in.

This allows you to use pulse to dial out of town and then use tones to access All Net or other services that require it. One such phone is the Thinfone, from TeleConcepts, Inc. (22 Culbro Drive, West Hartford, CT 06110).

However, you won't need pulse plus tone dialing just to go on-line. The tones used by a telephone modem are different from those used to dial a touch-tone phone. As long as your phone system allows you to converse easily with persons in other towns, it is good enough to support the use of a modem.

If you have doubts about the quality of your service, use a 300-baud modem rather than the faster but more sensitive 1200-baud type. If having both tone and pulse dialing is important to you, some modems now include both in built-in autodialers.

Q: Is it okay to leave a 1660 modem plugged in all the time? Will it affect the life of either the computer or the modem?

Tom Clausen
Lafayette, CA

A: If you never move your system even an inch or two, and don't have any other cartridges or interfaces connected to the system and using its power, you can leave the modem plugged in. In fact, under those circumstances it would be best to do so, to avoid wearing out the thin gold contacts on the port. On the other hand, if there's even the slightest chance your keyboard unit will shift position, you should keep the modem unplugged until needed. I learned this, much to my sorrow, by shorting out the port after cleaning around my computer.

Fortunately, there is a solution that doesn't require continual unplugging. Master Software (6 Hillery Court, Randallstown, MD 21133) sells a 4-foot user-port extension cable for $30 postpaid. The flexibility of the cable protects against shorts when the system is being moved.

Q: I'm having a problem with a recently purchased VIC-Modem 1600. I am unable to log onto CompuServe. The indicator light on the modem does not go on, and I am not getting the prompt from CompuServe. The modular phone I have has the dial built into the handset. Is there a problem with the modem?

Steve Herr
Chicago, IL

A: The problem is probably in your phone having its dial in the handset. Try using the modem with a standard Series 500 Western Electric desk phone, one with its smarts in the base and a detachable handset.

Get someone to assist you who has already called CompuServe and knows how to log on when the equipment works as it should. If you don't have that kind of phone available, it may be less expensive for you to trade in the 1600 on a direct-connect 1650, 1660 or 1670 modem than to buy another phone.

Q: By just adding the correct cable, can data be transmitted and received via the RS-232 ports of two computers appropriately equipped?

Julian M. Dean
Bay Minette, AL

A: Yes, computers equipped with RS-232 ports can generally use these ports to chat back and forth with other computers so equipped. However, since such ports are normally connected to a modem or printer rather than another computer, you'll need to do a bit of rewiring. Simply swapping pins 2 and 3 at one end of your cable may do the trick.

However, an easier and better way to do this is by plugging a null modem adapter into the cable between the two computers. It switches all the pins that could cause trouble, and you can quickly remove it when you want to use your RS-232 port with a modem or printer again. Radio Shack is one supplier of both RS-232 cables and null modem adapters.

Q: Please tell me if it is a good idea to get a modem and what I can do with one.

Sean Bergman
Veradale, WA

A: The key factor in deciding whether or not to get a modem is whether or not you can afford its benefits. CompuServe, for example, is a veritable cornucopia of information, but, where I live, using it costs me $20 an hour, so I tend to check in quickly once a week when the long-distance rates are lowest.

A friend in a larger town 30 miles away calls CompuServe at the same number I do, but for him it's a local call. Many towns, including his, also have active telephone bulletin board systems that people can call for free in their local dialing area.

As for what you can do with a modem, I'll cite one recent example. The day Commodore's new C-128 computer was announced, complete details about it were available to anyone interested, via CompuServe, within a half hour after the news conference that announced it. Although most weeks the news isn't as exciting as that, regular users of information networks and bulletin board systems tend to hear about news in the industry before most others.

One other important advantage offered by a modem is that it allows you to exchange files with users of other brands of computers, something you normally can't do via cassette or disk.

For information on modems, see *RUN*'s telecommunications series, which began in the May 1985 issue.

Q: How would one transfer text created on a Radio Shack Model 100 to a 64? Specifically, what connections, modems and word processing programs should be utilized? Thank you.

Gilbert Gall
Nashville, TN

A: First, you'll need an RS-232 interface. You'll also need to swap RS-232 lines 2 and 3 inside the interface or add a null modem adapter to do the same thing. Then connect the Tandy 100's serial port to the 1011A via an RS-232 cable with DB-25S (male) connectors at both ends. Radio Shack and other electronic stores will have suitable cables and adapters.

Next, you'll need a suitable terminal program for the 64. I use Telstar 64, from Eastern House Software, and Vidtex, from CompuServe, for this chore. To establish communication between the Tandy and the 64, start Telstar and use its @ command to set it to 300 baud, 8 bits, no parity and 1 stop bit.

Also select H, for Half-Duplex mode. Then set the Tandy's Telcom program to STAT 38N1E, go to Terminal mode and select Half Duplex. At this point, anything appearing on either screen will also appear on the other one.

To transfer files, first open a file on Telstar, using the W command, specifying PET ASCII as the filetype. Then exit to Terminal mode. Now press the return key twice on the Tandy and select UPLOAD, pressing the return key again when it asks for the width. Your file will then begin appearing on the 64's screen and will be buffered into memory at the same time.

When the Tandy stops sending, be sure to use Telstar's C (close) command, followed by W for write. This will dump the memory buffer into the disk file and close it properly.

Finally, to use the new file on the 64, I use the Paper Clip word processor, from Batteries Included. Its Control-J File Load command handles everything.

The entire process is very reliable, takes much less time to do than to describe and can be reversed to send files from the 64 to the Tandy.

Q: I have a C-128 at home and use an IBM-PC at work. My problem is I would like to take work home, but can't find an interface to run IBM software on my C-128. Can you help?

Vincent Hughes
Wappingers Falls, NY

A: The only way I know to directly run the same software on both machines, is via the CP/M operating system. Micro-solutions, of DeKalb, Illinois, sells UniDOS, an emulation program that lets the PC run many CP/M programs that also work on the C-128-80. They also sell Uniform, a well-known and excellent program that lets the PC format use CP/M disks in formats compatible with the C-128 (and about 50 other formats as well). However, this is not like running the same programs normally used on the PC under its usual operating system, MS-DOS.

To make the C-128 MS-DOS compatible, I suggest another approach. When you go home after work, leave your PC turned on with a modem connected and running a terminal program that allows remote operation of the PC (such as Remote, from Infostuff, of Roswell, GA). Then simply dial into the PC via a modem on your C-128, using any 80-column terminal program. Once connected, it will be just as though your C-128 were suddenly transformed into an IBM-PC, and you can run most MS-DOS programs normally.

15. Specific Computers

Q: I recently purchased a C-64 and have found some limitations I would like to overcome: memory not big enough; 80-column display needed; faster loading needed from disk. Could you provide any information about products to help me?

Dave Pearce
Southington, OH

A: Yes; choose one, and I can help. All three limitations have been overcome on the C-64, but not simultaneously; you can typically only solve one of them at a time, and even then not under all conditions. This is because all of the solutions involve using the cartridge port, and some of the solutions are incompatible with expansion motherboards and certain programs.

If you can live with the limitations, here are some solutions:

1. Added memory on the C-64 will have to be bank-selected, but is available. Though not in stores at this writing, Commodore's memory expander for the C-128 and C-64 seems likely to become the eventual standard.
2. Batteries Included still offers a good 80-column video board for the C-64.
3. Several plug-in cartridges speed up disk access, including Fast Load, from Epyx, and Mach 5, from Access Software.

If you can't accept the one-at-a-time idea, I suggest looking at a C-128 instead; it includes all your requests. Since your purchase was recent, perhaps your dealer will accept the C-64 in trade.

Q: Recently, a colleague mentioned that the TRS-80 has a memory location that can be Poked to increase the speed of the CPU. Can you recommend anything to speed up computations in the C-64?

Mark Janus
Panama City Beach, FL

A: The only speed-up Poke I've heard of on the 64 is POKE 53265,11. It turns off the VIC-II chip and eliminates its interruptions of the 6510 processor, giving about a 25% increase in speed. The catch is that the Poke also turns off the screen. When you need the screen again, POKE 53265,27 turns it back on.

Q: Are there any maps published for the 64's ROMs?

Drew Jenkins
Tusanawas, OH

A: I know of two publications that should meet your need. *Anatomy of the Commodore 64*, from Abacus Software, is a disassembly. It shows the actual machine language instructions used in the ROMs, with brief added comments as appropriate.

Another "unassembled" pseudo-source code for the 64 is available from Schnedler Systems (1501 N. Ivanhoe, Arlington, VA). It costs more than the Abacus book, but offers some added features in return.

Q: I have an SX-64 and want to know what difference there is, if any, between it and the C-64.

J. Isbell
Austin, TX

A: Apart from the obvious difference—the SX-64 has a built-in color monitor and disk drive—the two machines barely differ. There are slight differences in the SX-64's Kernal ROM that cause some incompati-

bility with copy-protected software. However, you can overcome these differences by adding a switchable Kernal ROM that includes a standard Rev. 3 C-64 Kernal. This will also change the SX's screen color from white to the standard blue, so as to avoid problems with programs that assume a blue background and use white text.

Also, the keyboards have a slightly different touch, and the 1541 has a built-in reset switch, but these differences should not have any effect on programs.

The Jason-Ranheim Co. has pointed out one other crucial difference between the user ports on the SX-64 and the C-64: Commodore grounded one leg of the 9v AC supply in the SX-64, requiring a slight hardware modification to the SX-64 and the Promenade EPROM burner when they're used together.

***Q:** Is there something that will improve the video resolution for early C-64 owners? (See answer below.)*

Tim Thompson
Boston, MA

When running a program, I notice a flickering white line or sparkle on many characters. When in immediate mode, this so-called sparkle is much less noticeable. Is there a circuit modification to do away with the problem?

Norbert Perry
New Port Richey, FL

A: The well-known sparkle problem only affects very early 64s, although some "new" units are recycled oldies. Most 64s are immune. Owners of early units may exchange their 64 for a "new" one through a full-service dealer for about $75.

To be sure the exhange unit is really a current model, see if its display is as clear as the one on your dealer's display model when plugged into the same TV or monitor. As an alternative, you may lessen the problem by adding two 330 picofarad capacitors to the computer. One goes from pin 30 to pin 20 on the 6567 VIC II chip, and the other goes from pin 14 to ground on the 6510 microprocessor.

If you remove those chips, insert the leads in the sockets, and then reinstall the chips, you will avoid permanently altering your computer. ■

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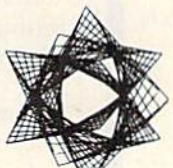

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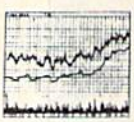

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From p. 32.

```
DOPEN#1,(F$)
DOPEN#1,"" + F$
```

Jerry W. Jarvis
Spokane, WA

C-128 mode switcher—When I replaced my trusty C-64 with a new C-128, it was difficult to keep track of which of my many disks were for C-64 mode and which were for Basic 7.0. I solved the problem by using the 1571's auto-boot feature to load and run this program for my C-64 disks.

```
100 REM SWITCH TO C-64 MODE
110 SYS 65357
```

C. David Moran
Ridgefield, NJ

Testing for 128/64 mode—The following line tells a program whether it is running in C-64 mode or C-128 mode. It works because FRE(0) and FRE(1) on the 64 always return the same value; while in 128 mode, they return the amount of bytes free for program and variable storage, respectively. It's possible, but highly unlikely, for both to be equal in 128 mode. After the line is executed, variable M will contain a 128 or a 64, depending on the machine you're using.

```
100 M = 128 : IF FRE(0) = FRE(1) THEN M = 64
```

Edward Horgan
Coatesville, PA

C-128 RGBI connector—Be careful when making cables for this connector, because the pin diagram in the manual is incompletely labeled. Pin 1 is always at the end of the longer row, but it can be on your left or your right, depending on whether you're looking at the pin end or the solder-terminal end of the connector, and on whether your connector is female or male.

Before connecting any wires, you should carefully determine the location of pin 1, then mark it unmistakably. The other pins will then be easy to find, and your chance of error will be greatly reduced.

Most connectors have tiny pin numbers molded into the plastic, and checking them is the surest way to locate pin 1. You can also rely on this advice: If you are looking at the solder-terminal end of the connector, with the longer row of pins on top, pin 1 is on your right for a male connector and on your left for a female connector.

Ron Hall
Duncan, OK

Using C-128 windowing—If you set a two-inch window at the top of your C-128 or Plus/4 screen, you can improve your speed when typing in programs. Set the window, then rest your magazine on the front of the monitor, with its top edge just below the window's lowest line. Since your cursor will never go below the window, you can simultaneously see the magazine and your own typed material.

Brad J. Taylor
Clarksville, TX

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C-128 Input prompt—To suppress the question mark, use POKE 21,64. Immediately following the Input statement, use POKE 21,0 to return the system to normal. If you don't make the second Poke, your system will operate erratically.

Edward B. Sullivan
Branson, MO

Tempo and the metronome—While the tones in computer music are usually faithful to the composer's intent, there's often something wrong with the music's speed, or tempo. There's no need for such a discrepancy, because the proper tempo is always specified on the sheet music by an Italian word such as Largo, Andante or Allegro. Musicians know the meanings of these words, but, unfortunately, computers don't.

Luckily, much sheet music also includes a numerical metronome setting that the computer can easily digest. The setting is found at the start of the piece, usually in the form:

M.M. [note] = [number]

The M.M. stands for Maelzel's Metronome. (Maelzel developed the first one in the early 19th century.) The [note] will be the symbol for the note, usually a quarter note or half note, which is counted as one beat in the time signature of the piece. The [number] signifies the number of beats per minute, often somewhere between 60 and 80, but with a practical range of about 50–120.

When you establish the tempo for your computer music, just be sure there are the appropriate number of notes per minute of music played.

On the C-128, the Tempo statement can be used for this, if you know the following formulas:

TEMPO = beats per minute / note value / 3.12

beats per minute = TEMPO × note value × 3.12

TEMPO is the appropriate argument for the Tempo statement, while note value is 1 for a whole note, 2 for a half note, 4 for a quarter note, and so on. The note value and number of beats per minute are, of course, taken from the metronome setting.

While the Tempo statement takes arguments from 1–255, only those in the lowest part of that range are useful in making music. Using a quarter note for one beat, Tempos from four to ten cover the range of 49 to 124 beats per minute. Using a half note for one beat, Tempos from 8–20 cover the same range.

Jean Patterson
Pittsburgh, PA

C-128 error trapping—When programming the C-128, add the following three lines, numbered exactly as shown. If your program encounters an error, these lines will tell you what kind it is and where it is. The offending line will even be listed to the screen.

```
Ø TRAP63999:REM MAGIC - A.OZERKOVSKY
63998 PRINT"THE PROGRAM IS OK!":END
63999 PRINTERR$(ER);" ERROR IN LINE";EL:HEL
      P
```

Alejandro Ozerkovsky
Mexico City
Mexico

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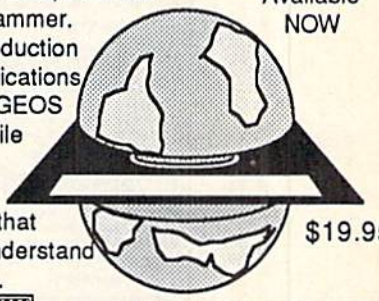

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M A G I C

C-128 terminal program—This little gem demonstrates the power and flexibility of the mighty C-128. Where else can you find a terminal program that fits on a single line?

```
10 REM MAGIC C128 TERMINAL - J.PAYNE
20 POKE56577,0:POKE56579,38:OPEN1,2,3,CHR$(
   6)+CHR$(0):DO:GETA$:GET#1,B$:IFA$<>""THE
   NPRINT#1,A$;:LOOP:ELSEIFB$<>""THENPRINTB
   $;:LOOP:ELSELOOP
```

Jim Payne
Dover, DE

C-128 function keys—This bit of magic lets you redefine the C-128's help key and shifted run/stop keys, as long as you run it before any of the function keys have been redefined. If you want the new definition to include a carriage return, use the left-arrow key where you want the return to appear.

If you know how the function keys are set up in memory, you can modify the program to accommodate your creative wishes. Locations 4096–4351 are reserved for the function keys. Locations 4096–4105 hold the lengths of each key definition, from F1 through F8, then shifted run/stop, then help. The definitions themselves are stored from 4106–4351.

Basic's Key command manages the first eight definitions, while a program such as this can manage the ninth and tenth.

You can save the setups for all ten keys by using

```
BSAVE "filename", P4096 TO P4351
```

They can be reloaded at any time by

```
BLOAD"filename"
```

```
10 PRINT"{SHFT CLR}MAGIC EXTRA C128 F-KEYS
   - GARY KEMPER"
20 INPUT"{CRSR DN}RUN/STOP KEY DEFINITION";
   R$
30 INPUT"{CRSR DN}{4 SPACEs}HELP KEY DEFINI
   TION";H$
40 POKE4104,LEN(R$):POKE4105,LEN(H$)
50 FORJ=1TOLEN(H$+R$)
60 B=ASC(MID$(R$+H$,J,1))
70 IFB=95THENB=13
80 POKE4158+J,B
90 NEXT
```

Gary Kemper
Azusa, CA

C-128 window work—If a window is established, all normal printing takes place inside it. But you can print outside the window by Poking to location 235, as shown by this little program.

```
100 PRINT"{SHFT CLR}C-128 WINDOW DEMO - E.
    DAM RAVN"
110 WINDOW 0,10,39,20
120 PRINT"INSIDE THE WINDOW":GOSUB180
130 POKE235,1:PRINT
140 PRINT"OUTSIDE THE WINDOW!":GOSUB180
150 POKE235,10:PRINT
160 FORJ=1TO20:PRINT"INSIDE AGAIN!":NEXT
170 END
180 PRINT"PRESS A KEY!":GETKEYA$:RETURN
```

E. Dam Ravn
Olstykke, Denmark

C-128 Sweeper—You can have some fun with this program, Sweeper, which I first wrote for the Timex-Sinclair ZX-81. It works even better on the C-128, with its CHAR and Color commands. Try your own sounds in the program, and try fitting your own words to the sounds.

```
10 PRINT"{SHFT CLR} MAGIC SWEEPER C-128 - B
   .BUSH
20 A=INT(RND(1)*16+1):IFA=2THEN20
30 B=INT(RND(1)*6+1)
40 IFB=1THENA$=" WHO?":B$=" >-YOU! "
50 IFB=2THENA$=" WHAT?":B$=" {LEFT ARROW}GE
   T OUT! "
60 IFB=3THENA$=" WHY?":B$=" <-BECAUSE "
70 IFB=4THENA$=" IT'S ME!":B$=" (-GO!! "
80 IFB=5THENA$=".AW":B$=" )-BEGONE "
90 IFB=6THENA$=" ME?":B$=" YES, YOU! "
100 COLOR0,2:COLOR5,A:COLOR4,7
110 FORJ=1TOA+10
120 CHAR1,J,A,A$:SOUND3,1050*B,2,1,1000*(J
    +A+B),6000,0,3000
130 NEXTJ
140 FORJ=30TO(2*B)STEP-1
150 CHAR1,J,A,B$:SOUND3,800*(A+J),2,,J,100*
    (J+A),3,50*(J+A)
160 NEXTJ
170 GOTO20
```

Bernard Bush
Address unknown

C-128 abbreviation—If you've been using P (shift) O as the abbreviation for the Poke command on your C-64 or 128 in 64 mode, then beware! In 128 mode, you must use PO {SHFT K}.

Mark Porter
Montpelier, VT

C-128 flasher—In 80-column mode, you can draw attention to any Print statement by adding a CHR$(15) between the Print statement and the quotation mark.

Dale L. Moore
Dimondale, MI

C-128 screen saver—The C-128's Binary Save command can be used as a nearly "invisible" screen save:

```
BSAVE"SCREEN",P1024 TO P2024
```

It will save text or graphics characters currently on the screen.

To preserve their color values, make a second binary file:

```
BSAVE"COLOR",P55296 TO P56296
```

You will lose some screen area to your BSave commands and the computer's replies, but you can reduce the screen loss with the following command:

```
WINDOW 0,24,39,24
```

This keeps your commands and the computer's replies to a single line, and it won't disrupt the image you're trying to save.

You can also use the screen save to merge programs. If you list single pages of your current program and save them in binary files, you can recall them after you've

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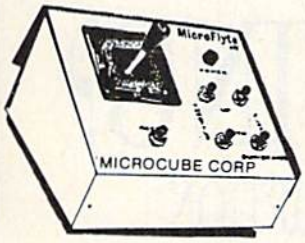

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loaded a new program. Then, you simply exit the Window mode, bring the cursor to the top of the screen and press the return key on every line you wish to add to the current program. (Make sure your new program doesn't duplicate any lines from your old program, or they'll be overwritten.

Scott Hanson
San Diego, CA

GET on the C-128—Many of you prefer using the Get routine over the Input routine because Get allows you to stop program execution with the stop key, while Input requires a run/stop-restore combination to break out, thus causing you to lose your screen.

Well, the C-128 has an undocumented fix for this that allows you to break in on the Input prompt. Simply hold down the run/stop key and press the enter key on the keypad. *Voila!* You'll see the familiar Break In Line Xxxx message, with the screen intact.

J. Ian Stott
Hamilton, Ontario
Canada

Commodore 128 Muzak—Try this trick with your C-128 and disk drive. Insert into the drive the tutorial disk that came with your computer. Then type in these lines in Immediate mode:

```
BLOAD"128MUSIC",B0,P32768
BANK0:SYS 32771,1,1
```

The music you hear is on the demo program. When it ends, type:

```
SYS 32771,2,1
```

And, when *that* finishes playing, type:

```
SYS 32771,0,1
```

Now change the 1s to 0s. To stop the music, type:

```
SYS 32774
```

Jeremy Winnick
Cloverdale, IN

Double speed C-64—This trick is of interest to anyone who uses the C-128 in C-64 mode. The program shows how to take advantage of the Fast (2 MHz) mode in your C-64 programs.

```
10 OT=TI:PRINT"{SHFT CLR}DOUBLE SPEED C64 -
   RAMOKOTA REDDY
20 GOTO30: POKE53296,1
30 FORI=1TO924
40 B=I*SIN(I):
50 NEXTI
60 POKE53265,PEEK(53265)OR16:POKE53296,0
65 T=(TI-OT)/60
70 PRINT"{SHFT CLR}TIME=";T:PRINTTAB(17)"{C
   RSR UP}SECONDS
```

After you run it, the program will display that it took nearly 30 seconds to execute. Now, remove the GOTO 30

from line 20 and run it again. The screen will scramble as the program executes in Fast (2 MHz) mode. Once it is reset in line 60 to Slow (1 MHz) mode, the screen will regain its composure and clear itself. The result? The program will tell you it took less than 15 seconds to run. Use this trick when you want to reduce the execution times of Basic and machine language C-64 programs running on the C-128.

Ramakota Reddy
Iowa City, IA

Doing 128 Loop-Do-Loops—The C-128's Basic 7.0's Do While and Loop While commands can be used in the same Do...Loop. This simplifies some difficult programming tasks. The following program illustrates this with the Shell binary sort:

```
10 PRINT"{SHFT CLR}DO WHILE, LOOP WHILE, DO
   ..LOOP - FRED RANSOM
20 DIMA$(500):NO=-1:DO:NO=NO+1:PRINT"ENTER
   CHARACTERS, * WHEN FINISHED":{2 SPACEs}I
   NPUT A$(NO):LOOP UNTIL A$(NO)="*":NO=NO-
   1:PRINT"NUMBER OF ENTRIES = ";NO+1
30 REM SORT
40 PRINT"START SORT: ";TI$:X=TI:D=NO:DO:D=I
   NT(D/2):PRINTD,:FORK=D TO2*D-1:FORI=K TO
    NOSTEPD:J=I:T$=A$(J):DO WHILE A$(J-D)>T
   $:A$(J)=A$(J-D):J=J-D:LOOP WHILE J>=D
50 A$(J)=T$:NEXT:NEXT:LOOP WHILE D>1:Y=TI:P
   RINT"{2 CRSR DNs}COMPLETED: "TI$:PRINT"T
   OTAL TIME: ";(Y-X)/60;"SECONDS": FOR I=1
   TONO:PRINTA$(I),:NEXT:END
```

Fred Ransom
Oxnard, CA

C-128 Lo-Res screen dump—Use this subroutine to create hard copies of screen displays. It works in both 40- and 80-column modes—it even does windows!

```
10 REM C128 SCREEN DUMP - MIKE TRANCHEMONTA
   GNE
20 OPEN3,3:OPEN4,4,7,CHR$(13):PRINTCHR$(19)
   ;
30 FOR Y=0TORWINDOW(0)
40 IF RWINDOW(2)=40THENPRINT#4,CHR$(14);
50 FORX=0TORWINDOW(1)
60 GET#3,A$:A=ASC(A$)
70 IF(AAND127)>31THENPRINT#4,A$;
80 NEXTX:PRINT#4,CHR$(13)
90 NEXTY:CLOSE3:CLOSE4
```

Mike Tranchemontagne
Nashua, NH

C-128 Hi-res screen dump—This C-128 40-column mode program, like some housekeepers, doesn't do windows. However, it does perform accurate screen dumps of both standard and multicolor bit-map screens.

```
100 REM C-128 HIRES SCREEN DUMP - JERRY JAR
    VIS
115 IFRGR(X)>2THEN MODE=159:ELSE MODE=319
120 OPEN3,4:FORY=0 TO 199STEP 7
```

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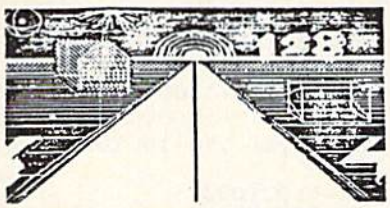

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Listing continued.

```
13Ø PRINT#3,CHR$(15);SPC(1Ø);CHR$(8);
14Ø FORX=Ø TO MODE:CH=Ø:FORM=ØTO6
15Ø LOCATE X,Y+M:IF RDOT(2)>ØTHENCH=CH+2{UP
    ARROW}M
155 NEXT
16Ø CH=CH OR 128:A$=A$+CHR$(CH):PRINT#3,A$;
    :A$="":NEXTX
17Ø PRINT#3,CHR$(8):NEXTY:CLOSE3:END
```

Jerry Jarvis
Spokane, WA

Hi-res-sketch-128—Here's a program that will let you sketch a hi-res picture on your 128. The table below gives a brief description of each key's function.

Y = up one pixel J = right one pixel
B = down one pixel H = left one pixel
T = move left and up one pixel
U = move right and up one pixel
V = move left and down one pixel
N = move right and down one pixel
P = paint an enclosed area

```
5 REM SIMPLE SKETCH C128 - ANDY BRAILO
1Ø GRAPHIC 1,1: X=15Ø: Y=9Ø: DRAW1,X,Y TO X
   ,Y:CHAR1,11,Ø,"SIMPLE SKETCH"
2Ø CHAR1,Ø,1,"{39 SHFT Ds}"
3Ø GETA$:IFA$=""THEN3Ø
4Ø IFA$="Y" THEN Y=Y-1:GOTO6Ø
42 IFA$="B" THEN Y=Y+1:GOTO6Ø
44 IFA$="H" THEN X=X+1:GOTO6Ø
46 IFA$="G" THEN X=X-1:GOTO6Ø
48 IFA$="N" THEN X=X+1: Y=Y+1:GOTO6Ø
5Ø IFA$="T" THEN X=X-1: Y=Y-1:GOTO6Ø
52 IFA$="V" THEN X=X-1: Y=Y+1:GOTO6Ø
54 IFA$="U" THEN X=X+1: Y=Y-1:GOTO6Ø
56 IFA$="P" THEN PAINT1,X+1,Y,1:GOTO3Ø
58 GOTO3Ø
6Ø IF X>318 THEN X=X-1:GOTO3Ø
65 IF Y>198 THEN Y=Y-1:GOTO3Ø
7Ø IF X<Ø THEN X=X+1:GOTO3Ø
75 IF Y<12 THEN Y=Y+1:GOTO3Ø
8Ø DRAW1,X,Y TO X,Y
85 GOTO3Ø
```

Andy Brailo
Alpha, NJ

Converting C-64 function keys to C-128—Any C-64 program that uses the function keys can be converted to work on your C-128. This four-liner will do the trick. Just add it early in your program.

```
1Ø REM CONVERTING C128 FUNCTION KEYS - ROBE
   RT H. WADE
2Ø A=132
3Ø FORI=1TO8STEP2:KEYI,CHR$(A+1):A=A+1:NEXT
4Ø A=136
5Ø FORI=2TO8STEP2:KEYI,CHR$(A+1):A=A+1:NEXT
```

Robert H. Wade
San Diego, CA

How do you spell help?—Here's a short C-128 program that tells you where to turn for help.

```
1 REM REDEFINE C-128 HELP - IAN CILLAY
1Ø L=13:POKE 41Ø5,L:FOR J=4Ø96 TO 41Ø4:C=C+
   PEEK(J):NEXT
2Ø FOR R=1 TO L:READ D:POKE 41Ø5+C+R,D:NEXT

3Ø DATA 82,85,78,32,77,65,71,65,9Ø,73,78,69
   ,141
```

To restore the normal help-key definition, change the value of L in line 10 to 5 and enter the following as line 30:

```
3Ø DATA 72,69,76,8Ø,13
```

Line 10 pokes the length of the help-key string into location 4105 and calculates the location where the help-key definition begins. Line 20 reads the values of the new characters from the data in line 30 and pokes them into the proper location. End the string with a carriage return (ASCII value of 13) to execute a command, or a shifted return (ASCII value of 141) to move the cursor to the beginning of the next line.

The help-key definition can also be viewed in hexadecimal with the C-128's built-in monitor by typing M $1000.

Ian Cillay
Bethesda, MD

C-128 Perfect Typist aid—To keep the SYS addresses on screen for this vital *RUN* program, insert the following in line 60, between the Print statement and the SYS5120.

```
:WINDOW 0,4,79,23:
```

J. C. Vollmer
Prior Lake, MN

C-128 Perfect Typist windows II—The C-128 Perfect Typist aid, above, works fine if you're using an 80-column monitor. However, if the 40-column monitor is in use, the computer will return an Illegal Quantity error in line 60.

Since the C-128 Perfect Typist program already detects for 40 or 80 columns in line 25, either screen width can be handled with the following modifications.

Insert W = 39: after the A$ = "": in line 25 and add :W = 79 to the end of line 25. This change sets the correct number of columns for the Window command. Then insert WINDOW 0,4,W,24: before the SYS command in line 60. Now the window will be set to the proper width no matter which screen you are using.

Allen L. Larkins
Sandusky, OH

A "Draw"-back in 7.0—One of the few bugs in Basic 7.0 is in the Draw command. When you attempt to draw with a negative increment such as DRAW 1,50,50 TO −20,25, you will get an Illegal Quantity error. To avoid this problem, use the RDOT function. RDOT(0) and RDOT(1) return the value of the X and Y positions of the pixel cur-

sor, respectively. If you change the line above to DRAW 1,50,50 TO RDOT(0)-20,RDOT(1)+25, your program will work fine.

Warren Roper
Gainesville, GA

C-128 customizer—If you're like me, there are several things you may change each time you start up your C-128. For example, I change the screen colors and the function key definitions. I use the following program to make all the changes I want at one time. The new function key definitions are very much like the old DOS wedge commands. You simply list the directory, move the cursor to the filename you want and press the F2 key to load or F6 to run the program. The PRG is automatically deleted from the end of the line. You can make any other changes you like.

To make the program easy to use, I put it on each new disk I format. This allows it to run with the shift-run/stop combination, and from then on you can use the directory to load or run other programs. This method also allows another program on the disk to be an auto-boot program. Give the program a try. I'm sure you won't want to work without running your version of it first.

```
10 REM C-128 CUSTOMIZER - JIM BORDEN
20 COLOR0,13:COLOR4,12:CL$=CHR$(27)+"Q"+CHR
   $(13)
30 KEY 2,"DLOAD{3 CTRL Is}"+CL$
40 KEY 3,"DIRECTORY"+CL$
50 KEY 5,CHR$(29)+CHR$(20):REM CURSOR 'BLAC
   K HOLE'
60 KEY 6,"RUN{3 CTRL Is}"+CL$
70 KEY 7,"LIST"+CHR$(27)+"@"+CHR$(13)
80 PRINT"{SHFT CLR}"CHR$(14):COLOR6,2:COLOR
   5,1
90 IF RGR(0)=5THEN FAST:REM 80 COL
100 NEW
```

Jim Borden
Carlisle, PA

Quiet, please—At power-up or after pressing the restore key or reset button on my C-128, I was getting background hum from the monitor speaker. I found that by typing CHR$(7) or pressing CTRL-G, a short tone will sound, followed by silence. No more humming!

Rodney Sweeney
Montpelier, VT

Improving 128 Perfect Typist—While typing in a lot of Data statements, using F1 for DATA and F7 for commas, I wondered if the plus, minus and decimal point keys on the keypad could be redefined. This would considerably improve typing speed for Data statements and commands such as Circle. I found that you can copy the keyboard matrix into RAM and change the keys any way you like. My program changes the decimal point key on the keypad to a comma and changes the minus key to duplicate the definition of the F1 key.

The lines are numbered to work with C-128 Perfect Typist. To use my program with it, be sure to remove :NEW from the end of line 60. Then add the lines below and save the program. You can also use this program without 128 Perfect Typist.

```
70 :REM '.'=, '-'=F1 (DATA) - TODD BAILEY
80 KEY1,"DATA ":BASE=3072:PH=INT(BASE/256):
   PL=BASE-PH*256
90 BANK15:FORX=0TO88:REM COPY OLD MATRIX
100 POKE BASE+X,PEEK(64128+X):NEXT
110 POKE830,PL:POKE831,PH:POKEBASE+82,44:PO
    KEBASE+74,133:NEW
```

Todd Bailey
Sharonville, OH

C-128 no-run safety—The shift/run-stop key combination will load and run the first program on a disk, which is a nice feature, but it can become a nightmare. Sooner or later, when you least expect it, you will accidentally press that combination while writing a program, and—poof!—there goes the program!

To disable shift/run-stop, type in and run the following program line, which erases the command that's built into location 4104:

```
10 POKE 4104,0:FORI = 4159 TO 4164:POKEI,PEEK(I + 9):NEXT
```

Don Harkness
Andover, KS

Function key restore—If you want to restore the default function keys on the Commodore 128, just type in this line: BANK15:SYS49425. It will restore the function keys, the tab settings and clear the screen. It also changes 40-/80-column modes, so you'll have to use ESC X to get back to the screen on which you typed the SYS.

Ron Sardo
Sugarloaf, PA

C-128 GETspeed—Using GET$ in a Do Loop is an easy way to check a sequential file. It can be slow, however, if the file is a long one. Here's a version of a Do Loop read that speeds things up considerably. Enter the name of the file when prompted. You can pause the printing with the no-scroll key. By changing the value of B in line 20, this program should run on any Commodore computer. Of course, you won't be able to stop the listing with the no-scroll key.

```
10 REM GETSPEED - EDWARD B. SULLIVAN
20 B=2816:FORI=BTOB+54:READT:POKEI,T:CK=CK+
   T:NEXT
30 IFCK<>7503THENPRINT"ERROR"
40 DATA 160,0,185,0,2,240,3,200
50 DATA 208,248,152,162,0,160,2,32
60 DATA 189,255,169,5,168,162,8,32
70 DATA 186,255,32,192,255,162,5,32
80 DATA 198,255,32,207,255,32,210,255
90 DATA 32,183,255,240,245,32,204,255
100 DATA 169,5,32,195,255,96,00
110 INPUT "FILENAME";F$:SYS B
```

Edward B. Sullivan
Branson, MO

3. COMPUTERS—C-64 AND VIC-20

C-64/VIC Buffer Saver—Many interesting programs poke machine language routines into the cassette buffer and adjoining locations, which occupy memory from 820 to 1023, decimal. The trouble with this technique is that you must run the Basic Poker every time you want to load your machine language routines.

The routine below saves the machine language directly from the buffer to disk or tape. To use Buffer Saver, just add it to the end of your Basic Poker program and add the proper program name in line 160. If you have a VIC, you must also change the SYS64738 to SYS64802. As printed, the program saves to disk. To make it save to tape, change the ,8 after the SAVE to a ,1,1.

Once machine language programs have been saved to disk, they must be loaded using the format

```
LOAD"name",8,1
```

in order to work properly, and a New command must be executed following the load. If the New wipes out an important Basic program, you can either reload it or use an Unnew program to bring it back to life. If you use the DOS 5.1 wedge, you can load machine language by using % instead of /, and, in that case, you need not perform the New command.

```
100 PRINT "{SHFT CLR}{CRSR DN} 64/VIC BUFFE
    R SAVER - LOUIS F. SANDER{CRSR DN}"
110 PRINT"SAVES 820-1023 ($0334-$03FF) TAPE
     BUFFER"
120 PRINT"{CRSR DN}NOTICE - YOU MUST FIRST
    PUT YOUR"
130 PRINT"PROGRAM NAME INTO LINE 160."
140 INPUT"{CRSR DN}READY TO SAVE THE BUFFER
    ";A$:IFLEFT$(A$,1)<>"Y"THENEND
150 POKE43,52:POKE44,3:POKE45,0:POKE46,4:PO
    KE179,20:CLR
160 SAVE"PROGRAM NAME",8:SYS64738:REM CHANG
    E TO SYS64802 FOR VIC
```

Louis F. Sander
Pittsburgh, PA

C-64 line counter—This relocatable program for the C-64 and VIC gives an accurate count of the lines in any Basic program. It is useful, among other things, for determining how many lines to list on each page of a printout. To use the line counter, load and run it, taking careful note of the SYS command on the screen. Then load the program whose lines are to be counted and execute the SYS.

```
100 PRINT"{SHFT CLR}MAGIC LINE COUNTER - JA
    MES PELLECHI"
110 SA=828:PRINT"{CRSR DN}SYS";SA;"TO COUNT
    ":REM RELOCATABLE!
120 FORJ=0TO41:READK:CS=CS+K:NEXT:RESTORE:I
    FCS<>7462THENPRINT"DATA ERROR":STOP
130 FORJ=0TO41:READK:POKESA+J,K:NEXT
140 DATA165,043,133,251,165,044,133,252
150 DATA160,000,132,253,132,254,177,251
160 DATA170,200,177,251,240,013,230,253
170 DATA208,002,230,254,134,251,133,252
180 DATA136,240,235,165,254,166,253,076
190 DATA205,189
200 REM ABOVE IS FOR C-64. FOR VIC-20, ADD
    LINE 210 POKESA+41,221
```

James Pellechi
Middle Island, NY

Printer-width fix—This C-64 and VIC-20 program lets you print program listings in any desired width. With it, you can use any size paper for your listings, or you can leave wide right margins for comments.

The first printed line of any program line is flush with the left margin, while succeeding lines are indented any number of spaces you choose. Default values are 64 column listings, with four-space indentation of unnumbered lines. They can be changed by poking as indicated in the program.

To use the program, run it, load the program to be listed, then Poke 807,3. Simultaneously pressing the run/stop and restore keys will disable the Special Listing mode.

```
100 PRINT"{SHFT CLR}MAGIC PRINTER WIDTH FIX
    - JAMES F. LEES":REM C64 & VIC
110 FORJ=1TO57:READK:CS=CS+K:NEXT:RESTORE:I
    FCS<>7554THENPRINT"DATA ERROR":STOP
120 FORJ=957TO1013:READK:POKEJ,K:NEXT:SYS95
    7
130 PRINT"{CRSR DN}POKE 976,PRINT WIDTH{2 S
    PACEs}(NOW";PEEK(976);"{CRSR LF})"
140 PRINT"{CRSR DN}POKE 989,INDENTATION{2 S
    PACEs}(NOW";PEEK(989);"{CRSR LF})"
150 PRINT"{CRSR DN}POKE807,3 ENABLES, STOP/
    RESTORE KILLS."
151 DATA173,038,003,141,238,003,173,039
152 DATA003,141,239,003,096,072,201,013
153 DATA240,033,169,064,197,252,208,021
154 DATA169,013,032,237,003,132,253,160
155 DATA004,132,252,169,032,032,237,003
156 DATA136,208,250,164,253,230,252,104
157 DATA076,000,000,169,255,133,252,208
158 DATA244
```

James F. Lees
Dayton, OH

4. CONNECTIONS/INTERFACES/CABLES

Cardco modification—I have a Cardco/? + G interface. I use it mainly for printing text, but occasionally I use it with The Print Shop program. Changing between the two applications normally requires opening the interface and flipping DIP switch #8.

I made the job much easier by turning the DIP switch off and wiring a Radio Shack #275-624 toggle switch in parallel with its terminals. I mounted the switch in a hole in the interface's cover. Now, when I need to change applications, all I do is flip the Radio Shack switch.

Jim Lynch
St. Thomas, Virgin Islands

Printer interface hazard—Most printer interfaces plug into the cassette port for power, leaving their own exposed contacts for connecting the Datassette. This is dangerous, since metal objects can easily touch the exposed contacts, with potentially disastrous results.

You can eliminate the hazard by changing the plug or the socket. If you don't use a Datassette, you can replace the special interface connector with a standard six-position PC edge connector and insulate its smaller exposed contacts with epoxy or other potting material.

As an alternative, you can mount a separate single-conductor connector on the back of your computer, connecting it internally to the + 5-volt power bus. Radio Shack

#274-721 and the mating #274-725 will do the job for under $2.

If disaster strikes before you take these safety steps, you may not have to take your computer in for service. Examine the fuse on the inside of your computer. If it's blown, replace it with a fuse of equal value and pray that nothing else went up in smoke.

Steven J. Walsh
Seaford, NY

Which wire is which?—Did you ever want to disconnect just *one* device from your surge protector in order to move it from one place to another? Did you have to go through the tedious task of tracing the appropriate wire to the surge protector? Here's a trick that will make your task a little easier.

Almost everyone owns a label maker that churns out plastic stick-on labels. Attach to the wire or cable near the base of the plug a short piece of label with the device name printed on it. Then finding the plug will be a snap.

Eric Pickell
Palatine, IL

5. Disk Operation/Recording

1541 Unscratch—This miraculous utility resurrects programs and datafiles that have been inadvertently scratched from the disk! As it runs, it examines the disk in the drive, displaying the name of every file in the directory, including the recently scratched ones. When it finds one of the latter, it asks if you want to unscratch it. If you do, it requests a code number for the type of file involved (SEQ, PRG, REL or USR), then performs the resurrection.

We're dealing in *very* strong magic here, and if things don't go just right, you can easily corrupt your disk. Unscratching is possible, since scratching a file merely sets a flag in the directory; the file and directory entry themselves are otherwise unchanged. Further writing to the disk, however, can overwrite any of this material, leading to unpredictable results when unscratching resets the flag. In addition, Unscratch bypasses several built-in safeguards of your disk recording system; without them, it's easy for troubles to arise.

So, please be careful when working with this program. After you type it in, test it to be certain you haven't made any disastrous errors. Save several programs on a newly formatted disk, then scratch and resurrect them one by one, until you're convinced that Unscratch is working perfectly. By the way, it's normal to experience apparently random delays of 30 seconds or so while running Unscratch—the program needs that time for "thinking."

When actually using Unscratch, it's best to use it just after your program has been scratched, before any new material has been saved to the disk. To do otherwise is to invite corruption (though sometimes it's a risk worth taking). And since the names of scratched files can duplicate those of live ones, you must be extremely careful in choosing the file to unscratch. The safest procedure is this:

- Make a backup copy of the disk you want to work with, then set it aside.
- Unscratch the file from the original disk, then load it and check to see that it's really the one you want.
- Save the file onto the disk you set aside.

If you type the program correctly and use it with caution, Unscratch can be your closest friend in times of real distress. Use it wisely and well, and remember where you got it.

```
1ØØ PRINT"{SHFT CLR}UNSCRATCH - LUKE MESTER

11Ø DIMBL$(255):TR=18:SE=1:OPEN2,8,15:OPEN1
    ,8,2,"#"
12Ø PRINT#2,"U1:2,"8,TR,SE:FORP=ØTO255:GET#
    1,BL$(P):NEXTP
13Ø NT=ASC(BL$(Ø)+CHR$(Ø)):NS=ASC(BL$(1)+CH
    R$(Ø)):NM=1:FORFI=2TO255STEP32
14Ø FORPN=3TO18:IFBL$(FI+PN)=""THEN19Ø
15Ø FORPN=3TO18:PRINTBL$(FI+PN);:NEXT:PRINT
    :IFASC(BL$(FI)+CHR$(Ø))<>ØTHEN19Ø
16Ø INPUT"UNSCRATCH{3 SPACEs}N{3 CRSR LFs}"
    ;Q$:IFLEFT$(Q$,1)="N"THEN19Ø
17Ø NM=Ø:PRINT"FILE TYPES: 1=SEQ{2 SPACEs}2
    =PRG{2 SPACEs}3=USR{2 SPACEs}4=REL"
18Ø INPUT"FILE TYPE{3 SPACEs}2{3 CRSR LFs}"
    ;TY:BL$(FI)=CHR$(TY+128):IFTY>4ORTY<1TH
    EN18Ø
19Ø NEXTFI:IFNM=1THEN21Ø
2ØØ FORP=ØTO255:PRINT#2,"B-P:"2,P:PRINT#1,B
    L$(P);:NEXTP:PRINT#2,"U2:2,"Ø,TR,SE
21Ø IFNT=ØANDNS=255THEN23Ø
22Ø TR=NT:SE=NS:GOTO12Ø
23Ø CLOSE1:PRINT#2,"VØ":CLOSE2:END
```

Luke Mester
Colliers, WV

SFD-1001 disks—The Commodore SFD-1001 disk drive looks just like a 1541, but it holds one megabyte of information. The major difference between the SFD-1001 and the 1541 is that the SFD-1001 is a direct drive with a massive heat sink and an IEEE interface instead of a serial bus. The SFD-1001 is made, but not sold, by Commodore; it is only available at a few places. Working with this drive can be a pleasure, but it has more than its share of challenges, mostly due to poor documentation.

Commodore recommends a 96TPI disk for use in this drive, but such disks are extremely hard to find and require a very strong signal to format and write to; the SFD-1001's signal is not strong enough. I've had success with premium-quality DSDD disks, such as Dysan and Maxell.

John Saguto
Washington, DC

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

Keith W. Marshall
San Juan, Trinidad

Disk drive speed adjustment—I adjusted the speed of my 1540 with the drive upside down, following the instruc-

tions in the article, "Keep Your Disk Drive in Line" (*RUN*, July 1985). However, when I put it right-side up, there was a noticeable change in speed. Cure: While the drive was right-side up, I removed the necessary covers, then used a mirror to reflect the light onto the stroboscope pattern. In the absence of a fluorescent light source, I used the all-white light from my monitor screen.

Erkki I. Suikki
Vaasa, Finland

Rearranging directories—Many computers and disk accessories provide an easy way of loading the first program in your disk directory. It's easy to put any program into the first position, even if another one is there at the moment. The secret is in using the Copy command, which can make a duplicate of any program already on disk.

By skillfully combining the Copy command with other disk commands, you can rearrange your directory at will. For example, if the first program in your directory is Oldfirst, and the one you want to move there is Newfirst, here is the procedure to follow:

1. Use the Rename command to rename Oldfirst, using a temporary name like Temp1.
2. Use the Copy command to copy Temp1 as Oldfirst. This puts a properly named Oldfirst somewhere other than in the first directory position. At this point, the first position is still held by Temp1.
3. Use the Scratch command to eliminate Temp1 from the directory. This vacates the first directory position; it will be filled by the next directory entry added to the disk.
4. Rename Newfirst, using something like Temp2.
5. Copy Temp2 as Newfirst. This puts Newfirst in the first directory position, which was vacated when you scratched Temp1.
6. Scratch Temp2.

Here is the complete syntax for accomplishing the swap:

```
OPEN 15,8,15
PRINT#15,"RENAME0:TEMP1 = OLDFIRST"
PRINT#15,"COPY0:OLDFIRST = TEMP1"
PRINT#15,"SCRATCH0:TEMP1"
PRINT#15,"RENAME0:TEMP2 = NEWFIRST"
PRINT#15,"COPY0:NEWFIRST = TEMP2"
PRINT#15,"SCRATCH0:TEMP2"
CLOSE15
```

Don't forget that PRINT# must be entered as one word, with no embedded spaces.

If you use the DOS wedge or another utility that provides simplified commands, those commands can make your program-swapping even easier. If you plan a lot of swapping, you can write a simple program to do it.

Louis F. Sander
Pittsburgh, PA

Disk Name Changer—This program, which you can use on any Commodore computer, lets you change the name of a disk without reformatting it or losing any files. Make absolutely certain you type it in correctly, since it modifies the directory header block, and program errors could corrupt the disk irreparably. Lines 200–210 are the ones that write to the disk, so you should check them with extraordinary care. Also, SP$ in line 100 should contain exactly 16 spaces.

```
100 PRINT"{SHFT CLR} MAGIC DISKNAME CHANGER
    - LUKE MESTER{CRSR DN}":SP$="{16 SPACE
    S}"
110 PRINT"INSERT DISK TO BE CHANGED,"
120 PRINT"THEN PRESS 'D' TO CONTINUE."
130 GETA$:IFA$<>"D"THEN130
140 OPEN15,8,15,"I0":OPEN2,8,2,"#"
150 PRINT#15,"U1:2,0,18,0"
160 PRINT#15,"B-P:2,144"
170 FORJ=0TO15:GET#2,A$:D$=D$+A$:NEXT
175 PRINT"{CRSR DN}OLD NAME: ";D$:PRINT
180 INPUT"NEW NAME";DN$:IFDN$=""THENEND
190 DN$=LEFT$(DN$+SP$,16)
200 PRINT#15,"B-P:2,144":PRINT#2,DN$;
210 PRINT#15,"U2:2,0,18,0":CLOSE2
220 INPUT#15,A,B$:PRINTB$
230 PRINT#15,"I0":CLOSE15
```

Luke Mester
Colliers, WV

Disk rescue tab—Has one of your disks ever warped after a lengthy period of use, making it difficult to remove from your drive? If it's a copy-protected master disk, the situation is very uncomfortable.

To remove a warped disk more easily, put the disk into your drive, making a mark where its top edge extends through the front of the cabinet. Remove the disk, locate the mark and place a label or piece of tape there, folded to form a protruding tab. You can then use the tab to extract the disk when it gets stuck. Such a tab also makes your disk more visible in its box, so it's easy to find when you need it.

Mike Rogalski
Pasadena, CA

Filename extensions—Do you wonder why some people end filenames with a period and three letters? Music filenames, for example, commonly end in .MUS, while files for downloading often have names ending in .IMG, or something similar.

The practice is common in computers using disk operating systems like CP/M and IBM's PC-DOS. Filenames in these operating systems are limited to eight characters, compared to Commodore's 16. In addition to its name, such a file can have an optional "extension" of up to three characters, separated from the filename by a period.

When the operating system lists such a file in a directory, it uses spaces to pad the filename to eight characters, then it prints another space and the extension. When searching for files, it treats the extensions as different from the filenames, so you can, for example, search for all files whose extension is BAS. This feature makes it useful to group similar files by giving them similar extensions, and this is the practice that is sometimes carried over into Commodore work.

But in Commodore's DOS, of course, there's no such thing as a separate extension. You can't search on it, and, because of the 16-character limit for filenames, you don't really need it. In fact, if you want to emulate such an extension, it's best to put it at the *beginning* of the filename,

where it can be searched for by using the wild-card characters.

So, if you're tempted to tack a period and three letters onto the end of your filenames, try to resist the temptation. If you *can't* resist it, try putting them up front where you can use them.

Lucy S. Terrier
Alton, IL

File finder—This routine can be used to check for the presence of a given file on the disk and to determine whether the disk is write-protected. It's useful to make such checks before attempting to manipulate a potentially unavailable file.

If the file named Filename is not on the disk, line 130 will give an error 62, File Not Found. If the disk is write-protected, that line will give an error 26, Write Protect On.

If you don't need to check for write protection, replace the Open statement's A (for append) with an R (for read).

```
10Ø REM FILE FINDER - LOUIS F. SANDER
11Ø OPEN2,8,2,"FILENAME,P,A":CLOSE2
12Ø OPEN15,8,15:INPUT#15,A,B$:CLOSE15
13Ø IFA>1THENPRINTA,B$:END
14Ø PRINT"THE FILE IS ON THE DISK"
```

Louis F. Sander
Pittsburgh, PA

Easier disk commands—Not everyone is aware of this easy way of sending disk commands. Instead of something like

```
OPEN 15,8,15 : PRINT#15,"N0:NAME,ID"
```

it's possible to use

```
OPEN 15,8,15,"N0:NAME,ID"
```

This works because the Open command's syntax allows text to be included after the secondary address, as long as it is separated from the address by a comma. In a slightly different way, you can use

```
OPEN 4,4 : CMD4,"PROGRAM NAME" : LIST
```

to get labels on your printed program listings.

Hillmon W. Ancrum
Orangeburg, SC

Last-disk effort—If one of your disks containing valuable data has been rendered useless because of a warped jacket or spilt liquid, don't despair—all may not be lost.

Carefully slit open the wrecked protective jacket and remove the good Mylar disk. Be sure not to touch the recording surface.

Scrounge up an old disk that has a good jacket. Remove the disk from this jacket and insert the disk to be salvaged. Now, resecure the jacket with tape. Then, try initializing the disk (not formatting). If you can't initialize it, turn the disk over; you may have put the wrong side up. If it initializes, make a backup copy immediately and you're all set. If it still doesn't initialize, at least you tried.

Joseph R. Charnetski
Dallas, PA

Easy on, easy off—As most 1541 or 1571 disk drive users know, the on/off switch at the back of the drive is inconveniently located. Fortunately, you can solve this problem by connecting the drive to a remote-control extension cord, available in hardware stores for about $5.

The cord has its own on/off switch. Plug the extension cord into a power source, plug the drive's power cord into the extension cord, depress the drive's switch and leave it in the on position. Thereafter, control the drive's power with the extension cord's switch. It's inexpensive, easy to hook up, and it really works.

William Lees
San Francisco, CA

1571 disk drive magic—Did you know your 1571 can format and access both sides of a disk with a C-64 or C-128 in C-64 mode? Here's the magical command:

```
OPEN 15,8,15:PRINT# 15, "U0>M1":CLOSE15
```

If you format a disk after sending this command, the 1571 will format both sides and give you 1328 blocks of storage per disk.

If you cannot access a disk that was formatted on a third-party disk drive, you can return to a single-sided mode with this command:

```
OPEN 15,8,15:PRINT# 15, "U0>M0":CLOSE15
```

Trent Bills
Lincoln, NE

Keeping track of disk commands—If you have a C-128, you now have the problem of remembering two sets of disk commands.

I keep a list of C-64 disk commands on one side of a 5×8 index card and the C-128 list on the other side. Then I prop up the card between my 128's vent panel and monitor stand. Thus, both sets of disk commands are readily visible.

Eric Pickell
Palatine, IL

SFD-1001 disk renamer—Luke Mester's Disk Name Changer (see p. 104) is a useful program, and I've made these line changes so that owners of SFD-1001 disk drives can change disk names, too.

```
1Ø REM SFD 1ØØ1 RENAMER - DAVE ENGLISH
15Ø PRINT#15,"U1:2,Ø,39,Ø"
16Ø PRINT#15,"B-P:2,6"
2ØØ PRINT#15,"B-P:2,6":PRINT#2,DN$;
21Ø PRINT#15,"U2:2,Ø,39,Ø":CLOSE2
```

Also, a user-friendly code should give you the opportunity to check and correct input. Here's a code for that check. It works with any drive.

```
174 :
191 PRINT"VERIFY: "DN$
192 PRINT"OK (Y/N) ?"
193 GETA$:IFA$<>"N"AND A$<>"Y"GOTO193
194 IFA$="N"GOTO175
```

Dave English
Orange, CA

Quick directory C-64—The Safe Directory program Pokes a short machine language routine into memory, beginning at location 830. The routine reads and displays the directory of the current disk, without harming a Basic program. To use it, type SYS 830 and press return. The directory will then be displayed as it is read from the disk. Press the shift or shift/lock key to pause the output, and the run/stop key to stop output.

Append the Basic loader to the end of your routine, and use the Gosub command to access it.

```
10 PRINT"{SHFT CLR}QUICK DIRECTORY C-64 BY
   D. MORRIS
15 FORA=830TO945:READB:POKEA,B:C=C+B:NEXT
20 IFC<>16387THENPRINT:PRINT"ERROR IN DATA"
   :STOP
25 PRINT:PRINT"'SYS830' TO ACTIVATE - 'SHIF
   T' TO PAUSE"
30 SYS830
35 DATA169,2,162,176,160,3,32,189,255,169,1
   ,162,8,160,0,32,186,255,32,192
40 DATA255,24,162,1,32,198,255,176,75,32,20
   7,255,32,207,255,169,13,32,210,255
45 DATA32,207,255,32,207,255,32,207,255,133
   ,252,32,207,255,133,251,165,144
50 DATA208,44,165,251,166,252,32,205,189,16
   9,32,32,210,255,32,207,255,32,210
55 DATA255,174,141,2,208,251,166,145,224,12
   7,240,15,32,207,255,105,0,208,235
60 DATA169,13,32,210,255,76,102,3,24,169,1,
   32,195,255,32,204,255,96,36,48
```

David W. Morris
Atmore, AL

Protect your writes—It's always a good idea to use write protects to safeguard the information on your disks, and when they wear out, black electrical tape is an inexpensive replacement. Use tape that's from one-half to three-quarters of an inch wide, and cut it about an inch long. It works great!

John Chong
Syracuse, NY

Easier loading 1571—When running unprotected C-128 programs in a 1571 disk drive, you may have noticed that the disk drive sometimes has trouble finding the program you want to run. The problem is that in 128 mode, the 1571 has difficulty reading programs written in single-sided format. If you make a copy of your unprotected software onto a 1571 double-sided format, you will have much smoother and faster loads. This works great with the autobooters, too. Try copying your 1571 test/demo disk using the double-sided format and watch how fast DOS shell loads.

Jay H. Graff
Bossier City, LA

Cleaning heads—Here's a good way to clean disk drive heads—with a C-128! First, insert a cleaning disk into the drive and turn on the computer. Then hold down the reset switch for 30 seconds—the job's done!

Unknown contributor
Bayfield, WI

Easier filenames—It is common practice to save long programs several times while typing them in. Each version is usually named "program#". Rather than add the number to the end of the name, try adding it to the beginning (e.g., "4program"). By doing so, you can load the file with the number and first few characters followed by a wild card (e.g., "4pro*") instead of typing the entire name and the number.

Save the final version without a number in it, and you can scratch all old versions with "S0:?program".

Jason Lee
Macomb, OK

Double-sided disaster—I wonder how many other new 1571 owners have erased a full side of perfectly good programs. This was a result of attempting to format the "flip side" using the Format Disk program included on the 1571 test/demo disk. The problem is, this program only formats disks as double-sided and thus erases whatever is on both sides of the disk.

The Format Disk program can be made safer and more versatile by deleting line 90 and adding the following four lines:

```
1 REM DOUBLE SIDE 1571 TEST/DEMO PROGRAM EN
  HANCEMENT - CHRIS MORRY
141 INPUT"SINGLE (S) OR DOUBLE (D) SIDED";S
    S$
142 IF SS$<>"D"THEN OPEN 15,8,15,"UO>M0":CL
    OSE15:GOTO150
143 OPEN15,8,15,"U0>M1":CLOSE15
269 OPEN15,8,15,"U0>M1":CLOSE15
```

These minor changes let you choose single- or double-sided formats. Line 269 restores your 1541 to a 1571.

Criss Morry
Moncton, N.B., Canada

Data on side 2 of the 1571—The 1571 double-sided drive allows twice as much storage as a single-sided 1541 disk. However, once you have reached 664 or fewer blocks free, data saves to the disk are quite slow. It appears that the drive writes a block, then checks for the next free block, writes another block, and so on. If you have several long programs on the first side, you can reduce these delays by copying the long programs to the back of the disk and then scratching the original version. The data files will now be written, at normal speed, to the empty blocks on the first side of the disk.

Richard D. Young
Greenwood, N.S., Canada

One for all—I do all my programming on one disk because of so much saving, loading and saving again. This can be hard on a disk, so it's wise to verify the program after saving it. When the program is finished, I transfer it to the disk in my normal software library. This habit keeps my disks in good condition.

Mike Dryja
Washington, MI

Back-side bonus—While using a C-64 word processor, I found that my data disk was getting full. After trying the mode-selection program found in the 1571 manual, which enables you to lock the drive into 1571 Double-sided mode, I found that loading the word processor would unlock the drive, or, in some cases, refuse to load. To overcome this, load and run the word processor, go into Disk mode and type U0>M1. The word processor will now be able to access the back side of the disk, provided that it has been formatted as a double-sided disk.

This trick works on Easy Script, RUN Script and Fontmaster II. It will probably work with any word processor that allows you to send commands to your disk drive.

Barry Estes
Westbrook, ME

No-knock loads—When loading commercial software, the 1541 disk drive often makes a loud chattering noise. This is usually caused by copy-protecting. Over a period of time this may cause the drive to go out of alignment.

If entered in Direct mode before you load the commercial program, the following one-line program usually stops this from occurring. This line is about 90% effective, but in cases where it does not work, it will not interfere with the proper loading of the commercial program.

```
Ø REM NO KNOCK - RUSSELL MCCRORY
1 OPEN1,8,15:PRINT#1,"M-W"CHR$(1Ø6)CHR$(Ø)C
  HR$(1)CHR$(133):CLOSE1
```

Russell McCrory
Gallatin, TN

Multiple scratch—When you want to scratch more that one file from your disk, try this:

OPEN15,8,15,"S0:file1,file2,etc.":CLOSE15 {return} (for Basic 2.0)
SCRATCH "file1,file2,etc" {return} (for C-128 or Plus/4)

All specified files will be scratched with one command.

Richard Penn
Montreal, Quebec, Canada

Last resort—If you have an important file that's been damaged by the Save with Replace command, it can be fixed. Save with Replace saves the new program before scratching the old program and then changes the pointers. So all you need to do to rescue that file is to find its first block by using a utility such as Disk Doctor (see *RUN*, June 1985). Then restore the pointers in the directory to that first block. Good luck.

James Evans
Humeston, IA

Disk locker—Once a disk is locked, no information can be written to or scratched from it, unless you use the Format command, which, unfortunately, completely erases a locked disk. My program lets you lock or unlock disks in the 1541 or 1571 disk drive. Unlocking a disk returns it to its normal state, allowing you to write and scratch files again.

```
Ø REM UN/LOCK DISKS-ERIC DARGAN
1Ø INPUT "{SHFT CLR}{CTRL 9}L{CTRL Ø}OCK OR
   {CTRL 9}U{CTRL Ø}NLOCK";A$:A$=LEFT$(A$,
   1)
2Ø OPEN15,8,15,"IØ":OPEN2,8,2,"#"
3Ø PRINT#15,"U1:"2;Ø;18;Ø:PRINT#15,"B-P:"2;
   2
4Ø LK=66:IFA$="U"THENLK=65
5Ø PRINT#2,CHR$(LK);:PRINT#15,"U2:"2;Ø;18;Ø

6Ø PRINT#15,"IØ":CLOSE2:CLOSE15
```

Eric B. Dargan
Sumter, SC

6. Joysticks and Ports

Commodore 1350 mighty mouse joystick—The only programs designed so far for the Commodore's new mouse are the Jane series of applications software. But don't fret! The rapid rodent performs quite capably as a joystick (the left button acts as a fire-button) on several C-64 favorites such as Doodle!, Micro Illustrator, the Graphic Editor in The Print Shop and even on GEOS.

It may take a while to become accustomed to using the mouse, but once you get the hang of it, you won't want to go back to using a joystick for these programs. Also try the mouse on other programs that require a joystick.

Warren D. Lee
Dayton, OH

Mouse tracks—The 1350 Mouse works best on a clean, smooth surface. Unfortunately, computer desks aren't always clean or smooth. Rather than buy an expensive pad for your mouse to run on, mouse out a plain plastic placemat for about a dollar or liberate one from the kitchen. It's larger than most mouse pads, so you don't have to pick up your mouse as often. It can be easily cut to match the workspace around your computer, and it's easy to wash.

Warren D. Lee
Dayton, OH

7. Keyboard/Keyboarding

Shifted run/stop—On most Commodore computers, when you press these keys in combination, you're prompted with "Press Play on Tape." (The computer is trying to load and run the next program on the cassette.) If you hit the keys by mistake (not an uncommon event), you can correct your error by pressing the stop key.

On the C-128, however, pressing shifted run/stop loads and runs the first program on your disk, without pausing for additional action. If you accidentally hit those keys, whatever is in memory will immediately be overwritten by the new program coming in from disk! If the overwritten program was a valuable one you have not yet saved, you'll be annoyed, to say the least.

You can guard against this disaster by placing a sequential file first on your disk. Since the computer cannot load it, it can't overwrite any programs. You can put such a file on a newly formatted disk by executing this line:

OPEN 2,8,2,"INSURANCE,S,W" : CLOSE2

Another, less automatic, way of having this insurance is to leave your disk's door open.

Bruce Jaeger
St. Paul, MN

Restore key tip—If you've experienced erratic operation when using the stop/restore combination, you've got plenty of company. Don't call the repairman, though, because there's nothing wrong with your computer. To work properly, the circuitry that monitors the restore key must see a sharp and rapid change in that key's status. So, if restore is pressed gently—in the manner of the other keys—the monitoring circuit often misses the event. The solution is to always use the following keyboard technique:

Press the stop key and hold it, just as though you were using it to shift a letter key. While stop is firmly depressed, give the restore key one sharp tap, as though your finger were a woodpecker's beak.

Mary Haver
Wood Islands, PEI, Canada

Easy-fingered loading—It's common practice to rename frequently used programs with one-character names, to minimize the amount of typing necessary to load them. It's even better when the new name is a single *shifted* character, such as shifted W. With such names, you can press the shift key immediately after the L in the abbreviated Load command, and not release it until the comma before the 8 for the disk drive number. This eliminates the coordinated fingering required with other sorts of filenames. It's not much, but it sure feels better!

David A. Hooyer
Bangkok, Thailand

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

Keyboard lock/unlock—Sometimes, usually when garbage has been printed to the screen, the shifted Commodore key won't switch your computer between Text and Graphics modes. (Naturally this always happens when you're in the mode you don't want to be in.)

You can correct the situation by holding down the CTRL key and pressing I. This is equivalent to printing a CHR$(9), the character that unlocks the mode switch. You can lock the mode as well, by pressing CTRL-H, which is the same as printing CHR$(8).

Scott Duncan
Superior, NE

8. Modems/Telecommunications

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

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

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

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

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

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

Louis F. Sander
Pittsburgh, PA

Modem cable tip—I used to connect my modem by disconnecting the telephone handset cable at the handset, then plugging it into the modem. It was always hard to get to the modem, which was out of the way behind my computer. To make things easier, I bought a coiled handset cord, which I now leave permanently connected to my modem. When the time comes to connect, I unplug the handset from the phone base, then plug in my new modem cord. The phone is more mobile and accessible than the modem.

Michael T. Martin
Phoenix, AZ

Modem modification—Some bulletin board systems are very difficult to connect to, since they have far more callers than available lines. Many terminal programs, when they encounter a busy signal, will keep redialing until they get through. This is great, but usually you, the operator, must

keep your eye on things so you know when the connection has been made.

You can free yourself for other tasks if you wire a switch and a small piezoelectric buzzer (Radio Shack #273-060) across the modem's carrier-detect LED. Close the switch before dialing, and when the LED finally goes on, your buzzer will start to buzz. Stop the noise by opening the switch, and proceed with your telecommunicating.

C. A. F.
Throop, PA

300-baud speedup—If you don't have a 1200-baud modem, here's a little consolation. It doesn't work with all modems or all terminal software, but when it does, it increases your modem speed to 345 baud, a 15 percent increase. (At these slow speeds, every little bit counts!) The trick is to add this line to your terminal program after the modem's Open statement:

```
POKE 665,240 : POKE 666,11
```

The terminal program, of course, has to be written in Basic.

Greg Long
Hillsboro, OR

Modem hearing aid—Sometimes you make a modem call and fail to get a carrier. Since most modems don't let you listen in on the line, you can't tell if you're getting a busy signal, a ring with no answer or something else. Worse, modems with the auto-redial feature can be repeatedly answered by an angry human voice.

To hear what your modem is receiving, use a telephone pickup such as the Radio Shack #44-533, which you can plug into any handy amplifier. Move the pickup around on the telephone or modem until you get a useful signal.

Many portable tape recorders can act as amplifiers for this purpose, if you plug earphones into the earphone jack, put a blank tape in the recorder and press the play and record buttons. The pause button will often stop the tape, but not the amplification.

Craig Edward Given
Chattanooga, TN

Turbo dial—Auto-dial modem owners know how agonizingly slow the auto-dial process is, especially when using pulse dialing. If your telephone has speed dialing, however, you can speed up the process immensely. (Speed dialing lets you dial commonly called numbers by dialing one or two digits.) Just establish your QuantumLink or BBS number as one of your speed dialing numbers, then set your terminal program to call it. Now that your computer has only one or two digits to dial, things like dialing and redialing will proceed more rapidly.

Craig Edward Given
Chattanooga, TN

Password maker—Our bulletin board needed passwords that were unique and easy to remember. We wrote the accompanying program to create easily pronounceable, eight-letter passwords. If you need a printout, you can alter the program to accomplish this.

The words are far from English, but they could easily have come from a tribal tropical paradise. Some consonants were omitted from B$ to make the words easier to pronounce.

```
100 PRINT"{SHFT CLR} MAGIC PASSWORDS - BUCK
    SOMMERKAMP{CRSR DN}"
110 A$="AEIOU":B$="BCDFGHKLMNPRSTWZ":PW$=""
    :K=RND(-TI)
120 FORJ=1TO4
130 K=INT(5*RND(1)+1):V$=MID$(A$,K,1)
140 L=INT(16*RND(1)+1):C$=MID$(B$,L,1)
150 PW$=PW$+C$+V$
160 NEXT
170 PRINTPW$,
180 GOTO110
```

Buck Sommerkamp
Warrensburg, MO

1670 modem auto-answer—An annoying quirk of the 1670 modem is that it will answer all incoming calls when the computer is on. This makes it hard on your friends' ears when they try to call you.

A solution is to buy the Ring Controller from Radio Shack (part #43-127) for $7.95. It's a replacement modem cord that connects the "line" connection of the modem with the wall jack. The cord has a switch box that lets you switch off the modem so that it won't detect the phone's ring. Be sure to plug the shorter end of this new cord into the modem and the longer end into the wall. Otherwise, it won't work.

David Dumas
Grovetown, GA

Terminal garbage—In calling 1200-baud bulletin boards, I was usually plagued with all sorts of garbage when communicating with a system that supported the higher speed. I was always told that it was "line noise," and that there was not much I could do about it. I discovered that the problem only occurred during a long scroll, such as a main menu or a long message. The conclusion? Well, to put it simply, in a Commodore there is a memory buffer in the channel the modem uses. At 300 baud, most programs can empty this buffer as fast as it's filled. At 1200 baud you're communicating four times as fast. If your terminal program isn't emptying the buffer as fast as it's filling up, it eventually overflows, and garbage results. My solution is to use a terminal program that runs fast enough to handle the speed. Some programs I recommend are: VIP Term XL, AutoCom III and a public domain program by Chris Kaiser called XMoBuf.7.31.

James R. Carson
The Woodlands, TX

Text file processor—The majority of terminal software programs give you a screen editor that you can use to generate a text file prior to uploading it. These editors usually provide rudimentary text manipulation, which is awkward at best.

Word processors are a better choice, but many don't use

PETASCII to save their text files. Instead, they use a method called compressed binary. Trying to dump one of these files into a terminal buffer will result in a screen full of garbage.

Before you scrap your familiar friend, check the main directory of the disk for a program entitled Convert or something similar. My Word Writer word processor has such a file, even though no mention of it is made in the literature. Load and run the program from Basic and follow the prompts.

You might also be able to write the file to disk as a sequential file. With RUN Script, you can do this with the F1 and W (for write) keys. True ASCII should be off for this procedure.

If all else fails, you can contact the software company. They might be able to provide a converter at little or no cost.

Guy B. Young II
Richmond, VA

9. Printers/Printer Paper

Gemini 10X paper sensor—You can disable this sensor by executing the following command:

```
OPEN 4,4 : PRINT#4,CHR$(27);"8" : CLOSE 4
```

Moien Jawaid Zobairi
Riyadh, Saudi Arabia

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

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

Star SG-10 special mode—This popular printer has an undocumented mode in which it prints everything sent to it as hex digits, much like a machine language monitor. The mode is useful in debugging faulty print routines, since it lets you see exactly what the printer is receiving, control sequences and all.

To activate the Hex mode, turn your printer off, then press both the formfeed (FF) and linefeed (LF) buttons. Turn the power on, keeping these buttons pressed until the printer's beeper sounds. Release the buttons, and your printer will be in Hex mode until it is either reinitialized or powered down.

James Judd
Ballwin, MO

Musical staff maker—This program prints eight sets of musical staff lines on a standard sheet of paper. My daughter uses it for music class, and I use it for planning computer music. Making your music paper is much less expensive than buying it, and it's a lot more fun.

```
10Ø REM MAGIC MUSICAL STAFF - M.L.OAKES
11Ø OPEN4,4:PRINT#4:PRINT#4:PRINT#4
12Ø FORJ=1TO79:A$=A$+CHR$(164):NEXT
13Ø FORK=1TO8
14Ø FORL=1TO5:PRINT#4,A$:NEXTL
15Ø PRINT#4:PRINT#4
16Ø NEXTK
17Ø CLOSE4
```

Melvin L. Oakes
Louisville, KY

Printer grease—After I ran nearly 7000 sheets of paper through my Panasonic KXP-1091 printer, the paper bail pivot arms on the square tractor drive shaft had had a lot of wear and started jumping, causing the platen to jam. Replacing the damaged parts can be expensive. Apply a dab of white grease such as Lubriplate to the pivot arms where the square shaft passes through them. If I'd done this when I purchased my printer, I'd've saved myself a lot of grief.

Jay H. Graff
Bossier City, LA

New Okimate 10 manual—If you bought one of the first Okimate 10 color printers, here's good news: The manufacturer has revised the original operator's manual.

Information that was confusing is much clearer in the new edition, and details for using some popular word processors have been added.

To determine which version of Okimate 10 you have, look at the manual's cover. The original manual is called *Printer Handbook* and has a photograph on the cover. The new manual has been retitled *Printer Manual* and has a drawing on the cover.

I called Okidata's toll-free number (1-800-OKIDATA), and they mailed the $5 updated version to me.

C. Finke
Evansville, IN

Faster hi-res dumps—If you use a Cardco +G or G-Wiz interface, you may be experiencing some printing delays. The print buffer is so small on these interfaces that they are not able to quickly do hi-res printing. This can make printing with programs such as The Newsroom or Print Shop very time-consuming. A solution (other than a new interface) is a new ROM chip. Romco (PO Box 248, Derby, KS 67037; 316-788-6985) has replacement ROM chips for the Cardco interfaces at a fraction of the cost of a new interface. The chips are simple to install and will speed printing by *1500%*! I'm now using a replacement ROM chip for my printer interface, and it has put new life into my printing.

Jay Knott
Huntington Beach, CA

Lo-Res screen dumps on the 1526—If you're having problems making low-resolution screen dumps with your 1526, here's a simple solution. With normal line spacing, there's a gap after each line printed. The space-setting feature controls the number of steps between lines of print. The default is six lines per inch, but that can be changed with this line:

```
OPEN6,4,6:PRINT#6,CHR$(21):CLOSE6
```

A value of 21 reduces the number of steps sufficiently to remove the gap between lines. The printer will remain in this step-reduced state until it is reset or turned off.

Cameron E. Currie
Winnipeg, Manitoba, Canada

Paper chase—Many first-time printer owners are confused over what type of paper to buy. "Word processing" paper is of thicker bond, while "data processing" means the paper is thinner, since it's used in situations where a lot of paper is consumed.

Price also generally reflects the quality of paper. The more expensive paper is usually better quality or has extra features such as "laser perf," which allows a smoother edge when the tractors are removed. First-time users should probably select a paper that is neither too thin nor too extravagant. After a while, you'll discover which paper suits your purposes best.

Mike Dryja
Washington, MI

The Plus 5 connection—Many printer interfaces have a special plug that connects to the cassette port in order to get +5 volts for the interface power. To be polite, this arrangement stinks! Most printers offer +5 volts at the parallel port, so it's possible to slightly modify your interface to draw the needed power directly from the printer. Just solder a jumper wire from the proper pin to the +5-volt printed circuit on the interface. For my SG-10 and Xetec interface, the entire project took about 20 minutes.

Scott H. Johnson
Traverse City, MI

Mini floppy labels—You can make tiny directory labels to glue right on your disks if you use superscripts or subscripts in Condensed mode to print your directories. Be sure to reduce the linefeed spacing to about half. You might also want to use Compressed pitch.

A directory with ten to 12 files will be the same size as the brand label already on the disk.

Bob Woodson
Carmichael, CA

SP-1000VC and WordPro fix—Using the Seikosha SP-1000VC printer with WordPro 3 Plus/64 word processor prevents you from accessing the printer's special features, like underline or double strike.

Hattori Seiko Computer Peripherals now has a replacement ROM chip to remedy this problem. The chip is available by calling 1-800-422-7768.

The new ROM is easily installed with no special tools.

Bob Woodson
Carmichael, CA

10. Video/Audio Devices

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

Lucy S. Terrier
Alton, IL

Color/no-color monitor—Some software locks the screen into its own colors, which are not necessarily legible or attractive. If you use the Commodore 1701 or 1702 monitor, connected through three wires on the back, there's a solution close at hand. Disconnect the chroma cable, and your display will appear in black, white and various shades of gray. The chroma cable is the one that carries the color signals. It plugs into the red-colored jack.

Michael F. Lehman
Los Angeles, CA

Too-small video display—Sometimes the top or bottom lines of your screen may not show up on your monitor or television. When that happens, the problem is not in your computer, but in the adjustment of your display. Look on its front or rear panel for two controls marked "vertical height" (or "size") and "vertical linearity." Their names may be somewhat different, or they may be abbreviated in some way. A few inexpensive sets do not have them at all.

When you find the controls, first fill your computer screen with text or keyboard graphics. Next, adjust the two controls so you can see the top and bottom lines, and so the lines in between are not distorted. You'll notice that the height and linearity controls interact somewhat, affecting the picture's size and uniformity. The best method is to adjust one and then the other, going back and forth until your picture is satisfactory.

If the controls are on the back panel, you can position a mirror so you can see the screen while adjusting them.

Bernhardt Sandler
Venice, CA

C-64 Commo-strobe—This program emulates a strobe light, which allows you to photograph moving objects that you cannot normally see with the naked eye, such as the rapidly spinning blades of a ceiling fan.

When the program prompts you for a delay value, enter a number. The larger the number, the longer the time between flashes.

Pressing the F key while the program is running will flash the light more rapidly, and pressing S will flash the light less rapidly. Pressing P gives you the current flashing frequency and will ask you for comments. Pressing C allows you to reset the delay.

```
5 REM C64 STROBE LIGHT
10 PRINT "{SHFT CLR}":PRINT "{CTRL 4}":OPEN
   3,4
20 INPUT "DELAY";A
30 POKE 53280,0:POKE 53281,0
40 FOR I=1 TO A:NEXT I
50 POKE 53280,1:POKE 53281,1
60 FOR I=1 TO A:NEXT I
70 GET A$:IF A$="" THEN GOTO 30
80 IF A$="S" THEN A=A+1
90 IF A$="F" THEN A=A-1
100 IF A$="P" THEN PRINT#3,"DELAY- ";A:POKE
    53281,6:INPUT "COMMENTS";B$
110 IF A$="P" THEN PRINT#3,B$
120 IF A$="C" THEN INPUT "NEW DELAY";A
300 PRINT "{SHFT CLR}":PRINT "DELAY-";A:GOT
    O 30
```

Darren Keith Bolding
Friendswood, TX

Catch the wave—I had a problem with wavy lines scrolling up my monitor screen. I discovered that the fluorescent light on my computer desk was the culprit. Switching to incandescent lights solved the problem.

Jerald Brown
Erlanger, KY

Dust-free screen—I use anti-fog/anti-static spray for eyeglasses to clean my monitor screen of dust. Just spray it on and wipe it off.

John Nadrowski
Bayonne, NJ

11. Miscellaneous Hardware Tips

Remembering power-up sequences—In our school, all children greet their Commodore by saying "My Dear Computer." This reminds them to turn on the monitor (My), then the disk drive (Dear) and, finally, the computer (Computer). When leaving the computer, they say "Computer, Don't Move." This, of course, reminds them to turn everything off in reverse order.

A large bulletin board display reminds children of the mnemonic and assures safe powering procedures in our computer lab.

Elaine Buckshaw
Holbrook, NY

Toolkit tip—A useful tool not usually found in the electronic toolbox is the jeweler's saw, available in most craft shops. This is something like the more familiar coping saw, except it has a finer blade and will cut metal. It can be used to modify connectors or cut circuit boards, and it's particularly well-suited for cutting off small screws and bolts. I recently used mine to cut a shoulder off a dongle so it would fit my new C-128.

Daniel Morris
Waynesburg, PA

Electronics repair—Many failures in the computer, disk drive and associated equipment can be attributed to IC chips failing when subjected to heat. A quick and fairly reliable way to find the culprit is to operate the equipment until the failure occurs, then to spray each chip with component coolant such as Radio Shack #64-2321. Chances are good that when you spray the faulty chip, the machine will resume operation.

Since the chips used in the C-64 and 1541 are now readily available, this technique could save you plenty of time and money.

Joe Grossinger
El Paso, TX

12. Entering/Editing Programs

Delete a block of lines—If you have a C-64 or VIC, it's never pleasant when a large block of Basic lines needs to be removed from your program. To delete them, you must type each line number individually, then press the return key. Sometimes, you can write a Basic program to automate the task, but such programs usually depend on your lines being numbered in a very regular way.

If you have a C-128, Plus/4 or C-16, or if you own a programmer's aid cartridge, the Delete command is a godsend at times like these—it lets you remove any number of lines, just by typing one command.

The accompanying program provides the Delete command for the rest of us. When run, it puts a machine language program into the cassette buffer. Once that program is in place, blocks of lines can be deleted by typing commands of the following form:

SYS828,starting line#,ending line# + 1 <return>

For example,

SYS828,100,200 deletes lines 100–199
SYS828,0,100 deletes everything up to line 99
SYS828,300,63999 deletes everything from line 300–63998
SYS828,300,0 deletes everything from 300 up

Once the machine language is in place, you can use the Buffer Saver program in Chapter 5 to save it directly, so you won't have to bother with the Basic program again.

Machine language experts will be pleased to know that the machine language is completely relocatable, making it possible to store in any safe area of memory.

```
1Ø PRINT"BLOCK DELETE - J. PELLECHI"
2Ø CS=Ø:FORJ=1TO147:READK:CS=CS+K:NEXT
3Ø RESTORE:IFCS<>17763THENPRINT"DATA ERROR"
   :STOP
4Ø S=828:FORJ=STOS+146:READK:POKEJ,K:NEXT:I
   FPEEK(65532)=226THENEND:REM C-64
5Ø POKES+6,2Ø6:POKES+26,198:POKES+37,198:PO
   KES+56,198:REM VIC-2Ø
6Ø POKES+14Ø,197:POKES+143,19:POKES+146,196
   :REM VIC-2Ø
61 DATA 162,ØØ4,138,Ø72,Ø32,253,174,Ø32
62 DATA 1Ø7,169,1Ø4,17Ø,165,Ø21,149,1Ø5
63 DATA 165,Ø2Ø,2Ø2,149,1Ø5,2Ø2,2Ø8,234
64 DATA Ø32,Ø89,166,165,1Ø8,166,1Ø9,133
65 DATA Ø2Ø,134,Ø21,Ø32,Ø19,166,165,Ø95
66 DATA 166,Ø96,133,1Ø8,134,1Ø9,165,1Ø6
67 DATA 166,1Ø7,133,Ø2Ø,134,Ø21,Ø32,Ø19
68 DATA 166,165,Ø95,166,Ø96,133,1Ø6,134
69 DATA 1Ø7,165,1Ø8,197,1Ø6,165,1Ø9,229
7Ø DATA 1Ø7,144,Ø12,165,Ø45,233,ØØ2,133
71 DATA 1Ø6,165,Ø46,233,ØØØ,133,1Ø7,Ø56
72 DATA 165,Ø45,229,1Ø6,133,1Ø4,165,Ø46
73 DATA 229,1Ø7,133,1Ø5,Ø24,165,1Ø4,1Ø1
74 DATA 1Ø8,133,Ø45,165,1Ø5,1Ø1,1Ø9,133
75 DATA Ø46,16Ø,ØØØ,165,1Ø4,2Ø8,ØØ4,198
76 DATA 1Ø5,Ø48,Ø15,198,1Ø4,177,1Ø6,145
77 DATA 1Ø8,2ØØ,2Ø8,239,23Ø,1Ø7,23Ø,1Ø9
78 DATA 2Ø8,233,Ø32,Ø51,165,Ø32,Ø89,166
79 DATA Ø76,128,164
```

James Pellechi
Middle Island, NY

Line-editing tips—When changing Basic program lines, here are some things to keep in mind.

1. As long as the cursor is on the altered line when you press the return key, the line will be entered into the program. You needn't move the cursor to the end of the line.

2. You can duplicate a line in the program by listing it, typing a new line number over the old one, then pressing return. The new line number will be added to the program, and the old one will remain as it was.

3. Before you press the return key, you can easily discard your changes by pressing shifted return or by moving the cursor off the line in question. The line will remain in memory in its uncorrected state.

4. If you want to replace one line with another while retaining the option of restoring the original line, insert a REM statement in the original line, just after its number. Then give the replacement a line number that is a small offset of the original. You can later undo your work by removing the REM and deleting the second line.

5. If you want to move a group of lines from one program to another, load the first program and list the lines you want to move on the screen. Then, without disrupting the screen, load the second program, move the cursor to each of the listed lines and press the return key. The first program's lines will be added to the second program. If the line numbers interfere with those in the second program, you can change them before pressing the return key.

6. If you have a C-128, you can use its two-screen capability to make the above process even better. List the desired lines to the 80-column screen, then use ESC X to return to 40-column mode. The lines will stay on the 80-column screen no matter what you do with the program or the 40-column screen. To add them to your program at any time, use ESC X to move to 80-column mode, then put your cursor on each line you wish to move and press the return key.

J. C. Vollmer
Prior Lake, MN

Entering C-64 programs in C-128 mode—When typing in Basic C-64 programs, use the C-128 mode in order to take advantage of Basic 7.0's editing features and the 1571's rapid disk access. When you're finished, save the program. It should load and run without trouble in C-64 mode.

You may find that some lines won't give the proper checksum for a C-64 line when using C-128 Perfect Typist. Should this occur, look for a C-128 keyword in that line. That would produce a different checksum than in the C-64 version. After you spot the keyword, move the cursor to its second letter, press the shift and INST/DEL keys simultaneously, then the Commodore/Z key combination and press return. This should give the proper C-64 checksum. (The Commodore/Z is ignored, but it prevents the keyword from being tokenized, thus treating all letters like the C-64.)

Richard W. Clark
Barrow, AK

Reverse append-ectomy—To combine two or three programs into one larger program takes a lot of work. An easy way is to combine them with an append routine. Load your first program and type, in Direct mode:

```
POKE 43,PEEK(45) - 2 : POKE 44,PEEK(46)
```

Now renumber the lines in the second program, beginning with a number higher than the last number in the first program. Load your second program and type:

```
POKE 43,1 : POKE 44,8
```

When you type LIST and press return, you'll find that the second program has been appended to the first. (Note: If you get an Overflow error, try adding an unnecessary line to the new program, such as 0 REM.)

Adzhar Hamdan
Syracuse, NY

Deleting a block of lines—This tip is useful to VIC-20 and C-64 users who wish to delete a block of lines. First type POKE774,0 and press the return key. The List command lists only the line numbers. Now list the block of lines you wish to delete, move the cursor to the first line number and press return to delete each line shown.

If you wish to delete more lines than will fit on the screen, just repeat the list-and-return sequence above until all lines in the block have been deleted.

After you've finished, you must type POKE774,26 and press return to restore the normal List command.

David Pampreen
Belleville, MI

Mechanical safety—Have you ever accidentally hit a key you did not want? The solution is to cover the key with a small box that's a bit taller than the key. Any heavy paper or light cardboard will do.

Mary E. Wilson
Clearwater, FL

Listen while you work—Typing programs is a long and tedious job. I've found a way to enter programs four times as fast, virtually error free and with considerably less eye strain.

First, I slowly read the program into my tape recorder. Then I play it back, typing the program as I listen. It's especially useful for entering long programs with many Data statements.

Kenneth S. Ascher
Virginia Beach, VA

Don't panic!—As any program you're writing becomes longer, it takes longer for the cursor to return after entering or editing a line. Never hit the run-stop/restore combination during this pause or the program may be mangled! But, should you ever do that, enter 0 and press the return key. This should restore your program.

Harv Harris
Wichita, KS

Basic program append—Would you like to be able to append Basic program segments to each other on the 64, 128 or Plus/4? Just load in your first program and type in one of the following lines:

```
64 or Plus/4: Z = PEEK(45) + PEEK(46)*256 - 2:POKE43,Z
  AND255:POKE 44,Z/256
C-128: Z = 65278 - FRE(0):POKE45,Z AND255:POKE 46,Z/256
```

Now load your second program. The second program must have line numbers higher than the first. After the second program is loaded, type in one of the following lines:

```
C-64: POKE43,1:POKE44,8
Plus/4: POKE43,1:POKE44,16
C-128: POKE45,1:POKE46,28
```

Now you can list the entire program. If you want to append another segment, just move the cursor back up to the first line and press return. Load the next segment, press return over the second line, and so on. On the Plus/4 and C-128, you can redefine the function keys to the lines for your computer.

Perry Buschert
Grand Rapids, MI

13. LANGUAGES—BASIC

Exclusive OR operator—The exclusive OR, also called XOR or EOR, works by comparing the bit patterns of two numbers and then returning a 1 for every case where the bits are dissimilar. In other words, if the compared bits are both 0s or both 1s, a zero will be returned. But if one is 1 and the other is 0, the XOR will return a 1. The principle is illustrated by this diagram:

```
        1001
XOR     1100
        ----
        0101
```

Machine language includes an XOR operator, and it is frequently used for flipping bits. (Using XOR to combine one byte with a byte consisting of all 1s gives a new byte whose bits are the reverse of those in the original.)

Commodore Basic doesn't have an XOR operator, but you can easily simulate one by using this:

```
A XOR B = (A OR B) AND NOT (A AND B)
```

Georges Elias
Tripoli, Lebanon

Faster-running programs—Here are some hints to make your Basic programs run faster:

- In For...Next loops, type the Next without the variable name.
- If possible, do not use arrays.
- If you have numerous Data statements, put them at the beginning of your program.
- Do the same with frequently executed subroutines.
- Strip all the spaces and REMs from your program.

Javier Echeverria
Santander, Spain

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

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

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

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

Joseph R. Charnetski
Dallas, PA

C-64 screen position—My short machine language subroutine keeps track of the current screen position when I need to display a message in another area of the screen.

For example, after accessing disk files, I include a routine in my program to display disk-status messages in the upper-left corner of the screen. The routine then returns the cursor to its previous screen location. Type SYS 49152 to save the current screen location and SYS 49157 to return the cursor to the previous screen location.

```
10 FOR L = 1 TO 10:READ PC(L):NEXT
20 L=1 : FORLOC= 49152 TO 49161
30 POKE LOC,PC(L):L=L+1:NEXT
40 DATA 56,32,240,255,96,24,32,240,255,96
90 OPEN15,8,15:INPUT#15,E,E$:GOSUB500
500 SYS49152:REM SAVE CURRENT SCREEN LOCATI
    ON
505 PRINT"{HOME} {CTRL 2}DISK STATUS:{COMD
    7} ";E$:REM MESSAGE
510 FORSL=1TO500:NEXT:REM DELAY
515 SYS49157:REM PREVIOUS LOCATION
520 RETURN
```

Stanley C. Evans
Bahama, NC

Heads or tails?—This one-liner simulates 100 coin tosses. Teachers and students of Basic programming may find the program of interest. It demonstrates important concepts, including For. . . Next looping, the RND function, Boolean expressions and subscripted variables. That's a lot of programming knowledge in a small package!

```
10 REM COIN TOSS SIMULATOR - S. SANDER
20 PRINT"{SHFT CLR}":FORX=1TO100:T=(RND(0)>
   .5)+1:S(T)=S(T)+1
30 PRINT"{HOME}HEADS:"S(0)TAB(18)"TAILS:"S(
   1):NEXT:CLR: INPUT"AGAIN(Y/N)";N$
40 IFN$="Y"GOTO10:END
```

Stephen Sander
Kennett Square, PA

Time machine 64/128—Convert improper times into correct form. For example, 1 hour, 71 minutes becomes 2 hours, 11 minutes.

```
10 PRINT"{SHFT CLR}TIME MACHINE 64/128 - MI
   KE DANIEL
11 INPUT" {3 CRSR DNs}HOW MANY ENTRIES";EN:
   IFEN<11THEN19
12 DIM M(EN)
19 PRINT "{SHFT CLR}":FOR E=1 TO EN
20 PRINT"#"E:INPUT "HOURS";H(E):INPUT"MINUT
   ES";M(E):PRINT "{SHFT CLR}":NEXTE
30 FORE=1TOEN:TH=TH+H(E):NEXT
40 FORE=1TOEN:TM=TM+M(E):NEXT
50 IF TM<60 THEN 10000
60 IFTM=60THENTH=TH+1:TM=0:GOTO10000
70 D=TM-60:TM=D:D=0:TH=TH+1:IFTM<60THEN1000
   0
9999 GOTO 70
10000 PRINT"HOURS....."TH:PRINT"MINUTES..."
      TM:END
```

Mike Daniel
Fountain Valley, CA

A better wait—C-64 programmers often use a Get loop in their programs to give the user time to select a key. A shorter and easier way is to wait for the shift, Commodore or control key by using the statement

```
WAIT 653,X
```

where X is replaced with 1 for the shift key, 2 for the Commodore key and 4 for the control key. The numbers can be added together to wait for one of several keys to be pressed. For example, to wait for the shift or control key to be pressed, use a value of 5 for X. Be sure to tell the user which key to press.

Also note that the run-stop key has no effect on the Wait statement, but will incur a Break error with Get.

Denis Boisvert
Saint John, N.B., Canada

Universal sequential printer—This compact but powerful program lets you print any sequential file to screen or paper for examination. It is quick and works with any Commodore computer. If the printer is ready when you run the program, the file will be printed on paper. If the printer is not ready, the screen is used.

If you misspell the filename or mistakenly enter a non-sequential file name, it lets you reenter it. Pressing any key (except run-stop) will close all files and stop the run. Or you can let the entire file be printed and the program will close the files. Remember that you may also use wildcards in the filename rather than typing the entire name.

```
10 PRINT"{SHFT CLR}{CRSR DN}{COMD 8}{CTRL 9
   }SEQUENTIAL FILE PRINTER":REM LON OLSON
20 DN=3:OPEN 15,4,15:CLOSE15:IF ST=0 THEN D
   N=4
30 OPEN 3,DN,7:OPEN 15,8,15:REM DN=PRINTER
   IF ON ELSE SCREEN
40 INPUT "{2 CRSR DNs}SEQ FILE NAME";S$
50 OPEN 2,8,2,S$+",S,R"
60 INPUT#15,E,M$,T,S:IF E=0 THEN 100
70 PRINT"{CRSR DN}";E;M$;T;S
80 IF E=62 OR E=64 THEN CLOSE2:GOTO 40
90 GOTO130
100 GET#2,A$:RS=ST
110 GET K$:IF K$<>"" THEN 130
120 PRINT#3,A$;:IF RS=0 THEN 100
130 PRINT#3:CLOSE2:CLOSE3:CLOSE15:END
```

Lon Olson
Mesa, AZ

C-64 hi-res error trap—One of the most frustrating things about writing programs that use the C-64's hi-res graphics screen is the resulting error message that prints as unreadable garbage on your TV or monitor when an error occurs. This short program pokes a machine language routine into memory that intercepts the Error Handling routine. This code turns off the hi-res screen before an error message is printed, so that you can read the message. The machine code is relocatable, meaning that you can load it at any safe location. To alter the location, just change the value of A in line 20 to the desired starting address.

```
10 REM HI-RES ERROR TRAP-JIM CHAMBERS
20 A=679:FORI=ATOA+15:READD:POKEI,D:NEXT
30 HB=INT(A/256):LB=A-HB*256:POKE768,LB:POK
   E769,HB:NEW
40 DATA 173,17,208,41,223,141,17,208,169,21
   ,141,24,208,76,139,227
```

Jim Chambers
Lithonia, GA

Variable name test—Descriptive variable names help to make a program more understandable, but with Commodore Basic, you cannot use a variable name containing a reserved Basic keyword. For example, COLOUR can be

used as a variable, but COLOR cannot because it contains the keyword OR.

The computer will tell you whether it can use a variable name if you type PRINT variable name {return} in Direct mode. If the name contains a reserved word, you'll get a Syntax error. If the name is acceptable, the computer prints the string (a blank) or the numeric value (0). Then you know that this variable name will not crash the program.

You might also like to look over the added keywords used by Basic 3.5 and 7.0. For example, XLoop is a legal variable for Basic 2.0 but not for Basic 7.0. If you write a program using XLoop on the C-64 and run the program in C-128 mode, no problem will occur. However, if you edit the line, XLoop will become a token and a Syntax error will result the next time it's run.

Paul Hollander
Ames, IA

C-64 cursor locator—This two-line program is capable of moving the cursor to any place on the screen—fast. It makes use of the Kernal Positioning routine at 65520 ($FF00). However, it does not require the bothersome Pokes and SYS calls necessary to otherwise invoke the routine. It is also completely relocatable. To move the code, change the 679 in line 1000 to the location where you want the code to start.

To use the routine, simply add it to your program. Be sure the data line is the first data in your program and Gosub to 1000. The routine will now be active, and a simple USR call will move the cursor to the desired position. The call would look like this:

```
A = USR(ROW*256 + COL):PRINT "Cursor is here"
```

Of course, ROW and COL would be replaced by your own values, where ROW ranges from 0 to 24 and COL ranges from 0 to 39, and any variable may be used in place of A.

If the program this routine is appended to uses other USR calls, which is unlikely, you'll have to update the USR vectors at 785 and 786 each time you change routines.

```
1Ø REM SCREEN CURSOR LOCATOR-G.M.JAMES
1ØØØ I=679:J=INT(I/256):POKE785,I-J*256:POK
     E786,J:FORJ=ITOI+15:READK:POKEJ,K
1Ø1Ø NEXT:RETURN:DATA32,17Ø,177,17Ø,173,15,
     3,41,254,141,15,3,32,24Ø,255,96
```

Gregory M. James
Fayetteville, WV

Universal input subroutine—This subroutine prevents errors associated with Input statements and allows use of selected characters only. It should work with any Commodore computer. Cursor and graphic keys are easily locked out, since only the characters included in X$ will be accepted. Easy escape is provided by using the left-arrow key.

By defining X$ as the numerals, the decimal point, delete character and return, numeric data can easily be handled with the VAL(L$) function.

While the routine is a bit slow in Basic, it is especially useful when children are on the keyboard. In a compiled program, there is no apparent loss of speed in execution.

```
1Ø REM UNIVERSAL INPUT SUB-JAMES R. BOOTH
2Ø X$="ABCDEFGHIJKLMNOPQRSTUVWXYZ1234567890
   +-/. {LEFT ARROW}"+CHR$(13)+CHR$(2Ø)
3Ø REM *MENU OR MAIN PROGRAM HERE*
4Ø :
1ØØ PRINT"INPUT DATA EXAMPLE:";:GOSUB1Ø3Ø:I
   FL$="" THEN STOP
11Ø YOUR$=L$:REM PUT DATA INTO PROPER STRIN
   G
12Ø REM *REST OF PROGRAM HERE*
13Ø :
999 END
1ØØØ PRINT"{COMD @}{CRSR LF}";
1Ø1Ø GETE$:IFE$=""GOTO1Ø1Ø
1Ø2Ø C=ASC(E$):RETURN
1Ø3Ø L$="":REM NULL STRING BEFORE STARTING
1Ø4Ø GOSUB1ØØØ:FORB=1TOLEN(X$):IFE$<>MID$(X
   $,B,1)THENNEXT:GOTO1Ø4Ø
1Ø5Ø IFC=13THENPRINT" {CRSR LF}":RETURN:REM
    [RETURN]
1Ø6Ø IFC=95THENPRINT" {CRSR LF}":B=LEN(X$):
   NEXT:L$="":RETURN:REM {LEFT ARROW} TO
   ESCAPE
1Ø7Ø IFC=2ØANDLEN(L$)>ØTHENPRINTE$;:L$=LEFT
   $(L$,LEN(L$)-1):GOTO1Ø4Ø
1Ø8Ø IFC=2ØGOTO1Ø4Ø:REM [DEL] WITHOUT ANY C
   HAR
1Ø9Ø PRINTE$;:L$=L$+E$:GOTO1Ø4Ø
11ØØ L$=L$+" ":B=LEN(X$):NEXT:RETURN:REM DO
   NE
```

James R. Booth
Moline, IL

**Clearer DS$**—While writing a program that checked the disk status, I found that DS$ was printed as aa,bb$,cc,dd. I wanted something a little more professional, so I looked at subdividing the message string. This listing is the result:

```
1Ø REM BETTER DS$-KEN GARBER
2Ø X=INSTR(DS$,",",4)
3Ø PRINT"ERROR NO. "LEFT$(DS$,2)"{4 SPACEs}
   ERROR TYPE: "MID$(DS$,4,X-4)
4Ø PRINT"IN TRACK: "MID$(DS$,LEN(DS$)-4,2)"
   {4 SPACEs}SECTOR: "RIGHT$(DS$,2)
5Ø REM{2 SPACEs}PRINT"IN TRACK,SECTOR: "RIG
   HT$(DS$,5)
```

Line 20 finds the second comma, the first being between the error number and the error description. Line 30 uses the LEFT$ function to print the error number and the MID$ function to print the error message. The value of X−4 is the location of the comma minus the starting position of the string. This finds the proper length of the message string.

Lines 40 and 50 are two ways of printing the track and sector information. Line 40 allows text between numbers while line 50 combines the track and sector into one string.

Ken Garber
Windsor, Ontario, Canada

Random number seeds—The computer uses the RND function to pick a random number. This number is actually based on the previous random number, so every time you turn on your computer, the same numbers are chosen. A simple solution is to use a different "seed" value each time the computer is turned on. This can be done as follows:

```
1 X = RND(-TI)
```

A negative "seed" will always start a new sequence of numbers, and, since the value of TI would almost always be different, the order of random numbers will be different. For subsequent RND calls, use a positive number (usually 1) in parentheses.

Joey C. Lin
Louisville, KY

Switchable Basic—I've found a way to switch back and forth between Simons' Basic and Basic 2.0. If you're in Simons' Basic and want to go to Basic 2.0, type SYS 58260. To return to Simons' Basic, type SYS 64738. When switching between the two Basics, the program in memory will be "lost." However, when switching to Simons' Basic, you can restore the program by using the Old command.

Lance Sloan
Swartz Creek, MI

14. Languages—Machine Language

Working with machine language—You can easily tell when a Basic program includes a machine language routine, because you'll see one or more Data statements whose elements are numbers between 0 and 255. Those numbers are the machine language program, and the Basic program always includes some Pokes to put them into memory.

Once the machine language program is in memory, it is activated by a SYS command, which is the machine language equivalent of RUN. Sometimes the SYS causes a one-time action to take place, and sometimes it activates a feature that you can access again and again, until the computer is reset.

Even if you erase your Basic program with the New command, or even if you reset it with stop/restore or a reset button, the machine language program remains in memory! If your reset seems to have killed the machine language, you can usually resurrect it by repeating the original SYS.

Ilse Payne
Cheswick, PA

CHAR and ML code—After a bit-map area has been allocated on the C-128 with the GRAPHIC1 command, all text printed with the CHAR command is sent to the bit-map screen. This can create a problem if you are writing a program using the allocated 9K of memory for ML code and operating in 80-column mode. Anything printed to the 80-column screen appears as it should, but text sent by the CHAR command ends up on the bit-map screen.

To correct this situation, a GRAPHIC0:GRAPHIC5 command must be issued after the GRAPHIC1 command to return to 80-column text mode. GRAPHIC0 returns to Text mode and the GRAPHIC5 to 80-column. The GRAPHIC5 command in itself is *not* sufficient!

Mark F. Kostner
Murdock, KS

15. Languages—Other

CP/M utilities—If you are using CP/M mode on the C-128, you might think that it came without some of its important utilities, because they don't show up in any disk directory. Flip your disk to the other side, and you'll find them lurking there.

Eugene Cozzi
Barre, VT

C-128 CP/M screen color—You can change the screen color when in CP/M mode by holding down the control key and one of the number keys on the keypad (*not* the number keys on the top row); CTRL 2 = white, CTRL 3 = red, and so on.

Michael L. Knapp
Omaha, NE

Kaypro CP/M disks—There are many public domain CP/M programs available that can be used with the C-128 and 1571 drive. While loading a disk formatted for the Kaypro II, the prompt KAYPRO IV appeared on the screen. To get the Kaypro II format, press the cursor-right key, and the disk will load correctly.

Lonnie Williams
Orange, CA

Faster CP/M disk copies—Here's a useful tip to use on the C-128 in CP/M mode. Making copies of CP/M disks with PIP.COM is time-consuming, for the program copies only a single file at a time. To speed things up a bit, I've used a fast commercial back-up program (Copy II 64/128) to copy Commodore (GCR-formatted) CP/M disks in a short time. You should watch out for several things, though. Only Commodore-formatted disks can be copied. Also, only single-sided disks can be copied unless the program you use specifies it is designed for double-sided disks. If your program offers a "whole disk" copy, select it instead of a "BAM" copy, since CP/M puts its directory in a place where Commodore computers won't find it!

Joe Malloy
Clinton, NY

16. Programming Tips—Debugging

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

Checking lines with C-128 Perfect Typist—To check programs entered without the 128 Perfect Typist, first load

and run 128 Perfect Typist. Then enter the following lines and press return:

```
10 REM CHECKING FOR C-128 PERFECT TYPIST -
   JOSEPH FAUST, JR.
20 REM ENTER LINE 30 WITHOUT LINE NUMBER
30 A$=CHR$(148):B$=CHR$(145):KEY7,CHR$(27)+
   "J"+A$+A$+A$+A$+"LIST"+CHR$(13)+B$+B$+B$
   +B$+CHR$(13)
```

Next, load the program you wish to check and type AUTO, followed by the line number increment used in the program to be checked. List the first line of the program, move the cursor up to the listed line and press return. This will give you the checksum for that line followed by the line number for the next line. Press F7, and the next line will be listed, along with the checksum for that line followed by the next line number. If you continue to press F7, you can step right through the program. As a side benefit, pressing F7 without a line number lists the program.

Joseph V. Faust, Jr.
Lompoc, CA

17. Programming Tips—General

Detecting keypresses—There is an alternative to the Get statement in detecting single keypresses on Commodore computers. A memory location called LSTX always contains a number that corresponds to whatever key is currently pressed. Here are the locations of LSTX:

C-64 and VIC—197
Plus/4 and C-16—2038
C-128—213

You can determine the values for different keys by executing the following program and pressing the keys. Substitute one of the numbers above for LSTX in the following example:

```
10 PRINT PEEK (LSTX) : GOTO 10
```

Feng Yihao
Singapore

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

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

Nonrandom 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

GET with flashing cursor—This routine provides a blinking cursor for the Get statement. It doesn't have the cursor footprint problems usually inherent in such routines, and it allows input from all keys, including the cursor, delete and color keys. The routine works as is on the VIC, C-64 and in both modes on the C-128.

```
1000 REM MAGIC GET W/CURSOR - ED HORGAN
1010 REM FOR C64,VIC,C128 IN BOTH MODES
1020 X=235:Y=236:IFFRE(0)=FRE(1)THENX=214:Y
     =211
1030 Z=1024+PEEK(X)*40+PEEK(Y):ZZ=PEEK(Z)
1040 POKEZ,160:GETA$:POKEZ,ZZ:IFA$=""THEN10
     40
1050 PRINTA$;:B$=B$+A$:IFA$=CHR$(13)THENGOT
     O1070
1060 GOTO1030
1070 PRINTB$;"REST OF PROGRAM GOES HERE"
```

Edward Horgan
Coatesville, PA

Active device finder—Memory location 186 always holds the number of the last device used for input or output, and it's a very useful location to use in programming. (174 is the equivalent location for the Plus/4 and C-16.) If you type PEEK 186 before performing any further input or output, the screen will display the number of the device from which the program was loaded. You can use this information instead of asking the user about disk or tape.

Be careful, though—after you use the printer, this location will contain a 4 until more disk or tape input/output takes place.

Brian Petroski
Iron River, MI

Hankey-Pankey—If your printer is like mine, it requires more than an 80-character line to set up the printer the

way I like. This short set of printer commands eliminates the need to type that data each time you want a printout.

Add the lines shown below with line numbers lower than the first line number in your program. List the first few lines and move the cursor to the O in OPEN; then press the delete key until the O and the cursor are in the first column. Erase the REM statement in the next line the same way. Next, press return and—*voila!*—your printer lists the program just the way you like it.

To avoid typing this line at the beginning of your old programs, use the line-editing tip described in Chapter 15. C-64 owners may have to use two lines because of the 80-character limit.

```
Ø REM EASY C-64/C-128 HARDCOPY - LARRY PANK
  EY
4 REM OPEN1,4:PRINT#1,CHR$(27)"C"CHR$(66)CH
  R$(27)"N"CHR$(6):CMD1:LIST
5 REM PRINT#1,CHR$(12);:CLOSE1
```

Larry Pankey
Dana Point, CA

C-64 function-key cheat sheet—If a program uses the C-64 function keys, make a cheat sheet from a 3 × 5 index card, and cut it to fit around those keys. Just write on the card any functions the keys perform or any other information.

Patrick A. Lee
Hempstead, NY

18. Programming Tips—Math/Educational

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

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

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

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

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

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

I've used this technique to add interesting highlights to games.

Davie Cooley
Dothan, AL

Decimal fractions = common fractions—I've written a program that converts decimal fractions into their equivalent common fractions.

```
Ø REM DECIMALS TO FRACTIONS - ED DARACK
1Ø PRINT"{SHFT CLR}{COMD 4}":POKE 5328Ø,Ø:P
   OKE 53281,Ø
2Ø INPUT "INPUT A DECIMAL NUMBER";X
3Ø X$=STR$(X):T=LEN(X$)
4Ø PRINT "{CRSR DN}{CTRL 6}WORKING{CRSR DN}
   "
5Ø FOR Y=1 TO 256
6Ø FOR Z=256 TO 1 STEP-1
7Ø E=(Y/Z):E$=STR$(E):IF LEFT$(E$,T+1)=X$ T
   HEN 1ØØ
8Ø IF Y=256 THEN PRINT"{3 CRSR DNs}{CTRL 8}
   {CTRL 9}NUMBER TOO LARGE{CRSR RT}{CTRL Ø
   }"
9Ø PRINTZ,Y"{3 CRSR LFs}{CRSR UP}":NEXT:NEX
   T
1ØØ PRINT "{CRSR DN}{CTRL 5}THE FRACTION FO
    RM OF";X;"IS{CTRL 8}";Y;"/";Z
11Ø PRINT "{CRSR DN}{CTRL 3}ANOTHER (Y/N)"
12Ø GET A$:IF A$=""THEN 12Ø
13Ø IF A$<>"N"THEN 1Ø
14Ø END
```

Ed Darack
Lompoc, CA

19. Programming Tips—Screen Display

Screen scrolling—Here are some easy ways to scroll your screen up or down a line, without using any machine language routines. Upward scrolling can be done by:

```
PRINT " {HOME} {25 CRSR DNs} {HOME} "
```

Downward scrolling, on the C-64 only, can be accomplished by:

```
PRINT " {HOME} {CRSR DN} {CRSR LF} {SHFT INST} " : POKE
218,156
```

Shachar Ebel
Rehovot, Israel

Screen Wiper—This routine for the C-64 or VIC wipes the screen clear in two visually interesting ways. It's one of the most elegant and intriguing screen effects we've seen.

The direction of this screen-clearing technique is controlled by the value of C1$ in line 500. If it's a left-arrow symbol, it clears your screen like a theatre curtain pulled from the sides toward the center. If C1$ is an up-arrow symbol, the curtain works from the top and bottom.

As printed, the routine is for the C-64. For the VIC, substitute line 580 for line 500.

```
48Ø REM MAGIC WIPER - J.R.CHARNETSKI
49Ø REM WIPES SCREEN UP/DN OR SIDEWAYS
5ØØ C1$="{LEFT ARROW}" :REM WIPE {UP ARROW}
    OR {LEFT ARROW}
51Ø C1=23:C2=19:C3=24:C4=39:C5=599Ø3:REM C6
   4
52Ø FORJ=ØTOC1:C2$=C2$+CHR$(32)+CHR$(157)+C
   HR$(17):NEXT:C2$=C2$+CHR$(145)
53Ø FORJ=ØTOC2:IFJ=ØTHENPOKE781,C3:SYSC5
54Ø IFC1$="{LEFT ARROW}"THENPRINT"{HOME}";T
   AB(J);C2$:PRINT"{HOME}";TAB(C4-J);C2$
55Ø IFC1$="{UP ARROW}"THENPOKE781,J:SYSC5:P
   OKE781,C3-J:SYSC5
56Ø NEXT:PRINT"{SHFT CLR}";:C2$="":RETURN
57Ø :
58Ø REM LINE 5ØØ FOR VIC: C1=21:C2=11:C3=22
   :C4=21:C5=6ØØ45:REM VIC
```

Joseph R. Charnetski
Dallas, PA

C-64 star track—This program will supply an interesting background for a space adventure. You can Poke normal or customized characters for the desired effect.

To speed up the stars, add Print commands to the end of line 20. To change characters, substitute other numbers, such as 34, 42, 43 and 58, for 46 in line 30.

```
10 REM SCROLLING STARS
20 POKE53280,0:POKE53281,0:X = INT(RND(1)*40):PRINT
30 POKE56256 + X,1:POKE1984 + X,46:GOTO20
```

Fred Buike
Madison Heights, MI

Artistic Commodore—Here's a 74-byte machine language title-enhancement routine for the C-64. Whenever you enter SYS 49152, all the graphics and text will be bathed in color. Press the space bar or joystick fire-button to terminate the routine. It makes a nice introduction to your programs!

```
Ø REM C-64 TITLE ENHANCEMENT
1 DATA 169,254,45,14,22Ø,141,14,22Ø,169
2 DATA 16,44,Ø,22Ø,24Ø,4Ø,44,1,22Ø,24Ø
3 DATA 35,169,14,141,25Ø,3,169,24,141
4 DATA 251,3,173,25Ø,3,141,32,2Ø8,141
5 DATA 33,2Ø8,2Ø6,251,3,2Ø8,251,2Ø6,25Ø
6 DATA 3,2Ø1,255,24Ø,213,169,Ø,24Ø,226
7 DATA 162,15,142,32,2Ø8,162,14,142,33
8 DATA 2Ø8,169,1,13,14,22Ø,141,14,22Ø
9 DATA 96
1Ø FORX=ØTO73:READA:POKE49152+X,A:NEXT
11 PRINTCHR$(147)SPC(16Ø)CHR$(144)
12 PRINTSPC(8)"{CTRL 9}{22 SPACEs}"
13 PRINTSPC(8)"{CTRL 9}{4 SPACEs}*{4 SPACEs
   }MAGIC{4 SPACEs}*{3 SPACEs}"
14 PRINTSPC(8)"{CTRL 9}{22 SPACEs}"
15 PRINTSPC(8)"{CTRL 9}{3 SPACEs}*{4 SPACEs
   }IS FUN{5 SPACEs}*{2 SPACEs}"
16 PRINTSPC(8)"{CTRL 9}{22 SPACEs}"
17 PRINTSPC(222);SPC(222)"PRESS {CTRL 9} SP
   ACE {CTRL Ø} OR {CTRL 9} FIRE-BUTTON ":S
   YS49152
```

James Pellechi
Middle Island, NY

C-128 and Plus/4 screen code decoder—This short Basic program converts screen codes to their equivalent CHR$ codes and displays the value represented by each character.

```
1Ø REM C128 & PLUS/4 SCREEN CODES - MARTIN
   GELB
15 PRINT"{SHFT CLR}":CHAR,6,1,"{CTRL 9}SCRE
   EN CODE TO CHR$ CODE":PRINT
17 PRINTTAB(1Ø)"{2 CRSR DNs}{CTRL Ø}RUN/STO
   P TO STOP":PRINTTAB(1Ø)"CONT <RETURN> TO
    CONTINUE"
2Ø FOR S = 1 TO 128
25 A=(S AND 127)OR(S AND 32)OR((S AND 64)*2
   )OR((64-SAND32)*2)
3Ø PRINT:PRINT"{HOME}{7 CRSR DNs}SCREEN COD
   E";S;"{2 SPACEs}CHAR ";CHR$(A);" CHR$ CO
   DE";A
4Ø FORT=1TO5ØØ:NEXT:NEXT
5Ø PRINT"{SHFT CLR}{CTRL 9}THE END":LIST
```

Change line 20 to INPUT"SCREEN CODE"; S and line 40 to GOTO 20 to inspect individual screen codes.

Martin Gelb
Deerfield Beach, FL

C-64 windows—Have you ever dreamed of writing a Basic program with pull-down menus for your C-64? The following program creates a window for each pull-down menu needed. Variable C determines the color of the window, Y1 is the number of lines down from the top of the screen, X1 is the number of spaces from the left side of the screen, X determines the column width of lines within the window, and Y is the number of horizontal lines in the window. The cursor is placed at the upper-left corner of the screen after the program is run.

Try substituting new values for the above variables to create fast, professional-appearing pull-down menus on your C-64.

```
1 REM C64 WINDOWS - ARAN ANDERSON
1Ø C=1:Y1=3:X1=5:X=5:Y=1:GOTO5ØØØ
2Ø C=C+1:Y1=Y1+2:X1=X1+3:X=X+2:Y=Y+3:IFC=6T
   HEN 5Ø5Ø
5ØØØ POKE646,C:PRINT"{SHFT CLR}";:IFY1=ØTHE
     N5Ø1Ø
5ØØ5 FORI=1TOY1:PRINT:NEXT
5Ø1Ø PRINTTAB(X1);"{SHFT U}";:FORI=1TOX:PRI
     NT"{SHFT *}";:NEXT:PRINT"{SHFT I}"
5Ø2Ø FORI=1TOY:PRINTTAB(X1);"{SHFT B}";:FOR
     J=1TOX:PRINT" ";:NEXT:PRINT"{SHFT B}":
     NEXT
5Ø3Ø PRINTTAB(X1);"{SHFT J}";:FORI=1TOX:PRI
     NT"{SHFT *}";:NEXT:PRINT"{SHFT K}"
5Ø4Ø PRINT"{HOME}";:GOTO2Ø
5Ø5Ø PRINTTAB(19)"{CTRL 2}{1Ø CRSR DNs}INSI
     DE THE ":PRINTTAB(21)"WINDOW{COMD 7}"
```

Aran Anderson
Pocatello, ID

Menu in reverse—The following routine should work on all Commodore computers. It produces a menu with reverse fields just as in some commercial programs. Use the cursor up-and-down key to move the reverse field bar, and press return to make your selection.

If you want the menu to appear somewhere other than in the upper-left corner, insert cursor movements after H$ in line 130. You have to use the same cursor movements before printing R$ on line 170. The variable A is the screen line on which the reverse field will be printed. The first line is line 0, the second line 1, and so on.

```
1Ø REM C64/C128 MENU IN REVERSE - DAVID LU
1ØØ REM * REVERSE OPTION *
11Ø REM * R$=REVERSE ON, H$=HOME *
12Ø PRINT"{SHFT CLR}":A=1:R$=CHR$(18):H$=CH
    R$(19):P1$=R$
13Ø PRINTH$P1$" OPTION 1 "
14Ø PRINTP2$" OPTION 2 "
15Ø PRINTP3$" OPTION 3 "
17Ø PRINTH$:FORI=ØTOA:PRINT:NEXT:PRINTR$
18Ø GETA$:IFA$=""THEN18Ø
19Ø REM NEXT LINE CAN CONTAIN ON-GOTO AFTER
     IF-THEN
2ØØ IFA$=CHR$(13)THENPRINT"OPTION"A"IS SELE
    CTED.":END
```

→

Listing continued.

```
21Ø P1$="":P2$="":P3$=""
22Ø IFA$=CHR$(17)THENON A GOTO24Ø,25Ø,26Ø
23Ø IFA$=CHR$(145)THENON A GOTO25Ø,26Ø,24Ø
24Ø A=2:P2$=R$:GOTO13Ø
25Ø A=3:P3$=R$:GOTO13Ø
26Ø A=1:P1$=R$:GOTO13Ø
```

David Lu
Tucson, AZ

Animated titles—This routine for the C-64 adds a special touch of magic to any Basic program by animating your title screens. The program creates two substrings from a user-defined title string and animates both characters from four directions. You may have as many lines in your title as desired, each specified in the N$(X) array. However, there is one limitation. Each N$(X) string must contain exactly 26 characters. If your string is shorter, just insert spaces on either side of the string.

```
1Ø REM ANIMATED C-64 TITLES - PATRICK GAINE
   S
2Ø PRINT"{CTRL 8}{SHFT CLR}"CHR$(14):POKE53
   28Ø,Ø:POKE53281,Ø:A$=" ":X=Ø
3Ø N$(Ø)="** DYNAMIC TITLE SCREEN **"
4Ø N$(1)="** FOR THE COMMODORE 64 **"
5Ø N$(2)=" CREATED BY PATRICK GAINES"
6Ø A=1:B=26:C=32:D=1:E=Ø:F=Ø:G=Ø:H=Ø:I=Ø:J=
   Ø:K=C:L=C:M=C:N=C:P=41:R=39
7Ø IFA>BTHEN17Ø
8Ø G=1263+E:H=13Ø4-F:I=19Ø3+E:J=1944-F:N1$=
   MID$(N$(X),A,D):N2$=MID$(N$(X),B,D)
9Ø IFN1$=A$THENA=A+D:E=E+D:GOTO7Ø
1ØØ IFN2$=A$THENB=B-D:F=F+D:GOTO7Ø
11Ø POKEG,K:G=G+P:K=PEEK(G):POKEG,ASC(N1$)
12Ø POKEH,L:H=H+R:L=PEEK(H):POKEH,ASC(N2$)
13Ø POKEI,M:I=I-R:M=PEEK(I):POKEI,ASC(N1$)
14Ø POKEJ,N:J=J-P:N=PEEK(J):POKEJ,ASC(N2$)
15Ø IFG>=ITHENA=A+D:B=B-D:E=E+D:F=F+D:K=C:L
   =C:M=C:N=C:GOTO7Ø
16Ø GOTO11Ø
17Ø FORS=ØTO2:SYS59626:NEXT:X=X+1:IFN$(X)<>
   ""THEN6Ø
18Ø REM ** PLACE REST OF PROGRAM HERE **
```

Patrick Gaines
Gastonia, NC

The white hole—This neat little subroutine prints any 38-character message from the center of the screen to the edges in a very fancy way. The printing sequence is just the opposite of a black hole. The first and last letters are printed, then the second and next-to-last letters, and so on, working outward from the center.

```
1Ø REM C-64/C-128 WHITE HOLE - ERIC J. BRUN
   O
2Ø PRINT"{SHFT CLR}":POKE5328Ø,Ø:POKE53281,
   Ø
3Ø M$="{CTRL 9}{CTRL 3}{3 SPACEs}THIS IS TH
   E 'WHITE HOLE' TRICK{3 SPACEs}":PL$="{HO
   ME}{8 CRSR DNs}":GOSUB1ØØØØ
4Ø M$="{CTRL 9}{CTRL 2}INSERT NEW TEXT IN L
   INES 3Ø,4Ø,& 5Ø.":PL$=PL$+"{2 CRSR DNs}"
   :GOSUB1ØØØØ
5Ø M$="{CTRL 9}{COMD 7}{6 SPACEs}PRESS ANY
   KEY TO CONTINUE.{4 SPACEs}":PL$=PL$+"{2
   CRSR DNs}":GOSUB1ØØØØ
6Ø GETA$:IFA$=""THEN6Ø
7Ø END
1ØØØØ L=LEN(M$):MI=38-L/2:FORI=1TOLEN(M$)-1
      9
1ØØ1Ø PRINTPL$SPC(MI)LEFT$(M$,I)RIGHT$(M$,L
      -(L-I)):MI=MI-1:NEXT:RETURN
```

Eric J. Bruno
Shirley, NY

Shake it up, baby!—Try running this short and simple program for an earth-shaking surprise:

```
1Ø REM SHAKE IT UP - HAZMAN HALID - C-64
2Ø POKE5328Ø,Ø:POKE53281,Ø:INPUT "FRICTION
   (1-7)";F
3Ø FOR R=1 TO 2ØØ:PRINT "SHAKE";:NEXT
4Ø FOR R=Ø TO 15 STEP F:POKE5327Ø,R:NEXT
5Ø FOR R=15 TO Ø STEP -F:POKE5327Ø,R:NEXT
6Ø GOTO4Ø
```

Input a 1 for a sliding effect or a 7 for a good shake! To smooth the slide, just add :POKE 56325,1 to the end of line 20. Press the run/stop key to quit and run/stop-restore to exit the program.

Hazman Halid
West Malaysia

No-fade colors—This program lets you select screen colors to replace the standard blues on the C-64. The program remembers the new colors until the computer is reset or turned off. Use F1, F3 and F5 to cycle through the text, background and border colors, respectively. Printed text will always be visible because the program automatically sets a selection to the next color if text and background colors are the same.

When you've selected your colors, press F7. If all has gone well, the run/stop-restore combination won't destroy your colors, and even if you run a program that changes the colors, they'll return when the program ends.

```
1Ø REM NO-FADE C-64 COLORS-J.R.CHARNETSKI
2Ø FORJ=1TO23:READN:T=T+N:NEXT:RESTORE
3Ø IFT<>1Ø8865THENPRINT"DATA ERROR":END
4Ø READM,B,T,W:POKET+4,128:X=15:Y=7:S=X
5Ø PRINT"{SHFT CLR}":FORJ=MTOM+N:READA:POKE
   J,A
6Ø NEXT:POKET,X-1:POKEB,X-1:POKEB+1,Y-1
7Ø PRINT"{HOME}{2 CRSR DNs}F1 TEXT":IFX>STH
   ENX=Ø
8Ø PRINT"{CRSR DN}F3 BACKGROUND":IFY>STHENY
   =Ø
9Ø PRINT"{CRSR DN}F5 BORDER":IFZ>STHENZ=Ø
1ØØ PRINT"{CRSR DN}F7 COLORS OK"
11Ø GETA$:IFA$=""THEN11Ø
12Ø IFA$="{FUNCT 1}"THENPOKE T,X:X=X+1
13Ø IFA$="{FUNCT 3}"THENPOKE B+1,Y:Y=Y+1
14Ø IFA$="{FUNCT 5}"THENPOKE B,Z:Z=Z+1
15Ø IFX=YTHEN12Ø
16Ø IFA$<>"{FUNCT 7}"THEN7Ø
17Ø POKEM+1,PEEK(B):POKEM+6,PEEK(B+1)
18Ø POKEM+11,PEEK(T):POKET+4,Ø
19Ø POKEW,232:POKEW+1,2Ø3:PRINT"{SHFT CLR}"
   :NEW
2ØØ DATA 522ØØ,5328Ø,646,77Ø,169,Ø14,141
```

→

Listing continued.

```
21Ø DATA Ø32,2Ø8,169,ØØ6,141,Ø33,2Ø8,169
22Ø DATA Ø14,141,134,ØØ2,Ø76,131,164,Ø17
```

Joseph R. Charnetski
Dallas, PA

C-128 graphs—The following short program will show how easy it is to create graphs in your programs. As set up, the height is determined by a random number. In your own program, this will be determined by your statistics.

To save you the trouble of dividing the scale, I used the variable that determines the height of each graph to tell it's magnitude. Placing it atop the appropriate bar identifies it nicely. The headings will be correlated to these also.

```
Ø REM 7.Ø GRAPHS - G. L. PENROSE
1Ø PRINT"{SHFT CLR}":GOSUB1ØØ:COLORØ,1:CHAR
   1,4,23:E$="{COMD M}":F$="{COMD @}"
2Ø FORI=1TO22:PRINTE$"{CRSR UP}{CRSR LF}";:
   NEXT:CHAR1,5,23
3Ø FORI=1TO88STEP4:PRINTF$"{CRSR UP}{CRSR L
   F}";:NEXT:CHAR1,6,23:G$=F$:FORI=1TO3Ø:PR
   INTG$;:NEXT
4Ø CHAR1,12,1,"CYAN":CHAR1,18,1,"GRN":CHAR1
   ,24,1,"YEL":CHAR1,3Ø,1,"RED"
5Ø CHAR1,12,24:A$="{CTRL 9}{CTRL 4}{CRSR UP
   }{2 SPACEs}{2 CRSR LFs}":FORI=1TOX:PRINT
   A$;:NEXT:PRINT"{CTRL 2}{CRSR LF}{CRSR UP
   }{CTRL Ø}"X;
6Ø CHAR1,18,24:B$="{CTRL 9}{CTRL 6}{CRSR UP
   }{2 SPACEs}{2 CRSR LFs}":FORI=1TOY:PRINT
   B$;:NEXT:PRINT"{CTRL 2}{CRSR LF}{CRSR UP
   }{CTRL Ø}"Y;
7Ø CHAR1,24,24:C$="{CTRL 9}{CTRL 8}{CRSR UP
   }{2 SPACEs}{2 CRSR LFs}":FORI=1TOZ:PRINT
   C$;:NEXT:PRINT"{CTRL 2}{CRSR LF}{CRSR UP
   }{CTRL Ø}"Z;
8Ø CHAR1,3Ø,24:D$="{CTRL 9}{CTRL 3}{CRSR UP
   }{2 SPACEs}{2 CRSR LFs}":FORI=1TOW:PRINT
   D$;:NEXT:PRINT"{CTRL 2}{CRSR LF}{CRSR UP
   }{CTRL Ø}"W;
9Ø COLOR5,2:CHAR1,1,1:GETKEYK$:RUN
1ØØ X=INT(RND(1)*21)+1:Y=INT(RND(1)*21)+1
11Ø Z=INT(RND(1)*21)+1:W=INT(RND(1)*21)+1:R
    ETURN
```

G. L. Penrose
Oakville, Ontario, Canada

Easy on your eyes—When writing a program, it is important to use color combinations that are easy on the eyes. To increase legibility, try to resist the temptation to put dark text on a light background. Actually, a black background is not only easier on the eyes but also makes the foreground colors stand out better and gives your program a professional appearance.

Jay Leslie
Hillside, NJ

20. Programming Tips—Sound

Selecting sheet music—Commodore computers have a great deal of musical talent, but they are limited to three voices (four for the Amiga), or, in other words, to three notes playing at once. Unfortunately, most sheet music is arranged for the keyboard world, where up to ten notes can be playing at once (one for each finger), and where a huge double staff is used. When you computerize such music, choosing the three most important notes can drive you back to spreadsheets.

If you want to make life easier, buy your sheet music in the finger-picking guitar department of a well-stocked music store. Most finger-picking guitar arrangements are in a three-voice format, with all voices noted on one staff. The finger-picking style puts a complete lead, harmony and bass arrangement on a single instrument and is tailor-made for Commodore computers.

Dave Rensberger
Brea, CA

Crybaby's reward—A special sound effect for a losing game player or an incorrect trivia answer can enliven your programs. Try it on your C-64. Then use it with a Gosub.

```
1 REM C64 CRY BABY'S REWARD
1Ø1Ø POKE54296,15: POKE54295,Ø
1Ø2Ø R=54272: POKER+6,24Ø
1Ø3Ø POKER+1,4: POKER+5,Ø: POKER+4,33
1Ø4Ø FOR Z=1Ø24 TO 512 STEP-8
1Ø5Ø POKER+1,Z/256: POKER,Z AND 255
1Ø6Ø NEXT Z
1Ø7Ø POKER+4,Ø
1Ø8Ø REM RETURN
```

W. Stuart Sewell
Asheville, NC

Songs in the key of C—The C-128's SID chip has great music capabilities and the ease of programming provided by Basic 7.0. There is one slight drawback, though. If you program a song using the default note values in SID, your song will be in the key of F instead of in the key of C. That means you cannot accompany your 128 on the keyboard or piano without first transposing the music.

The accompanying program will play the default scale, then a C scale using the Sound command to demonstrate the difference between the two scales.

```
1 REM GIVE ME A C - NEAL SMITH - C-128
1Ø TEMPO 8
2Ø PLAY"V1O4T7U15XØCDEFGABO5C":SLEEP1
3Ø READA:SOUND1,A,3Ø:IFA=ØTHENEND:ELSEGOTO3
   Ø
4Ø DATA4297,4822,5412,5724,6429,7217,81Ø2,8
   578,Ø
```

Neal Smith
Rochester, NY

From the Grand Ole Opera—My program plays "The Marines Hymn," which was written in 1868 for an opera by Jacques Offenbach. I've converted it to C-128 Basic. I hope you enjoy it.

```
1Ø REM GRAND OPERA C-128 - JESSE B BROWN
2Ø TEMPO 31:PLAY"V1O4TØU15XØ":PLAY"V2O3TØU1
   5XØ"
3Ø A$="V1O4.QEV2Ø3.QEQFV1O4QFMHGV2O3HFHFV1O
   4HGMQFV2O3QF.HDV1O4.HDMWCV2O3WEMV1Ø4HBV2
   O3$HFHRV1O4.QCQEM"
```

→

Listing continued.

```
4Ø B$="V1O4HGV2O3HGHGV1O4HGMHGV2O3HGHGV1O4H
   GMWGV2O3HEV2O2HEMV1O4HGV2O2HAHAV1O4.QEQF
   MHGV2O3HCHCV1O4HGM"
5Ø C$="V1O4QFV2O3QD.HFV1O4.HDMWCV2O3HCV2O2H
   BMV1O4HCV2O2QAQGV1O4.QCIEMHGV2O3HGHGV1O4
   HGMHGV2O3HFHFV1O4HGM"
6Ø D$="V1O4.HGV2O3HCO2HBV1O5QCMO4HGV2O2HAHG
   V1O4.QEIFMHGV2O3HCHCV1O4HGQFV2O3QD.HFV1O
   4.HDMWCV2O3HCO2HBM"
7Ø E$="V1O4HCV2O2HAHGV1O5.QCO4IBMHAV2O2HFO3
   HCV1O4HFMHAV2O3HFO2HFV1O4HFM.HGV2O3HCO2H
   BV1O4QAMHGV2O2HAHGV1O5.QCO4IBM"
8Ø F$="V1O4HAV2O2HFO3HCV1O4HFMWAV2O3HFHCMO4
   V2O3HGV1O4WGV2O3HBMV1O4QGV2O3$QBV1O4QRV2
   O3QRV1O4.QCV2O3HRV1O4IEM"
9Ø G$="V1O4HGV2O3HGHGV1O4HGMHGV2O3HFHFV1O4H
   GM.HGV2O3HCO2HBV1O5QCMO4HGV2O2HAHGV1O4.Q
   EIFM"
1ØØ H$="V1O4HGV2O3HCHCV1O4HGMQFV2O3QD.HFV1O
    4.HDMV2O3.QCV1O4WCO2IGQAQGQEMV1O4QCV2O2
    QCQRV1O4QRO5QCV2O2QCQRV1O4QRM"
11Ø PLAYA$:PLAYB$:PLAYC$:PLAYD$:PLAYE$:PLAY
   F$:PLAYG$:PLAYH$
```

Jesse B. Brown
Eunice, LA

C-128 Beethoven—Here's a program that creates a C-128 version of a piece of music actually written by Beethoven.

```
1Ø REM 128 BEETHOVEN-JESSE B BROWN
2Ø TEMPO16:ENVELOPE 6,3,8,5,9,2
3Ø A$="V1O3T6V15XØHGIAIGIAIBQGO4IGIDIDO3IBI
   BIGO4HCO3IBIAIB"
4Ø B$="O4ICO3QAO4IDIEIDO3IBO4ICO3IAHGIAIGIA
   IBO4HCIEIDIE#IFIGIDIEIC"
5Ø C$="O3IBO4ICO3IAHAQGQRHAO4ICO3IBIBO4ICIA
   IG#IFIEIDICO3HBO4IDICO3IBO4ICIEIDIBIAIG#
   IFIEIDIC"
6Ø D$="O3QBO4IG#IFIGIAIBQCIBO4ICIDICO3IAIBO
   4HDQDQDHDQDQBO5HDQDQDO4HBHRHDQDQDHDQGO5Q
   DQR"
7Ø E$="O4#QFQRQGQRØ3QGHGHGWG"
8Ø PLAY A$:PLAY B$:PLAY C$:PLAY D$:PLAY E$
```

Jesse B. Brown
Eunice, LA

Trumpet fanfare—Here's a trumpet fanfare introduction for your important screen announcements. Try it in your C-64 or C-128 (in 40- or 80-column mode) programs. To balance the slower speed in the C-128's 40-column mode, change the delay value in line 90 from 200 to 125. Also be sure you're in bank 15.

```
1Ø REM TRUMPET FANFARE - W. STUART SEWELL
2Ø FORX=1TO8:READFH(X),FL(X):NEXT
3Ø WF=64:A=3:D=Ø:SU=15:R=1Ø:AD=A*16+D:SR=SU
   *16+R
4Ø S=54272:FORI=STOS+24:POKEI,Ø:NEXT
5Ø POKES+24,15:POKES+5,AD:POKES+6,SR
6Ø READN:IFN= Ø THEN END
7Ø IFN=9THEN FORI=1TO125:NEXT:GOTO6Ø
8Ø POKES+1,FH(N):POKES,FL(N):IFWF=64THENPOK
   ES+3,7:POKES+2,15Ø
9Ø POKES+4,WF+1:FORT=1TO2ØØ:NEXT:POKES+4,WF
   :GOTO6Ø
1ØØ DATA 28,49,31,165,33,135,37,162
11Ø DATA 42,62,44,193,5Ø,6Ø,25,3Ø
12Ø DATA 8,3,5,7,9,7,5,9,5,3,5,3,8,9,9,9
13Ø DATA 8,3,5,7,9,7,5,9,5,3,9,3,8,9,8,3,9,
   9,9,Ø
```

W. Stuart Sewell
Asheville, NC

21. Programs—Amusements/Delights

Christmas card—Type in this program on your C-64 or C-128, put the program away with the ornaments, and take a look at it next year.

```
1Ø REM CHRISTMAS CARD - AUTUMN BAYLES
2Ø POKE53281,13:POKE5328Ø,1Ø:PRINT"{SHFT CL
   R}{CRSR DN}"
3Ø X$="{CTRL 6}HO":Y$="{COMD 3}HO":FORT=1TO
   9:PRINTTAB(T);X$;TAB(2Ø-T);Y$:NEXT:PRINT
   TAB(T);X$
4Ø FORJ=11TO2Ø:PRINTTAB(2Ø-J);Y$;TAB(J);X$:
   NEXTJ
5Ø PRINTTAB(18);"{11 CRSR UPs}{COMD 3}MERRY
    CHRISTMAS{1Ø CRSR DNs}"
6Ø FORC=5TO1ØSTEP5:FORP=55754TO55768:POKEP,
   C:NEXT:FORT=1TO1ØØ:NEXT:NEXT:GOTO6Ø
```

Autumn Bayles
Nazareth, PA

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

```
1Ø PRINT"{SHFT CLR}VALENTINE - JOSEPH R. CH
   ARNETSKI":PRINT
2Ø FORJ=1TO154:READK:CS=CS+K:NEXT:IFCS<>624
   5THENPRINT"DATA ERROR!":STOP
3Ø RESTORE:S=54272:V=S+24:FORJ=STOV-1:POKEJ
   ,Ø:NEXT:POKEV,15
4Ø READN,D:IFD=255THENPRINT"MAGIC!":END
5Ø POKES+1,N:POKES+5,9:POKES+15,9
6Ø POKES+4,17:FORDL=1TOD*25Ø:NEXT
7Ø POKES+4,Ø:FORDL=1TO45:NEXT:GOTO4Ø
71 DATA 59,3,67,1,71,1,67,1,71,1,67,5
72 DATA 59,2,67,1,71,1,67,1,71,1,67,6
73 DATA 59,2,67,1,71,1,1Ø6,3,94,1,89,1
74 DATA 79,7,71,1,67,1,1Ø6,3,71,1,71,2
75 DATA 67,1,71,5,71,1,67,1,119,3,71,1
76 DATA 71,2,67,1,71,5,71,1,67,1,134,3
77 DATA 71,1,71,2,67,1,71,3,79,1,89,1
78 DATA 119,5,71,2,79,1,89,1,79,1,89,1
79 DATA 79,3,71,5,59,2,67,1,71,1,1Ø6,3
8Ø DATA 94,1,89,1,79,7,59,2,67,1,71,1
81 DATA 67,1,71,1,67,3,71,2,79,1,89,1
82 DATA 79,1,89,1,79,3,71,2,79,1,89,1
83 DATA 79,1,89,1,79,3,71,1Ø,Ø,255
```

Joseph R. Charnetski
Dallas, PA

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

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

Tim Whitecotton
Manson, IA

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

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

Bob Snader and David Snader
Baltimore, MD

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. 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

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 COLOR0,1:COLOR4,1:COLOR3,RND(0)*14+2:GRAP
  HIC3,1:J=RND(0)*5+1:N=RND(0)*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

Bunny Hop—This game for the C-64 or C-128 in 64 mode lets you put the Easter Bunny into his basket. To make him hop, hold down any key for a second or so. The longer you hold it, the farther Mr. Rabbit jumps. If he misses the basket, he returns to his starting place and lets you try again. When you put him into the basket, the program tells you how many hops it took.

You can make the game more difficult by increasing the value of X in line 35. That moves the starting point closer to the basket, making the target harder to hit.

```
10 PRINT"{CTRL 8}{SHFT CLR}{CTRL 1} MAGIC B
   UNNY HOP - BOB & DAVE SNADER{CRSR DN}"
15 H=1:V=53248:POKE2040,13:POKE1805,76:POKE
   1808,122
20 FORJ=832TO879:READK:POKEJ,K:NEXT
25 FORJ=880TO896:POKEJ,0:NEXT
30 POKEV+21,1:POKEV+33,5:POKEV+39,1
35 X=50:Y=192:F=0:G=0:POKEV,X:POKEV+1,Y
40 IFPEEK(197)=64THENGOTO40
45 IFPEEK(197)<>64THENF=F+.04:GOTO45
50 POKE198,0:POKEV,X:X=X+F:POKEV+1,Y
55 Y=Y-1.5*F+G:G=G+.05:IFY<0THENY=0
60 IFY<192ANDX<255THENGOTO50
65 IFX>195ANDX<212THENPRINT" YOU DID IT IN"
   ;H;"HOPS":END
70 FORJ=0TO700:NEXT:H=H+1:GOTO35
71 DATA 008,000,000,012,000,000,014,024
72 DATA 000,007,060,000,001,066,000,000
```

→

Listing continued.

```
73 DATA 224,000,000,248,000,000,240,000
74 DATA 003,128,000,007,128,000,015,128
75 DATA 000,031,224,000,031,032,000,127
76 DATA 000,000,126,000,000,031,240,000
```

Bob Snader and David Snader
Baltimore, MD

April 1 Magic—If you appreciate practical jokes, you'll have endless fun with these April Fools subroutines. The first one simulates the Ready prompt, leading one to believe that the main Basic program is finished. However, nothing could be further from the truth.

The first subroutine is composed of lines 699–750. These give the bogus Ready prompt, which, for the next 30 seconds, waits for you to press any key. If you do, an interesting message appears on the screen, and the 30-second timer is reset. If no key is pressed, the subroutine finishes so quietly that nobody is the wiser.

To get the second subroutine, replace lines 740 and 750 with lines 770 and 780. This time, the subroutine also waits 30 seconds. If a key is pressed during this period, the subroutine terminates unobtrusively, and your computer will accept normal keyboard input. But if the Magic key defined in line 700 is pressed, program execution is transferred to line 780. You can put anything at all there, including hundreds of additional program lines.

As printed, the program runs on the C-64 or VIC-20. For the C-128, you must change the value of C in line 700, using the number listed in line 790. You can change the program's time delay or the Magic character by making appropriate changes to line 700. If you disable your stop key before executing the subroutine, you'll keep others from discovering your trick.

```
699 REM LARSON E. RAPP
700 C=204:DELAY=5000:MAGIC$="*":POKEC,0
710 PRINT"{CRSR DN}READY.":FORJ=1TODELAY:GE
    TA$
720 IFA$=""THENNEXT:PRINT"{2 CRSR UPs}";:EN
    D
730 POKEC,1:J=DELAY:NEXT
740 PRINT" {CRSR UP}{CRSR LF}HANDS OFF, BUD
    DY!"
750 FORK=1TO500:NEXT:RUN700
760 :
770 IFA$<>MAGIC$THENPRINT"{2 CRSR UPs}";:EN
    D
780 PRINT"PROGRAM CONTINUES HERE":STOP
790 REM C=2599 FOR C128, 204 FOR VIC&C64
```

Larson E. Rapp
Newington, CT

Summertime magician—This C-64 audiovisual spectacular shows a miracle worker in full flower. There are no bugs in the program, but there *is* a CHR$(66) that you'll only see when you run it.

```
10 PRINT"{SHFT CLR}{CTRL 2}SUMMERTIME MAGIC
   IAN - BOB & DAVID SNADER
15 S=54296:V=53248
20 FORJ=832TO959:READK:POKEJ,K:NEXT
25 FORJ=0TO7:READ,L:POKEV+K,L:NEXT
30 S=54296:V=53248:FORJ=0TO255:POKEV,J
35 POKES,5:POKE204,B:POKES,0
40 IFB=14THENB=13:GOTO35
45 B=14:NEXT
50 DATA 000,240,000,003,252,000,003,255
51 DATA 000,003,255,001,000,255,004,000
52 DATA 255,016,000,063,016,000,063,004
53 DATA 001,143,028,073,153,093,025,153
54 DATA 085,009,153,085,001,153,020,000
55 DATA 145,000,000,004,064,000,001,016
56 DATA 000,004,064,000,017,000,000,000
57 DATA 000,000,000,000,000,000,000,000
60 DATA 000,000,000,000,000,000,000,000
61 DATA 000,000,000,001,000,000,004,000
62 DATA 000,016,000,000,016,000,000,004
63 DATA 003,255,028,075,252,093,025,249
64 DATA 085,009,153,085,001,153,020,000
65 DATA 145,000,000,004,064,000,001,016
66 DATA 000,004,064,000,017,000,000,000
67 DATA 000,000,000,000,000,000,000,000
70 DATA 032,005,033,014,037,000,038,015
71 DATA 039,007,021,001,028,001,001,108
```

Bob Snader and David Snader
Baltimore, MD

Jotto answers—A guessing game named Jotto appears on p. 145 in my copy of *Commodore 64 User's Guide*. If you're like me, that was one of your first programs. The accompanying lines, an accessory to that program, will show you all the right answers. Just add them to the original unchanged Jotto, then save the combined program under some appropriate name.

```
10 PRINT"{SHFT CLR}JOTTO ANSWERS - CARL E.
   MADSEN{CRSR DN}"
20 FORJ=1TO50:READA$
30 FORK=1TO5
40 T$(K)=MID$(A$,K,1)
50 JK=ASC(T$(K)):JK=JK-1
60 PRINTCHR$(JK);
70 NEXTK
80 PRINT
90 NEXTJ
```

Carl E. Madsen
Bayard, IA

C-64 multiple elevators—Here's a neat little trick for the C-64. Hope you like it!

```
1 REM C64 MULTIPLE ELEVATORS
10 PRINT"{SHFT CLR}"
20 POKE 220,234
30 PRINT"MULTIPLE ELEVATORS"
40 GOTO 30
```

Tim Dunn
Edgewood, KY

Commodore kudos—Ever wonder who are the real wizards whose magic lets you perform all those amazing tricks on your C-128? Enter the following incantation on your screen and press the return key to find out.

```
SYS32800,123,45,6
```

You will also see a bit of advice we would all do well to follow.

Daniel Miller
Astoria, NY

C-128 spiralgraph—Here's a three-line update to Matt Woodring's "C-128 boxed spirals" (see p. 30). It changes most of the variables to let the 128 really do its thing.

```
1 COLOR 0,1:COLOR 4,1
5 A=11:X1=0:Y1=0:X2=160:Y2=195
10 GRAPHIC 3,1:FOR J=0 TO 360 STEP A:BOX
   3,X1,Y1,X2,Y2,J,0:NEXT
20 A=A-.5:X1=X1+5:Y1=Y1+5:X2=X2-5:Y2=Y2-5:GOTO 10
```

James D. Hanke
Yakima, WA

Up, up and away C-64—Whoever said piloting a hot-air balloon was easy? Windspeed, the rate of ascent and descent, the balloon's fuel consumption and the navigation of the contraption all add up to create a pilot's nightmare. This program opens with the balloon rising from the bottom of the screen. The balloon's buoyancy is controlled by alternately pressing and releasing any key until you alight on the landing pad at the opposite end of the screen.

Obstacles have been placed in the sky to keep your journey to the landing pad challenging. While keeping an eye on the fuel gauge at the top of the screen, navigate over the first obstacle, under the second and then land on the pad. Avoid hard landings and bypassing or colliding with anything on the screen.

Although it is unlikely you'll want to do so, the level of difficulty can be increased by changing the wind speed, fuel allotment and obstacle locations (L1 and L2) in the first line of the program.

```
10 PRINT"{SHFT CLR}UP, UP AND AWAY - THE SN
   ADERS":FUEL=250:WIND=20:L1=1395:L2=1724
20 X=40:Y=228:B=1:V=53248:POKE1612,68:POKE2
   040,13:POKEL1,42:POKEL2,42
30 FORT=0TO7:READQ,D:POKEV+Q,D:NEXT:FORT=83
   2TO895:READQ:POKET,Q:NEXT
40 IFPEEK(197)<>64THENA=-.03:FU=FU-1
50 B=B-A:Y=Y-B:POKEV+1,Y:X=X+WI/50:POKEV,X:
   A=.03
60 IFPEEK(V+31)=1ORY>229ORX>250ORFU<0THENPR
   INT" GAME OVER - TRY AGAIN!":END
70 IFX>239ANDX<243ANDY>141ANDY<145ANDB>-.5A
   NDB<.5THENPRINT"NICE LANDING!":END
80 PRINT"{HOME}{CRSR DN} FUEL{4 SPACEs}{4 C
   RSR LFs}";FU:PRINT" BUOYANCY{4 SPACEs}{4
    CRSR LFs}";INT(B*100):GOTO40
90 DATA 21,1,28,1,31,0,32,2,33,1,37,12,38,2
   ,39,7
91 DATA 002,170,128,042,170,168,170,170
92 DATA 170,234,234,234,234,234,234,187
93 DATA 187,187,187,187,187,110,174,173
94 DATA 110,174,173,074,170,161,018,170
95 DATA 132,018,170,132,004,170,016,004
96 DATA 170,016,001,040,064,001,040,064
97 DATA 000,065,000,000,065,000,000,085
98 DATA 000,000,085,000,000,085,000,000
```

Bob Snader and David Snader
Baltimore, MD

Son of Burrow—I've added color and sound to Magic's first published trick ($00, January 1984). My little toddler enjoys watching it, but hey, so do I!

```
0 REM SON OF BURROW - DOUGLAS BURR
1 A$="{CRSR UP}{CRSR DN}{CRSR RT}{CRSR LF}"
  :B$="{CTRL 1}{CTRL 2}{CTRL 3}{CTRL 4}{CTR
  L 5}{CTRL 6}{CTRL 7}{CTRL 8}{COMD 1}{COMD
   2}{COMD 3}{COMD 4}{COMD 5}{COMD 6}{COMD
  7}{COMD 8}":DIMH(16):FORI=1TO16:READH(I):
  NEXT:W=54276
2 F=54273:DATA39,37,42,44,47,50,53,56,59,63
  ,67,71,75,79,84,89:FORS=54273TO54296
3 POKES,0:NEXT:POKE54296,15:POKE54277,100:P
  OKE54278,100:POKEW,33
4 D=INT(1+(16-1+1)*RND(.)):PRINTMID$(A$,RND
  (.)*4+1,1)"*{CRSR LF}";
5 PRINTMID$(B$,RND(.)*16+1,1)"{CTRL 9} {CRS
  R LF}";:POKEF,H(D)/3.5:GOTO4
```

Douglas Burr
White Plains, NY

Typing for toddlers—Children will have fun printing short messages they've typed on the screen, without having to load a word processor. Type in this little program.

```
0 REM SIMPLE TEXT PRINTING - JERALD BROWN
10 OPEN 4,4,7
20 INPUT"TYPE IN WORDS:";A$
30 PRINT#4,A$
40 GOTO 20
```

Youngsters can type in words or short messages, which will print out on hard copy when they press the return key.

Jerald Brown
Erlanger, KY

The way we were—Sometimes there's magic in memories. We're not old enough to long for NASA's good old days, but we will, for a while at least, miss the scene depicted in this program.

We think this C-64 program produces a pretty spectacular display. Turn up the volume on your monitor to get the full effect.

```
1 REM THE WAY WE WERE - BOB & DAVID SNADER
  - C-64
10 PRINT"{SHFT CLR}{2 CRSR DNs}THE WAY WE W
   ERE...":PRINT"{2 CRSR DNs}PRESS ANY KEY
   ";
20 V=53248:S=54273:B=3:POKE2040,13:POKE2041
   ,14:FORJ=842TO919:READK:POKEJ,K:NEXT
30 FORJ=0TO2:READK,L:POKES+K,L:NEXT:FORJ=0T
   O8:READK,L:POKEV+K,L:NEXT
40 GETK$:IFK$=""THEN40
50 FORC=9TO0STEP-1:PRINTC;"{3 CRSR LFs}";:P
   OKES+23,15:POKES+23,0:FORT=0TO950:NEXT:N
   EXT
60 FORY=245TO40STEP-1:POKEV+1,Y-40:POKEV+3,
   Y:POKEV+23,B:IFB=1THENB=3:NEXT:RUN
70 B=1:POKES+23,(Y/15)-2:POKES,Y/6:NEXT
80 DATA 16,0,0,124,0,0,254,0,8,254,32,28,25
   4,112,62,130,248,62,56,248,62,84,248
90 DATA 62,124,248,60,124,120,57,109,56,57,
   109,56,35,109,136,15,109,224,63,125
100 DATA 248,254,0,254,0,108,0,20,0,80,0,0,
    16,0,8,56,32,28,124,112,62,124,248,28
110 DATA 56,112,28,56,112,8,56,32,0,16,0,4,
    128,5,128,3,129,21,3,23,1,39,1,40,8,0
120 DATA 220,2,220,1,207,3,245,33,6
```

Bob Snader and David Snader
Baltimore, MD

A plane joy—The following program creates an airplane and stores it as sprites. You can then move the airplane in three directions with a joystick in port 2. This program could provide the groundwork for a simple game.

```
10 REM C-128 PLANE JOY - DAVID ZAJAC
15 GRAPHIC1
20 SCNCLR 1:BOX 1,1,1,29,29
30 DRAW1,5,11TO5,12
40 DRAW1,4,12TO9,12TO8,11
50 DRAW1,24,12TO24,14
60 DRAW1,21,11TO24,11TO24,9TO23,8TO25,8
70 DRAW1,21,10TO23,8
80 BOX 1,23,10,24,12:BOX1,22,14,25,15:BOX1,
   3,13,4,14
90 DRAW1,6,10TO9,10TO10,11TO11,11TO12,12TO2
   0,12
100 DRAW1,21,15TO18,15TO17,14TO11,14TO10,15
    TO5,15
110 DRAW1,11,16TO17,16
120 SSHAPEA$,3,7,25,30:SPRSAVA$,1:SPRITE1,1
    ,1
130 BOX0,0,0,30,30,,1:MOVSPR1,150,100:DO
140 IFJOY(2)=6THENMOVSPR1,260 #10
150 IFJOY(2)=7THENMOVSPR1,270 #10
160 IFJOY(2)=8THENMOVSPR1,280 #10
170 IFJOY(2)>127THENMOVSPR1,0 #0:ELSE:LOOP
```

David Zajac
Alhambra, IL

"Holladay" snowflakes—This program produces a series of snowflakes by drawing triangles in different colors and rotating them through 360 degrees. Run this program on the C-128 in 40-column mode.

```
10 REM SNOWFLAKES - HARMON K. HOLLADAY
20 GRAPHIC 1,1:COLOR 0,1:COLOR 4,1
30 FORI=1TO5:Z=Z+1
40 IFZ>16ORZ<1THENZ=2
50 COLOR1,Z
60 X=X+10:IF X=>300THENX=10
70 Y=Y+10:IFY=>200THENY=10
80 A=A-10:IFA<=10THENA=300
90 B=B-10:IFB<=10THENB=200
100 FORJ=0TO360STEP30
110 CIRCLE 1,(X+A)/2,(Y+B)/2,ABS(A-X)/2,ABS
    (B-Y)/2,,,J,120
120 NEXT:NEXT
130 SCNCLR:GOTO30
```

Harmon K. Holladay
Dodge City, KS

Ultra hi-res string art—Here's a program I originally typed in from the *VIC-20 Super Expander Programmer's Guide*. I modified it to work with the C-128 Ultra Hi-Res module (*RUN*, February 1986). It draws two ever-changing lines that swirl around on the screen. This program is simply fun to watch, especially if you have an RGBI monitor.

```
10 REM ULTRA HI-RES STRING ART-JEFF GOODE
20 FAST:TRAP230:DIMA%(200,3):@CLR,0:FORL=1T
   O5
30 SC=INT(RND(1)*16+1)
40 CH=INT(RND(1)*16+1):IFCH=SCTHEN40
50 @GRAPHIC,SC,CH
60 X=INT(RND(1)*1280/2)
70 Y=INT(RND(1)*400/2)
80 X1=INT(RND(1)+320*2)
90 Y1=INT(RND(1)*100*2)
100 C1=0:C2=0:FORM=0TO200
110 IFC1<1THENC1=5+INT(RND(1)*10):RE=INT(RN
    D(1)*3)+1
120 IFC2<1THENDX=INT(RND(1)*41)-20:DY=INT(R
    ND(1)*41)-20:DA=INT(RND(1)*41)-20
130 IFC2<1THENDB=INT(RND(1)*41)-20:C2=15+IN
    T(RND(1)*10)
140 X=X+DX:Y=Y+DY:X1=X1+DA:Y1=Y1+DB
150 IF(X<0)OR(X>639)THENDX=-DX:X=X+DX*2
160 IF(Y<0)OR(Y>199)THENDY=-DY:Y=Y+DY*2
170 IF(X1<0)OR(X1>639)THENDA=-DA:X1=X1+DA*2

180 IF(Y1<0)OR(Y1>199)THENDB=-DB:Y1=Y1+DB*2

190 C1=C1-1:C2=C2-1
200 @DRAW,A%(M,0),A%(M,1),A%(M,2),A%(M,3),0

210 @DRAW,X,Y,X1,Y1,1:A%(M,0)=X:A%(M,1)=Y:A
    %(M,2)=X1:A%(M,3)=Y1
220 NEXT:NEXT:SLEEP5
230 @TEXT:HELP:END
```

Jeff Goode
Burlington, CT

Random 3-D shapes—This program draws and erases several 3-D shapes in random sizes on the C-128.

```
1 REM 3D SHAPES-M. N. CARSWELL
2 COLOR0,1:COLOR1,2:COLOR4,1:GRAPHIC1,1:DO
3 FORJ=1TO15:X=160:Y=100
4 XR=INT(RND(1)*30)+80:YR=INT(RND(1)*30)+60

5 IFD=0THEND=15:ELSEIFD=15THEND=45:ELSEIFD=
  45THEND=60:ELSEIFD=60THEND=90:ELSEIFD=90T
  HEND=15
10 COLOR1,3:FORI=XRTO0STEP-(XR/6):CIRCLE1,X
   ,Y,I,YR,,,,D:NEXT
11 COLOR1,8:FORI=YRTO0STEP-(YR/6):CIRCLE1,X
   ,Y,XR,I,,,,D:NEXT
12 FORI=YRTO0STEP(-YR/6):CIRCLE0,X,Y,XR,I,,
   ,,D:NEXT
13 FORI=XRTO0STEP-(XR/6):CIRCLE0,X,Y,I,YR,,
   ,,D:NEXT:NEXT:LOOP
```

M. N. Carswell
Eatonton, GA

More snow—Here's another snowmaker for the C-128. The technique used here is the same as that used to draw a star. The program will run until you press the stop key.

```
10 REM MORE SNOW - JIM BORDEN
20 COLOR0,1:COLOR1,2:X=RND(-TI):DIM X%(50),
   Y%(50)
30 DO:R=INT(RND(1)*90)+10:NS=INT(RND(1)*10)
   *2+5:GRAPHIC 1,1:Z=0
40 AN=2*{PI}/NS:FORX=AN TO 2*{PI}+.1 STEP A
   N :Z=Z+1
50 X%(Z)=R*SIN(X)+160.5:Y%(Z)=R*COS(X)+100.
   5:NEXT
60 LOCATE X%(NS),Y%(NS):S=INT(NS/2)-INT(RND
   (1)*4):N=S:IFS=0THEN60
70 WIDTH2:IFNS/S=INT(NS/S)THEN60
80 FORX=1TONS:DRAW 1,RDOT(0),RDOT(1) TO X%(
   N),Y%(N)
```

→

Listing continued.

```
9Ø N=N+S:IFN>NSTHENN=N-NS
1ØØ NEXT:SLEEP2:COLOR1,RND(1)*15+2:LOOP
```

Jim Borden
Carlisle, PA

Space Caverns—One day, while piloting your mining cruiser back home, your ship begins to tremble and shake. Your cruiser has entered the dreaded Space Caverns!

When you run this C-64 program, the number you see in the upper-left corner of the screen is the cavern width. To make your journey more difficult, use the F1 key to decrease the width and then press any other key to begin.

To pilot your ship, press the cursor-down key to go left or cursor-right to go right. The game is over if you hit the cavern wall, and your score will be displayed. For every cavern width less than nine, you get 150 points, and for every star you pass, you get one point.

Good luck, space cadets!

```
Ø REM SPACE CAVERNS 64 - MIKE GEBIS
1 DATA Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,Ø,128,
  Ø,1,192,Ø,3,231,Ø,1,199,128,8,134,144
2 DATA 5,255,16Ø,3,6Ø,192,7,6Ø,224,7,6Ø,224
  ,3,255,192,1,255,128,3,153,192,4,24
3 DATA 32,8,24,16,16,24,8,12Ø,6Ø,3Ø,Ø
4 V=53248:POKEV+21,255:POKE2Ø42,13:K=9:POKE
  198,Ø
5 FORN=832TON+62:READQ:POKEN,Q:NEXT:POKE532
  8Ø,Ø:POKE53281,Ø:PRINT"{SHFT CLR}{CTRL 2}
  "K;:H=1984
6 POKEV+5,17Ø:POKEV+41,1:PRINTTAB(16)"SPACE
   CAVERN":WAIT 198,1:GETA$:Z=15
7 FORD=1TO23:PRINT:NEXT:IFA$="{FUNCT 1}"THE
  NK=K-1:S=S+15Ø:PRINT"{SHFT CLR}"K;:GOTO6
8 X=16Ø:F=PEEK(V+31)
9 S=S+1:GETA$:IFA$="{CRSR RT}"THENX=X+5
1Ø J=26:IFA$="{CRSR DN}"THENX=X-5
11 U=INT(3*RND(1)+1):IFX>255THENX=255
12 C=42:IFU=1THENZ=Z+1:IFZ>JTHENZ=J
13 IFU=3THENZ=Z-1:IFZ<1THENZ=1
14 POKEV+4,X:POKEH+Z+K,C:POKEH+Z,C
15 PRINT:IFPEEK(V+31)=.GOTO9
16 PRINT"{SHFT CLR}YOU HAVE DIED! SCORE="S:
   PRINT"PRESS [SHIFT] TO CONT":WAIT653,1:R
   UN
```

Mike Gebis
Bloomingdale, IL

Unicorn/Pegasus—The following C-64 program will produce an interesting sprite. Its magical appearance certainly fits this column!

```
1Ø REM UNICORN/PEGASUS - RAY PEREZ
2Ø POKE5328Ø,Ø:POKE53281,Ø:PRINT"{SHFT CLR}
   "
3Ø FORS=832TO894:READT:POKES,T:NEXT
4Ø V=53248:POKE2Ø4Ø,13:POKEV+21,1
5Ø POKEV+39,12:POKEV+1,15Ø:POKEV,16Ø
61 DATA ØØ3,243,224,ØØ1,Ø25,Ø16,ØØØ,14Ø
62 DATA 2ØØ,Ø56,Ø98,Ø72,1Ø8,Ø26,136,196
63 DATA Ø1Ø,144,143,233,Ø96,Ø31,255,224
64 DATA Ø31,255,24Ø,Ø31,255,249,Ø31,255
65 DATA 25Ø,Ø31,255,254,Ø27,Ø15,22Ø,Ø25
66 DATA ØØ6,Ø92,Ø17,ØØ2,Ø84,Ø17,ØØ2,Ø92
67 DATA Ø17,ØØ1,Ø76,Ø17,ØØ2,Ø64,Ø17,Ø12
68 DATA Ø64,ØØ8,136,Ø32,Ø12,192,Ø48,ØØØ
```

Ray Perez
Henderson, NV

C-128 spirals—The program listed below will draw randomly shaped spirals.

```
1Ø REM MAGIC SPIRALS - MICHAEL E RANDELL
2Ø GRAPHIC1,1
3Ø BG=INT(RND(1)*15)+1
4Ø BC=INT(RND(1)*15)+1
5Ø FG=INT(RND(1)*15)+1:IFFG=BGTHEN5Ø
6Ø COLOR1,FG:COLORØ,BG:COLOR4,BC
7Ø IN=INT(RND(1)*25Ø)+1
8Ø AN=INT(RND(1)*359)+1
9Ø R=INT(RND(1)*9)+2:T=INT(RND(1)*15)
1ØØ DO UNTIL XR>1ØØ
11Ø XR=XR+R:AN=AN+T
12Ø CIRCLE 1,16Ø,1ØØ,XR,,,,AN,IN
13Ø LOOP:SLEEP2:CLR:GOTO2Ø
```

Mike Randell
Coloma, MI

22. Programs—Commercial Software

Colorful Print Shop—Output from the popular Print Shop program can be brightened up by using colored marker pens. It's easy to color The Print Shop text and designs, and with the range of colors available in markers today, your creativity can be virtually unlimited. Give this idea a try the next time you do something with The Print Shop. It's extremely easy to do, and the results must be seen to be believed.

Roger Baillie
Kensington, PEI, Canada

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

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

Al G. Bell
Boston, MA

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

Donald E. Griffey
Hopkinsville, KY

Fast Load and drive 9—There's an easy way to make the popular Epyx Fast Load cartridge work with drive 9 (or

any other drive) rather than the default drive 8. Just open a command channel to the drive in question, and Fast Load will adopt it as its default drive. Here's an example for drive 9:

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

To return to drive 8, just do this:

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

Donald E. Griffey
Hopkinsville, KY

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

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

Lee A. Seats
Mountville, PA

Flight Simulator II coordinates—The manual omits the coordinates for some important landmarks:

World Trade Center—17060 N, 20982 E
Brooklyn Bridge—17054 N, 20991 E
Empire State Building—17073 N, 20991 E
Statue of Liberty—17049 N, 20971 E

When entering coordinates from the Editor mode, don't start out on the landmark itself, or you'll fall to the street like King Kong.

Kim Moser
New York, NY

Flight Simulator II jet assist—In the Editor mode, if you type 65535 for your throttle setting, you can cruise at 189 knots and climb at 1600 feet per minute. Also, if you select the right fuel tank prior to entering WWI Ace mode, your effective range is doubled.

Nicholas R. Clarke
McKinnon, Victoria, Australia

Blitzing Blitz!—The popular Blitz! compiler executes For/Next loops much more quickly than If/Then statements. So you can speed up your Blitzed programs by changing lines like

```
100 J=0
105 J=J+1
110 Other program lines
120 IF J<10 THEN 105
```

to lines like

```
100 FOR J=1 TO 10
110 Other program lines
120 NEXT J
```

Mike Dryja
Washington, MI

KoalaPainter to Print Shop—This bit of magic will change KoalaPainter picture files into Print Shop Screen Magic picture files. Enter your machine language monitor, then type these commands:

```
.L "[COMD 1]PIC1tr filename",08
.T 6000 7F3F 4000
.S "filename",08,400,5F3F
```

In the first line, [COMD 1] stands for the Commodore key and the 1 key pressed simultaneously, and 1tr stands for any letter between A and O. The filename stands for the name of your KoalaPainter file. There must be 15 characters between the quotes, including spaces. If your filename isn't long enough, pad it out with spaces.

Your monitor may have slightly different commands from those shown here. Use the necessary syntax to load a file, transfer memory and save the transferred block.

Brian Dressel
Spring Lake, MI

Colossal Datafile on the C-128—The C-128 greatly expands the memory capacity of Mike Konshak's Datafile program (*RUN*, November and December 1984). Since the unexpanded C-128 has over three times the available RAM of the C-64, your files can be much larger.

In line 22 of the original Datafile program, simply increase the value of MEM from 30,000 to 60,000. *Presto!* You've got a Datafile 128!

James Adams
Indianapolis, IN

A faster colossal Datafile—After making the above change to Datafile, you can double the speed of RAM operations by adding the Fast command either to the first line of Datafile or as a new line at the beginning of the listing.

You must have an RGB cable connected between the C-128 and the video monitor to use this feature, since the Fast command blanks the 40-column screen.

James Adams
Indianapolis, IN

Restructuring DFRestructure—In Mike Konshak's DFRestructure program (*RUN*, November 1985), changing line 4784 to MEM = 60000: RL = 0 increases the number of entries you may enter into your files. Now load the old file and either rename the field or increase the length of the field by one character. When you resave the file, you'll have more space for entries.

Clarence F. Cragin
Cottage Grove, MN

Copying with RUN Script 64 1.0—Did you know that your copy of RUN Script 64 1.0 can double as a handy machine language code copier? Load and run RUN Script 64 1.0, then insert into your disk drive a disk containing the machine language program to be copied. With the F1 and L keys, load the program file into RUN Script's text area as you would a text file. Now insert another formatted disk into the drive and copy the code to the disk with the F1 and S keys, followed by a filename.

This is a fast and handy method of copying RUN Script ML code and character sets, but be careful—some ML code may save at an improper address and become corrupted. Also, Basic programs cannot be copied this way without extensive modifications.

Tim Walsh
RUN Staff

RUN Script 64 reversed characters—If you have a favorite character set you would like to use with RUN Script 64 1.0, but can't because it lacks reversed characters, here's a fix to get around that problem. First, using the copy method outlined in the above Magic trick, copy the character set(s) you want to use to a disk containing a copy of RUN Script 64 1.0. Next, load and run RUN Script using the standard C-64 character set or any other character set that has reversed characters. Once RUN Script is activated, exit it via the F1 and X keys.

Next, load in the Boot program and change the character set name that resides there to the filename of the preferred character set you saved on the disk. Now run the boot program. Your new character set has replaced the original one. In most instances, you will still retain the first set's reversed characters that are needed for the command bar and printer macros.

Tim Walsh
RUN Staff

Quick-loading Basic 4.5 a la C-128 mode—To quickly load Basic 4.5 in 128 mode, enter these two lines and run the program. Be sure your monitor is in 40-column mode.

```
10 BLOAD"BASIC 4.5",B0,P32768
20 GO 64
```

Arhn R. Sprinty
Zumbrota, MN

Datafile punctuation—In Mike Konshak's Datafile program (*RUN*, November and December 1984), you cannot include commas, colons or semicolons in data you are entering. But you can if you enclose such data in quotes, for example, "Anucci, Mary Lynn: unemployed." The quotes aren't counted as characters, and they won't appear in any printouts.

David M. Palo
Escanaba, MI

NLQ and Paperback Writer—To switch to Near-Letter Quality mode on the Star line of printers with Paperback Writer, select a pitch of 11. The printer file for the Gemini does not allow you to turn off the NLQ mode with a pitch command, but pitch 20 is not defined. So if you wish, you can load the file and define pitch 20 to ESC,"B",5. Then save the file back to disk. This will turn off NLQ and revert to the type you were using before NLQ was selected.

Greg Simpson
Murrayville, IL

Word-processing database—If you don't have a database program, a word processor can sometimes make a good substitute. For example, you can put a list of addresses and phone numbers in one word processor document. Each name, address and phone number should be listed together. When you need to look for an address or phone number, use your word processor's search function to locate the person's name. You'll automatically find the address and telephone number too. If you don't find the person's name, you'll know that you should add the information to the file and resave the document.

Mark Bersalona
Philadelphia, PA

Make 'em sparkle—We all know that we can make terrific cards with The Print Shop and color them with crayons, paint or magic markers, but here's how to make 'em sparkle! Just add glitter!

Thin some white glue with water to make it easier to work with and apply it to the areas where the glitter will go. Then sprinkle the glitter over the glue and shake off the excess.

Mary E. Wilson
Clearwater, FL

Datafile improvement—With the Datafile program (*RUN*, November and December 1984) you can set up records with various fields of your own choosing and design. For example:

```
1. NAME:
   BORN:
   LIKES:
```

You can also select the number of characters you want in each field. After you select a field name and length, place the number you have selected for the field length at the end of the field name. For example:

```
1. NAME 10:
   BORN 8:
   LIKES 10:
```

Now you can see how many characters you have allowed for each field. It's really helpful when you have many databases set up with Datafile.

Gary W. Hollen
Address unknown

23. PROGRAMS—USEFUL APPLICATIONS

Super-simple scheduling program—I'm in charge of scheduling and reservations for our Lions Club hall. I used a paper calendar for six months, but with all the reservations, cancellations and conflicts, I decided to put my computer to use. I started by writing a Basic program using Data statements. However, with our very heavy schedule, the program became monstrous and time-consuming.

I finally came up with a program that contains only one executable line and operates in real time. I don't know

that it is unique, but in my computer-conscious small community, no one has ever seen the like.

The secret is to use one line for each day, with the line number consisting of a 1 followed by the month and day in four-digit form. The line number for June 8 would be 10608; for Halloween, it would be 11031; and so on. After some dates have been scheduled, the program might look like this:

```
10 LIST 10000-
10112 BINGO TONIGHT
10113 SWIM PARTY AT 8:00
10114 LUNCHEON
```

and so on, with up to 80 characters per line.

The beauty of the program is that lines are never executed, so they needn't be syntactically correct. To access the lines, you simply load and run the program. You can make monthly or quarterly printouts by listing to the printer. If all your information won't fit on one line, end the line with SEE xxxxx, where xxxxx is an unused line number above 20000. After a date has passed, you may delete it by typing its line number; you can then save the file by using the Save with Replace command.

If you adopt this system for your own purposes, be careful not to use question marks in your entries, since the computer will convert them to Print statements. Also, to guard against reserving the same date twice, always list the program before making a new entry.

John T. McClennan
Point Arena, CA

ML Booter—If you use short Basic programs, usually called boots, to load machine language and enter a SYS command to activate the ML, there's no need to clutter your disks with a specific boot for each ML routine. You can use the program below to boot any ML of the type described above, and it will execute the appropriate SYS command automatically.

Since loading ML from Program mode does not disrupt Basic's internal pointers, it isn't necessary to use a New command. So, without reloading ML Booter, you can run it again to boot as many ML programs as you like.

The ML program's SYS address must be the first byte in the program for ML Booter to activate it. If you must access an address other than the first byte, you will need a separate boot program.

```
10 PRINT"{SHFT CLR}C-64 ML BOOTER - SUSAN C
   HARNETSKI{CRSR DN}"
20 IFA=0THENINPUT"FILENAME";F$:OPEN15,8,15
30 OPEN2,8,2,F$+",P,R":IFATHEN70
40 INPUT#15,E,E$:CLOSE2:CLOSE15:IFE=0THEN60
50 PRINTE;E$:INPUT"{CRSR DN}HIT RETURN";R$:
   RUN
60 A=1:PRINT"{CRSR DN}LOADING.":LOADF$,8,1
70 GET#2,L$,H$:CLOSE2:L=ASC(L$+CHR$(0))
80 X=L+ASC(H$+CHR$(0))*256
90 PRINTF$" ACTIVATED.":SYSX
```

Susan Charnetski
Plains, PA

Foreign exchange—Here's a nifty little program that prints a conversion chart for U.S. and foreign currency. Look in the business section of your newspaper for the foreign exchange rates. Find what one U.S. dollar is worth in a foreign currency and enter that value at the prompt. The program then prints the values for one dollar to $50. To print higher amounts, change the value in the loop in line 50.

```
10 REM C-64/C-128 FOREIGN EXCHANGE - CHAD J
   ONES
20 INPUT "$1.00 US=";C1:C2=1/C1:C1=C1*100
30 OPEN4,4
40 PRINT#4,"{4 SPACEs}AMERICAN ${2 SPACEs}=
   {2 SPACEs}FOREIGN{2 SPACEs}${5 SPACEs}FO
   REIGN ${2 SPACEs}={2 SPACEs}AMERICAN $"
50 FORT=1TO50
60 A=INT(T*C1+.5)/100:F=INT(T*C2*100+.5)/10
   0
70 PRINT#4,"{6 SPACEs}"T"{10 SPACEs}"A"{10
   SPACEs}"T"{10 SPACEs}"F
80 NEXT:CLOSE4
```

Chad Jones
San Gabriel, CA

Variable-size graph paper—There are times when you need graph paper for different applications. This program gives you the number of squares you need. Some applications might include an 8 × 8 grid to create custom characters for your printer, a 24 × 21 grid for sprite design, or maybe you want to make your own crossword puzzle. This program is designed for the 1526 printer, but could easily be adapted to other printers.

```
10 REM VARIABLE GRAPH PAPER-DAN PRICE
20 INPUT"{SHFT CLR}HOW MANY SQUARES ACROSS"
   ;X:IFX>40THENX=40
30 INPUT"HOW MANY SQUARES DOWN";Y
40 OPEN4,4:OPEN6,4,6
50 A$="{SHFT O}{SHFT P}":B$="{SHFT L}{SHFT
   @}"
60 A=A+1:IFA=Y+1GOTO120
70 PRINT#6,CHR$(20)
80 FORI=1TOX:PRINT#4,A$;:NEXT
90 PRINT#6,CHR$(20)
100 FORI=1TOX:PRINT#4,B$;:NEXT
110 PRINT#6,CHR$(20):GOTO60
120 CLOSE6:CLOSE4:END
```

Dan Price
Athol, MA

24. PROGRAMS—UTILITIES

Unprotector—Have you been frustrated by C-64 programs that use REM {SHIFT L} to protect them from being listed? Have you laboriously gone through those programs, deleting the offending lines by hand? Well, if you have, that drudgery is behind you. Type in the accompanying program, run it, then load a program containing some of those disturbing REMs. Enter SYS 49152, and, in a few seconds, all the shifted Ls will be removed. You can then list your program without encountering Syntax errors.

```
10 PRINT"{SHFT CLR}UNPROTECTOR - RALPH NEAL
   "
20 FORJ=49152TO49200:READK:POKEJ,K:CS=CS+K:
   NEXT:PRINT
```

→

Listing continued.

```
30 IFCS<>822ØTHENPRINT"ERROR IN DATA STATEM
   ENTS":STOP
40 PRINT"SYS49152 REMOVES REM SHIFT L'S FRO
   M":PRINT
50 PRINT"THE BASIC PROGRAM IN MEMORY. MAGIC
   !"
61 DATA 169,ØØØ,133,251,169,ØØ8,133,252
62 DATA 16Ø,ØØØ,177,251,2Ø1,143,2Ø8,Ø2Ø
63 DATA 192,255,2Ø8,ØØ2,23Ø,252,2ØØ,177
64 DATA 251,2Ø1,2Ø4,2Ø8,ØØ7,169,Ø32,145
65 DATA 251,Ø76,Ø1Ø,192,2ØØ,2Ø8,227,23Ø
66 DATA 252,165,252,197,174,2Ø8,219,Ø96
67 DATA 255
```

Ralph Neal
Nash, TX

C-64 shorter sorter—I believe this to be the world's fastest Basic number-sorter. I challenge you magician's apprentices—even you Houdinis!—to come up with a faster sorter. My benchmark program first prints a list of 100 random numbers in the range 1–100 and then prints the sorted version of the numbers in less than eight seconds.

```
Ø REM C64 SHORTER SORTER
1 TI$="ØØØØØØ":DIMB(1ØØ):PRINT"{SHFT CLR}{C
  TRL 2}";:A=RND(-TI):C=1:D=1ØØ
2 FORI=CTOD:A=INT(RND(C)*D)+C:PRINTA;:B(A)=
  B(A)+C:NEXT:PRINT:PRINT"{CRSR DN}":FORI=C
  TOD
3 IFB(I)=.THENNEXT:PRINT:PRINT"{CRSR DN}TIM
  E ="TI/6Ø"SEC":WAIT198,1:END
4 PRINTI;:B(I)=B(I)-C:GOTO3
```

James F. McConnell
Marathon, NY

REM Highlighter program—This program displays reversed REM statements in your Basic listings. As written, REM Highlighter resides at memory location 679 (an unused area of 88 bytes). You may want to use a different RAM location because a reset clears the memory below address 2049. If you use a higher address in RAM, you can reactivate REM Highlighter after a reset by entering a SYS to the starting address. Some suggested starting addresses are 49152 and 53221.

```
1Ø PRINT "{SHFT CLR}64 HIGHLIGHTER - BRUCE
   KARPE
2Ø DEFFN HI(X)=INT(X/256):DEFFN LO(X)=X-FNH
   I(X)*256
3Ø INPUT"STARTING ADDRESS 679{5 CRSR LFs}";
   SA
35 I=Ø:CS=I4
4Ø READX:IFX=256THEN ON-(CS=2643)GOTO6Ø:PRI
   NT"DATA ERROR":END
5Ø POKESA+I,X:CS=CS+X:I=I+1:GOTO4Ø
6Ø POKESA+25,PEEK(774):POKESA+26,PEEK(775)
7Ø POKESA+1,FNLO(SA+11):POKESA+3,FNHI(SA+11
   )
8Ø SYSSA:PRINT"REM HIGHLIGHTER ENABLED":NEW
9Ø DATA 169,178,162,ØØ2,141,ØØ6,ØØ3,142,ØØ7
   ,ØØ3,Ø96,ØØ8,72,2Ø1
1ØØ DATA143,2Ø8,ØØ5,169,Ø18,Ø32,21Ø,255,1Ø4
    ,Ø4Ø,Ø76,Ø26,167,256
```

Bruce S. Karpe
Stroudsburg, PA

Byte-size sequential files—If you've ever tried to load an important sequential file into a word processor, only to find that it was too long to fit into its text buffer, then my program is for you.

The program asks you for the filename of that long file and the desired size, in bytes, of your new, smaller files. It then splits your large file into several smaller files with filenames beginning with 1, 2, and so on.

```
Ø REM SPLITTING SEQ FILES - JIM BRANBERG
1 INPUT"{SHFT CLR}{CRSR DN} FILENAME";N$:IN
  PUT"{CRSR DN} SIZE OF NEW FILES (IN BYTES
  )";B$:CK%=VAL(B$)
2 ST%=64:N=49:OPEN 2,8,2,N$+",R"
3 AA$=CHR$(N)+CHR$(16Ø)+N$:X=Ø:Q%=Ø:OPEN 3,
  8,3,AA$+",W"
4 GET#2,A$:Z=ASC(A$+CHR$(Ø)):IF Q%=1 THEN6
5 IFZ=44 OR Z=59 OR Z=58 THEN A$=CHR$(34)+A
  $:Q%=1
6 IF A$=CHR$(13) GOTO 9
7 IF STATUS AND ST% THEN PRINT#3,B$:PRINT#3
  :CLOSE 3:CLOSE 2:END
8 B$=B$+A$:GOTO 4
9 X=X+LEN(B$)
1Ø PRINT#3,B$:IFX>CK% THEN N=N+1:PRINT#3:CL
   OSE 3:GOTO 3
11 B$="":GOTO 4
```

Jim Branberg
Los Angeles, CA

Number formatting—You can format and accurately round numbers to any desired number of decimal places. The resulting string will contain zeros to fill places having no digit, including an initial zero for numbers between zero and one.

```
1Ø REM NUMBER FORMATTER - ROBERT FLETCHER
2Ø K=4:REM # OF DECIMAL SPACES
3Ø PRINT"{SHFT CLR}{3 CRSR DNs} "N,N$
4Ø PRINT"{2 CRSR DNs} INPUT N {CRSR DN}":IN
   PUTN
5Ø X=INT(N*1Ø{UP ARROW}(K+1)):X$=STR$(X)
6Ø IFVAL(RIGHT$(X$,1))>4THENX=X+1Ø
7Ø X$=STR$(X):L=LEN(X$):IFL>K+2THEN11Ø
8Ø N$="Ø.":IFL=K+2THEN1ØØ
9Ø FORJ=1TO(K+2-L):N$=N$+"Ø":NEXT
1ØØ N$=N$+MID$(X$,2,L-2):GOTO12Ø
11Ø N$=MID$(X$,2,L-K-2)+"."+MID$(X$,L-K,K)
12Ø PRINT"{2 CRSR DNs} "N,"*"N$"*"
13Ø GETKEY RPT$
14Ø GOTO1Ø
```

Robert Fletcher
Annandale, VA

Limited input routine—Here's a short machine language Get routine for the C-64. It provides control for you to limit the number of characters that are input. No more POKE198,0; no more GET A$:IF A$ = "" THEN. . ., and so on. Any value from 1 to 255 may be passed to the routine. The cursor will flash automatically, and the only acceptable characters are the alphanumerics, uppercase/graphics, delete and return. This means the cursor cannot move off the line you start it on by using the cursor control keys.

Experiment with the routine by positioning the cursor as you would normally do in any program, and then provide the appropriate SYS number for accessing the new

routine. An example of the proper format to use the Get routine follows:

```
10 A$="":REM STRING MUST BE FIRST VARIABLE
   <Your program goes here.>
520 PRINT CHR$(147);:REM POSITION CURSOR
530 SYS 49152,16:PRINT A$
```

In line 530, the value 16 is passed to the routine, setting a maximum limit of 16 characters to input. If no value is passed, then a default of 1 is used. Be sure you define the string variable you want to use as the *first* variable in your program.

Pressing return will exit the Get routine. When you're back in the Basic program, A$ (or whatever string you defined first in your program) will hold the value that was input.

```
1Ø REM C-64 LIMITED INPUT ROUTINE - JAMES P
   ELLECHI
97 REM ALL PURPOSE 'GET' (C-64)
98 REM FORMAT:{2 SPACEs}SYS 49152,[1-255]
1ØØ FORX=49152TO49262:READZ:T=T+Z:POKEX,Z:N
   EXT:IFT<>15813THENPRINT"ERROR":STOP
1Ø1 DATA 16Ø,Ø,14Ø,111,192,132,2Ø4,177,122,
   2Ø1,44,24Ø,4
1Ø2 DATA 162,1,2Ø8,3,32,241,183,142,112,192
   ,32,228,255
1Ø3 DATA 2Ø1,Ø,24Ø,249,2Ø1,13,24Ø,53,2Ø1,2Ø
   ,2Ø8,1Ø,172
1Ø4 DATA 111,192,24Ø,236,2Ø6,111,192,16,29,
   17Ø,41,127,2Ø1
1Ø5 DATA 32,144,224,138,172,111,192,2Ø4,112
   ,192,176,215,238
1Ø6 DATA 111,192,2Ø8,5,2Ø6,111,192,48,2Ø5,1
   53,113,192,32
1Ø7 DATA 21Ø,255,169,Ø,133,212,76,23,192,16
   Ø,2,173,111
1Ø8 DATA 192,145,45,2ØØ,169,113,145,45,2ØØ,
   169,192,145,45
1Ø9 DATA 23Ø,2Ø4,169,32,76,21Ø,255
```

James Pellechi
Middle Island, NY

Shifty top row—When I enter a program on my C-128, I use the numeric keypad to enter all numbers. I use the upper row of keys on the main keyboard only for entering the shifted characters. To avoid the need to use the shift key, I wrote a short ML program that switches the shifted and unshifted values for the top row of keys (numbers 1 to 9). If you prefer to get the shifted character when shifted *or* unshifted, change the 10739 in line 20 to 10626 and change the 157 near the end of line 120 to 44. If you remove the REM from line 180, the ML will be saved to disk and can be BLoaded.

```
Ø REM SHFT NUMS-ANTOON U. BREDA JR
1Ø FORX=4864TO4972:READA:CS=CS+A:POKEX,A:NE
   XT
2Ø IFCS<>1Ø739THENPRINT"SORRY, DATA ERROR":
   LIST:END
3Ø SYS4864
4Ø DATA 162,89,2Ø2,189,128,25Ø,157,1Ø9
5Ø DATA 19,189,217,25Ø,157,198,19,224
6Ø DATA Ø,2Ø8,239,162,8,32,67,19
7Ø DATA 162,11,32,67,19,162,16,32
8Ø DATA 67,19,162,19,32,67,19,162
9Ø DATA 24,32,67,19,162,32,32,67
1ØØ DATA 19,162,27,32,67,19,162,56
11Ø DATA 32,67,19,162,59,32,67,19
12Ø DATA 76,8Ø,19,189,128,25Ø,157,198
13Ø DATA 19,189,217,25Ø,157,1Ø9,19,96
14Ø DATA 173,197,1Ø,5,128,141,197,1Ø
15Ø DATA 169,1Ø9,141,62,3,169,19,141
16Ø DATA 63,3,169,198,141,64,3,169
17Ø DATA 19,141,65,3,96
18Ø REM BSAVE"KEY CONFIG",BØ,P4864 TO P4973
```

Antoon U. Breda, Jr.
Eersel
The Netherlands

25. Computer Room

Computer desk—I used a door to make a computer desk. The door sits on two small filing cabinets, but I could easily have used sawhorses or bookshelves. The door-desk is quite large and can easily hold all my computer equipment. An added attraction is that all cables and cords pass neatly through the hole for the lock.

If you don't have any old doors hanging around, you can buy new ones at building supply stores, usually for under $20.

Nigel Horscroft
St. Lucia, West Indies

Printer stands—Here's how to get an inexpensive printer stand. You can use an old TV or microwave stand to hold your printer and paper. If it has wheels, it will be easy to move around. If it has only two bars for the top shelf, so much the better if your printer feeds from the bottom. The paper is stored on the bottom shelf. If you don't have a TV stand, scan the merchandise section of your newspaper's classified ads.

Chuck Moody
Milledgeville, GA

26. Odds and Ends

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

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

Tom Kinsel
Sandusky, OH

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

James Albrecht
Kalispell, MT ■

MAGIC INDEX

COMPUTER-SPECIFIC TRICKS

1. Computers—C-64

C-64 screen-line erasing 26
Magic C-64 clock 26
50-Hz clocks 26
C-64 screen blanking 26
C-64 text-color change 26
Improving background color changes 27
Datapointer for the C-64 27
Halley's Comet revisited 27
C-64 wedge and Auto Menu 27
Printing with C-64 sound 27
Instant reset button 28
C-64 quick directory 28
C-64 goto variable 28
64 Keypad and VCR tapes 28

2. Computers—C-128

C-128 load and run 28
C-128 joystick ports 28
C-128 MID$ feature 30
C-128 slow listing 30
C-128 bytes free 30
C-128 ESC key 30
C-128 40/80 display key sense 30
C-128 tab stops 30
C-128 boxed spirals 30
C-128 Magic Boot 30
C-128 Unnew program 32
Print Using on the C-128 32
C-128 Print Using bug 32
C-128 stop key trap 32
C-128 disk operations 32
C-128 mode switcher 94
Testing for 128/64 mode 94
C-128 RGBI connector 94
Using C-128 windows 94
C-128 Input prompt 95
Tempo and the metronome 95
C-128 error trapping 95
C-128 terminal program 96
C-128 function keys 96
C-128 window work 96
C-128 Sweeper 97
C-128 abbreviation 97
C-128 flasher 97
C-128 screen saver 97
GET on the C-128 98
Commodore 128 Muzak 98
Double speed C-64 98
Doing 128 Loop-Do-Loops 99
C-128 Lo-Res screen dump 99
C-128 Hi-Res screen dump 99
Hi-res-sketch-128 100
Converting C-64 function keys to C-128 100
How do you spell help? 100
C-128 Perfect Typist aid 100
C-128 Perfect Typist windows II 100
A "Draw"-back in 7.0 100
C-128 customizer 101
Quiet, please 101
Improving C-128 Perfect Typist 101
C-128 no-run safety 101
Function key restore 101
C-128 GETspeed 101

3. Computers—C-64 and VIC-20

C-64/VIC Buffer saver 102
C-64/VIC-20 line counter 102
Printer-width fix 102

HARDWARE TRICKS

4. Connections/Interfaces/Cables

Cardco modification 102
Printer interface hazard 102
Which wire is which? 103

5. Disk Operation/Recording

1541 Unscratch 103
SFD 1001 disks 103
Reading the status variable 103
Disk drive speed adjustment 103
Rearranging directories 104
Disk Name Changer 104
Disk rescue tab 104
Filename extensions 104
File finder 105
Easier disk commands 105
Last-disk effort 105
Easy on, easy off 105
1571 disk drive magic 105
Keeping track of disk commands 105
SFD 1001 disk renamer 105
Quick directory C-64 106
Protect your writes 106
Easier loading 1571 106
Cleaning heads 106
Easier filenames 106
Double-sided disaster 106
Data on side two of the 1571 106
One for all 106
Back-side bonus 107
No-knock loads 107
Multiple scratch 107
Last resort 107
Disk locker 107

6. Joysticks and Ports

1350 mighty mouse joystick 107
Mouse tracks 107

7. Keyboard/Keyboarding

Shifted run/stop 107
Restore key tip 108
Easy-fingered load 108
Ergonomic urge? 108
Keyboard lock/unlock 108

8. Modems/Telecommunications

Modem buyer's guide 108
Modem cable tip 108
Modem modification 108
300-baud speedup 109
Modem hearing aid 109
Turbo dial 109
Password maker 109
1670 modem autoanswer 109
Terminal garbage 109
Text file processor 109

9. Printers/Printer Paper

Gemini 10X paper sensor 110
1526/MPS-802 print troubles 110
Okimate money-saver 110
Star SG-10 special mode 110
Musical staff maker 110
Printer grease 110
New Okimate 10 manual 110
Faster hi-res dumps 111
Lo-Res screen dumps on the 1526 111
Paper chase 111
The Plus 5 connection 111
Mini-floppy labels 111
SP-1000VC and WordPro fix 111

10. Video/Audio Devices

Better video display 111
Color/no-color monitor 111
Too-small video display 111
C-64 Commo-strobe 112
Catch the wave 112
Dust-free screen 112

11. Miscellaneous Hardware Tips

Remembering power-up sequences 112
Toolkit tip 112
Electronics repair 112

SOFTWARE TRICKS

12. Entering/Editing Programs

Delete a block of lines 112
Line-editing tips 113
Entering C-64 programs in 128 mode ... 113
Reverse append-ectomy 113
Deleting a block of lines 113
Mechanical safety 114
Listen while you work 114
Don't panic 114
Basic program append 114

13. Languages—Basic

Exclusive OR operator 114
Faster-running programs 114
Input with variable default 114
C-64 screen position 114
Heads or tails 115
Time machine 64/128 115
A better wait 115
Universal sequential printer 115
C-64 Hi-Res error trap 115
Variable name test 115
C-64 cursor locator 116
Universal input sub 116
Clearer DS$ 116
Random number seeds 116
Switchable Basic 117

14. Languages—Machine Language

Working with ML 117
CHAR and ML code 117

15. Languages—Other

CP/M utilities 117
C-128 CP/M screen color 117
Kaypro CP/M disks 117
Faster CP/M disk copies 117

16. Programming Tips—Debugging

Line numbers for debugging 117
Checking lines with C-128 Perfect Typist . 117

17. Programming Tips—General

Detecting keypresses 118
Ultimate program backup 118
Backing up while typing 118
Non-random RND 118
Get with flashing cursor 118
Active device finder 118
Hankey-Pankey 118
C-64 function keys 119

18. Programming Tips—Math/Educational

Probability function 119
Decimal fractions = common fractions ... 119

19. Programming Tips—Screen Display

Screen scrolling 119
Screen wiper 119
C-64 star track 120
Artistic Commodore 120
C-128 & Plus/4 screen code decoder 120
C-64 windows 120
Menu in reverse 120
Animated titles 121
The white hole 121
Shake it up, baby! 121
No-fade colors 121
C-128 graphs 122
Easy on your eyes 122

20. Programming Tips—Sound

Selecting sheet music 122
Crybaby's reward 122
Songs in the Key of C 122
From the Grand Ole Opera 122
C-128 Beethoven 123
Trumpet fanfare 123

21. Programs—Amusements/Delights

Christmas card 123
Funny Valentine 123
Spritebusters 123
Racehorse 124
March Hare 124
C-128 lines & sounds 124
Bunny Hop 124
April 1st Magic 125
Summertime magician 125
Jotto answers 125
C-64 multiple elevators 125
Commodore kudos 125
C-128 spiralgraph 126
Up, up and away C-64 126
Son of Burrow 126
Typing for toddlers 126
The way we were 126
A plane joy 127
Snowflakes 127
Ultra Hi-Res string art 127
Random 3-D shapes 127
More snow 127
Space Caverns 128
Unicorn/Pegasus 128
C-128 spirals 128

22. Programs—Commercial Software

Colorful Print Shop 128
QuantumLink scrolling 128
Fast Load flakiness 128
Fast Load and drive 9 128
Cartridge repair 129
Flight Simulator II coordinates 129
Flight Simulator II jet assist 129
Blitzing Blitz! 129
KoalaPainter to Print Shop 129
Colossal Datafile on the C-128 129
A Faster Colossal Datafile 129
Restructuring DFRestructure 129
Copying with RUN Script 64 1.0 129
RUN Script 64 reversed characters 130
Quick-loading Basic 4.5 a la C-128 mode 130
Datafile punctuation 130
NLQ and Paperback Writer 130
Word processing database 130
Make 'em sparkle 130
Datafile improvement 130

23. Programs—Useful Applications

Super-simple scheduling program 130
ML Booter 131
Foreign exchange 131
Variable-size graph paper 131

24. Programs—Utilities

Unprotector 131
C-64 shorter sorter 132
REM Highlighter program 132
Byte-size sequential files 132
Number formatting 132
Limited input routine 132
Shifty top row 133

25. Computer Room

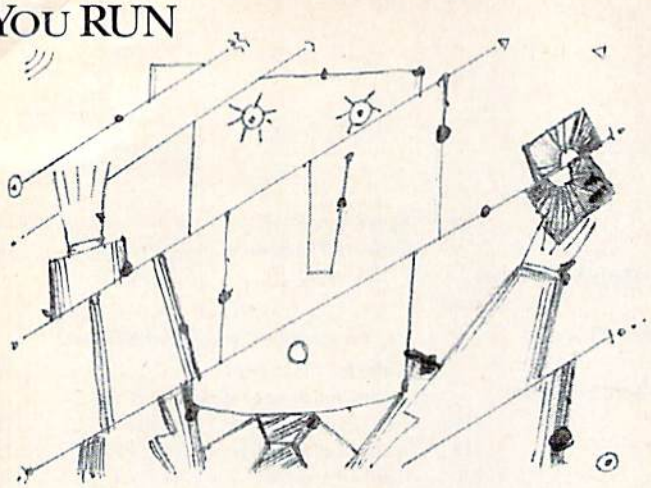
Computer desk 133
Printer stands 133

MISCELLANEOUS TRICKS

26. Odds and Ends

Easy SEQ file viewing 133
Magazine indexing 133

Learn to Walk Before You RUN



We receive many letters from new Commodore owners who want to learn the first steps in using their computers. For these first-time users, we present the following step-by-step list of things that all beginners should be aware of as they start typing in programs.

1. Before you can use a fresh disk, you have to format it. First turn on your disk drive, then insert the disk, close the latch and type:

```
OPEN15,8,15 <Press Return>
PRINT#15,"N0:NAME,##" <Press Return>
```

The ## is a two-character identification number that can be any combination of letters and/or digits. "NAME" can be any title for your disk that you choose, but it must not exceed 16 characters. Wait for a few minutes while the disk spins inside the drive, being formatted. When the disk stops spinning, type:

```
CLOSE15 <Press Return>
```

C-128 owners can shorten this procedure by simply typing:

```
HEADER "NAME,##" <Press Return>
```

Caution: The formatting process erases all material already on the disk, so if you're formatting a used disk, make sure it doesn't contain any programs you want to save. See item 7, below, on reading the disk directory.

2. As a beginner, you should start entering short Basic programs. Avoid machine language listings and very lengthy Basic programs until you get the hang of what you're doing. We have a checksum program (Perfect Typist) which actually proofreads your typing and tells you when you make a mistake. You should type in Perfect Typist before you enter any programs. See directions below.

3. Remember to press the return key after each programming line you type in.

4. As you are typing in a program, you are likely to make typographical errors. To check what you have typed in, you'll need to list your program's lines on the screen. You can specify the exact lines that you want to see. Typing LIST 10–50 will list lines 10 through 50. LIST 20 will list only line 20. If you see an error in one of your listed lines, you can fix it by using the INST/DEL key and retyping the incorrect section of the line. Always press the return key after you have fixed a line.

5. Be sure to save what you have typed in before turning off your computer. To save any partial or complete Basic program listing to your disk, type:

```
SAVE "NAME",8 <Press Return>
```

C-128 owners can press F5, type in the program name, and press the return key.

Note: As you save subsequent versions of the same program, you need to make a slight change in the program name each time. You might simply add version numbers to the end of the program name (PROGRAM.1, PROGRAM.2, etc.).

6. While working on a program, you may develop several versions before you're satisfied that you have it in final form. After you *do* achieve that final version, you might want to go back and erase the old, incomplete versions from your disk. Erasing unwanted programs is called scratching. (Be sure not to erase your final version!) To scratch a program, type:

```
OPEN15,8,15 <Press Return>
PRINT#15,"S0:prog.name" <Press Return and wait a few seconds>
CLOSE15 <Press Return>
```

7. After you have saved several programs to your disk, you will need to see their names so that you can load the one you want. To get the complete list (the disk directory) of all the program names on your disk, type:

```
LOAD "$",8 <Press Return>
```

Then type LIST to actually see the directory. C-128 owners simply press F3.

8. When you know what program you want to load into your computer, type:

```
LOAD "NAME",8 <Press Return>
```

C-128 owners can just press F2, type in the program name, and press the return key.

9. After you have loaded a program, type RUN to actually use the program.

How to Type 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 BY: JAMES E BORDEN
10 POKE56,PEEK(56)-1:POKE52,PEEK(56):CLR
20 PG=PEEK(56):ML=PG*256+60
30 FORX=ML TO ML+154:READD:T=T+D:POKEX,D:NE
   XT
40 IFT<>16251 THEN PRINT"ERROR IN DATA...":
   END
60 POKEML+4,PG:POKE ML+10,PG:POKE ML+16,PG
70 POKE ML+20,PG:POKE ML+32,PG:POKE ML+38,P
   G
80 POKE ML+141,PG
89 PRINT"{SHFT CLR}{CRSR RT}**************
   ********************"
90 SYS ML:PRINT "{CRSR RT}** 64 PERFECT TYP
   IST IS NOW ACTIVE{2 SPACEs}**"
100 PRINT "{CRSR RT}** SYS"ML"=ON{5 SPACEs}
    SYS"ML+30"=OFF **"
101 PRINT"{CRSR RT}**********************
    **************":NEW
110 DATA 173,005,003,201,003,208,001,096
120 DATA 141,105,003,173,004,003,141,104
130 DATA 003,162,103,160,003,142,004,003
140 DATA 140,005,003,096,234,234,173,104
150 DATA 003,141,004,003,173,105,003,141
160 DATA 005,003,096,032,124,165,132,011
170 DATA 162,000,142,240,003,142,241,003
180 DATA 189,000,002,240,051,201,032,208
190 DATA 004,164,212,240,040,201,034,208
200 DATA 008,072,165,212,073,001,133,212
210 DATA 104,072,238,241,003,173,241,003
220 DATA 041,007,168,104,024,072,024,104
230 DATA 016,001,056,042,136,016,246,109
240 DATA 240,003,141,240,003,232,208,200
250 DATA 173,240,003,024,101,020,024,101
260 DATA 021,141,240,003,169,042,032,210
270 DATA 255,169,000,174,240,003,032,205
280 DATA 189,162,003,189,211,003,032,210
290 DATA 255,202,016,247,164,011,096,145
300 DATA 013,032,032
```

Listing 2. *128 Perfect Typist program.*

```
1 REM 40/80 COL C128 PERFECT TYPIST
2 REM BY: JAMES E BORDEN
10 FORX=5120TO5379:READD:T=T+D:POKEX,D
20 NEXT:IFT<>28312 THENPRINT"{2 CRSR DNs}ER
   ROR IN DATA...":END
25 A$="":IFPEEK(215) THENA$="{20 SPACEs}"
30 PRINT"{SHFT CLR}"A$" ******************
   ******************"
40 PRINTA$" ** 128 PERFECT TYPIST IS NOW AC
   TIVE **"
50 PRINTA$" **{2 SPACEs}SYS 5120=ON{7 SPACE
   s}SYS 5150=OFF{2 SPACEs}**"
60 PRINTA$" ******************************
   *******":SYS5120:NEW
70 DATA 173,5,3,201,20,208,1,96,141,45,20,1
   73,4,3,141,44,20,162,43,160,20
80 DATA 142,4,3,140,5,3,96,234,234,173,44,2
   0,141,4,3,173,45,20,141,5,3,96
90 DATA 32,13,67,140,255,19,162,0,142,252,1
   9,142,253,19,142,254,19,189,0,2
100 DATA 201,32,240,8,201,48,144,7,201,58,1
    76,3,232,208,238,189,0,2,240,54
110 DATA 201,32,208,5,172,254,19,240,42,201
    ,34,208,10,72,173,254,19,73,1
120 DATA 141,254,19,104,72,238,253,19,173,2
    53,19,41,7,168,104,24,72,24,104
130 DATA 16,1,56,42,136,16,246,109,252,19,1
    41,252,19,232,208,197,173,252
140 DATA 19,24,101,22,24,101,23,141,252,19,
    169,42,32,241,20,32,188,20,160
150 DATA 2,185,185,20,32,241,20,136,16,247,
    165,116,208,9,165,117,208,5,169
160 DATA 145,32,241,20,172,255,19,96,13,32,
    32,162,0,173,252,19,232,56,233
170 DATA 100,176,250,105,100,202,240,3,32,2
    32,20,201,10,176,5,205,252,19
180 DATA 240,15,162,0,232,56,233,10,16,250,
    24,105,10,202,32,232,20,170,72
190 DATA 138,9,48,32,241,20,104,96,170,173,
    0,255,72,169,0,141,0,255,138,32
200 DATA 210,255,104,141,0,255,96
```

1986 INDEX

TITLE	AUTHOR	ISSUE	PAGE	COMPUTER
Applications				
Making the Video Connection	Bobo	Jan	26	
Commodore Carousel	Morris	Jan	34	
The Creative Computer	Cohn	Jan	44	
Tax Deductor's Delight	Schulak	Feb	66	C-64, Plus/4
Runscript 64	Rockefeller	Mar	40	C-64
Runscript 64, Part 2	Rockefeller	Apr	42	C-64
Label Maker	Konshak	May	56	C-64
Extra! Extra! Read All About It!	D. Hook	Jul	26	C-64
Needlegraph	Venator	Jul	34	C-64
Computerize Your Finances	Shaughnessy	Sep	28	C-64, C-128
The Loan Arranger	Kroes	Sep	34	C-64, C-128
Focus on Screen Shots	Bobo	Sep	40	
Sign Maker	Amberg	Sep	76	C-64, VIC-20
Computer Creativity	Karrow	Oct	50	C-64
64 Personal Ledger	Beddows	Oct	62	C-64
Spreadsheets Revisited	Shaughnessy	Nov	34	
CalcAid 64	Busch	Nov	40	C-64
Dashing Off the Dots	Novak	Nov	74	C-64, C-128
Electronic Expressions	Grubbs	Dec	33	C-64
Extra! Newsletter Graphics	D. Hook	Dec	56	C-64
Runscript 128	Rockefeller	Dec	60	C-128
CP/M				
CP/M Treasure Trove	Peterson	Jan	68	C-128
Commodore's CP/M Plus 3.0 Documentation	Lane	Mar	64	C-128
Shopper's Guide to CP/M Programs	Peterson	Apr	53	C-128
A CP/M Sampler	Rockefeller	Nov	46	C-128
Education				
Grolier—Leading the Way in Education	Morabito	Jun	58	
Education in Canada—A Favorable Climate for Commodores	G. Hook	Jun	62	
The C-64 Goes to Second Grade	Gore	Jun	74	C-64
Turtle-Tutor for Tykes	Crosby	Sep	46	C-64
Educational Games				
A-Mazeing Word Jumbler	DeGroff	Jan	104	C-64
Arithme-Sketch	Pellechi/Jean	Jun	66	C-64
As the Word Turns	Caron	Oct	74	C-64, VIC-20
Math Square-Off	Broussard	Nov	82	C-64, VIC-20
Sum Fun	Achtman	Dec	92	C-64, C-128
Games				
Fast-Food Chef	Decker	Feb	80	C-64
Swish!	Jordan	May	40	C-64

TITLE	AUTHOR	ISSUE	PAGE	COMPUTER
General Interest				
New Members of the Commodore Family	Brisson/Morabito	Jul	22	
The 1581 Disk Drive	Morabito	Jul	24	
Commodore Power	Shaughnessy	Oct	58	C-64, VIC-20
Jim Butterfield: The Guru of Commodore Computing	G. Hook	Oct	82	
Graphics				
Pulsing Pictures	Trepal	Jan	48	C-64
Ultra Hi-Res Graphics	Wallace/Darus	Feb	34	C-128
C-128 Custom Character Sets	Malitz	Feb	42	C-128
A Gallery of Characters	Sander	Mar	50	C-64, C-128
C-128 Ultra Hi-Res Graphics, Part 2	Darus/French/Wallace	May	34	C-128
Give Your C-128 More Character	Goddard	Jun	52	C-128
Video Fantasia	Nyman/Newman	Jul	40	C-128
Hi-Res Writer	Jaeger	Jul	50	C-64
Add Some Character to Your C-64	Solimene	Aug	54	C-64
High-Resolution Revolution	Markarian	Oct	68	C-64
Double Vision	Cotton	Oct	86	C-64
Micro Artist	Gannon	Nov	90	C-128, C-16, Plus/4
Hardware Reviews				
Cartridge Expander	Morabito	Jan	136	C-64
MIDI Interface	Morabito	Feb	114	C-64, C-128
Commodore's New Disk Drive	Borden	Feb	26	C-128
Home Sweet Home Control	Adamec	Apr	22	C-64
RAM Expansion for the C-128	Wallace	Jul	46	C-128
Quick Brown Box	Premack	Jul	88	C-64
The FSD-1 Disk Drive—A Viable Alternative	Ruddick	Sep	78	
MicroFlyte Joystick	Bobo	Nov	127	C-64
Add an Apple to Your 64	Morabito	Dec	86	C-64
H/W Modifications				
1541 Number Changer	Cotton	Apr	82	
Languages				
RUN Basic	Rockefeller	Sep	50	C-64
Music/Sound				
Songfest	Kaczynski	Apr	30	C-64
Speak Up, Commodore!	Wallace	Dec	74	
Printers/Interfaces				
Homewriter 10	Wright	Jan	136	
Okidata 120	Walsh	Feb	114	
Super Graphix Printer Interface	Kevelson	Feb	116	C-64, C-128, VIC-20
In Search of the Perfect Printer	Walsh	May	26	
Your Guide to Printer Interfaces	Kevelson	May	32	
In Search of the Perfect Printer, Part II	Walsh	Jun	38	
MW-350 Interface	Kevelson	Jul	88	C-64, C-128, VIC-20
Controlling Your Printer	Shaughnessy	Nov	54	
The Gemini II and NL-10	Walsh	Nov	124	
Spotlight on Laser Printers	Stern	Dec	50	
Okimate 20	Walsh	Dec	150	
Device One	Walsh	Dec	152	

TITLE	AUTHOR	ISSUE	PAGE	COMPUTER
Software Reviews				
White Lightning	Bryan	Jan	12	C-64
Stunt Flyer	Bobo	Jan	14	C-64
Winter Games	Annucci	Jan	14	C-64
1541 Disk Drive Alignment Program	Premack	Jan	16	C-64
Project: Space Station	Bobo	Jan	18	C-64
The Original Boston Computer Diet	Premack	Jan	20	C-64
Success with Algebra Series	Guerra	Jan	22	C-64
Fast Tracks	Bobo	Feb	16	C-64
Calkit	Silverstein	Feb	16	C-64
Snowdrifts and Sunny Skies	A. Hinshaw	Feb	18	C-64
Maps 64 USA	Stern	Feb	20	C-64
The Whole Bit	Premack	Feb	22	C-64
Real Estate 64	Wasser	Feb	22	C-64
The Halley Project	Guerra	Feb	24	C-64
Spy vs. Spy II	Wasser	Mar	12	C-64
Inventory Management and Accounts Receivable Management	Khalsa	Mar	14	C-64
PlayWriter/Castles and Creatures	Bobo	Mar	16	C-64
S'More	Wasser	Mar	18	C-64
Productivity Plus for the C-128	Guerra	Mar	24	C-128
The Management Edge	Grubbs	Apr	12	C-64
Newsroom	Grubbs	Apr	14	C-64
Wordpro 128	Premack	Apr	14	C-128
Sylvia Porter's Your Personal Financial Planner	A. Hinshaw	Apr	17	C-64
Silent Service	Guerra	Apr	19	C-64
Personal Portfolio Manager	Grubbs	May	14	C-64
Hardball!	Guerra	May	14	C-64
Stickybear Math and Stickybear Reading	A. Hinshaw	May	16	C-64
Paperback Writer 128	Bobo	May	18	C-128
Heart of Africa	Guerra	May	18	C-64
The File Converter	Premack	May	20	C-64
Chem Lab	Premack	Jun	18	C-64
At Bat Stats 64	Wasser	Jun	20	C-64
Transylvania	Bobo	Jun	20	C-64
Pipeline	Premack	Jun	24	C-64
Programmers' Basic Toolkit	Guerra	Jun	25	C-64, C-128
Ultima IV: Quest of the Avatar	Guerra	Jun	26	C-64
GEOS: A Whole New World for Your Commodore	Stern	Jun	30	C-64
Alter Ego	Bobo	Jul	14	C-64
CMS General Accounting System 128	Wasser	Jul	16	C-128
The Bard's Tale	Guerra	Jul	18	C-64
The Graphics Magician Junior	A. Hinshaw	Jul	18	C-64
Fontmaster II	A. Hinshaw	Jul	19	C-64
PaperClip II	Walsh	Jul	56	C-128
Superscript	Premack	Aug	14	C-128
Grover's Animal Adventures	Guerra	Aug	14	C-64
Elite	Teverbaugh	Aug	16	C-64
Silver Disk Series	Teverbaugh	Aug	16	C-64
WillWriter	A. Hinshaw	Aug	18	C-64
Butcher, Baker, Candlestick Maker	Adamec	Aug	46	
Fight Night	Bobo	Sep	16	C-64
The Body in Focus	Guerra	Sep	18	C-64
MicroLeague Baseball/General Managers Disk	Wasser	Sep	18	C-64

TITLE	AUTHOR	ISSUE	PAGE	COMPUTER
Quizam!	Wasser	Sep	20	C-64
Shadowfire	Bobo	Sep	22	C-64
Bank Street Mailer	Wasser	Sep	24	C-64
The Music Studio	Bobo	Oct	16	C-64
Your Personal Financial Planner	Guerra	Oct	18	C-128
Gato	Bobo	Oct	18	C-64
Party Songs	M. Hinshaw	Oct	18	C-64
Fleet System 3	Walsh	Oct	20	C-128
Jet	Bobo	Oct	22	C-64
Infiltrator	Bobo	Oct	22	C-64
Personal Inventory; Personal Accountant; Time Manager	Lane	Oct	24	C-128
Big Software for Small Business	Wallace/Premack/Bouterse	Oct	28	C-128
Software to Improve Your Business Picture	Hunt	Oct	40	C-64
GBA Championship Basketball: Two-on-Two	Wasser	Oct	104	C-64
Solo Flight	Guerra	Oct	104	C-64
Super Boulder Dash	Guerra	Oct	105	C-64
Whole Brain Spelling	Grubbs	Nov	20	C-64
Acrojet	Walsh	Nov	20	C-64
Quake Minus One	Bobo	Nov	22	C-64
Color Mail	Grubbs	Nov	22	C-64
Intrigue!	M. Hinshaw	Nov	26	C-64
Lords of Conquest	Bobo	Nov	26	C-64
Final Four College Basketball	Teverbaugh	Nov	26	C-64
Battle of Antietam	Teverbaugh	Nov	116	C-64
Dfile 128	Premack	Nov	116	C-128
Partner 128	Wasser	Dec	18	C-128
Mind Mirror	Sodaro	Dec	18	C-64
Riddle of the Redstone	Bobo	Dec	24	C-64
Football	Grubbs	Dec	24	C-64
Where in the World is Carmen Sandiego?	Bobo	Dec	26	C-64
Mach 128	Watt	Dec	26	C-128
Conflict in Vietnam	Bobo	Dec	27	C-64
Bank Street Speller	Wasser	Dec	28	C-64
World Karate Championship	Guerra	Dec	28	C-64
Lords of Midnight	Wasser	Dec	28	C-64
1541 M.A.S.H.	Grubbs	Dec	29	C-64
Telecommunications				
BRS/After Dark and The Knowledge Index	Morabito/Adamec	Jan	56	
RUN's Great Communicator—Runterm Plus	Sims	Jan	84	C-64
On-Line with Medical Services	Morabito	Feb	50	
Enter the On-Line World of Lucasfilm	Morabito	Aug	24	
Utilities				
Add Elegance to Your Program Listings	Broussard	Jan	74	C-64
Auto-Run	Kapauan	Jan	100	C-64, VIC-20
New Names for Old Disks	Dickow	Feb	74	C-64
Create Your Own Keypad	Borden	Mar	58	C-64
C-128 Automenu	Darus/Wallace	Apr	60	C-128
Automenu	Rocke	Apr	66	C-64
Automatic Line Numbers	Broussard	Apr	72	C-64, VIC-20
Autoboot	Smoak	Apr	76	C-64

TITLE	AUTHOR	ISSUE	PAGE	COMPUTER
Disk Reader	Agostini	May	50	C-64
Hide and Seek with Basic	Flee	May	62	C-64
Easy Data Entry	Allen	May	69	C-64
Easy Disk-File Conversion	Stange	Jun	78	C-64
Quick Merge!	De A'Morelli	Jun	84	C-64
Disk Keeper	Broussard	Aug	34	C-64
Bootmaker 128/64	Pytlovany	Aug	42	C-128
Programmers, Take Note!	Kodadek	Sep	72	C-64
Making a Pointer	Campbell	Oct	78	C-64
Put It on Paper	Rasmussen	Nov	68	C-64
ML Perfect Typist Version 2.0	Borden	Dec	98	C-128

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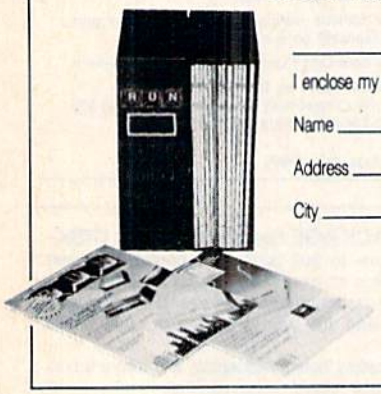

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423	Batteries Included	7
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442	Master Software	96
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427	Microlog Corp.	61
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